Implementing An Integrated Multijurisdictional Emergency Management System: A Case Study at the Savannah River Plant

by

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(ABSTRACT)

The combination of modern, technological hazards and overlapping government jurisdictious requires coordinated, multijurisdictional emergency management. The Three Mile Island incident clearly demonstrated the impact of technical hazards and the importance of intergovernmental cooperation. A method is required to understand intergovernmental considerations in emergency management. This thesis derives such a method by proposing a three component model.

The first component considers that all intergovernmental relationships are dynamic. Efforts to describe intergovernmental systems in terms of fixed relationships are not accurate. Rather intergovernmental systems are better described by the concept of movement along a scale between relationships that are separate and distinct and relationships that overlap and are interdependent. Relationships change along the scale depending on the strength of case-specific influencing variables.

Identification and use of windows of opportunity describes the second component of the model. Institutional opportunists in favor of cooperative, intergovernmental programs must be able to identify and act when opportunities exist. Understanding this second component improves the chances of implementing lasting, cooperative intergovernmental results.

The final component of the model emphasizes that by taking advantage of system change at the optimal time, linkages can be established between multiple jurisdictions. In multijurisdictional emergency management these linkages are made by integrating emergency plans and procedures.

Applying the model by utilizing a case study in multijurisdictional emergency management completes this thesis. The case study documented is an intergovernmental cooperative planning effort between the Department of Energys Savannah River Operations Office and the states of South Carolina and Georgia.

ACKNOWLEDGEMENTS

This thesis orginated from applied research conducted at and around the Savannah River Plant between 1982 and 1984. I would like to express my appreciation to Dr. Harold Kurstedt, the Principal Investigator on this research. His continued support for my graduate studies and his confidence in my abilities to conduct a large part of the research effort are reflected by this thesis. I am also grateful to my colleague, Richard DeBusk for his valuable comments made on portions of this paper.

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Most importantly I would like to recognize the contribution of my wife, Mindi, for her commitment and encouragement on this thesis and throughout my graduate program.

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

CHAPTER I

INTRODUCTION

This thesis develops and establishes a model for implementing integrated multijurisdictional emergency management systems. The approach is to document and apply the model through a case study of an intergovernmental cooperative planning effort between the Department of Energys Savannah River Operations Office and the states of South Carolina and Georgia. This intergovernmental effort was not legislated but rather caused by events and conditions. It can best be understood by first examining background research and developing a method to be applied to the actual case study.

The implementation perspective in this thesis is my own. From June 1983 through August 1984, I served as the Program Manager for Virginia Tech's Management Systems Laboratories which was retained to assist in the development and production of emergency management documents. The coordination of emergency planners from seven different jurisdictions and organizations required the formulation and negotiation of solutions to implementation problems. As a result, valuable lessons were learned for implementing an integrated, multijurisdictional emergency management system in a dynamic intergovernmental environment. These lessons are equally valuable in other areas of implementation study and application.

Background Research

Emergency management is a significant government responsibility. However, rarely is emergency management the responsibility of a single government jurisdiction. The combination of modern, technological hazards and overlapping jurisdictions requires understanding of intergovernmental considerations when implementing emergency management policies. Petak and Atkisson (1982), Drabek (1985), Rubin and Barbee (1985), Comfort (1985), Mushkatel and Weschler (1985), and others have highlighted the importance of intergovernmental considerations in emergency management. William Petak emphasizes this perspective by noting that:

> Indeed, understanding politics and the intergovernmental complexities may be of greater importance to the success of mitigation and preparedness activities than scientific knowledge, technologic remedies, or their associated economic costs and benifits (Petak, 1985: 4-5).

The impact of technological hazards and the importance of intergovernmental cooperation was clearly demonstrated by the Three Mile Island incident. Subsequent studies and evaluations cited a general deficiency in offsite planning (Rogovin, 1980 and Scranton, 1980), called for greater emhasis on the federal, state, and local coordination (Chenault, 1980), and recommended improvements in communication between participating emergency organizations (Kemeny, 1979 and Scranton, 1980). The failures in emergency management at Three Mile Island were not limited to failures in the response actions of individuals or single organizations but rather

a lack of coordination between multiple jurisdictions. Substantiating that view, Petak believes this to be a common condition.

> Intergovernmental and interorganizational complexity often leads to lack of a coordinated response, distrust, and conflict (Petak, 1985: 5).

Successful multijurisdictional emergency management depends on coordinated response actions. This is only possible when intergovernmental relationships and responsibilities are considered prior to an emergency and during the preparedness phase of emergency management. In addition to being supported by Petak (1985), May and Williams (1986: 1) strongly argue that preparedness is central to an effective disaster policy that can prevent and lessen loss. Cooperative planning, in preparation for an emergency, is the foundation of successful intergovernmental emergency response. This lesson was learned at Three Mile Island. Requirements for emergency management coordination and planning between commercial nuclear facilities and offsite authorities became more clearly understood. In many cases improvements were implemented through a new federal organization, the Federal Emergency Management Agency (FEMA). Responsible for coordinating all federal emergency actions, FEMA dispenses its authority in three ways. First, in the event of an actual incident FEMA manages the federal response by coordinating and providing federal resources. Second, through funding grants to states, the federal government subsidizes subnational emergency management activities. The grants are provided to support subnational emergency managment in specific hazard program areas (i.e., civil defense, nuclear power plant emergencies,

floods, etc.). Third, FEMA functions as a quasi-regulatory authority by approving some emergency management activities, such as emergency plans and procedures, of subnational organizations receiving FEMA funds. This condition of the federal and subnational governments sharing responsibility and funding for implementing policy has been characterized as shared governance by May and Williams. Typical of the relationship between the federal government and its state and local counterparts in program implementation, the most difficult problems come from cases involving shared governance. In emergency management the federal government has significant management responsibilities while the subnational governments are responsible for operational activities. This causes a mutually dependent relationship that is common of many contemporary federal-subnational relationships (May and Williams, 1986: 15).

Although mandated by federal law, FEMA activities alone have not and will not likely cause universal, all-hazards, multijurisdictional emergency management to occur. Admittedly described as a difficult and uneasy partnership by May and Williams, the concept of shared governance does not relect the entire emergency management picture. Progress has been and will continue to be retarded by tangible and intangible issues such as the number, type, and site-specific characteristics of hazards, funding difficulties, and jurisdictional considerations. Mandated policy is not enough. Without a method to understand and address each type of hazard, and its attendant characteristics, effective multijurisdictional emergency management is not possible. To address the need, this paper presents a methodology that has utility specifically in emergency man-

agement and also within the larger framework of policy development and implementation.

Research Approach: A Model for Implementation

The purpose of this thesis is to derive a model useful for identifying and overcoming the problems of implementing integrated multijurisdictional emergency management systems. The research approach is to utilize a case study to document and apply this orginal implementation model. The case study represents an example in emergency management that is outside the purview of FEMA or any other single organization. As such this research represents an orginal condition to serve as a test case for problems in emergency management and implementation studies.

The differences between a federally owned, defense nuclear facility (like the Department of Energy's Savannah River Plant) and a commercial fixed nuclear facility (like any licenced commercial nuclear power generating reactor) are subtle but complex. Subtle because both involve nuclear power and similar hazards but complex because of the different organizations and regulations that govern defense nuclear facilities. Utilizing a case study at a defense nuclear facility represents a worst-case implementation scenario. Such a case involves multiple jurisdictions at all levels of government and a different federal role (a direct participant rather than as a regulatory, oversight authority). From the perspective of emergency management, this case study provides supporting

considerations to those more widely publicized, understood, and documented at licensed commercial reactors. The case study provides new insight and understanding into multijurisdictional implementation programs at all facilities. Development of the implementation model has specific applicability in emergency management activities at all federally owned installations beyond the overview and regulatory authority of other federal and subnational organizations.

The implementation model that will form the conceptual framework for this research has three major components. A discussion of the general characteristics and scholarly foundation of each of these components follows.

1. Intergovernmental Relationships: Systems Dynamics

Intergovernmental relationships are frequently represented by models that describe the authority relationships between governments. Deil Wright's simplified models of intergovernmental relations represent three authority relationships among national, state, and local jurisdictions (Wright, 1982: 29-41). Wright makes a convincing case that his Coordinate-Authority Model, characterized by autonomous relationships between federal and state governments, describes an obsolete condition. In contrast Wright believes that his Overlapping-Authority Model, characterized by overlapping, interdependent behavior, better describes contemporary intergovernmental relationships. Wright's findings are useful, and form the foundation of this first component of the implementation model, but do not accurately describe the entire intergovernmental environment.

Wright and others assume that intergovernmental relationships remain fixed. However, intergovernmental relationships, like the political environment they are a part of, are constantly changing. Influenced by specific variables, the intergovernmental systems are not fixed but are dynamic.

Intergovernmental relationships can, therefore, be better understood in terms of a moving scale between the extremes of autonomy and interdependence. Authority relationships change depending on the influencing variables applied by case-specific characteristics. In this way changed conditions in the intergovernmental environment may actually enhance the visibility of program needs and improve the chances of implementation success. Recognizing the systems dynamics of intergovernmental relationships permits identification of the existing stage of authority relations among jurisdictions. External variables can either cause or constrain movement along the scale of intergovernmental relations. In summary, the first component of the proposed model suggests that the alignment of intergovernmental relationships is important in multijurisdictional environments, that relationships are not fixed and that relationships change based on the influence of external variables.

2. Windows of Opportunity

John Kingdon's concept of windows of opportunity forms an important element in the proposed model. Rather than windows of opportunity being

opened through a rational process of goal definition and the identification, comparison, and selection of solutions, Kingdon states:

> Windows are opened either by the appearance of compelling problems or by happenings in the political stream (Kingdon, 1984: 21).

In emergency management, programmatic action is frequently caused by the actual occurrence of an emergency or other significant event. These events can cause movement toward an overlapping, interdependent relationship. When this occurs, rapid action is required by institutional and external advocates to take advantage of what is likely to be a temporary condition. As movement toward the overlapping, interdependent relationship takes place, a window of opportunity opens.

Just as important to this discussion of windows and dynamic relationships is what makes windows of opportunity close. Kingdon identifies five reasons:

First Participants may feel that they have solved the problem through their actions.

Second If solutions fail, participants may stop trying. In fact, the longer a problem remains a problem the more it becomes a condition.

Third Events that caused action may pass.

Fourth Key participants may change.

Fifth A lack of alternatives to formulate solutions.

The application of any of these reasons reinforces the concept of systems dynamics in the proposed model. An overlapping, interdependent relationship between multiple jurisdictions is difficult to maintain. Most intergovernmental relationships will default to the more traditional and easier to maintain separate and distinct, autonomous relationships. For multijurisdictional emergency management, recognition of systems relationships changes, identification of the windows of opportunity, and the ability to act quickly improve the chance to implement lasting results.

3. Institutionalization of Gains

The third and final component of the proposed model is to utilize system dynamics and the window of opportunity to establish lasting linkages between jurisdictions. In multijurisdictional emergency management the lasting linkages must take form in documented plans and procedures. In that manner permanent solutions to the problem of coordinated, multijurisdictional emergency response are institutionalized into the intergovernmental system.

Summary and a Look Ahead

A model useful for identifying and overcoming implementation problems in integrated multijurisdictional emergency management systems has been derived. The model consists of three major components: 1) understanding intergovernmental systems dynamics, 2) recognizing windows of opportunity, and 3) institutionalizing gains. Although the model has broader application possibilities, the remainder of this thesis is concerned with documenting and applying the model through a case study in emergency management at the Savannah River Plant. To do so this case study is presented in five additional chapters.

1. Chapter II- Savannah River Plant Mission and History

2. Chapter III-Constraints to Cooperative Emergency Management

3. Chapter IV-Changes in Environment and Perspectives: A Window of Opportunity

4. Chapter V-Institutionalizing the Emergency Management System

5. Chapter VI-Conclusion

CHAPTER II

SAVANNAH RIVER PLANT MISSION AND HISTORY

The Savannah River Plant is a vital facility in the defense nuclear fuel cycle. Its primary mission is the production of plutonium, tritium, and other special nuclear materials for nuclear weapons. Special nuclear materials produced at the Savannah River Plant (SRP) are sent to other Department of Energy (DOE) facilities in the United States for fabrication into nuclear weapons components. Additionally, certain other nuclear materials are produced for peaceful applications (e.g., nuclear fuel sources for spacecraft and nuclear-powered cardiac pacemakers and isotopes for medical treatment). To accomplish its primary mission, special nuclear materials are produced at SRP by the transmutation of elements in large nuclear production reactors that are moderated and cooled by heavy water (The Savannah River Plant, 1980: 17). Other major activities at SRP that support its production mission include:

- The fabrication of nuclear fuel and target elements made from natural or enriched uranium for use in the SRP reactors.

