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RISK COMMUNICATION IN MICHIGAN: A CASE STUDY OF THE CHEMICAL INDUSTRY IN MUSKEGON COUNTY, MICHIGAN

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ABSTRACT

RISK COMMUNICATION IN MICHIGAN: A CASE STUDY OF THE CHEMICAL INDUSTRY IN MUSKEGON COUNTY, MICHIGAN

By

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Risk communication in a democratic society is a complex and difficult endeavor. Historically the process has consisted of one-way delivery of messages from government, industry, and other institutions to the receiving public. Ideally, however, risk communication may be approached as an interactive process of exchange of information and opinions among individuals, groups, and institutions. Message intermediaries play an important role in this process by filtering and packaging the information presented to the audience.

A retrospective case study was used to illustrate the role of the media as an intermediary in the risk communication process surrounding the chemical industry in Muskegon County, Michigan. A content analysis of newspaper coverage presented in The Muskegon Chronicle was employed to assess the source and type of risk information presented concerning sites of chemical manufacturing within the county. This analysis was augmented by personal interviews with individuals in print media, members of local environmental groups, private citizens and government officials.

Analysis of the results of the content analysis revealed a peak in newspaper coverage concerning Muskegon's chemical industry which corresponds to the enactment of Federal and State statutes aimed at hazardous waste sites. Government agencies,

primarily state officials, were identified as the most frequently quoted source and as most likely to convey messages which affirm public risks. Industry was the next most frequently quoted source, either denying risk or assuring that control of contaminants was feasible. Advocacy groups and individuals received little attention from the press prior to 1970 and increasing but sporadic coverage thereafter. It is concluded based on these findings and information gathered in interviews that (1) competing influence of the environmental movement and local economic concerns produced only minimal shifting of power, as defined by access to the media, from government and industry to groups and individuals, and (2) the conditions under which most daily papers are published do not foster dissemination of in-depth and sometimes conflicting representation of environmental risk.

This dissertation is dedicated

to Pete, Lorien, Joey and Ryan

who lived it with me

and love me still.

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CHAPTER I

RISK COMMUNICATION

A. Introduction

Concerns about public misconceptions of health risks have prompted government agencies and industry officials to seek better methods for communicating risks to the public. The condition derives impetus in part from the frustrations and difficulties encountered in the past. Government officials have often been baffled by the public's apparently exaggerated perception of health risks and unrealistic demands for risk reduction. The public in turn is equally disturbed by the often condescending and paternalistic attitude of responsible officials (Covello, 1989, Sandman, 1989). Unsuccessful risk communication characterized by these frustrations contributes to what has been referred to as "environmental gridlock" (Daggett, 1989).

It is indisputable that the complexity of environmental problems dictates a coherent, long range, and collaborative plan of action. That consensus, however, has not led us to lasting answers (Daggett, 1989). Devising effective solutions to complex issues of public policy in a free society must include all affected parties. By informing the public, risk communication serves the democratic imperative that individuals be allowed to take part in the decision making process towards a comprehensive plan of environmental action. The goal in this process is not to change public opinion but rather

to provide the necessary information which allows the individual to make effective contributions (Baram, 1989). Thomas Jefferson characterized this goal 200 years ago when he said, "If we think the people not enlightened enough to exercise their control with a wholesome discretion, the remedy is not to take it from them, but to inform their discretion." (Jefferson, 1820.)

B. Definitions

Risk is a dynamic concept. It is subjective and dependent upon situational factors over which the analyst exerts little control. Therefore, several key terms must be defined before any knowledgeable discourse on risk may be attempted. Within the confines of chemical contamination, "hazard" refers to the interaction of the inherent toxicity of a substance coupled with the potential for exposure. Thus an extremely toxic substance with little likelihood for human exposure need not pose an extreme hazard. Conversely, a substance of only moderate toxicity may pose a greater hazard if exposure is acute or prolonged. "Risk" is the probability of injury, disease, or death under specific circumstances of toxicity and exposure. The risk, therefore, imposed by even an extremely hazardous substance is dependent upon the likelihood of individual exposure. In this way risk is a set of possible occurrences with associated probabilities over some interval of time (Lind, 1989). The use of this definition is highly subjective and technologically oriented. Quantitative assessments of risk may vary dramatically dependent upon the assumptions and mathematical equations employed in the analysis.

Quantitative assessments of risk are characterized by uncertainty which derives from four general sources:

1. statistical randomness or variability of nature,
2. lack of scientific knowledge about mechanisms of action,
3. lack of scientific data, and
4. imprecision in risk assessment methods (Covello, 1989).

The uncertainty which results from these sources may produce estimates of risk which vary by several orders of magnitude (Conservation Foundation, 1985). The ensuing disagreements between experts over the risk imposed by a hazardous substance contributes to the public's distrust in risk information and communicators alike.

The public's "perception" of risk may be drastically different than that of the scientific expert. Rescher (1983) postulated that the perception of risk associated with an activity has three components:

1. an outcome, something we feel or experience;
2. the probability distribution of the occurrence of the outcome;
3. a choice of an activity, each of which results in benefits and costs with their associated probabilities.

"Risk acceptability" may be defined in the context of this framework. The risk choice involves a tradeoff between perceived costs and benefits. The acceptable level of risk is a level where the advantages of increased benefits are not worth the costs of reducing risk by restricting or altering the activity (Fischkoff, et al, 1978). The average

individual does not, however, engage in this formal summing of risk and advantages. The level of risk tolerated in a given situation is dependent upon a number of situational and circumstantial factors.

C. Research Framework

The discussion above supports the idea that risk communication, in the framework of a democratic society, is a complex and difficult endeavor. The National Research Council (1989) has recommended several areas of needed research including; (1) the characterization of risks, (2) the "mental models" used in characterizing the target audience, and (3) the role of message intermediaries. Investigation of these issues may be undertaken through the use of retrospective or contemporaneous case studies.

The present dissertation will investigate the role of the media as an intermediary in the risk communication process. A retrospective case study of Muskegon County, Michigan, will be used to illustrate the role played by the media and the impact of risk messages on the attitude of the community towards the resident chemical industry. A content analysis of newspaper coverage presented in The Muskegon Chronicle is used to assess the source and type of risk information presented concerning sites of past chemical manufacturing included in the Federal Superfund National Priorities List. This analysis will be augmented by personal interviews with individuals in the media, members of local environmental groups, private citizens, and government officials.

D. Limitations and Assumptions

This dissertation does not attempt to make a full assessment of the community impacts of hazardous waste sites. To do so would require resources beyond the scope of this project. Medical issues such as increased rates of cancer or other disease will not be investigated with the exception of those which received extensive press coverage. Analysis of the technical or legal questions inherent in remedial cleanup actions will not be addressed beyond a cursory depiction of factual accounts.

Muskegon County is not unique in respect to the issues presented to its residents concerning promotion of a potentially polluting industry. These problems are faced by innumerable communities on a regular basis. It is expected that trends in risk reporting illustrated in this study will be similar to those observed in previous works (Sandman, 1987). The present dissertation, however, will attempt to illuminate the underlying motivations for these trends.

It is expected that individuals and institutions such as local media and governing agencies will have biases in favor of their own agendas. This dissertation does not attempt to make a judgment as to the appropriateness of the conduct of any official or member of the news media. Rather, the focus is on the factors which influence risk representations in the media.

E. Significance of the Research

On a daily basis, local, state, and federal authorities as well as private corporations face situations in which key decisions must be made based on the public's perception of risks. Retrospective and contemporaneous assessments of the risk

communication process in these situations may shed light on how people react to different kinds of messages, how the preparation and delivery of those messages affects risk perception, and how outside groups and intermediaries impact message transmission. The present research seeks to characterize the actors and components of a real risk communication process with the desired end of aiding agency planners and the public in future collaborative efforts.

CHAPTER II

THEORETICAL PERSPECTIVE

A. Introduction

Douglas and Wildavsky (1982) postulated a theory of cultural change in which a center of established practice and thought possesses the majority of power within a society. The center is composed of the "powers that be" such as government, industry, and any other institutions that support the status quo. The center is challenged by a border of criticism composed of people who are essentially critical of some defined part of the establishment. The composition of the border changes dependent upon the issue which creates a division between the center and the border. This perspective may be applied to any social movement including that of environmental protection. Environmentalists, at least in the early stages of the "Environmental Movement" are viewed as part of a border while pro-growth forces such as industry constitute the center. Societal influences, such as economics, politics and ethics are seen as impinging upon the boundary between the center and the border, either expanding or contracting the placement of the division line. Likewise other actors, scientists and the mass media, may become part of the center or the border depending upon ideology and the influence of outside forces.

Nelkin (1985) has stated that mainstream press reporters convey a consensus view in which government and industry work together for the benefit of society. The orientation of mainstream press is depicted as technical/bureaucratic and is reflected by the prevalence of stories focusing on technical solutions to environmental problems. By contrast, news sources outside the mainstream, referred to by Nelkin as the advocacy press, tend to focus on social issues such as effects on individuals, government and industrial misdeeds, and the structure of society which allows these things to occur. This depiction places the mainstream media within the center of the environmental debate as a force in favor of maintaining the status quo and the existing hierarchy of power. Any communication which flows, therefore, through the mainstream press is expected to promote the views of the center at the expense of the border. Societal forces can impinge upon the press forcing an ideological movement either against or in favor of change.

The present dissertation will focus on the role of the media in communicating the risks of environmental pollution to the public. A primary focus of this research is the identification of changing trends in the source and content of risk messages in a case analysis setting. An investigation of historical and community factors which influence the risk communication process can further serve to delineate the forces which have produced these trends.

B. Science in the News

Science journalists are required to report on a broad range of topics often with little or no formal training in science or technology. Coverage of natural disasters,

manmade disasters such as Chernobyl or Three Mile Island, and disputes over risks such as nuclear power, hazardous wastes, or medical issues contain a great deal of technical information which must be made understandable to the public (Nelkin, 1987). A review of the coverage of science in the news reveals a pattern of features which are manifested over a wide spectrum of issues. First, content is replaced by imagery (Nelkin, 1987). A report of a hazardous substance will rarely contain quantitative estimates of risk or the numbers of people expected to be effected. Rather, a journalist will attempt to evoke visions of the bereaved family of a victim. Specifics of occupational exposure will give way to images of the magnanimous or evil employer dependent upon the focus of the piece. Secondly, coverage of an issue will be portrayed as a series of dramatic events (Nelkin, 1987). The general public is often unaware of the painstaking work involved in scientific research and is treated only to coverage of announcements of possible breakthroughs. These features are manifested in events surrounding the investigation of a hazardous waste site where the public is often angered by the seeming lack of diligence on the part of regulatory agencies in pursuing remedial action. By contrast, if media reports minimize the risk of occupational or environmental exposure, the public will be annoyed with the seeming waste of time and resources used to protect against a non-existent threat. The reaction of the public is often tempered by the perceived credibility of the source of the information. The news media cannot, however, be viewed as objective reporters of reality. A newspaper, radio or television station possesses agendas and political objectives which serve to promote the welfare of the institution and its members. In a conservative organization, these objectives tend to support the dominant

ideology and social structure. Sources which possess power will, therefore, tend to retain that power and only reluctantly accede to others.

C. Risk Communication

Risk communication as historically practiced has primarily consisted of one-way delivery of messages calculated to influence the public in a desired direction. William Reilly, at the first National Conference on Risk Communication, stated:

> In the conflict or confusion over risk questions...often the communication process is at fault or, at the least, exacerbates the problem. Risk communicators simply do not do a good job of getting their message across.
>
> (Reilly, 1987)

This one-way formulation of risk communication is inadequate for three reasons. First, the attendant costs and benefits of risk decisions are inequitably distributed throughout society (National Research Council, 1989). Those who are in a position to gain from a course of action, such as industry representatives, will seek to sway others to their point of view by sometimes coercive persuasion.

Secondly, costs and benefits are valued differently by different individuals and groups (National Research Council, 1989). Decision making in risk situations is a normative process which does not readily lend itself to calculations of the net benefit to society.

Thirdly, risk communication must serve the democratic imperative which dictates public involvement in the decision making process. Any process which attempts to substitute technological assessment for political debate fails in this respect (National

Research Council, 1989). Historically, decisions about technologies have taken place within sponsoring corporations with the advice of "experts". These experts were assumed to be knowledgeable in their respective fields and to bring a degree of objectivity into the decision making process. Those who lacked technical training to understand the intricacies of technology were disenfranchised. More recently, the normative nature of scientific and technological decisions have been recognized as well as the subjectivity of the experts. The answer lies, therefore, not in removing the decision making process from the lay public but rather to promote a more generalized understanding of science and the consequences of technological choices. Armed with this information the public can communicate more effectively with other groups in the decision making process.

Alternatively, risk communication may be approached as an interactive process of exchange of information and opinions among individuals, groups, and institutions. It can involve multiple messages about the nature of risk and the expression of concerns, opinions, or reactions to risk messages or to legal and institutional arrangements for risk management (National Research Council, 1989). Effective risk communication "raises the level of understanding of relevant issues or actions and satisfies those involved that they are adequately informed within the limits of available knowledge" (National Research Council, 1989).

D. Models of Risk Communication

Several models have been used to analyze the risk communication process. An early model of risk communication was adopted from the engineering theory of

communications (Figure 2.1). This approach was utilized by Covello et al (1986, 1987) to enumerate the problems in the field of risk communication. Difficulties were broken down into four dimensions.

1. Message Problems. Included in this category is the high level of scientific and technical complexity of the information and the uncertainty with which estimates are made. Complex information is difficult to present to the public in a meaningful way without condensation.

2. Source Problems. The uncertainty of risk information fuels the public distrust with experts and government agencies. Officials contribute to this lack of credibility by disagreements among themselves and by discounting the public's concerns and fears.

3. Channel Problems. These difficulties are primarily a function of the mass media. The nature of media promotes selective and biased reporting as well as reliance on sensational or dramatic aspects of a story to sell copy. These phenomena are not well understood and should serve as the focus of further research (Leiss and Krewski, 1989).

4. Receiver Problems. Included in this category are a wide variety of individual and situational factors which contribute to inaccurate perceptions of risk by the public. This can take the form of overconfidence in the ability to avoid harm and a resistance to change of these perceptions.

