EMERGENCY RESPONSE TO TRANSPORTATION ACCIDENTS INVOLVING RADIOACTIVE MATERIALS IN THE SOUTHERN UNITED STATES

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INTRODUCTION

The widespread transportation of radioactive material (RAM) requires programs for responding promptly and effectively to accidents and incidents. In the United States, the U.S. Department of Transportation (DOT) regulates RAM shipments but the states are responsible for emergency response with the support of the Federal government. This study examined the emergency response capability in the Southern States Energy Board region of 16 states, namely Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, Missouri, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia and West Virginia.

The magnitude of RAM shipments is difficult to delineate in brief because of the variety of materials, their quantities, types of containers, and transport modes. A number of packages in excess of 2.5 million was estimated for 1975 (Gr76). Among the more common shipments are Mo-99 for medical use, Ir-192 for radiography, and radioactive wastes for near-surface burial. In addition to these shipments at the level of 1-100 curies (Ci), some much higher curie levels are transported in Co-60 teletherapy sources (1,000 -10,000 Ci) and spent fuel elements (100,000 - 1,000,000 Ci).

External radiation exposure and environmental radioactivity contamination from these shipments are limited by regulations concerning surface radiation and radioactivity levels, radionuclide amounts, packaging, labelling, and handling in Title 49 Code of Federal Regulations Parts 171-178. Nevertheless, some transportation accidents and incidents of noncompliance will occur.

The DOT Hazardous Material Incident Report System, to which carriers must submit reports of incidents and accidents, shows an average of 20 accidents with RAM per year between 1971 and 1980, divided almost evenly between handling and transportation (Mc80). Incidents, such as excessive surface contamination, external radiation beyond that indicated by the label, or mishandling of a package, occurred 46 times per year. These frequencies are very low compared to the average 8,600 accidents per year for all hazardous materials. Only 11 major vehicular and railroad accidents, and no airline accident, involved RAM during the same 10-year period and none caused radioactivity in the environment (TF81).

Impetus for emergency planning by states has come from the U.S. Nuclear Regulatory Commission requirements for a Radiological Emergency Response Plan in support of nuclear power plants (Gr80). A Transportation Radiation Emergency Response Plan (TRERP) can be based on a number of available guides (TF81, Be80, IA81, B180, Mc77). Plan implementation is initially by police and firefighters who are usually first at the scene of an accident, and by radiation protection officials who respond to reports of radiation problems. In serious

cases, support may be needed from Federal emergency response teams (SE81), from nearby states, and other radiation protection specialists within the state. Response quality depends on planning, training, and availability of sampling and detection instrumentation.

Information from this study, obtained by inquiries with officials and RAM carriers in the 16 participating states and at two conferences held by the Southern States Energy Board, is presented in a detailed agency report (Ca 82). Emergency response capability was evaluated from the availability of a well written TRERP and of organizational preparedness.

RESULTS AND DISCUSSION

Each of the 16 states has a TRERP, completed or under development. The TRERP is usually part of a Radiological Emergency Response Plan or an Emergency Operations Plan. More recently prepared plans are models of detailed information but some of the older ones are so poorly organized that their application in an emergency would be difficult. The latter ones are being revised with guidance by the Federal Radiological Preparedness Coordinating Committee (TF81).

State radiological protection officials are responsible for the TRERP because of the specialized competence needed in dealing with radiological problems. These officials are assigned to various agencies in the 16 states, notably those concerned with public health or the environment. Officials from disaster response agencies are formally involved in some of the plans. Their participation is important when the accident is serious or has other associated hazards.

The only broadly operative interstate agreement is the Southern Mutual Radiation Assistance Plan (SE81), although 3 states do not participate. Assistance from Federal response teams is invoked through the Interagency Radiological Assistance Plan.

Qualified individuals within the state, who could provide support, are listed in only a few TRERPs. These lists do not always indicate the specific competence of the individual.

Maintaining current addresses and telephone numbers for reporting accidents or requesting assistance was indicated as a major problem in many states. Changes in personnel or responsibilities among state offices are sources of delay when rapid response is necessary.

State officials recognize the importance of special training through attendance at short courses and distribution of manuals, particularly because effective response depends on decisions by those first on the scene -- usually the carrier's employees and police or firefighters. Short courses on RAM accident response are presented by Federal agencies (Va80, TF81), and state employees also obtain radiological training through other emergency response and defense courses (Mi80). Useful training materials (RE79) and hazards guides (DT80) are available and some carriers provide training courses and manuals. Such training is a continuing function because of personnel turnover, and difficulty in keeping pace with turnover is generally identified as a problem.

The Federal Emergency Management Agency and predecessor agencies have supplied the states with many radiological survey instruments (SE81). Simple survey instruments are widely distributed within states, but the more complex and specialized the instrument, the fewer are available and the less widely distributed they are (Mi80). Instances of inadequate maintenance were cited. In general, for highly specialized detection instruments in good working condition, one needs to depend on specific radiological laboratories within a state or the Federal emergency response team.

Transportation and communication appear to be readily available to state emergency response personnel. Some emergency vehicles equipped with radiological detection instruments are also available. Equipment maintenance, again, is a major problem.

Program effectiveness has been evaluated by responses to reported accidents or incidents. In a few cases, the program has been field tested in training exercises, but some of these have been criticized because results were not rigorously evaluated.

Another limitation in planning and implementing emergency action response is the lack of needed Protective Action Guides which would cover most of the potential situations encountered in transportation accidents.

CONCLUSIONS

Each of the 16 states in the Southern States Energy Board region has an agency responsible for handling transportation radiation emergencies and operates under a response plan that is either completed or under development. Each state also has available to it supporting Federal emergency response teams, and most of the states have an interstate agreement for mutual support.

Certain older emergency response plans need improvement in accord with Federal guidance for greater clarity and information content. Direct agreement with neighboring states for mutual assistance would provide a larger pool of professionals and trained technicians than is normally available to any one state. Agreements with hospitals to admit patients with possible radioactivity contamination must also be prearranged. Maintaining current listings of names, addresses,and telephone numbers for officials and consultants should be accomplished by computer application.

Effective implementation of the plan requires a continuous training effort, especially for firefighters and law enforcement officials who make initial emergency responses on the basis of on-the-scene observations, shipping papers, and survey meter readings. Newly employed persons will need short course training, and manuals that provide guidance in terms of relatively simple categories must be available to all responders. Maintenance of radiation detection equipment was indicated as an important priority. Also needed for use in serious accidents are appropriate Protective Action Guides established by the U.S. Environmental Protection Agency.

In planning and implementation, a three-tiered response is needed. First is a false alarm, followed by minor radiation exposure or radioactivity contamination, while occurrences of major exposure or contamination are most rare. All three events, however,

require well planned responses that are appropriate for the circumstances and have the confidence of the public.

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