- The chemical separation and purification of reactor products.

- The storage and management of radioactive wastes produced by the chemical processing of irradiated materials.

All SRP facilities are located inside a 315-square-mile reservation in three South Carolina counties. The site is about 60 miles southwest of Columbia, South Carolina, and 25 miles southeast of Augusta, Georgia. Figure 1. The Savannah River Plant, places the location in perspective to major cities in South Carolina and Georgia. Operational since 1954, the site along the Savannah River was selected because it combined access to vast quantities of low mineral content water, large open areas conducive to fast construction, sparse population, a space large enough to distance facilities apart for security and safety reasons, and good potential for minimizing the radiological, thermal, and industrial effects of operations (The Savannah River Plant, 1980: 11-12).

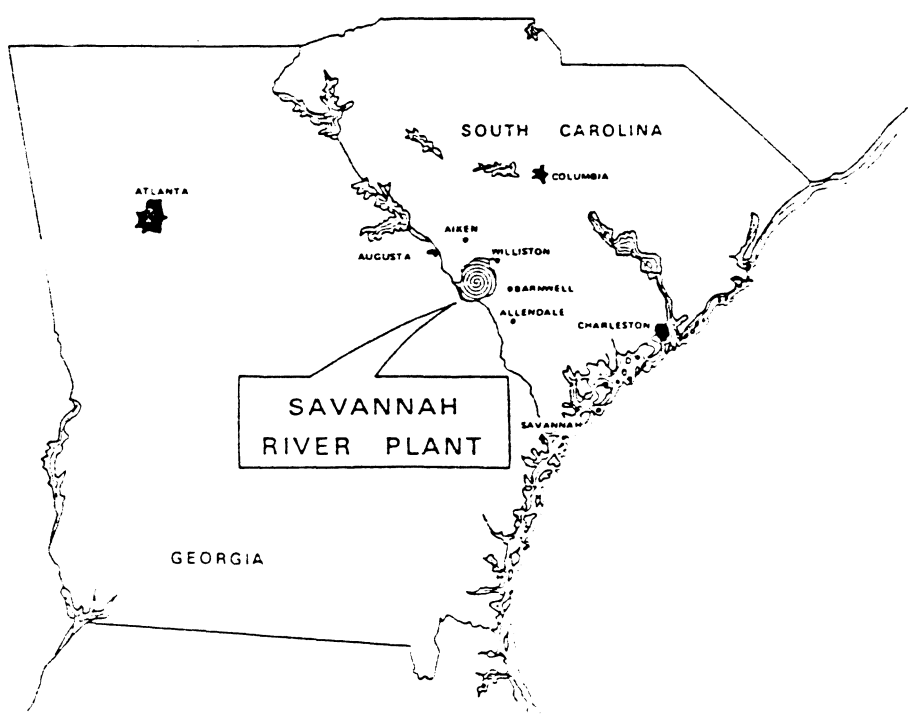


Figure 1. The Savannah River Plant

The Savannah River Plant is a Government-Owned, Contractor-Operated (GOCO) facility. E. I. du Pont de Nemours and Company has been the exclusive operator of SRP since Du Pont agreed to design, build, and operate the Savannah River Plant for the Atomic Energy Commission (AEC) in 1950. In turn, the AEC has been succeeded by the Energy Research and Development Administration (ERDA) and currently by the Department of Energy. Du Pont's offsite role is to provide technical resources (health physicists, nuclear engineers, etc.) to offsite authorities at the direction of DOE. The Department of Energy's Savannah River Operations Office (DOE-SR) has responsibility for onsite policymaking and offsite interaction between SRP and other federal agencies and state and local governments. For these reasons Du Pont was not a major participant in the events described by this case study.

CHAPTER III

CONSTRAINTS TO COOPERATIVE EMERGENCY MANAGEMENT

Prior to 1982 SRP had been operating with a combination of formal and informal emergency agreements for interaction with the states and other offsite authorities in the event of an onsite emergency. What formal agreements existed were documented as memorandums-of-understanding. Principally, these agreements concerned notification of offsite authorities by DOE-SR and did not provide for coordinated emergency response activities between DOE-SR and offsite authorities. Further, state and county plans and procedures for specific response actions to an accident at SRP, with consequences extending outside its boundaries, did not exist. Therefore, a comprehensive, integrated emergency management system, including both onsite and offsite participation, did not exist.

There were constraints and conditions that discouraged DOE-SR and offsite cooperation in emergency management activities prior to 1982. They existed both within SRP and with the offsite authorities. This chapter identifies and discusses the constraints and conditions that formed the environment for cooperative emergency management among cognizant Savannah River Plant area government organizations.

Savannah River Plant Focused Onsite

Since operations began at SRP, DOE-SR and Du Pont focused primarily on planning for onsite emergencies. This was the result of a number of factors that constrained interaction offsite and caused DOE-SR to be concerned almost exclusively with planning for onsite emergency response. The reasons identified for this onsite focus include: 1) history, 2) self-regulation, 3) non-applicability of industry standards, 4) plant location and size, and 5) DOE policy. An explaination of each of these factors follows.

1. DOE History

SRP, like most DOE nuclear facilities, has its orgin in the Manhattan Project and the production of nuclear weapons. Relevant to this case, several institutional characteristics are identified.

First Nuclear weapons program activities are characterized by an overwhelming emphasis on security considerations. Security considerations limit access to the site and information. The lack of information about site activities and mission prevented the states and the public from developing an understanding of the hazards SRP represented and, therefore, developing policies and procedures in response to these hazards.

Second Because SRP is a vital part of the nuclear weapons program, issues which might compromise its production mission have been delayed or avoided altogether based on national defense needs. Offsite cooperative activities, such as emergency management, have been avoided in the past based on this reasoning.

Third DOE, particularly in its nuclear programs, employs scientists, engineers, and other highly specialized people. Recruiting and retaining these people has resulted in a highly elitist, closely held organization, especially at the field sites disposing them to minimize cooperative relations both inside and outside DOE. This combined with security and vital mission considerations, make difficult the application of influence by national and subnational organizations on DOE.

2. DOE Self-regulation in Emergency Management

The DOE production reactors and other nuclear facilities at SRP, do not require Nuclear Regulatory Commission (NRC) licensing as do all commercial reactors and most other commercial nuclear facilities. A major part of such commercial licensing procedures is evaluation of emergency management plans and procedures required jointly by the NRC and the Federal Emergency Management Agency (FEMA). Instead, at SRP and most other DOE nuclear facilities, emergency management activities are self-regulated through policy statements issued from DOE Headquarters and implemented at each site. SRP, like nearly all DOE nuclear facilities, predates the

construction and operation of commercial nuclear reactors. As a result, SRP reactors also predate the licensing and regulations that are common in commercial reactor and facility operation.

3. Non-applicability of Industry Standards

Commercial nuclear reactors use a relatively standard conceptual engineering design. This has permitted the establishment of standard criteria for operations, risk assessments, and emergency management. The limited number and technical diversity of DOE nuclear facilities make it difficult to apply the same standards or to develop similar common criteria for DOE facilities.

DOE-SR cites, as evidence of its unique position, that SRP reactors, unlike commercial power reactors, operate at low temperatures and pressures. For that reason DOE contends that SRP reactors do not require the large containment domes that exist at commercial reactor sites. Rather, SRP reactors have an activity confinement system to prevent a radiological release to the atmosphere. Because of these technical considerations, credible accident scenarios at commerical reactors are not the same as those at SRP and make difficult the application of the same emergency planning and response standards.

4. Savannah River Plant Location and Size

The Savannah River Plant was located in a rural, sparsely populated area on the South Carolina-Georgia border partly to limit the potentially adverse radiological, thermal, and industrial effects of operation. This is another important emergency management consideration that further separates SRP from commercial facilities. Because the closest SRP reactor is over six miles from the site boundary, the potential for offsite impact and the prompt versus immediate requirement for offsite notification and response is diminished. It is also worth noting that a recent analysis of Three Mile Island did not find a strong correlation between plant location and public risk cognition (Cutter, 1984: 255). If this is also true around SRP where residents are miles away from the reactors, unlike residents around commercial reactors, this may partially account for a lack of visible concern about operations.

SRP combines a remote location, a large buffer zone between reactors and plant boundary, and a low public risk cognition with low accident record. Accidents at the Savannah River Plant have rarely resulted in any health or environmental impacts offsite. As a result, demands for more formal, coordinated emergency management activities have not been very intense or concentrated from the public or offsite governments.

5. DOE Policy

Prior to 1982 policy issued from DOE Headquarters in Washington, DC did not require the coordination of onsite and offsite emergency management activities. Given DOE's role in national security, nothing was required that might interfere with production operations. For that reason it is not surprising that DOE Headquarters did not encourage any offsite interaction.

State Interests Focused Elsewhere

Beverly Cigler employs the concept of an intergovernmental paradox to describe the capacities of actors in the intergovernmental system for emergency management (Cigler, 1986: 9). In Cigler's paradox, subnational governments have the major responsibility to protect the lives and property of their citizens but do not have the funding resources necessary to independently prepare and respond to the hazards that threaten people and their property. In recognition of this paradox, the conflict between responsibility and resources, a partnership has been formed between the federal government and the states. Typical of many existing intergovernmental relationships, the federal government has been providing funding grants to assist state governments in emergency management. However, as with all federal grant programs, the sponsoring agency seeks some control over the use of the grants. Federal assistance in emergency management is characterized by this paradox. The availability of federal funds to conduct specific types of planning activities has focused the

states' attention elsewhere. The influence of federal requirements and funding to help meet other state emergency management needs had a significant impact on the activities of the states. An understanding of the importance of federal control, the objectives of the grant donors, and the effects of that influence contributed to the environment for emergency management around SRP.

1. Funding Influences Emergency Management

Among the elements of Jeffrey Pressman's model for the aid process is his notion of organizational objectives. Pressman found that the aid donor and the aid recipient were interested in moving money and in receiving it respectively. However, the aid donor tries to ensure the funded project is carried out in a manner the donor wants while the aid recipient wants an independent say on the use of the donor funds (Pressman, 1975: 106-108). In the relationship between federal and state emergency management participants, the federal perspective has been the dominant one.

Through FEMA, the federal government funds state emergency management, personnel positions, and equipment purchases through grants of aid. In turn, the states are obligated to be prepared to respond to certain types of emergencies as a condition of the grant. Through the 1970s the emphasis was on civil defense. Following the incident at Three Mile Island, states with commercial nuclear reactors were asked to emphasize radiological planning. Both states that were participants in this case study (South Carolina and Georgia) had commercial reactors in operation

and under construction. As a result they received supplementary emergency management funding for radiological planning from FEMA.

In addition, a second variable influenced the direction of state emergency management activities. Those states which have NRC licensed commercial nuclear facilities receive direct funding from the power utilities as a part of their licensing and operating requirements. Since SRP is not licensed by the NRC, it is not required to contribute funding directly to the states for emergency management. The combination of traditional funding shortages for emergency management at the state level, external funding availability for commercial nuclear facility emergency management activities, and the absence of funding for SRP emergency management efforts resulted in the interest of South Carolina and Georgia focused where funding could be found. This is illustrated in Figure 2. Emergency Management Interests are Channeled by Funding.

