
UNITED STATES
NUCLEAR REGULATORY COMMISSION
TECHNICAL TRAINING CENTER

# Inspecting for Performance Materials Version Course Manual

A/6

# PLEASE PRINT THE FOLLOWING INFORMATION

**Course Title:** **Inspecting for Performance-Materials Version**

**Course Dates:**

**Course Location:**

Name: _____
(Print your name as you want it to appear on the Training Certificate)

Social Security No: ____/____/____ Job Title: _____

Office Phone No: _____ Office E-mail: _____

Office Mailing Address: _____

_____

_____

Motel where you are staying: _____

Emergency Contact: _____ Phone No: _____

Your State, Agency, HQ Office or Region: _____

Name of Immediate Supervisor: _____

Name of Division/Program Director: _____

Initials of Division/Program (e.g. DNMS): _____

**(States only)** Your status (check one): My State is paying tuition for my attendance: ____
I am attending Space Available: ____

**(For TTC Office Use Only)** Catalog No: G-304 Grade: _____

**Rev 0901**


# CONTRACTED COURSE EVALUATION SHEET

COURSE TITLE: Inspecting for Performance

DATE:

INSTRUCTIONS:

In order to improve and maintain the quality and applicability of TTC courses, it is necessary to obtain information from the attending students.

Please rate the following subject areas. Amplifying comments are requested, but not required. Please place your amplifying comments in the section for written comments.

## PART A - PARTICIPANT BACKGROUND

1. Highest Level of Education

   ___ Doctorate ___ Masters ___ Bachelors ___ Associates ___ Other

2. Years of experience in nuclear industry

   ___ >6 ___ 4-6 ___ 1-3 ___ <1 ___ None

3. Years of experience in nuclear power

   ___ >6 ___ 4-6 ___ 1-3 ___ <1 ___ None

4. Percentage of time spent working in related inspection/technical evaluation

   ___ 90 - 100% ___ 60 - 90% ___ 30 - 60% ___ 10 - 30% ___ <1

PART B - COURSE DESIGN

| | Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|---|
| 5. Course description in the Guide to Training Opportunities was accurate. | ____ | ____ | ____ | ____ |
| 6. Course objectives are clear and realistic. | ____ | ____ | ____ | ____ |
| 7. Subject matter was organized and presented logically. | ____ | ____ | ____ | ____ |
| 8. Time spent in labs and for demonstrations was adequate. | ____ | ____ | ____ | ____ |

PART C - COURSE MATERIALS AND FACILITIES

| | Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|---|
| 9. The course manual adequately covered course topics (where applicable). | ____ | ____ | ____ | ____ |
| 10. The course manual was organized and indexed so that it can be used as an effective study guide. | ____ | ____ | ____ | ____ |
| 11. The course manual will be useful as a future reference. | ____ | ____ | ____ | ____ |
| 12. Supplemental course materials (handouts, etc.) aided in the presentation of course concepts. | ____ | ____ | ____ | ____ |

PART D - OVERALL COURSE RATING

| | Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|---|
| 13. Classrooms were adequate and properly equipped for the course. | ____ | ____ | ____ | ____ |
| 14. Laboratories and equipment were adequate for the course. | ____ | ____ | ____ | ____ |
| 15. Class activities such as labs, demonstrations and work groups contributed to the course. | ____ | ____ | ____ | ____ |
| 16. Case studies and example problems were used effectively throughout the course. | ____ | ____ | ____ | ____ |
| 17. Concepts and skills can be applied on the job. | ____ | ____ | ____ | ____ |
| 18. The instructors were technically proficient and able to convey the subject matter to the students. | ____ | ____ | ____ | ____ |
| 19. The course meets the needs of the target audience. | ____ | ____ | ____ | ____ |

PART E - COURSE INSTRUCTORS

(Use one page for each Instructor)

Name: _____

| | Strongly Disagree | Disagree | Agree | Strongly Agree |
|---|---|---|---|---|
| 1. Well prepared for lectures. | ____ | ____ | ____ | ____ |
| 2. Presented information in an organized and interesting manner. | ____ | ____ | ____ | ____ |
| 3. Achieved lecture goals and learning objectives. | ____ | ____ | ____ | ____ |
| 4. Spoke clearly and audibly. | ____ | ____ | ____ | ____ |
| 5. Encouraged discussion and student questions. | ____ | ____ | ____ | ____ |
| 6. Answered questions clearly and completely. | ____ | ____ | ____ | ____ |
| 7. Stimulated interest in the class. | ____ | ____ | ____ | ____ |
| 8. Used visual aids and other course materials effectively. | ____ | ____ | ____ | ____ |
| 9. Was familiar with and used the student's training manual. | ____ | ____ | ____ | ____ |
| 10. Presentation was at the appropriate technical level for the target audience. | ____ | ____ | ____ | ____ |

PART F - WRITTEN COMMENTS

A. What did you like best or find most helpful about this course?

B. What did you like least about this course?

C. What subject might be added or expanded?

D. What subject might be deleted or discussed in less detail?

PART F - WRITTEN COMMENTS (Continued)

E. Additional Comments

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# TABLE OF CONTENTS

# PREFACE

The NRC's effort to progress into a performance-based, risk informed regulatory environment is closely linked to the inspection process. This course develops the concepts and techniques related to a performance-based approach to inspection where risk is a key factor in determining priorities.

The course consists of three modules that are presented over two and one half days. The course will conclude with a review, and a written examination. Students are also given an opportunity to complete a written evaluation of the course. The information gathered from these evaluations will be compiled and used to periodically update the course.

The subject matter covered in this manual supplements the course lectures and group workshop activities. Chapter 1 introduces concepts related to a performance based inspection program. Chapter 2 describes the techniques for implementing performance-based inspections. The final section of the manual provides a copy of the projection graphics, arranged in the order of presentation.

# Chapter 1

# CHAPTER 1

# INSPECTION CONCEPTS

## OBJECTIVES

This chapter introduces performance-based inspection and addresses its relevance to the nuclear industry. At the completion of the classroom presentation, students should be able to:

- Describe the attributes of a performance-based inspection.
- Identify and prioritize licensee activities that impact performance.
- Describe the purposes and benefits of a performance-based approach to inspection.

## INTRODUCTION

The review of licensee program documentation has always been a strong component of the licensing process. This initial in depth review is necessary to develop some confidence that the licensee's programs will result in the safe reliable performance of licensed activities. The same kind of review is also appropriate for newly developed licensee programs that result from rule making or industry initiatives. In either case, there will be a period of time required for any newly implemented programs to become fully functional. During this period, program document review coupled with some evaluation of program activities is an appropriate way to inspect. After newly implemented programs are fully functional, there is a need for adjustment. The licensee's ability to perform program activities must then be emphasized during inspections.

## PERFORMANCE

Performance is synonymous with execution or accomplishment. NRC expects licensee's to not only have programs in place, but to execute them in order to accomplish regulatory and technical objectives.

Observation of a licensee's program activities to determine if regulatory and technical objectives are being achieved is called performance-based inspection. This type of inspection can be applied to any functional area of any licensee. The only variable is the technical nature of the activities at different licensees.

It is anticipated that performance-based inspection will: focus inspectors on the most important program issues; enhance clear factual documentation of these issues; set an example that encourages licensee management to continuously improve program activity performance.

Even though this approach represents a departure from the traditional, it should not be assumed that reviews of programs are excluded from performance-based inspection. Program activity performance is evaluated first and then specific observations are used as a basis for program review. This allows the inspector to judge the effectiveness of a licensee program on the strength of verified performance factors rather than personal conjecture that often stems from an administrative review of program documentation.

## COMPLIANCE

It should also not be assumed that compliance is unimportant in a performance-based inspection environment. NRC will always be striving to identify and ensure the correction of non-compliance. However, in a performance-based regulatory culture NRC must also be alert to adverse conditions in circumstances where minimum compliance has been achieved. Therefore, inspectors should freely evaluate the need for performance improvement even when compliance is evident.

This view of compliance will grow in significance as more performance-based regulations are developed. Performance-based rules tend to be less prescriptive in specifying <u>how</u> licensees must accomplish regulatory objectives. Rather, licensees are given the opportunity to develop their own methods for achieving success. NRC experience with the ALARA regulations has shown that performance-based regulation can be successfully enforced even though the rule may be somewhat subjective.

## PERFORMANCE MEASURES

The NRC's principle measures of successful performance are <u>safety and reliability</u>. Therefore, a performance-based inspection focuses on the safety and reliability of program activities. It is necessary for inspectors to have definitions for these terms that are useful "in the field".

<u>Safety</u> is the relative freedom from harm or hazard to the public, workers, or the environment. Safety is a relative measure of the hazard associated with a given activity. Inspectors need not be able to quantify levels of safety during an inspection. It is sufficient to identify whether or not an activity, condition, or trend is adverse to safety. Concern for safety must also not be dependent on any administrative classification system. Serious safety consequences can stem from equipment and activities that are not classified as "safety related" by the licensee.

<u>Reliability</u> is the capability to perform as designed or intended when needed and for the duration required. Generally, a lack of reliability is only a concern to NRC when safety is adversely affected as a result. It is important for inspectors to recognize that reliability applies to both equipment and workers. In many cases, the interaction between equipment and workers can be a source of problems

even though by themselves the equipment and workers seem technically sound. Additionally, reliability involves short term as well as long term capability. Inspectors may not always be able to draw conclusions about long-term capability until after additional data are gathered in future inspections. However, it may be possible to project long-term capability on the basis of a historical data evaluation. Regardless of the situation, inspectors must realize that reliability evaluations involve much more than a "snapshot" of licensee performance.

Safety and reliability are critical factors for inspection even though their measurement may sometimes be subjective. Inspectors should be deeply concerned about observable adverse trends in safety and reliability even though objective measurements cannot always be made. These kinds of issues are important to document and follow even if a violation is not involved.

## PERFORMANCE CONDITIONS

Naturally, inspectors are interested in finding acute conditions that have obvious impact on safety and reliability. For instance: the supervisor gave incorrect direction and an individual was overexposed. These kinds of acute conditions are still important, but other categories must also be considered if the inspection process is to foster licensee improvement.

Latent conditions are underlying and usually obscure. If unchanged, these may result in acute conditions at some future time when circumstances change. For instance: a licensee's survey procedures are very detailed and difficult for the technicians to use. In this case the replacement of experienced technicians with new personnel could conceivably lead to a technical problem involving the use of such procedures. These conditions are latent in that a plausible set of future circumstances could result in an acute consequence.

Precursor conditions are changing with time and will likely result in acute conditions at some future time. Precursors are similar to latent conditions, but are more definite in their eventual outcome. For instance: the levels of smearable contamination in a licensed facility are within allowable limits, but have increased over time; man-rem exposure is higher than other similar facilities, etc. All of these conditions are developing in an unsafe direction and will likely become acute if the licensee takes no action.

Performance based inspections must consider latent and precursor conditions in addition to acute consequences in order to thoroughly assess safety and reliability. It is not necessary for inspectors to distinguish between latent and precursor conditions, but it is essential to be aware of circumstances that have not developed to the acute stage. It would be irresponsible to simply wait for acute consequences to occur before anything was done. Inspectors can best equip themselves for the necessary latent and precursor sensitivity by considering lessons learned from industry incidents. These lessons can be used to provide the proper focus during inspections.

## RISK FACTORS

Risk is an important consideration in both the management and implementation of the NRC inspection process. As a general consideration, the highest risk licensees should be inspected more frequently and more thoroughly than should lower risk licensees. That is the basis for the licensee priority system used in the materials inspection program. A similar basis should be used when determining inspection priorities for a given licensee. That is, the highest risk activities should be inspected more frequently and more thoroughly than should lower risk activities.

Risk can be subjectively viewed as a relationship between consequence and probability. The highest probability coupled with the most severe consequence represent the highest risk. Other combinations of consequence and probability represent different relative levels of risk. This qualitative assignment of relative risk can be very useful for inspectors to determine how they should best utilize their resources. It is not necessary for inspectors to quantify the relationship between consequence and probability, but it is essential to use relative risk to determine inspection priority.

## SUMMARY

Performance-based inspection does not represent substantially new methods of inspection, but rather a refinement of traditional methods. The NRC has recognized the need for this refinement and expects three primary benefits to be derived:

- Inspection techniques and efficiency will improve
- Inspection results will be more clearly linked to safety and reliability impact
- Licensee corrective action will be more thorough and timely.

NRC recognizes that time will be required for the performance based inspection process to mature. However, inspectors are encouraged to implement these concepts to the best of their ability to enhance the value of inspection results as soon as possible.

# CHAPTER 2

# INSPECTION TECHNIQUES

## OBJECTIVES

This chapter describes the methods inspectors can use to plan, conduct, evaluate and report the results of performance-based inspections. At the completion of the classroom presentation, students should be able to:

- Construct a performance based inspection plan.
- Describe the process to conduct a performance-based inspection.
- Describe how programmatic evaluation is part of performance based inspection.
- Identify the performance-based attributes of inspection reports.

## PLAN THE INSPECTION

Once the inspection subject for a given licensee is identified, arrange the scheduled inspection into logical components. Start with a broad picture of inspection strategy and then proceed into more detail as the planning progresses. Concentrating on details too early in the planning stage can quickly contribute to losing the larger picture.

A functional arrangement that corresponds with the licensee's organizational structure is usually best. This allows an evaluation of important management issues that typically stem from organizational interfaces. A suggested method for establishing a functional arrangement is shown below.

- List all of the activities the licensee performs.
- Identify the organization(s) with primary responsibility for each of the activities listed.
- Using relative risk assign a priority to each activity listed.
- Identify organizations that provide support or are supported by the primary organization.