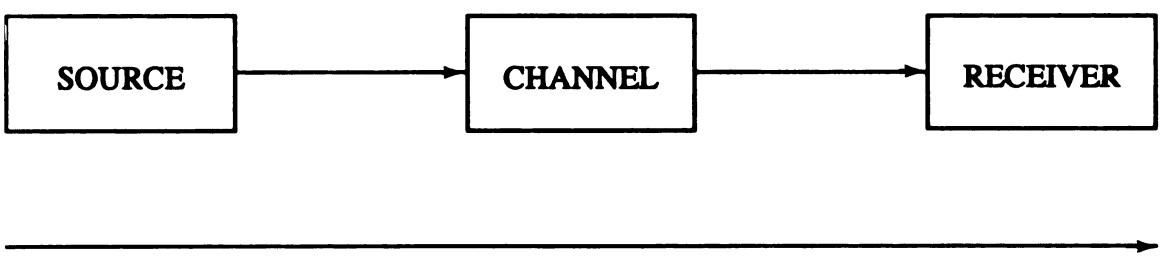

Figure 2.1. The message transmission model of risk communication (Leiss and Krewski, 1989).

A significant strength of this model is the identification of the tension which exists between experts and government agencies which act on a technological base and the public which acts on a "common sense" base of information. Unfortunately, this model again represents a one-way flow of information and does not provide the public an opportunity for active communication with the source of the communication.

The information flow model has been used to portray the one-way or two-way flow of communication among those people and institutions who possess information to those who ultimately acquire and use it (see Figure 2.2). The communication path ways represented by this model are primarily those among industry, experts, and the regulatory agencies. Note that the two-way information flow exists only for the channels between industry and agency, and experts and the agency. In this model, no communication channels exist from the public to the other parties. This lack of communication promotes mistrust of experts, industry, and government agencies alike on the part of the public. In addition, it perpetuates the prejudice that the public is ill informed on technological issues and tends to react to them out of fear and ignorance. Other limitations of the information flow model include the necessity of legal intervention to prompt most communication between the primary participants and the limited role of the media as a transmitter of information to the public (Leiss and Krewski, 1989).

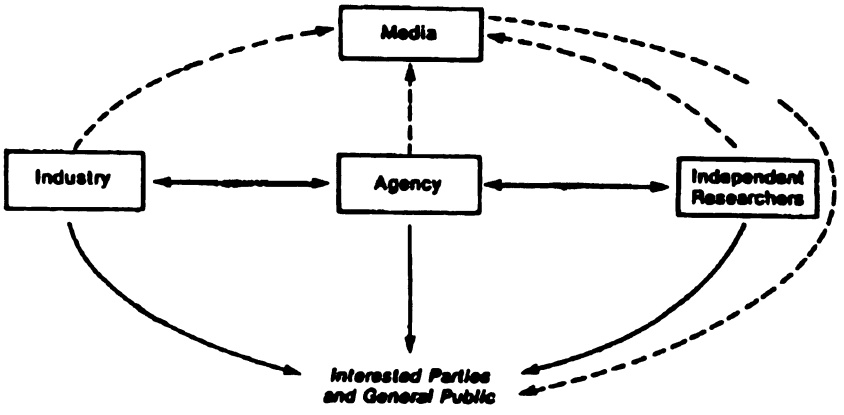

Figure
2.2. The information flow model of risk communication(Leiss and Krewski, 1989).

The Communications Processes Model (Figure 2.3) incorporates aspects of both the Information Flow and Message Transmission models and attempts to improve upon both. This model incorporates the concept of two domains, "technical risk" and "perceived risk" and is based on the flow of information between experts and the public (Covello, 1986,1987; Fischoff et al, 1983). Government is seen as bridging the gap between the expert domain and the public domain and thus is required to deal effectively with both technical assessment and the subjective perception of risk.

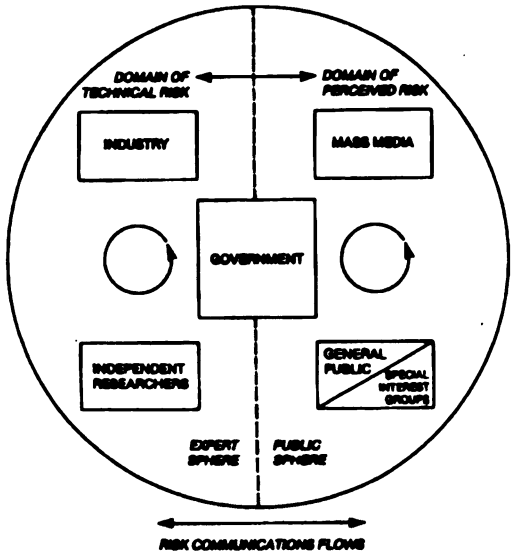

Figure 2.3. The communications processes model of risk communication (Leiss and Krewski, 1989).

This model allows for the analysis of the problems associated with risk communication within the categories of source, channel, receiver, and message. In addition, the tension between experts and the public is presented as a feature of the process. This model expands upon the message transmission model in that it highlights the communication within those spheres of interest which impact upon the communication process as a whole.

Based upon the models illustrated above risk communication problems may be analyzed by examining the message source, the message design, the delivery channel, and/or the target audience (Covello, 1986). The source of risk communication is usually a government agency. In the last 20-30 years, however, trust in these agencies has declined due to perceptions of mismanagement and governmental bias towards

technological solutions (Covello et al, 1989; Greenberg et al, 1984). Several key issues have been identified which contribute to the effectiveness of the communicating agency. These include: early, open, and honest relationships with the public and message intermediaries such as the mass media; consistency within and among agencies at the federal, state, and local levels; and a comprehensive plan of action which includes goals and objectives to guide the communication process (Covello et al, 1989; The National Research Council, 1989). Message preparation is also a key activity performed by the communicating agency. The design of effective messages is often made more difficult by conflicting responsibilities to the public, the agency, and legal requirements (Covello, 1988; Perry et al, 1985; Baram, 1989).

Perhaps the greatest failure of risk communication efforts is the lack of time and effort spent characterizing the target audience. Messages prepared with the utmost attention to style and content may not be favorably received if community dynamics dictate otherwise. Individual perceptions of risk may be based upon perceived characteristics of the risky activity such as the catastrophic potential and reversibility of the risk or upon factors associated with the individual. Among these factors are; perceived economic consequences, equity, impact upon children, and personal stake in the risky activity (Von Winterfeldt, 1981; Slovic, 1982; Bealer, 1981; Heberlein, 1981; Udd, 1985).

Ideas about risk perception suggest that the environment should be viewed as a person-environment system in which the individual's experiences, understandings, and actions define the reality of the environmental situation. With the exception of a few areas such Love Canal and Times Beach, very few people have experienced first hand

the potential destructive power of environmental contamination. Thus accurate understanding of environmental contamination is limited. Since scientists are unsure of the effects of many toxins, it is to be expected that the public is skeptical not only of claims of safety but also of risk. The individual who has eaten fish from a lake or stream for a number of years is distrustful when an official tells him the fish may be lethal. Baker et al(1980) reports that the public invests very little confidence in either regulatory agencies or elected officials. The action that the individual takes may therefore depend on a private risk/benefit analysis which may be very different from that proposed by a regulatory agency. This presents problems from the administrative point of view for an agency charged with the protection of the public.

Delivery channels are often referred to as intermediaries. The role of these intermediaries in the risk communication process is dependent both upon the delivery mode (i.e., radio, television, personal communication) and upon the characteristics of the intermediary (Greenberg et al, 1984; Rubin, 1987). For example, the message which appears in a newspaper or on television may be very different from that conveyed by personal communication. Correspondingly, two articles prepared for newsprint may be very different depending upon the backgrounds of the authors. The most effective communication efforts are those which exploit the strengths of specific communication channels (Scanlon, 1988; Sood, 1987; Wilkins, 1987).

The classic paradigm of the communication process - "who says what, in which channel, to whom, and with what effects" (Lasswell, 1948) excludes the "whys?" of communication content. Sandman (1989) suggests six factors which may account for

patterns of source and message which may emerge from an analysis of risk communication messages in the media:

1. which sources make themselves available,
2. what those sources choose to say,
3. which sources reporters seek out for interviews,
4. what the reporters choose to ask,
5. what information reporters put in their stories, and,
6. what information editors ask for, accept, or delete.

Differential access by a group or an individual to the media produces a hierarchy of power and credibility. Power may be defined as "the degree to which any individual or group successfully promotes happenings and occurrences as events" (Lester, 1971: 319). Because news space and time are limited it follows that an increase in power by one group results in a loss of power by another.

E. Hypothesis

This research will concentrate on the role of message intermediaries in the risk communication process surrounding a potentially risky industry. A content analysis of newspaper coverage of the chemical industry in Muskegon County will constitute part one of the research.

General Hypothesis 1: The ability of a source to be quoted in the local media will change over time. This ability may be equated with power. Situational characteristics

such as the enactment of environmental legislation will influence the power of a source over time.

Specific Hypothesis 1a: Government officials will appear with increasing frequency as a result of the enactment of environmental legislation.

1b: Industry sources will appear with consistent frequency over time.

1c: Sources such as individuals, grass root or community organizations will appear with increasing frequency over time.

General Hypothesis 2: The content of a risk message will vary dependent upon the characteristics of the source.

Specific Hypothesis 2a: Sources such as industry and government officials are likely to produce messages which deny or downplay risks associated with a potentially polluting industry.

2b: Sources such as individuals, grass roots or community organizations will produce messages which affirm the riskiness of a potentially polluting industry.

The quantitative analysis of risk messages will be supplemented with an investigation into the historical and institutional factors which contributed to the character of the information portrayed in the media. The primary hypotheses relevant to this investigation are:

General Hypothesis 3: The content of risk messages is affected by the economic circumstances in the surrounding community.

Specific Hypothesis 3a: Economic conditions in Muskegon County in the 1950's prompted the downplay and dismissal of the potential risks of chemical manufacturing.

3b: Economic conditions in Muskegon County in the environmental era following 1970 affected the emerging depiction of risks associated with occupational and environmental exposure to hazardous substances at site of chemical manufacturing.

General Hypothesis 4: The increase in power and credibility associated with private citizens and environmental groups will be reflected in an increase in coverage of the effects of hazardous substances on individuals and the environment of the surrounding community.

CHAPTER III

METHODOLOGY

A. Site Selection

Muskegon County, Michigan was chosen as the geographic basis for this study after a careful review of (1) the Michigan State Act 307[1] list of contamination sites and (2) the National Priorities List for Michigan[2]. Muskegon County was also a proximate choice for the present investigator, who was based in East Lansing, Michigan which is two hours from Muskegon by automobile. Importantly, Muskegon County also contains two sites of notoriety, the former Hooker Chemical site in the city of Montague and the Ott/Story/Cordova site in Dalton Township. Each of these chemical waste sites was at one time considered one of the most contaminated areas in the state. In addition, the Bofors site was considered by the EPA as a test project for incineration of soils contaminated with toxic waste. Other sites of comparable contamination are located in

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[1] The Michigan Sites of Environmental Action List Act 307 (1982) provides for the identification, risk assessment, and priority evaluation of sites of environmental contamination. An environmental response fund was also created to provide support for response activities. See Chapter IV for a more detailed discussion.

[2] The Comprehensive Environmental Response, Compensation and Liability Act (1980 as amended in 1987) provides the necessary federal power, organization and funding for the clean up of abandoned and inoperative waste sites. More than 1000 sites are included or proposed for the National Priorities List of sites requiring remedial action.

the Metro-Detroit area. The researcher's familiarity with the Muskegon area allowed for ease of discovery of historical records and administrative files such as those located at the Hackley Public Library. In addition, previous research concerning economic conditions in Muskegon provided insight into the community dynamics of the hazardous waste situation (Larsen, 1987). Together these factors influenced the site selection process in favor of choosing the Muskegon site.

The promotion of the chemical industry in Muskegon County is especially interesting from a environmental risk perspective. Land disposal of hazardous wastes (legal or otherwise) on the sandy and porous soils of Muskegon County produces substantial contamination of groundwater as well as surface water in the Muskegon River watershed. Muskegon Lake, fed by the Muskegon River watershed, is directly connected to Lake Michigan via a deep water channel. It would be difficult to choose environmental conditions less appropriate for disposal of toxic wastes.

B. Content Analysis

1. Time period selected for study

The hypotheses articulated in the Chapter II require a longitudinal analysis of risk communication concerning hazardous waste sites. As will be described in Chapter IV, the first articles about the chemical industry which appear in The Muskegon Chronicle provide coverage of Hooker Chemical's efforts to find a suitable location in the Muskegon area beginning in May of 1951. The time frame of this study will, therefore, include articles appearing in The Muskegon Chronicle from May 1951 through

November of 1991.[3] These end points are selected to provide a complete review of coverage from the beginning of Muskegon's chemical industry to the present.

2. Data Collection

The Muskegon area is served by more than twenty radio stations located both within and outside the county. Television broadcasts received in the area (other than those on cable networks) originate in Grand Rapids or Kalamazoo, Michigan. Several newspapers are available including out-of-county publications such as The Detroit News/Free Press, USA Today, and the New York Times. In addition, many local communities produce weekly publications which provide information on a limited geographic area. The Muskegon Chronicle, with an average daily circulation of 47,276 in 1992, is the largest daily newspaper in the county. (The Muskegon Chronicle Circulation Department, 1993).

Newspapers were chosen as the media for analysis due to the relative ease of recovery of articles from morgue files. The Muskegon Chronicle has maintained clipping files for all major chemical manufacturers located within Muskegon County. Most of these files date from the initial facility planning stages of the various chemical facilities. Unfortunately, clippings files at the local weekly newspapers were erratically maintained and would not have provided a comprehensive history of information. The Muskegon Chronicle was selected as the most reliable and accessible source of information on risk communication concerning the chemical industry in Muskegon County. Inclusion of

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[3]Public access to the morgue clipping files of The Muskegon Chronicle is restricted. The present investigator was limited, therefore, to photocopying relevant articles on a one-time-only basis.

television and radio information was impossible since no permanent records are kept of these broadcasts.[4]

Morgue clippings files at The Muskegon Chronicle office were cross referenced with card catalog files housed at the Hackley Pubic Library in Muskegon to ensure a complete representation of articles. An archive of all major articles appearing on page A1 of The Muskegon Chronicle was developed.[5] Photocopies of all chosen articles were obtained. Items accepted included all articles concerning chemical manufacturing facilities on the National Priorities List, any articles which deal generally with the chemical industry in Muskegon County, and any article which portrays the environmental state of the county. Articles which are exclusively concerned with corporate business matters such as appointments of executive officers, anti-trust suits or facility expansion were excluded.[6]

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[4] Several authors have examined the correlation between print and broadcast media and determined that the relative amount of coverage afforded an issue rises and falls similarly across media. Based on these analyses, it may be concluded that the content of print media does not differ to any great extent from what may be reported by radio and television broadcast (Rogers et al, 1991; McCombs and Shaw, 1989; Danielian and Reese, 1989).

[5] Only A1 articles were included in the content analysis to avoid violating the statistical assumption that all articles receive equal attention from readers. Additionally, the restriction served to limit the number of articles included while maintaining consistency of the data.

