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EMERGENCY AND DISASTER SERVICES  
IN BROOKINGS COUNTY, SOUTH DAKOTA

This thesis is submitted as a requirement for the  
degree of Master of Science in the Department of  
Geography, and is acceptable for meeting the thesis re-  
quirements for this degree. Acceptance of this thesis does  
not imply that the qualifications required of the candidate are  
necessarily the province of the major department.

BY

  
LISA M. BRANNAN

Dr. Lee A. GIBSON  
Thesis Advisor

  
A thesis submitted in partial fulfillment  
of the requirements for the degree  
Master of Science  
Major in Geography  
South Dakota State University  
1986

EMERGENCY AND DISASTER SERVICES  
IN BROOKINGS COUNTY, SOUTH DAKOTA

Special recognition should be given to several people for their part in making this nightmare become a reality. My parents, especially my mother, Margaret (especially my mother), who kept urging me to get it done; Orville Gao, for his excellent map work; and Robert Bishara, for his previous work and his stories to keep me interested in this topic. Very special credit goes to Dr. Lee A. Opheim, who's suggestion of this topic and his patient dying patience for Dr. "O" I'm

This thesis is approved as a creditable and independent investigation by a candidate for the degree, Master of Science, and is acceptable for meeting the thesis requirements for this degree. Acceptance of this thesis does not imply that the conclusions reached by the candidate are necessarily the conclusions of the major department.

Dr. Lee/A. Opheim  
Thesis Adviser

\_\_\_\_ / \_\_\_\_ / \_\_\_\_  
Date

Dr. Edward Patrick Hogan  
Head, Geography Department

\_\_\_\_ / \_\_\_\_ / \_\_\_\_  
Date

## ACKNOWLEDGEMENTS

Special recognition needs to be given to several people for their part in making this nightmare become a reality: my parents, Bill and Margaret (especially mom), who kept bugging me to get it done; Orville Gab, for his excellent map work, and Robert Bishman, for his precious time and "war stories" to keep me interested in this topic.

Very special credit goes to Dr. Lee A. Opheim, who's suggestion of this topic got me going, and his undying patience with me when I stalled. If it were not for Dr. "O" I would never have finished.



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## CHAPTER I

### INTRODUCTION

#### Need for Study

The nature of disasters has changed over the years. There is a need for informing the general public of the nature of these changes so that they can be prepared for disasters that may be possible in the future. This thesis addresses the nature of these changes and what the response has been to each. An effort will be made to predict the types of disasters that may be most certain in the future.

Most counties in South Dakota do not have written plans for their communities in the event of a disaster. Brookings County is one of the few that does. For some of the counties that are attempting to get their Emergency and Disaster Services and their county plans moving, Brookings County is the model they use. It is one of the best in the state of South Dakota (Bayer, 1986).

#### Statement of Problem

This thesis attempts to examine why emergency services are needed in Brookings County, and why a Emergency and Disaster Services program will continue to be important in the future. If there were no disasters in Brookings County, there would be no need for an Emergency

and Disaster Service or the various plans that go with it for the future.

When examining the geography of a given area, one is interested in more than just where something is located and why. All living organisms on the earth's surface interrelate with one another in various ways. The purpose of this study is to investigate a small, but very important, aspect of a county's future; how it can mitigate the losses of lives and property should a disaster occur.

#### Definition of Terms

The author will first distinguish the difference between an emergency, a hazard, and a disaster. Emergencies are events such as fires and automobile accidents that can be handled by local resources. Hazards are events such as floods and blizzards which are beyond one's control. Disasters are unforeseen and ruinous events such as tidal waves and earthquakes which usually require outside assistance. The scope of disaster preparedness includes response to emergencies that result from the effects of nature as well as disasters caused by man (Department of the Air Force, 1979: p. 1).

#### Limitations of Study

When attempting to research this topic, the author realized that there was much more information available

that could be used. This study had to be selective because of thesis content and space limitations. While searching for information on this subject, the author had to sift through many boxes of literature, some relevant and worthwhile and some not. Also, some extra material on the Emergency and Disaster Services was not available since the former Civil Defense Director, Robert Bishman, had retired and moved to Tuscon, Arizona.

#### Review of Related Literature

Natural disasters in Brookings County have been examined but technological disasters and the Civil Defense program was not discussed in "The Changing Impact of Natural Disasters in Brookings County" written by Linda Hillestad (Hillestad, 1982). The book Technological Hazards gives a good overview of technological hazards. However, since it is written to cover a global scale, only a few of the hazards can be expected in Brookings County (Zeigler, 1983).

Various plans have been reviewed. One lists the resources in Brookings County and establishes a system for implementing these resources in time of emergency or disaster. However, it is a general plan which does not discuss individual emergencies or disasters and has not been updated since 1978 (Bishman, 1978).

Since most of the information received for this was based on interviews, the most helpful information this author found was while interviewing Robert Bishman and Lee Opheim. Both of these men have been acquainted with Emergency and Disaster Services for many years. They could tell this author some interesting bits of information that one could not find in a newspaper article, although a lot of the information was found in the various newspapers.

#### Organization of Study

This thesis is organized in format so as to provide the reader sufficient background on this topic. Warn-systems and equipment used, planning for future disasters, different types of disaster exercises, and the future of Emergency and Disaster Services will also be discussed. Also included in this thesis are selected disaster plans and sample exercises.

Some type of organization, training, and facilities is needed for disaster mitigation and recovery now and in the future. The primary purpose of disaster preparedness is to protect people, equipment, and facilities. This author will attempt to show how this can be accomplished in Brookings and elsewhere without costing the taxpayers a great deal of money.

John W. McConnell, Assistant Director for Plans

# 'Umbrella' Concept

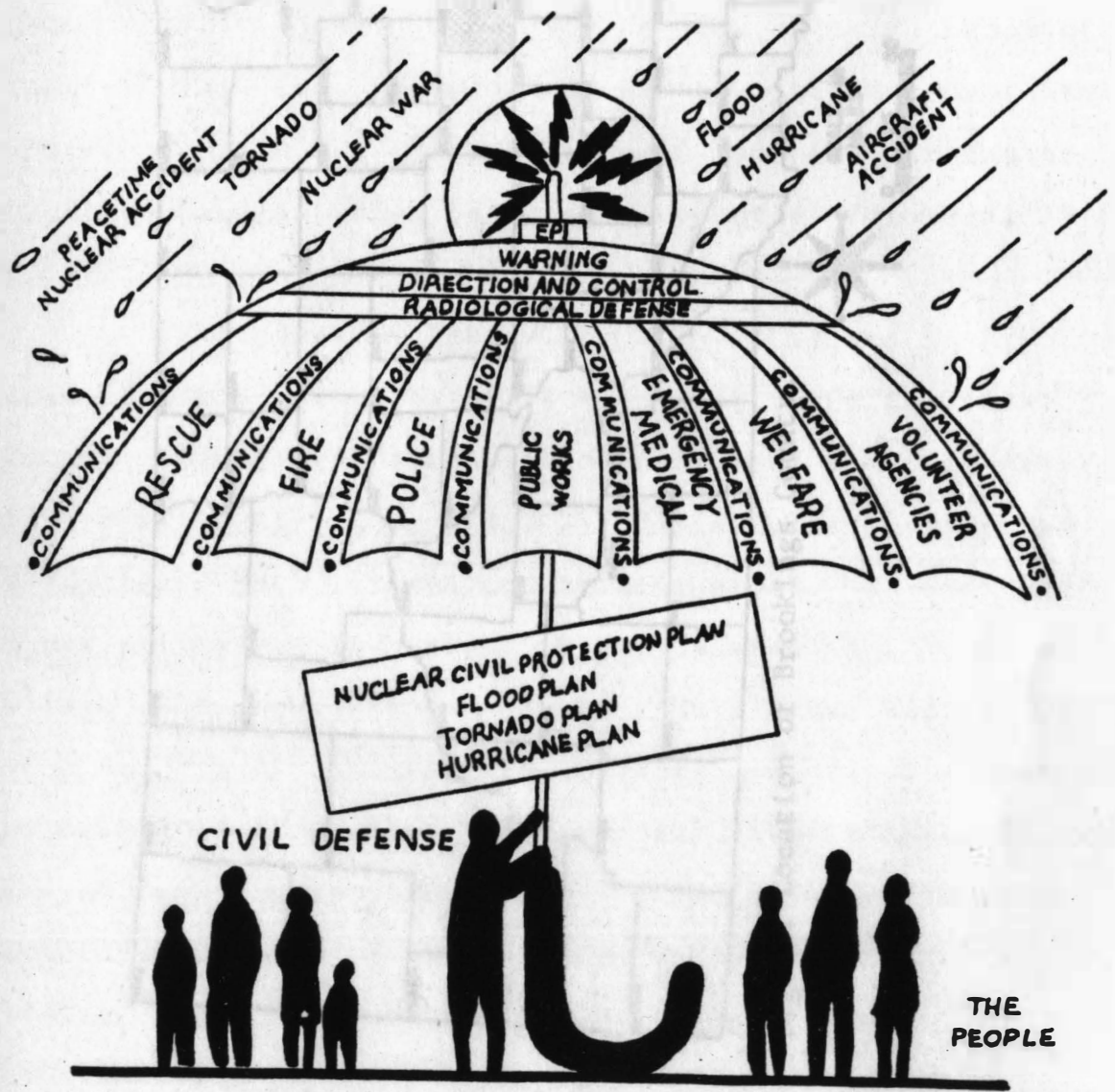


Fig. 1. "Umbrella" Concept.

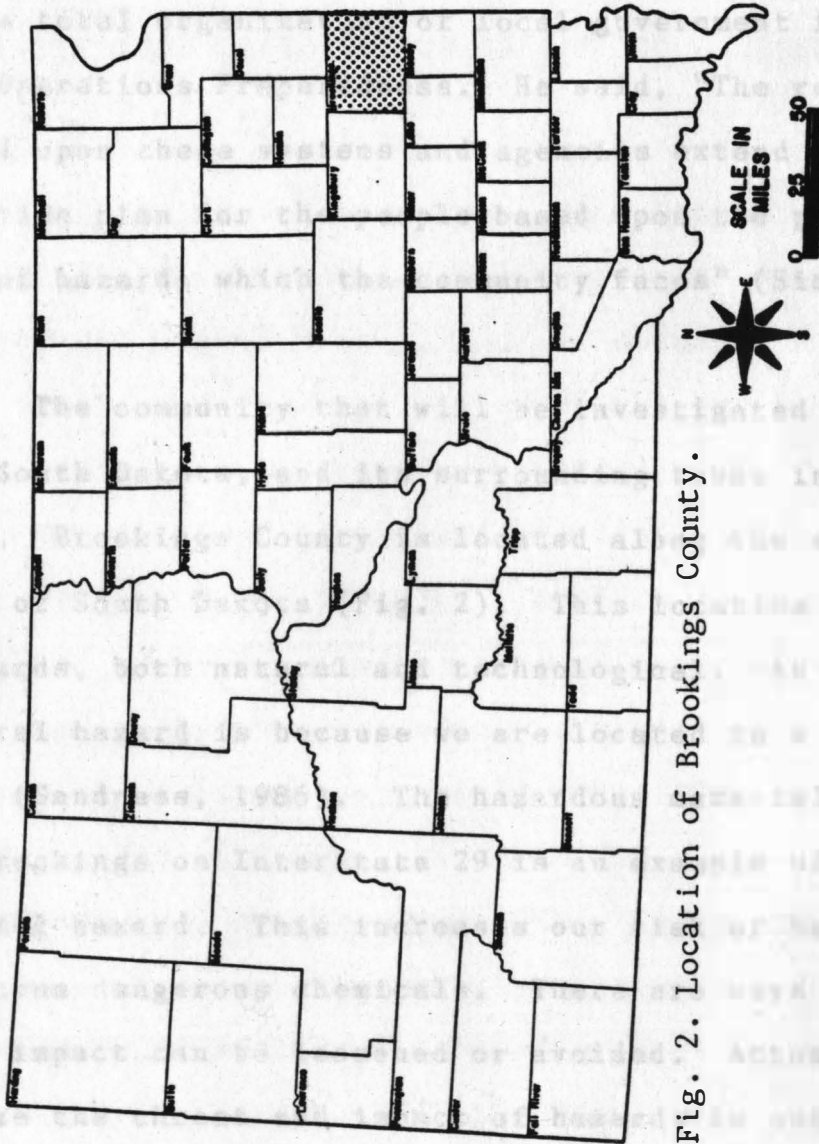


Fig. 2. Location of Brookings County.



and Operations of Defense Civil Protection Agency (DCPA) in 1976, conceived the idea of the "umbrella concept" (Fig. 1) for the total organization of local government for Emergency Operations Preparedness. He said, "The requirements imposed upon these systems and agencies extend from a basic protection plan for the people based upon the particular types of hazards which the community faces" (Simpson, 1976: p. 3).

The community that will be investigated is Brookings, South Dakota, and its surrounding towns in Brookings County. Brookings County is located along the east-central border of South Dakota (Fig. 2). This location is prone to hazards, both natural and technological. An example for a natural hazard is because we are located in a "tornado alley" (Sandness, 1986). The hazardous materials traveling past Brookings on Interstate 29 is an example of a technological hazard. This increases our risk of being exposed to various dangerous chemicals. There are ways by which hazard impact can be lessened or avoided. Attempts to minimize the threat and impact of hazards is and shall continue to be a top priority for the people in this county.