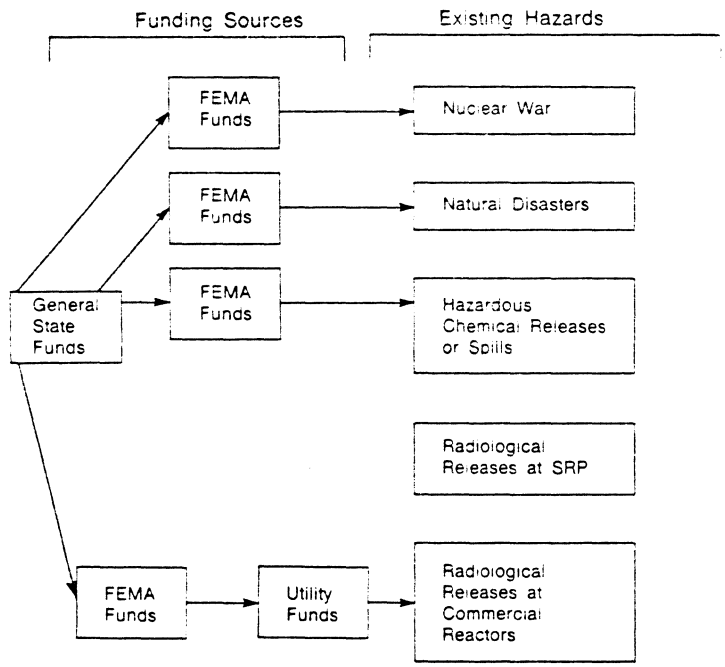


Figure 2. Emergency Management Interests are Channeled by Funding.

2. Jurisdictional Limitations

Jurisdictional complications have contributed to South Carolina and Georgia focusing on other, more self-sustaining areas. First, SRP maintained its independence from South Carolina jurisdiction over onsite issues. DOE-SR acknowledged state authority only for emergency response offsite to consequences from an onsite accident. South Carolina did not contest jurisdiction by requiring formal emergency planning for a coordinated onsite and offsite response. Second, because SRP borders both South Carolina and Georgia, prudent emergency preparedness should involve

both states and their respective counties. Surprisingly, the appropriate state agencies did not find it important enough to push for a coordinated response by both states. Without the experience of a major SRP accident with offsite consequences, overcoming jurisdictional constraints was not possible before 1982.

Summary of Constraints and Conditions: 1982

The constraints and conditions discussed above formed an environment not conducive for cooperative, multijuisdictional emergency management between the Savannah River Plant and offsite authorities prior to 1982. The constraints and conditions influenced the perspectives of all the major participants with emergency management responsibilities. As shown in Figure 3. Participants and Perspectives Prior to 1982, each of the participants had different perspectives, all of which resulted in a low interest in activities toward improving offsite interaction. Department of Energy Headquarters in Washington DC was primarily interested in maintaining production schedules and did not want interference from potential problem areas, such as entanglement in environmental issues. The states were sensitive to the occurrence of emergencies with impact within their jurisdictional authority.

The jurisdictional limits and SRP safety record combined with funding availability in other areas of emergency management, caused low interest at the state and local level for improving emergency management around SRP. However, there was recognition in both South Carolina and DOE-SR that

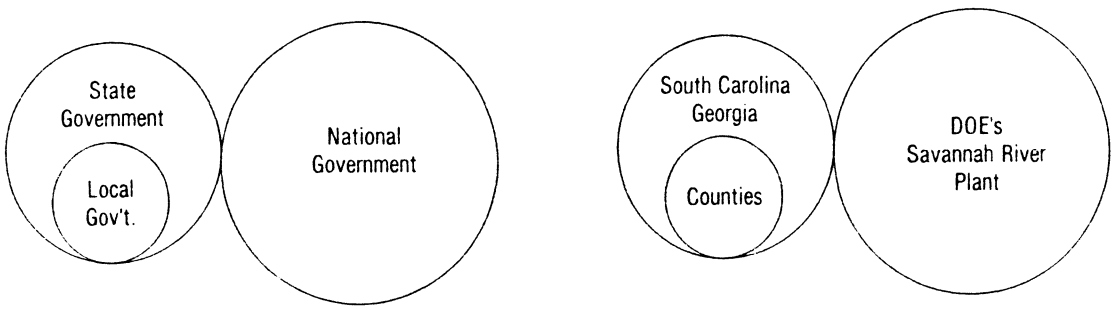
Participant	Connection With Study	Perspective and Major Objective	Interest In Improving Interaction
DOE-HQ	DOE policy-making and oversite of field site implementation of DOE policy.	Emphasis on production accomplishments to meet national defense needs and emergency response onsite.	Low. No national or subnational pressure for improvements.
DOE-SR	Implements DOE-HQ policy.	Emphasis on production mission, but resists DOE-HQ interference. Able to take initiative on actions required by field site-level conditions.	Low-Moderate. Cognizant of need to maintain good relations with offsite neighbors, but no local pressure to make improvements.
South Carolina	Implement state and federal policy on emergency management programs.	Sensitive to funding source requirements and to occurences of actual emergencies or events.	Low. Funding not provided for emergency management activities around SRP and no major emergencies with offsite effects
Georgia	Implement state and federal policy on emergency management programs.	Sensitive to funding source requirements and to occurences of emergencies or events. Location of SRP in South Carolina contributed to low emphasis.	Low. Funding not provided for emergency management activities around SRP, no major emergencies with offsite effects, and SRP not on Georgia soil.
County Governments	Implement state programs at county level.	Even more sensitive to funding provided by state agencies. In both states, state agencies have primary planning and response roles.	Low. Funding not provided for emergency management activities around SRP and no major emergencies with offsite effects

Figure 3. Participants and Perspective Prior to 1982

improvements were necessary. Because the South Carolina Emergency Preparedness Division and DOE-SR's Office of External Affairs were responsible for emergency management in their respective jurisdictions, they each had responsibility for effective emergency planning and response within their jurisdictional authority. But the influence of the described constraints and conditions overcame any need to make improvements.

It is possible to assess the environment for coordinated, multijurisdictional emergency management before 1982 in terms of a larger framework of intergovernmental relations. Deil Wright's Coordinate-Authority model of intergovernmental relations accurately describes that environment (Wright, 1982: 30-31,40). Condensing the environmental conditions and constraints into the framework of the model permits comparison of changing conditions and perspectives and ultimately a change in intergovernmental relations altogether. Figure 4. The Coordinate-Authority Model Applied, is provided to graphically present and cross-reference general characteristics. Case-specific details are discussed below.

Generally it is thought that the Coordinate-Authority model is obsolete and does not represent contemporary intergovernmental relationships. However, Wright found that "...we may sometimes find elements of this model accurately respresented in a particular case or problem area" (Wright, 1982: 40). This is exactly the case in describing the intergovernment relationship conditions for emergency management at SRP before



General Characteristics	Case Specific Characteristics
o Juristictional Differences (separate spheres of power, control, and interest)	o SRP jurisdiction for onsite emergency response and state jurisdiction for offsite response o SRP location and size gave a sense of isolation from onsite accidents o Complications of inter-state cooperation o DOE policy did not encourage offsite interaction o State emergency management activities focus on funding availability
o Autonomy and Independence From Outside Control	o DOE field sites difficult to influence because of history and mission o DOE self-regulation of emergency management activities o Non-applicability of operational and emergency management standards at DOE sites
o Dependency of Local Governments	o Small county governments dependent on states for emergency management funding and expertise

Figure 4. The Coordinate-Authority Model Applied

1982. Wright's Coordinate-Authority model accurately represents these conditions for three primary reasons.

First The federal and state relationships for emergency management had sharp, distinct boundaries based on actual and perceived jurisdictional differences. SRP is a federal facility where the states have limited jurisdiction and influence. In addition, South Carolina and Georgia did not coordinate their activities relative to SRP. This resulted in separate spheres of power, control, and interests.

Second Constraints and conditions, such as DOE's focus on onsite issues and the states emphasis on emergency management activities for which there was funding, caused SRP and the states to remain autonomous and independent of outside control of influence.

Third Local county governments were dependent on their respective state governments for emergency management funding and expertise and did not exert influence on their respective states.

CHAPTER IV

CHANGES IN ENVIRONMENT AND PERSPECTIVES : A WINDOW OF OPPORTUNITY

The intergovernmental relationship between the Savannah River Plant and the surrounding jurisdictions changed after 1982. Although most of the constraints and conditions that characterized the intergovernmental relationship in previous years remained, they were to be overcome by events and the actions of opportunistic individuals. These events and actions had direct and indirect influence on emergency management at SRP. It is the purpose of this chapter to identify and analyze each of the events and actions because they represent the first and second elements of the proposed model. The events and actions illustrate a change in the intergovernmental relationships (systems dynamics) and a window of opportunity opened for a cooperative, intergovernmental emergency management system.

L Reactor

The construction and operation of five production reactors at SRP in the 1950s reflected a national policy of maintaining nuclear supremacy over the Soviet Union. But the 1960s saw a leveling in the requirement for additional nuclear weapons. This changing requirement caused a decrease in the amount of special nuclear materials (plutonium and tritium) produced by DOE. Specifically, at SRP this meant a reduction in the number of on-line reactors from five to three by 1968.

The inauguration of the first Reagan Administration brought a renewed emphasis on defense preparedness and an increase in defense budgets. Included in the subsequent rise in weapons system orders was an increase in the demand for nuclear weapons production. By 1981 this had caused DOE to plan for increased production of special nuclear materials. Although plutonium is a byproduct of commercial nuclear power reactors (in spent fuel), the recovering of weapons grade nuclear material from commercial spent fuel is prohibited in the United States. Additionally, SRP is the only source of tritium in the United States. As a result, the only viable alternative to meet demand was the restart of one of Savannah River's two shutdown reactors. SRP's L Reactor was selected for restart and operation.

However, the restart of one of the shutdown reactors was not just to be an internal decision and action by DOE. Significant changes in national values had taken place since the two reactors had been placed in standby condition. For reactor restart the most important change was a national concern for the environment and organized activity against nuclear energy in general and nuclear weapons in particular. In the case of the environment, this concern had successfully been translated into national and subnational policy for environmental protection. As implemented, construction and building projects that had potential environmental impact could not begin without an assessment of that impact. Federal projects were particularly subject to these new requirements. Given the favorable political and legal conditions, South Carolina and Georgia, supported by environmental and anti-nuclear activists, demanded that DOE prepare an

Environmental Impact Statement (EIS) for L Reactor restart. This demand was initially opposed by DOE as both unnecessary and threatening to national security. It required a combination of legal action and recognition of the national and subnational political and legal conditions for DOE to recognize that it would be impossible to avoid the preparation of an EIS. In late 1982 and early 1983 development of the EIS and work on L Reactor proceeded concurrently. DOE hoped the EIS would not delay the scheduled operation of L Reactor.

During preparation of the EIS it became clear that two issues would predominate and had the potential to cause a delay in L Reactor operation. First, the principal environmental concern was the thermal effect of discharged cooling water from L Reactor. In reality this had been a long-standing issue between South Carolina and DOE. Cooling water from all SRP reactors is discharged into onsite creeks that flow six to seven miles into the Savannah River Swamp before entering the Savannah River. Although by the time the discharged water reaches the river it is only "a few degrees" warmer than the river itself, this concern became a major issue. For South Carolina, the restart of L Reactor was an opportunity to address the thermal impact issue, albeit only for water discharged from L Reactor. Facilitated through the EIS, agreement was eventually negotiated for the construction of a large cooling lake in which the discharged water is contained, cooled, and monitored before release into onsite streams that feed the Savannah River.

Second, and more important to this study, was the EIS assessment of coordinated emergency management between SRP and offsite jurisdictions. DOE-SR realized the response capability of the jurisdictions surrounding SRP was inadequate. Prior to issuance of the EIS, DOE began the process of upgrading its own notification and coordination procedures. In addition, DOE-SR offered to assist South Carolina in preparing its own procedures. Events and actions that supported this decision are elaborated in the following sections.

New DOE Orders

In August 1981, Department of Energy Headquarters (DOE-HQ) issued new policy guidance for DOE program offices and field sites on emergency management. As with all DOE-HQ issued policy statements, this guidance was transmitted in DOE Orders. Significantly these orders contained the first comprehensive guidance on emergency management issued to field sites. Additionally, this set of orders, for the first time, included provision for interaction with offsite authorities in emergency management. This was almost certainly in response to general radiological emergency planning and preparedness standards being revised in the commercial nuclear industry following the Three Mile Island incident.

DOE-HQ policy requires implementation at the program office or field site level. It also is usually provided in discretionary wording to permit maximum flexibility by the implementer. These new emergency management orders were consistent with those two characteristics. Provided below

is a summary of the new DOE Orders, relative to offsite emergency management interaction, and the corresponding DOE-SR implementing order.

DOE ORDER 5500.2

Title: Emergency Planning, Preparedness, and Response for Operations.

Requirement: This order requires offsite emergency management coordination in general items. Specifics are provided in DOE Order 5500.3.

Issued at SR: DOE-SR Order SR 5500.2, dated July 1982.