After the basic functional arrangement of the inspection is determined, the methods of inspection can be selected. Direct observation of the activity in progress is the preferred method. However, there are times when the activities are not in progress at the time the inspection is planned or direct observation is

not possible for other reasons. In these cases a document review and/or interviews with appropriate licensee personnel can be used as the inspection method. It may also be advantageous to use a demonstration or walk through with licensee personnel instead of direct observation. Likely, a combination of these methods will be required in a typical inspection. It is the inspector's decision; however, the best method should always be selected even though it may not necessarily be the most convenient.

At this point in the planning process, the details for inspection can be developed. Specific elements or perceptible aspects of the selected activities should be identified. These can be derived from a variety of resources which include the inspector's own knowledge and experience; the expectations of NRC; input from the inspector's supervisor; and numerous documents such as: inspection reports, NRC Bulletins, Field Notes, device manuals, performance histories, procedures, etc.

After the organizations, activities and elements are known the types of skill and knowledge required for the inspection become evident. Although a particular inspector may already be assigned, it is important to consider the actual personnel needs at this point. If the assigned inspector does not have the knowledge and skill required to observe the chosen activities and elements, some alternative may be needed. Perhaps additional inspectors will be helpful; perhaps more personal preparation time will be required for the assigned inspector; perhaps outside assistance will be needed. Regardless, the necessary steps must be taken to ensure that the inspection results are optimized.

The inspector should then consider schedule constraints. The schedule should reflect: time in personal preparation; time to acquire sufficient observation data; time to properly evaluate inspection results; time to properly report inspection results. When time is limited, the planning and evaluation phases often suffer. If sufficient time is not available; it is usually better to reduce the scope of the inspection than to abbreviate the planning or evaluation phases.

At this stage, most find it suitable to develop a written inspection plan. This is not a step-by-step inspection "procedure", but rather a general "road-map" to help the inspector keep the inspection objectives clearly in mind. The plan should indicate some sense of time, sequence and personnel. The format should be helpful to the individual inspector. Excessive detail should be avoided so that the inspector can pay close attention to the inspected activities. The written plan should identify the major observations to be made as well as parallel observations of lower priority elements that can be made during "slack" time. Documents for review should be identified as well as individuals who will be interviewed.

## CONDUCT THE INSPECTION

As the inspection of various elements progresses, the inspector should note problems when they occur whether or not they can be related to a particular regulation or license requirement. Inspectors should not suppress their own instincts when they suspect a problem. The inspector's knowledge and experience are appropriate resources for performance-based inspections. This is especially true if latent or precursor conditions are to be identified.

When an activity results in identified problems, the inspector should inform licensee management at an appropriate time. Generally, the sooner the better. It is intended that the inspector and the licensee staff come to an understanding of just what the problems entail. This will allow the licensee sufficient time to begin root cause determination and perhaps even corrective action. Even if the licensee disagrees with the inspector's assessment, they will at least not be surprised at the exit or when the report is issued.

Attempt to determine the extent of the identified problems. If similar problems are identified or there is evidence of a recurrence, a programmatic weakness may exist throughout the licensee's operations. If this is the case, a comprehensive program oriented evaluation may be required to determine the cause(s). If the identified problems are not extensive, the cause is likely isolated to the initially observed activity and the associated licensee personnel.

The performance based inspection process represents a change in sequence from the more traditional programmatic inspections. The traditional process requires programs like personnel training and qualification or procedure controls to be verified "up front" as separate and distinct functions. In performance-based inspection, a problem with actual licensee performance leads the inspector to any suspect programs for evaluation. This process allows the inspector to observe not only the effectiveness of individual programs, but also the effectiveness of program interfaces in assuring proper licensee performance.

## EVALUATING INSPECTION RESULTS

The inspector should strive to make an accurate determination of the actual condition of the activities inspected. The technical basis of identified problems must be emphasized, not just the symptoms or administrative indications. If at all possible, the inspector should determine the causes of any problems. It is not intended to perform the licensee's job to find root cause; but it is necessary for the inspector to have some idea about cause in order to evaluate the licensee's planned corrective action.

## REPORTING

Proper documentation of inspection results in a written report is important not only for violations, but also to allow the retention of licensee performance history. Inspection Manual Chapter 0610 provides a consistent method of documentation for all inspection types.

Although IMC 0610 primarily focuses on power reactor licensees, Appendix D puts NMSS inspections into proper context. Regional management is provided with the necessary flexibility to determine the appropriate type of report, format and level of detail. Materials inspection reports can be documented with either (1) a cover page plus narrative inspection report, or (2) inspection field notes; or (3) a completed NRC form 591.

When field notes are selected to document the inspection, formats found in the appendices to IMC 87100 should be used. Although they need not be typed, they should be legibly written in ink. They should also contain sufficient detail to describe the inspection; compliance status of areas observed; follow-up status of previous enforcement or licensee events; sufficient support information for identified violations including corrective action status; sufficient detail for management to evaluate the licensee's overall safety program. Further, they should document the basis for performance conclusions or checkmarks.

A complete formal inspection report is required for some team inspections (see IMC 2800), for apparent violations being considered for escalated enforcement and for any special inspection conducted in response to a significant licensee incident, event or misadministration. The following general guidance applies:

- Report should be similar to content in IMC 0610 sections 05.01-05.03.
- IMC 0610 Exhibits 3-5 provide standard format for materials inspection types.
- IMC 0610 section 05.05 provides examples of performance based result documentation.

Regardless of whether the report is a NRC form 591, field notes, or a formal report, several common principles should be observed. Detailed discussion should be used only for significant problems or when escalated enforcement is being considered. Reports should be written for the principle reader who is the addressee in most cases. It can be assumed that the reader is conversant with nuclear technology, but not likely an expert. For non-fuel cycle licensees, organization and staffing issues may be documented.

Inspection Manual Chapter 0610 provides a consistent reporting method for all licensee types. The content specified in IMC 0610 will assist NRC to easily

develop and evaluate licensee performance history. Therefore, inspectors should adhere as closely as possible to the reporting process in IMC 0610.

## SUMMARY

Performance-based inspection depends on the same formula for success as other management processes. Detailed planning, sound performance, proper evaluation, and accurate reporting are all required in a successful inspection program. Performance-based inspection concentrates on the activities with the most significance to safety and reliability. By focusing on these specific areas of importance, the inspection report will warrant useful and timely action by the licensee. Performance-based inspection enhances the image of the inspection personnel and performance-based techniques allow them to use their abilities to the best advantage in providing an accurate assessment of licensee programs.

# WORKSHOP #1

The following table represents some of the activities that could be encountered during inspections of the indicated types of materials licensees.

| Medical Broad Scope | Industrial Radiography |
|---|---|
| • RSC Meeting | • RSC Meeting |
| • New Employee Indoctrination Class | • RSO Inspection of Facilities |
| • Teletherapy Unit Annual Calibration | • Hazardous Material Training Class |
| • Dose Calibrator Constancy Check | • Survey Instrument Calibration |
| • Daily Survey of Radiopharmacy | • Six Month Source Leak Tests |
| • New Teletherapy Source Receipt | • New Radiography Source Receipt |
| **Fuel Cycle Facility ULFF** | **Academic Broad Scope** |
| • RSC Meeting | • RSC Meeting |
| • Criticality Safety Training Class | • General Survey of Laboratories |
| • Process Nuclear Instrument Calibration. | • Packaging of Laboratory Waste |
| • Semi-Annual Fire Drill | • Operation of Waste Incinerator |
| • Low Level Solid Waste Shipment | • Laboratory Safety Training Class |
| • Replace Hi Level Liq. Waste Level Detector | • RSO Audit of Authorized User Records |

Use the risk factors discussed in class to assign a High, Medium, or Low priority to each of the above activities.

You will be asked to explain the basis for your rankings. Therefore, you are encouraged to identify specific elements of risk rather than general observations regarding importance.

Select an individual in your group to present the consensus results.

# WORKSHOP #2

## INTRODUCTION

The following four scenarios represent some of the different materials licensees that NRC regulates. The instructor will assign a scenario that best corresponds with the type of licensee inspected by most in your work group. Using the assigned scenario construct a plan that could be used to inspect the selected licensee. You may use any resources available here at headquarters.

## LIMITED SCOPE MEDICAL

The licensee is authorized to perform routine diagnostic nuclear medicine scans, radiopharmaceutical therapy, and sealed source (brachytherapy) therapy.

Previous inspections have identified several violations, but none were of any safety significance. However, analysis of violations over the last two inspections indicates the possibility that a weakness exists in management and Radiation Safety Officer (RSO) oversight and control of the radiation safety program.

Through discussions with the Section Chief, it was determined that the inspection objective should relate to three broad areas: (1) the daily implementation of the radiation safety program; (2) the oversight and control provided by the RSO; and (3) the oversight and control provided by senior licensee management.

## INDUSTRIAL RADIOGRAPHER

The Mom and Pop Pipeline Company has exhibited poor performance over the last two inspection cycles, i.e. 1.5 to 3 years. The last inspection was conducted nine months ago, and identified four violations: (1) failure to maintain records of sealed source leak test results; (2) failure to perform a complete exposure device and guide tube survey in accordance with 10 CFR 34.43(b); (3) failure to complete quarterly radiographer and radiographer's assistant audits in accordance with license commitments; and (4) failure to properly complete shipping papers for the transport of radioactive material (no emergency response telephone number, no package identification number, and no activity entered on shipping paper). The licensee is authorized to perform its own leak test sample analysis.

The inspection conducted previous to the last one identified eight violations and resulted in the imposition of a civil penalty. The violations included: (1) failure to leak test sealed sources; (2) failure to calibrate survey instruments every 3 months; (3) failure to provide all required training to individuals prior to allowing them to work as radiographers and radiographer's assistants; (4) failure to report a personnel exposure in excess of 10 CFR 20 requirements; (5) failure to limit the exposure of personnel to 10 CFR 20 requirements; (6) failure to use shipping papers when transporting radioactive

material; (7) failure to block and brace packages during transport; and (8) failure to secure radioactive material not in storage from unauthorized removal.

## ACADEMIC BROAD SCOPE

This large licensee has 500 authorized users working in 1250 laboratories. Approximately 3500 individuals are employed in laboratory activities. The licensee's records (committee approvals, RSO survey results and user inventories, etc.), indicate that 2 approved users routinely have problems in their labs, i.e. contamination events, failure to keep use records, failure to perform periodic surveys as required. The following additional information applies to each of these users and their labs:

Dr. J. Smithson: authorized for millicurie quantities of phosphorus-32, tritium, sulfur-35, carbon-14, and iodine-125 for laboratory tracer studies and student instruction, and labeling experiments with sulfur-35 and iodine-125. Dr. Smithson's labs include two open labs for bench top work, a lab used for student instruction, a waste storage room (shared with other researchers), a sample counting room and a room with an iodination hood.

Dr. S. Johnson: authorized for sub-millicurie quantities of cesium-137 and cobalt-60, in liquid form, for tracer studies, millicurie quantities of americium-241, in powdered form, for irradiation of small gemstones, and 2.0 curies of plutonium-239/beryllium, as a sealed source, for activation experiments. Dr. Johnson's labs include a lab for student instruction, a lab for bench top work, a storage room housing the PuBe source and moderator, and a room used for waste storage, sample counting, and a hood used to house the americium experiments.

## FUEL CYCLE FACILITY

The licensee is classified as UHFF due to the production of high enrichment nuclear fuel. Since the last inspection, the licensee has implemented several equipment modifications to improve their ability to prevent and mitigate fires associated with their zirconium machining operations. Further, the licensee is planning extensive routine maintenance on various ventilation systems. This is likely to involve cleaning of ductwork, flow balancing, calibration of system instrumentation including process radiation monitors, and finally comprehensive functional testing after the maintenance is completed. It appears that much of the scheduled maintenance will be in progress during the inspection period. Although, most has been scheduled for back shift work to avoid conflicts with work schedules.

# WORKSHOP #3

## INTRODUCTION

The following scenario represents a reactive inspection situation. All of the work groups have been assigned this scenario. Construct a plan that could be used for this inspection. You may use any resources available here at headquarters.

### High Standards Industries

The Environmental Protection Agency (EPA) has requested that NRC provide assistance in response to a reported incident. The following information is known: A report was made to EPA regarding abandoned radioactive material at a scrap metal recycling yard operated by High Standards Industries (HSI). It has also been reported that the radioactive material was discovered in a truckload of metal scrap and that hand held survey measurement indicates greater than 2.0 rad/hour a few inches from the radiation sources. A consultant for HSI contacted NRC and stated that the radioactive material was securely stored at the metal scrap yard facility and that two individuals involved with the incident actually handled the sources in order to secure them.

# WORKSHOP #4

You have been provided with example inspection reports for a medical licensee, a gauge licensee, and a fuel cycle licensee. These are actual reports that have been "sanitized" to obscure the identity of the licensee and others involved in the inspections. No alterations have been made to enhance or complicate this workshop.

You have also been provided with a copy the First Stage Review Checklist found in Appendix C of IMC 0610. Using this check list, evaluate each of the three reports.

Work together in your assigned group to develop a presentation of your results. Your presentation should indicate:

- Inspection process good practices that enhance the technical and regulatory content of each report.
- Reporting process good practices that enhance the technical and regulatory content of each report.
- Inspection process weaknesses that could be corrected to enhance the technical and regulatory content of each report.
- Reporting process weaknesses that could be corrected to enhance the technical and regulatory content of each report
- Overall evaluation of each report with respect to the criteria in the first stage review checklist.