## CHAPTER II

### HISTORY OF BROOKINGS COUNTY CIVIL DEFENSE

In 1946, a few months after the bombing of Japan, a recommendation for a permanent Civil Defense Agency to be set up was requested by top authorities in the Armed Forces of the United States. It was refused by President Truman who turned the matter over to the National Security Resources Board (Sweet, 1982: p. 413).

Legislation established the Federal Civil Defense Administration (FCDA) in 1950. The FCDA was authorized to give grants of money to each state to train officials, help create warning and communications systems, and develop standards for fallout shelters (Sweet, 1982: p. 414).

In 1958, the FCDA was replaced by the Office of Civil and Defense Mobilization. This declared that emergency preparedness would now be shared by the federal, state, and local officials instead of just the state and local personnel (Sweet, 1982: p. 416).

In 1960, the County Commissioners of Brookings County established the office of Civil Defense to coordinate preparation for future disasters within the county. This was the first of its kind in Brookings County. The

name has been changed several times starting with Brookings County Civil Defense and ending with Brookings County Emergency and Disaster Service.

The present state statute pertaining to local government and the responsibilities of the Civil Defense Director went into force on July 1, 1977. It is a section of the South Dakota Compiled Laws (SDCL 33-15). One significant change was the name of Civil Defense to Emergency and Disaster Service. This was done to acquire more federal funding. The Federal Government cut spending for Civil Defense because they didn't want any more money to be spent on preparing for a nuclear war. So Brookings County Civil Defense, in order to receive federal funding once again, changed its name to Brookings County Emergency and Disaster Service. This name portrayed the agency as being less oriented toward defense (Opheim, 1986).

The first director was Robert M. Bishman, who held the position from 1960 to 1985. Bishman was selected as Civil Defense Director for a number of reasons. He was previously a fireman, the president of Dakota Fire Apparatus in Brookings, SD, his father had been Fire Chief when Bob was younger, and he was well-known and well-liked by the public.

One of the first projects undertaken by Bishman in

conjunction with former Fire Chief Charlie Jensen, then current Fire Chief Royal Adamson, and Police Chief Doug Filholm, was the designing and construction of an Emergency and Disaster Services building. This facility was completed in 1965, and at the time was South Dakota's finest Emergency Services building (Bishman, 1985).

Brookings County is highly regarded within the state of South Dakota for its disaster exercises. Each spring, for 20 years, a major disaster exercise was held. No other county in South Dakota can make that statement. The experience gained by key personnel in Brookings County over the years will be of great value should disasters happen in the future. These exercises have been witnessed and participated in by Civil Defense personnel from surrounding counties, as well as representatives of the state of South Dakota Emergency and Disaster Services staff.

Brookings County also is unique in the utilization of reserve forces personnel to assist in the updating of plans and conducting exercises. At one point five of the six reservists, or Mobilization Designees (MOBDES) as they were called, were working for Robert Bishman as disaster preparedness officers.

Unfortunately, funds were slowly reduced for the MOBDES program so that when the original MOBDES officers

retired, no replacements could be funded. However, these people left a legacy of up-dated plans that will be guidelines for the future (Opheim, 1985).

After the Vietnam War, surplus equipment was made available by the federal government to communities that could put it to good use. Robert Bishman was quick to respond to this opportunity and was able to acquire some \$500,000 in fire equipment including 20 trucks. Some vehicles, such as snowplows, also were obtained for the county highway department. He made trip after trip to Salt Lake City, Utah and Fort Leonard Wood, Missouri, to bring this equipment to Brookings.

In 1985 Robert Bishman retired and Lonnie Bayer became the new director of Emergency and Disaster Services. His background includes firefighting and past experience with the Civil Defense program in Sioux Falls, SD. His first year has proven to be an exciting one. It began with the flood in the spring of 1985 with the filling of sandbags. In quick succession, other natural and technological disasters have followed.

The following chapter discusses some of the different disasters, natural and technological, that Brookings County has experienced in the past and will probably be acquainted with in the future.

## CHAPTER III

### DISASTERS IN BROOKINGS COUNTY

#### Natural Disasters

Disaster can be defined as any occurrence causing widespread distress, usually with the loss of life and irreparable damage to social systems or property. Brookings County has been subjected to many natural disasters. They range from blizzards to floods to tornadoes. The state office of South Dakota has made an inventory of disasters and has determined those that are most likely to occur. Among the disasters on the list are tornadoes, floods, snow storms, transportation accidents, hazardous waste spills, and fires (Olson, 1984: p. 1).

One type of disaster that Brookings County is well-acquainted with is the thunderstorm, with its followers, lightning, hail, heavy rain, high wind, and tornadoes. Most precipitation falls in the form of convectional thunderstorms (Griesenbrock, 1986).

With some thunderstorms there is the possibility of hail. Hail is precipitation in the form of rounded lumps of ice, called hailstones, and indicates an intensely active thunderstorm system. Hailstones range from pea size

to the size of a grapefruit. Hail is most devastating to crops (Figs. 3-4). A hailstorm in 1979 cost area farmers close to \$1 million in damages. Doris Schumacher, director of the Agricultural Stabilization and Conservation Service, called the hailstone damage the most extensive the county has suffered since 1963 (Swenson, 1979: p. 1). It was indicated that soybeans were probably most affected by the hail. The Emergency and Disaster Services in Brookings County don't deal with hail damage since it is not as common as other events of nature.

Probably one of the most frightening natural hazard associated with Brookings County is the tornado. They are the most violent of all windstorms and happen most frequently in the midwestern, southern, and central states from March through September. The most dangerous hours are usually between 3 p.m. and 7 p.m. (Capp, 1965: p. 25). Hot, humid days with southerly winds and a threatening, ominous sky constitutes favorable tornado weather.

According to statistics compiled by William Lytle, climatologist and agricultural engineering professor at South Dakota State University, in South Dakota there are an average of six tornadoes in May, eight in June, and four in July (Woster, 1978: p. 1). If a tornado is imminent, all of the sirens in Brookings County will be activated and key people will be notified. Figure 5 shows the alert





Fig. 3. Hail-damaged Bean Crop.



Fig. 4. Hail-damaged Corn Crop.



## Fig. 5. ALERT NOTIFICATION PROCEDURE

(NATURAL DISASTER)

Brookings County Warning Point - Emergency Communications  
Center

## ALERT PROCEDURE

DO NOT USE THIS COLUMN  
UNLESS TIME ALLOWSCo. C.D. Director - 6CD1  
R.M. Bishman 692-4217/693-3100Co. C.D. ORNS Officer  
Dale Brchan 692-5772MOBDES OFFICER  
Lee Opheim 692-7406 Home  
688-4511 Bus.MOBDES OFFICER  
Ralph Lindsay 692-5966 Home  
688-4022 Bus.Co. Sheriff 6-1  
Gordon Ribstein 692-2932Police Chief  
Douglas Filholm 692-2498Fire Chief  
Curt Jensen 693-3349Chairman, Board of Co. Comm.  
George Messner 692-5410Mayor--City of Brookings  
Orrin Juel 692-2931/692-5790City Commissioner  
Ron Bjerke 692-5875County Highway Supr.  
M.R. Cheeseman 692-6567/692-2841

P.I.O.-W.H. "Gip" Nolan 692-6233

Utilities-Wes Hayes 692-6325

## WARNING PROCEDURE

1. Sound selected sirens or all depending on affected areas (Brookings, Aurora, Bruce, Elkton, Sinai, Volga, White)
2. Announce on police radio
3. Announce on fire radio
4. Announce on Civil Defense radio
5. Call latest information to KBRK 692-6233
6. Call Brookings school (during school hours 692-6371)
7. If no response by radio call C.D. Director 692-4217 or 693-3100 or 693-4217
8. Call Brookings Chief of Police 692-2498 if no response by radio
9. Call Brookings Fire Chief 693-3349 if no response by radio
10. Call County Operations-Dale Brchan 692-5772

notification procedure for 1976. The signal is a three-minute steady blast. It doesn't sound steady because the siren that makes the noise is whirling around. Though it is sent in a steady roar, it comes out as though it's rising and falling in a loud, irritating snarl (Argus Leader, 1979: p. 2C).

Another frequent environmental hazard that affects Brookings County is flooding. Of all natural disasters, flooding is most ruinous to life and property (Griesenbrock, 1986). Flooding occurs when soil cannot absorb the excessive rain or snow melt and it cannot be held within the banks of a river, stream, or lake during the natural runoff process. The majority of flood events are a result of early spring snow melt runoff (Griesenbrock, 1986).

One type of flood is known as a flash flood. Here, there is little or no warning. A flash flood can be defined as a sudden violent flood caused by exceptionally heavy rain in a normally dry valley in a semi-arid area or by the collapse or breach of a dam or sea wall (Clark, 1985: p. 220).

One of the most spectacular floods in Brookings County occurred in the spring of 1969. The snow from the previous winter had left more than 70 inches of precipitation to melt when the weather began to get warmer.

Pictures were sent down to earth from satellites and showed the snow cover across the Midwest. The following sequence of maps shows the speed with which flood areas appeared in Brookings County as determined from airplane flights on successive evenings (Figs. 6-11). These were drawn by Robert Bishman from actual sightings in an airplane. Between and including the first and ninth of April 1969, the amount of snow dropped from 19 inches to just a trace (Griesenbrock, 1986).

One project undertaken by the Emergency and Disaster Services before the flood of 1969 was the filling and distribution of sand bags to the people of the county. This happens for every major flood (Bishman, 1985).

It was during this flood that Bishman went out on his first medical run. It was to farm near Aurora and it was by boat. The patient was "a little old lady" who did not trust the boat. They had a hard time persuading her to get in the boat but she finally relented. They brought her back to Brookings and later on that day she had her appendix taken out at the hospital (Bishman, 1985).

There is one more hazard to be mentioned for Brookings County, the blizzard. In her outstanding thesis on "The Changing Impact of Natural Disasters in Brookings County," Linda Hillestad describes the blizzards that occurred prior to 1982. These disasters are so common that

# BROOKINGS COUNTY FLOOD AREA MAP

SOUTH DAKOTA

DAY-DATE: FRIDAY 4-4-69

TIME: 4:00 PM

SNOW COVER: 100 %

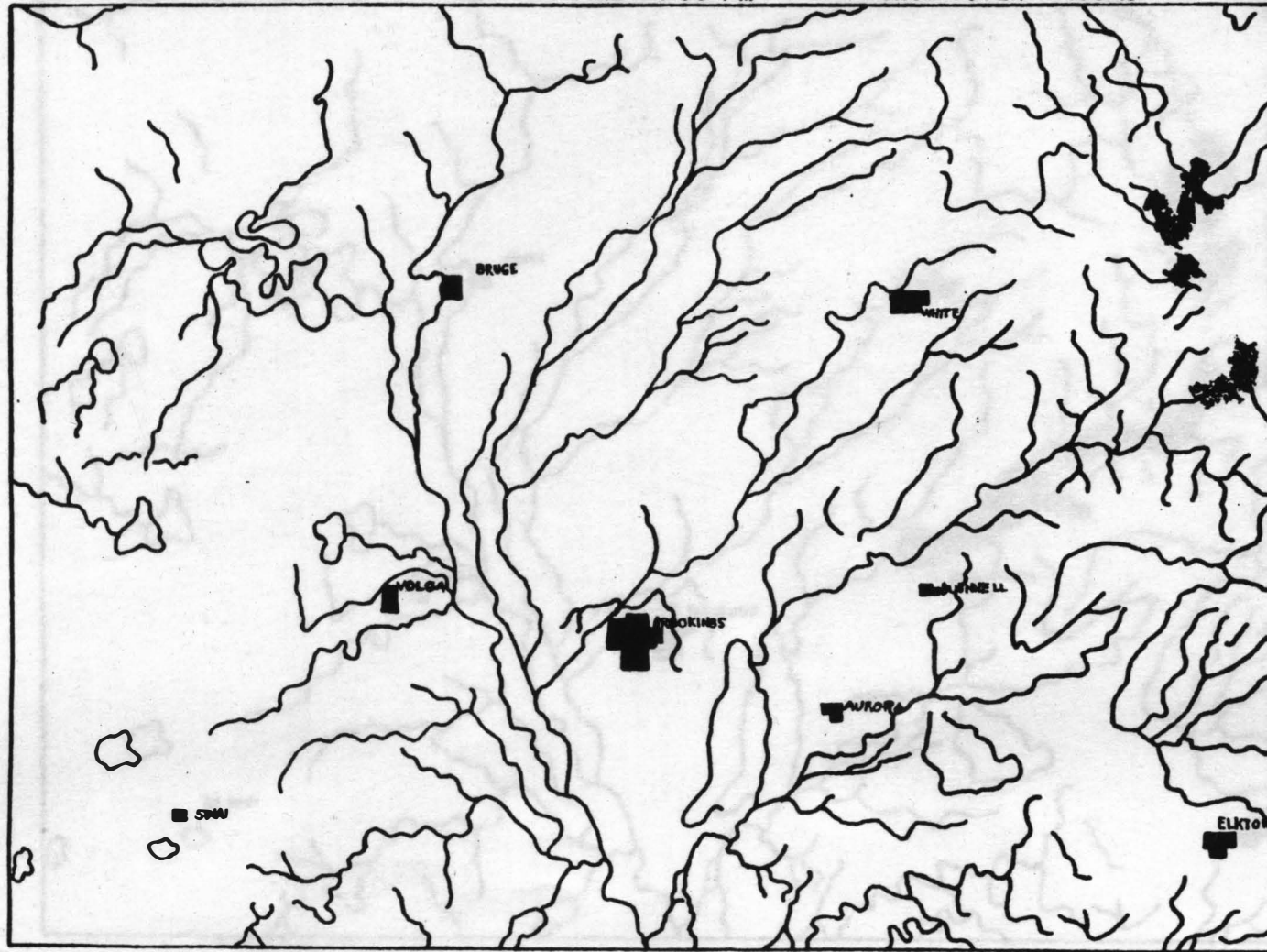


Fig. 6. Flooding 4-4-69. (Bishman, 1969)