DOE ORDER 5500.3

Title: Reactor and Nonreactor Nuclear Facility Emergency Planning, Preparedness, and Response Program For Department of Energy Operations.

Requirement: This order requires that comprehensive actions be planned, coordinated, and implemented to include the offsite consequences of a radiological emergency at a DOE facility. It establishes four levels of emergency conditions that are to be used to categorize emergencies and therefore assist in offsite notification in the event of an emergency at a DOE facility. Detailed offsite coordination activities required include: 1)

onsite emergency plans consistent with offsite plans when practical, 2) consideration of offsite regulations and requirements, 3) planning zones to be based on site-specific hazard analysis, 4) technical assistance to offsite authorities for plan development to be offered, and 5) clarifies DOE's onsite response duties and state and local authorities' offsite response duties.

Issued at SR: DOE-SR Order SR 5500.3, dated July 1982.

DOE ORDER 5500.4

Title: Public Affairs Policy and Planning Requirements For Emergencies.

Requirement: Complements DOE Order 5500.3 and provides guidance for public information coordination and prompt notification of offsite authorities and the general public.

Issued at SR: Implemented by DOE-SR Order SR 5500.4, dated August 1981.

Although these orders provided a basis for offsite coordination they did not give any suspense dates for implementation. They also gave no specific guidance on the amount or type of planning and preparedness assistance that could be rendered. Indeed, based on a comparative analysis with other DOE field sites, it is unlikely that actual offsite activities would have

begun as early as they did or that they would have been as substantial without the influence of L Reactor. Compared to other DOE field sites SRP was at least two years advanced in implementation. In fact, some DOE field sites have yet to comply with these DOE orders. In addition, no other field sites have been as comprehensive in their planning activities or in the amount of technical and resource assistance provided. Offsite emergency management coordinating activities are not a high program or funding activity at other sites. The influence of the L Reactor issue, coupled with favorable policy guidance and institutional opportunists, caused an acceleration in implementation of these orders at the Savannah River Plant.

Institutional Perspectives and Opportunism

As previously detailed, DOE-SR does not delegate responsibility for off-site interaction to its operating contractor Du Pont. The organization within DOE's Savannah River Operations Office responsible for that activity is the Office of External Affairs (OEA). OEA's responsibilities include Congressional, intergovernmental (both national and subnational), media, and community affairs. Reporting directly to the Manager of the Savannah River Operations Office, OEA is unique among DOE field sites in that it combines responsibility for emergency management with public affairs. Emergency management responsibilities include:

- notification

- planning and preparedness

- evaluation of contractor emergency management capabilities

- news releases and press briefings

- response activities as part of SRP emergency system.

The professional experience of key OEA staff members is important in developing an understanding of institutional perspectives. The Director is a former national news correspondent well connected with the media. He is very knowledgable in public relations, experienced at political diplomacy, and has direct access to the DOE-SR Manager. The Deputy Director has been an emergency planner for South Carolina and worked in the Office of the Governor. He has a good state perspective and maintained good working relationships with former colleagues. The Director relies on his deputy almost completely for emergency management issues. The Emergency Preparedness Specialist in OEA also had worked as a South Carolina emergency planner. His experience with the state proved to be valuable during the actual implementation of the integrated onsite and offsite program. Relative to this case, the institutional responsibilities and perspectives of OEA and its key staff members can be detailed as follows:

1. To operate visibly and actively at SRP to successfully make L Reactor operational.

2. To implement the new DOE Orders on emergency management.

3. To improve overall onsite and offsite emergency management.

4. To maintain good relations with all offsite participants.

5. To utilize their knowledge and perspective of offsite needs and requirements in public affairs and emergency management.

The combination of institutional responsiblities, personal perspectives, and access to key onsite decision-makers placed OEA in a position to be proactive opportunists embedded within the DOE system. OEA was in position to meet SRP requirements and improve overall offsite relations and emergency management at the same time. Recognizing this window of opportunity, OEA worked creatively and successfully to make the best of this opportunity.

Predictably, given the circumstances, the Office of External Affairs made the initial contact with each state organization responsible for emergency management in South Carolina and Georgia. In both cases, although especially in South Carolina, each state organization was interested in improving the existing inadequate arrangements. Each was cognizant of its responsibilities to provide for effective emergency management programs and took them seriously. However, each was also aware that neither their state budgets nor their federal grants provided for this type of activity. Consistent with their institutional history and experience of

seeking supplemental funds to accomplish their mission, and knowing SRP's eagerness to restart L Reactor, their first request was for financial assistance.

Plant Vogtle

The complex multijurisdictional environment was further complicated by the location of Georgia Power Company's Vogtle Electric Generating Plant, a commercial nuclear power station under construction. Plant Vogtle was located immediately across the Savannah River from SRP. When completed and ready for licensing, Plant Vogtle's ten-mile emergency planning zone, which is mandated by the NRC, would extend onsite to SRP. Although several years away from beginning licensing procedures, Plant Vogtle represented another important change to the envirnoment both for intergovernmental relations and coordinated emergency management. As such it contributed to the reasons for improving the interactions of all the jurisdictions in and around SRP.

Summary of Changes

As shown, the events that transpired during 1982 changed the conditions for intergovernmental relationships between the Savannah River Plant and surrounding jurisdictions. But it took a major issue, such as L Reactor, to overcome the relationships accurately described by the Coordinate-Authority Model. The intervention of the L Reactor restart issue was the type of event required to change the separate and distinct relationships

developed and maintained for thirty years. The opportunity for improved emergency management presented by the described sequence of events was not wasted. Opportunists both at SRP and within offsite agencies moved quickly to take advantage of the L Reactor situation and other supporting conditions. However, the changing intergovernmental relationship was limited in its effect. Because the constraints and conditions that characterize SRP operations still remained (DOE history and mission, self-regulation by DOE, etc.), the changes in relationships were primarily limited to environmental and emergency management issues. It is significant that the obstacles represented by the constraints and conditions were sufficiently surpressed by events, and the timely action of opportunists, to improve interaction between government units. In this manner intergovernmental relations were forced from their traditional separate and distinct orientation to an overlapping condition. This clearly illustrates the dynamic nature of intergovernmental relations.

The intervention of the L Reactor issue, and supporting circumstances, caused a change in the level of interest in improving intergovernmental interaction for many of the participants. These changes are documented in Figure 5. Participants and Perspectives after Intervention. What is important is that the major objectives of most of the participants remained different and they remained generally unchanged both before and after intervention. An example illustrates this point. DOE-HQ's major objective was to meet special nuclear material production goals. When more production was required, DOE-HQ's major objective was to increase production by restarting L Reactor. The objective of meeting production

goals did not change. What did change was DOE-HQ's level of interest in interaction with the states to ensure reactor restart and the demand for increased production. The increased interest in interaction with the states took the form of allowing, and indeed supporting, DOE-SR's efforts to negotiate a settlement between DOE and the states. For emergency management the result of that settlement was direction to implement an integrated, multijurisditional program, the process of which is the subject of the next chapter.

In contrast to the Coordinate-Authority Model described in the preceeding chapter, the events and actions of 1982 make it possible to describe the changed intergovernmental relations environment by using another of Deil Wright's models. This model, the Overlapping-Authority Model, is more respresentive of contemporary intergovernmental relations. In this model, power is more widely and evenly distributed among intergovernmental participants (Wright, 1980: 39). This condition of near equal authority makes difficult the imposition of unilateral authority by any participant. Wright details the primary characteristics of the Overlapping-Authority Model as follows (Wright, 1980: 40):

- limited, dispersed power

- interdependence

- limited areas of autonomy

Participant	Connection With Study	Perspective and Major Objective	Interest In Improving Interaction
DOE-HQ	DOE policy-making and oversite of field site implementation of DOE policy.	Supported SRP bargaining to achieve L Reactor restart and production goals.	High. Based on pressure to meet production schedule.
DOE-SR	Implements DOE-HQ policy.	Bargains with state agencies in order to restart L Reactor and meet production goals.	High. Increased production goals, new DOE-HQ policy, opportunity to improve emergency management program, local pressure, and Plant Vogtle combine to increase interest and provide opportunities.
South Carolina	Implement state and federal policy on emergency management programs.	Bargaining with SRP to achieve maximum environmental and saftey concessions and resource support for cooperative emergency management.	High. Opportunity to resolve environmental, safety, and emergency management concerns.
Georgia	Implement state and federal policy on emergency management programs.	Participated in bargaining but allowed South Carolina to take lead.	Moderate. Opportunity to participate in environmental and emergency management improvements recognized.
County Governments	Implement state programs at county level.	Participated at direction of states.	Low-Moderate. Aprehensive about resource requirements.

Figure 5. Participants and Perspective after Intervention

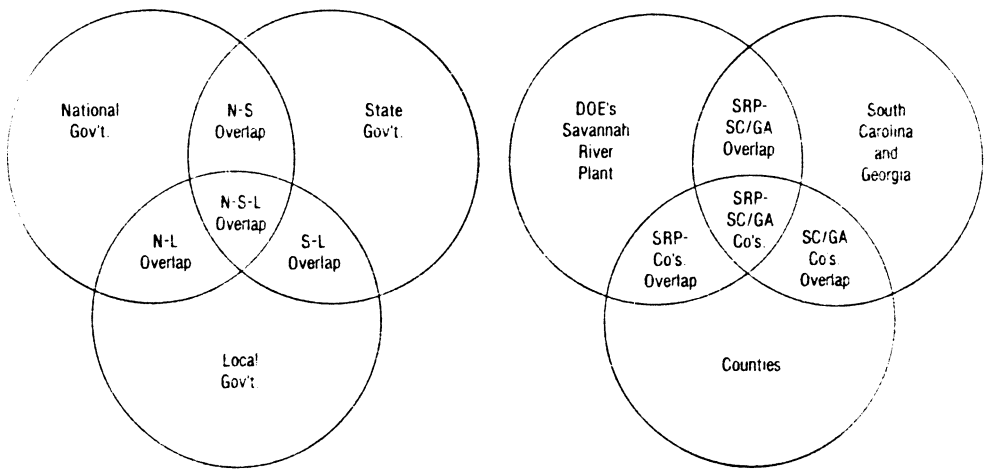
- bargaining and exchange relationships

- cooperation and competition.

Each characteristic is representive of the SRP-offsite relationship described by the changing events and actions of 1982. However, the key characteristic and most appropriate is the concept of bargaining. Jeffrey Pressman supports this view in his discussion of federal and city agency relationships.

> Because federal and city governments depend on each other, they can each get the other party to do things that that party would not otherwise do (Pressman, 1975: 13).

Pressman further states that the resulting mutual dependence leads to a reciprocal power arrangement in which bargaining must take place (Pressman, 1985: 14). This is exactly the position that SRP and the offsite jurisdictions found themselves in. SRP needed to restart L Reactor and the states wanted environmental and emergency management improvements. Neither was strong enough to overcome the objections of the other and bargaining for concessions resulted. Figure 6. The Overlapping-Authority Model Applied, is provided to illustrate and to again cross-reference general characteristics with case-specific details.



General Characteristics	Case Specific Characteristics
o The process of government involves national, state, and local authorities simultaneously	o Environmental impact of L Reactor restart created an opportunity for state involvement in internal DOE actions and decisions o New DOE Orders encourage offsite interaction o Plant Vogtle construction caused all government units to recognize that joint planning would eventually be necessary.
o Areas of antonomy and independent power and authority by a single jurisdiction limited	o DOE not able to restart L Reactor on its own authority
o Limited single jurisdiction authority and recognition of interdependence encourages government units to bargain to achieve goals	o Because neither DOE or states strong enough to overcome the objections of the other, bargaining over issues resulted

Figure 6. The Overlapping-Authority Model Applied

CHAPTER V

INSTITUTIONALIZING THE EMERGENCY MANAGEMENT SYSTEM

The intervention of the L Reactor restart issue, combined with the support of new DOE policy and willing institutional opportunists, temporarily changed the definition and framework of intergovernmental relationships for emergency management at the Savannah River Plant. The combination of events and supporting factors created an agenda for action to develop an integrated multijurisdictional emergency management system during the preiod of time that favorable conditions existed. To illustrate the effects of the intervening events and supporting factors, Figure 7. Intervention Bridges the Intergovernmental Relations Gap, is provided. However, a temporary change in intergovernmental relationships is not enough to guarantee a successful integrated multijurisdictional emergency management system. Institutional linkages between jurisdictions need to be developed and implemented. The process of this implementation stage further defined and adjusted the emergency management intergovernmental relationship between SRP and the offsite jurisdictions. The strategic-level bargaining that took place over the L Reactor restart was not specific on many of the issues. These issues had to be settled. These operational issues were addressed and resolved during the process of implementation.

