


STAFF ACTION ON NEAR-TERM TASK FORCE RECOMMENDATION

11.3

REAL-TIME RADIATION MONITORS ONSITE AND WITHIN THE 10-MILE EMERGENCY PLANNING ZONE (EPZ)

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- **The Near-Term Task Force (NTTF) observations:**
 - Licensees have numerous fixed radiation monitors located onsite.
 - During emergencies, licensee field teams, in addition to Federal, State, and local teams are dispatched.
 - Field monitoring remains an effective method to acquire radiation data.
 - Accurate and timely dose data are critical to validating dose projections.
 - Having publically available data provides a level of public confidence.
- **Recommendation:**

Study the efficacy of real-time radiation monitoring onsite and within the EPZ (Including consideration of AC independence and real-time radiation readings publically via the Internet.)
- Tier 3 Recommendation

Fixed Station Environmental Monitors (FSEM)

- **What are they?**

- Typically, a spherical pressurized ion chamber (PIC) gamma radiation detector mounted to a pole or other structure in the environment.
- Electronic package to energize the detector, to process detector output, and to continuously relay data to a central processor via radio or telecommunication lines.
- Stations may have meteorological sensors and/or higher range radiation detectors.
- Stations are usually arranged in 16 compass sectors surrounding the plant.



Detector



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- **Staff Evaluation Focus**

- Currently available post-accident radiological monitoring capabilities.
- General regulatory overview and relevant emergency preparedness regulations.
- Regulatory actions on radiation monitoring post-TMI.
- The 1982 contractor assessment of FSEMs.
- Review of a sampling of FSEM installations.
- Fixed station environmental monitoring in Japan.
- Public protective action recommendations (PARs) in the United States.
- Protective action recommendations in Japan.

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- **Currently available post-accident radiological monitoring capabilities:**
 - Licensees, States, and local authorities have extensive existing capabilities for performing post-release radiological monitoring.
 - States and local authorities also have access to Federal capabilities.
 - These capabilities are exercised periodically.
 - Although the installed capability located at the plant could be affected by a station blackout, emergency declarations and protective action recommendations could still be made in a timely manner in that unlikely case.

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- **General regulatory overview and relevant emergency preparedness regulations:**
 - No NRC regulation requires FSEMS.
 - NRC regulations do require extensive licensee radiological monitoring resources, fixed and portable.
 - FEMA guidance requires State and local governments to have radiological monitoring resources.
 - NRC regulations and guidance require the licensee to provide radiological monitoring data to cognizant offsite officials during emergencies.
 - There is no current requirement that the data be made available to the public on a real-time basis.

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- **Regulatory actions on radiation monitoring post-TMI.**
 - Following the TMI accident, the NRC required licensees to install high range radiation monitors, including
 - Containment high-range area radiation monitors.
 - High-range effluent monitors on likely release paths
 - Regulatory Guide 1.97, *Instrumentation for Light-Water Cooled Nuclear Power Plant and Environs Conditions during and following an Accident*, Rev. 2, December 1980
 - Included “radiation exposure meters (continuous indication at fixed locations)”.
 - Purpose identified as “verifying significant releases and local magnitudes.”

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- **Regulatory actions on radiation monitoring post-TMI.**
 - Regulatory Guide 1.97, *Instrumentation for Light-Water Cooled Nuclear Power Plant and Environs Conditions during and following an Accident*, Rev. 3, May 1983.
 - Omitted “radiation exposure meters (continuous indication at fixed locations),” placing reliance on portable instrumentation instead.
 - Footnote stated:

It is unlikely that a few fixed-station area monitors could provide sufficiently reliable information to be of use in detecting releases from unmonitored containment release points.