**BROOKINGS COUNTY FLOOD AREA MAP**

**SOUTH DAKOTA**

**DAY-DATE: SATURDAY 4-5-69**

**TIME: 5:00 PM**

**SNOW COVER: 95%**

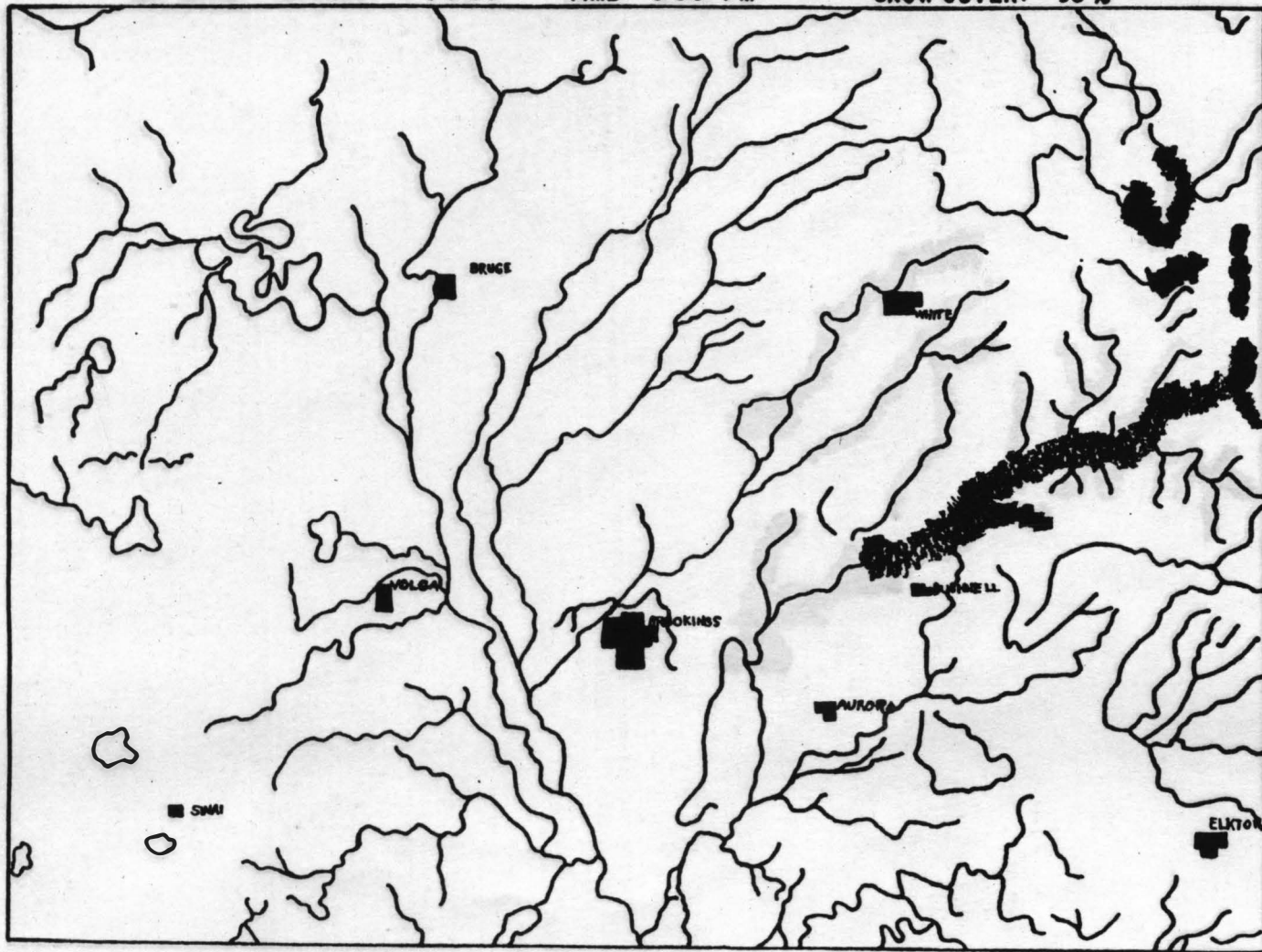


Fig. 7. Flooding 4-5-69. (Bishman, 1969)



BROOKINGS COUNTY FLOOD AREA MAP

SOUTH DAKOTA

DAY-DATE: SUNDAY 4-6-69

TIME: 5:30 PM

SNOW COVER: 75 %

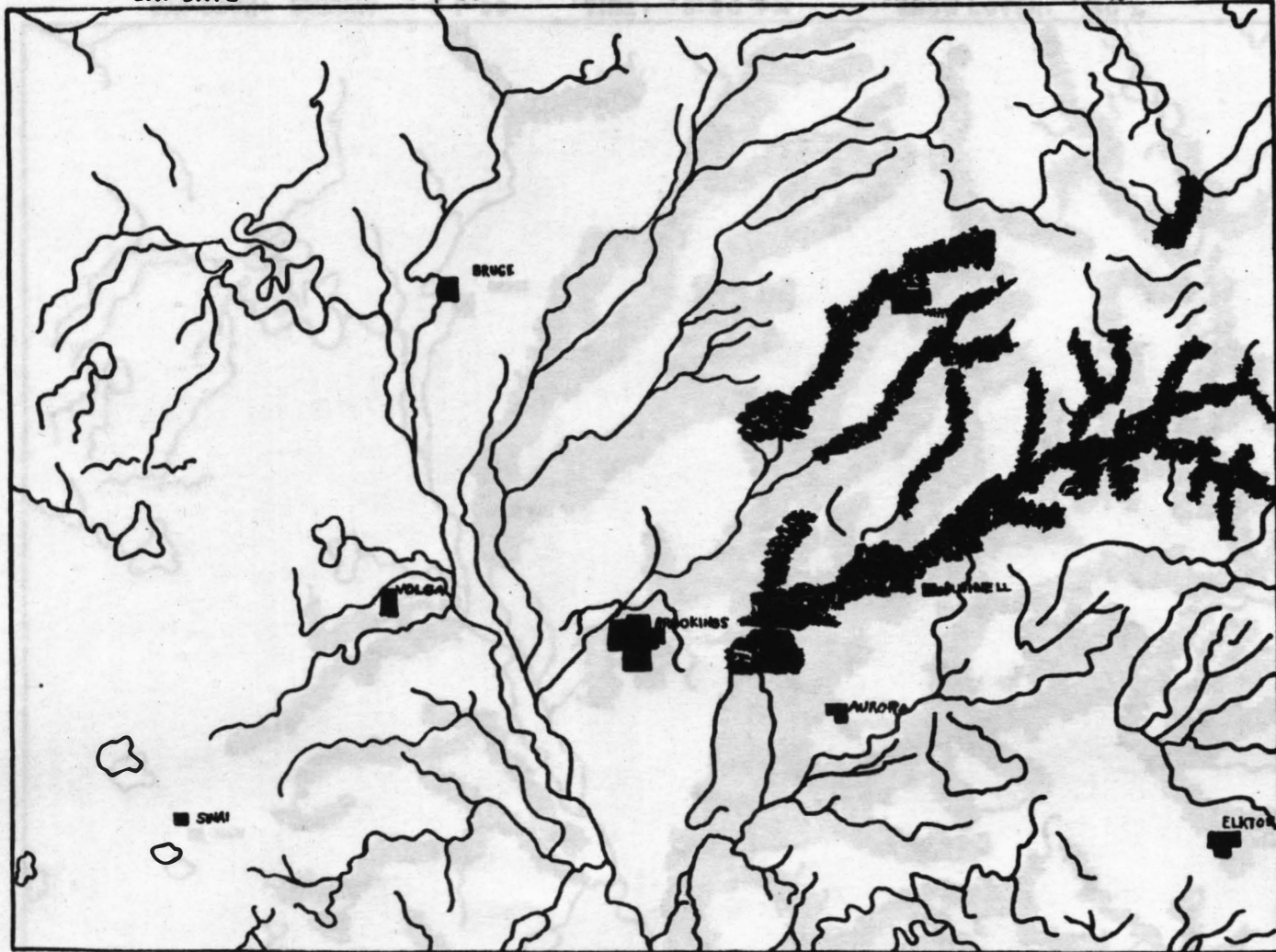


Fig. 8. Flooding 4-6-69. (Bishman, 1969)

**BROOKINGS COUNTY FLOOD AREA MAP**

**SOUTH DAKOTA**

**DAY-DATE: MONDAY**

**4-7-69**

**TIME: 5:30 PM**

**SNOW COVER: 50%**

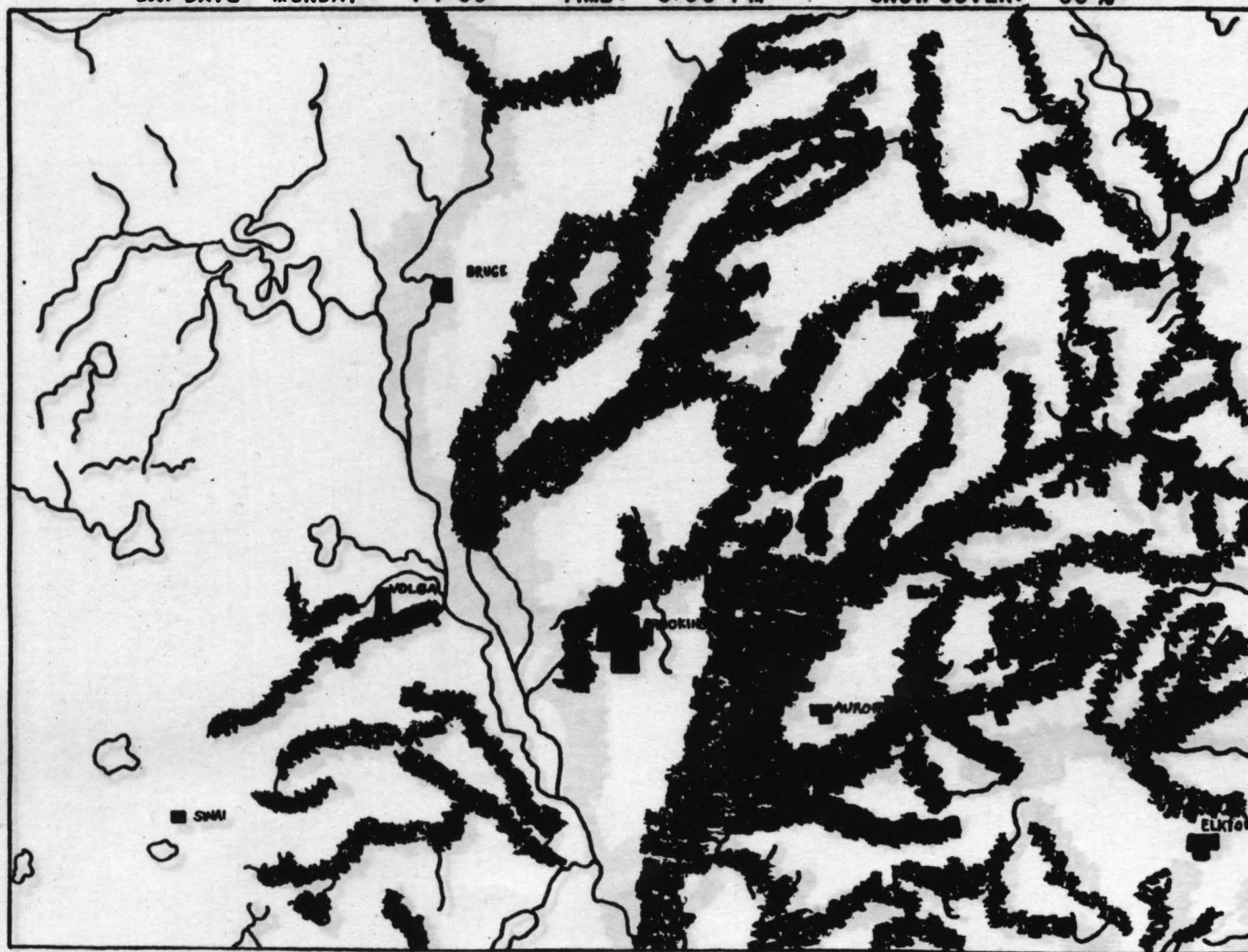


Fig. 9. Flooding 4-7-69. (Bishman, 1969)