[6] Articles of this type did not contain information pertaining to hazardous wastes or manufacturing practices. Most consisted of only a paragraph or two and contained no quotes. These articles represented a very limited percentage of all articles in the clippings files and were excluded by the present investigator at the time the clippings were photocopied.

Quotations are used as the unit of analysis to provide a clear physical boundary (ie. material contained within the quotation marks). Before coding for the source and content of the quotes, the title of the article, the by line or author, the date of publication, and the document number were noted for each article on a coding sheet (see Appendix A). The midpoint of each article was determined by counting the number of paragraphs it contained to serve as a point of reference for coding the position of a quote within the article. In order to avoid bias in favor of the general tone set in the article, the whole text was not read, only the material within quotation marks. Each quote was coded as to the source of the information, the type of risk message it contained, and position within the article relative to the midpoint.[7]

3. Description of variable categories

Source is defined as the person to whom the information contained in the quote is attributed. Sources were generally identified with both name and position in the articles. If the source of the quote was a document, such as a consent agreement or other court document, the source of the quote was coded as the source of the document. The following categories were used to code the source variable:

> **Federal Government**: The United States EPA or any other federal agency, representatives of the federal judiciary system, the federal Congress, or the executive branch.

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[7] The coding system used in this analysis was originally developed by Peter Sandman in Environmental Risk and the Press: An Exploratory Assessment (Transaction, Inc., 1987).

State Government: The Michigan Department of Natural Resources, any other state agency, representatives of the state judiciary, state Congress, the Governor or his staff.

County/Local Government: Health officers, police officers, local agencies and elected officials

Industry and Industry Association: Corporate officials, company spokespeople, trade associations, legal representation.

Workers & Unions: Individual workers and Union spokespeople

Advocacy/Environmental/Citizens Groups: Local, state, or federal groups organized for environmental action.

Citizens/ by-standers/ individuals: Residents, individuals not connected in an institutional way to the event.

Experts (not involved): University or other scientific experts contacted to provide technical information.

Unattributed: Information with no stated source.

Mixed Attribution: Credit given to more than one source.

Other: Any source which does not fit into the above categories.

Risk is actually a composite of two issues. The first issue is whether a substance is risky in that it poses a threat to human health or the environment. The second issue is whether the substance in question is in fact present in the situation depicted in the quote. Where the distinction between the two is unclear the quote was coded as "risk-claiming." If no information regarding a risky substance or its presence was provided the quote was coded as "No Risk Information." The following is a list of the risk categories included in the analysis.

Risk - claiming: Quotes which contain statements or opinions of the riskiness of a substance or waste disposal method, including any positive use of the term "toxic."

Risk - denying: Quotes which contain statements or opinions which deny the riskiness of a substance or waste disposal method, including any negative use of the term toxic.

Risk - mixed opinion: Quotes which take an equivocal position on the riskiness of a substance or method of waste disposal.

Risk presence - claiming: Quotes which state or express the opinion that a risky substance or action is present at the site in question.

Risk presence - denying: Quotes which state or express the opinion that a risky substance or action is not present at the site in question.

Risk presence - mixed: Quotes which take an equivocal position on the presence of risky substances or actions.

Risk Presence - under control: Quotes which acknowledge the presence of a risky substance or action but which claim that such risk is under control.

No Risk Information: Quotes which contain no information regarding risk or the presence of risk.

4. Pretest

All articles were chronologically ordered and a systematic sample of 20 articles selected for inclusion in the pretest. Articles were chosen for the pretest by selecting every 12th article. These articles were then coded for (1) *source* of quotation, (2) the type of *risk* information conveyed, and (3) the position of the quote relative to the midpoint of the article.

Source categories for the pretest included; federal government, state government, county government, local government, general government, industry, workers and unions, advocacy/environmental groups, citizens\bystanders, experts, unattributed, mixed attribution, and other.

Risk categories for the pretest included; risk - claiming, risk - denying, risk - mixed opinion, risk presence - claiming, risk presence - denying, risk presence - mixed opinion, risk present - under control, and no risk information.

5. Results of the pretest

Cross tabulation of the pretest data revealed a general trend in support of the proposed hypotheses. Actual numbers of quotes containing information in each risk category attributed to each source are presented in Table 3.1. Figure 3.1 illustrates the number of quotes attributed to each source by year (only those years represented in the pretest are included). The categories of federal, state, county, local and general government are combined for clarity in the graphic representations of pretest data. Workers and unions, advocacy groups, citizens and experts are also represented as a single category (individuals/group).

Table 3.1: Pretest Number of Quotes of Each Risk Approach to Each Source

Source	Risky (%)	Not Risky (%)	Mixed Opinion (if Risky) (%)	Risky Substance Present (%)	Risky Substance Not Present (%)	Mixed Opinion (if Present) (%)	No Risk Info. (%)
Federal Government	0	0	0	2	0	0	0
State Government	2	7	1	5	0	1	4
County Government	0	0	0	0	0	0	0
Local Government	1	1	0	1	0	0	1
General Government	0	0	0	0	0	0	0
Industry	0	8	0	2	4	0	12
Workers and Unions	0	0	0	0	0	0	0
Advocacy Groups	3	0	0	0	0	0	1
Citizens	1	0	0	4	0	0	4
Experts	0	0	0	0	0	0	0
Unattributed	0	0	0	0	0	0	0
Mixed	0	0	0	0	0	0	0
Other	0	0	0	0	0	0	0

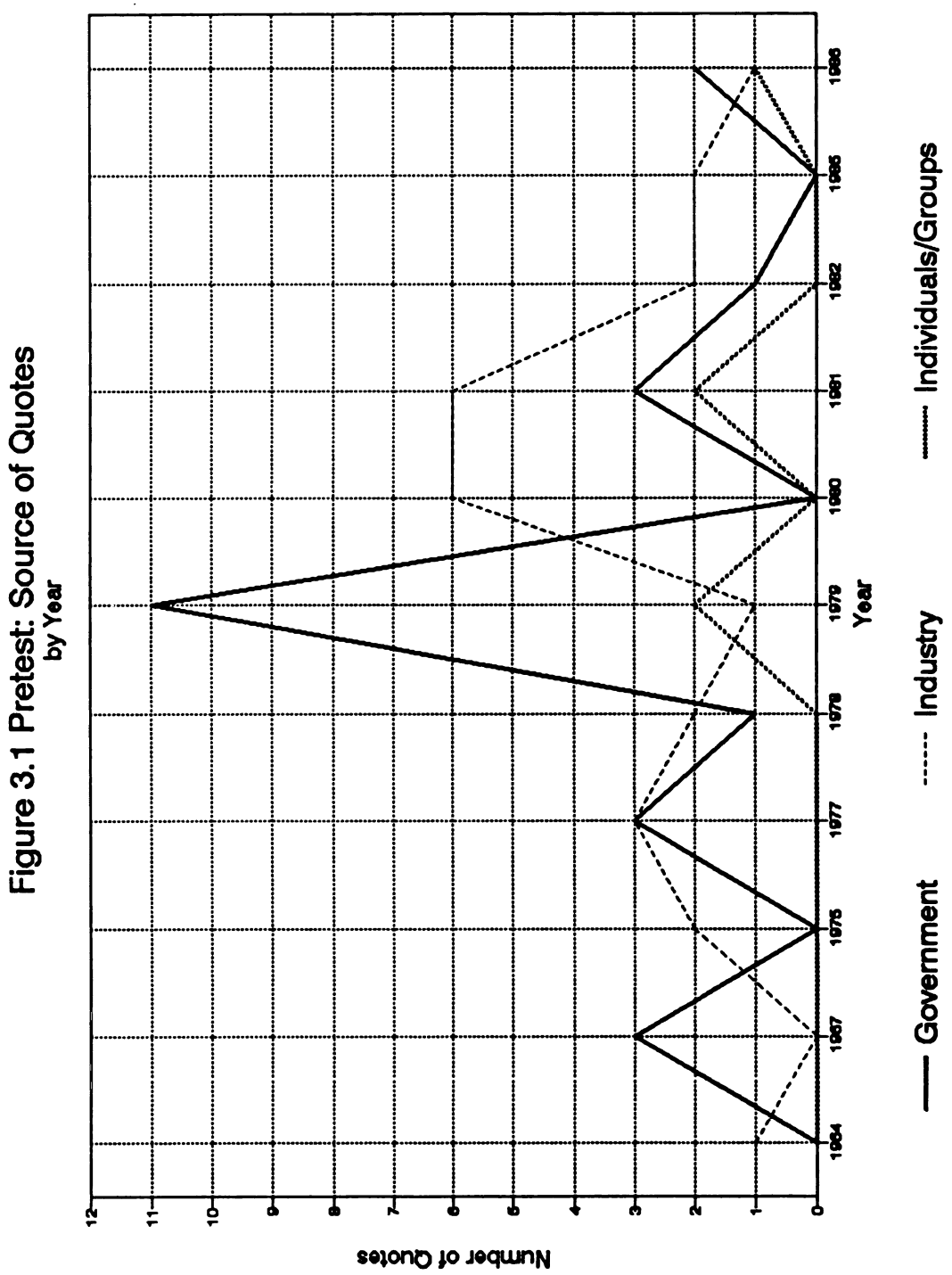
Figure 3.1 Pretest: Source of Quotes
by Year
Number of Quotes
0
1
2
3
4
5
6
7
8
9
10
11
12
1964
1967
1975
1977
1978
1979
1980
1981
1982
1985
1986
Year
Government
Industry
Individuals/Groups

Industry enjoys a consistent amount of attention from the local press. Utilization of industry sources peaked in the early 1980's. Use of government sources remained relatively constant with a peak in the late 1970's. The greater attention afforded to industry and government sources is a function of the enactment of environmental legislation during these years coupled with the discovery of hazardous contamination at the Hooker and Ott/Story/Cordova sites.

The appearance of individuals and citizen groups as a source of risk information is a significant finding in support of the hypothesis presented in Chapter II.

Figure 3.2 illustrates the type of risk messages conveyed in the quotes analyzed in the pretest. The categories of "risk - claiming" and "risk presence - claiming" have been combined into "affirm risk". Likewise "risk -denying" and "risk presence-denying" have combined into "deny risk" for the sake of this representation. The enactment of environmental legislation as well as the findings of hazardous contamination again contributed to the overall rise in number of quotes which convey risk information. However, the affirm risk category is consistently greater than the deny risk category following 1979. This trend is consistent with findings in the general content analysis which followed. The effect is attributable to the tendency of State Government to confirm the presence and risk of hazardous wastes.

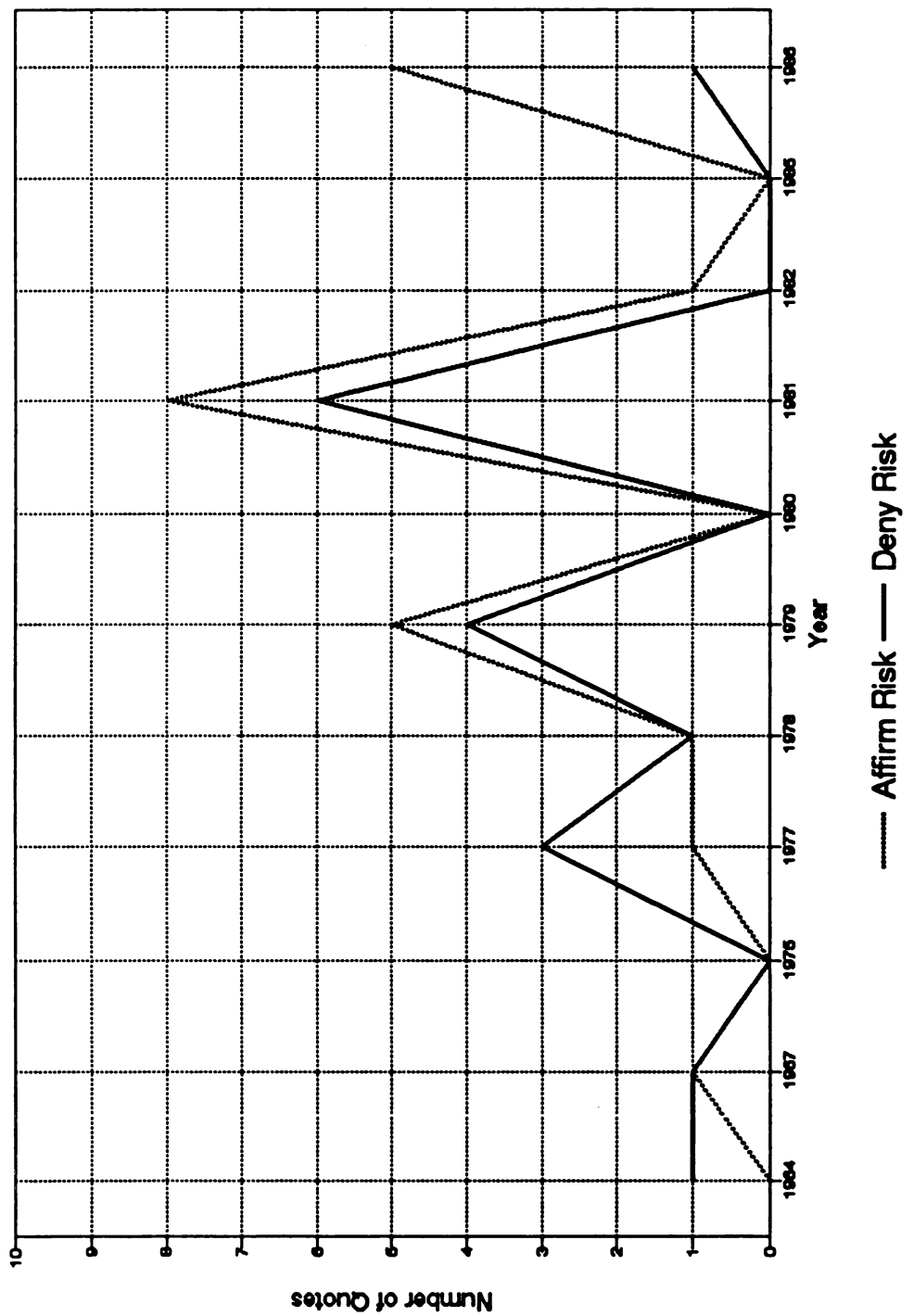

Figure 3.2 Pretest: Risk Message
by Year

Based on the analysis of the pretest data, two adjustments were made in the coding system. First, the categories of "local" and "county" within the source variable were collapsed into one category. These government entities were quoted infrequently in both the pre-test and the large content analysis and the distinction between the two was not deemed important to the overall study. Secondly, another response option was added to the risk variable "risk present, but under control". This addition reflected the frequency of statements from industry and government sources which confirmed the presence and risk of contaminants but sought to assure the public of the ability to deal with the problem.

