Use of a Graded Approach in the Application of Regulatory Inspection Programmes

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Purpose of a Graded Approach

- Focus agency resources where they can most benefit people and the environment
- Ensure licensees maintains sufficient staff and facility equipment to prevent events
- Prioritize agency actions

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U.S. Power Reactor

- Resident Inspectors
  - US power plant utilize at least one resident and senior resident at each location
  - US power plant inspectors report to a Regional Office
  - Headquarters office are supplemental resources for additional inspections and technical reviews

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U.S. Research Reactors

- Inspector assigned multiple facilities
- Inspector may also be assigned project manager responsibility
- Inspectors consolidated at NRC headquarters in DC and visit sites on a pre-determined schedule
- Reactive inspections occur as needed

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IAEA Safety Guide GS-G-1.3

- Regulatory Inspection of Nuclear Facilities and Enforcement by the Regulatory Body
  - Allows for the use of resident or non-resident inspectors
  - Encourages planned, reactive, announced, and unannounced inspections
  - Individual or team inspections as appropriate

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Two Classes of U.S. Licenses

- Class 104 License
  - Medical therapy facility
    - Boron neutron capture therapy
  - Research and development facility
    - University, private, or government research reactor
- Class 103 License
  - Commercial facility
    - Greater than 50 percent of costs are for commercial activities
    - Medical isotope production facility
    - Nuclear power plant

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Graded Approach to Licensing

- Research Reactor (lower source term)
  - Licensed power up to 10 Mega-Watt (MW) thermal
- Testing Facility (higher source term)
  - Licensed power greater than 10 MW thermal
  - License power greater than 1 MW thermal and:
    - a circulating loop in the core for fueled experiments,
    - liquid fuel, or
    - an in-core experiment with cross sectional area greater than 16 in^2 (100cm^2)

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Range of Facilities

- U.S. Experience (thermal power limits)
  - Smallest, AGN 5 Watts (W)
  - Largest, plate-type 20 MW
  - Typical TRIGA 1 MW with 1,500 MW pulse capability

(AGN – Aerojet General Nucleonics)

(TRIGA – Training Research Isotope production General Atomics)

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Range of Equipment

- High power research reactors have more equipment
  - Coolant flow pumps
  - Containment with controlled leakage and pressure requirements (versus a confinement system)
  - Emergency cooling
  - Ventilation filters during emergency
  - Required back-up power system

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Other Impacts

- A facility that is performing initial testing or restart should receive increased attention
- A facility with performance concerns should have increased inspections
- Agency review of operating experience may identify equipment or facility types that need more frequent inspections

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Rationale

- Why does a graded approach make sense?
  - A more complex design will have an increased probability of an initiating event
  - A higher power reactor will have a higher source term, which has the potential to increase the consequence of an accident
  - Risk is the combination of probability with consequence, so a higher power research reactor is a higher risk than a low power research reactor

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GS-G-1.3 Safety Guide

- Section 3.14 “Inspections by the regulatory body should be concentrated on areas of safety significance”
- Section 3.15 “ … the degree to which the area should be considered will depend on the nature of the facility and the risks associated with it ...”

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Caution

- Even the smallest reactors must be properly monitored. The only research reactor in the US currently shutdown because of a safety concern is a 5 W reactor. The issue was identified by a project manager working on the license renewal application safety review.

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Inspection Concept

- The licensee is responsible for safe operation of the facility
- Site inspections are intended to be a sampling of licensee behavior
- The baseline frequency and type of inspection is set by the power level, but poor licensee performance can lead to additional inspection items or visits

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Routine Inspections

- Routine scheduled visit (need to ensure licensee will be present when conducting the inspection):
  - Frequency based on power level
  - Modules predetermined and identified to the licensee
  - Inspection dates coordinated with licensee schedule of availability (minimizing conflict)
- Reactive and non-routine inspections are scheduled, based on need

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Routine Inspection Frequencies