BROOKINGS COUNTY FLOOD AREA MAP

SOUTH DAKOTA

DAY-DATE: TUESDAY 4-8-69

TIME: 5:30 PM

SNOW COVER: 35 %

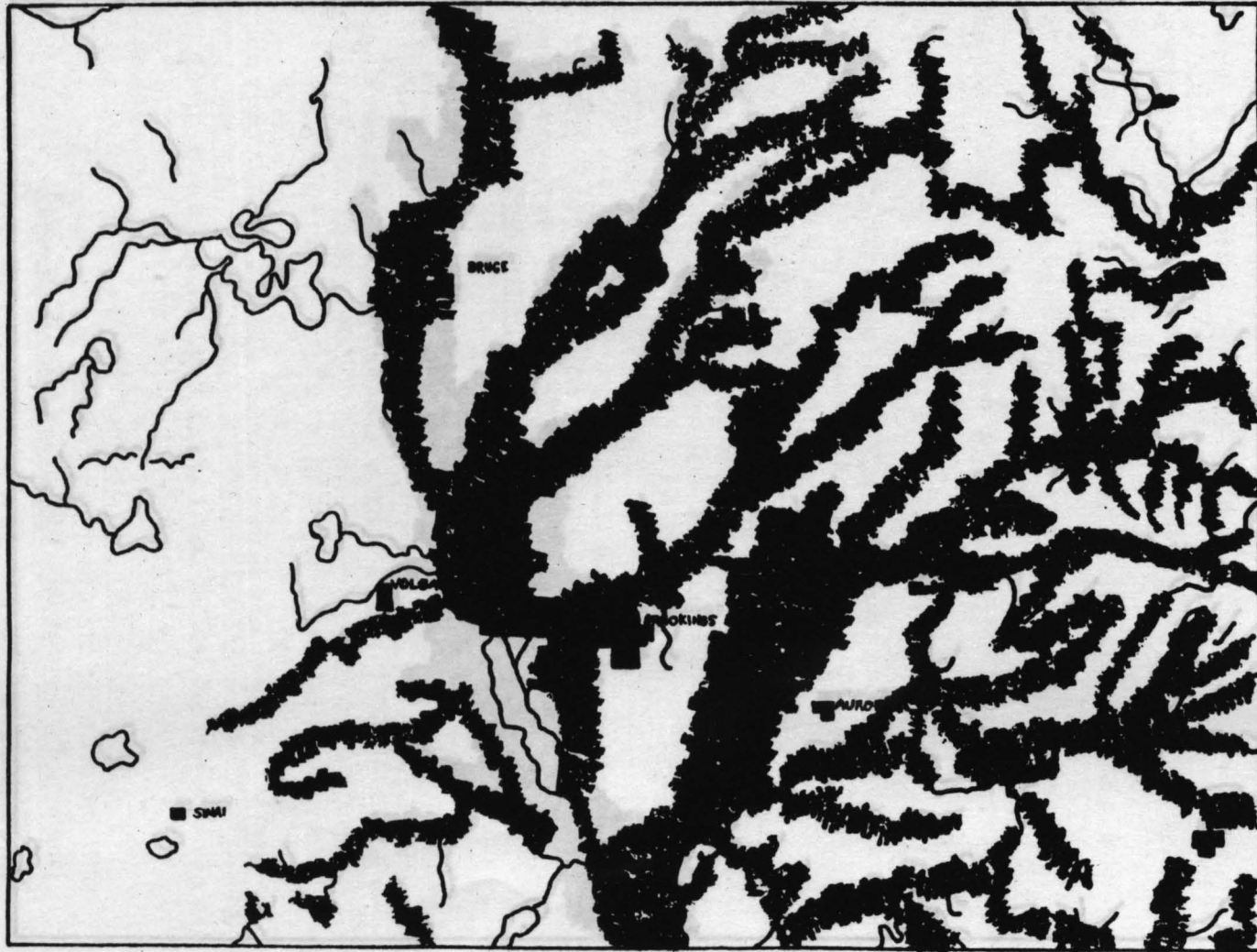


Fig. 10. Flooding 4-8-69. (Bishman, 1969)



BROOKINGS COUNTY FLOOD AREA MAP

SOUTH DAKOTA

DAY-DATE: WEDNESDAY 4-9-69

TIME: 5:30 PM

SNOW COVER: 10 %

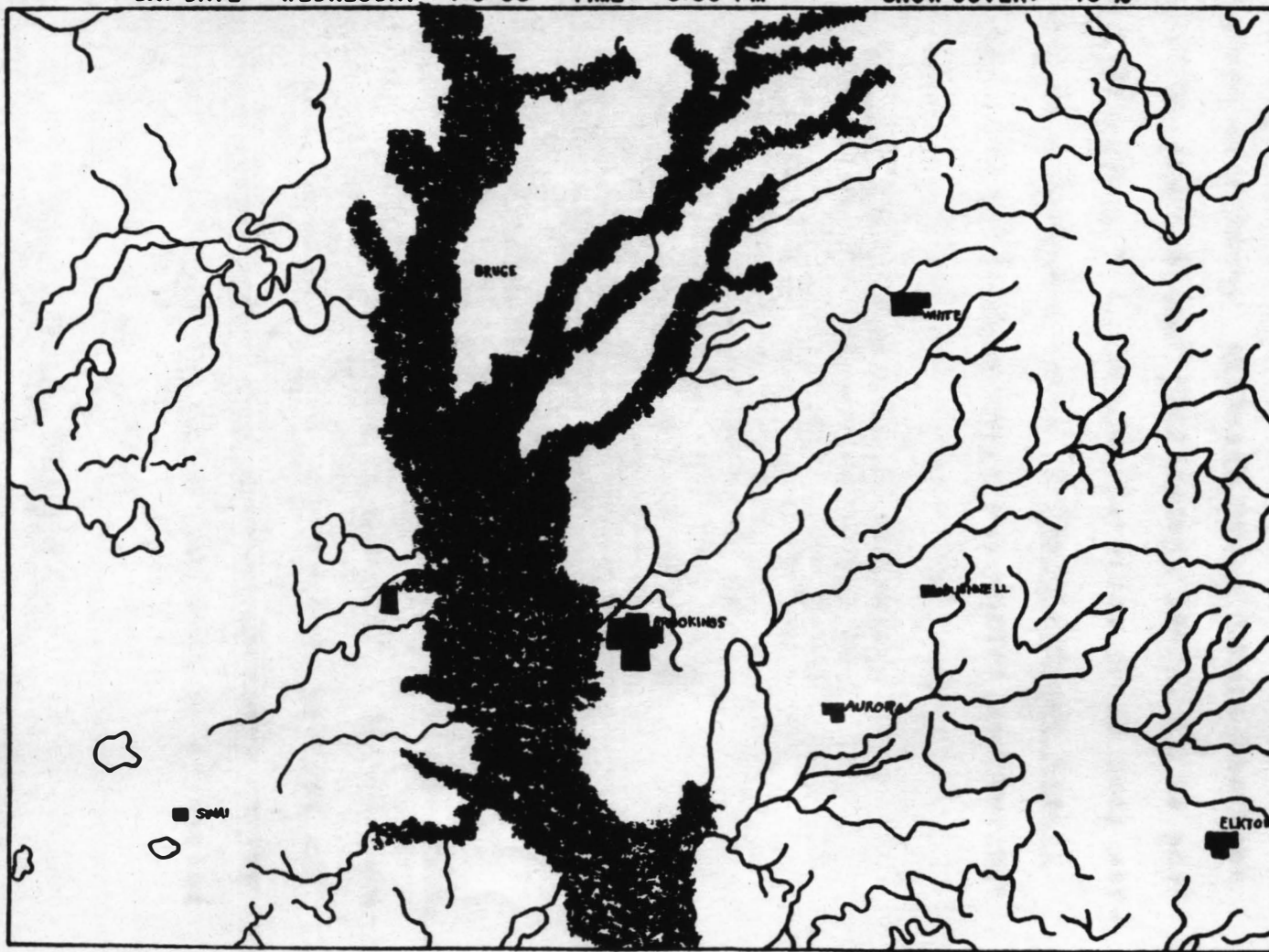


Fig. 11. Flooding 4-9-69. (Bishman, 1969)

it is difficult to arouse a great deal of interest in the fall blizzard exercises. Although South Dakota has been called the "Blizzard State" (Hillestad, 1982), it is possible that Emergency and Disaster Services could stop worrying about this frequent event if The Brookings Weekly Register was correct in describing our winter weather as follows:

...the atmosphere here in Brookings County is dry and devoid of any humidity during the winter...it never penetrates and chills as does the damp atmosphere of the Atlantic states or those bordering on the great lakes...The winters are cold, it is true, but the air is dry, pure and full of invigoration and with every respiration one feels that he is drinking from the mythical spring of perpetual youth (Souvenir Edition of the Brookings Weekly Register, 1899: n.p.).

The role of Emergency and Disaster Services during all natural disasters is generally the same. Each department, i.e. law enforcement, fire and rescue, medical and health, transportation, etc. has a separate annex in the basic plan that specifically tells them what to do during a natural disaster.

#### Technological Disasters

Technological or man-made disasters are becoming the disasters of the future. Whereas natural disasters are unusual events of nature, technological disasters are most

commonly caused by human error. As the scale of technology has grown, so has the scale, catastrophic potential, and fear of technological hazards (Zeigler, 1983: p. 85).

The most dangerous man-made disasters in Brookings County have been hazardous materials spills and radiological problems. Hazardous materials have been defined as a substance or material which has been determined by the Secretary of Transportation to be capable of posing an unreasonable risk to health, safety, and property when transported in commerce, and which has been so designated (Department of Transportation, 1979: p. 1). In March 1980, the Department of Transportation officially recognized the Chemical Transportation Center (CHEMTREC) as the central emergency response service for dealing with incidents involving the transportation of hazardous materials.

The Brookings County Hazardous Materials Plan was drawn up after several spectacular, widely publicized, and serious accidents involving hazardous materials occurred. Fortunately, these were far from Brookings County. Hazardous materials are commonly used, transported, and produced in Brookings County. However, shortly after the implementation of this plan, Brookings was the scene of the worst technological disaster in South Dakota history. This occurred at the Gary Heldt Chemical Company, north of Brookings. The concept of operations and operational

procedures of the plan were followed, and although the dollar losses were high, no deaths have been attributed to this disaster.

Many of the hazardous materials spills occur during the transport of chemicals from one place to another. More than 250,000 shipments of hazardous materials are made each day through the nation's transportation network. While these include shipments made by truck and air, as well as those by rail, the National Transportation Safety Board believes that the greatest potential for a hazardous materials disaster lies with the railroads (Schultz, 1979: p. 58).

"We're going to have more and more derailment disasters as time goes by," observed Brookings County's disaster preparedness officer, Lee Opheim, "because they're shipping more and more hazardous materials on the rails every day" (Hovey, 1979: p. 2). Chlorine gas, used in treatment plants, and anhydrous ammonia, used in farm fertilizer, are among the commodities that regularly move over South Dakota track. "And of course, the people that have to use it know how to handle it. A disaster comes when other people are exposed to it that are not used to it," Opheim added. "An example is chlorine. If it (a rail tank car) breaks open and the gas starts escaping, it

would kill everyone within a five-mile range downwind" (Hovey, 1979: p. 2).

The most recent man-made disaster in Brookings County of a large magnitude was the hazardous materials spill at the Gary Heldt Chemical Company north of Brookings in 1984. This disaster would never have occurred had it not been for human error. As told by the now retired Civil Defense Director, Robert Bishman, "A truck with a gasoline leak pulled into the yard near the chemicals. They decided to fix the hole that was causing the leak with a blowtorch. The gas that had leaked out caught on fire and the fire spread to the chemicals, which started on fire. The most dangerous chemical involved was gasoline." Bishman added, "If people knew long ago how dangerous gasoline really was, we wouldn't be using it as fuel for our cars today" (Bishman, 1985). The city of Brookings almost had to be evacuated. Luckily the wind wasn't blowing from the north. The cost of the Gary Heldt Chemical Company disaster was \$1.35 million in damages (Olson, 1985: p. 1).

Another hazardous materials incident involved a truck (Fig. 12) carrying radioactive materials that overturned in a ditch south of Brookings, causing a grass fire (Fig. 13). The truck was carrying two canisters containing B-52 bomber engines with the element cesium in its component parts (Fig. 14). The element cesium is the same type





Fig. 12. The Damaged Truck After the Bomber Engines Were Removed.



Fig. 13. Grass Fire Area.

of material that is used in the photo-electric cells in street lights and the radioactivity is similar to the luminous dial in a wrist watch.



Fig. 14. Canisters containing B-52 bomber engines.

Firemen fought the fire in the ditch for about 30 minutes. Brookings Fire Chief Curt Jensen said, "I don't think we were too alarmed. There was little concern. That stuff is going up and down the Interstate all the time" (Hovey, 1980: p. 2).

Tom Manthey, an environmental specialist for the State Department of Water and Natural Resources, said South Dakota is a "bridge state" over which trucks travel from the East to chemical dumps in Wyoming and Montana (Brown, 1981: pp. 1-2). Hazardous chemicals being

transported via the Interstate system are required to be labeled with appropriate words of identification and caution. The U.S. Department of Transportation is responsible for regulating the movement of hazardous chemicals.

When a hazardous materials spill does occur, a Hazardous Materials Incident Report (Fig. 15) must be filled out. This is to show what was spilled, the nature of the spill, and the number of deaths and injuries due to the spill, among other information.