You should select someone from your group to present the consensus results. You may use any resources available here at headquarters.

INSPECTION REPORT REVIEW CHECKLIST APPENDIX C

The checklist can be an effective aid both for writers and reviewers. It is not intended to be a prescriptive recipe; used consistently, however, it will add considerable focus and efficiency to the writing/reviewing process, and it will improve the clarity of the written product.

## First Stage Review

### Cover Letter

- ☐ Major idea is clearly presented
- ☐ Message is supported by findings in the executive summary
- ☐ Letter uses appropriate tone

### Executive Summary

- ☐ Organization follows the order of the standardized report outline
- ☐ Each significant finding and conclusion is given a clear, concise description
- ☐ Executive summary findings are supported by report details

### Report Details: Overall Organization

- ☐ Organization follows the order of the standardized report outline
- ☐ Each report section uses standard internal organization
- ☐ "Areas Inspected" sub-sections are presented clearly and concisely

### Report Details: Presentation of Report Observations/Findings/Conclusions

- ☐ Thresholds of significance (in determining what to document) are appropriate
- ☐ Findings are clearly developed
  - Main ideas are clearly presented
  - Observations are placed in context
  - Assertions are supported by facts
  - Requirement or standard is included, where appropriate
  - Licensee response to findings is included, where appropriate
- ☐ Level of detail is appropriate (based on significance, complexity, and reader awareness)
- ☐ Conclusions are of appropriate scope
  - Conclusions are substantiated, and findings are incorporated
  - If substantial inspection has occurred, an assessment of program adequacy results

November 30, 1996

Flatbottom Electric Corporation

ATTN: Mr. J. A. Smith, Manager
Greenfield Plant
Commercial Nuclear Fuel Division
Box 155
Greenfield, EV 29250

SUBJECT: NRC INSPECTION REPORT NO. 65-99999/96-05 AND NOTICE OF VIOLATION

Dear Mr. Smith:

This refers to the inspection conducted on October 29 - November 1, 1996, at the Greenfield Nuclear Fuel Plant. The purpose of the inspection was to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the enclosed report.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress.

Based on the results of this inspection, certain of your activities appeared to be in violation of NRC requirements, as specified in the enclosed Notice of Violation (Notice).

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. In your response, you should document the specific actions taken and any additional actions you plan to prevent recurrence. After reviewing your response to this Notice, including your proposed corrective actions and the results of future inspections, the NRC will determine whether further NRC enforcement action is necessary to ensure compliance with NRC regulatory requirements.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be placed in the NRC Public Document Room.

Should you have any questions concerning this letter, please contact us.

Sincerely,

Edward J. McAlpine, Chief
Fuel Facilities Branch
Division of Nuclear Materials Safety

Docket No. 65-99999
License No. SNM-99

Enclosures: 1. Notice of Violation
2. NRC Inspection Report

U. S. NUCLEAR REGULATORY COMMISSION

Region X

Docket No.: 040-99999

License No.: 14-99990-00

Report No.: 14-99990-00/96-01

Licensee: Jensen Construction Company

Location: Richard, East Virginia

Date: November 5-7 and 14, 1996

Inspector: Crystal Rivers, Radiation Specialist

Approved by: John J. Fotter, Chief
Materials Licensing/Inspection Branch
Division of Nuclear Materials Safety

EXECUTIVE SUMMARY

Jensen Construction Company
Inspection Report No.: 14-99990-00/96-01

This special, unannounced inspection was conducted 1) to evaluate the adequacy of the licensee's Radiation Protection Program, 2) to determine the status of the licensed material since the expiration of the previous license on January 31, 1996, and 3) to resolve licensing issues stemming from the licensee's renewal application dated January 29, 1996. The application was postmarked February 1, 1996, and received by NRC Region X on February 7, 1996, with neither date considered to be a timely filing for a renewal.

Licensing:

The licensee has a history of unresponsiveness relating to the licensing process; an untimely filed application, failure to respond to licensing questions, and use of the gauge after the license expired. This indicates a lack of attention or carelessness towards regulated activities.

The licensee received an expiration notice, by NRC letter dated October 5, 1996, advising that if an application for renewal was not received 30 days prior to expiration, the licensee should discontinue all but decommissioning efforts. The inspector observed that the licensee continued to use its licensed material after the license had expired, an apparent violation. After the NRC received the licensee's application on February 7, 1996, license reviewers attempted to resolve several issues. The licensee was unresponsive to two letters and many phone calls. The licensee's RSO provided answers to the licensing questions during this inspection.

Organization and Scope of the Licensee Program

The licensee was authorized to use a Troxler portable moisture density gauge to measure properties of construction materials or soils at temporary job sites throughout the United States. There were two authorized users, one of whom is the Radiation Safety Officer.

Radiation Safety Program

The inspector identified several violations indicative of a lack of attention to detail with respect to licensed material, displaying carelessness or disregard of regulatory issues. The licensee failed to perform required leak tests and inventories of its gauge for four years. In addition, the inspector observed that the gauge was stored unsecured from unauthorized removal on two occasions, also an apparent violation. The second time occurred after this problem was pointed out to a licensee employee.

## REPORT DETAILS

01. Licensing

10 CFR 30.36(a) states in relevant part, that each specific license expires at the end of the day on the expiration date stated in the license unless the licensee has filed an application for renewal under 10 CFR 30.37 not less then 30 days before the expiration date stated in the existing license.

10 CFR 30.36(c)(1) states in relevant part, that a license continues in effect beyond the expiration date, with respect to possession of byproduct material, but that actions relevant to licensed material be limited to decommissioning.

On October 5, 1995, the NRC sent the licensee a letter advising that their current license would expire on January 31, 1996 and that the license could remain in effect if the licensee filed for renewal 30 days prior to this date. The licensee was further advised that if this was not done and the NRC was not given time to process the application prior to the expiration date the license would expire, and that the material should be placed in locked storage and not used. Finally, the licensee was advised that use of the material after the expiration date may subject them to enforcement action.

The licensee's application for renewal was postmarked February 1, 1996, and received by NRC on February 7, 1996; both dates occurring after the license expiration date, therefore, the license expired and the application was not considered a timely renewal. The licensing reviewer had several questions dealing with the application and sent a deficiency letter dated April 3, 1996. The licensee failed to respond to this letter. A second letter was sent on July 24, 1996, asking the licensee to respond. Additionally, inspectors attempted to contact the licensee by telephone on January 31, May 20, June 12 and 25, August 19, September 6, 9, 10, and 11, and October 18, 1996. In all cases the licensee failed to provide the necessary information. In most cases the inspectors left a message on the licensee's answering machine, to which the licensee did not respond. On August 28, 1996, an inspector attempted to visit the licensee, but no one was in the office. During the inspection on November 5-7, 1996, the licensee provided handwritten answers to the deficiency letter. The licensee's RSO indicated that work constraints prevented a more timely response.

The licensee's Radiation Safety Officer, job foreman, and a East Virginia Highway Department employee indicated that the gauge had been used after expiration of the license. The inspector observed it in storage at a job location in War, East Virginia.

Continuing to use the gauge after the license has expired is an apparent violation of 10 CFR 30.36.

02. Organization and Scope of the Licensee Program

The licensee was licensed to possess and use a Troxler Model 3400 series portable moisture density gauge to measure properties of materials. There are two authorized users, one of them is the owner of the company and the Radiation Safety Officer. The license authorized use anywhere in the United States and storage at the licensee's facility in Richard, East Virginia.

03. Radiation Safety Program

License Conditions 14 and 15 to Materials License 14-99990-00 require, respectively, that the licensee leak test sources every six months, and inventory the sources every six months.

10 CFR 20.1801 requires the licensee to secure from unauthorized removal or access licensed materials that are stored in controlled or unrestricted areas.

Through discussion with the Radiation Safety Officer and review of licensee procedures and relevant documentation, the inspector found that the licensee had failed to perform leak tests or inventories of the sources since the last inspection conducted on January 14, 1992. These failures are apparent violations of license conditions 14 and 15. It was not readily apparent why the licensee had failed to do so; and licensee representatives offered no explanation. The licensee had received two violations during the last inspection for failing to document that leak tests and inventories had been performed.

The licensee advised that the gauge was at a job site in War, East Virginia. The inspector drove to this job site on that evening, November 6, 1996, and found the gauge in its carrying case. The case was unlocked and stored in an unlocked tool trailer. The licensee's employees were working in an excavated pit, approximately 60 feet from the trailer. There were several members of the public in the area observing work activities. The Radiation Safety Officer was not present so the inspector advised the crew foreman of the need to secure the gauge, and stated that failure to do so was a violation of regulatory requirements. The foreman did so by locking the trailer. The next morning the inspector returned to the job site and found the gauge in the same unsecured condition, the trailer having been unlocked to access the tools. At this time the Radiation Safety Officer was present and the inspector advised him of the need to properly secure the gauge and told him that the foreman had been advised of this previously. He took control of the gauge and said that he would continue to safeguard the gauge. He could not explain why the gauge was unsecured for a second time. These two failures to secure the gauge are apparent violations of 10 CFR 20.1801.

## EXIT MEETING SUMMARY

An exit meeting was held with the Radiation Safety Officer by telephone on November 14, 1996. The overall findings from the inspection, including the apparent violations were discussed. Additionally, the inspector stressed the need for the licensee to secure the gauge at its facility in Richard, East Virginia and the need to discontinue using the gauge. The licensee was asked to leak test the gauge to ensure that it was in a safe condition. The licensee's RSO stated that the gauge was still at the job site, but that he would retrieve it. He further stated that he would probably take it to a Troxler facility to be serviced and tested. No dissenting comments were received from the licensee, and the Radiation Safety Officer did not specify any information reviewed during the inspection as proprietary in nature.

On November 25, 1996, the MLIB Branch Chief spoke to the licensee's RSO by telephone to confirm that the RSO would immediately retrieve the gauge, have it leak tested, maintain the gauge in secure storage; and not use it again until renewal of the license. The RSO indicated that he would complete the actions.

## LIST OF PERSONS CONTACTED

Licensee Personnel

David Jensen, Owner, authorized user
Tim Jensen, Radiation Safety Officer, authorized user

State of East Virginia Personnel

Lon Smith, Highway Department, Construction Division

## INSPECTION PROCEDURE USED

IP 87100: Licensed Materials Program

## ITEMS OPENED, CLOSED, AND DISCUSSED

OPENED

| Item Number | Type | Description and Discussion |
|---|---|---|
| 96-001 | VIO | CONTINUING TO USE LICENSED MATERIAL AFTER EXPIRATION OF THE LICENSE |
| 96-002 | VIO | FAILURE TO PERFORM LEAK TEST |
| 96-003 | VIO | FAILURE TO PERFORM INVENTORY |
| 96-004 | VIO | FAILURE TO SECURE LICENSED MATERIAL |

December 3, 1996

Jensen Construction Company
ATTN: Mr. Sandy C. Jensen
Radiation Safety Officer
P. O. Box 55
Train, EV 41230

SUBJECT: NRC INSPECTION REPORT NO. 16-24818-02/96-01

Dear Mr. Jensen:

This refers to the inspection conducted on November 5-7, and 14, 1996, at your Richard, East Virginia facility and your telephone conversation with Mr. John Potter on November 25, 1996. The purpose of the inspection was to follow up on your use of byproduct material. The enclosed report presents the results of this inspection. The findings were discussed with you by telephone on November 14, 1996.

Based on the results of this inspection, four apparent violations were identified and are being considered for escalated enforcement action in accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions" (Enforcement Policy), NUREG-1600. These apparent violations relate to your failure to perform a leak test or inventory of licensed material for four years, your continued use of the material for ten months after your license had expired, and your failure to secure the material on at least two occasions. The apparent violations are also a concern because of the potential carelessness and/or disregard for regulatory requirements that may have been involved. Accordingly, no Notice of Violation is presently being issued for these inspection findings. In addition, please be advised that the number and characterization of apparent violations described in the enclosed inspection report may change as a result of further NRC review.

Based upon the conversation on November 25, 1996, it is our understanding that you will complete the following:

1. Immediately retrieve the gauge from your work site outside of War, East Virginia, secure it from unauthorized removal, maintain it under lock and key at your facility, in Richard, East Virginia, and have the gauge leak tested within the next month from the date of this letter.

2. Maintain the gauge in secure storage as in Item 1 and do not use the gauge until the NRC has resolved the issues involved with your license application.

A closed predecisional enforcement conference to discuss these apparent violations has been proposed for December 19, 1996, at 2:00 p.m. in the Region II office. Please advise me within seven days if you will attend the conference on this date. If not, please provide an alternate date on which you may attend. The decision to hold a predecisional enforcement conference does not mean that the

NRC has determined that a violation has occurred or that enforcement action will be taken. This conference is being held to obtain information to enable the NRC to make an enforcement decision, such as a common understanding of the facts, root causes, missed opportunities to identify the apparent violation sooner, corrective actions, significance of the issues and the need for lasting and effective corrective action. In particular, we expect you to address why you continued to use the Troxler moisture density gauge after your license had expired, and why you failed to comply with the requirements of your license.

In addition, this is an opportunity for you to point out any errors in our inspection report and for you to provide any information concerning your perspectives on 1) the severity of the violation(s), 2) the application of the factors that the NRC considers when it determines the amount of a civil penalty that may be assessed in accordance with Section VI.B.2 of the Enforcement Policy, and 3) any other application of the Enforcement Policy to this case, including the exercise of discretion in accordance with Section VII. In presenting your corrective action, you should be aware that the promptness and comprehensiveness of your actions will be considered in assessing any civil penalty for the apparent violations. The guidance in the enclosed excerpt from NRC Information Notice 96-28, "SUGGESTED GUIDANCE RELATING TO DEVELOPMENT AND IMPLEMENTATION OF CORRECTIVE ACTION," may be helpful.

