Fundamentals of Emergency Preparedness

National Radiological Emergency Preparedness Conference
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Presenter

- Bob Kahler, Branch Chief
- NSIR/DPR/IRIB
- Office of Nuclear Security and Incident Response (NSIR)
  - Division of Preparedness and Response (DPR)
    - Emergency Preparedness
      - Inspection and Regulatory Improvements Branch (IRIB)
Meet your presenter...

- **NRC**
  - 2001 to Present

- **Beaver Valley Power Station**
  - 1981 to 2000
  - EP Manager
  - Simulator/Classroom Instructor
  - SRO license on both units

- **Shippingport Atomic Power Station**
  - 1979 to 1981
  - Reactor Operator
Workshop Overview

• Role of the NRC in the Federal Government
• Introduction and History of EP
• Emergency Planning Zones (EPZs) and Emergency Action Levels (EALs)
• EP Regulations and Guidance
• EP Inspection Program
• FEMA and Offsite Preparedness
• EP Going Forward
Role of the NRC in the Federal Government
Executive Branch

• Created to “execute” the law and run the day-to-day activities of the government

• Primarily comprised of several different entities:
  – Executive Office of the President
    • Support staff and Councils
  – Departments
  – Independent agencies and Government Corporations
  – Quasi-Official agencies
    • Smithsonian Institution
Departments

- Heads of executive departments are members of Cabinet
- Cabinet members are appointed by President and must be confirmed by simple majority of Senate
- Cabinet members serve for that President while in office
  - President can remove member without consulting Senate
- These departments sensitive to political factors and partisan politics
- Examples
  - Department of State
  - Department of Defense
  - Department of Energy
  - Department of Homeland Security
Independent Agencies

- Comprise all Federal agencies not included under
  - executive departments
  - direct authority of President

- Commissioners/Administrators typically appointed by President
  - Confirmed by simple Senate majority to fixed terms
  - President cannot remove from position
  - Requires act of Congress for removal

- Established and given authority and direction by Congress
  - Includes power of rulemaking

- Agency rules (or regulations)
  - Power of federal law
  - Code of Federal Regulations

- Matters too complex for ordinary legislation
  - Responsible for keeping the government and economy running smoothly
Independent Agencies

- "Independent" agencies not under direct control of President
  - partisan politics have less effect on daily operations or policy

- Examples
  - National Aeronautics and Space Administration
  - Federal Communications Commission
  - National Transportation Safety Board
  - U.S. Postal Service
  - Peace Corps
  - Federal Reserve
  - Central Intelligence Agency
  - Social Security Administration
  - Nuclear Regulatory Commission
Nuclear Regulatory Commission

• Atomic Energy Act of 1954
  – Made development of commercial nuclear energy possible
  – Atomic Energy Commission (AEC)
    • development and production of nuclear weapons
    • development and regulation of civilian uses of nuclear materials
    • Sought to ensure public health and safety without inhibiting nuclear industry growth

• Energy Reorganization Act of 1974
  – Conflict of interest between regulating & promoting nuclear power
  – Congress split AEC into two agencies
    • Department of Energy (a Cabinet agency)
      – development and production of nuclear weapons
      – promotion of nuclear power
      – other energy-related work
    • Nuclear Regulatory Commission
      – regulate civilian nuclear materials
      – does not regulate defense nuclear facilities
The Commission

• NRC headed by five Commissioners
  – President appoints Commissioners
    • Confirmed by Senate
    • Five-year terms
    • Term can be renewed
  – President designates one Commissioner as Chairman
    • Official Commission spokesperson
    • President can change Chairman designation at any time
    • President can not add or remove Commissioners without the consent of Congress
  – No more than 3 of the 5 Commissioners can be of the same political party
  – Policy decisions by the Commission require a majority vote
The NRC Staff

- NRC staff directed by Executive Director for Operations (EDO)

- EDO
  - carries out policies and decisions of Commission

- Commission
  - Five person collegial body

- Commission
  - Overall agency
Introduction and History of Emergency Preparedness
Topics:

• What is Emergency Preparedness?

• Why prepare?

• History of EP
What is Emergency Preparedness?

• Overall objective of EP
  – To ensure that the nuclear power plant licensee is capable of implementing adequate measures to protect public health and safety in the event of a radiological emergency
Philosophy

• Ensure licensee is capable of protecting public health and safety
  – Defense-in-depth
  – EP does not consider probability of an event
  – EP requires constant state of readiness
  – Last line of defense
Regulations

• What are adequate measures?
  – Planning
    • 10 CFR 50.47
    • 10 CFR 50 Appendix E
    • Supporting documentation
Components of Onsite Emergency Plan

- **Documents**
  - Emergency Plan
  - Implementing Procedures
  - Emergency Action Levels (EALs)

- **People**
  - Emergency Response Organization (ERO)
  - Trained

- **Facilities**
  - Equipment
  - Maintenance
  - Power/survivability
  - Communications

- **Agreements**
  - Offsite assistance
Why prepare?

- Prudent
  - Prepare for emergency, regardless of likelihood

- Planning
  - Strategy with supporting infrastructure in place

- Training and practice
  - Maintain human expertise

- Examples:
  - Emergency Plan
  - NRC Operations Center
  - Fire drill
Clarifications

• Commercial nuclear power plants

• EP is for *ALL* initiating events
  – Operational accident, natural disaster, or terrorist attack
  – Regardless of cause, EP objective is the same
  – Radiological consequences of hostile action can be no greater than operational reactor event

• EP and Incident Response are *NOT* the same
  – EP creates the response framework
  – Incident Response is the action itself
  – NRC role during Incident Response
    • Provide assistance and expertise
    • Not an inspector
History of EP Requirements

Pre-TMI

• 1958 – Atomic Energy Commission (AEC)
  – Outlines procedures for radiological emergency response
  – Emergency plans were vague, sketchy, and low in priority

• 1966 – Advisory Committee on Reactor Safeguards (ACRS)
  – Raised concern regarding adequacy of emergency planning
  – MW output

• 1970 – AEC drafted guidelines for public comment
  – Existing requirements improved
  – New Appendix E to 10 CFR Part 50
  – Approved by Commission in December, 1970
History of EP Requirements Pre-TMI

• 1970 – Appendix E to 10 CFR Part 50

ONSITE

– Assign duties and authorities of emergency response personnel

– Arrangements for working with local, State and Federal agencies to notify and evacuate the public