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- **The 1982 contractor assessment of FSEMs.**
 - NUREG/CR-2644, “An Assessment of Offsite, Real-Time Dose Measurement Systems for Emergency Situations,” was issued.
 - The study considered:
 - The ability to detect and quantify monitored and unmonitored releases
 - The ability to detect and quantify an unmonitored release in the presence of a known release.
 - The uncertainties associated with estimating the magnitude of an unmonitored release.
 - The number of stations needed to detect a release and the uncertainty associated with the detected value.
 - The instrumentation requirements and costs for a system.

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- **The 1982 contractor assessment of FSEMs.**

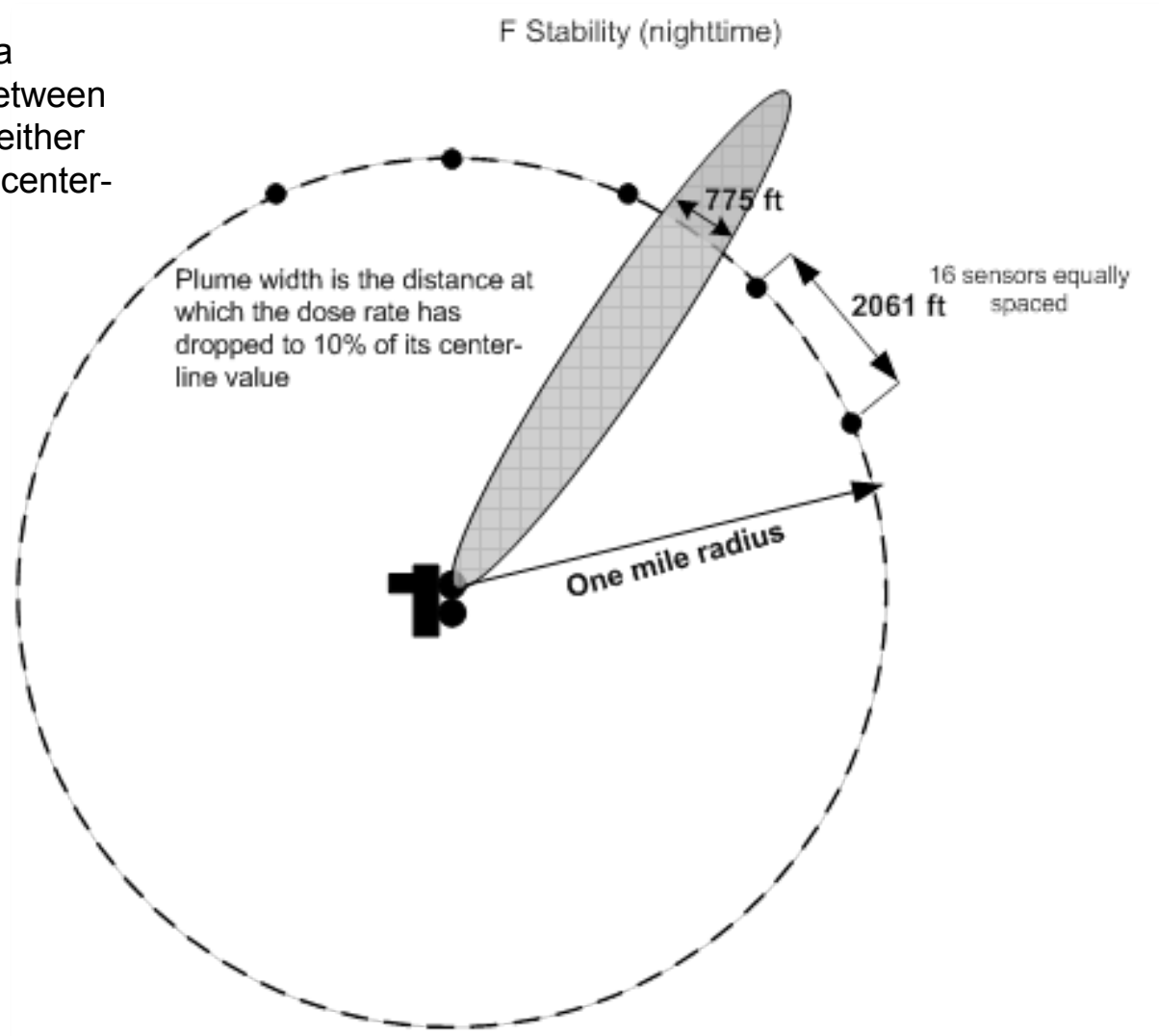
- The study concluded:

In general, it is highly questionable that a fixed station (16-32 units) emergency monitoring system can provide sufficiently reliable technical information to be of use in a decision-making process in the event of an emergency situation.