7. Analysis

To avoid bias in favor of support of the proposed hypothesis a random order of coding was used for the actual content analysis. Following completion of the pretest, the chronological order was replaced by a random order of articles. Document numbers 001 through 250 were entered into the Lotus 123 program. A random number table was generated with an identical number of entries. The document numbers were then randomly sorted by computer based upon the generated random number sequence. After arranging the articles according to random order, each article was assigned a new document number to reflect the new order.

A numerical system was used for computer input and the information analyzed using the SPSS-X statistical package for social sciences. Results are presented in Chapter V.

Procedures for coding were modeled after those used by Sandman et al (1987) as adapted for the methodology for the present analysis. To ensure coder reliability, a systematic subsample of twenty articles was drawn and recoded. Data drawn from the content analysis and from the recoded articles were compared for percentage of agreement. The percentage of agreement is expressed as a ratio of the incidence of agreement with post test codes and the total number of data codes possible for those twenty articles (incidence of agreement/total number of codes). This analysis revealed a 100% agreement on the source variable. The level of agreement on the risk variable was 98%. Some of the variability on the risk variable may be due to the addition of the "risk presence - under control" category.

A key assumption of the statistical analysis of data from the content analysis is the absence of nonsampling error. Nonsampling errors are those imperfections in the data which are not a result of the sampling procedure. For this study, this type of errors include mistakes in coding for the content analysis and noninlcusion of relevant articles. In addition, two key assumptions are made concerning the proposed research design: (1) the frequency with which an attribute appears in an article is a valid indicator of attention, intensity, and importance of that attribute and, (2) each content unit should be given equal weight thus permitting aggregation or direct comparison (Holsti, 1969). Regarding the first assumption, the analysis will determine whether a difference exists between messages and sources contained in the first half of the total number of paragraphs contained in the article compared to those in the last (Sandman, 1989, Holsti,

1969).[8] In reference to the second assumption, only articles which appeared on page A1 were included in the study, thus controlling for any effects of location within the publication.[9]

C. Expert Interviews

A variety of documents were used to identify those persons to be interviewed such as EPA administrative reports, media articles, and referral from other sources. An attempt was made to provide a representative balance of media, government, industry, and private sources. Initial contact with each source was made by telephone followed by in person face-to-face interviews when permitted. (Please see appendix E for list of interviewees.) From an initial list of twenty three individuals and five chemical companies, twelve interviews were conducted including three MDNR project leaders, two members of the chronicle staff, the director of the Muskegon Chapter of the Lake Michigan Federation, a local historian, and five private citizens who had been involved in local environmental issues since the early 1970s. Of the eleven others, five could not be reached (no forwarding addresses or phone numbers), one had died, and five others declined to be interviewed. In person interviews were held in Michigan at the business office of the interviewee.

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[8]Newspaper articles may not be read to completion by all readers. Information portrayed in the first half of the article, therefore, may receive more attention than that in the second half.

[9]Page A1 articles receive more attention than articles placed in inner pages of a newspaper. Therefor, comparing the effects of information contained on other pages with those on page A1 may violate the assumption that all articles receive equal attention from readers.

Three of the five chemical industries are no longer in operation precluding the opportunity for contact. Officials at Lomac (current owners of the Bofors/Lakeway site) declined the interview (based on pending legal action) and referred to the feature article which appeared in The Muskegon Chronicle in 1992. DuPont officials stated they are in compliance with agreements with the MDNR and declined further comment.

Michigan Department of Natural Resources project leaders were contacted by phone to confirm information concerning the clean up activities at each of the sites of contamination and to corroborate facts presented in newspaper articles.

Media personnel with experience in reporting on the chemical industry and/or hazardous waste issues were identified by the by-lines of articles included in the content analysis and by personal contact with staff at The Muskegon Chronicle. Two individuals, the city editor and a staff reporter, knowledgeable of environmental reporting over the time span of the content analysis were selected for in-person interviews. Interviews were conducted with these individuals to obtain a subjective interpretation of the local media's coverage.

Additional contacts were made with members of local environmental groups and interviews conducted with willing individuals. Only the Director of the Muskegon office of the Great Lakes Federation agreed to be interviewed in person. This individual added a caveat to the permission form which allowed the right to review the completed dissertation prior to any publication. Several other private citizens were interviewed by phone but declined an in-person taped interview and asked not to be directly quoted.

These included active environmentalists and the wife of a former Hooker chemical worker. The majority of these people were identified by referral from other sources.[10]

Interviews were tape recorded with permission of the interviewee. Sessions were conducted in a structured but open ended format to promote the exchange of information. Written permission was obtained from each participant to both tape record the interview and to use direct quotes in the dissertation (Please see Appendix B for permission form). Taped recorded interviews lasted approximately one and one half to two hours. Telephone interviews were of some what shorter duration, usually about thirty minutes. The results of these interviews are presented as part of the discussion of results in Chapter VI.

The proposed methodology for the present dissertation was reviewed by the Michigan State University Committee on Research Involving Human Subjects (UCRIHS). Exemption from full review was granted June 4, 1993 (See Appendix C) based on the protection of the rights and welfare of human subjects afforded by the interview conditions described above.

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[10]Dr. Daniel Yakes, a local historian and instructor in the Social Sciences Department of Muskegon Community College, was very helpful in supplying information on local environmental groups. In addition, staff at the Hackley Public Library were a source of two referrals.

CHAPTER IV

DESCRIPTION AND HISTORY OF MUSKEGON COUNTY

A. Introduction

Muskegon County, on the eastern shore of Lake Michigan (see Appendix D for map), is a place of great natural beauty. The area abounds in lakes and beaches ideally suited for recreation. Until very recently, however, the economic emphasis of the area has been on industry. The port of Muskegon serves a number of large shipping firms which in turn supply cheap transportation of raw materials into the area and finished products out to other ports. These attributes made Muskegon a prime location for the lumber industry in the late 1800's and for the industries that followed when the timber ran out. Manufacturing expanded in the years after World War II and remains the chief source of employment for the residents of the area. In recent years, however, Muskegon has seen a decline of industry and the accompanying economic base which it provided. A number of factors have been contributory including the recessions of the 1970's and the availability of cheaper labor in other regions of the country. In addition, the environmental legislation prohibiting disposal of hazardous wastes in unsuitable locations has had a major impact on the area.

The soil of Muskegon County is sandy and porous. These conditions which are so beneficial to the method of land disposal of municipal waste water used there make

hazardous wastes particularly dangerous. There are more than 58 sites of hazardous waste disposal recognized by the state of Michigan and the Environmental Protection Agency within the county lines. Seven of these sites are of sufficient magnitude to qualify for inclusion in the National Priorities List (NPL) for Remedial Action under the Superfund Amendments and Reauthorization Act of 1987 (SARA). The contamination is of particular severity due to the virtually unhampered movement of the contaminants through the porous soil thus endangering the groundwater supplies as well as the natural lakeshore habitat. As a result Muskegon finds itself in the position of balancing the benefits of economic growth with the long term cost to the environment. (WMRSDC, 1987.)

B. Early History of Muskegon County 1700-1950

The history of European settlers in Muskegon County begins in the 1700's when trappers were drawn to the area by the abundance of wildlife and the natural port afforded by the Muskegon River and Lake. The first settlement was established on the Southern shore of Muskegon Lake where fish were so abundant they could easily be caught by hand. The native Ottawa Indians were amazed that the Europeans maintained their residence in Muskegon year round since the huge swarms of mosquitoes which descended on the area led the natives to seek higher ground in the summer. The name "Muskegon" is derived from an Ottawa phrase meaning "low swampy ground".

The first lumber mill was established on Muskegon Lake in 1837 and was followed in rapid succession by five more. Several factors made Muskegon the natural capitol of the midwest lumber industry. Among these were the huge stands of pine along

the Muskegon River and the deep, fast moving Spring currents which allowed the movement of lumber to Muskegon Lake. The delta of the river provided a natural sorting area for the lumber which could then be shipped out of the port to feed the growing western markets at Chicago and beyond (Beukema, 1952). In 1887 it was predicted that cutting could continue at its current rate for another one hundred years. A board of trade publication in 1884 stated:

> "The timber prophet of today who lives long enough to see the lumber supply exhausted in Muskegon Valley will be so wrinkled that he can wrap himself up in a linen rag and be labeled a well-preserved specimen of Egyptian mummy without danger of detection.
>
> (The Muskegon Chronicle, 1952)

By 1890, however, only three years later it was apparent that the boom in the lumber business was waning. The supply of lumber was exhausted. In addition, construction came to a halt nationwide in response to a downturn in the economy. In 1893 a fire destroyed much of the business district in the county seat, the city of Muskegon. The demise of Muskegon was predicted in the wake of these twin disasters.

The years surrounding the turn of the century were characterized by repeated attempts to attract diversified manufacturing into the area. The Muskegon Improvement Company was organized to provide the necessary funds to attract business and proceeds from the sale of 1000 subdivided acres were used as seed money for a "bonus fund," (Beukema, 1952). Monies from this fund were used to build factories and to provide incentives to industries interested in locating in Muskegon. These efforts, with additional

support from municipal bonds, were spurred on by the demand for goods during World War I.

In 1928 Muskegon's second natural resource, oil, was discovered in the Traverse horizon[11] at a depth of 1600 to 1800 feet. An influx of wildcatters followed and at least 470 town lot wells were drilled. Unfortunately, the rapidity of the drilling released the natural gas which provided sufficient rock pressure to recover the oil in large quantities. Recovery in barrels per year reached a peak of 3,157,668 in 1929 and declined rapidly thereafter (Beukema, 1952).

The period from 1930 to the beginning of World War II was an era of slow growth for Muskegon. County Commissioners authorized the improvement of the Muskegon Channel to provide a deep water channel for large vessels and Muskegon became known as the "gateway to the west" (Beukema, 1952). Unfortunately, however, many of the firms attracted to the area in the earlier days of expansion floundered in the Depression.

The advent of World War II was a mixed blessing for the residents of Muskegon County. Industries such as Continental Motors, who had virtually ceased production of private automobiles at its Muskegon site, geared up to produce the massive amounts of goods need to support the war effort. The "Gateway to the West" nee "Lumber Queen," now acquired the name "Arsenal of Democracy," (Beukema, 1952). The existing

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[11] The traverse Horizon constitutes an important oil producing horizon of the Michigan Basin. The horizon was probably formed in the mid-Devonian periods of the Paleozic geological age and corresponds to the oil sands found in Pennsylvania. Limestone within this formation serves as a reservoir of oil and gas (Ver Wiebe, 1930).

infrastructure of housing and other facilities rapidly expanded providing additional jobs secondary to the military complex.

C. The Beginnings of a Chemical Empire

The era of peace which followed World War II left Muskegon again in need of a foundation for its manufacturing base. A local resident with personal ties to Hooker Chemical invited company officials to investigate the brine deposits underneath Western Michigan. Hooker considered a number of sites on the lakeshore and finally chose to locate in the city of Montague which is the northern half of Muskegon County.

> Our greatest industrial accession of the '50's is the new $10,000,000 Hooker Electro-Chemical plant at Montague for the manufacture of chlorine, caustics, and hydrogen. While not located at Muskegon proper, it lies within the local area and promises to develop a great chemical industry here through the utilization of one of our major underdeveloped natural resources, the salt beds that underlie most of the county - thus fulfilling a dream of the 1870's and 1880's.
>
> (Beukema, 1952)

A near miss at fulfillment of this dream occurred between 1867 and 1881 when a 2,100 foot well was drilled striking the Dundee formation which underlies much of West Michigan. The brine produced at this depth is too heavily impregnated with magnesium and calcium chloride to be of commercial value and drilling efforts were abandoned (Beukema, 1952). Had drilling continued to the depth of the Salina formation, Muskegon might have attracted early chemical companies such as Dow.

In 1951, when Hooker Electro-Chemical expressed interest in locating in the Muskegon area the city fathers saw the opportunity to create a chemical empire on the

foundation of the saline deposits. Manufacturing companies which gravitate to the source of chemicals such as chlorine, caustics, and hydrogen were seen as additional sources of employment and tax revenues (The Muskegon Chronicle, 1952). An editorial dated April 11, 1951 stated;

> The new industry will in no way make Greater Muskegon a less desirable place to live. It will bring no undesirable odors, smoke, or other nuisances, the Chamber (of Commerce) officials assure. They point to the operations of the Dow Chemical Company in Midland and in other cities as proof that the modern chemical plants are among the most desirable a community could possibly obtain.
>
> (The Muskegon Chronicle, 4/11/1951)

Initially, Hooker sought to acquire a site immediately adjacent to the channel which joins Muskegon Lake to Lake Michigan. Opposition from local landowners in the Edgewater area forced the Muskegon City Commission to refuse to sell the property. After reviewing alternative sites Hooker decided on the Dowie Property on White Lake in northern Muskegon County. Executive vice-president Bjarne Klaussen declared;

> The Hooker plant will be one of the outstanding chemical plants in the country and its design will fit in with the natural beauty of the White Lake area.
>
> (The Muskegon Chronicle, 11/29/51)

Announcement of this decision was followed by legal action by area landowners to block construction on the White Lake site. Residents claimed that Hooker posed a threat to their health and happiness and asked for temporary injunctive relief. A sixteen page document filed by the plaintiffs stated that accidents and leaks at other Hooker sites

resulted in the release of chlorine gas into adjacent neighborhoods. Hooker officials, while acknowledging these events, stated that such accidents could not occur at the White Lake site (The Muskegon Chronicle, 8/27/51).

Muskegon Chronicle editorials written later in 1951 stated that it was "a serious mistake to try to ...discredit the new industry by citing records of the accidents elsewhere that may have little or nothing to do with the operations of a plant such as planned," (The Muskegon Chronicle, 12/1/51). The writer goes on to say that the Hooker Company was the biggest and most important industrial prospect in the Muskegon area in the previous thirty or more years. Compromise was reached in early 1952 and construction on the $10,000,000 plant proceeded without further challenge (The Muskegon Chronicle, 1/22/52).

In 1955 The Chronicle covered a fire at the Hooker facility which resulted in the escape of chlorine gas. Along with statements from local fire fighters and the county health officials the reactions of a fifteen year old schoolgirl were reported. She stated, "It (the chlorine gas) made my throat tickle. But it wasn't too bad," (The Muskegon Chronicle, 5/23/55). Editorials which followed in The Chronicle lauded the quick response of local and industry safety workers and decried the "exaggeration" of alarm experienced by many local residents (The Muskegon Chronicle, 5/25/55).