- Class I
  - Thermal power is 2 Megawatts or more
  - Inspection effort consists of 10 modules (inspection procedures)
  - Entire program is repeated annually (2 one-week visits annually)
- Class II
  - Thermal power is less than 2 Megawatts
  - Inspection effort is one module with 11 sub-topics
  - Program is completed over a two year interval (2 one-week visits)
- Class III
  - Long-term Shutdown or Possession only license
  - Inspection effort is five modules
    - Some may not be necessary
  - Inspected once every three years
- Actively Decommissioning
  - License is amended for possession only
  - NRC Office of Federal and State Materials and Environmental Management Programs (FSME) provides regulatory oversight of decommissioning

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Non-Routine Inspections

- Industrial Safety
- Transportation Requirements 49 CFR 172-178
- Transportation of Radioactive Materials and Activities
- Event/Accident root cause analysis (special inspections)
- Decommissioning Plan and License Termination Plan
- Allegations

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Reactive Inspections

- Reactive Inspection
  - Augmented Inspection Team
  - Special Inspection Team
  - Office of Investigation Inspection
    - Suspected wrongdoing (intentional actions)
  - Security Inspections
    - National Events
    - Changes to Physical Security Plan

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Agency Non-Inspection Activity

- Site visits that do not constitute an inspection
  - Project Manager routine/orientation visit (helps routine communication and incident response with an improved understanding of the physical layout of the facility)
  - Audit of materials in support of a licensing action (seeing what is described in the application can reduce the need for follow up questions)
  - Senior management level visits (Goodwill visit provides additional opportunity for dialog)

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Preparation for Inspection

- Discuss facility activities with Project Manager
  - Recent modifications
  - Current amendment requests
  - Items from annual report
- Review previous inspection report
  - Unresolved items
  - Items for follow up
- Review required reports
  - Incident reports for regulations or technical specifications

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Results of Inspection

- Entry and Exit meeting conducted explaining what was observed and any concerns that were identified
- Discussion of potential violations
- Inspection report generated within 30-days and made publically available (redacting any sensitive information)

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Inspection Reports

- Safety significant program weaknesses will be characterized as:
  - Inspector Follow-up Items
  - Unresolved Items
  - Violations
- The goal is to formally issue routine inspection reports within 30 days and special inspection reports within 45 days
- A report with no negative findings is acceptable. It is NRC policy that the licensee is encouraged to identify and permanently fix any program weaknesses

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Management of Violations

- Violations may be written against the facility or an individual
- Program weakness are assigned a severity level (Severity Level I-IV) in the inspection report to identify its safety significance
  - Actual Safety Consequences
  - Potential Safety Consequences
  - Impacting the Regulatory Process
  - Willfulness
- The severity level also determines the monetary fines and extent of corrective actions to be taken by licensee management

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Management of Violations

- A Non-Cited Violation (NCV) describes one way to handle a Severity Level IV violation. These issues are documented as violations in inspection reports to establish public records of the violations, but are not cited in Notices of Violation which normally require written responses from licensees

- Enforcement guidance and requirements are found in 10 CFR Part 2 and the NRC Enforcement Policy and Enforcement Manual

- Risk Informed Decisions

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Violation Resolution

- Non-cited violation
  - Low level consequence event
  - Identified by the licensee
  - Corrective actions in progress or completed
  - No wrongdoing suspected
  - May be closed in inspection report

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Violation Resolution

- Some violations may have monetary fines, the actual amount can be increased or decreased depending on the circumstances
- Corrective actions must be taken and documented
- Licensee actions will be reviewed in follow up inspections

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Safety Guide GS-G-1.3

- Methods of Enforcement
  - 5.12 Modification, suspension, or revocation of the authorization (NRC Orders 10 CFR 2.202).
  - 5.13 Penalties; serious violations can include fines and persecution through the legal process
  - 5.15 No immediate threat to safety, reasonable time to respond, however, integrated approach to safety should be considered to determine the total risk for the facility

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Summary

- Graded approach to regulatory inspection
  - Frequency of inspection (when)
  - Inspection items (what)
  - Issue response based on safety consequences (how)
  - Escalation if needed (why)
  - Always keep (potential or actual) impact in mind

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Discussion

- Exchange of pros and cons to graded approach
- Insights into program effectiveness