– Procedures for training personnel

– Conduct of drills and exercises
History of EP Requirements Pre-TMI

• 1970 – Appendix E to 10 CFR Part 50

OFFSITE

(licensees were responsible)

– Traffic Control
– Fire Protection
– Medical Support
– Decontamination
– Evacuation

• Provide for transportation, shelter, food, sanitation
History of EP Requirements Pre-TMI

• 1973 – AEC designated as lead agency for radiological emergency planning
  - AEC issues guidance to State and local governments
    • checklist of 154 items
  - Emphasized that emergency plans should cover most serious “design basis” accidents

• 1975 – January 19th
  - Nuclear Regulatory Commission created
  - Focused attention on protecting public health and safety
History of EP Requirements Pre-TMI

• 1977 – NRC publishes Regulatory Guide 1.101
  – Detailed information on emergency plan content

• 1978 – NRC-EPA task force developed
  – NUREG-0396 created
  – Emergency Planning Zones (EPZs) created
  – Spectrum of accidents (not the source term from a single accident sequence) should be considered in developing a basis for emergency planning
History of EP Requirements Pre-TMI

• Creation of FEMA
  – Before 1979, emergency response activities were fragmented
  – 100+ federal agencies involved
    • compounded complexity of federal disaster relief efforts
  – National Governor's Association asked President Jimmy Carter to centralize federal emergency functions
  – 1979 executive order merged disaster-related responsibilities into a new Federal Emergency Management Agency (FEMA)
History of EP Requirements - TMI

• March 28, 1979
  – Three Mile Island, Unit 2
  – General Accounting Office (GAO) recommends State/local emergency plans meet NRC guidelines
  – GAO urged adoption of EPZ concept
  – GAO called for measures to better inform the public
    • Kemeny Commission report (TMI investigation)
  – FEMA designated lead agency for offsite oversight
  – MOU delineating FEMA and NRC roles
    • On the basis of FEMA’s assessment, NRC retained responsibility for judging whether or not the “overall state of emergency preparedness” was satisfactory
History of EP Requirements - TMI

• 1980 – NRC authorization bill mandates stricter EP requirements
  – Licenses contingent on approved State/local plans
  – Concern State/local governments have veto authority
  – Congress declined to expand NRC’s authority to provide emergency plans for States that refused to cooperate
    • legislation failed 3X’s
  – Owners of existing plants had until April 1, 1981 to develop adequate plan
History of EP Requirements

• 1982 – FEMA finds State/local plans deficient for Indian Point 2/3
  – Westchester County evacuation uncertainties
  – Rockland County refusal to participate in drill
    • State of New York substituted for Rockland County
  – Commission voted 3-2 to allow operation
  – NRC staff discussed creation of 2-mile “prompt” action zone within EPZ
  – Congress did not approve
History of EP Requirements

• 1982 – Shoreham
  – Consultant concluded 10 mile EPZ was inadequate
    • 25% of residents would leave island
  – Suffolk County Executive and New York Governor (Cuomo) refused to cooperate with emergency planning efforts
  – Long Island Lighting Co (LILCO) argued State/local agencies were misusing NRC’s regulations

• 1986 – Seabrook
  – Controversy of evacuation/sheltering of beaches
  – MA refused to participate in exercise, would not prepare plans
  – Utility requested exemption to NRC’s rules
    • Argued 2 mile EPZ was sufficient

• 1986 – Chernobyl
History of EP Requirements

Seabrook Siren Trucks
History of EP Requirements

• 1987 – Realism Rule
  – Allows issuance of license in the absence of State/local government cooperation if:
    • Applicant made good faith effort to obtain cooperation
    • Applicant prepared achievable emergency with “likely State or local response to an actual emergency”
  – Based on assumption that State/local governments would protect public
History of EP Requirements

• 1992 – Turkey Point & Hurricane Andrew
  – Clarified roles between NRC and FEMA
  – FEMA reasonable assurance determination
  – MC 1601, “Communication Protocol For Assessing Offsite Emergency Preparedness Following a Natural Disaster”

• 2000 – Reactor Oversight Process (ROP)
  – Emergency Preparedness is one of seven cornerstones
History of EP Requirements

• September 11\textsuperscript{th}, 2001
  – NRC Operations Center activated for several months

• February 25\textsuperscript{th}, 2002
  – Order issued to all 104 nuclear power plants
    • Interim Compensatory Measures (ICM’s)
    • Three Emergency Preparedness items
History of EP Requirements

• 2004
  – Need for larger focus and increased communication of EP
  – Created Division of Preparedness and Response in NSIR
  – EP staff rose from ~10 to >30 HQ employees
  – New one-day training course created

• 2005
  – Comprehensive review of EP regulations and guidance
NEXT

EP Philosophy and Concepts
BREAK
Topics:

• Defense-in-Depth
• Protective Action Guides
• Emergency Planning Zones
• Offsite EP concepts

• Emergency Response Facilities
• Onsite EP concepts
• Emergency Plans
• Emergency Classes
• Emergency Action Levels
Defense-in-Depth Safety Philosophy

• High quality design and construction
• Safety systems
• Containment structures
• Emergency Planning
Planning Philosophy

- Planning reduces complexity of decision making
- Planning simplifies choice of possible responses
- Judgment required only for viable alternatives
2 Pieces of Emergency Preparedness

Offsite

Onsite
EPA-400

• “Manual of Protective Action Guides and Protective Actions for Nuclear Incidents”
• Guidance in creating emergency plans and decision making strategies
• Source of Protective Action Guidelines (PAGs)
• Protective actions based on Dose Assessment
Protective Action Guide (PAG)

• PAG
  – projected dose from unplanned release at which a specific protective action to reduce or avoid dose is recommended

• Used as guidance for triggering appropriate protective actions to minimize dose

• At PAG levels, no health effects detectable, even for sensitive populations such as pregnant women
PAGs

• Established by the EPA and FDA
• Current guidance: EPA-400, October 1991
  – 1-5 rem warrants evacuation or sheltering
  – 25 rem to thyroid warrants administration of stable iodine

• Based on projected dose
  – does not count dose already received
Emergency Planning Zones (EPZs)