The predecisional enforcement conference will be transcribed. We have also enclosed a copy of NUREG-1600 for your information. Section V addresses predecisional enforcement conferences.

You will be advised by separate correspondence of the results of our deliberations on this matter. No response regarding these apparent violations is required at this time.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosure will be placed in the NRC Public Document Room.

Should you have any questions concerning this letter, please contact us.

Sincerely,

(original signed by
I. M. Toast)

Ira M. Toast, Director
Division of Nuclear Materials Safety

Docket No. 030-31981
License No. 16-24818-02

Enclosures: 1. Inspection Report No. 16-24818-02
2. Excerpt from NRC Information Notice 96-28
3. NUREG-1600, Enforcement Policy

November 27, 1996

Mallett Healthcare Corporation
ATTN: Mr. Bob R. Mallett
Plant Manager
P. O. Box 555-5555
Altuna, GA

SUBJECT: NRC INSPECTION REPORT NO. 52-999-01/96-02

Dear Mr. Mallett:

This refers to the inspection conducted on October 29, 1996, at your Altuna, GA facility. The purpose of the inspection was to examine the implementation of your maintenance and repair program associated with the operation of your irradiator. At the conclusion of the onsite inspection, the findings were discussed with you. The enclosed report presents the results of this inspection.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, observations of maintenance and repair activities and interviews with personnel.

Based on the results of this inspection, five apparent violations were identified. The most serious of the violations concerns the apparent bypassing of the roof plug interlock because of a failure of the interlock to function properly at some time in the past. This apparent violation is of concern because the bypassing of safety interlocks at irradiator facilities has been identified as a precursor to serious accidents. Our immediate concerns regarding the apparent violations were addressed in a Confirmatory Action Letter (CAL) dated October 31, 1996. We are reviewing your November 19, 1996, response to the CAL and will address the results of this review in separate correspondence.

Our review of these apparent violations continues as a part of our deliberations regarding the enforcement actions we may take in response to the inspection findings. Accordingly, no Notice of Violation is presently being issued for the findings contained in the report. In addition, please be advised that the number and characterization of the apparent violations described in the enclosed inspection report may change as a result of further NRC review.

You will be advised by separate correspondence of the results of our deliberations on this matter. No response regarding the apparent violations is required at this time.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and any reply will be placed in the NRC Public Document Room.

Should you have any questions concerning this letter, please contact Mr. John P. Potter at (404) 331-5571.

Sincerely,

Bruce S.Lou, Director
Division of Nuclear Materials Safety

Docket No.: 030-999
License No.: 52-999-01

Enclosure: NRC Inspection Report No. 52-999-01/96-02

cc w/encl: Commonwealth of Georgia

U. S. NUCLEAR REGULATORY COMMISSION

REGION X

Docket No.: 030-999

Report No.: 52-999-01/96-02

Organization: Mallett Healthcare Corporation

Location: Altuna, GA

Date: October 29, 1996

Inspectors: Jimmy Henson, Health Physicist
José Díaz, Radiation Specialist

Approved by: Bay B. Plotter, Chief
Materials Licensing/Inspection Branch
Division of Nuclear Materials Safety

# EXECUTIVE SUMMARY

## Mallett Healthcare Corporation
## NRC Inspection Report 52-999-01/96-02

This special, unannounced inspection was conducted to evaluate Mallett Healthcare Corporation's (BHC) program for the inspection, testing, maintenance and repair of the equipment and facility design features important to the safe operation of its Nordion Model IR-130 irradiator. Through discussions with cognizant BHC representatives, reviews of documents, and direct observations of BHC irradiator safety related equipment and systems, the inspectors identified several apparent violations in this program area. The most serious of these apparent violations involved the bypassing of the radiation room roof plug interlock because of the failure of the interlock to function properly at some time in the past. Program areas included in this report are training, retraining and instruction to workers, physical plant facilities and equipment, and operating and emergency procedures.

Training, Retraining and Instructions to Workers

- The inspectors identified an apparent violation regarding BHC's failure to provide radiation safety training to its maintenance staff.

Physical Plant Facilities and Equipment

- The inspectors identified an apparent violation regarding BHC's failure to have an interlock on the roof plug that would prevent operation of the irradiator if the roof plug was not in its proper location.

- The inspectors identified an apparent violation regarding BHC's altering of a safety system when the roof plug interlock was bypassed.

Operating and Emergency Procedures

- The inspectors identified an apparent violation regarding BHC's failure to maintain records of repair and maintenance problems that involved required radiation safety equipment.

- The inspectors identified an apparent violation regarding BHC's failure to implement its electrical wiring procedure.

## REPORT DETAILS

01. Training, Retraining and Instructions to Workers (87100)

Condition 17 to License No. 52-999-01, Amendment No. 10, requires, in part, that the licensee conduct its program in accordance with the statements, representations, and procedures contained in the license application dated July 22, 1993, and in letters dated September 12, 1994, and February 5, 1995. Item 10.F. of the September 12, 1994, letter states that the training for employees other than the authorized irradiator operators includes shielding, all safety devices, and how they work, emergency and abnormal event procedures, and how to respond to all the alarms.

Licensee employees who enter the irradiator exposure room or work in the immediate vicinity of the irradiator must be able to perform their jobs safely and know the proper response to any emergency or abnormal events. Providing radiation safety training to these employees that includes information such as shielding, all safety devices, and how they work, emergency and abnormal procedures, and how to respond to all the alarms is one means the licensee uses to ensure these employees have sufficient knowledge of the hazards associated with the irradiator operations.

The inspectors requested the licensee to provide a list of the training received by the maintenance staff involved in the repair and maintenance of the equipment associated with the operation of the irradiator and its safety related equipment. These individuals work both in the irradiator exposure room and in the area immediately adjacent to the irradiator. The licensee provided a computer printout of the training received by three maintenance employees. The inspectors found no specific reference to radiation safety training in the printout, but did identify two references to general safety training. The Sterilization Superintendent (SS) stated that he thought that radiation safety training was included in at least one of these general safety classes. The SS provided no other documentation or objective evidence to demonstrate that the maintenance staff had received radiation safety training or that the general safety training included radiation safety training as specified in the license.

The inspectors interviewed the three members of the maintenance staff (electricians) who were present during the inspection. These individuals routinely performed maintenance and repair activities on equipment within the irradiator radiation room, a restricted area. These individuals also assisted in the repairs of the irradiator during the inspection. The inspectors interviewed the three individuals to determine the extent of their knowledge regarding radiation safety issues associated with the irradiator. Two individuals did not know any specific safety requirements, such as how to respond to the different alarms, associated with the irradiator operations. They stated that they did not remember receiving any specific radiation safety training. They also said that they do not enter the

irradiator exposure room without an operator. The third maintenance employee interviewed remembered receiving an informal, on-the-job discussion on radiation safety and recounted some of what he remembered. In general, this individual's knowledge of the irradiator radiation safety issues was adequate. He also said that he did not enter the irradiator exposure room without an operator.

Based upon the review of the records provided to the inspectors and discussions with the three members of the maintenance staff, the inspectors concluded that at least two of these individuals had not received adequate radiation safety training (e.g., shielding, safety devices, emergency and abnormal event response, alarms, etc.) as described in the license application. Failure of the licensee to train the maintenance staff as described in Item 10.F. of their September 12, 1994, letter was identified as an apparent violation of License Condition 17.

02. Physical Plant Facilities and Equipment (87100)

10 CFR 36.61(a) requires that the licensee perform inspection and maintenance checks to determine the operability of specified radiation safety related equipment at the frequency specified in the license or license application.

10 CFR 36.23(h) requires that if the radiation room of a panoramic irradiator has roof plugs or other movable shielding, it must not be possible to operate the irradiator unless the shielding is in its proper location. This requirement may be met by interlocks that prevent operation if shielding is not placed properly or by an operating procedure requiring inspection of shielding before operating.

Condition 17 to License No. 52-999-01, Amendment No. 10, requires, in part, that the licensee conduct its program in accordance with the statements, representations, and procedures contained in the license application dated July 22, 1993, and in the letters dated September 12, 1994, and February 5, 1995. Item 1.3.3.12 of the July 22, 1993, application states that the roof plug is electrically interlocked with the source hoist mechanism such that if the plug were raised, the source would automatically be lowered into the pool.

Condition 14 to the license requires, in part, the licensee not perform repairs and/or alterations on the irradiator, its control console and safety systems, its shielding or any other mechanism that might affect the containment integrity of the sealed irradiator sources, the irradiator "on-off" mechanism or the physical security of the irradiation room.

The inspectors asked the licensee Radiation Safety Officer (RSO) if the operators had performed their weekly safety checks to test the operability of the radiation safety related equipment. The RSO responded that he and an alternate RSO (ARSO) routinely perform these checks and that they had not performed them for the current week. The RSO, with the assistance of an ARSO agreed to conduct these checks so that the inspectors could observe their performance.

The safety systems the licensee tests on a weekly basis include the personnel entrance door controls, radiation monitors, storage pool water radiation levels and water level alarms, emergency stop mechanisms, product carrier collision detection devices, and personnel entrance controls at the product entry and exit points into the irradiator exposure room. The RSO had successfully tested most of the 24 items listed on the safety checks form used to document these tests when he tested item 21, the Carrier Collision Device (CCD).

The CCD is composed of two steel columns mounted on either end of the source rack to prevent product and product carriers from hitting or touching the source rack or the rack movement mechanism. These steel columns have carrier collision switches behind them which will lower the source when activated. This causes the source pass fault indicator of the console to illuminate.

The device on the product entrance/exit end of the source rack functioned properly. However, the device on the opposite end of the source rack failed. The RSO stated that this system had passed the test during the previous week. The inspectors reviewed the safety check record for the previous week and found that the RSO recorded that this system had passed the test.

The RSO and ARSO removed the cover plate on the steel column at the end of the source rack that failed to expose the two switches underneath. The ARSO tested both switches, and neither caused the required fault. The ARSO removed the bottom switch (this switch broke apart while he was removing it) and replaced it with a new switch. The ARSO also replaced the upper switch, and repeated the test, but the system failed. At that time the RSO summoned members of the maintenance staff to diagnose and repair the problem.

The two electricians that responded examined the wires running from the two switches. They moved the wires back and forth to determine if one or more of the wires had lost its insulation and shorted-out in the wire run above the product carrier track. While moving the wires, the system functioned and they determined that there was a short in at least one of the wires.

As a part of their effort to replace these wires, the electricians removed the cover from the maze junction box where all the wiring from the safety and operational related systems in the radiation room is connected to wiring that runs to the irradiator control console. While observing the electricians removing the old wires from the CCD and replacing them with the new wires, the inspectors noticed that two white wires on the left side of the center terminal bus (indicated these wires come from equipment inside the radiation room) were not connected. These wires were numbered 445 and 477. The inspectors also noted that the correspondingly numbered, colored wires on the console side of the terminal bus had been connected together to the same terminal.

The inspectors asked the lead electrician what these white wires were and he said they were probably just spare wires. The inspectors also asked the RSO and ARSO what these wires were and they said they did not know.

The lead electrician had the wiring diagram for the junction box out for repair of the collision system, and the inspectors reviewed the drawings to determine the purpose of these two wires. The drawing indicated that both wires were connected to the interlock on the roof plug. It appeared to the inspectors that the two white wires numbered 445 and 477 normally would have been connected to the correspondingly numbered colored wires that connect to the irradiator control console. As found, it appeared to the inspectors that someone had disconnected the two white wires and connected the two colored wires together. The inspectors asked the RSO, ARSO and the electrician to look at the drawings and identify to which system or component these wires connected. They all stated they could not definitely determine the wires purpose. The electrician completed the CCD wire replacement and the system functioned as designed.

The inspectors asked the licensee to call Nordion to determine the purpose of the disconnected wires in the maze junction box. Nordion personnel reviewed their drawings and stated that it appeared that the wires did go to the roof plug interlock. The inspectors and licensee personnel discussed the situation and it was suggested that the wires be reconnected to determine if they were connected to the roof plug interlock. The Nordion personnel concurred that this was a means of determining the wires purpose. The licensee reconnected the wires and got a fault signal at the control console that indicated the interlock switch had functioned. This fault signal is intended to warn the operator that the roof plug is not in its proper place, but the plug was in place and was pushing on the interlock switch as designed. Nordion concluded that the interlock switch was not working properly.

The licensee had an electrician remove the interlock switch from the roof plug. The electrician determined that the electrical component of the switch functioned but that the mechanical part did not. The mechanical portion of the switch was replaced. The interlock switch was returned to the roof plug and the system functioned as designed.

Based upon the above, it appeared to the inspectors that someone had altered the roof plug interlock wiring by disconnecting the two numbered, white wires running from the switch to the maze junction box, and connecting the two corresponding control console wires together. As a result of this alteration, the roof plug interlock switch was bypassed. The inspectors asked the RSO, ARSO, and the Sterilization Superintendent if they knew who could have altered the wiring and they said they did not know. The inspectors asked Nordion personnel if this was something that may have been done during the annual maintenance in December, 1995 and they said no. The Nordion personnel said they do not bypass the interlock system when performing maintenance at the facility.