Another technological hazard is hazardous waste. SDSU is one of few South Dakota campuses that houses nuclear and toxic waste (Lang, 1985: p. 1). Hazardous wastes are defined by the Environmental Protection Agency (EPA) as those that are flammable, corrosive, or toxic to humans or that react violently with chemicals (Bishman, 1980: p. 2). They account for 10 to 15 percent of all industrial wastes. The federal government now regulates both the management of newly created hazardous waste and the cleanup of accidental waste spills and disposal sites that threaten drinking-water sources (Carol, 1985: p. X1).

Probably the most dangerous and the most feared disaster is nuclear war. If a nuclear attack occurred, the direct danger in the Brookings area most likely would not be from the tremendous shock waves, heat, and fires caused



## DEPARTMENT OF TRANSPORTATION

Form Approved OMB No. 04-5613

## HAZARDOUS MATERIALS INCIDENT REPORT

**INSTRUCTIONS:** Submit this report in duplicate to the Director, Office of Hazardous Materials Operations, Materials Transportation Bureau, Department of Transportation, Washington, D.C. 20590, (ATTN: Op. Div.). If space provided for any item is inadequate, complete that item under Section H, "Remarks", keying to the entry number being completed. Copies of this form, in limited quantities, may be obtained from the Director, Office of Hazardous Materials Operations. Additional copies in this prescribed format may be reproduced and used, if on the same size and kind of paper.

A INCIDENT		
1. TYPE OF OPERATION 1 <input type="checkbox"/> AIR 2 <input type="checkbox"/> HIGHWAY 3 <input type="checkbox"/> RAIL 4 <input type="checkbox"/> WATER 5 <input type="checkbox"/> FREIGHT FORWARDER 6 <input type="checkbox"/> OTHER (Identify) _____		
2. DATE AND TIME OF INCIDENT (Month - Day - Year)		3. LOCATION OF INCIDENT
B REPORTING CARRIER, COMPANY OR INDIVIDUAL		
4. FULL NAME		5. ADDRESS (Number, Street, City, State and Zip Code)
6. TYPE OF VEHICLE OR FACILITY		
C SHIPMENT INFORMATION		
7. NAME AND ADDRESS OF SHIPPER (Origin address)		8. NAME AND ADDRESS OF CONSIGNEE (Destination address)
9. SHIPPING PAPER IDENTIFICATION NO.		10. SHIPPING PAPERS ISSUED BY <input type="checkbox"/> CARRIER <input type="checkbox"/> SHIPPER <input type="checkbox"/> OTHER (Identify) _____
D DEATHS, INJURIES, LOSS AND DAMAGE		
11. NUMBER PERSONS INJURED		13. ESTIMATED AMOUNT OF LOSS AND/OR PROPERTY DAMAGE INCLUDING COST OF DECONTAMINATION (Round off in dollars) \$
12. NUMBER PERSONS KILLED		
14. ESTIMATED TOTAL QUANTITY OF HAZARDOUS MATERIALS RELEASED		
E HAZARDOUS MATERIALS INVOLVED		
15. HAZARD CLASS (*Sec. 172.101, Col. 3)	16. SHIPPING NAME (*Sec. 172.101, Col. 2)	17. TRADE NAME
F NATURE OF PACKAGING FAILURE		
18. (Check all applicable boxes)		
(1) DROPPED IN HANDLING	(2) EXTERNAL PUNCTURE	(3) DAMAGE BY OTHER FREIGHT
(4) WATER DAMAGE	(5) DAMAGE FROM OTHER LIQUID	(6) FREEZING
(7) EXTERNAL HEAT	(8) INTERNAL PRESSURE	(9) CORROSION OR RUST
(10) DEFECTIVE FITTINGS, VALVES, OR CLOSURES	(11) LOOSE FITTINGS, VALVES OR CLOSURES	(12) FAILURE OF INNER RECEPTACLES
(13) BOTTOM FAILURE	(14) BODY OR SIDE FAILURE	(15) WELD FAILURE
(16) CHIME FAILURE	(17) OTHER CONDITIONS (Identify)	19. SPACE FOR DOT USE ONLY

Form DOT F 5800.1 (10-70) (9/1/78)

\*Editorial change to incorporate redesignation per HM-112.

Fig. 15. Hazardous Materials Incident Report.

G PACKAGING INFORMATION - If more than one size or type packaging is involved in loss of material show packaging information separately for each. If more space is needed, use Section H "Remarks" below keying to the item number.				
ITEM		#1	#2	#3
20	TYPE OF PACKAGING INCLUDING INNER RECEPTACLES (Steel drums, wooden box, cylinder, etc.)			
21	CAPACITY OR WEIGHT PER UNIT (55 gallons, 65 lbs., etc.)			
22	NUMBER OF PACKAGES FROM WHICH MATERIAL ESCAPED			
23	NUMBER OF PACKAGES OF SAME TYPE IN SHIPMENT			
24	DOT SPECIFICATION NUMBER(S) ON PACKAGES (21P, 17B, 3AA, etc., or none)			
25	SHOW ALL OTHER DOT PACKAGING MARKINGS (Part 178)			
26	NAME, SYMBOL, OR REGISTRATION NUMBER OF PACKAGING MANUFACTURER			
27	SHOW SERIAL NUMBER OF CYLINDERS, CARGO TANKS, TANK CARS, PORTABLE TANKS			
28	TYPE DOT LABEL(S) APPLIED			
29	IF RECONOITIONED OR REQUALIFIED, SHOW	A	REGISTRATION NO. OR SYMBOL	
		B	DATE OF LAST TEST OF INSPECTION	
30	IF SHIPMENT IS UNDER DOT OR USCG SPECIAL PERMIT OR EXEMPTION, ENTER PERMIT OR EXEMPTION NO.			
H REMARKS - Describe essential facts of incident including but not limited to defects, damage, probable cause, stowage, action taken at the time discovered, and action taken to prevent future incidents. Include any recommendations to improve packaging, handling, or transportation of hazardous materials. Photographs and diagrams should be submitted when necessary for clarification.				
31. NAME OF PERSON PREPARING REPORT (Type or print)		32. SIGNATURE		
33. TELEPHONE NO. (Include Area Code)		34. DATE REPORT PREPARED		

Reverse of Form DOT F 5800.1 (10-70)

Fig. 15. Hazardous Materials Incident Report.  
(Back Side)

by the initial blast; rather, the danger would be in the radioactive dust particles, or fallout, that might be carried here by the wind. Opheim said there is no way to know for sure how much fallout might reach Brookings (Thompson, 1978: p. 3). Several factors, such as wind direction, wind speed, and precipitation would have a direct effect. Time is another factor. "It is possible for us (Brookings County) to have a 100 percent survival rate if people follow instructions," said Bob Bishman (Thompson, 1978: p. 3).

When asked how the general public would react, Bishman replied, "Most people would be stunned. It's been my experience from natural disasters that people act subdued, rather than hyper" (Thompson, 1978: p. 3).

#### Changing Nature of Disasters

The frequency of natural disasters has not diminished; rather, technological disasters are increasing in frequency and severity due to the nature of substances involved. It is obvious that if there were no people there would be no disasters. However, the population can be expected to grow and loss of life and property will increase. If we could accurately predict what, when, and where disasters will occur, we could say there would be no hazards. However, a great deal of research must still be done if we

are to adequately predict future disasters and plan for an adequate response.

Most people are not properly trained to protect themselves and their property when a technological disaster occurs. The idea is to protect the lives and property of the community with the least amount of damages possible. One bright spot is that Brookings County is not a likely target for nuclear weapons. Rather, the residents of Brookings County would be more apt to suffer from the effects of fallout.

Whether the disaster is natural or technological, one of the most important duties of the Emergency and Disaster Services is to provide adequate warning. Let us now look at the warning systems provided in Brookings County and the various pieces of equipment that are used.

## CHAPTER IV

### WARNING SYSTEMS AND EQUIPMENT

A problem facing the Emergency Operation Center (EOC) is the ability to transmit the warning of an oncoming disaster, such as a tornado, in time. Most of the deaths associated with natural hazards are the result of inadequate warning. Warning systems have evolved considerably throughout the period from the telephone call-ups through the siren-radio alert notification to the present radio alert system.

Radio broadcasting is an important device in the flow of information. A message can cross hundreds of miles in an instant. Every region of South Dakota is accessible to some form of radio broadcast.

If there is one single facet that ties radio broadcasting to geography, it is weather information. Radio is capable of informing people throughout a large geographic area very quickly about an impending storm. Radio can keep the public up-to-date on current weather information on happenings as they become available, usually in a matter of seconds.

A national effort called SKYWARN incorporates rural

observers, city, county, and state sheriffs and deputies, and amateur radio operators to watch for tornadoes. Bob Bishman said that 25 to 30 people have been taught to spot cloud clusters in severe storms that might harbor a churning vortex--the final warning that a tornado is imminent (Hayes, 1981: p. 1).

The new encoder for the indoor warning system makes all hazard information available at the fingertips of the police dispatcher. An encoder is a piece of communications equipment that can transfer information from one system of communication into another in the form of a code. Lonnie Bayer, Brookings County Civil Defense Director, said the indoor warning system originally was designed for heavily populated buildings which may not have access to a radio for weather and other warnings. Bayer said what he liked about the system is that it is selective; a single receiver or the entire county can be notified at the touch of a button (Welsh, 1986: pp. 1-2). Bayer also said Brookings County is the only one in the state to have a county-wide warning system.

If the disaster is severe, the governor can call in the National Guard and also ask the president to declare the area a national disaster. Designation as a disaster area qualifies massive state and national aid, as was provided following the Rapid City flood.



In the case of a nuclear attack, the Attack Warning Signal would be set off. It is a wavering, wailing sound on the sirens lasting three to five minutes (Kearny, 1980: p. 19).

People are not saved by having shelters nearby unless they receive warning in time to reach their shelters--and unless they heed that warning (Kearny, 1980: p. 18). However, a good warning system is not the only thing that is needed. Adequate planning is also important. Let us now examine the planning for disasters in Brookings County.

## CHAPTER V

### DISASTER PLANNING

With disasters comes the need for disaster planning in Brookings County. Whether a person wants to protect himself from the elements or from radiation, he will need a shelter. Normally, a person's number one priority in a survival situation is to protect his/her body (Lehman, 1979: p. 65).

The federal government exerts a considerable influence on the activities of a county emergency staff. One of the most time-consuming programs over the years has been the radiation fallout protection program. A national shelter survey was implemented. This survey became more elaborate until every type of structure that could possibly be used as a shelter was examined and recorded. The Corps of Engineers did the surveys.

Preparation for civil disasters, like floods and tornadoes, has overshadowed the need for nuclear fallout shelters (Raasch, 1979: p. 1E). "People are just not defense oriented right now," says Perry Aker, supervisor of Emergency and Disaster Services for about 25 southeastern South Dakota counties. "The Cuban Missile Crisis really

got the shelter plan going in the '60s, but what has there been since then?" (Raasch, 1979: p. 1E).

The most recent survey of Brookings County shelters was in 1983. This survey showed that there were some 40,000 public spaces in Brookings County which with upgrading could handle over 200,000 people from around the state. Ten square feet of ventilated space per person, or 500 cubic feet per person, where there is not ventilation, is the rule for public shelters. This doesn't include private residences or downtown stores. The Emergency Operations Center (EOC) can house up to 550 people and is one of several buildings in the city which is built to withstand most disasters (Stiles, 1982: p. 4). The EOC is located in the basement of the Brookings Fire-Police Building.

Brookings County is extremely fortunate in having South Dakota State University which can provide so many public shelters. There is a good Emergency Operations Center located in the power plant building. This is where the campus police radio facilities and the controls for the university buildings are located. The university EOC can also serve as a substitute county EOC if necessary. The big advantage of public shelters is that food, medical care, and current knowledge of the situation would be available. Surveys show that approximately 15 percent of

the population would never leave home because of pets which could not be housed in the public shelters (Opheim, 1985).

A Community Shelter Plan for Brookings County was published in 1968. It was a time of international crisis (Vietnam War) that was considered to be of such magnitude that a copy of this plan was sent to many homes and organizations in the county. On the cover were the words, "Save this booklet. It may save your life." It was a good product and an excellent reference for future shelter plans.

The emphasis on preparedness for a nuclear war has since dwindled in most communities, but the watchful eyes are still open in Brookings and one well-credentialed observer maintains there is no safer place to be in the event of a nuclear disaster than this prairie college town of 14,000 (The Brookings Daily Register, 1976: p. 1). The observation comes from Lee Opheim, former Brookings disaster preparedness officer.

"One plus is Brookings' underground water supply. Because our source is underground it can't be radioactively contaminated like a reservoir source" (The Brookings Daily Register, 1976: p. 1). Other reasons are shelters that are well-equipped with radiological monitoring equipment and medical supplies and what Opheim calls, "one of the best emergency operations centers in the country."

When an emergency occurs of such magnitude that

the population is at risk, people can go to the public shelters and set up housekeeping on a dormitory model. Such facilities are known as Congregate Lodging Facilities. People could find safe lodging, but would have dormitory-like living conditions, i.e., they could go downtown or to the store or do what they normally would do. If conditions improved, they could go home. If attack became imminent they could change the buildings to a shelter mode whereby more people could be housed until the danger was over. A shelter training program sponsored by the federal government would have to be ready to train shelter managers on short notice. Also, shelter management handbooks and radiometers would need to be on hand for each shelter.