- **Plume Exposure Pathway**
  - 10 mile radius

- **Ingestion Exposure Pathway**
  - 50 mile radius
Plume Exposure Pathway EPZ

- Area requiring immediate protective actions
- Approximately 10 miles in radius
- Size based upon:
  - Projected doses from design basis accident (DBA) do not exceed EPA PAGs outside EPZ
  - Immediate life-threatening doses would generally not occur outside zone for worst-case core melt sequence
  - 10 mile EPZ provides base for expansion if necessary
• Boundaries typically determined by topography and political jurisdictions
  – Roads, rivers, lakes, peninsulas
  – Municipal, County, State jurisdictions
Plume Exposure Pathway EPZ

• Provisions for action within EPZ
  – Prompt decision making for public protective actions
  – Development of evacuation plans
  – Public information program
  – Prompt public alerting and notification
  – 24/7 communication capability with State/local officials
  – Monitoring of offsite radiological release
  – Activating & maintaining Emergency Operations Centers
IMPORTANT EMERGENCY INFORMATION

FOR THESE COLUMBIANA COUNTY COMMUNITIES:
• EAST LIVERPOOL FIRST WARD  • EAST LIVERPOOL SECOND WARD  • EAST LIVERPOOL THIRD WARD
• EAST LIVERPOOL FOURTH WARD  • LIVERPOOL TOWNSHIP EAST  • LIVERPOOL TOWNSHIP WEST
• MIDDLETOWN TOWNSHIP (EAST OF 170 AND SOUTH OF TOWNSHIP ROAD 102)  • ST. CLAIR TOWNSHIP (EAST OF CANNON MILLS ROAD)

THIS INFORMATION IS IMPORTANT. DO NOT DISCARD. KEEP IN A HANDY PLACE, DISPLAY IT PROMINENTLY.

Do You Know What to Do When the Alert Siren Sounds?

Turn on your radio or TV!

*The Alert siren signal is a steady, three-minute tone. It will be used to alert of an impending natural emergency (such as a flood, tornado, or earthquake) or a man-made emergency (such as a chemical spill or a nuclear power plant emergency). If you hear the Alert signal . . . Turn on your radio or TV for instructions.

This brochure has been prepared and printed by Duquesne Light Company, in cooperation with the County of Columbiana Board of Commissioners and the Columbiana County Emergency Management Agency.
Prompt Public Notification

- Alert and Notification Systems
  - Sirens
  - Tone Alert Radios (TARs)
  - REVERSE 911®
  - Route Alerting
  - Emergency Alert System (EAS)
Ingestion Exposure Pathway EPZs

- Protect from consumption of contaminated food
- Considerable time to act (typically State level)
- Approximately 50 miles in radius
- Sized based upon:
  - Contamination will not exceed PAGs beyond 50 miles
  - Particulate material would be deposited within 50 miles
  - Likelihood of exceeding PAGs at 50 miles is comparable to exceeding PAGs at 10 miles
Brief History of EPZs

- 1970s
  - Dilemma – Federal Govt has no statutory authority over offsite agencies
  - Accomplished on cooperative basis
  - Growing concern over ability of State and local governments to respond to nuclear incident
Brief History of EPZs

• 1978 – Established concept of EPZs
  – Joint NRC/EPA task force findings
    • Major threat for DBA in range of 2-3 miles
    • Establishment of EPA PAGs and 10 mile EPZ appeared conservative approach
    • Response not necessary in entire 10 mile EPZ, but planning mechanisms would be in place
Relationship between PAGs and EPZs

- PAGs used as trigger for protective actions
  - Protect public health and safety
  - Minimize exposure to general public and emergency workers
  - Not to be used as acceptable dose limits
  - PAGs and EPZs complement each other
- Not to be used to determine EPZ size
Emergency Response Facilities

- Emergency Response Facilities (ERFs)
  - Technical Support Center (TSC)
  - Operations Support Center (OSC)
  - Emergency Operations Facility (EOF)
Technical Support Center (TSC)

- Reduces congestion and confusion in Control Room
- Monitor, Diagnose, and Mitigation Strategies
  - Access to technical data
  - Responsible for engineering support
  - Onsite Radiological Monitoring
- Typically 30 minutes to staff
- Located near Control room for fast access
Operations Support Center (OSC)

- Relieves influx of emergency response craft personnel in Control Room
- Emergency response craft personnel receive instruction and coordination by operations staff
- Coordination of damage control teams
Emergency Operations Facility (EOF)

– Near-site*
– Interface with offsite agencies
– Receives turnover from TSC
– Organization
  • Emergency Director
  • Communications
  • Public information
  • Accident analysis
  • Dose assessment/offsite monitoring
  • Protective Action Recommendation (PAR)
  • State and county liaisons
  • Support
Offsite EP Interface

- State/local 24/7 communication
- Activities of interest at State level
  - Technical assessment
    - Dose Assessment
  - Decision Making
Offsite EP

- Joint Information Center (JIC)
  - Coordinated dissemination of public information
  - State/county liaisons
  - Media liaisons
  - Location for media briefings and news conferences
Event Classification

• Emergency Classes
  – Notification of Unusual Event (NOUE or UE)
  – Alert
  – Site Area Emergency (SAE)
  – General Emergency (GE)
Emergency Classifications

- Unusual Event (UE)
- Alert
- Site Area Emergency (SAE)
- General Emergency (GE)
Alert Definition

• Alert
  – Events are in progress or have occurred which involve actual or potential substantial degradation of the level of safety of the plant.
  • Any release is expected to be a small fraction of EPA PAG levels
Site Area Emergency Definition

• Site Area Emergency
  – Events are in progress or have occurred which involve actual or likely major failures of plant functions needed for protection of the public.
  • Any release is not expected to exceed EPA PAG levels near the site boundary.
General Emergency Definition

• General Emergency
  – Events are in progress or have occurred which involve an actual or imminent *substantial core degradation or melting with the potential for loss of containment integrity*.
  