In 1954 E. I. DuPont De Nemours announced plans to build a $15,000,000 neoprene synthetic rubber plant in Montague near the banks of the White River. The ready availability of hydrogen chloride produced by the nearby Hooker plant was cited as a determining factor by DuPont officials (The Muskegon Chronicle, 10/28/54). Several other plants followed the DuPont lead including Ott Chemical Company which

located in North Muskegon. Egelston Township located in Eastern Muskegon County was chosen by both Lakeway Chemicals Inc and Thermo-Chem/Thomas Solvents as well as other small chemical firms which have not experienced the degree of contamination necessary for inclusion on the National Priorities List.

Beginning in 1957 the Ott facility produced various organic chemicals which required the use of phosgene as a raw material. Wastewater on-site was disposed of in seepage lagoons or waste ponds. As a result, contaminants migrated through seepage into the water table aquifer and became part of the groundwater flow in the area. The site is located in Dalton Township, approximately five miles north of the City of Muskegon. The area is predominately residential although several small business are located to the south and to the west of the site. About one mile east of the site, Little Bear Creek and an unnamed tributary of the creek flow southward onto Bear Creek which empties into Bear Lake. Bear Lake flows into Muskegon Lake which in turn flows into Lake Michigan (Klepper, 1981).

Problems began to arise in 1964 when the Ott Company received a permit from the Michigan Department of Natural Resources to discharge effluent from on-site groundwater purge wells into Little Bear Creek. Fortunately for the groundwater supply the plume of contamination was stopped at Little Bear Creek which served as an effective discharge system. Unfortunately, however, all recreational fishing in the creek was destroyed.

In 1967 complaints from area residents of foul smells and damage to aquatic wildlife prompted Ott to temporarily divert the discharge to the middle branch of the Muskegon River. Ultimately, in 1974, the purge system was abandoned, allowing

contaminants to accumulate in the underlying aquifer. In 1972, the Story Company purchased the property and announced plans to produce isocyanate following a $2,000,000 expansion of the facilities (The Muskegon Chronicle, 2/3/75).

In 1975 The Michigan Department of Health (MDH) and the MDNR conducted tests of residential wells which revealed a number of organic contaminants. In July of 1976, Story declared bankruptcy, although the firm continued to operate on a limited basis. In 1977, a class action suit was filed by area residents against the Ott/Story company and its parent companies seeking relief in the form of a replacement system for contaminated residential wells. Story claimed and was granted innocent landowner exemption from the suit.

In 1977 the facility was abandoned when Story went bankrupt. Potential purchasers of the property were discouraged by the liability attached to the property. In August of 1977 it was discovered that numerous tanks of highly toxic liquid phosgene gas were stored on site. This situation was regarded as particularly hazardous since the site was essentially abandoned and open to vandalism. State agencies stepped in to provide the necessary technical and security assistance. The immediate problems were solved by an agreement between the DNR and the new purchaser, Cordova Chemical Company, which stated that Cordova would not be held liable for problems caused by previous owners. In return, Cordova agreed to dispose of the phosgene gas and to contribute $600,000 toward a cleanup of the site. Through this agreement, area residents were connected to the Muskegon municipal water supply. The agreed upon surface cleanup was completed in 1978 (Klepper, 1981). However, remediation measures

continued to dispose of the contaminated sludge and soil still present at the site (The Muskegon Chronicle, 02/29/93).

Lakeway Chemicals began the manufacture of dichlorobenzidine in 1961 and in 1962 began to produce a similar compound, benzidine. These compounds are used in the production of yellow paints and dyes and were recognized in 1965 by the United States Public Health Service as cancer-causing compounds (The Muskegon Chronicle, 12/6/92). In response to these health advisories the Upjohn Company, the only other domestic producer, informed Lakeway officials it would no longer be producing benzidine. Lakeway officials, however, chose to continue production despite knowledge of the oncogenic effects of benzidine.

Bofor's-Nobel Inc. owned the site from 1981 to 1987 when they declared bankruptcy. Lomac, Inc. purchased the site under an "Agreement and Covenant not to Sue."[12] Currently, chemicals are produced in the plant area which is separated from the lagoon area by a fence. Although the site carries the Bofors name it has not been determined if in fact Bofors is the liable party or if the contamination stems from earlier manufacturing practices. A number of unlined lagoons and settling ponds used for wastewater and sludge disposal have been identified as the primary source of contamination. Also, in 1975, the dikes around the lagoons failed and an estimated two million gallons of waste water spilled into Big Black Creek. Contaminants have been identified in the soil near the lagoons, the underlying groundwater and in sediments of Big Black Creek which borders the site to the South. Potential routes of exposure

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[12]Under such an agreement, a current owner of a hazardous waste site is not held liable for contamination which occured prior to transfer of ownership. Any subsequent releases are the responsibility of the current and any future owners.

include air, soil, surface water, and groundwater. Contaminants include; aniline, benzene, oryzalin, dinitrochlorobenzene, benzidine, dichlorobenzidine, and tetrachloroethylene. Purge wells currently operating on site prevent further contamination of underlying surface and groundwater (ATSDR, 1990).

Occupational exposures to chemicals were a significant hazard to both workers and their families. Studies of workers homes have revealed considerable off-site contamination. At least eight cases of bladder cancer have been confirmed in former workers and one case is suspected in an off site resident (ATSDR, 1990).

In December of 1992 The Muskegon Chronicle published the results of an extensive investigation into the working conditions at Lakeway during the years of benzidine production. State records indicate that a number of problems were endemic at the site including poor plant design, insufficient safety measures for worker protection and little or no safeguards for prevention of releases into the environment. In 1973 Lakeway was forced to discontinue production by increasing regulatory pressure. On-site contamination, however, remains extensive and dichlorbenzidine has been identified as far as half a mile away from the site (The Muskegon Chronicle, 12/6/92)

Hooker Chemicals problems began in 1976 when local residents complained of a chlorine like odor coming from the site. In December of that year the MDNR accused Hooker of violating its wastewater permit by allowing asbestos fibers, chlorinated hydrocarbons, chlorine and brine into White Lake. Hooker was given nine months to clean up its effluents. Samples of White Lake fish showed excessive amounts of chlorinated hydrocarbons and local residents were given a tentative warning about over consumption of fish. The MDNR later backed away from these fish advisories stating

that tests had erroneously reported high levels of contaminants (The Muskegon Chronicle, 7/7/76, 7/15/76).

Hooker's problems intensified in the Summer of 1977 when an ex-employee accused the firm of dumping C-56 and other toxic wastes on-site. C-56 is a extremely toxic compound used in the manufacture of pesticides and plastics. Once considered by the Army for gas warfare it was rejected as too toxic for this use. On August 19, 1977 Hooker spokesmen released a statement admitting to burying wastes prior to 1972 but stated that only inert waste material had been landfilled on site from 1972 to 1976 (The Muskegon Chronicle, 8/19/77). The MDNR did not investigate the dump site for eight months following these statements. Andrew Hogarth, then chief of the DNR's groundwater compliance section stated when asked about the delay;

> We asked Hooker about it, and they said there were a few barrels up there. We've got a limited staff. If we didn't have so many other projects going, like Story and Lakeway, we could've gone up there earlier.
>
> (The Muskegon Chronicle, 4/14/78)

The prepared statement issued following the delayed site inspection stated:

> An inspection of the site revealed thousands of rusted, exposed and fly-ash covered barrels containing C-56 distillation and residue, which company information confirms had been routinely discarded there between 1957 and 1972.
>
> (The Muskegon Chronicle, 4/14/78)

In October of 1978 Hooker submitted a disposal plan which focused on burial of waste in a pit capped with soil, clay and a synthetic liner. This proposal was deemed unacceptable by the MDNR and Hooker was warned that legal action would ensue if state cleanup regulations were not followed. The MDNR proposed a plan which included incineration of wastes where appropriate and a clay walled vault for those wastes which must be buried (The Muskegon Chronicle, 10/27/78).

On October 30, 1979 a settlement was reached between Hooker Chemical, Michigan's Attorney General, the Department of Natural Resources, and the Michigan Natural Resources Commission. The judgment required Hooker to implement a plan to contain certain hazardous wastes upon the Hooker Montague site. The plan was to include purging and treatment of contaminated groundwater beneath and adjacent to the premises, and removal and disposal of solid and liquid wastes improperly disposed of on-site. Solid waste containment was to consist of placement into containment vaults constructed with ten foot clay liners. While much of the excavated material was in fact disposed of in this fashion, subsequent to closure of the vault more contaminated soil was discovered adjacent to the site. In addition to the outlined disposal plan, Hooker was required to pay $1 million to the state for costs incurred in the preparation of the case and to finance the 20 year monitoring of the site by the DNR. An additional $2 million was to be deposited in a "perpetual care" fund to be used in the event that Hooker went bankrupt or failed to perform the cleanup. The settlement stipulated that Hooker monitor the clay vault for 50 years to ensure that the contamination did not recur (The Muskegon Chronicle, 10/23/79).

Hooker was further required to provide evidence of marketable title to the areas containing the vault as well as a 300 foot buffer zone. The following restrictions were to be placed on the land, to run with the land through chain of title:

1. No vehicles except those needed to maintain the area.

2. No excavation or construction except to maintain the integrity of the vault or to construct further vaults as needed.

3. No uses which would impair the integrity of the vault.

4. Hooker and its successors in interest were required to erect and maintain barriers to access to the property which indicate the toxic nature of the contamination.

5. No conveyance of title, easement or other interest of the site without express consent of the Attorney General of Michigan.

6. Hooker was required to provide surety of continued monitoring and maintenance of the property in the amount of two million dollars to be used in the instance that Hooker fails to do so.

(MDNR, 1979)

D. Regulatory Authority for Cleanup of Contaminated Sites

The majority of the contamination sites in Muskegon County were slated for action under Michigan Sites of Environmental Contamination List Act 307 enacted in 1982. As stated the purpose of the act was "to provide for the identification, risk assessment, and priority evaluation of environmental contamination at certain sites in this state: to provide for response activity: to prescribe certain powers and duties of the

governor: to provide for the promulgation of rules: to create an environmental response fund." Act 307 requires the governor or his designee to:

1. Develop a numerical system whereby the relative and potential hazard posed to the public health, safety, welfare, and to the environment may be assessed for each site.

2. Submit the risk assessment model for review at public hearings.

3. Annually identify and evaluate known sites of environmental contamination within the state.

4. Submit to the state legislature two lists in November of each year: the first list is to contain in rank order the sites which require evaluation and interim response activity. The second list identifies sites which are recommended for final response actions.

5. Submit both lists to review in public hearings.

6. Recommend a level of funding to the State Legislature.

Not all the sites listed for evaluation and interim response are recommended for funding. In addition, funding is based upon such considerations as the availability of Superfund Money, Act 307 funding, voluntary action by responsible parties, the likelihood of legal action against responsible parties, and the immediate danger to human health.

Michigan's Act 307 and the federal Superfund legislation are similar in that they both provide for a numerical model which allows for prioritization of contamination sites for remedial action. In both cases the numerical ranking system provides the means to

allocate limited funding. Act 307 provides the state with the resources to take action at sites which are not eligible for federal money or which do not rank high enough for inclusion on the National Priorities List.

The ranking system employed by the state differs in two basic ways from that used by the federal government. First, the state system evaluates the site as to its condition at the time of publication, the federal system evaluates the site as to its condition at its worst. Second, the state evaluation puts more emphasis on the imminent danger to human health. These differences may result in a ranking which is substantially different for each list.

There are seven sites in Muskegon County which are slated for remedial action under the Superfund Amendments and Reauthorization Act of 1987 (SARA). The provisions of this legislation were originally authorized by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). The intended purpose of the legislation was to provide the necessary power, organization, and funding for the clean up of abandoned and inoperative waste sites. Superfund, as it is now known, established a trust fund under the administration of the U.S. Environmental Protection Agency (EPA) to help pay the enormous cost of cleanup. To be eligible for cleanup and funding the site had to be listed on the NPL. As of the passing of the act the EPA had reviewed 16,000 potential sites. In 1981 the EPA published a list of 115 sites which grew to 419 in 1983. Each year, as the number of eligible sites grew, the list was updated. By 1991 there were more than 1000 sites included or proposed for the NPL. Of this total, remedial investigation and feasibility studies have been conducted on approximately 300, while only 63 sites are actually being cleaned up. Another 400

sites have received emergency action and there are some which have received private action under EPA supervision. However, as of December 1990, 33,834 sites have been identified nation wide as potentially hazardous (Feder, 1991).

Title I of CERCLA defines the hazardous substances and releases which are to be regulated. It also authorizes the EPA to respond to control releases or to order responsible parties to do so according to a planned procedure. Also provided for is the assignation of financial responsibility for the clean up of such releases.

E. Current Status of Chemical Waste Sites

E I DuPont De Nemours - There at least three sites of environmental contamination at the DuPont facility; (1) a lime waste pit of 1 million tons which has resulted in groundwater contamination including arsenic, antimony, copper, thiocyanite, (2) a bury pit and dump area used for disposal of neoprene tars, latexes, copper chloride salts, potassium and ammonium latexes, potassium hydroxide, and inert plant refuse, and (3) areas involved in routine spills from railroad tank unloading involving trichloroethylene, carbon tetrachloride, perchloroethylene, and methyl chloroform. Dupont has entered into a consent agreement with the Michigan Department of Natural Resources and a Delaware firm to clean up the Montague site. In addition, residents of the area have been connected to a municipal water supply at the expense of DuPont. As of 1986 the company has installed a purge well system and agreed to maintain the groundwater remedial plan until testing reveals that the levels of the contamination in the water have reached background levels (MDNR,1986).

Hooker Chemical remains a contamination site despite construction of a massive pyramid filed with 1 million cubic yards of contaminated waste. Concern is now focused on the 80,000 cubic yards of C-56 contaminated soils Federal and State officials discovered after sealing the depository. With no place to put the soils the area was deemed a "no mans land." Purge wells installed under the Hooker site have not detected any further migration of C-56 or other contaminants, however MDNR officials are asking Federal officials to request a more complete investigation of the site (The Muskegon Chronicle, 12/16/92; MDNR, 1993).

Lakeway Chemicals/Bofors-Nobel, Inc. is located in Eagleston Township, approximately 6 miles east of the City of Muskegon. The site has undergone a number of name and ownerships changes and is currently owned by Lomac Inc.. The contaminated soils and sludges behind the Lomac facility have been described by EPA officials as a "real witches brew of various chemicals...extremely hazardous materials," (The Muskegon Chronicle, 12/6/92). The federal government will build a clay-lined pyramid-shaped landfill to contain the contaminated materials. In addition, it is estimated it could take up to 200 years to treat all of the 73 billion gallons of contaminated groundwater beneath the site, (The Muskegon Chronicle, 12/6/92; EPA, 1990).