- Given this conclusion, the staff retracted the requirement in Revision 3 to Regulatory Guide 1.97.

Effect of FSEM Spacing

Diagram shows how a plume could transit between two FSEMs and for neither to indicate the plume center-line dose rate



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- **Review of a sampling of FSEM installations.**

- The staff reviewed material from the websites of two states that operate large FSEM arrays (176, 26 units), a journal article highlighting a licensee's system, and the EPA's RadNet with 130 stations across the U.S.
- The staff held discussions and an e-mail exchange with representatives from the two states.
- All systems continuously collect data and make the data to their respective staffs. None make the data available via the Internet on a real-time basis.
 - The EPA will make its data available via the Internet after a 3-hr delay for data validation.
 - The States and the licensee cited concerns about counterproductive impacts on protective action implementation (e.g., shadow evacuations).

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- **Fixed station environmental monitoring in Japan.**
 - Prior to the Fukushima Dai-ichi event:
 - Two data collection systems:
 - » Emergency Response Support System (ERSS) – collected plant status information sent by licensee.
 - » System for Prediction of Environmental Dose Information (SPEEDI) – data from FSEMs.
 - Data forwarded to national regulator in Tokyo.
 - SPEEDI stations were located onshore from the plant.
 - SPEEDI data reported to the local prefecture. No indication that it was made available to the public.
 - Data would be used to generate protective action recommendations that the local prefecture would implement.

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- **Fixed station environmental monitoring in Japan.**
 - After the tsunami:
 - Many SPEEDI stations were damaged.
 - The plant data ERSS data stream was lost when plant lost power.
 - Without the source term data provided by the plant, the dose projections provided by SPEEDI were invalid and likely delayed protective action recommendations.
 - For significant periods of time, the wind flow was offshore (towards ocean), away from the SPEEDI stations.
 - In October 2013, the national regulator reduced the reliance placed on the SPEEDI stations and instituted a protective action process that relied primarily on plant condition for initial PARs.

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- **Public protective action recommendations in Japan.**
 - At the time of the Fukushima accident:
 - The primary trigger for a PAR was a certain reading on FSEMs for a set period of time.
 - PARs were not issued based on plant conditions.
 - During the early period of the accident, the wind was blowing towards the ocean and away from the onshore monitors.
 - The SPEEDI system failed due to tsunami damage to monitors and loss of plant ERSS data stream.
 - Current PAR strategy (summary)
 - A declaration of a General Emergency results in a initial PAR to evacuate the 5 km (3.1 mi) precautionary action zone (PAZ).
 - If the accident continues or multiple units are involved, the PAZ is gradually extended to 5 – 30 km (3.1 to 18.6 mi).
 - Further expansion is based on measured in-field radiation levels.
 - Reliance on SPEEDI was minimized.

Summary

- Licensees, States, and local governments have adequate radiological monitoring and assessment means as described in the respective plans.
- FSEMs cannot provide reliable data to support protective action decision making.
- Requiring the FSEM data to be publically available on a real-time basis will not enhance the ability of public officials to implement protective actions, and could reduce that capability.
- Initial PARs in US (and now, Japan) do not rely on offsite dose measurements, but rather on plant condition. The absence of FSEMs would not preclude the issuance of timely and appropriate PARs.
- The installation of FSEMs would not result in a substantial increase in the protection of public health and safety.