This chapter describes the third component of the implementation model for developing an emergency management system. To do so will require a

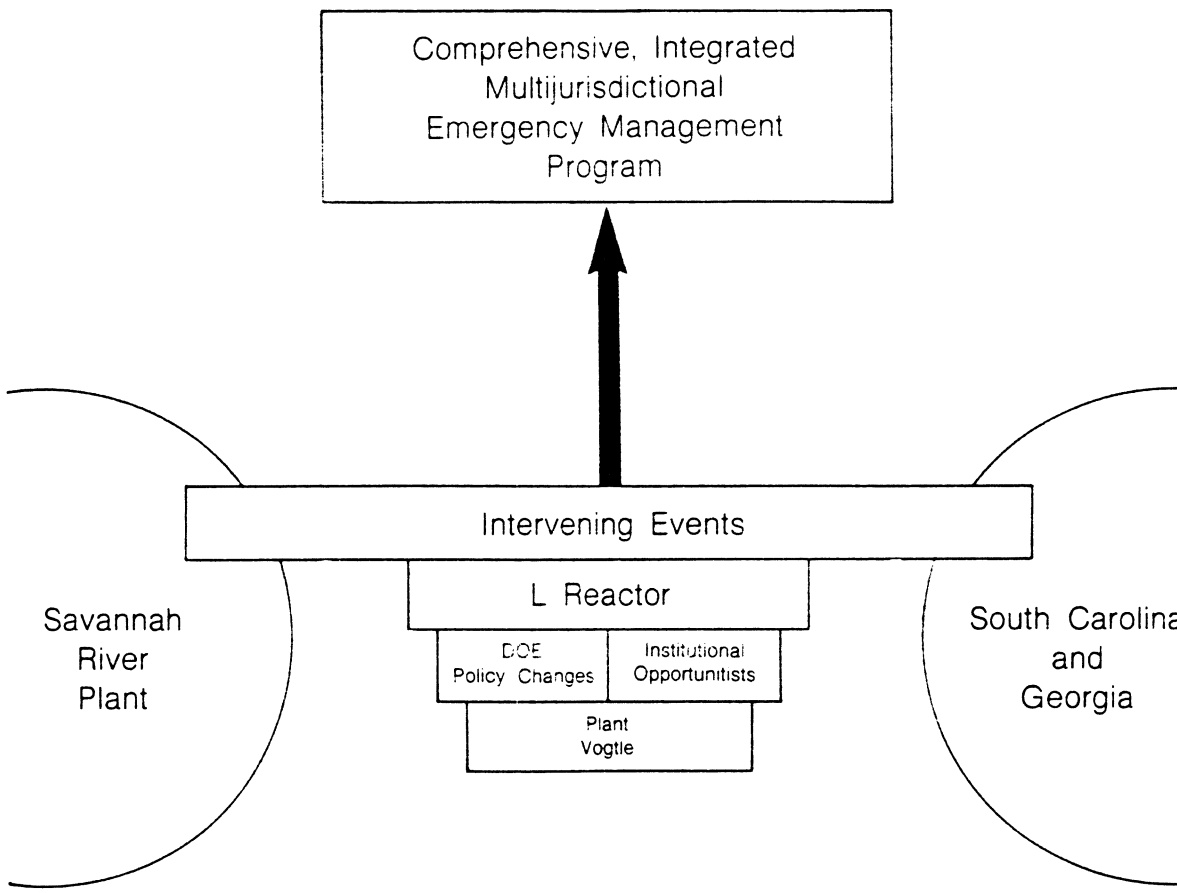


Figure 7. Intervention Bridges the Intergovernmental Relations Gap

discussion of the participants, the problems encountered, how they were resolved, a description of the resulting emergency plans and tools that were the final product of the implementation phase, and finally evaluation of the plans by an emergency exercise.

The Participants

The number of major and supporting governmental actors involved in an intergovernmental program is usually great. This case was no exception. The L Reactor issue increased political visibility which enhanced the level of participation by many state organizations. In addition, as was normal, each state used two organizations for radiological planning and response. Each state divided responsibilities between organizations for emergency planning and response management organizations and organizations which had radiological health specialists. These factors, combined with the location of SRP on the border between two states, complicated implementation activities by increasing the number of participants. Major participants and their roles in the implementation process are discussed below.

- DOE-SR's Office of External Affairs is responsible for emergency management activities at SRP and is also responsible for all offsite affairs. Office of External Affairs management took an active role in the process of developing the offsite plans and procedures, in ensuring commitments made during the implementation process were

consistently implemented onsite, and reviewed all proposed onsite-offsite agreements to assure they did not violate DOE policy.

- The Office of the Governor in South Carolina took an active role in preliminary meetings to establish emergency planning zones and other definitions. When satisified that the implementation effort was taking place, and was consistent with L Reactor agreements, representives of the Governor's Office left completion to the proper state organization. The participation of the Governor's Office served as a reminder that the issue was important to South Carolina and to the Governor himself.

- The South Carolina Emergency Preparedness Division (SCEPD), Office of the Adjutant General, is responsible for all hazards emergency planning, preparedness, and response management activities in the state. As such, SCEPD was the primary participant and responsible for development of the specific emergency plans for both the state and the appropriate counties. To accomplish this, SCEPD assigned the emergency planner responsible for the counties surrounding SRP on a full-time basis to this effort. In addition, technical specialists in radiological planning and exercises were available on an as-required basis.

- South Carolina Department of Health and Environmental Control, Bureau of Radiological Health, is responsible for all health and enviromental issues related to radiation in South Carolina. This department was active in the L Reactor issue and was involved in approving the technical recommendations of emergency planning zones and the health effects of credible accident scenarios.

- The Georgia Emergency Management Agency (GEMA) is the Georgia counterpart of the SCEPD. As such its responsibilities are nearly identical. Consistent with Georgia's involvement with the L Reactor issue, GEMA let SCEPD take the lead and establish most of the planning criteria. As a result, most of the planning work with GEMA involved placing the information in their procedural format.

- South Carolina's Aiken, Allendale,and Barnwell counties and Georgia's Burke County were eventually determined to be within SRP's planning zones. However, only Aiken County had a full-time emergency services manager. For that reason the states assumed the lead role and conducted all preliminary discussions with SRP to determine the boundaries of planning zones and other procedural negotiations. Following that, the counties provided the county-specific information needed to complete planning efforts.

- Although prohibited from providing direct funding to state or local governments, DOE-SR was able to provide technical support. This support was provided in the form of the Management Systems Laboratories (MSL), a research laboratory in the Department of Industrial Engineering and Operations Research at Virginia Tech. MSL had just completed the design, development, and production of the onsite DOE-SR emergency management plans and was familiar with SRP, DOE policy and procedures, and the difference between DOE policy and NRC requirements. MSL was contracted to design, develop, and supply specific emergency management documents and other tools in conjuction with and in support of this intergovernmental effort.

Establishing a Planning Basis

Logically, the first step in emergency planning is identification and analysis of the hazard. Without an understanding of the hazard, realistic and effective emergency management documents cannot be developed and implemented. In emergency planning among multiple jurisdictions it is also necessary to agree on key planning variables and terminology. Collectively, this will be referred to as the planning basis. In this case study, establishment of the planning basis defined the various geographic planning zones based on hazard analysis, emergency document format, and resolution on the question of NRC and FEMA guidance and its applicability. Without agreement on these prerequisites, an integrated, multijurisdictional emergency management system would not have been possible.

In July 1983, at the invitation of DOE-SR's Office of External Affairs, all the participants identified earlier in this chapter were invited to SRP. This meeting was principally a gathering of management to agree on ground rules and to show support for the implementation phase that was about to begin. At that initial meeting DOE-SR made clear its commitment to sponsor the establishment of an integrated system both by its participation and by providing technical support through MSL.

Following this initial "start-up" meeting, working sessions were scheduled with each state beginning with the South Carolina Emergency Preparedness Division and later with the Georgia Emergency Management Agency. Of the major state and county participants, these organizations served as the lead agencies for emergency management in their respective states, and in this effort, all emergancy planning in their states was accomplished through them. However, each state's radiological health department played a significant role. Both SCEPD and GEMA relied on the radiation health specialists for technical confirmation of SRP-provided data especially necessary in establishing the planning basis. Radiation health representatives were present at nearly all planning sessions throughout the implementation phase because they also have a notification and emergency response responsibility in the event of a real incident. Conflicts between the emergency management and the radiation health organizations surfaced occasionally during planning meetings. Generally these were organizational jealousies concerning responsibilities in assuming the lead role in an emergency response and the sequence of notification. These conflicts were normal organizational difficulties and

did not seriously hinder the planning process. In fact, as a result of the planning process, the notification and response sequence and responsibilities of all state organizations was documented. This documentation may help prevent organizational difficulties from obstructing emergency response.

For reasons already recounted, South Carolina was the most active and interested of the two states. As a result, the first working sessions were scheduled in Columbia, South Carolina. These first sessions were dominated by discussions on two issues which were directly related to and contingent on each other. First, because DOE-SR wanted L Reactor operational in early 1984, it pushed for completion of the emergency management system by that time. This would eliminate emergency management as an impediment to reactor restart. From firsthand experience, the DOE-SR Office of External Affairs representive was concerned about the states' ability to meet schedule. Second, SCEPD was reluctant to proceed without an understanding on what was being planned for-- the planning basis. Although it was clear that they were planning for the consequences of a radiological incident, a complete hazards analysis had not been completed to define the degree of threat to offsite health, at what distances, and at what concentrations. Because both South Carolina and Georgia have NRC-licensed commercial nuclear reactors in operation, they were familar with the standard planning basis established for them by NRC and FEMA. Standard ten-mile emergency planning zones and other technical uniformities are the rule at commercial reactors. However, everything about this effort (the threat analysis and planning zones, document format, and re-

solution of the degree of applicability of NRC and FEMA standards) required study and negotiation.

At these early working sessions several agreements were made to allow planning activities to preceed pending the completion of the hazards analysis. When completed, these agreements formed a constructive basis for initial planning activities.

- It was agreed that the definition and area of planning zones offsite of SRP was a necessary first step. All participants agreed that Emergency Planning Zones (EPZs) as defined by NRC did not apply and that planning zones appropriate for SRP needed to be established. DOE-SR had anticipated this requirement and had requested that Du Pont conduct a technical assessment of worst-case credible incidents (hazards analysis) at SRP facilities that would have offsite impacts. Because the results of this assessment had a direct impact on other elements of the planning process, further elaboration is provided below in the section entitled Technical Assessment of the Hazard.

- Both states had emergency management document systems. These systems included radiological emergency response plans for commercial nuclear power reactor incidents. The states were comfortable with these systems and their established formats. It was agreed that their formats would be used for the SRP site-specific state and county plans.

- It was acknowledged by all participants that NRC and FEMA regulations did not apply. However, it was also agreed that these regulations provided useful guidelines and considerations.

Technical Assessment of the Hazard

Any analysis of the threat a radiological hazard poses to the public health and safety must consider the total release and distance from the radiation source as primary factors. Distance is important because the danger of radiation is reduced by the dissipation of the radiation dose over time and distance. Because commercial nuclear reactors have a relatively standard conceptual engineering design, it has been possible to standardize hazard analysis and determine maximum distance and exposure limits to radiation. The result has been a ten-mile minimum for emergency planning zones. Although considered excessive by the nuclear industry, planning at this distance is required for NRC licensing.

As discussed, the SRP nuclear reactors do not require NRC licensing and, therefore, do not require a ten-mile emergency planning zone. However, new DOE Order 5500.3 did permit definition of an emergency planning zone based on a site-specific technical evaluation of a worst-case credible accident. Du Pont, SRP's operating contractor, was tasked to conduct such a technical assessment. Provided below is a summary of the technical assessment, as it relates to the subject of emergency management (SRP Environmental Impact Statement, 1984: Appendix H and Du Pont Memorandum dated August 12, 1983).

- For the SRP reactors, the worst-case credible accident is a fuel reloading accident in which a series of faults and errors would result in a double target vacancy at the periphery of the reactor, causing an unplanned nuclear criticality. The consequence of such an accident is that about three percent of the reactor core would melt.