The inspectors concluded that as a result of the wiring alteration, the roof plug did not have a functioning interlock as required. Because the maze junction box was located in a restricted area, and the selection and bypassing of the wires associated with the operation of the roof plug interlock required a unique

knowledge of the irradiator wiring system, the inspectors also concluded that a member of the licensee's staff had made an unauthorized alteration to an irradiator safety system when the interlock wiring was altered.

The inspectors asked the RSO, ARSO and licensee management if they understood the limitations on repairs and alterations to the irradiator and its safety systems imposed by Condition 14 to their license. Through discussions with licensee personnel regarding this issue, the inspectors concluded that the licensee did not have a clear understanding of the license condition barring it from performing repairs and alterations.

Failure of the licensee to have an interlock on the roof plug that would prevent operation of the irradiator if the roof plug was not in its proper location was identified as an apparent violation of License Condition 17. The licensee's alteration to the wiring in the maze junction box which bypassed the roof plug interlock was identified as an apparent violation of License Condition 14.

03. Operating and Emergency Procedures (87100)

10 CFR 36.81(j) requires that the licensee maintain records of major malfunctions, significant defects, operating difficulties or irregularities, and major operating problems that involve required radiation safety equipment for 3 years after repairs are completed.

Condition 17 to License No. 52-999-01, Amendment No. 10, requires, in part, that the licensee conduct its program in accordance with the statements, representations, and procedures contained in the license application dated July 22, 1993, and in the letters dated September 12, 1994, and February 5, 1995. Item 4.7 in Addendum 7 to the letter dated September 12, 1996, describes the electrical wiring inspection procedure which will be performed by an authorized operator every six months.

The inspectors reviewed records of the weekly, monthly, quarterly, annual and biannual safety and preventive maintenance checks performed by the licensee since January 1, 1996. These checks are routinely performed by the RSO and an ARSO. The licensee had documented all systems checked with a check mark or OK. There were no documented problems associated with any of the systems checked. The inspectors reviewed the Maintenance Log maintained by the licensee to document any maintenance and repairs performed on the irradiator and its associated safety and operational equipment. There were only five incidents of repair identified since 1994. Most of the repairs documented pertained to the product carrier system and not to any safety related system. The inspectors asked the licensee staff if all maintenance and repair activities were documented either in this record or in one of the other records of safety and maintenance checks. The licensee representatives stated that some safety related maintenance and repair activities, such as the replacement of a carrier collision device switch, had not been documented. The licensee representatives further stated that when conducting safety and maintenance checks, if a system

fails, it is repaired, and a check or OK is entered in the record. The fact that the system initially failed the test is not documented.

The inspectors asked the RSO and ARSO for records of the electrical wiring inspections performed in accordance with the procedure described in Item 4.7 of Addendum 7 to their letter dated September 12, 1994. The inspectors showed a copy of this procedure to the RSO and ARSO. Either the RSO or ARSO routinely performed all maintenance and safety checks, and the RSO routinely reviewed the records of these checks. The RSO and ARSO both responded that they were not familiar with this procedure and that the activities required by this procedure had not been performed.

The inspectors concluded that the licensee had not maintained records of all the repair and maintenance activities it performed as required. The inspectors also concluded that the licensee had not conducted the electrical wiring inspections as required by its electrical wiring inspection procedure.

Failure of the licensee to maintain records of repair and maintenance problems that involved required radiation safety equipment was identified as an apparent violation of 10 CFR 36.81(j). Failure to implement the electrical wiring inspection procedure was identified as an apparent violation of License Condition 17.

## EXIT MEETING SUMMARY

An exit meeting was held with BHC representatives on October 29, 1996. The overall findings from the inspection, including the apparent violations were discussed. No dissenting comments were received from BHC, and BHC did not specify any information reviewed during the inspection as proprietary in nature.

## LIST OF PERSONS CONTACTED

Licensee

R. Beta, Plant Manager
E. Alado, Operations Manager
N. Rivers, Sterilization Superintendent
T. Camo, Radiation Safety Officer
A. Plea, Engineer/Alternate Radiation Safety Officer
B. Lou Rosario, Lead Electrician
A. Stores, Electrician
T. Terry, Electrician

## INSPECTION PROCEDURES USED

IP 87100: Licensed Materials Program

## ITEMS OPENED, CLOSED, AND DISCUSSED

OPENED

| | | |
|---|---|---|
| 96-001 | VIO | FAILURE TO TRAIN MAINTENANCE PERSONNEL |
| 96-002 | VIO | FAILURE TO HAVE ROOF PLUG INTERLOCK |
| 96-003 | VIO | UNAUTHORIZED ALTERATION OF SAFETY SYSTEM |
| 96-004 | VIO | FAILURE TO MAINTAIN RECORDS OF REPAIRS |
| 96-005 | VIO | FAILURE TO IMPLEMENT ELECTRICAL WIRING PROCEDURE |

CLOSED

None

DISCUSSED

None

November 30, 1996

Flatbottom Electric Corporation

ATTN: Mr. J. A. Smith, Manager
Greenfield Plant
Commercial Nuclear Fuel Division
Box 155
Greenfield, EV 29250

SUBJECT: NRC INSPECTION REPORT NO. 65-99999/96-05 AND NOTICE OF VIOLATION

Dear Mr. Smith:

This refers to the inspection conducted on October 29 - November 1, 1996, at the Greenfield Nuclear Fuel Plant. The purpose of the inspection was to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the enclosed report.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress.

Based on the results of this inspection, certain of your activities appeared to be in violation of NRC requirements, as specified in the enclosed Notice of Violation (Notice).

You are required to respond to this letter and should follow the instructions specified in the enclosed Notice when preparing your response. In your response, you should document the specific actions taken and any additional actions you plan to prevent recurrence. After reviewing your response to this Notice, including your proposed corrective actions and the results of future inspections, the NRC will determine whether further NRC enforcement action is necessary to ensure compliance with NRC regulatory requirements.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be placed in the NRC Public Document Room.

Should you have any questions concerning this letter, please contact us.

Sincerely,

Edward J. McAlpine, Chief
Fuel Facilities Branch
Division of Nuclear Materials Safety

Docket No. 65-99999
License No. SNM-99

Enclosures: 1. Notice of Violation
2. NRC Inspection Report

## NOTICE OF VIOLATION

Flatbottom Electric Corporation
Commercial Nuclear Fuel Division

Docket No. 65-99999
License No. SNM-99

During an NRC inspection conducted on October 29 - November 1, 1996, a violation of NRC requirements was identified. In accordance with the "General Statement of Policy and Procedure for NRC Enforcement Actions, NUREG-1600" the violation is listed below:

> License Condition S-1 of License Number SNM-99 requires the use of special nuclear material in accordance with statements, representations, and conditions in the License Application dated April 30, 1995, and supplements dated May 11, 18; August 4, 25; and September 25, 1995.
>
> Section 3.2.1 of the License Application requires that the following safety-related systems and components will receive programmed maintenance: 1) air compressors; 2) emergency electrical generators; 3) fire detection and fire control; 4) natural gas valves; 5) nuclear criticality detection; 6) pellet carts; 7) pressure relief valves; and 8) steam boilers.
>
> Section 1.4 of the License Application stipulates that when a measurement, surveillance, and/or other frequency is specified in License documents, the following applies: QUARTERLY frequency means four per year, with each covering a span of 115 days or less.
>
> Maintenance and Calibration Operating Procedure Number MCP-108000, Revision 2, dated October 21, 1993, requires in Section 4.7 that maintenance engineering enter all preventive maintenance (PM) procedures and revisions into MAPCON and requires in Section 4.6 that crafts personnel perform preventive maintenance per work orders generated by the MAPCON system.
>
> In the MAPCON system, PM 20451 stipulates the preventive maintenance to be performed on the #1 North American Boiler, Equipment Number (No.) 65973, on a 3-month (quarterly) cycle.
>
> Contrary to the above, a thee month PM work order for the #1 North American Boiler, Equipment No. 65973, was generated on May 11, 1995, and completed on June 21, 1995; however, the subsequent 3-month PM work order was generated on September 14, 1995 but was not completed until November 9, 1995, a time period greater than the 115-day frequency allowed.

This is a Severity Level IV violation (Supplement VI).

Pursuant to the provisions of 10 CFR 2.201, Flatbottom Electric Corporation is hereby required to submit a written statement or explanation to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555 with a copy to the Regional Administrator, Region II, within 30 days of the date of the letter transmitting

this Notice of Violation (Notice). This reply should be clearly marked as a "Reply to a Notice of Violation" and should include for each violation: (1) the reason for the violation, or, if contested, the basis for disputing the violation, (2) the corrective steps that have been taken and the results achieved, (3) the corrective steps that will be taken to avoid further violations, and (4) the date when full compliance will be achieved. Your response may reference or include previous docketed correspondence if the correspondence adequately addresses the required response. If an adequate reply is not received within the time specified in this Notice, an order or Demand for Information may be issued as to why the license should not be modified, suspended, or revoked, or why such other action as may be proper should not be taken. Where good cause is shown, consideration will be given to extending the response time.

Dated at Altuna, East Tennessee
This 27th day of November, 1996

U.S. NUCLEAR REGULATORY COMMISSION
REGION II

Docket No.: 65-99999

License No.: SNM-99

Report No.: 65-99999/96-05

Licensee: Flatbottom Electric Corporation

Facility: Commercial Nuclear Fuel Division
Greenfield, EV 29250

Inspection Conducted: October 29 - November 1, 1996

Inspectors: B. Hound, Senior Radiation Specialist

Approved by: E. Maxell, Chief Fuel Facilities Branch,
Division of Nuclear Materials Safety

EXECUTIVE SUMMARY

Commercial Nuclear Fuel Division
65-99999/96-05

FACILITY SUPPORT - MAINTENANCE

- The maintenance function is organized and staffed adequately to perform the maintenance function at the facility. The Maintenance, Planning, and Control (MAPCON) computer system is a powerful and useful tool, the full capability of which is still being developed by the licensee.

- In general, the maintenance procedures are adequate to provide reasonable assurance that maintenance activities at the site will be performed in a safe manner. One exception is that safety-related preventive maintenance (PM) is apparently allowed to be overdue for two weeks before any administrative action is begun.

- Work orders (WOs), which control all work performed by the maintenance organization, are being completed properly and contain special instructions and controls as needed.

- Maintenance activities at the facility are being performed by qualified individuals.

- No formal management audit is conducted in the area of maintenance.

- Reporting of maintenance problems can occur through the use of the "Red Book" but generally occurs by other means. The licensee uses various approaches in response to problem identification from assigning an engineer to develop corrective action to forming an investigation team to look into the problem.

- Surveillance testing is being conducted within the specified frequencies as required by procedure, the procedures contain adequate guidance, and the test results are in conformance to written requirements.

- Instrument calibration is being conducted within the frequencies outlined by procedure, the procedures used contain adequate guidance, and the results of the calibrations conform to specified requirements.

- Preventive maintenance is generally being conducted within the specified frequencies as required by the License Application. One exception was noted of the 3-month PM that was scheduled for the #1 North American Boiler between the period of June and September 1995. The PM was not conducted within the 115-day period allowed by the License Application which is an apparent violation.

Attachment:

Inspection Procedures Used
List of Items Opened, Closed, and Discussed
List of Acronyms

## Report Details

### IV. Facility Support

F1 Maintenance/Surveillance (88025)

F1.01 Conduct of Maintenance

a. Inspection Scope

The licensee's maintenance organization was reviewed to assess the effectiveness of the program.

b. Observations and Findings

The maintenance organization is composed of a maintenance manager, five maintenance team managers, two maintenance engineers, a maintenance coordinator, a secretary, 52 mechanics, 23 technicians, and 18 electricians. Of the mechanics, technicians, and electricians, six function as planners and two as training coordinators.

The maintenance manager reports to the manager of manufacturing who reports to the Plant Manager. The team managers report to the maintenance manager and each is assigned a specific area of responsibility including electrical systems; heating, ventilation, and air conditioning; instrumentation; predictive maintenance; and, as an aggregate, the various systems and equipment in the chemical area of the plant. Four of the team managers are assigned to day shift and the fifth team manager works on second and/or third shift. The maintenance engineers deal with problems associated with the areas outlined above, with one engineer being assigned the specific responsibility to maintain and oversee the functioning of the licensee's computer system and database designated as the MAPCON computer system. MAPCON is an integrated relational database computer system used to collect and report on maintenance costs, to assist in scheduling work, to order and track parts, and track time spent on each maintenance job. The planners schedule work, write work orders, get the needed materials and equipment for the various jobs in progress or that are scheduled to be performed during the shift, and track the progress of the work that is being performed. The training coordinators conduct training classes in job-related subjects, provide training materials and films for the other maintenance workers, and coordinate special training classes with a local technical college. The mechanics, technicians, and electricians perform the work and complete the tests and calibrations that keep the various systems, instruments, and equipment in an operable condition.

In addition to the above and as a result of previous problems in following work orders dealing with safety-related equipment, one individual has been assigned to track such work orders. Another individual, the maintenance secretary, has been assigned the task of closing out all the work orders and is the only person with that assignment.

The licensee employs contract workers in the maintenance area but has recently eliminated all but two contract organizations. One contractor supplies custodial and grounds personnel, as well as approximately 36 electricians; the other contractor operates the licensee's storeroom. The licensee had operated the a Maintenance, Repair, and Operations (MRO) storeroom as part of the maintenance organization but recently turned over that operation to a separate contractor. The contractor maintains the licensee's inventory through the use of the licensee's MAPCON computer system.

c. Conclusions

The maintenance function is organized and staffed adequately to perform the maintenance function at the facility. The MAPCON computer system is a powerful and useful tool, the full capability of which is still being developed by the licensee.