Analysis of groundwater at the **Ott/Story/Cordova** site has identified the following contaminants which are considered to be tumorigenic and/or carcinogenic; vinyl chloride, 1,2-dichloroethane, chloroform, methyl chloride, and benzene. In addition, several other chemical have been identified whose carcinogenicity is undetermined such as toluene and several arylamines. All contaminants are considered to present a danger to area residents through air, soil, surface water, and groundwater

routes of exposure. Although residential water supplies are now connected to the Muskegon County Municipal supply, residents experienced several years of exposure (ATSDR, 1989; EPA, 1990).

The OSC site is listed on the National Priorities List for Superfund cleanup. In addition, it rated a score of 43 out of 48 under the Michigan Act 307 criteria for state action. The Agency for Toxic Substance and Disease Registry has completed a preliminary health assessment of former workers and area residents and is currently conducting a more detailed analysis in response to community requests (ATSDR, 1989).

In a recent court case in which Ott sought to limit its future liability, former workers expressed concern over dumping barrels of effluent behind the production facility. Workers stated they were told that the company had dumping permits and that the chemicals would vaporize harmlessly. In February of 1993 CPC International Inc., parent company of Story, and Aerojet General Corp. parent company of Cordova reached an agreement to provide $25 million in the form of an escrow account to fund remedial efforts on-site. Cleanup of contaminated groundwater is expected to begin in mid-1994 (The Muskegon Chronicle, 2/12/93).

Thermo-Chem / Thomas Solvents was a solvent recovery and incineration facility which operated from 1977 until 1980. Thomas solvents and other companies hauled solvents and/or materials containing hazardous substances to the site. Recovered solvents from Thermo-Chem's distillation process were resold through Thomas Solvent Company which is adjacent to the facility. The distillation process generated sludge residues which were incinerated. Wastewaters from the distillation process were discharged to two seepage lagoons. A clay-lined lagoon contained spills and

contaminated wastes. During operation the site contained up to 3,500 drums of waste solvents and a 20,000 gallon tank of waste contaminated with hexachlorobenzene, a pesticide intermediate which was involved in a spill on April 30, 1980.

Records indicate that Thermo-Chem handled a variety of aliphatic and aromatic hydrocarbons as well as many unidentified compounds. The on-site lagoons were of unknown integrity and underlain with sandy soils. The underlying groundwater may consist of or be hydraulically connected to the aquifer which serves the private wells in the area. The groundwater flows in a southerly direction to Black Creek which is tributary to Mona Lake. Groundwater samples taken from a well located near the warehouse on-site contained trichloroethane, methylene chloride, trichloroethene, perchloroethylene, and carbon tetrachloride. Soil gas surveys indicate the presence of toluene, trichloroethane, trichlorethylene, perchloroethylene. ethylbenzene, and xylenes (EPA feasibility study, 1985).

F. Economy of Muskegon County

The conditions described in the preceding sections depict a region which has experienced significant environmental contamination coupled with the potential for enormous costs of remediation. These costs are made more significant by the loss of the polluting industries themselves. The information provided by personal interviews with representatives of The Muskegon Chronicle and local environmentalists suggests that the local media is perceived as following a pro-growth agenda. A brief review of the economic conditions of the region is necessary to provide a backdrop for any communication efforts concerning those industries.

The West Michigan Shoreline Regional Development Commission (WMSRDC) is responsible for the design, planning, and monitoring of economic development of Oceana, Ottawa and Muskegon Counties. The reports and decisions from this office are made with the advice and consent of the Muskegon County Health Department and the County Planning Commission. The issue of the economic impacts of hazardous waste sites as well as the public perception of the problem has been an area of great interest to the WMSRDC since 1980 (Koches, 1988). Representatives of that office feel that answers to these inquiries would enable them to make decisions in keeping with the prevailing public opinion while fostering the needed economic growth.

Muskegon county's adjusted population estimate[13] for 1990 was 158,983 which represents a increase of 1.0 percent from the 1980 census. This increase is minor when compared to the surrounding counties where population is experiencing a faster rate of growth (Table 4.1). The WMSRDC has postulated that the slow rate of population growth is due in part to an out migration of population in search of employment opportunities elsewhere.

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[13]As of June 30, 1991, The U.S. Department of Commerce announced that 1990 census figures would be adjusted to account for misrepresentation of some groups such as the homeless.

Table 4.1: Population for Region 14 and Counties, Michigan and the United States, 1970, 1980 and 1988 Estimates

				Change			
Area	1970	1980	1990	1970 # to 1980	%	1980 # to 1990	%
Muskegon County	157,426	157,589	158,983	163	0.1	1,394	1.0
Oceana County	17,984	22,002	22,454	4,018	22.3	452	2.05
Ottawa County	128,181	157,174	187,768	28,993	22.6	30,594	19.47
Region 14	303,591	336,765	369,205	33,174	10.9	32,440	9.63
Michigan	8,881,826	9,262,078	9,295,297	380,252	4.3	33,219	.36
United States	203,235,298	226,545,805	249,632,692	23,310,507	11.5	23,086,887	10.19

Source: U.S. Department of Commerce, Bureau of Census.

Figure 4.1. depicts the estimated annual average civilian labor force for region 14 counties, Michigan and the United States. The trend for Muskegon which is portrayed in these figures is one of declining employment while surrounding counties are experiencing some growth. While the percent of change in unemployment is relatively low, unemployment in Muskegon County has remained consistently high. Table 4.3 presents a graphic depiction of unemployment rates in region 14 counties, Michigan and the United States. While overall unemployment has declined since a high in 1982, the rate for Muskegon remains higher than that of both state and national levels.

Table 4.2: Estimated Annual Average Civilian Labor Force, Employment, and Unemployment for Region 14 and Counties, Michigan and the United States, for Selected Years 1979-1989. (By Place of Residence)

							Percent Change	
	1979	1982	1985	1988	1989	1990	1979-1989	1989-1990
Civilian Labor Force (x 1000)								
Ottawa County	75.6	84.9	87.7	95.4	98.4	101.1	30.2	2.74
Muskegon County	68.6	70.2	69.3	68.6	68.6	68.0	0.0	-.87
Oceana County	9.2	9.8	9.6	10.3	10.5	11.3	14.1	7.61
Region 14	153.5	164.5	166.6	174.3	177.5	180.4	15.6	1.63
State of Michigan	4,320	4,296	4,352	4,580	4,666	4,578	8.0	-1.88
United States	102,910	110,204	115,461	121,669	123,869	124,787	20.4	.74
Employment (x 1000)								
Ottawa County	72.1	76.1	80.7	90.9	93.5	95.2	29.7	1.81
Muskegon County	62.7	57.9	60.6	62.6	62.4	61.6	-0.5	-1.28
Oceana County	8.3	8.1	8.0	9.1	9.4	10.1	13.3	7.44

	1979	1982	1985	1988	1989	1990	Percent Change 1979-1989	Percent Change 1989-1990
Region 14	143.1	142.1	149.3	162.6	165.3	166.9	15.5	.96
State of Michigan	3,989	3,632	3,920	4,232	4,333	4233	8.6	-2.30
United States	96,946	99,526	107,150	114,968	117,342	117,914	21.0	.48
Unemployment (x 1000)								
Ottawa County	3.5	8.8	7.0	4.5	4.9	6.0	40.0	22.4
Muskegon County	5.9	12.2	8.7	6.1	6.1	6.4	3.4	4.91
Oceana County	.9	1.8	1.6	1.2	1.1	1.2	22.2	9.09
Region 14	10.3	22.7	17.3	11.8	12.1	13.6	17.5	12.39
State of Michigan	336	664	43	348	330	344	-1.8	4.24
United States	5,863	10,678	8,312	6,701	6,528	6,874	11.3	5.30
Unemployment Rate (percent)								
Ottawa County	4.7	10.4	8.0	4.7	5.0	5.9	0.3	0.18
Muskegon County	8.6	17.4	12.5	8.8	8.9	9.4	0.3	5.61
Oceana County	9.8	16.9	16.8	11.6	10.7	10.5	0.9	-1.86
Region 14	6.7	13.8	10.4	6.8	6.8	7.5	0.1	10.29
State of Michigan	7.8	15.5	9.9	7.6	7.1	7.5	-0.7	5.63
United States	5.8	9.7	7.2	5.5	5.3	5.5	-0.5	3.77

Source: Michigan Employment Security Commission.

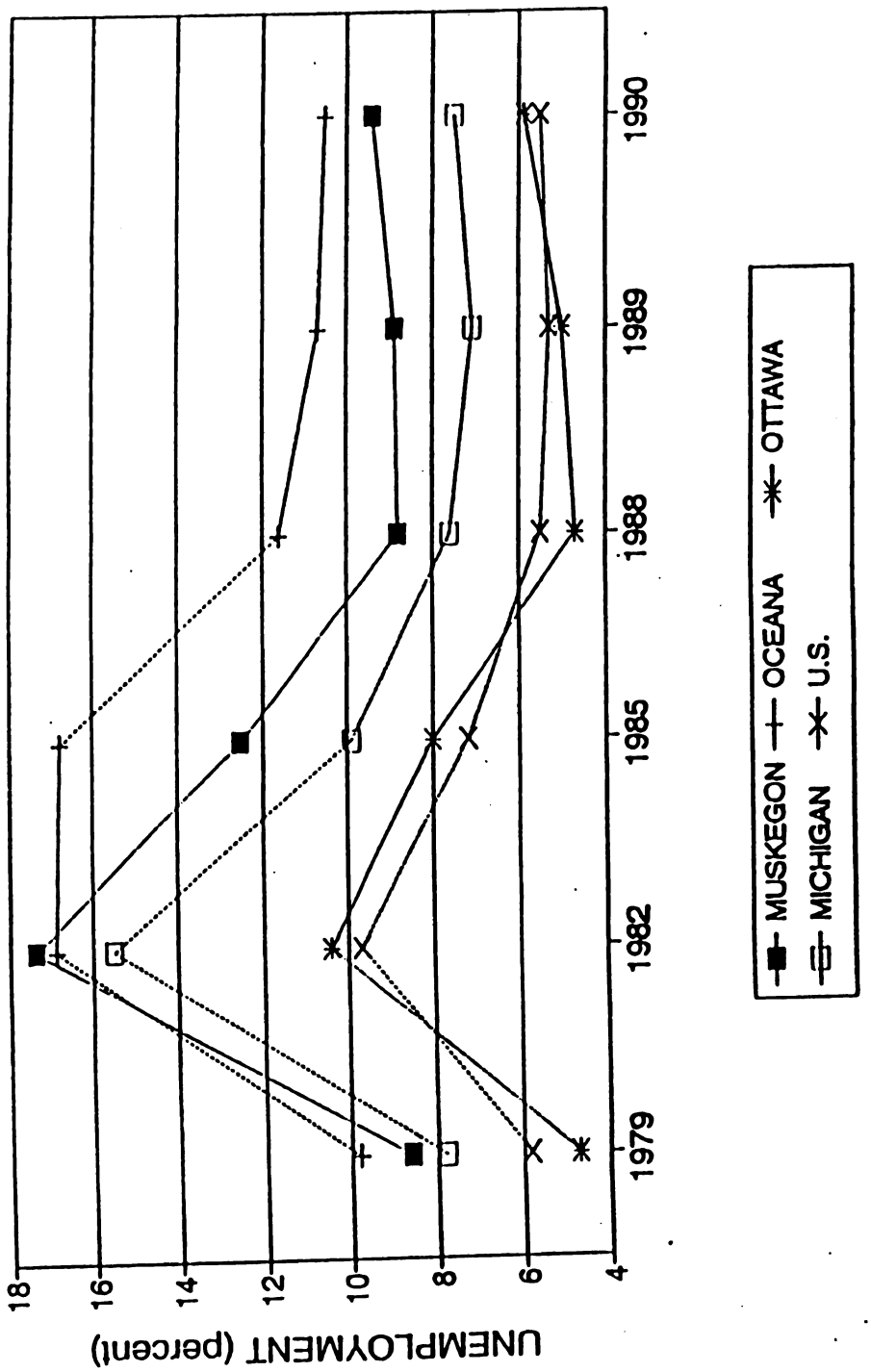


Figure 4.1: Unemployment Rate, 1979-1990 for Region 14 Counties, Michigan and United States. (WMRSDC, 1991).

CHAPTER V

CONTENT ANALYSIS RESULTS

A. Overall Distribution of Quotes by Year

Figure 5.1 depicts the total number of quotes which appeared in archive articles per year. Years in which no articles appeared in The Muskegon Chronicle about the chemical industry have been omitted. Lack of identifiable articles may be attributable to a number of factors including the omission of an article from the newspaper morgue files, competing stories which pushed chemical industry news to pages other than A1, or simply the lack of reportable stories. The newspaper coverage of these sites remains consistently low from 1951 to 1975. Coverage increases sharply in 1976 and rises to the highest level in 1979. This corresponds to the time period in which the Hooker barrels were discovered, the Ott problems arose, and the link between bladder cancer and benzidine at Bofors/Lakeway was made public. Coverage declines sharply in 1983 and 1984 and remains moderate for the remainder of the study period.

B. Relationship Between Source and Risk Approach

The most interesting and important data derived from this analysis is the relationship between the source and the risk variables. This relationship may be addressed in two ways. First, the question may be asked, *What does each source say*

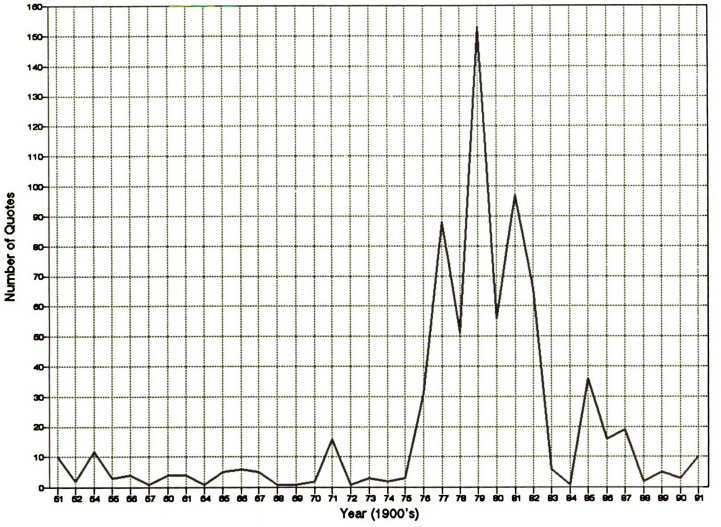
about risk? Secondly, *Where does each risk statement come from?* (Sandman, 1987). The answer to the first question may be found by examining the types of risk statements attributable to a particular source. For example, the question may be asked "If a state official is quoted as the source of information what percentage of the time is the presence of a risky substance likely to be confirmed?" Similarly, a particular risk message may be examined to determine its possible sources. For example, "If a message affirms the presence of a risky substance what percentage of those messages is attributable to federal government officials."