- To delineate between credible and noncredible accidents, SRP used the 10^{-6} per reactor-year probability of occurrence threshold. This factor was noted as being consistent with normal nuclear power industry standards.

- It was expected that potential radioactive releases would be limited by the reactor confinement system of the SRP reactors.

- The standard for determining permissible radiation doses for the offsite population was the Environmental Protection Agency's Protective Guidelines. EPA guidelines require protective action for doses that exceed 5 rem total body and 25 rem to an individual organ. (A rem is an acronym for roentgen equivalent man which is a unit used to measure doses of ionizing radiation.)

- The reloading accident was recommended to be the basis for technically establishing emergency planning zones around SRP. For this accident, calculations were made using worst-case meteorological conditions (according to industry standards) at each reactor. It was determined that in the event of a reloading accident at any of the SRP reactors

that doses exceeding Protective Guidelines to individual organs would remain onsite. However, potential reloading accidents at C or K Reactors could cause doses to exceed 5 rem as far as 1.8 miles beyond the SRP boundary. Figure 8. Dose Calculation Results for Reactor Reload Accident and Figure 9. Technically Recommended Emergency Planning Zone, are provided to illustrate these findings. Ironically, a potential reload accident at L Reactor did not have radiation impact offsite beyond the Protective Guidelines.

Following completion of the technical assessment, it was provided to both states for review and acceptance. For establishment of the Emergency Planning Zone (EPZ), the technical assessment was accepted by both states. In subsequent discussions it was also agreed that a public warning system (sirens) should be installed in the technically established EPZ. This system was to be under the control of the local counties for warning residents of the EPZ. The siren system would be provided by DOE-SR.

Although the states accepted the technical assessment and realized DOE-SR constraints in establishing an EPZ beyond those technically established with site-specific information, there was concern over abandoning the normal ten-mile limit (NRC standard). This issue was further fueled by the comments of nuclear activists during the EIS public hearings. To effect a solution it was suggested that another level of planning outside the technical boundaries of the EPZ be established. Designated the Con-

Reactor	Sector	Distance to 5 rem boundary, miles	Distance to plant boundary, miles	Whole-body dose at plant boundary, rem
C	NW	9.0	7.6	6.0
	NNW	8.3	8.2	5.2
K	SSW	8.5	6.7	7.0
	SW	7.8	6.6	5.4

[a]Source: Du Pont, 1983.
[b]3% inventory release.
[c]99.5% meteorology, worst sector.

Figure 8. Dose Results for Reactor Reload Accident

tingency Planning Zone (CPZ) with a ten-mile radius around each reactor, the CPZ was defined as as area outside the EPZ where:

- Potential credible accidents could be expected to result in offsite radiation doses lower than the EPA Protective Guidelines.
- State guidelines require an additional level of planning to provide mechanisms for population sheltering and possible evacuation.
- DOE-SR will provide information and education about SRP operations and notification of accidents.

The final component in completing the planning basis was the acceptance by all participants of a still larger planning zone for evaluation of potential exposures along the ingestion pathway. Included was consideration of potential radioactive materials deposited on ground and water surfaces that might be incorporated into food and water sources. Similar to commerical reactor planning, this Ingestion Pathway Zone (IPZ) was

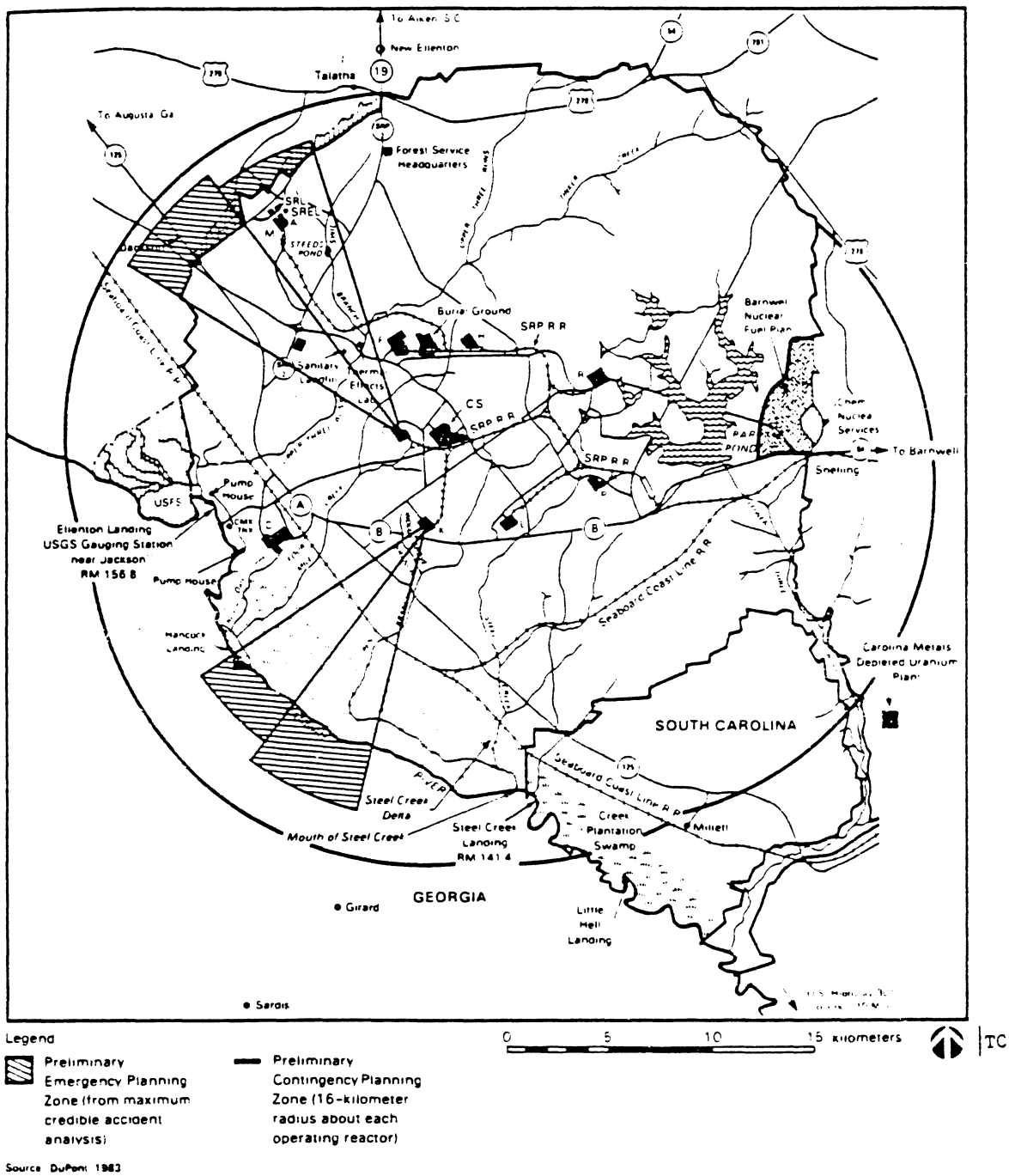


Figure 9. Technically Recommended Emergency Planning Zone

adopted to a distance of fifty miles from the center of the Savannah River Plant. Figure 10. SRP Fifty-Mile Food Ingestion Pathway Zone shows the IPZ relative to SRP. It was decided that immediate emergency response actions in the IPZ were not necessary, but provision for environmental monitoring and assessments were required. With agreements on these issues, all conditions for planning were established.

Emergency Notification and Information Sharing

Finalization of the planning basis permitted the process of gathering site-specific information for emergency plans to begin. Part of this process included structuring and executing agreements on emergency notifications and cooperative emergency response measures. Early in the planning process it was clear the years of separate and distinct independent relationships would need to be overcome to implement an integrated multijurisdictional system. This was required not only to accomplish the planning but to build permanent emergency response precedures between jurisdictions. This situation existed not just between SRP and offsite jurisdictions but between the offsite jurisdictions themselves. Any major emergency at SRP with offsite consequences would require a complex, intergovernmental, multiorganizational response. In such an environment, effective information sharing among the responding organizations and among the government and other agencies responsible for the response is a basic requirement for success (DeBusk and Walker, 1986: 1). To integrate the individual SRP, state, and county plans together required some integration techniques that would ensure that notification and response

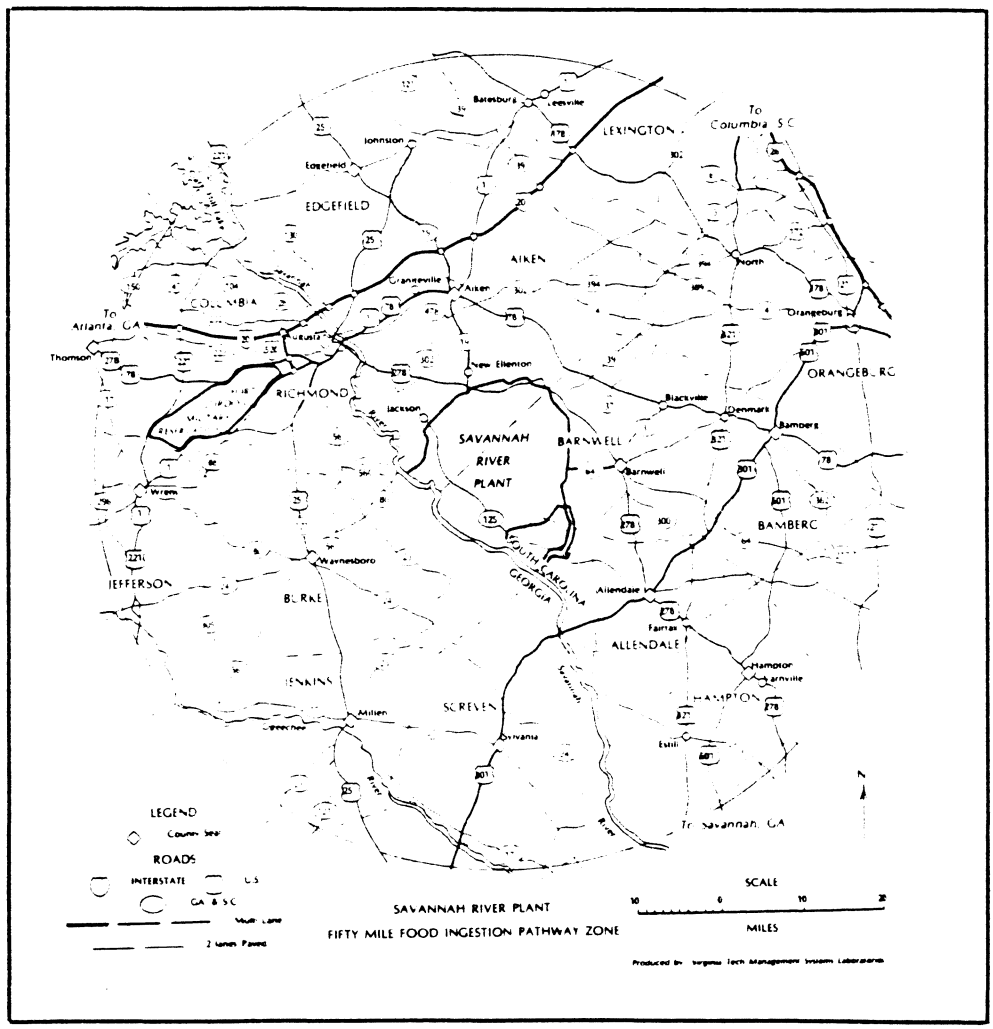


Figure 10. SRP Fifty-Mile Food Ingestion Pathway Zone

procedures fit together and properly share information. One suggested improvement that accomplished the integration objective was the use of common incident notification forms and common incident response maps.

The incident notification procedures then in use by DOE-SR to inform offsite agencies were not well documented and were complicated by the multiple authorities requiring notification with different information. Specifically, DOE-SR expressed concern over the number of agencies requiring notification with the same type of information but requiring that it be calculated and reported differently. The time required to gather incident information, calculate it in accordance with each preference, and report it exceeded the notification time requirements also requested by the offsite agencies. This situation created a nearly impossible communications and coordination problem for participants.