F1.02 Work Control Procedures

a. Inspection Scope

Maintenance procedures were reviewed to determine that they required a "special work permit" for maintenance activities; required review and approval of the work permit; required the concurrence of the operations group for the work to be performed, a release of the equipment for maintenance, and approval and/or acceptance of the work performed; and defined the criteria under which the work was to be completed.

b. Observations and Findings

The inspector reviewed selected maintenance procedures including the following:

- Maintenance and Calibration Procedure (MCP)-108000, Preventive Maintenance, Revision (Rev.) 2, dated October 21, 1993
- MCP-108103, Work Order Handling, Rev. 3, dated January 11, 1996
- MCP-108105, Equipment Set-Up, Rev. 1, dated November 30, 1995

The maintenance procedures reviewed required a "special work permit" for maintenance activities. This was stipulated as a "work order" and a WO was required to be generated for each maintenance job. The WO was required to be reviewed and approved prior to initiation of the work; the WO also required the concurrence of the operations group for the work to be performed. The WO defined the criteria under which the work was to be completed by means of a safety checklist. The safety checklist stipulated special controls (if needed) such as a radiation work permit (RWP), bioassay, special air sampling, protective clothing and/or equipment, a cutting and welding permit, a fire watch, tank entry permit, and a functional test following work on safety-related equipment (SRE). The WO also contained a release of the equipment for maintenance and

approval and/or acceptance by the operations group of the work performed by maintenance personnel.

During the review of the procedures, the inspector noted that delays could occur in the completion of WOs. Procedure MCP-108000 indicates in Section 4 that the "owner" of the equipment or instrumentation (requiring preventive maintenance) must review the safety significance of delays or cancellation of scheduled PM and must authorize the first delay (a week after the PM was due). The Area Manager must review the safety significance of delays or cancellation of scheduled PM and must authorize the second delay (two weeks after the PM was due). The staff-level manager must review the safety significance of delays or cancellation of scheduled PM and must authorize the third delay (three weeks after the PM was due). The inspector discussed this process with the individual who had been assigned responsibility for tracking the completion of safety-related PMs. The individual indicated that he receives a printout of the overdue safety-related PMs every week. There is a one-week "grace" period built into the system. After two weeks the overdue PM is placed on a tracking board located in one of the team managers' offices and the Area Manager is issued a letter documenting the overdue PM and requesting a response on what will be done to correct the situation. If, after three weeks, the PM has not been completed, a letter is sent to the staff manager requesting a response. According to the licensee, prior to having an individual assigned to the task of tracking overdue PMs, there was a lack of emphasis placed on completing the safety-related PMs on time. Since one person has been assigned to track the overdue PMs, the incidence of non-compliance has dropped and the licensee no longer considers this a problem. The inspector noted that apparently nothing happens concerning an overdue safety-related PM until two weeks after it was due.

c. Conclusions

Based on this review, the inspector determined that, in general, the procedures were adequate to provide reasonable assurance that maintenance activities at the site would be performed in a safe manner. One exception is that safety-related preventive maintenance is apparently allowed to be overdue for two weeks before any administrative action is begun.

F1.03 Work Control Authorizations

a. Inspection Scope

WOs were reviewed to determine that they were being completed properly, that they required specific authorization for maintenance activities involving welding, open flame, or other ignition sources, and that they required a special survey or evaluation of any proposed work to be performed in the vicinity of flammable material, vital cable runs, and critical process equipment.

b. Observations and Findings

The inspector reviewed numerous WOs for the period during the past six months and selected WOs from the past two years. It was noted that the licensee

maintains a "hard copy" of WOs for the previous three to six months. Beyond that time, the WOs are archived and maintained in the computer system. The inspector verified that the WOs contained the proper authorizations when special activities were to be completed such as welding. The safety checklists had also been completed as required and contained requirements for special surveys, protective clothing, air sampling, respirators, auxiliary ventilation, and special permits as required by the situation.

The inspector also observed work in the chemical area of the plant and reviewed the WOs associated with those jobs. The specific work observed and WOs reviewed included:

- WO Number (#) 137375, Conversion Line 2 $UF_6$, Nitrogen, Eduction - Transport Piping, issued September 27, 1996. The work involved performing the annual preventive maintenance on the $UF_6$ nitrogen line check valve.

- WO# 139981, Conversion Line 5 Westfalia Decanter, issued October 30, 1996. The work involved disassembling the decanter for cleaning and changing out the feed-end bearing.

- WO# 140003, Conversion Line 2 Westfalia Decanter, issued October 30, 1996. The work involved removing the decanter from Conversion Line 5 and installing that decanter on Line 2.

- WO# 140006, Conversion Line 2 Hot Oil Dryer, issued October 30, 1996. The work involved repairing leaks on the flow switch at the piping elbow.

The inspector noted that the WOs had been properly completed, the maintenance work had been authorized, and special controls were stipulated as needed. It was also noted that the WO dealing with preventive maintenance contained additional guidance detailing the disassembly, inspection, and reassembly of the valve and included a listing of the materials that would be needed for the job, the cost of the materials, and the estimated time required to complete the work. Interviews with those maintenance personnel involved with the job indicated that they were aware of the scope of the work to be performed, were aware of the special controls in place to stipulate added safety precautions for the job, and were knowledgeable of what was required to complete the work.

c. Conclusions

WOs, which control all work performed by the maintenance organization, were being completed properly and contained special instructions and controls as needed.

F1.04 Qualifications of Maintenance Personnel

a. Inspection Scope

Maintenance personnel qualifications were reviewed to ensure that maintenance

activities were being performed by qualified individuals.

Observations and Findings

The inspector reviewed the records of five maintenance personnel selected at random from among the entire group. Although some training records were maintained on the MAPCON system and certain records were maintained by an individual's supervisor, the official records were maintained by the Personnel Department in coordination with the Plant Training Department. Of those individuals reviewed, two were instrument technicians, one was an electrician, and two were mechanics. It was noted that, in the past, personnel were typically hired to perform one job and then were trained to function in another. The current practice is to hire personnel who have already received training and are qualified/certified in a certain skill from a technical college. The records of the individuals' skills and qualifications were compared with the licensee's job descriptions for a particular job classification. In each case the maintenance personnel were determined to have received the proper training and certification through work-related experience, on-the-job training, and/or specialized training from classes at a technical college.

As noted in Paragraph F1.03 above and F1.06 below, the inspector interviewed various maintenance personnel. All individuals interviewed were knowledgeable of the work that was being performed and the actions required to complete the job and return the equipment and/or instrumentation to proper working condition. Maintenance and Operations managers interviewed indicated that the maintenance personnel were experienced, knowledgeable, dedicated, and took pride in their work.

The inspector also interviewed the training coordinators for the maintenance organization. It was noted that, as was mentioned in Paragraph F1.01 above, continuing specialized training was coordinated through a local technical college and was generally available for those who requested the assistance.

c. Conclusions

Based on interviews with licensee representatives and documentation of training and qualifications, the inspector determined that maintenance activities at the facility are being performed by qualified individuals.

F1.05 Management Audit of Maintenance

a. Inspection Scope

The licensee's programs for conducting management audits of maintenance activities and for identifying maintenance problems were reviewed to determine that problems were being reported and resolved and that maintenance activities were being audited.

b. Observations and Findings

The inspector interviewed various maintenance personnel including the maintenance manager, team managers, engineers, planners, technicians, operators, and mechanics to determine what program the licensee employed to complete management audits of maintenance activities. Those interviewed indicated that no routine, formal, documented audit was conducted by management of the maintenance activities.

The inspector also interviewed these individuals to determine what program or system the licensee had in place to ensure that both major and minor maintenance problems would be identified and reported to management so that corrective actions could be taken. Those interviewed stated that the formal program for reporting any type of a problem was the use of the "Red Book" outlined in Regulatory Affairs Procedure No. RA-107, Internal Reporting and NRC Notification of Unusual Occurrences, Rev. 6, dated March 17, 1994. Section 7.1 of the procedure requires an employee to report various types of issues to one's immediate supervisor upon discovery of the problem. The types of issues to be reported include process upsets, i.e., abnormal process conditions, unauthorized or unapproved operations or activities, and deviations from or inability to follow procedures. Once the problem was reported, the supervisor (or the operator) was required fill out a form, RAF-107-1, and place it in the "Red Book." Copies of the form were to be distributed to Regulatory Engineering and to the Area engineer. The procedure then provides for a formal method of tracking the issue and closing it out. Although through this method of reporting a problem was formalized, it did not appear to give sufficient guidance for operations or maintenance personnel to report the minor, recurring problems that sometimes occur. It appeared that, for minor issues, whether or not a problem was reported depended upon the initiative of the individual who noted it.

Other methods of problem reporting were also mentioned by those interviewed and included approaches from a technician reporting the issue to an engineer, maintenance planners reporting the problem to an engineer or a team manager, to the issue being brought to light from reviews of cost analyses of equipment maintenance and repair. These types of analyses are typically done by team managers who report this and other data to the maintenance manager in a monthly report.

Once a problem is reported, the licensee uses various means to correct the situation. If the problem is of major significance, i.e., if it is directly affecting production, an investigation team is generally formed to review the issue, determine the root cause, and develop corrective actions. If the problem is of lesser significance, the issue is generally assigned to an engineer to review and correct. The licensee also has Area Teams which have the responsibility to make improvements in production and safety. These teams may also be asked to resolve an identified problem in a specific area of the plant.

c. Conclusions

Based on the interviews conducted with licensee personnel, the inspector determined that no formal management audit is conducted in the area of maintenance. Reporting of maintenance problems can occur through the use of

the "Red Book" but generally occurs by other means. The licensee uses various approaches in response to problem identification from forming an investigation team to assigning an engineer to review the issue and develop corrective action.

F1.06 Surveillance Testing

a. Inspection Scope

The inspector reviewed the licensee's program for conducting functional/ surveillance testing to ensure that the tests were being performed at the frequency delineated in the License Application, the procedures used provided adequate guidance, and the test results conformed to written requirements.

b. Observations and Findings

The inspector reviewed selected maintenance and surveillance procedures including the following:

- MCP-202046, Pressure and Differential Pressure Transmitters (Generic), Rev. 2, dated June 1, 1995
- MCP-202058, Limit/Trip/Interlock/Alarm Switches (Generic), Rev. 1, dated June 27, 1990
- RA-108, Safety Significant Interlocks, Rev. 6, dated May 30, 1996

The inspector determined that the procedures contained adequate guidance to perform the required surveillance tests when used in conjunction with the forms and/or instrument data cards accompanying the PM and outlined in the procedures.

The inspector also observed surveillance testing in the chemical area of the plant and reviewed the instrument data cards and the results associated with those tests. The specific work observed involved the testing of instrumentation associated with nitrogen heater over-temperature indicator, the calciner scrubber level probe, the nitrogen flow to the nitrogen heater indicator, and the "A" precipitation column level probe. The inspector noted that the technicians performed the tests in accordance with procedure and the associated instrument data cards and the test results were within the ranges specified on the data cards. The tests were also performed within the frequencies prescribed by procedure. Interviews with the technicians involved with the testing indicated that they were aware of the scope of the tests to be performed, were aware of the WOs and the special controls in place to stipulate added safety precautions for the job, and were knowledgeable of the systems that were being tested.

Section 3.2.2 of the License Application specifies that the safety-related systems and components outlined therein are to be functionally tested at a prescribed frequency. The inspector reviewed the results of the surveillance testing of an representative sample of each group with an emphasis on those related to nuclear criticality safety and reviewed the frequencies of those tests as contained

in the database of the MAPCON system. The tests were performed according to the procedure and the tests were also performed within the prescribed frequencies.

c. Conclusions

Surveillance testing is being conducted within the specified frequencies as required by procedure, the procedures contain adequate guidance, and the test results are in conformance to written requirements.

F1.07 Calibrations of Equipment

a. Inspection Scope

The inspector reviewed the licensee's program for conducting instrument calibration to ensure that the calibrations were being performed at the required frequency, the procedures used provided adequate guidance, and the calibration results conformed to specified requirements.

b. Observations and Findings

The inspector reviewed selected maintenance and calibration procedures including the following:

- MCP-202025, Panametrics 700 Moisture Analyzer Calibration, Rev. 0, dated June 22, 1989
- MCP-202034, Solvent Extraction Aqueous Waste Monitor System 1, Rev. 8, dated April 21, 1994
- MCP-202035, On Line Monitor Calibration, Rev. 10, dated May 9, 1996
- MCP-202037, GA-6M Criticality Alarm Calibration, Rev. 6, dated May 9, 1996

The inspector determined that the procedures contained adequate guidance to perform the required calibrations when used in conjunction with the forms and/or instrument data cards accompanying the PM and outlined in the procedures.

The inspector reviewed the results of selected calibrations with an emphasis on those related to nuclear criticality safety and reviewed the frequencies of those calibrations as contained in the database of the MAPCON system. The calibrations were performed according to the procedure and the results were within the ranges specified. The inspector also noted that these calibrations were performed within the prescribed frequencies.

c. Conclusions

Instrument calibration is being conducted within the frequencies outlined by procedure, the procedures contain adequate guidance, and the results of the calibrations conform to specified requirements.

F1.08 Preventive Maintenance of Equipment

a. Inspection Scope

The inspector reviewed the licensee's program for conducting preventive maintenance to ensure that the PMs were being performed at the required frequency and the procedures used provided adequate guidance.

b. Observations and Findings

License Condition S-1 of License Number SNM-1107 requires that the licensee shall use special nuclear material in accordance with statements, representations, and conditions in the License Application dated April 30, 1995, and supplements dated May 11, 18; August 4, 25; and September 25, 1995.