1. Distribution of Source Variable

Table 5.1 shows the overall distribution of sources of quotes contained in the articles examined. There is a heavy reliance on government agencies as the primary source for risk information. Government sources are cited in 49.5% of all quotes. State Government sources account for 34.6% of quotes. Federal and Local sources are referenced 4.4% and 10.5% respectively.

Industry is the most likely non-government source to be quoted, 25.2%. Private citizens, workers and unions, and advocacy groups received only moderate coverage (8.1%, 3.6%, and 1.7% respectively). It is interesting to note that experts were cited only 4.7% of the time since uninvolved experts could be considered an unbiased source of technical and environmental information (Sandman, 1987).

Figure 5.1 Quotes by Year



A chi-squared one-sample test was used to determine whether a significant difference exists between the observed frequencies in Table 5.1 and the expected frequencies which might be attributable to chance. The calculated chi square statistic of 973.89 is greater than the critical value of 29.59 (degrees of freedom = 10, $p < 0.001$). If the calculate chi square (x^2) statistic exceeds the critical value of x^2 it can be concluded that the observed frequencies are not attributable to chance.

2. Source of Quotes by Year

Figure 5.2 depicts the source of quotes by year. Longitudinal analysis of the data yields answers to two questions; (1) Did Muskegon Chronicle staff writers rely on any one particular source over the time span of the study and (2) Were there any changes in the pattern of sources used over the time span of the study? For purposes of this graph, composite source categories were used. *Government* includes Federal, State, and Local/County sources. Use of government sources peaks sharply beginning in 1976 and coincided with sharp increase in coverage shown in Figure 5.1. *Individuals and Groups* is a composite category consisting of Workers & Unions, Advocacy/Environmental/ Citizens Groups, Citizens/By-Standers/Individuals, and Experts. These sources receive only modest attention from the press throughout the study period. The exception is in 1979 when several articles appeared concerning statements made by an MSU expert that levels of contamination of White Lake fish were excessively high and dangerous.

Table 5.1: Overall Distribution of Sources.

Source	Number of Quotes that Mention Source	Percent of All Quotes
Federal Government	32	4.4
State Government	251	34.6
Local Government	76	10.5
Industry	183	25.2
Workers and Unions	26	3.6
Advocacy Groups	12	1.7
Citizens	59	8.1
Experts	34	4.7
Unattributed	0	0
Mixed	0	0
Other	2	0.3

Total number of quotes = 675

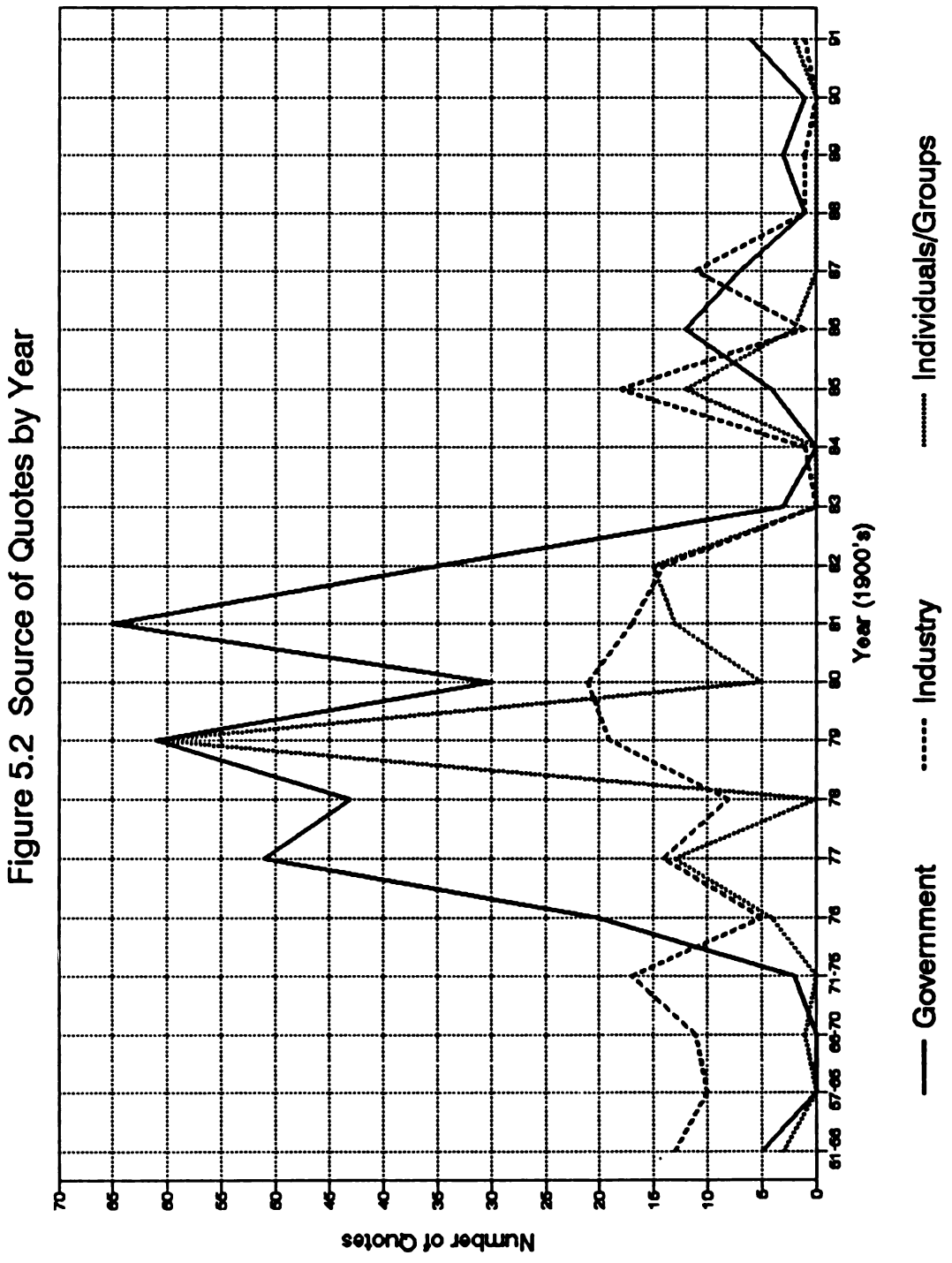


Figure 5.2 Source of Quotes by Year
Number of Quotes
Year (1900's)
Government
Industry
Individuals/Groups

Industry, by contrast to the amount of coverage received by individuals and environmental groups, is employed consistently by The Muskegon Chronicle as a primary source throughout the study period. The exception is in the latter years of 1986-1991 However, very little coverage was afforded the sites under study during these years.

3. Relationship of Source to Each Risk Approach

The percentage of each type of risk statement attributable to each source is represented in Table 5.2. Each horizontal row sums to 100%. The statement, "Federal Government made statements confirming the presence of a risky substance 40.6% of the time" means that of all quotes attributed to the Federal Government, 40.6% of them say that the risky substance was present. The following discussion will be on a source-by-source basis.

Federal Government. While representing an overall low rate of citation (4.4%) the Federal Government is most likely to affirm risk (6.3%) and the presence of a risky substance (40.6%). Statements denying the risk imposed account for 6.3% of all quotes attributed to the Federal Government and mixed opinions account for 15.7% (mixed opinion if risky, 6.3%; mixed opinion if present, 9.4%). No quotes containing the message of "risk present, but under control" were attributed to the Federal government. When cited on risk, Federal sources are therefore more likely to affirm the nature and presence of a risk than to deny it. This result is probably related to the inclusion of these sites on the National Priorities List in that substantial contamination and risk are components of the criterion for Federal intervention. (Chi square value = 45.0 > critical value of 24.32, df = 7, $p < 0.001$.)

Table 5.2: Frequency and Percentage of Quotes of Each Source to Each Risk Approach (rows sum to 100%)

Source	Risk (%)	No Risk (%)	Mixed Opinion about Risk (%)	Risky Substance Present (%)	Risky Substance Not Present (%)	Mixed Opinion about Present (%)	Risk Present But Under Control (%)	No Risk Info. (%)
Federal Government	2 (6.3)	1 (3.0)	2 (6.3)	13 (40.6)	0 (0)	3 (9.4)	3 (0)	11 (34.4)
State Government	27 (10.8)	4 (1.6)	11 (4.4)	54 (21.5)	5 (2.0)	10 (4.0)	26 (10.3)	114 (45.4)
Local Government	6 (8.0)	2 (2.6)	5 (6.6)	8 (10.5)	2 (2.6)	0 (0)	2 (2.6)	51 (67.1)
Industry	1 (0.5)	15 (8.3)	2 (1.1)	5 (2.7)	6 (3.3)	2 (1.1)	44 (24.0)	108 (59.0)
Workers and Unions	5 (19.2)	0 (0)	4 (15.3)	7 (27.0)	0 (0)	0 (0)	0 (0)	10 (38.5)
Advocacy Groups	1 (8.3)	0 (0)	2 (16.7)	1 (8.3)	0 (0)	0 (0)	0 (0)	8 (66.7)
Citizens	13 (22.0)	1 (1.7)	2 (3.4)	13 (22.0)	0 (0)	0 (0)	0 (0)	30 (50.9)
Experts	6 (17.6)	3 (8.8)	10 (29.4)	2 (5.9)	2 (5.9)	4 (11.8)	0 (0)	7 (20.6)
Unattributed	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Mixed	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Other	1 (50.0)	0 (0)	0 (0)	1 (50.0)	0 (0)	0 (0)	0 (0)	0 (0)

( ) Percentage of quotes attributable to source/risk.

State Government. State officials are twice as likely to be cited on claiming the presence of risky substances (21.5%) as on the risk of the substance (10.8%). State sources are less likely to deny risk (1.6%) and the presence of risk (2.0%). However, unlike Federal sources, State officials are cited as making "Under control" statements (10.3%) roughly equivalent to the overall average for this risk category (10.7%).

Relative to the overall average, State officials more slightly are likely to affirm risk and the presence of risk and slightly less likely to deny risk and the presence of a risky substance (chi square equal to 309.3 > critical value of 24.32, degrees of freedom = 7, $p < 0.001$).

Local Government. The percentages of quotes per risk category attributable to local officials are very close to the average overall. Local officials are slightly less likely to claim risk (8.0%) and the presence of risk (10.55). However, the overwhelming majority of quotes attributable to local sources do not contain any risk information (67.1%). These quotes deal primarily with the impact of remediation efforts on employment and other economic issues (chi square = 212.2 > critical value of 24.32, degrees of freedom = 7, $p < 0.001$).

Industry. Industry is less likely to be quoted on risk than any other source. When Industry is quoted on risk it is much more likely to deny risk (8.35) than to affirm it (0.5%) and more likely to deny the presence of a risky substance (3.3%) than to affirm presence (2.7%). The percentage of Industry quotes which deny risk and presence of risk are higher than the average of all sources and affirmation of risk or the presence of risk is much lower.

The majority of quotes attributable to Industry do not contain risk information (59.0%). However, Industry is more likely than any other source to acknowledge the presence of a risk while assuring that the risk is under control (24.0%). The high percentage of risk denial and risk under control statements is especially interesting in light of the number of quotes in the archive which are attributable to that source. Industry ranks second only to State sources, contributing 27.1% of all quotes (chi square equal to 424.4 > critical value of 24.32, df = 7, $p < 0.001$).

Workers and Unions. Quotes attributable to workers and unions tend to affirm the presence of risk (19.2%) and the presence of a risky substance (27.0%). No quotes denying risk or the presence of risk are attributed to this source. A high percentage of Workers and Union quotes (38.5%) contain no risk information (chi square equal to 32.5 > critical value of 24.32, df = 7, $p < 0.001$).

Advocacy Groups. Quotes attributable to Advocacy Groups also affirm the presence of risk (8.3%) and the presence of a risky substance (8.3%). The number of quotes attributed to the mixed opinion if risky category (16.7%) is much higher than the overall average of 5.6%. No quotes denying risk or the presence of risk are attributed to this source. The percentage of quotes containing no risk information (66.7%) is higher than the overall average (50.2%) (chi square equal to 34.7 > critical value of 24.32, df = 7, $p < 0.001$).

Citizens. Individuals cited as sources are more likely to affirm risk (22.0%) and the presence of risk (22.0%) than to deny risk (1.7%) or the presence of risk (0.0%). The percentage of quotes containing no risk information (50.9%) is equivalent to the

overall average (chi square equal to 109.5 > critical value of 24.32, df = 7, p < 0.001).

Experts. Outside experts are much more likely than any other group to present a mixed opinion of risk (29.4%). They are more likely to affirm a risk (17.6%) than to deny it (8.8%). But equally likely to affirm the presence of a risky substance (5.9%) as to deny it (5.9%) (chi square equal to 17.3 . critical value of 16.62, df = 7, p = 0.02).

Unattributed and Mixed Attribution. No quotes fell into either of these source categories.

Other. Only two quotes fell into this category, one affirming risk and one affirming the presence of risk. Both these quotes were taken from a Circuit Court Consent Agreement between Hooker Chemical and State Officials and the authorship of the passage was not explicit in the article (chi square value not significant).

4. Distribution of Risk Variable

The overall distribution of risk approaches by quote is represented in Table 5.3. The most striking finding of this analysis is the likelihood that a source will assert riskiness (9.2%) or the presence of a risky substance (15.4%). Sources which deny risk or the presence of a risky substance are represented in 3.9% and 2.2% respectively. Of the quotes that do discuss risk it is more likely that the presence of a substance will be discussed rather than the issue of how dangerous the substance is to people or the environment.

The category "risk present but under control" represents 10.7% of quotes. Roughly half (50.2%) of all quotes contain no risk information. These quotes tend to

deal with financial matters such as the cost of cleanup operations, production losses, or other corporate matters.

Table 5.3: Overall Distribution of Risk Approaches by Quote

Risk Category	Number of Quotes with Risk Approach	Percent of All Quotes
Risky	62	9.2
Not Risky	26	3.9
Mixed Opinion (if risky)	38	5.6
Risky Substance Present	104	15.4
Risky Substance Not Present	15	2.2
Mixed Opinion (if present)	19	2.8
No Risk Information	339	50.2
Risk Present but Under Control	72	10.7

Total number of quotes = 675

5. Risk Messages by Year

Figure 5.3 is a depiction of risk information contained in quotes by year. Composite categories have been used for ease of graphic presentation. *Affirm risk* is a composite of the *risky* and the *risky substance present* categories. *Deny risk* is a composite of the *not risky* and risky *substance not present* categories. While the appearance of quotes which deny risk is always low it is interesting to note that all of these fall before 1985. The major peaks seen for the risk affirming category coincide with the heavy reliance on government sources within those years and is consistent with

the findings of Peter Sandman for print media coverage of environmental issues in New Jersey (Sandman, 1987).