Accurate maps are a key ingredient to effective emergency management. This case was no exception. Among the first planning activities was to utilize the information from establishing the planning basis and convert it to information on maps. Through this process of mapping, or microzonation to emergency planners, many planning elements were developed and finalized. They included the identification of alternatives and final selection of:

- the geographic boundaries of planning zones,

- reception and shelter facilities,

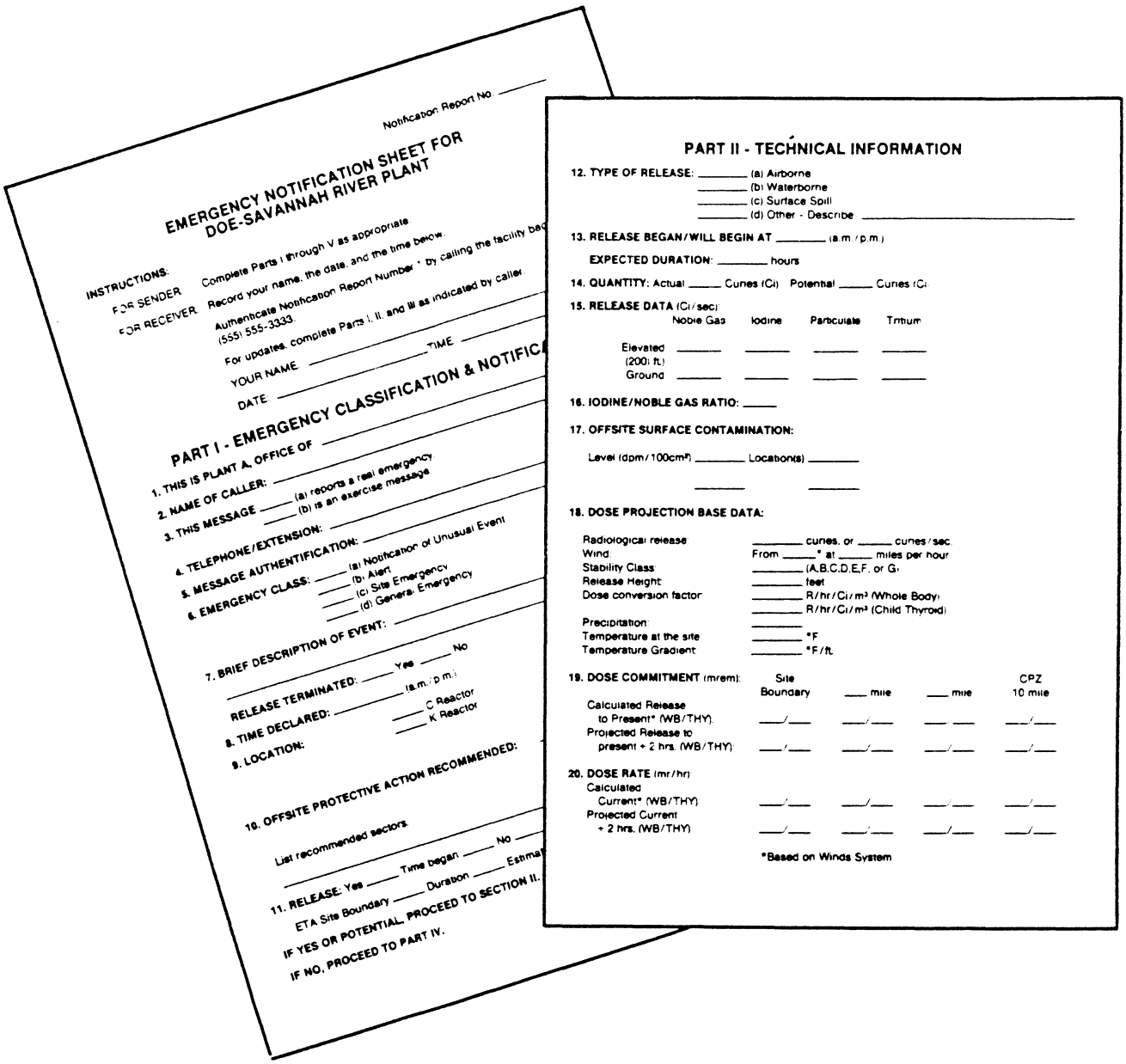
- population centers, and

- traffic control points and evacuation routes.

Because the agreement on a planning basis was reached early in the planning phase, mapping activities were begun immediately in order to define planning zones and subsequently the population within each zone. This information is a primary element in emergency planning when evacuation is one of the response options. However, as the mapping activities began it was clear that the jurisdictions did not consider it necessary to have common maps.

To foster common emergency planning and response tools, MSL suggested a meeting of DOE-SR and offsite agencies to reach consensus on these integration issues. It was a conflict resolution meeting in which all participants were confronted with the problem and with solutions to the problems. First, based on the requirements of each state's emergency planning and health agency, a common procedural and incident-specific notification form was designed. See Figure 11. A Common Incident Notification Form Allows Information Sharing.

Second, a common map showing both states was designed to promote more effective intergovernmental communications and coordination during planning and during response. See Figure 12. The Common SRP Radiological Response Map. In four hours, compromises were negotiated and consensus reached. As a result, these emergency management tools were incorporated into the SRP and offsite emergency management documents. More impor-



EMERGENCY NOTIFICATION SHEET FOR
DOE-SAVANNAH RIVER PLANT

Notification Report No. _____

INSTRUCTIONS:
FOR SENDER: Complete Parts I through V as appropriate
FOR RECEIVER: Record your name, the date, and the time below.
Authenticate Notification Report Number * by calling the facility bac
(555) 555-3333.
For updates, complete Parts I, II, and III as indicated by caller.

YOUR NAME _____ TIME _____
DATE _____

PART I - EMERGENCY CLASSIFICATION & NOTIFIC

1. THIS IS PLANT A, OFFICE OF _____
2. NAME OF CALLER: _____
3. THIS MESSAGE ____ (a) reports a real emergency
____ (b) is an exercise message
4. TELEPHONE/EXTENSION: _____
5. MESSAGE AUTHENTIFICATION: _____
6. EMERGENCY CLASS: ____ (a) Notification of Unusual Event
____ (b) Alert
____ (c) Site Emergency
____ (d) General Emergency
7. BRIEF DESCRIPTION OF EVENT: _____
RELEASE TERMINATED: ____ Yes ____ No
8. TIME DECLARED: _____ (a.m./p.m.)
9. LOCATION: ____ C Reactor
____ K Reactor
10. OFFSITE PROTECTIVE ACTION RECOMMENDED:
List recommended sectors _____
11. RELEASE: Yes ____ Time began ____ No ____
ETA Site Boundary ____ Duration ____ Estima
IF YES OR POTENTIAL, PROCEED TO SECTION II.
IF NO, PROCEED TO PART IV.

PART II - TECHNICAL INFORMATION

12. TYPE OF RELEASE: _____ (a) Airborne
_____ (b) Waterborne
_____ (c) Surface Spill
_____ (d) Other - Describe _____
13. RELEASE BEGAN/WILL BEGIN AT _____ (a.m./p.m.)
EXPECTED DURATION: _____ hours
14. QUANTITY: Actual _____ Curies (Ci) Potential _____ Curies (Ci
15. RELEASE DATA (Ci/sec)

	Noble Gas	Iodine	Particulate	Tritium
Elevated (200 ft.)	_____	_____	_____	_____
Ground	_____	_____	_____	_____

16. IODINE/NOBLE GAS RATIO: _____
17. OFFSITE SURFACE CONTAMINATION:
Level (dpm/100cm²) _____ Location(s) _____
_____ _____
18. DOSE PROJECTION BASE DATA:

Radiological release	_____ curies, or _____ curies/sec
Wind	From _____° at _____ miles per hour
Stability Class	_____ (A,B,C,D,E,F, or G)
Release Height	_____ feet
Dose conversion factor	_____ R/hr/Ci/m³ (Whole Body)
	_____ R/hr/Ci/m³ (Child Thyroid)
Precipitation	_____
Temperature at the site	_____ °F
Temperature Gradient	_____ °F/ft.

19. DOSE COMMITMENT (mrem):

	Site Boundary	___ mile	___ mile	CPZ 10 mile
Calculated Release to Present* (WB/THY)	___/___	___/___	___/___	___/___
Projected Release to present + 2 hrs. (WB/THY)	___/___	___/___	___/___	___/___

20. DOSE RATE (mr/hr)

Calculated Current* (WB/THY)	___/___	___/___	___/___	___/___
Projected Current + 2 hrs. (WB/THY)	___/___	___/___	___/___	___/___

*Based on Winds System

Figure 11. A Common Incident Notification Form: Allows Information Sharing

tantly, they represented an integrated approach by all participants to coordinate planning and share information. This commitment made during the planning process represents a lasting change in their intergovernmental relationships.

Emergency Plans and Joint Exercise

In the final analysis, all planning activities were documented in a series of new offsite site-specific emergency management plans for all jurisdictions located within the SRP Contingency Planning Zones. These plans formed an integral part of South Carolina's and Georgia's emergency organization and system of documents. They included:

- Part 5, South Carolina Operational Radiological Emergency Response Plan (SCORERP)
- Annex Q, Aiken County (SC) Emergency Operation Plan
- Annex Q, Allendale County (SC) Emergency Operation Plan
- Annex Q, Barnwell County (SC) Emergency Operation Plan
- Georgia Radiological Emergency Plan (REP), Base Plan
- Georgia Radiological Emergency Plan (REP), Annex C, Savannah River Plant
- Burke County (GA) Emergency Operations Plan for Nuclear Accidents

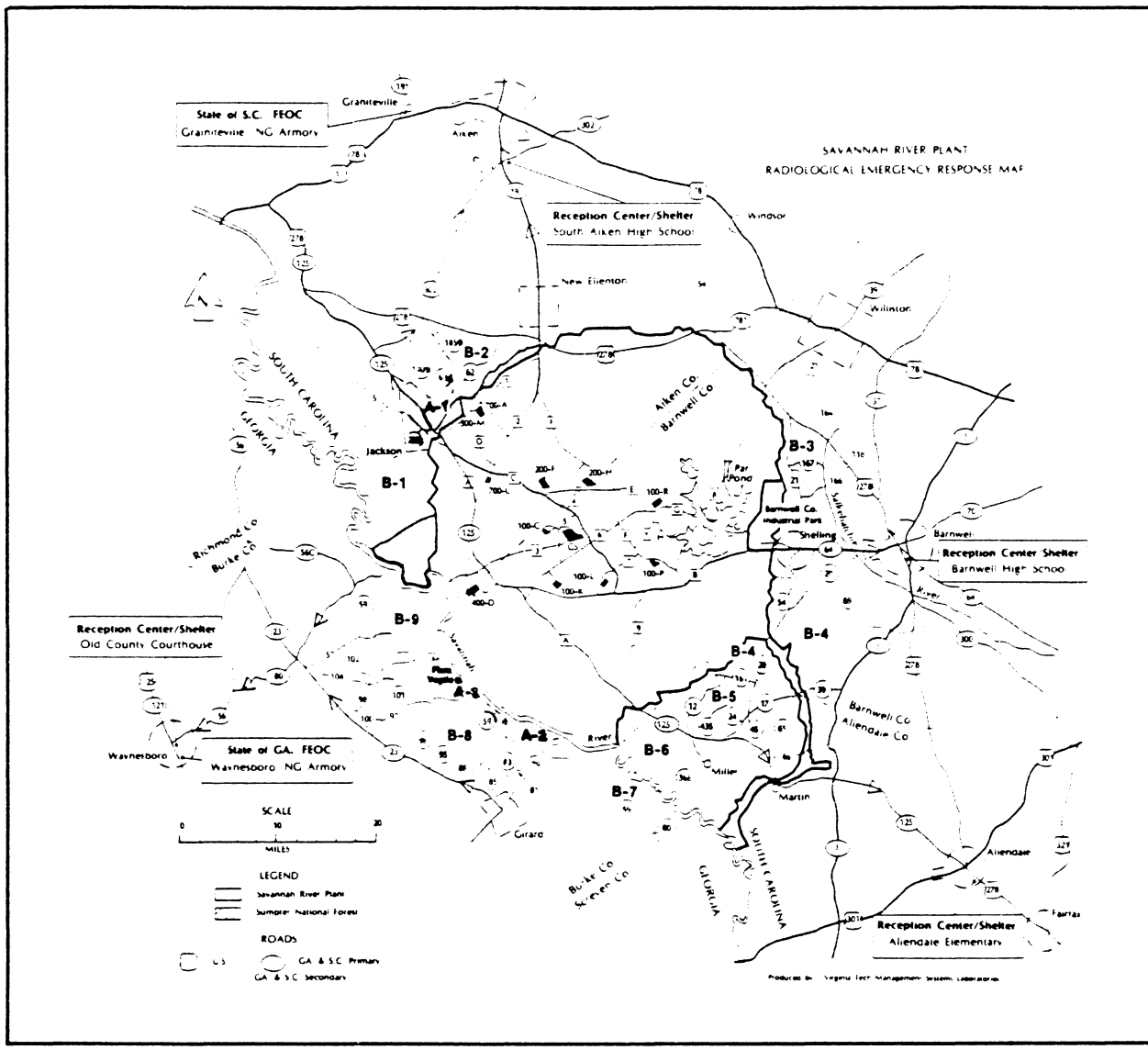


Figure 12. The Common SRP Radiological Response Map

On November 15, 1984, a Joint Savannah River Plant, South Carolina, and Georgia Radiological Emergency Response Exercise was held. The purpose of the exercise was to test both onsite emergency response and to activate offsite plans and practice response interactions. Plans and procedures are not enough. They must be tested, practiced, and needed improvements implemented. The exercise itself was conducted by mutual agreement of all the participants. During the planning process it was further agreed that offsite jurisdictions, lead by the states, could exercise SRP-offsite emergency response by participating in an SRP exercise once a year. However, offsite participation, and to what degree, are optional and dependent on funding availability. The November 1984 test was the first full-scale exercise between SRP and offsite authorities. Indeed it was the first known full exercise between any DOE field site and offsite authorities. It involved a simulated radiological emergency that required full activation of the states' emergency operating centers, deployment of full-scale radiation monitoring and emergency management personnel, and even a limited offsite evacuation.