As shelter plans progressed, it became obvious that areas considered to be possible targets in a nuclear war, such as Sioux Falls, South Dakota, would have to develop some sort of evacuation plans. A plan providing for the orderly relocation of people from areas of potentially high risk to areas of low risk, was drawn up by the U.S. Department of Defense. Under a national program called "Crisis Relocation Planning," which is designed to relocate the major urban populated "high risk" areas to less populated "low risk" areas, thousands of Sioux Falls residents would travel up Interstate 29 to Brookings. High risk areas are generally considered by the U.S. Government to be

metropolitan areas of 50 thousand or more population or areas near major military installations, and low risk areas are the surrounding small town and rural areas (Defense Civil Preparedness Agency, 1977: p. 49).

This relocation plan is tested 10 times each year. The most spectacular test is during South Dakota State University's Homecoming or Hobo Day, where some 50,000 additional people drive to Brookings, participate in the exercises, and then drive home again.

The following map shows that Brookings County is considered a host area for people living in high risk areas, whereas Minnehaha County is considered a potential target or risk area for a nuclear bomb (Fig. 16). The map indicates the risk areas and the counties that would serve as hosts for the relocated population. The counties designated as key worker host areas would provide shelter for the personnel needed to operate essential services in the risk area.

People from Minnehaha County would be expected to arrive in private autos via Interstate 29, entering Brookings via Exit 132, and would be expected to register at either the SDSU Fieldhouse (Stanley Marshall HPER Center) or the Brookings High School (Fig. 17). There they would be processed and assigned a public shelter, where items







SCALE

1 INCH = 2075 FT

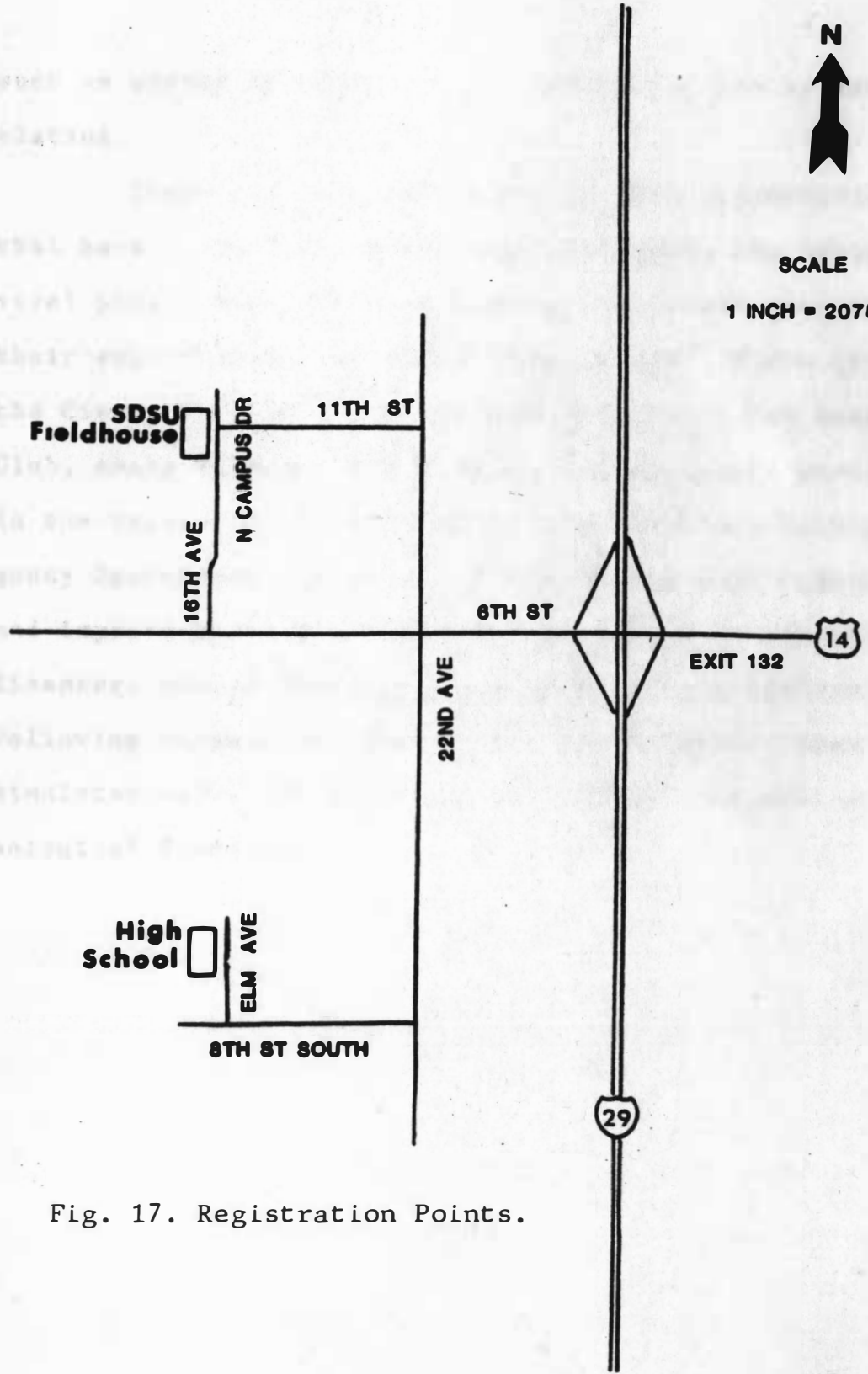


Fig. 17. Registration Points.

such as energy and food can be assured for the entire population.

There are many public and private organizations that have plans that support and strengthen the basic survival plan. Organizations that can be called upon for their expertise in individual emergencies. These include the Civil Air Patrol (CAP), Snowmobile Club, HAM Radio Club, among others. All of these organizations participate in the regular exercises held in the Brookings County Emergency Operations Center. The individuals work together and improve their plans so that the losses in any type of disaster, should one occur, can be held to a minimum. The Following chapter discusses the many different types of simulated exercises which involve natural, as well as technological disasters.

## CHAPTER VI

### DISASTER EXERCISES

One way of training officials for emergencies is through simulated disaster exercises or scenarios. These exercises have been held annually in Brookings County for the past 20 years.

Originally the job entailed planning and executing a simulated disaster exercise involving key individuals within the city and county limits. The first exercise was also the first exercise in Region VIII conducted outside of Region Headquarters in Denver. Over the years, many different types of disasters were simulated. One exercise even involved terrorist activities.

The exercises generated by the Brookings County Civil Defense Director enable the County and City Commissioners to practice decision making in a stressful environment in order to minimize errors in an actual emergency. Just getting to know one another and the state staff can prove to be important when decisions must be made and actions must be taken during a crisis.

Many volunteer organizations respond to these simulated disasters and express their willingness to contribute expertise to add realism to the exercises. This

assistance can be of great value in the future. The exercises test the emergency management plans and reveal weaknesses that can be corrected.

The publicity received from these exercises increases public support for the Emergency and Disaster Services. A visit by a congressman during an exercise, for example, and a picture of him eating the "survival" rations always gets wide distribution. The exercise builds confidence in the staff that solutions can be found to mitigate any disaster that might come to Brookings County.

Special training for the key Emergency Operations Center (EOC) staff is a continuing process. Personnel directly involved with the EOC, such as former City Civil Defense Director Dale Brchan, the MOBDES, and Gip Nolan, the Public Information Officer practiced continuously throughout each year, as well as participating in the annual emergency exercises.

Initially, the exercises dealt with natural disasters. Although the task of simulating exercises in the Emergency Operations Center is more frequent now, a fall (blizzard) exercise and a spring exercise pertaining to technological hazards, i.e., hazardous materials spills, explosions, and radiation, has been held each year for over 20 years. No other county in South Dakota can make that claim.

The winter storms or "blizzard" exercises usually have been held in Brookings. Township supervisors would attempt to see how the County Commissioners handled problems associated with blizzards. The most successful, or at least the most interesting part of these exercises, seemed to be the portion led by the County Highway supervisor, Mr. (Dutch) Cheeseman. He could tell some fantastic stories about snow removal operations under adverse conditions, and ended by showing the township supervisors how to fill out the forms associated with obtaining finances for snow removal.

The spring exercises focusing upon technological disasters always drew a larger crowd, including spectators, because of the perceived need for learning about man-made disasters such as hazardous materials spills and radiological problems became apparent. The entire operation staff and key city and county employees, the city and county commissioners, and the state staff received notice of an exercise ahead of time in order that they could make arrangements to attend.

When the big moment arrived for the exercise to begin, those assembled were briefed and assigned their positions. The scenario was read and the action began. Messages began flowing in and it seemed like one disaster occurred after another. This was due largely to the fact



that from the simulator room, filled with state staff and others, messages of equipment failures and other complications were being generated.

After each exercise a critique was held in which everyone involved had a chance to point out problem areas and suggest improvements that could be made to mitigate a real disaster. A good example of such an exercise was held in March of 1983. The notification, scenario, and critique, as well as a list of those participating in the exercise, appears in Appendix B.

The federal government requires four exercises to be simulated each year. At least one must be technological in nature (Bayer, 1986). The scenarios vary a great deal and the staff normally does not know the nature of the disaster before the exercise begins. It could be a tornado, a terrorist attack, a train derailment, an atomic plant explosion, and overturned truck carrying hazardous materials, or even a plane crash.

In Civil Defense, as in the military, the planning must be for the greatest possible threat (Opheim, 1985). This is why more emphasis seems to be placed on the EOC training and plans than on the disasters themselves, especially the so-called minor types of disasters such as fire, flood, or tornado, even though these

disasters will be most common in the future and will probably wreak the most havoc within our county.

Training is a never-ending process, as the experience gained by all of the people involved in emergency and disaster services has to be passed on to those who will take their place. Over the years, areas of responsibility for the Civil Defense Director, Fire Chief, Police Chief, and others have been determined and written into the plans.

Although each person should know to whom he or she reports, coordination constantly must be practiced in areas such as hazardous materials handling, radiological monitoring, severe weather (SKYWARN) threats, and hazard education in the schools. These exercises are an important part of the ongoing training necessary to provide the best possible emergency and disaster services in the years to come.

## CHAPTER VII

### FUTURE TRENDS

The future for Civil Defense is optimistic (Opheim). However, the overall tightening of the budget will mean loss of personnel not only at the federal level, but at the state level as well. Funds for support such as secretarial staff and MOBDES personnel will be harder to obtain and no more assistance of this type is anticipated.

Disasters will continue to increase as the population increases and moves to more hazardous areas such as floodplains. As larger amounts of agricultural chemicals are used, new and more dangerous disasters will become more frequent.

Hazard education in the schools of disaster preparedness learned via Your Chance to Live will continue. Young people of Brookings County will be more knowledgeable in disaster preparedness than are their parents.

The emphasis in shelters has changed from the current fallout mode to protection from tornadoes. The well-known radiation signs have come down and are replaced with a green tornado symbol.

However, "The two superpowers will continue to be essentially what they are today: adversaries locked in a

potentially deadly competition--primarily military, but also political, economic and technological. Both sides will devote a lot of desperate energy to keep things from heating up to the flash point, but there are bound to be tense times as well as breathing spells" (Kiplinger, 1986: p. 292).

Terrorism is nothing new. Unpredictable, undeclared violence to gain political end has been fashionable for centuries (Metzger, 1986: p. 3). A decade ago, the world experienced an average of 10 incidents of terrorist violence per week--assassinations, bombings, air hijackings, maimings, or attacks on facilities. The average is nearly 10 a day (U.S. News & World Report, 1985: p. 27).

Sabotage or accidents involving train derailments will continue to plague society. There will always be malcontents who will attempt to express their frustrations by destroying people and property.

More effort will be spent on training for disasters pertaining to the transportation of hazardous waste through the county. South Dakota is destined for a major catastrophe in transportation. According to Robert Gunderson, State Director of Emergency and Disaster Services, from January 1, 1986 through November 14, 1986, 39,666,640

pounds and gallons of hazardous materials have traveled on the highways of South Dakota (Bayer, 1986).

The number of exercises is expected to increase to include more involving technological disasters (Bayer, 1986). However, more scenarios will be dictated from the federal level and may not be as realistic or as well accepted as in the past.

South Dakota State University could help the Emergency and Disaster Services coordinator in updating plans and exercises through internship and special problems courses. As the field of planning continues to develop, disaster planning will play an important role. The courses now being taught at the university in natural disasters and technological disasters will continue.

## CHAPTER VIII

### CONCLUSION

The author has examined one aspect of Brookings County, South Dakota in the previous chapters, that aspect being the Brookings County Emergency and Disaster Services. Disasters, both natural and technological, have been identified. The different types of warning systems and equipment, as well as the different types of plans were also discussed. A sometimes forgotten part of disaster preparedness, the disaster exercise, was reviewed to explain to the reader what Emergency and Disaster Services personnel participate in during each year to prepare for disasters when they occur. One appendix for selected disaster plans and a second appendix for sample exercises were added as references for the reader.