Section 3.2.1 of the License Application requires that the following safety-related systems and components will receive programmed maintenance: 1) air compressors; 2) emergency electrical generators; 3) fire detection and fire control; 4) natural gas valves; 5) nuclear criticality detection; 6) pellet carts; 7) pressure relief valves; and 8) steam boilers.

Section 1.4 of the License Application stipulates that when a measurement, surveillance, and/or other frequency is specified in License documents, the following applies: QUARTERLY frequency means four per year, with each covering a span of 115 days or less.

Maintenance and Calibration Procedure (MCP) Number MCP-108000, Rev. 2, dated October 21, 1993, requires in Section 4.7 that maintenance engineering enter all PM procedures and revisions into MAPCON and requires in Section 4.6 that crafts personnel perform preventive maintenance per work orders generated by the MAPCON system.

In the MAPCON system, PM 20451 stipulates the preventive maintenance to be performed on the #1 North American Boiler, Equipment No. 65973, on a 3-month (quarterly) cycle.

The inspector reviewed the results of preventive maintenance performed for a representative sample of each group specified above and reviewed the frequencies of that maintenance as contained in the database of the MAPCON system. In all cases except one the PMs were performed according to the procedure and within the prescribed frequencies. The exception noted by inspector involved that the 3-month PM for the licensee's #1 North American Boiler, Equipment No. 65973. A 3-month PM had been performed on June 21, 1995, under WO# 100297 (which was generated on May 11, 1995). However, the subsequent 3-month PM WO, WO# 109367, which was generated on September 14, 1995, was not completed until November 9, 1995. The time period between June 21 and November 9 is greater than the maximum 115-day interval allowed. When this issue was brought to the attention of the licensee, a search of the records was made in an effort to determine whether the PM was actually late or whether the WO had been closed out at a date much later than

when the work had been performed. No indication could be found that the PM was performed on time with only the WO being closed out late.

The inspector informed the licensee that failure to perform preventive maintenance of the #1 North American Boiler within the frequency specified was an apparent violation (VIO) of Safety Condition S-1 and Chapter 3, Section 3.2.1 of the License Application (VIO 65-99999/96-05-01).

c. Conclusions

PM is being conducted within the specified frequencies and as required by the License Application with the exception of the 3-month PM that was scheduled for the #1 North American Boiler between the period of June and September 1995.

## Management Meetings

M1 Exit Interview

On November 1, 1996, the inspection scope and results were summarized with licensee representatives. The inspector discussed in detail the routine program areas inspected, and the findings, including the violation for failure to perform preventive maintenance of the #1 North American Boiler within the frequency specified. Dissenting comments were expressed by the Manager, Regulatory Affairs in response to the characterization of the failure to perform only one PM within the specified frequency as a possible violation. The manager indicated that the failure should be characterized as a non-cited violation or as an Inspector Followup Item.

The licensee did not identify any of the materials provided during the inspection as proprietary.

## INSPECTION PROCEDURE USED

| Procedure Number | Title |
|---|---|
| IP 88025 | Maintenance and Surveillance Testing |

## LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

| Item Number | Type | Description and Discussion |
|---|---|---|
| 70-143/96-05-01 | VIO | Failure to perform preventive maintenance of the #1 North American Boiler within the frequency specified by Section 3.2.1 of the License Application. |

Closed

| Item Number | Type | Description and Discussion |
|---|---|---|
| None | | |

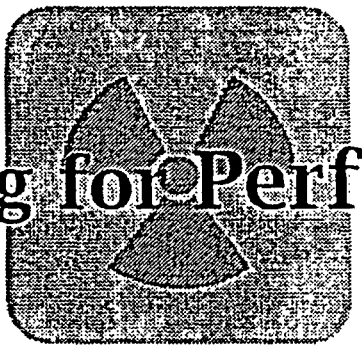
Discussed

| Item Number | Type | Description and Discussion |
|---|---|---|
| None | | |

## LIST OF ACRONYMS

| | |
|---|---|
| CFR | Code of Federal Regulations |
| IFBA | Integrated Fuel Burnable Absorber |
| IP | Inspection Procedure |
| NRC | Nuclear Regulatory Commission |
| MAPCON | Maintenance, Planning, and Control (computer system) |
| MCP | Maintenance and Calibration Procedure |
| MRO | Maintenance, Repair, and Operations (storeroom) |
| # | Number |
| PM | Preventive maintenance |
| REV. | Revision |
| RWP | Radiation Work Permit |
| SNM | Special nuclear material |
| SRE | Safety-related equipment |
| VIO | Violation |
| WO | Work order |

# Inspecting for Performance



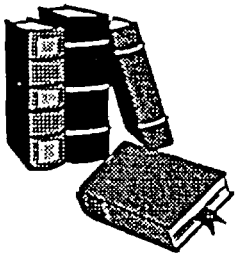
## *Materials*

1-1

# Course Components

- *Inspection Concepts*
- *Inspection Techniques*
- *Workshop Exercises*
- *Review and Written Exam*

1-2



# Inspection Concepts



## Objectives:

- *Describe the attributes of performance based inspection*
- *Identify and prioritize licensee activities that impact performance*
- *Describe the purposes and benefits of a performance based approach to inspection*

# A Matter of Emphasis

***Licensing Phase:***

*Reviewing licensee's program documents*

***Operations Phase:***

*Observing licensee's program performance*



# Performance

***Execution and accomplishment!***

## Performance Based Inspection

Observation to determine whether or not a licensees program activities are executed in a manner to ensure safety and regulatory compliance.

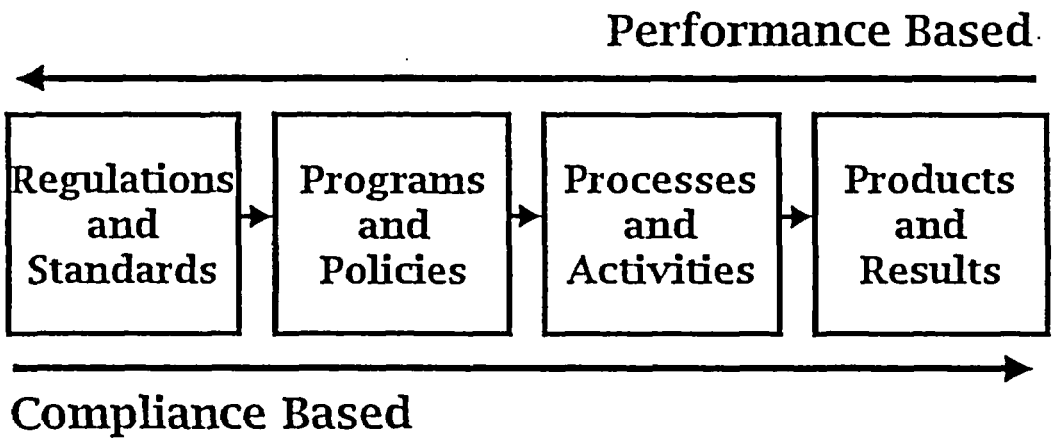
1-7

# Purposes:

- *Put inspectors in the best position to examine the most important program issues*
- *Provide real time facts to support inspection conclusions*
- *Set an example that encourages licensees to continuously improve program execution*

1-8

# Inspection Sequence




1-9

# Compliance

- *NRC will always strive to identify and ensure the correction of compliance issues.*
- *However, compliance is a minimum rather than a maximum standard in performance based inspection.*

1-10

## Performance Based Regulation

- *Tends to be much less prescriptive regarding how licensees must accomplish regulatory objectives.*
- *Tends to be much more prescriptive regarding the results licensees must achieve to meet regulatory objectives.*

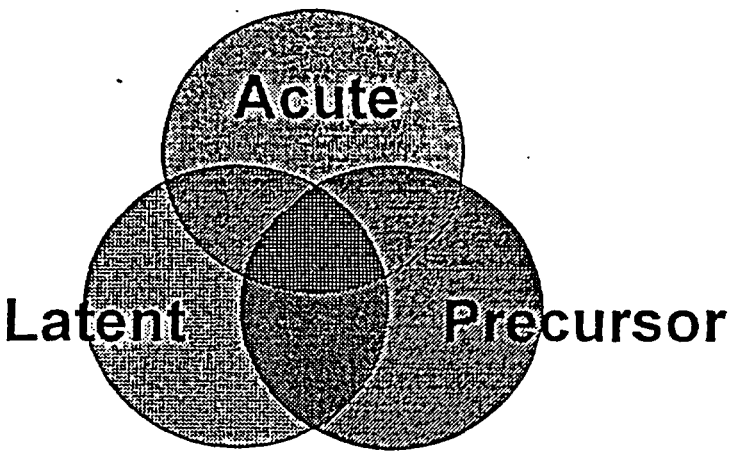
1-11

# Performance Measures

- *Safety is the relative freedom from harm or hazard to the public, workers, the environment*
- *Reliability is the capability to perform as designed or intended when needed and for the duration required*

1-12

# Performance Conditions




1-13

# Risk Factors

| Consequence | | Probability: Unlikely | Probability: Likely |
|---|---|---|---|
| | Severe | Med Risk | High Risk |
| | Minimal | Low Risk | Med Risk |

1-14

# Summary

- *Inspection techniques and efficiency will improve*
- *Inspection results will be more clearly linked to safety and reliability*
- *Licensee corrective action will be more thorough and timely*

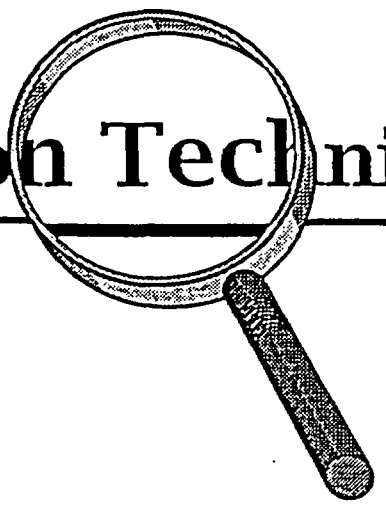


# Workshop 1:
## *Prioritize Activities*

# Instructions

- *Work together in your assigned group.*
- *Follow the guidelines in the scenario provided.*
- *Be prepared to discuss your results in 60 minutes.*

# Inspection Techniques

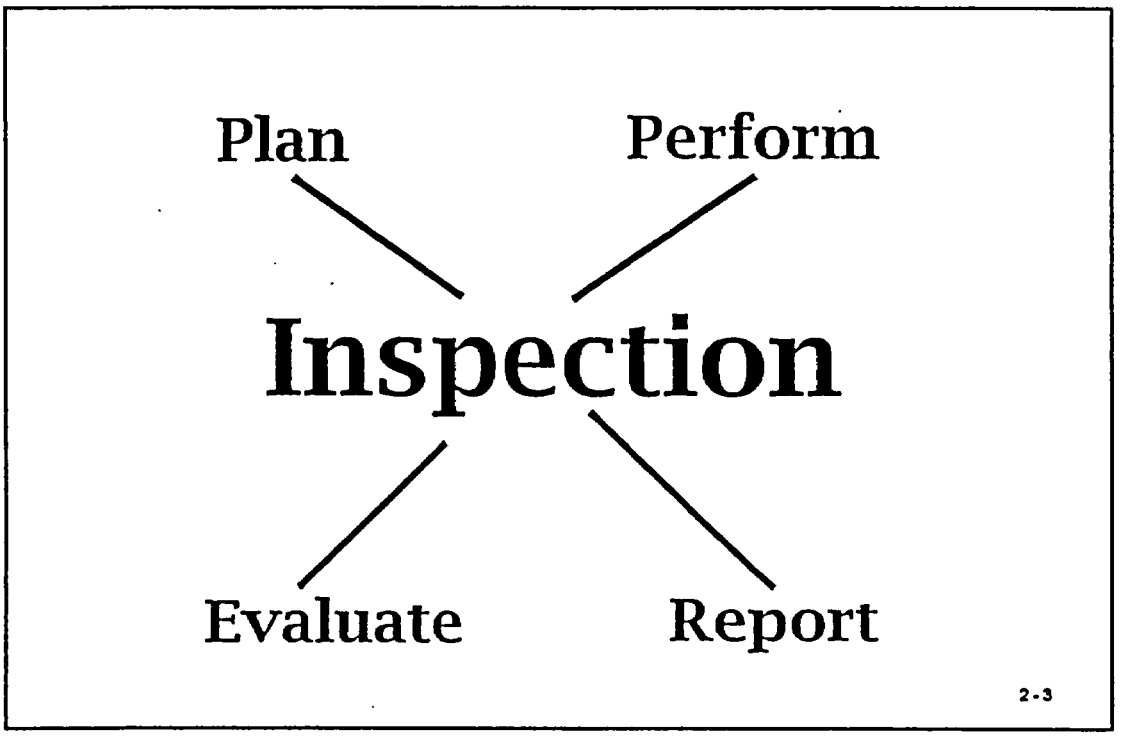


2-1

# Objectives:

- Construct a performance based inspection plan
- Describe the process to conduct a performance based inspection
- Describe how programmatic evaluation is part of performance based inspection
- Identify the performance based attributes of inspection reports

2-2




2-3

## Activities and Organizations

- Activity: composed of tasks done by workers and/or equipment.
- Organization: licensee's structure of departments and/or work units.