• Releases can be reasonably expected to exceed EPA PAG levels offsite

• NOTE: a GE does **NOT NECESSARILY** mean that a release is in progress
Emergency Classifications

• No release expected
  – Unusual event

• Any release is expected to be a small fraction of EPA PAG levels onsite
  – Alert

• Any release is not expected to exceed EPA PAG levels near the site boundary but may exceed EPA PAG levels onsite
  – Site Area Emergency

• If there is a release, it can be reasonably expected to exceed EPA PAG levels offsite
  – General Emergency
Flow of Events

• Initiating Conditions

• Emergency Action Levels

• Emergency Classifications

• Offsite Actions, if necessary
Initiating Conditions

• Predetermined subset of conditions
  – Examples:
    • Measurable parameter (RCS temperature)
    • Event (fire, flood, security)
    • Barrier breach (RCS pipe break)
## Facility Staffing vs Classification

<table>
<thead>
<tr>
<th></th>
<th>UE</th>
<th>Alert</th>
<th>SAE</th>
<th>GE</th>
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</thead>
<tbody>
<tr>
<td><strong>ERO</strong></td>
<td>On-shift staff</td>
<td>Augmented</td>
<td>Augmented</td>
<td>Augmented</td>
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<tr>
<td><strong>Facility</strong></td>
<td>Control Room (control)</td>
<td>TSC/OSC (turnover/control) EOF (staffing)</td>
<td>TSC/OSC (control) EOF (turnover/control)</td>
<td>TSC/OSC/EOF (control)</td>
</tr>
<tr>
<td><strong>ORO</strong></td>
<td>Notified</td>
<td>Staffing</td>
<td>Preliminary Protective Actions</td>
<td>Protective Actions</td>
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EP Regulations and Guidance

EP Inspection and Enforcement
BREAK
EP Regulations and Guidance

EP Inspection and Enforcement
EP Regulations and Guidance

- 10 CFR 50 Appendix E
- 10 CFR 50.54(q)
- 10 CFR 50.47(b) -- The 16 Planning Standards
- 10 CFR 50.54(t)
- Supporting Guidance
10 CFR 50 Appendix E
“Emergency Planning and Preparedness for Production and Utilization Facilities”

- Contains requirements for emergency plans for non-power reactors
- Emergency Plans are a part of power reactor applicant’s Final Safety Analysis Report (FSAR), Chapter 13
- Contains supporting requirements for the planning standards in § 50.47(b) for power reactors
- Requirements for content of applicant’s emergency plan only
  - Must include compliance with standards of § 50.47(b)
- Examples
  - Offsite notification capability within 15 minutes of emergency declaration
  - Defines equipment and facility needs
  - Defines exercise and training expectations
10 CFR 50.54(q)

- § 50.54, Conditions of Licenses
  - requirements that are conditions to every power reactor operating license

- § 50.54(q) addresses the licensee’s Emergency Plan
  - Licensees shall follow and maintain in effect emergency plans which meet the requirements in Appendix E, and for power reactors, the planning standards of § 50.47(b)

  - Licensees can make changes to emergency plan without prior Commission approval as long as it does not represent a:
    - Decrease in Effectiveness (DIE) of the plan; and,
    - the plan continues to meet the requirements in Appendix E, and for power reactors, the planning standards of § 50.47(b)

  - Most EP violations are cited against § 50.54(q)
10 CFR 50.47(b)

• 16 Planning Standards
  – A high-level set of standards to be applied to emergency planning
    • Further detail on how to comply with the planning standards is contained in NUREG-0654/FEMA-REP-1
  – Must be met in licensee and State and local emergency plans
  – Power reactors only
Primary responsibilities for emergency response by the nuclear facility licensee and by State and local organizations within the EPZs have been assigned, emergency responsibilities of the various supporting organizations have been specifically established, and each principal response organization has staff to respond and to augment its initial response on a continuous basis.

- **Translated:**
  - Responsibilities for onsite/offsite personnel/organizations are established to support 24/7 coverage

- **Examples:**
  - Emergency response organizational chart
  - Position descriptions
10 CFR 50.47(b)(2)

On-shift facility licensee responsibilities for emergency response are unambiguously defined, adequate staffing to provide initial facility accident response in key functional areas is maintained at all times, timely augmentation of response capabilities is available and the interfaces among various onsite response activities and offsite support are specified.

• **Translated:**
  – Transition from normal duties to emergency responsibilities; ensuring sufficient on-shift emergency staff at all times; timely augmentation of on-shift staff; and identifying offsite emergency resources

• **Examples:**
  – Shift Manager to Emergency Director
  – Shift Staffing Schedule to Support On-shift Emergency Response
  – Identify local ambulance agency(s), fire department(s), police, hospital(s), etc. and obtain MOU’s
Arrangements for requesting and effectively using assistance resources have been made, arrangements to accommodate State and local staff at the licensee’s near-site EOF have been made, and other organizations capable of augmenting the planned response have been identified.

• **Translated:**
  – Federal, State, and local governmental assistance is arranged with space available in EOF for their response and other technical organizations as needed by the plan

• **Examples:**
  - INPO
  - Utility Owners Group
  - Coast Guard
  - State Officials
  - Local Officials
  - Federal Officials
A standard emergency classification and action level scheme, the bases of which include facility system and effluent parameters, is in use by the nuclear facility licensee, and State and local response plans call for reliance on information provided by facility licensees for determinations of minimum initial offsite response measures.

- **Translated:**
  - Ability to classify an emergency via a standard scheme
- **Examples:**
  - Emergency Action Levels
  - ORO Standard Operating Plans (SOPs) entry conditions
10 CFR 50.47(b)(5)

Procedures have been established for notification, by the licensee, of State and local response organizations and for notification of emergency personnel by all organizations; the content of initial and follow-up messages to response organizations and the public have been established; and the means to provide early notification and clear instruction to the populace within the plume exposure pathway EPZ have been established.

- **Translated:**
  - Capability to provide notification and response instructions to onsite/offsite emergency response personnel and the public.

- **Examples:**
  - Call out list
  - Notification Forms
  - EAS Messages
  - Alert and Notification Systems ANS)
  - Tone Alert Radios
Provisions exist for prompt communications among principal response organizations to emergency personnel and to the public.

- **Translated:** Have plans for contacting all necessary OROs and emergency personnel

- **Examples:**
  - Pagers, Cell Phones, Blackberries
  - NRC Emergency Notification System
  - Direct ringdown phones from licensee to counties/States
10 CFR 50.47(b)(7)

Information is made available to the public on a periodic basis on how they will be notified and what their initial actions should be in an emergency, the principal points of contact with the news media for dissemination of information during an emergency are established in advance, and procedures for coordinated dissemination of information to the public are established.

• Translated:
  – Information on nuclear power plant emergencies shall be provided annually to the general public and the media

• Examples:
  – JICs
  – Phone Books
  – Annual Mailers, Calendars
  – Annual Media Training
10 CFR 50.47(b)(8)

*Adequate emergency facilities and equipment* to support the emergency response are provided and maintained.

- **Translated:**
  - Provide and maintain all facilities and equipment necessary to support emergency response at all times.