Hazards are a fact of life. The general population of Brookings County faces the threat of blizzards, floods, tornadoes, fires, and other natural hazards, as well as air and water pollution, industrial accidents,, transportation of hazardous waste through our area, radiation, and other technological hazards. Some of these hazards can be predicted but not eliminated.

It is recommended by the author that another study



similar to this one be undertaken in the future. The public can expect to experience more technological disasters, that will probably be of greater magnitude in the future.

Disaster planning at the state levels will continue to improve and training will become more realistic. Volunteers will always play a large part in disaster preparedness in Brookings County. Therefore, exercises and training can be expected to continue as people change their way of life to accommodate a more crowded Brookings County and the changing requirements of society. Citizens must be kept aware of impending disasters so that they will be prepared to act properly when one occurs.

When speaking to Civil Defense Director, Lonnie Bayer, he expressed the need for a computer to keep plans and personnel up-to-date. One of his future projects is to write a proposal showing the need for a computer and having it approved by the City Commissioners (Bayer, 1986). By having all of the pertinent data on file, many of the boxes filled with duplicate pieces of literature can be stored elsewhere instead of in the Emergency Operations Center. Perhaps a historical study should be completed before the present Civil Defense Director leaves and takes the information and "war stories" with him.

Society cannot afford to let Civil Defense wane,



Each town in the county has a local Emergency Plan. The contents of each town version of the county plan are as follows:

APPENDIX A

SELECTED DISASTER PLANS

CLANNY COUNCIL OF FOX RESOURCE GATHERING

In addition to the South Dakota State Emergency and Disaster Services Plan, the director of the Emergency and Disaster Services in Brookings County must keep current the state statute pertaining to local government and the responsibilities that go with his office.

Annex B The Brookings County Civil Defense Plan under Emergency Conditions is the general guidebook for everyone in the county involved in emergency and disaster services. It contains the warning procedure, the Emergency Operations Center (EOC) staff and assignments, and a summary of each of the plans for individual disasters. It also attempts to keep current all resources available to the county in time of disaster. Therefore, individual sections are updated quite frequently. Each year during the spring exercise the notebooks of the commissioners and key personnel are checked and the new material is inserted.



Each town in the county has a Local Emergency Plan. The contents of a scaled-down version of the county plan are as follows:

PLANNING GUIDE FOR RESOURCE GATHERING

Basic Plan and Resolution

Annex A - Emergency Operations Center

Appendix I - EOC Staff Organization and Assignments

Appendix II - Alert Notification Procedures

Annex B - Community Shelter Plan

Annex C - Emergency Communications

Annex D - Radiological Defense Emergency Plan

Annex E - Law Enforcement Services

Annex F - Fire and Rescue Services

Annex G - Medical and Health Services

Annex H - Engineering Services

Annex I - Emergency Transportation

Annex J - School Plan

\*In each annex list personnel, equipment, and telephone numbers.

LOCAL EMERGENCY PLAN FOR (ANY TOWN)  
LOCATED IN BROOKINGS COUNTY, BROOKINGS, SOUTH DAKOTA

Reference: Brookings County Civil Defense Plan Under  
Emergency Conditions

In addition to probable contamination by nuclear fallout, Brookings County will be subjected to natural disasters such as fire, floods, tornadoes, blizzards, and possibly even earthquakes, riots, and accidents.

To maximize survival of both humans and livestock, and to preserve property, resources of civil defense will be used locally. You as Mayor are charged by State Law with the responsibility of protecting lives and property in your city or town. State Law and local ordinances determine what you can do. It may be necessary that you review and update some of your local ordinances.

We cannot emphasize enough the importance of keeping records. They could even be scratched on the back of an envelope. At the minimum, these records should show WHO was given WHAT order WHEN. It would mean the difference of that person's actions covered by law and even whether or not that volunteer is covered by Workman's Compensation Insurance.

The County Commissioners are responsible for civil defense emergency operations. The civil defense director acts as the chief of staff for the County Commissioners. Emergency operations will be conducted by county and city forces, and supplemented as necessary by trained auxiliaries and by man-power available within the county.

The County Defense Board will supply Brookings County Civil Defense with information as needed. The Civil Defense organization will coordinate all actions of other organizations including Red Cross and Civil Air Patrol that might become involved in emergency activities.

Support from military units must be channeled through the County Civil Defense Office. They must determine that all local facilities and man-power, and other county facilities and man-power are committed and functioning before requesting aid. There is a good possibility there will not be any outside aid available.



Military assistance will, if made available, complement county participation in emergency operations. Military forces, will remain at all times under military command. They will not assist county forces, but take missions assignment from the Chairman of the Board of County Commissioners, or his designated representatives, mission type requests to include objectives, priorities, and other information necessary to accomplish missions in the county.

### EMERGENCY OPERATIONS CENTER

In cases of natural disasters or enemy attack, Brookings County will operate from its emergency operations center, which is located in the basement of the Public Safety Building, 307 Third Avenue, Brookings, South Dakota. Communications equipment is already installed to keep local governments throughout the county informed. Our office phone is 692-5212. If there is no answer, call 692-6323 which is the 24-hour Brookings Police Radio Operator. They will take emergency action or if no emergency exists they will forward your message to some one in Civil Defense.

In addition, each of the other towns or cities in the county should have an emergency operations center, so that communications can be passed back and forth and the mission can be accomplished with a minimum of losses.

In your planning for emergencies, the following suggestions might be helpful. By organizing information according to the planning guide index, a complete list of resources can easily be compiled. Remember that in time of emergency you will have to operate 24 hours a day so each person on your staff should have at least one back-up personnel or assistant. The listing of the emergency operations center staff and assignments should consist of key town officials and their families.

An alert notification procedure should list the sequence in which these officials are to be contacted. Their phone numbers are to be included as well as their radio call signs.

The community shelter plan should list all the buildings in town which might be considered shelters.



Even if a building is not listed in the National Shelter Directory, it does provide some protection from disasters such as radiation. Each shelter should have a telephone and the plan should list the number. Someone should be selected to act as a shelter manager for each shelter; a likely prospect is the building owner.

The Emergency Communications Annex should list all communications equipment and frequencies in the community, including Citizens Band radios.

Each community should have someone assigned the duties of Radiological Monitor. This individual should take the Defense Civil Preparedness Agency Correspondence course, "Introduction to Radiological Monitoring." This individual's name and phone number and radio call number (radio net or frequency) should be given in the Radiological Defense Emergency Plan.

An annex listing Law Enforcement personnel and equipment should contain a chain of command or alert sequences and phone numbers.

The Fire and Rescue Annex should also include snowmobiles. Items like this are often overlooked when listing individuals and equipment.

The Medical and Health Resources Annex should contain location of the nearest hospital, mortuary, ambulance service, medical supplies, doctors, nurses, and veterinarians.

The Engineering Services Annex should include items such as County Highway personnel and equipment stationed in your city, as well as the city personnel and equipment.

The Emergency Transportation Annex should include service stations, wreckers, etc. When listing something like wreckers be sure to include radio call numbers and capacity. If capacity is unknown, a statement should be made as to what use can be made of the wrecker. For instance, could it pull a school bus out of a ditch?

All schools have some sort of emergency procedures, even if they are not in writing. Recent action by the South Dakota State Board of Education indicates that the school safety programs are going to be expanded to include information on both natural and man-caused disasters.

Civil Defense will play a large role in getting this information to the schools.

If you do not have information on a particular annex, such as the school plan, it would be best to insert a page which might simply say, "School Plan to be added later." People involved in Law Enforcement services, fire department operations, and even city government must be replaced from time-to-time for a number of reasons. It is therefore a good policy to date each annex. The county plan is reviewed and updated each year. Your local plan should be updated as necessary.

When your emergency plan has been completed, it is requested that a copy of it be sent to the Brookings County Civil Defense Director, 307 Third Avenue, Brookings, South Dakota. This will enable the overall County program to be more successful.

If a separate page is used for each annex, it is easy to update by simply inserting the new page and throwing away the old one. Between your local emergency plan and the Brookings County Emergency Plan, it should be possible to conduct operations in any emergency with a minimum of confusion and a minimum of loss of life and property.

Annex L of the Brookings County Civil Defense Plan pertains to schools. There are individual plans for the Brookings, Volga, Deubrook, and Elkton school districts. These are kept up-to-date by the school districts themselves.

The Brookings County Energy Emergency Response Plan was drawn up so that in the event of a severe loss of energy, the County Commissioners would know immediately what actual energy sources and supplies are available within the county. They would also know what public facilities would be available during a critical energy

shortage. This plan shows that we are prepared should an energy crisis arise.

#### APPENDIX B

The Hazardous Materials Plan was discussed in Chapter III, under Technological Disasters.

The following exercise scenarios are just a few of the many that were simulated throughout the last 20 years. The ones chosen for this Appendix were relatively well documented.

An attempt was made to choose a wide variety of scenarios. All were related to technological disasters except for one, and that particular one was a combination of a natural and a technological disaster.

SCENARIO

APPENDIX B

SAMPLE EXERCISES

The following exercise scenarios are just a few of the many that were simulated throughout the last 20 years. The ones chosen for this Appendix were relatively well documented.

An attempt was made to choose a wide variety of scenarios. All were related to technological disasters except for one, and that particular one was a combination of a natural and a technological disaster.

The 1987 simulated disaster exercise was held Tuesday, March 31, 1987. The emergency operations center was activated by the Board of the Fire and Police Departments at 10:30 a.m. to receive their briefing.

They were told that a land airplane had occurred at about 7:15 a.m., north of downtown and slightly east of the city. The report had come from a radio operator. They had no way of knowing who he was and could not identify the cause of the accident.

The 1988 staff was told that two trucks had gone south of downtown and were involved in a collision.



SCENARIO

It is Thursday, August 18, 1983.

Situation: Real time 9:30 a.m., very foggy, heavy clouds  
Forecast: Rain, temperature is 28 degrees Celcius, no  
wind.

9:10: Very excited motorist called from Ron's Interstate  
Mobile. He said he saw a bright flash just east of In-  
terstate 29 followed by a loud "boom." He was not sure of  
the distance but estimated it at about four miles back  
north. He said it could have been a meteorite; the ground  
just shook. Fog is very thick; visibility limited. At  
times he could not see the hood of his car.

EXERCISE SUMMARY

The 1983 simulated disaster exercise was held  
Thursday, March 31, 1983. The emergency operations center  
staff reported to the basement of the Fire and Police  
building at 9:30 a.m. to receive their briefing.

They were told that a loud explosion had occurred  
at about 9:10 a.m., north of Brookings and slightly east  
of the city. The report had come from an excited motorist.  
The fog was very thick so he could not identify the cause  
of the explosion.

The EOC staff was told that fire trucks had gone  
north on Interstate 29 some seven miles without sighting

anything unusual, but soon three different farmers east of Interstate 29 called in with reports of burning hay. Firemen soon located several grass fires. (The date was simulated to be August 18th, so there would be dry vegetation.)

The explosion turned out to have been caused by a small aircraft with Canadian markings. Firemen reported debris scattered over a wide area. The aircraft had struck a highline from a substation, and power in Brookings and the surrounding area was going off and on.

Upon examination, the aircraft seemed to have been loaded with several stainless steel thermos bottle-type packages of liter size and the packages were widely scattered. Some of the material was packed in boxes with a styrofoam filler and were floating down Six Mile Creek. The pilot of the aircraft lived long enough to mention toxic chemicals, but no further information could be obtained before he died.

The aircraft was traced through Canadian authorities as a classified flight from Winnipeg to Houston. The Canadian government, when informed of the accident, was extremely upset. They asked if any of the 36 containers had ruptured. When informed that only 24 had been found and at least one had ruptured, they said that we had



better evacuate everyone within two miles of the crash site, unless the searchers were wearing self-contained hazardous material suits. The contents of the canisters were identified as mercuric cyanide.

Meanwhile, in the simulator room, the people from the state staff were attempting to complicate the problem, by causing equipment to fail, and reporting that people had been overcome by the toxic cloud. Practically everyone in the emergency operations center, plus the county and city commissioners, had an opportunity to coordinate their efforts as different problems arose.

As the cloud rolled toward the city, it began to lift, thus eliminating the need for large scale evacuation. Eventually the hazard area was isolated, Six Mile Creek was dammed, and all of the canisters were recovered.

Following the exercise a critique was held, in which each person involved had an opportunity to give their opinion of the exercise, point out problem areas, and suggest improvements that could be made to mitigate future disasters.

Problems such as the following were mentioned:

1. Who should act as the on-site commander? (Covered in our hazardous materials plan, but those involved were not all aware of this.)
2. Hazardous materials suits were not available, other than in Sioux Falls and Mitchell. (More discussions will be held on this at the local level.)

3. A "salesman" reported that the manufacturer had a problem with the gas masks and we should not use them anymore. (The masks were already in use and functioning properly, so a value judgment has to be made when unknown people give instructions.)
4. The operations room coordinator requested that a flip chart be supplied to the EOC, so key emergency messages could be logged and recovered. (This can be provided.)
5. The hospital was saturated with calls for ambulances. (The 911 "emergency" number should be used in the future, so the EOC could determine where ambulances should be dispatched first.)
6. There was speculation about the feasibility of evacuation of the hospital and nursing home and moving patients to alternate sites. (This should be done only as a last resort because of other facilities that would be lost. The decision to self-contain the hospital by closing ventilators, etc., was the correct one.)