2-4

# Selection Guidelines

- Identify high priority activities and the organizations associated with them.
- Activities in progress are preferred
- Identify medium or low priority activities that can be inspected concurrently



# Method Selection

Preferred: *direct observation*

Indirect observation methods:

- interview licensee personnel
- review of activity documents
- demonstration or walk-through

# Assemble Resources

- Knowledge and experience of the inspector
- Agency's expectations of the licensee
- Documented materials

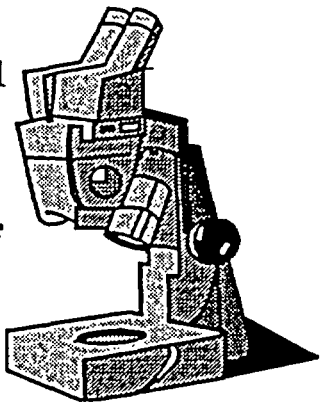


# Documented Materials

- Basic: safety analyses, design criteria, license conditions, program descriptions.
- Periodic: bulletins, notices, generic letters, administrative letters.
- Planning: licensee procedures, field notes, inspection procedures, inspection reports.
- Follow-up: historical records of licensee performance that will aid current evaluation.

## Select Elements

Elements are the things you can observe in an activity. For example: rad levels, survey technique, clarity of communication, skill of the worker, cleanliness, etc.



2-9

## Consider Personnel

- Does the assigned inspector have the skill and knowledge required to observe the elements?
- Will lengthy personal preparation be required for the assigned inspector?
- Will additional NRC personnel be necessary?
- Will outside assistance be necessary?

2-10

# Schedule Factors

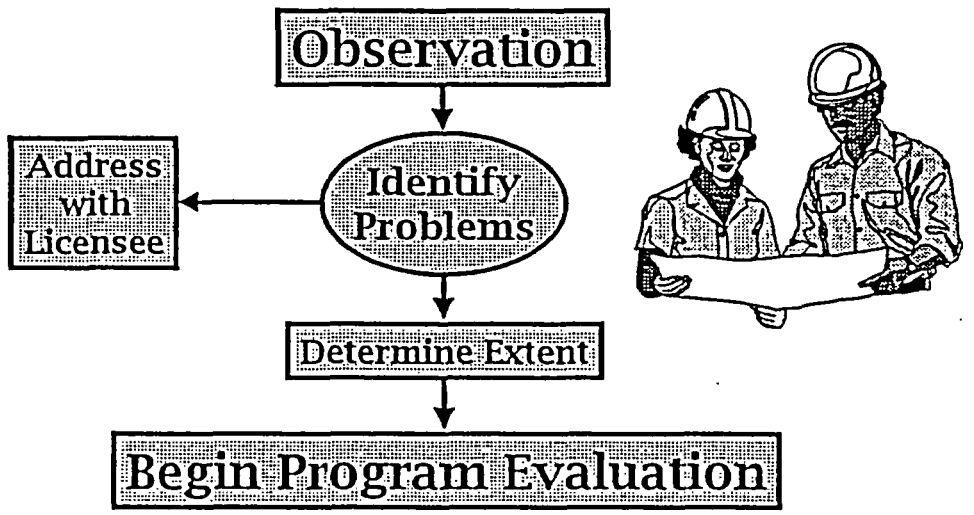
- Time for sufficient inspector preparation
- Time to acquire sufficient observation data
- Time to develop a thorough personal evaluation of the raw inspection results
- Time to translate the personal evaluation into a technically meaningful report



# Inspection Plan

- Written in a format convenient to the individual inspector(s)
- Flexible enough to allow alternate observations during work delays
- Include parallel observations of medium/low priority elements along with high priority elements

# Field Process




2-13

# Program Evaluation

- Stick to the safety issues
- Attempt to determine apparent causes
- Quickly inform licensee about any additional safety impact that may affect their operations

2-14

# IMC 0610 Reporting

- Appendix D puts NMSS reporting into context.
- Regional management has the flexibility to determine type of report, format and level of detail.
- Reports will be either narrative, field notes, or NRC 591



# Field Notes

- Sufficient detail to describe the inspection
- Compliance status of areas examined
- Follow-up status of previous enforcement or licensee events
- Sufficient support information for identified violations including corrective action status
- Sufficient detail for management to evaluate the licensee's overall safety program
- Summary statements documenting the basis for conclusions or checkmarks.

# Formal Reports

- Similar in content to IMC 0610 sections 05.01-05.03
- Standard format for materials inspection types provided in exhibits 3-5
- Section 05.05 provides some guidance for documenting performance based results



# General Reporting

- Detailed discussion for significant problems or when escalated enforcement is considered
- Also need to document assessment of performance for what was inspected - both good and bad!
- Written for the principle reader - the addressee.
- Assume the reader is conversant with nuclear technology, but not likely an expert.
- For non-fuel cycle licensees, organization and staffing issues may be documented.

# Summary

- Plan, Perform, Evaluate, Report
- Focus on activities with the most significance to safety
- Use relative risk assessment to maintain safety focus



# Workshop 2:
## *Plan a Routine Inspection*

# Instructions:

- *Work together in your assigned groups*
- *Using the scenario assigned develop a plan for the inspection*
- *You may use <u>any</u> resources available to you here in the region.*
- *Be prepared to deliver a presentation of your plan to the class.*

2-21

# Workshop 3:
## *Plan a Reactive Inspection*

2-22

# Instructions:

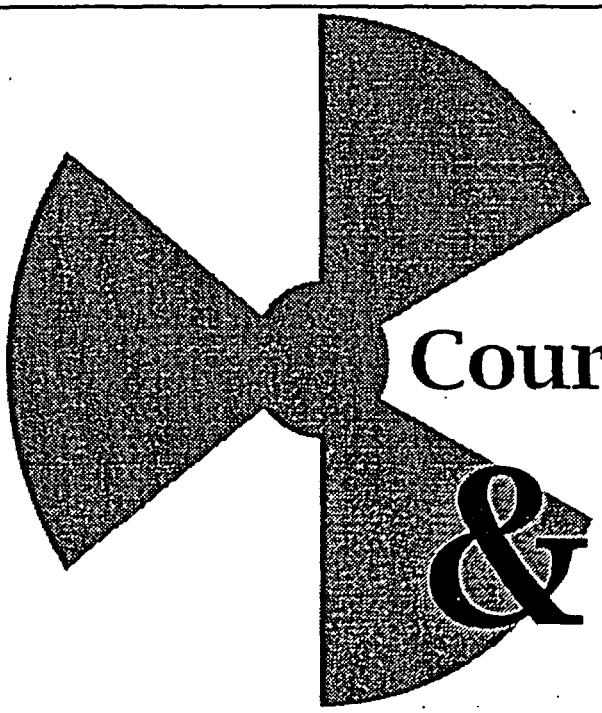
- *Work together in your assigned groups*
- *Using the scenario provided develop a plan for the inspection*
- *You may use any resources available to you here in the region.*
- *Be prepared to deliver a presentation of your plan to the class.*



# Workshop 4:
## *Evaluate Inspection Reports*

# Instructions:

- *Work together in your assigned groups*
- *Follow the instructions in the scenario provided*
- *Be prepared to deliver a presentation of your results to the class.*



# Course Review & Exam

3-1

# Emphasis...

After newly implemented programs are fully functional, the licensee's ability to perform program activities must become the principle focus of inspections.

3-2

# Performance

Synonymous with execution and accomplishment. NRC expects the licensees to have programs in place and to execute them in order to achieve safety and regulatory compliance.



# Performance Based Inspection

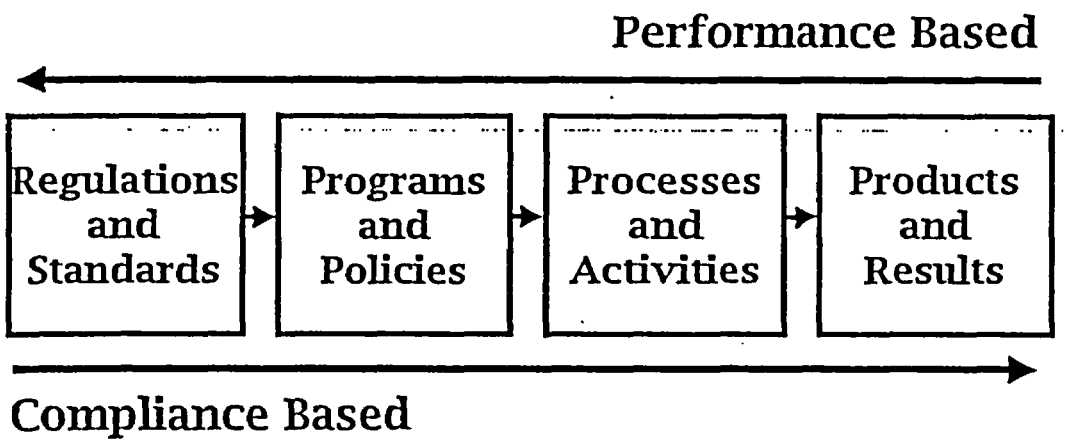
*Observations to determine whether or not a licensees program activities are executed in a manner that ensures safety and regulatory compliance.*

# Purposes

- Put inspectors in the best position
- Provide hard facts to support inspection conclusions
- Provide example to licensees

3-5

## Performance Based Sequence




3-6

# Compliance

NRC will always strive to ensure the correction of non-compliance.

However, compliance is a minimum rather than a maximum standard in performance based inspection.

3-7

# Performance Based Regulation

- Less prescriptive about "how" a licensee must achieve regulatory objectives.
- Inspectors must understand the technical nature of the regulatory objectives in order to determine the effectiveness of licensee programs.

3-8

# Performance Measures

- *Safety* is the relative freedom from harm or hazard to the public, workers, or the environment.
- *Reliability* is the capability to perform as designed or intended when needed and for the duration required.

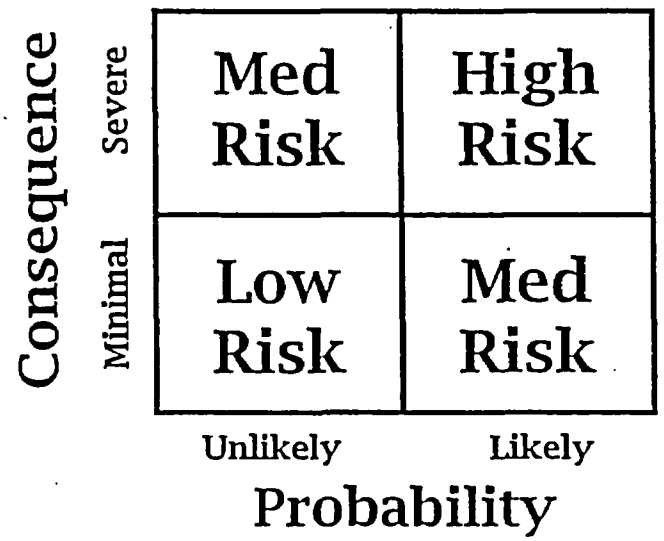
3-9

# Performance Conditions

- Acute conditions are obvious.
- Latent conditions are hidden or underlying.
- Precursor conditions are time dependent and changing.

3-10

# Risk Factors




3-11

# Inspection Structure

- *Plan* for the inspection
- *Perform* the inspection
- *Evaluate* inspection results
- *Report* inspection results

3-12

# Plan the Inspection

1. Select organizational arrangement
2. Establish activity priority
3. Select methods of inspection
4. Assemble inspection resources
5. Select inspection elements
6. Consider personnel requirements
7. Evaluate schedule constraints
8. Develop written inspection plan
9. Prepare for observations



# Perform the Inspection

- *Observe and note any problems*
- *Address problems with licensee*
- *Determine the extent of problems*

# Evaluate Results

- *Stick to the safety issues*
- *Attempt to find apparent causes*
- *Keep licensee informed about any new problems discovered*



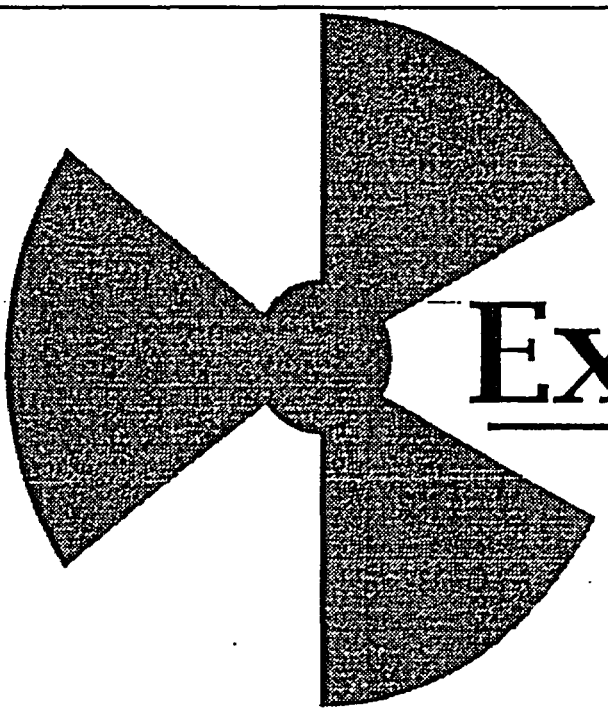
# Report Results

- *IMC 0610 and regional preference governs.*
- *Details only for significant issues or when escalated enforcement*
- *Written for the addressee who may not be a technical expert.*

# Workshop Lessons

- Planning need not be complicated nor time consuming
- Group planning can save time and enhance quality of inspection
- Our own knowledge and experience are valuable resources
- Group discussion can stimulate our thinking and improve understanding





# Exam

# Instructions:

1. Put name on front exam sheet
2. Do not separate exam sheets
3. Closed book; no time limit
4. Complete evaluation forms
5. You may leave when finished!