- **Examples:**
  - TSC, EOF, OSC, EMAs
  - Air Samplers, Computers, FAX machines, UPS
  - Met towers
Adequate methods, systems, and equipment for assessing and monitoring actual or potential offsite consequences of a radiological emergency condition are in use.

- **Translated:**
  - Ability to monitor and assess radiological release

- **Examples:**
  - Dose modeling software
  - Radiation monitors
  - Field monitoring teams
A range of protective actions has been developed for the plume exposure pathway EPZ for emergency workers and the public. In developing this range of actions, consideration has been given to evacuation, sheltering and as a supplement to these, the prophylactic use of potassium iodide as appropriate. Guidelines for the choice of protective actions during an emergency, consistent with Federal guidance, are developed and in place and protective actions for the ingestion exposure pathway EPZ appropriate to the locale have been developed.

**Translation:**
- Have a set of preplanned protective actions (that must consider evacuation and sheltering – potassium iodide is a possible supplement, but not a replacement) that can be implemented based on radiological conditions for both EPZs

**Examples:**
- Evacuation sector maps
- Onsite Assembly Areas
- List of Dairy Farms within 50 miles
Means for controlling radiological exposures, in an emergency, are established for emergency workers. The means for controlling radiological exposures shall include exposure guidelines consistent with EPA Emergency Worker and Lifesaving Activity Protective Action Guides.

- **Translated:**
  - Have a plan for protecting and directing plant personnel that must respond to radiological hazards during an emergency and base it on the EPA guidance

- **Examples:**
  - Life-saving dose levels identified and who can authorize entry
  - Emergency worker dosimetry both onsite and offsite
Arrangements are made for medical services for contaminated injured individuals.

• **Translated:**
  – Arrangements made with ambulance and hospitals responsible for contaminated personnel

• **Examples:**
  – Evaluated drills with ambulance and hospital personnel
  – Onsite emergency medical squads
10 CFR 50.47(b)(13)

General plans for recovery and reentry are developed.

- **Translated:**
  - Create a framework for recovering from an emergency

- **Examples:**
  - Event Termination and/or de-escalation criterion pre-established in the emergency plan
**10 CFR 50.47(b)(14)**

*Periodic exercises are (will be) conducted to evaluate major portions of emergency response capabilities, periodic drills are (will be) conducted to develop and maintain key skills, and deficiencies identified as a result of exercises or drills are (will be) corrected.*

- **Translated:**
  - Evaluated and training exercises/drills are conducted to identify and correct weaknesses and maintain proficiency

- **Examples:**
  - Onsite ERO drills
  - Biennial Evaluated Exercise (FEMA)
  - Licensed Operator Requal (LOR) Drills
  - Fire Drills
  - Critiques
Radiological emergency response training is provided to those who may be called on to assist in an emergency.

- Translated:
  - Training to onsite and offsite emergency response personnel

- Examples:
  - Fire Department training on decontamination efforts
  - Classroom training on classifying emergencies
10 CFR 50.47(b)(16)

Responsibilities for plan development and review and for distribution of emergency plans are established and planners are properly trained.

- **Translation:**
  - An emergency planning department is established with qualified personnel

- **Examples:**
  - Initial and continuous training of EP department staff
  - Annual review of emergency plan
10 CFR 50.54(t)

- Periodic review of licensee’s EP program
- Conducted by persons having no direct responsibility for implementation of Emergency Preparedness Program
- Evaluation of licensee’s drills and exercises and emergency response capabilities
- Adequacy of interface with offsite agencies
- Results of review and recommendations are documented
  - Reported to management
  - Retained for 5 year period
  - Report is made available to State and local governments
10 CFR 50.72 - Notifications

– Emergencies
  • Notify NRC immediately following notification of State and local agencies and not later than one hour after declaration
  • Immediately notify NRC of emergency class escalation

– Non-emergency events
  • One, four, and eight hour reports
  • EP related eight hour report: 10 CFR 50.72(b)(3)(xiii)
    – Any event that results in a major loss of:
      » emergency assessment capability
      » offsite response capability
        (e.g., offsite notification system)
      » offsite communications capability
NUREG-0654/FEMA-REP-1

- Product of joint NRC/FEMA Steering Committee
- Guidance for complying with 10 CFR 50.47(b) and App E
### Evaluation Criteria

<table>
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<tr>
<th>Evaluation Criteria</th>
<th>Applicability and Cross Reference to Plans</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Each licensee shall establish an Emergency Operations Facility from which</td>
<td>Licensee</td>
</tr>
<tr>
<td>evaluation and coordination of all licensee activities related to an emergency is to</td>
<td>X ____</td>
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<tr>
<td>be carried out and from which the licensee shall provide information to Federal,</td>
<td></td>
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<tr>
<td>State and local authorities responding to radiological emergencies in accordance</td>
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<tr>
<td>with NUREG-0696, Revision 1.</td>
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<tr>
<td>3. Each organization shall establish an emergency operations center for use in</td>
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<tr>
<td>directing and controlling response functions.</td>
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<td>4. Each organization shall provide for timely activation and staffing of the</td>
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<tr>
<td>facilities and centers described in the plan.</td>
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</tbody>
</table>
- Appendix 1 – Emergency Action Levels
- Appendix 2 – Meteorological Criteria
- Appendix 3 – Alert and Notification
- Appendix 4 – Evacuation Time Estimates
- Appendix 5 – Glossary
- Supplement 1 – Criteria for Utility Offsite Planning
  – 1988
- Supplement 2 – Early Site Permit
  – 1996, Draft Report for Comment
- Supplement 3 – PARs for Severe Accidents
  – 1996, Draft Report for Interim Use and Comment
- Addenda
  – 2002, Replace Outdated Citations
Guidance Documents

  - Introduced concept of Emergency Planning Zones
Alternate EAL Schemes

- Products of NRC and industry
  - Acceptable alternatives to NUREG-0654 EAL Scheme

- NUMARC/NESP-007, “A Methodology for Development of Emergency Action Levels”
  - Endorsed by Reg Guide 1.101, rev. 3

- NEI 99-01, “Methodology for Development of Emergency Action Levels”
  - Endorsed by Reg Guide 1.101, rev. 4
  - Added EALs for permanently shutdown reactors and dry cask spent fuel storage
  - Improvements to NUMARC/NESP-007