Generally, the exercise went well. The Exercise Evaluation Report stated:

> The Joint Exercise demonstrated that plans, procedures, and personnel assignments for responding to emergencies at SRP and for interactions with South Carolina and Georgia are basically sound and workable; and necessary actions and interactions were accomplished successfully (Exercise Evaluation Report, 1985: 2).

Recommended areas for improvement tended to be in specific technical areas. For example, the common notification form accomplished the objec-

tive of quick, single point-of-contract information for notifying state health officials. However, some changes were recommended for adjusting data to the new state dose-projection models. Another example was that interorganization agreements and procedures documented in the offsite emergency documents had not been fully implemented in SRP procedures.

The emergency management documents that represent agreements and procedures for intergovernmental notification and coordinated response require frequent review and adjustment. The intergovernmental environment at SRP will tend to return to the separate relationship that existed before 1982 without the pressure of a forcing function like L Reactor. This will limit continued and improved intergovernmental cooperation. The agreements and procedures made during the 1983-4 time period require continued interaction. For example, a method that might keep agreements and procedures current is actually holding the planned annual SRP-offsite exercises. These do not need to be on the scale of the first exercise. The interaction caused by the joint planning and execution alone have positive effects for emergency response. No doubt, the overall success of the November 1984, exercise is partly attributable to the close interaction of the participants over the preceeding fifteen months. The challenge to the imbedded opportunists will be to utilize the existing conditions and agreements to maintain the progress institutionalized during the window of opportunity.

CHAPTER VI

CONCLUSION

Modern technological hazards require coordinated, multijurisdictional emergency management action. To effectively respond to the challenge presented by modern hazards and multijurisdictional complexities, a proactive approach is necessary. This thesis addresses this need by proposing an implementation model and applying it in a case study.

The implementation model consists of three major components. First, any consideration of a multijurisdictional emergency management system must be made in terms of a dynamic intergovernmental system. These systems are not fixed. Rather they are better represented by the concept of a movement along a scale between the extremes of the intergovernmental spectrum. At one extreme the intergovernmental environment can be characterized as separate and distinct. At the other end of the spectrum intergovernmental relationships are based on overlapping and interdependent authority. Relationships change along the scale depending on the strength of case-specific applied variables. The case study used in this thesis documented the change in intergovernmental relationships caused by specific influencing variables. The L Reactor restart issue, supported by policy changes, institutional opportunism, and Plant Vogtle construction, forced intergovernmental relations in and around the Savannah River Plant toward contemporary interdependent relationships.

The second component consists of identifying and acting on windows of opportunity. Building upon the concept of systems dynamics, intergovernmental relationships, without the pressure of applied variables, will default to separate and distinct relations. Institutional opportunists in favor of cooperative, intergovernmental programs must be able to identify and act quickly when opportunities present themselves. At the Savannah River Plant the opportunities were maximized to gain favorable intergovernmental results.

The last component in the model is the use of system change at the optimal time to establish linkages between multiple jurisdictions. In multijurisdictional emergency management these linkages are documented by emergency plans and procedures. In the examined case study, cooperative planning yielded such results. Despite a general return to separate and distinct intergovernmental relationships, the existence of a common and coordinated emergency management system enhances the multijurisdictional response capabilities of all participants.

The implementation model developed and demonstrated in this paper has broad application in the field of public administration. By gaining visibility of intergovernmental relationships and alignments through understanding the first component, the chance of successful programmatic action is enhanced by the used of the second and third components.

BIBLIOGRAPHY

1. Bish, Robert L. and Ostrom, Vincent, Understanding Urban Government, Washington, D.C.: American Enterprise Institute for Public Policy Research, 1973.

2. Burby, Raymond J., and French, Steven P., Flood Plain Land Use Management, A National Assessment. Boulder: Westview Press, 1985.

3. Chenault, William W., Evacuation Planning in the TMI Accident, Washington, DC :FEMA, 1980.

4. "Chernobyl Accident Elicits Federal Action," Nuclear News. (June 1986), 37-38.

5. Comfort, Louise K., "Integrating Organizational Action in Emergency Management: Strategies for Change," Public Administration Review, Vol. 45, Special Issue (January 1985), 155-164.

6. Cutter, Susan L., "Residential Proximity and Cognition of Risk at Three Mile Island: Implications for Evacuation Planning," Nuclear Power, Assessing and Managing Hazardous Technology, Boulder: Westveiw Press, 1984.

7. DeBusk, Richard E. and Walker, J. Andrew, "Improving Emergency Management Through Information Sharing: Considerations In Emergency Operations Center Design." To be Presented at the American Nuclear Society Topical Meeting on Radiological Planning, Washington, D.C., September 1986.

8. Drabek, Thomas E. et al, Managing Multi-organizational Responses Boulder : The University of Colorado, 1981.

9. Drabek, Thomas E., "Managing the Emergency Response," Public Administration Review, Vol. 45, Special Issue (January 1985), 85-92.

10. "Emergency Planning," Atomic Industry Forum, Background Information. June 1986.

11. Elmore, Richard F., "Backward Mapping: Implementation Research and Policy Decisions," Political Science Quarterly. (Winter 1979-80),601-616.

12. Fishoff, B., "Managing Risk Perceptions," Issues in Science and Technology. (Fall 1984), 83-96.

13. Foster, H., Disaster Planning. (New York: Spring-Verlag, 1980).

14. Garrett, A. J., Buckner, M. R., Mueller, R. A., "The Weather Information and Display Emergency Response System," Nuclear Safety. July 1982.

15. Georgia Emergency Management Agency, State of Georgia Radiological Emergency Plan, Annex C, Savannah River Plant, Atlanta, Georgia.

16. Ingram, Helen, "Policy Implementation Through Bargaining," Public Policy, Vol. 25, No. 4, (Fall 1977), 499-526.

17. Kasperson, R. E., Pijawaka, K. D., "Societal Response to Hazards and Major Hazard Events: Comparing Natural and Technological Hazards," Public Administration Review.,Vol.45, Special Issue (January 1985), 7-19.

18. Kemeny, John G., Report of the President's Commission on the Accident at Three Mile Island, Washington, DC: 1979.

19. Kemeny, John G., "Saving American Democracy: The Lessons Learned at Three Mile Island," Technology Review, (June-July 1980), 65-75.

20. Kingdon, John W., Agendas, Alternatives, and Public Policy, Boston: Little, Brown and Company, 1984.

21. Mazmanian, Daniel A. and Sabatier, Paul A., Implementation and Public Policy. Glenview, Illinois : Scott, Foresman and Company, 1983.

22. May, Peter J., "FEMA's Role in Emergency Management: Recent Experience," Public Administration Review, Vol. 45, Special Issue (January 1985), 40-48.

23. Mushkatel, A. H., and Weschler, L. F., "Emergency Management and the Intergovernmental System," Public Administration Review. Vol. 45, Special Issue (January 1985), 49-56.

24. Nakamura, Robert T. and Smallwood, Frank. The Politics of Policy Implementation. Berkeley: University of California Press, 1973.

25. Perrow, C., Normal Accidents: Living With High Risk Technologies. New York: Basic Books, Inc., 1984.

26. Petak, W. J., "Emergency Management: A Challenge for Public Administration," Public Administration Review, Vol. 45, Special Issue (January 1985), 3-6.

27. Petak, W. J., and Atkisson, A. A., National Hazard Risk Assessment and Public Policy. New York: Springer-Verlag, 1982.

28. Pressman, Jeffrey L., Federal Programs and City Politics, The Dynamics of the Aid Process in Oakland. Berkeley: University of California Press, 1975.

29. Pressman, Jeffrey L., and Wildavsky, Aaron, Implementation. Berkeley: University of California Press, 1979.

30. Rogovin, Mitchell, Three Mile Island, A Report to the Commissioners and to the Public, Washington, DC: Government Printing Office, 1980.

31. Rubin, Clair B. and Barbee, Daniel G., "Disaster Recovery and Hazard Mitigation: Bridging the Intergovernmental Gap," Public Administration Review, Vol. 45, Special Issue (January 1985), 57-63.

32. Schmidt, J. W., Kurstedt, H. A., Walker, J. A., and DeBusk, R. E., "Tri-Purpose Emergency Management Model," Conference Proceedings of the 4th Annual Multiconference, Society for Computer Simulation, January 1985, 55-60.

33. Scranton, William W., Report of the Governors Commission on Three Mile Island, Commonwealth of Pennsylvannia, 1980.

34. Sills, D. L., Wolf, C. P., and Shelarski, V. B. (eds.), Accident at Three Mile Island: The Human Dimensions. Boulder: Westview Press, 1982.

35. South Carolina Emergency Preparedness Division, South Carolina Operational Radiological Emergency Response Plan, Part 5, Savannah River Plant Site Specific, Office of the Adjutant General, Columbia, South Carolina.

36. U.S. Nuclear Regulatory Commission NUREG 0654 and Federal Emergency Management Agency, Criteria for Preparation and Preparedness and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants FEMA-REP-1 Rev. 1, November 1980.

37. U.S. Department of Energy, Defense Waste Processing Facility, Blacksburg: Virginia Tech, 1984.

38. U.S. Department of Energy, Emergency Planning, Preparedness, and Response for Operations. DOE Order 5500.2, Washington D.C., August 13, 1981.

39. U.S. Department of Energy, Savannah River Operations Office, Emergency Planning, Preparedness, and Response Program for the U.S. Department of Energy Savannah River Operations Office and Savannah River Plant. SR Order 5500.2, 9 July 1982.

40. U.S. Department of Energy, Exercise Evaulation Report, Aiken, South Carolina, 1985.

41. U.S. Department of Energy, Offsite Notification Plan, SR 302, Savannah River Plan, Aiken, South Carolina.

42. U.S. Department of Energy, Public Affairs Policy and Planning Reguirments for Emergencies, DOE Order 5500.4, Washington, D.C., August 13, 1981.

43. U.S. Department of Energy, Reactor and Nonreactor Nuclear Facility Emergency Planning, Preparedness and Response Program for Department of Energy Operation, DOE Order 5500.3, Washington D.C., August 13, 1981.

44. U.S. Department of Energy, The Savannah River Plant, Savannah River Operations Office, 1980.

45. Walker, J. Andrew, DeBusk, Richard E., and Kurstedt, Harold A., "Developing Integrated Multijurisdictional Emergency Management Documents: A Case Study At The Department of Energy's Savannah River Plant." Presented at the Annual Meeting of the American Society for Public Administration, panel on Original Case Studies in All Phases of Emergency Management, Anaheim, California, April 1986.

46. Walker, David B., Toward a Functioning Federalism, Boston: Little, Brown and Company, 1981.

47. Wright, Deil S., Understanding Intergovernmental Relations. Monterey, California: Brooks/Cole Publishing Company, 1982.

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