In spite of the minor deficiencies, the overall exercise was considered successful. The ability of the different areas of government and emergency and disaster services to work together and coordinate their efforts seems to increase with each exercise, and should mitigate any actual disaster.

A list of those who participated in this exercise is attached.

SIMULATED DISASTER EXERCISE ROSTER

31 March 1983

Douglas Chittick	City Commissioner
Lloyd Oseby	County Commissioner
W. H. Nolan	Public Information Officer
Roger Prunty	Mayor
Art Graslie	County Commissioner
Richard Negstad	Chairman, County Commission
George Messner	County Commissioner
Robert T. Bates	City Commissioner
Neil Ribstein	County Highway
Lloyd Darnall	City Engineer
Jerry Wagner	Street Superintendent
Leonard Allstot	County Highway
D. Wayne Kruse	Water & Waste Water
Dave Felton	Water & Waste Water
Tom Honkomp	Electrical City
Chuck Helgerson	Telephone City
Robert C. Gaard	Telephone City
Jerry Hayden	CAP
Jan Hayden	CAP
Dorothy Peterson	City Auditor (shelter)
Jan Clites	Director of Nursing
H. O. Johnson	Observer from Watertown
Arnold Stors	Observer
Gordon Miller	Police Chief
Gar Faye Narragon	Police Radio Dispatcher
Orlyn J. Berkner	Observer from Watertown
R. C. Hoars	Codington County CD
Andy Jensen	Supt. of Utilities
Cole Hendry	State Staff
Charles Walker	State Staff
Ralph Lindsay	Aviation
Lee Opheim	Disaster Prep. Officer
Bob Bishman	CD Director
LaVerne Andersh	Disaster Prep. Officer
Robert Wall	Capt. ROTC
Dorothy Bishman	County Finance Mgr. Utilities
Becky Peterson	City Utilities
Nancy Savage	City Utilities
Dutch Cheeseman	County Highway Director
Ron Bjerke	City Commissioner

BROOKINGS, SOUTH DAKOTA COUNTY/CITY CIVIL DEFENSE DISTRICT  
SCENARIO: OPERATIONAL EXERCISE, 19 MARCH 1976

On the morning of the 19th of March, there was an accident involving a semi-trailer tank truck and an automobile on the Highway 14 bypass and Interstate 29, located northeast of Brookings. The immediate investigation of the accident did not indicate any serious consequences, other than vehicle damage. The drivers of the vehicles suffered minor injuries. The weather was moderately foggy with near freezing temperatures during the night. Freezing temperatures caused ice on the roadway. The driver of the auto was on the overpass heading east. The driver of the truck approaching the overpass heading west was aware of the auto and applied brakes causing himself to skid to the right of the overpass onto the roadway below on the north side of the overpass. This drop from the approach caused the tank to overturn, spilling the contents on the roadway. The contents of the tank drained into the roadway ditch, flowing toward Six Mile Creek.

Investigation authorities became aware that the contents of the tank were a hazardous chemical that could have serious implications for the city of Brookings and surrounding area. The contents in the tank was liquid chlorine. Investigating authorities immediately contacted

... SOUTH DAKOTA COUNTY/CITY CIVIL DEFENSE DISTRICT  
police headquarters and ordered all roads leading to the  
accident area sealed off to traffic except emergency ve-  
hicles and personnel. Weather conditions will be as they  
exist at the time of the accident.

... freight train of the Chicago & Northwestern  
... in the vicinity of the ...  
... The accident was reported by the police  
... at 11:11 a.m. The emergency and disaster service  
... of the accident at 11:11 a.m. At  
... and railroad cars were derailed and wrecked.  
... and the contents of the wrecked cars  
... The emergency and  
... the warning devices  
... to turn the  
... all areas of the city within 1,000 feet  
... all electrical switches  
... recorded on the  
... of North 10th. The ...



## BROOKINGS, SOUTH DAKOTA COUNTY/CITY CIVIL DEFENSE DISTRICT

SCENARIO: OPERATIONAL EXERCISE, 17 MARCH 1978

On March 17th, 1978, at 6:30 a.m. the city of Brookings was the scene of a disastrous train wreck. A west-bound freight train of the Chicago & Northwestern Railroad was derailed in the vicinity of the Kellogg Ready Mix Cement Plant. The accident was reported by the police patrol at 6:31 a.m. The emergency and disaster service director was informed of the accident at 6:32 a.m. Approximately 20 cars of the train were derailed and wrecked. It was 6:35 a.m. and the contents of the wrecked train could not be immediately determined. The emergency and disaster service director ordered the warning devices sounded. Radio station KBRK was informed to warn the public to evacuate all areas of the city within 1,000 feet of the accident scene and turn off all electrical switches and gas valves. About one inch of rain was recorded on the night of March 16th. The underpass on 6th Avenue was flooded.

This exercise was included the Civil Air Patrol (CAP) with their own plane and several members of the community. Before 11:00 a.m. the rain had reached 3 to 5.0/hour.

The exercise covered the fallout from No. 60. Before 11:00 a.m. the rain had reached 3 to 5.0/hour. The exercise covered the fallout from No. 60. Before 11:00 a.m. the rain had reached 3 to 5.0/hour.





## BROOKINGS, SOUTH DAKOTA COUNTY/CITY CIVIL DEFENSE DISTRICT

SCENARIO: OPERATIONAL EXERCISE, 1980

Earthquakes in southern California and Idaho of a 7.5 and 6.0 on the the Richter Scale, respectively, were somehow connected to an atomic plant explosion. It was believed they were associated. A great amount of public information was being broadcast over the television and radio. George Messner, Chairman of the County Commission, ordered the activation of the EOC.

This was a fast-moving exercise because beyond the normal problems generated by the simulation team, the radioactive cloud moved faster than expected across the country, bringing hazardous material into South Dakota within hours.

During the few hours this exercise continued, the radiation measuring and mapping teams received training. The shelters were activated and simulated traffic and medical problems (people in shelters leaving their medicine behind) increased. This exercise even included the Civil Air Patrol (CAP) with their new plane and aerial monitoring equipment. Before it was over, simulated radiation levels had reached 3 to 5 R/hour.

The critique compared the fallout from Mt. St. Helens to what we could expect from a radiation-type disaster in western South Dakota or beyond.

## BROOKINGS, SOUTH DAKOTA COUNTY/CITY CIVIL DEFENSE DISTRICT

SCENARIO: OPERATIONAL EXERCISE 1982

This was perhaps the most enjoyable of all the exercises because what began almost as a lark quickly turned serious as the entire resources of the city were mobilized to rescue our mayor.

Mayor Orrin Juel was kidnapped in the early morning hours by a group called the Norwegian Liberation Army. Their plan was to blackmail the citizens of Brookings, South Dakota into giving them \$300,000 so they could go to Norway and start a revolution.

The Emergency Operations Center was activated. The EOC staff listened as a voice with a Norwegian accent delivered his demands. Although a plan of action was quickly formulated, additional calls provided greater threats (3 bombs), greater challenges (no paper bills, all coins), greater demands (the mayor, who is famous for his singing, was to go with the terrorists to yodel across the fiords), and greater clues (the more MEAD the terrorist consumed, the better the accent; the voice began to sound familiar).

The Norwegian Liberation Army came to a sudden end near a phone booth on South Main, where the Brookings Police rounded them up without casualties and freed the mayor.



## BIBLIOGRAPHY

Books

- Bishman, Robert M. Brookings County Civil Defense Plan Under Emergency Conditions. Brookings, SD: Brookings County Civil Defense, May 1978.
- Bishman, Robert M., and Opheim, Lee A. Community Shelter Plan. Brookings, SD: Brookings County Emergency and Disaster Service, 1981.
- Bishman, Robert M., and Opheim, Lee A. University Disaster Plan. Brookings, SD: Brookings County Emergency and Disaster Service, 1981.
- Carol, Daniel, and Rubin, Kenneth. Hazardous Waste Management: Recent Changes and Policy Alternatives. Washington, DC: Congressional Budget Office, May 1985.
- Clark, Audrey N. Longman Dictionary of Geography Human and Physical. Washington, DC: Geographical Publications Limited, 1985.
- Department of the Air Force. Fundamentals of Disaster Preparedness. Washington, DC: U.S. Government Printing Office, 1979.
- Department of the Army. Flood Plain Information--Deer Creek, vol. I, Omaha District: Corps of Engineers, April 1973.
- Department of the Army. Flood Plain Information--Six Mile Creek, vol. II, Omaha District: Corps of Engineers, December 1974.
- Kearny, Cresson H. Nuclear War Survival Skills. Coos Bay, Oregon: NWS Research Bureau, 1980.
- Kiplinger, Austin H., ed. The New American Boom: Exciting Changes in American Life and Business Between Now and the Year 2000. New York, NY: The Kiplinger Washington Editors, Inc., 1986.

- Lehman, Charles A. Emergency Survival: How To Handle Emergencies That Can Threaten Your Life. Primer Publishers, 1979.
- Lowery, Tamara C., ed. Your Chance To Live. San Francisco, CA: Defense Civil Preparedness Agency, 1972.
- Metzger, John, ed. Terrorism: Who? Why? What is to be Done? Omega Group Ltd., September 1986.
- Opheim, Lee A., ed. How To Manage Congregate Lodging Facilities and Fallout Shelters. Brookings, SD: SDSU Print Lab, 1981.
- Sweet, William. Civil Defense: Nuclear Debates New Element. Washington, DC: Congressional Quarterly, Inc., 1982.
- White, Gilbert F. Natural Hazards. New York: Oxford University Press, 1974.
- Zeigler, Donald J. et al., Technological Hazards. Association of American Geographers, 1983.

#### Booklets and Pamphlets

- Defense Civil Preparedness Agency. Nuclear Civil Protection Planning: Nuclear Attack--Will You Survive? Pierre, SD: South Dakota Emergency & Disaster Service, 1977.
- Defense Civil Preparedness Agency. Protection in the Nuclear Age. Washington, DC: Department of Defense, February 1977.
- Simpson, J. Herbert, ed. U.S. Civil Defense Council Bulletin. "McConnell Presents 'Umbrella' Concept." Washington, DC: U.S. Department of Defense, 1976.
- United States Department of Transportation. Hazardous Materials--Emergency Action Guide. National Highway Traffic Safety Administration, 1979.
- United States Department of Transportation. How To Handle Radioactive Materials Packages. March 1978.



Newspaper Articles

- Argus Leader. "Twister! What to do when it hits." June 20, 1979.
- Brown, Tony. "Local officials worry about chemical spills." Argus Leader. November 2, 1981.
- Hayes, Joe. "SKYWARN increases tornado survival chances." Prairie Profile. April 21, 1981.
- Hovey, Art. "Risk of derailments is growing." The Brookings Daily Register. November 29, 1979.
- Hovey, Art, and Olson, Corrine. "Accident aftermath is averted." The Brookings Daily Register. October 7, 1980.
- Lang, Gary. "Spinar: waste dump doesn't affect safety." SDSU Collegian. October 9, 1985.
- Olson, Corrine. "City, county officials 'plan' for 11 possible emergencies." The Brookings Daily Register. May 11, 1984.
- Olson, Corrine. "\$1,350,000: Helldt receives bill for cleanup of chemical spill." The Brookings Daily Register. March 27, 1985.
- Raasch, Chuck. "Dakotans not defense oriented." Argus Leader. June 17, 1979.
- Souvenir Edition of the Brookings Weekly Register.  
Brookings, SD: Dutcher, Breed & Storgaard, September 7, 1899.
- Stiles, Scott. "Brookings prepared for natural disaster." The Brookings Daily Register. November 5, 1982.
- Swenson, Rob. "Area hail damage close to \$1 million." The Brookings Daily Register. August 14, 1979.
- The Brookings Daily Register. "Brookings safest place in nation says professor." October 27, 1976.
- Thompson, Roger, ed. "Brookings unlikely bomb target--but shelters are ready anyway." SDSU Collegian. October 4, 1978.



Welsh, Lisa. "Workings of new indoor warning system explained." The Brookings Daily Register. August 29, 1986.

Woster, Jaciel. "Thunderstorms tempt tornadoes." SDSU Collegian. July 12, 1978.

#### Periodicals

Capp, Mary J. "Death From The Sky." Globe-Democrat Sunday Magazine. December 5, 1965.

Schultz, Mort. "How experts are defusing rolling bombs that ride our rails." Popular Mechanics. January 1979.

U.S. News & World Report. "Hazardous Waste--How Dangerous?" November 5, 1979.

U.S. News & World Report. "The Rise of World Terrorism." July 8, 1985.

#### Personal Interviews

Bayer, Lonnie. Brookings County Civil Defense Director. Brookings, SD. Interview, 20 November 1986.

Bishman, Robert M. Former Brookings County Civil Defense Director. Brookings, SD. Interviews, 26, 28 March 1985, 2 May 1985.

Opheim, Lee A. Professor of Geography, South Dakota State University. Brookings, SD. Interviews, 19, 21 March 1985, 11 April 1985, 17 November 1986.

Sandness, Roger. Assistant Professor of Geography, South Dakota State University. Brookings, SD. Interview, 3 December 1986.

#### Theses

Griesenbrock, Jan. "The Impact of Flooding in Brookings County, South Dakota: 1936-1985." 1986.

Hillestad, Linda. "The Changing Impact of Natural Disasters in Brookings County, South Dakota." 1982.