- Cannot mix portions of methodologies
Generic Communications

• Inform industry of generic issues
• Bulletins, Generic Letters, Regulatory Issue Summaries, Information Notices
• A complete list of EP-related generic communications can be found at:
EP Inspection Program and Enforcement
Topics:

- ROP Framework
- EP Performance Indicators
- EP Baseline Inspection Program
- EP Significance Determination Process
Regulatory Framework

NRC Overall Safety Mission

Strategic Performance Areas

Cornerstones

Cross-cutting issues

Human Performance

Safety Conscious Work Environment

Problem Identification and Resolution

Initiating Events

Mitigating Systems

Barrier Integrity

Emergency Preparedness

Occupational Radiation Safety

Public Radiation Safety

Physical Protection

Public Health and Safety as a Result of Civilian Nuclear Power Operation

Reactors Safety

Radiation Safety

Safeguards
Performance Assessment

- Safety Cornerstones
  - Baseline Inspection Results
  - Significance Determination Process (SDP)
    - Special Inspections
  - Action Matrix
    - Regulatory Response
  - Performance Indicator Results
    - Significance Threshold

Baseline Inspection Results

Significance Determination Process (SDP)

Special Inspections

Regulatory Response

Performance Indicator Results

Significance Threshold

Action Matrix
Finding Colors / Significance Levels

- **Green**  Very low safety significance (licensee response band)
- **White**  Low to moderate safety significance (increased regulatory response band)
- **Yellow** Substantial safety significance (required regulatory response band)
- **Red**  High safety significance (unacceptable performance band)
Emergency Preparedness Cornerstone

- 3 Performance Indicators
- Baseline Inspection Program
Emergency Preparedness
Performance Indicators

- Drill and Exercise Performance (DEP)
- Emergency Response Organization Drill Participation (ERO)
- Alert and Notification System Performance (ANS)
Drill and Exercise Performance (DEP) PI

- Monitors timely and accurate licensee performance in drills and exercise when presented with “opportunities” for classification, notification, and protective action recommendations (PARs)

- 90% Green/White threshold
  
  \[
  \frac{\text{# of timely & accurate classifications, notifications & PARs (calculated over previous 8 quarters)}}{\text{# of total opportunities}} \geq 0.90
  \]

Drill/Exercise Performance

Thresholds: White < 90.0% Yellow < 70.0%
Emergency Response Organization (ERO) PI

• Percentage of ERO members assigned to fill key positions who have participated in a performance-enhancing drill/exercise

• 80% Green/White threshold

# of ERO members assigned to fill key positions that have participated in a drill (calculated over 8 quarters) / total number of key positions assigned to ERO members
ERO Drill Participation

Thresholds: White < 80.0% Yellow < 60.0%
Alert and Notification System (ANS) PI

- Monitors the reliability of offsite ANS
- Periodic tests are the regularly scheduled tests (documented in the licensee’s test plan or guidelines) that are conducted to actually test the ability of the sirens to perform their function (e.g., silent, growl, siren sound test).

- 94% Green/White threshold

\[
\frac{\text{# of successful siren tests (calculated over 4 quarters)}}{\text{# of total number of siren tests}} \times 100
\]
Alert & Notification System

Thresholds: White < 94.0% Yellow < 90.0%
Emergency Preparedness Baseline Inspections

- IP 71114 Attachments .01 - .07
  - Exercise Evaluation (biennial exercise)
  - Alert and Notification System Testing
  - Emergency Response Organization Augmentation
  - Emergency Action Levels And Plan Changes
  - Correction of Weaknesses
  - Drill Evaluation (resident inspector)
  - Force-on-Force Exercise Evaluation
Significance Determination Process

• Precepts
  – EP is a defense-in-depth measure
  – Emergency Plan being implemented in response to event (∴ probability of event is 1.0)
  – EP SDP makes a **qualitative predictive** evaluation of the impact of the finding on the licensee’s capability to implement its E-plan should an accident occur
  – Risk to public health and safety increased due to lack of fully functioning defense-in-depth feature
Two Entry Conditions

- **Failure to Comply**
  
  An EP program is noncompliant with a regulatory requirement (e.g., 16 planning standard, Appendix E)
  
  - Associated with *preparedness* issues rather than *response* issues.
  - Typically identified during routine program inspections

- **Failure to Implement**
  
  A finding during an actual event in which a failure to comply precluded effective implementation of program elements
  
  - Associated with *response* issues rather than *preparedness* issues.
Risk Significant Planning Standards (RSPSs)

• Origins of the RSPSs
  – During the development of the EP Cornerstone, the most risk-significant EP elements were identified as being distinct from other EP elements
  – Developed by a group of EP subject matter experts, including NRC staff and industry stakeholders, with input from members of the public
  – EP SDP methodology recognizes findings in the identified risk-significant elements as being more significant

• Classification - (b)(4); Emergency Action Level Classification Scheme
• Notification - (b)(5); Prompt notification of offsite officials and the public
• Dose Assessment - (b)(9); Dose assessment capabilities
• Protective Action Recommendations - (b)(10); Range of protective actions for 10 mile EPZ
NEXT

FEMA and Offsite Preparedness

EP Going Forward
FEMA and Offsite Preparedness

EP Going Forward
Topics:

• Role of FEMA
• Background – Time Line
• Licensing
• Reasonable Assurance
• Exercises
• 10 CFR 50.54(s) - Withdrawal of Reasonable Assurance
• Realism Rule
• Events Which Have Shaped the NRC/FEMA Relationship
• MC 1601 - Can We Talk?
• Memorandum of Understanding
• Research / Test Reactor and Fuel Cycle EP
Role of FEMA

Determination of “Reasonable Assurance” for offsite emergency response plans

Two basic parts:

• annual review of State and local emergency plans for a radiological emergency at a commercial nuclear power facility

• Assess the demonstration of State and local government capabilities to effectively implement their plans to protect the health and safety of the public
FEMA/DHS Time Line

- 1978 – Created as a part of a governmental reorganization
- December 1979 – Assumed the lead responsibility for offsite nuclear power plant EP
Pre-TMI
- NRC Voluntary Concurrence Program
- NRC - Lead role for both onsite & offsite emergency preparedness
- NRC coordinated Federal Radiological Emergency Preparedness Activities

Post-TMI
- “350 Process”; Offsite Planning & Preparedness a condition of licensing (P.L. 96-295, 6/30/80)
- NRC - Lead onsite role; FEMA - Lead offsite role (Presidential Directive - 12/7/79)
- FEMA coordinates Federal Radiological Emergency Preparedness Activities
FEMA/DHS Time Line (continued)

• March 2003 – Became part of the U.S. Department of Homeland Security (DHS)
• 2005 – Radiological emergency preparedness activities transferred from FEMA to the Office of Infrastructure Protection in DHS
• 2007 – REP returns to FEMA
Licensing – Initial vs. Operating

• Initial licensing
  – Granting a license is based on a finding of reasonable assurance
  – Governed by 10 CFR 50.47

• Operating reactor licensing
  – Required to maintain Emergency Plan
  – Governed by 10 CFR 50.54(q)
  – Decision to shut down an operating plant or take other enforcement action is based on a finding of no reasonable assurance
  – Reasonable assurance does not need to be reaffirmed on a periodic basis
Reasonable Assurance

• Following TMI, Commission issued regulations stating:
  – “no operating license for a nuclear power reactor will be issued unless a finding is made by the NRC that there is reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency”

• Adequacy of Reasonable Assurance
  – Requires NRC to make a predictive finding that there are no undue risks to public safety. It does not require zero risk.
Reasonable Assurance

• NRC must find that the state of emergency preparedness provides reasonable assurance that adequate protective measures can and will be taken in the event of a radiological emergency

or

• Take steps under 10 CFR 50.54(s)(2)(ii) to correct the situation
Offsite Emergency Preparedness

- Applicant/licensee does not operate in a vacuum
- Reliance on State and local governments to plan and prepare offsite
- Contiguous-jurisdiction governmental emergency planning
- Integrated guidance and criteria (NUREG-0654)
NRC and FEMA

• NRC responsible for regulating & assessing onsite emergency planning, preparedness & response

• FEMA - responsible for assessing offsite emergency planning, preparedness & response
Reasonable Assurance

• Emergency plans evaluated against 16 planning standards

• Objective is achievement of reasonable and feasible dose reductions in the event of an accident
  – Not a preset minimum dose saving or minimum evacuation time

• What may be reasonable and feasible for one plant site may not be for another
Reasonable Assurance

• NRC bases findings on review of FEMA findings and determinations as to whether State and local plans are adequate and capable of being implemented
• In addition, NRC assesses whether the onsite plan is adequate and capable of being implemented
• Adequate emergency plans are in place
  • Adequate staff and facilities to implement plan
  • Emergency Plans are workable
Exercises

• Primary means used by FEMA to assess continued adequacy of offsite EP is the evaluation of the biennial full participation exercise
Offsite Exercise Deficiencies

• What is a Deficiency?

“An observed or identified inadequacy of organizational performance in an exercise that could cause a finding that offsite EP is not adequate to provide reasonable assurance that appropriate protective measures can be taken in the event of a radiological emergency to protect the health & safety of the public living in the vicinity of a nuclear power plant”

[44 CFR 353, Appendix A]
FEMA Deficiencies

- Handling of Exercise Deficiencies
  - Deficiencies should be corrected within 120 days through remedial actions
  - FEMA HQ promptly (1-2 days) discusses these with NRC HQ
  - Within 10 days of the exercise, official notification of the deficiency is made by FEMA to the State, NRC HQ & the Regional Assistance Committee (RAC) with an information copy to the licensee
FEMA Deficiencies

- NRC notifies licensee & monitors licensee’s efforts to work with State & local authorities to correct deficiency

- Approximately 60 days after official notification of the deficiency, NRC (in consultation with FEMA) assesses progress toward resolution
Withdrawal of Reasonable Assurance -- 10 CFR 50.54(s)

- FEMA Withdraws “Approval”
  - Evaluation of Biennial Full Participation Exercises
  - “350” Process
- NRC Withdraws “Reasonable Assurance” (10 CFR 50.54(s))
  - 120-day clock
  - Commission determines whether the reactor is shut down or other actions are taken if the issues are not addressed in 120 days
Withdrawal of Reasonable Assurance -- 10 CFR 50.54(s)

• Timeline
  – A deficiency is found
  – FEMA starts a 120-day clock for the State/locals to correct the problem
  – Licensee, NRC, State, locals notified within 10 days
  – After 60 days, a progress report is made
  – After the 120 days is up, FEMA withdraws reasonable assurance
  – NRC then starts its own 120-day clock for the licensee to correct the problem or face Commission action
  – Total time from deficiency to agency action = 240 days
Realism Rule

• What happens if a State or local government refuses to participate in emergency planning?

10 CFR 50.47(c)(1)
  – Provides means for an applicant to obtain a license when State or local governments decline or fail to participate adequately in offsite emergency planning
  – Applicant/licensee may:
    • Demonstrate that deficiencies in emergency plans are not significant
    • Show that adequate interim compensatory actions have been or will be taken promptly
    • Assert that other compelling reasons exist that would permit plant operations
Realism Rule

• Compensatory actions may be required for licensing
  • May involve some form of utility offsite plan
  • Guidance contained in NUREG-0654/FEMA-REP-1, Rev. 1, Supp. 1
• NRC recognizes that in an actual emergency, State and locals will exercise best efforts to protect the public
  • Hence, 10 CFR 50.47(c)(1) is known as the “realism” rule
• Historical Perspective
  – Shoreham
    • New York refused to support the licensing of Shoreham on Long Island
  – Seabrook (NH/MA) licensed under this rule
    • Massachusetts refused to support the licensing of Seabrook which is located in New Hampshire, 2 miles from the Massachusetts State line.
Realism Rule

- Executive Order 12657
  - Directs FEMA to assist licensees when State & locals decline or fail to participate
  - 44 CFR 352 contains procedures for requesting FEMA assistance
  - Contingent on licensees making maximum use of its resources & extent of licensee compliance with 10 CFR 50.47(c)(1)
  - To date, the Order has not been invoked
The NRC/FEMA Interface

- Memorandum of Understanding (MOU)
  - Clarifies roles & responsibilities
    - FEMA
    - NRC
    - Joint
  - MOU first issued January 1980
  - Current version issued June 1993
    - Under revision
  - Appendix A to 44 CFR 353
MOU for Radiological Emergency Planning & Preparedness

- FEMA Responsibilities
  - Lead in offsite EP
  - Reviews & assesses offsite emergency plans & preparedness for adequacy
  - Makes findings & determinations as to whether offsite emergency plans are adequate & can be implemented
  - Assumes some responsibility for radiological EP training of States & locals
  - Develops & issues series of interagency assignments
MOU for Radiological Emergency Planning & Preparedness

- NRC Responsibilities
  - Assesses licensee emergency plan
  - Verifies adequate implementation of plan
  - Reviews FEMA findings & determinations
  - Makes radiological health & safety decisions on the overall state of EP
MOU for Radiological Emergency Planning & Preparedness

• Areas of Cooperation
  • NRC Licensing Reviews
  • FEMA Review of Offsite Plans & Preparedness
  • Preparation for & Evaluation of Joint Exercises
  • Withdrawal of Reasonable Assurance
  • Emergency Planning & Preparedness Guidance
  • Public Information & Education Programs
  • Recovery from Disasters Affecting Offsite Emergency Preparedness
FEMA/NRC Steering Committee

- Addressed in MOU, 44 CFR 353 App A
- Focal point of coordination
- Serves to implement points in the MOU
- Examples of Recent Issues
  - EP Rulemaking
  - National Response Framework
  - Potassium Iodide (KI) Policy & Program
  - Evacuation Studies
  - Alert and Notification Systems
  - Hostile Action Based EP Exercises
  - New Reactor License Applications
Federal Radiological Preparedness Coordinating Committee (FRPCC)

- FEMA Lead (44 CFR 351.10 & .11)
- Meets quarterly
- Many federal agencies are represented:
- Assists FEMA in providing policy direction for Federal assistance to State & locals
- Coordinates research & study efforts
- Assists in resolving issues related to final FEMA approval of a State plan
Regional Assistance Committee (RAC)

- FEMA Lead (44 CFR 351.10 & .11)
- One in each FEMA Field Office (10)
- Federal participation
- Assists State and local government officials in the development & review of their radiological emergency plans
- Observes exercises to evaluate adequacy of plans
- NRC is represented on the RAC by the Regional State Liaison Officer
A natural disaster, malevolent act, or extended shutdown may call into question the status of EP around a plant site.

MC 1601 defines interaction between FEMA and the NRC during restart situations—As defined in the MOU.

FEMA performs offsite EP assessment and informs NRC of results.

Restart requires FEMA and NRC approval.

Requires rapid, effective communications to many stakeholders in many areas.
NRC/FEMA Relationship

• Hurricane Andrew -- Turkey Point
• Atomic Safety Licensing Board & Appeal Board Decisions
  – Shoreham
  – Seabrook
NRC/FEMA Relationship

- Creation of the Department of Homeland Security (DHS)
- State and local interest in emergency planning around Indian Point
- Continued oversight of Alert and Notification Systems
- National Response Framework
- New Reactor License Applications
- Hostile Action Based EP Exercises
Research and Test Reactor (RTR) EP

- Due to the low power level (0.1 to 20 MW) and small amount of radioactivity in the core, the radioactive release from an accident associated with most RTRs will not result in radiological doses to the general public exceeding the protective action guides (PAGs)
- Emergency plans are required by 10 CFR 50 Appendix E
- 10 planning standards (as opposed to 16)
- EPZs range in size from the operations boundary for a reactor less than or equal to 2 megawatts to 800 meters for a reactor up to 20 megawatts
Fuel Cycle Facility EP

- The scope and depth of emergency plans are more variable and generally not as extensive as power reactors
  - This reflects the diverse nature of these facilities and the hazards and risks associated with their operation

- Facts
  - No designated EPZs
  - No extraordinary provisions to alert and notify the general public
  - Only 2 levels of emergency classifications
    - Alert – requiring no offsite response
    - Site Area Emergency – could require offsite response
  - FEMA has no oversight over State and local governments with regards to a fuel cycle facility

- Why?
  - No EPA PAGs will be exceeded beyond the site boundary
Fuel Cycle Facility EP

  - Showed that emergency plans cannot be justified for these facilities in terms of protecting the public
  - However, it was justified due to “intangible benefit” of being able to reassure the public that appropriate actions will be taken
Fuel Cycle Facility EP

• Regulatory Guide 3.67 provides the standard format and content for emergency plans for fuel cycle and material facilities

• Independent Spent Fuel Storage Installations (ISFSIs)
  – If located at an operating reactor, the 10 CFR Part 50 emergency plan is all that is required
  – If located at a non-operating reactor or elsewhere, there are lesser emergency plan requirements
EP Going Forward
Topics: The Future of EP

- Emergency preparedness rule changes
- Revision to NUREG-0654/FEMA-REP-1
- Performance Based EP
- Outreach

• Current EP rule will be updated to reflect:
  – Recent technological advances
  – Lessons learned

• New rule divided into two general sections:
  – Hostile action based EP issues
  – Results of comprehensive review
<table>
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<th>DRAFT FINAL EP RULEMAKING TOPIC</th>
<th>ONSITE GUIDANCE</th>
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<td>Removal of One-Time Requirements</td>
<td>N/A</td>
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Revision to NUREG-0654/FEMA-REP-1

– Background
– Multi-Year Effort
– Coordination with FEMA
– Stakeholder Involvement
Revision to NUREG-0654/FEMA-REP-1, Supplement 3

– Guidance for development of PARs for severe reactor accidents (rev 1, 1996)
– Multi-year effort
– Close Coordination with FEMA
– Public Comment Resolution
– Next Steps
Performance Based EP

- Commission Direction, SRM COMDEK-08-0005
  - Quantify protection provided by EP
  - Codify in a transparent and objective manner
- Credible Scenarios
- Quantitative Goals
- Risk Informing Emergency Action Levels
- Process
  - Multi-year
  - Determine feasibility and direction
  - Commission paper
Risk Informed EALs

- NRC staff is using computer modeling tools to examine emergency action levels (EALs)
  - Probabilistic risk assessment (PRA)
  - Do EALs in the same emergency class have similar risk of core damage?
  - Identify outlier EALs and reclassify
Outreach

• EP – the link between the public and the plant

• Integration and Communication
  – Commission focus on outreach and communication
  – Coordination between the Regions and HQ

• Engage external stakeholders
  – State/locals
  – Licensees/Industry
  – Public/Professional Societies
Current Outreach

- FEMA Regional Planning Meetings
- NREP Conference
- NEI Communications Forum
- Regulatory Information Conference
- Webpage
- We are always looking for new outreach activities
  - Contact Joe Anderson, Branch Chief,
    (301) 415-4114, joseph.anderson@nrc.gov
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END