The fairly consistent appearance of the risk controlled statement is a function of the reliance on industry spokespeople as the source of quotes as depicted in Figure 5.2.

6. Relationship of Risk Approach to Each Source

Another way to look at the source-risk relationship is to examine the risk information portrayed in the archive quotes and from which sources they originate. Table 5.4 shows the percentage of each risk category attributable to each source. In this table the vertical columns sum to 100%.

Risky. Quotes which claim risk account for 9.2% of all quotes in the archive. The majority of these statements are attributable to State Government (43.6%) and Citizens (21.0%). This is significant in light of the overall low percentage of attribution of quotes to Citizens (8.1%). The Federal Government is less likely than the overall average to claim risk (3.2%) and Local Government (9.7%), and Experts (9.7%) are roughly equivalent to the overall average. Industry and advocacy groups (1.6% each for both groups) are very unlikely to affirm riskiness of a substance (chi square value = 83.4 > critical value of 26.12, df = 8, $p < 0.001$).

Not Risky. Industry (57.9%) is more than fifteen times as likely to deny risk as the overall average (3.9%) and accounts for most of the statements denying the riskiness of a substance. Industry is followed by State Government (15.4%), Experts (11.5%), and Local government (7.6%) in exceeding the overall average. Federal sources (3.8%)and Citizens (3.8%) are equivalent to the overall average. No quotes denying the

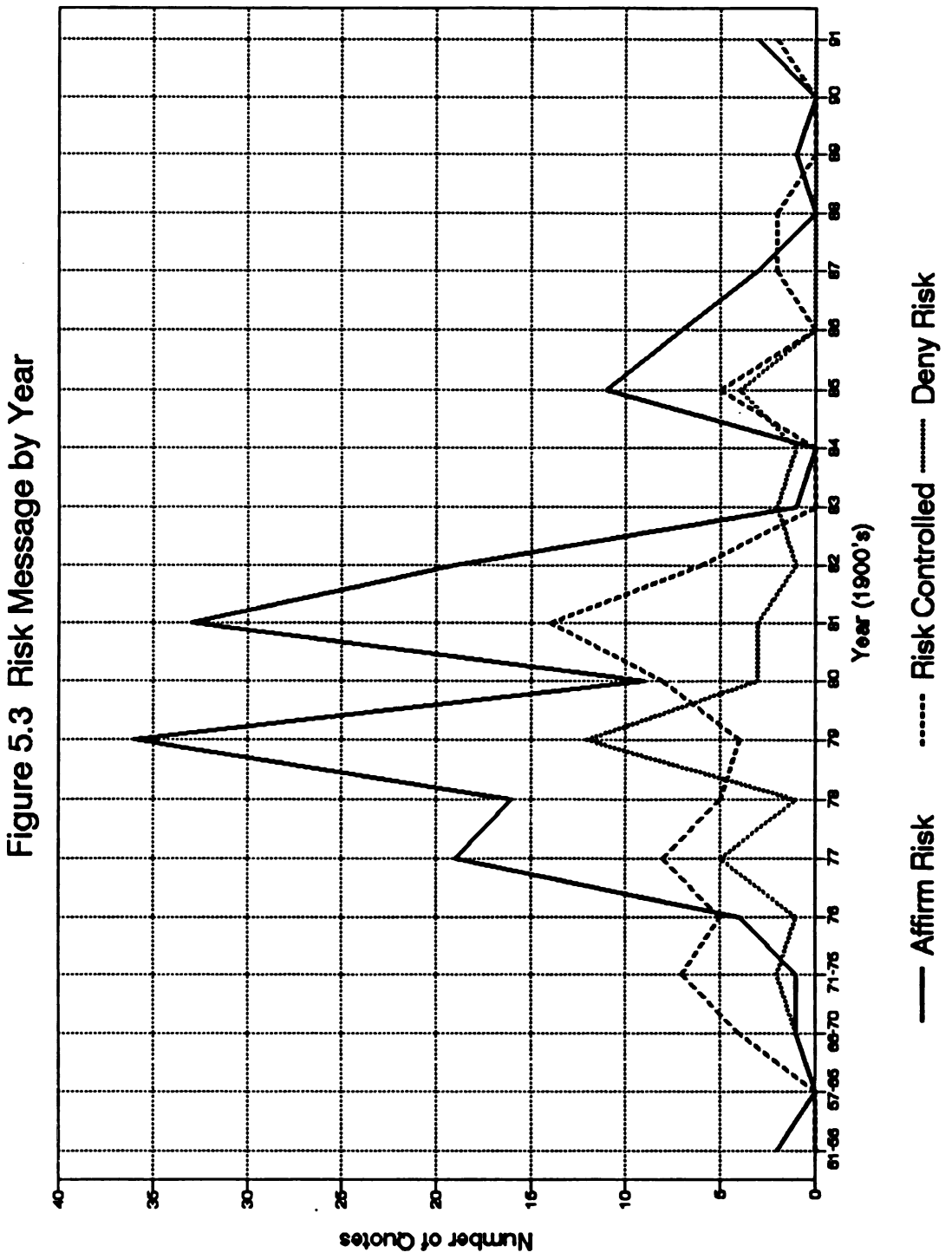


Figure 5.3 Risk Message by Year

riskiness of a substance are attributed to Workers and Unions or Advocacy Groups (chi square value = 62.6 > critical value of 26.12, df = 8, $p < 0.001$).

Mixed Opinion if Risky. Of the quotes which present a mixed opinion of the riskiness of the substance 28.8% are attributed to State Government. Surprisingly, 26.3% are attributed to experts. This is probably a result of the confusion concerning the levels of contaminants in White Lake fish (chi square value = 27.8 > critical value of 26.12, df = 8, $p < 0.001$).

Risky Substance Present. State Officials account for over half of statements affirming the presence of a risky substance (51.9%). Federal Government and Citizens account for 12.5% each, followed by local government (7.7%) and Workers and Unions (6.7%). Industry (4.8%) Advocacy Groups (1.0%), and Experts (1.9%) are much less likely than the overall average (15.4%) to affirm risk the presence of a risky substance (chi square value = 190.0 > critical value of 26.12, df = 8, $p \leq 0.001$).

Risky Substance Not Present. Quotes denying the presence of a risky substance are most likely to be made by Industry (40.0%) followed by State Officials (33.4%). Quotes within this category are made by Local Government and Experts at a rate of 13.3% each. No presence denying statements were made by the Federal Government, Workers and Unions, Advocacy Groups, or Citizens (chi square value = 26.4 > critical value of 20.09, df = 8, $p \leq .01$).

Table 5.4: Frequency and Percentage of Quotes of Each Risk Approach to Each Source (columns sum to 100%)

Source	Risky (%)	Not Risky (%)	Mixed Opinion (if Risky) (%)	Risky Substance Present (%)	Risky Substance Not Present (%)	Mixed Opinion (if Present) (%)	Risk Present But Under Control (%)	No Risk Info. (%)
Federal Government	2 (3.2)	1 (3.8)	2 (5.3)	13 (12.5)	0 (0)	3 (15.8)	0 (0)	11 (3.2)
State Government	27(43.6)	4 (15.4)	11 (28.8)	54 (51.9)	5 (33.4)	10 (52.6)	26 (36.1)	114 (33.6)
Local Government	6 (9.7)	2 (7.6)	5 (13.2)	8 (7.7)	2 (13.3)	0 (0)	2 (2.8)	51 (15.0)
Industry	1 (1.6)	15 (57.9)	2 (5.3)	5 (4.8)	6 (40.0)	2 (10.5)	44 (61.1)	108 (31.9)
Workers and Unions	5 (8.0)	0 (0)	4 (10.5)	7 (6.7)	0 (0)	0 (0)	0 (0)	10 (2.9)
Advocacy Groups	1 (1.6)	0 (0)	2 (5.3)	1 (1.0)	0 (0)	0 (0)	0 (0)	8 (2.4)
Citizens	13(21.0)	1 (3.8)	2 (5.3)	13 (12.5)	0 (0)	0 (0)	0 (0)	30 (8.5)
Experts	6 (9.7)	3 (11.5)	10 (26.3)	2 (1.9)	2 (13.3)	4 (21.1)	0 (0)	7 (2.1)
Unattributed	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Mixed	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Other	1 (1.6)	0 (0)	0 (0)	1 (1.0)	0 (0)	0 (0)	0 (0)	0 (0)

( ) Percentage of quotes attributable to each risk/source.

Mixed Opinion if Present. Statements in which the opinion on the presence of a risky substance was equivocal were made most often by State Government (52.6%) followed by Experts (21.1%), Federal sources (15.8%), and Industry (10.5%). Local Governments, Workers and Unions, Advocacy Groups, and Citizens were never the source of statements of mixed opinion (chi square value = 42.1 > critical value of 26.12, df = 8, $p < 0.001$).

No risk Information. Of the quotes which contain no risk information 61.1% come from Industry sources. This is a reflection of the Industry's reluctance to discuss risk issues and the reliance on this source for employment and economic information. State Government accounts for 33.6% of this risk category followed by Local Government (15.0%). Federal sources (3.2%), Workers and Unions (2.9%), Advocacy Groups (2.4%), Citizens (8.5%), and experts (2.1%) supply very little of the information which does not deal with risk (chi square value = 417 > critical value of 26.12, df = 8, $p < 0.001$).

Risk Present But under Control. Only three sources provided statements which affirmed the presence of risk but sought to assure the capability to remedy or control the situation. Industry accounts for 61.1% of these statements, State Government 36.1% and Local Government 2.8% (chi square value = 255 > critical value of 26.12, df = 8, $p < 0.001$).

C. Relationship Between Quote Position and Source

Table 5.5 depicts the frequency of sources in the first half of the article as compared to the last half (percentages sum horizontally to 100%). In other words, of

the total number of quotes attributable to a source, what percentage appear in the first half and what percentage appear in the second? Comparisons based on the Federal Government, State Government, and Industry source categories indicate very little difference in the percentage of quotes in the first versus the second half of the article. By contrast, the majority of quotes attributable to Workers and Unions, Citizens and Experts appear in the second half. Sandman explains this phenomena as a result of a "typical" format in which more "credible" sources such as government officials appear before other "human interest" sources (Sandman, 1987).

D. Relationship Between Quote Position and Risk Approach

Table 5.6 shows the frequency of risk approaches in the first half of the article compared to the last half (percentages sum horizontally to 100%). In other words, of the total number of quotes attributable to a risk category, what percentage appear in the first half and what percentage appear in the second?. Quotes which affirm risk are twice as likely to appear in the second half (69.4%) of an article as in the first (30.6%). This relationship also holds true for the Risk present but under control category with 37.5% and 62.5% of quotes in the first and second half respectively. These results may be due to the tendency for writers to present more technical details in the latter half of an article after sufficient back ground information has been presented.

Statements denying risk, affirming or denying the presence of a risky substance are as likely to appear in the first half of the article as in the second. These findings are similar to those presented by Sandman (1987) and indicate at least in the area of risk

reporting there is little evidence to support the assertion that news writers use sensational leads to grab readers attention.

Table 5.5: Position of Sources in the Article

Source	1st half		2nd half	
	# of Quotes	% of Quotes	# of Quotes	% of Quotes
Federal Government	18	56.3	14	43.7
State Government	102	40.6	149	59.4
Local Government	30	39.5	46	60.5
Industry	82	44.8	101	55.2
Workers and Unions	6	23.1	20	76.9
Advocacy Groups	5	42.7	7	58.3
Citizens	17	32.7	42	67.3
Experts	12	35.3	22	64.7
Unattributed	0	NA	0	NA
Mixed	0	NA	0	NA
Other	0	0	2	100.0

Total number of quotes = 675

Table 5.6: Position of Risk Categories in the First 10 Paragraphs

Risk Category	1st half		2nd half	
	# of Quotes	% of Quotes	# of Quotes	% of Quotes
Risky	19	30.6	43	69.4
Not Risky	13	50.0	13	50.0
Mixed Opinion (if risky)	14	36.8	24	63.2
Risky Substance Present	53	51.0	51	49.0
Risky Substance Not Present	6	40.0	9	60.0
Mixed Opinion (if present)	2	10.5	17	89.5
No Risk Information	138	40.7	201	59.3
Risk Present but Under Control	27	37.5	45	62.5

CHAPTER VI

SUMMARY AND CONCLUSIONS

A. Introduction

Risk communication research has developed out of a need for a more interactive and informative process to relay information from officials to the public and to convey the needs of the public concerning risk issues. The dilemma of increasing reliance upon technology and the relative lack of information concerning the accompanying risks has created a situation in which a partially informed public have demanded a better and more equitable process in which to acquire information and air their concerns. Government, industry and scientists, in turn, are seeking new ways to communicate effectively with the public while avoiding the pitfalls of paternalism and scientific chauvinism. It is informative, therefore, to examine situations, developed over a span of years including less environmentally conscious eras, which illuminate the successes and failures of past experience.

The present dissertation presents a case study of the risk communication process surrounding the chemical industry in Muskegon County, Michigan. Part One consisted of a content analysis of page A1 (front page) articles which appeared in The Muskegon Chronicle concerning several sites of chemical manufacturing which have been slated for remedial action either under the Federal Superfund program or the Michigan Act 307

cleanup program. The statistical results of the content analysis have been presented in Chapter V.

Part Two of this effort consists of an examination of the historical, economic and environmental circumstances in Muskegon County and its chemical industry which set a backdrop for the content analysis results reported in Chapter V. As stated in Chapter II, risk communication must be viewed as a situational phenomena which cannot be isolated from the social and economic circumstances under which it occurs. Additionally, a thorough understanding of the risk communication process in Muskegon County cannot be achieved without asking the underlying question of "Why?". Why does a source produce the type of risk message that it does? Why does a particular source appear with greater frequency than another? What are the underlying reasons for trends in both? Reporting the percentages of the appearance of a given source or risk approach is insufficient in itself to illuminate the dynamics of the process of communication. The realities of reporting scientific and environmental news and the economic conditions in Muskegon in and preceding the time frame of the study provide insight to the motivations which produce the type of coverage seen both in The Muskegon Chronicle and on a national scale. As a supplement to this information various stakeholders in the risk communication process including environmentalists, editors and staff reporters, government officials, and members of the concerned public were interviewed to provide personal insight into the historical perspective and the process of risk communication. This multi-faceted approach to investigating risk communication lends added support to the individual components of the study and provides greater confidence in the data and its interpretation.

B. The Influence of History and Economics

The results of the content analysis suggest that the enactment of environmental legislation beginning in 1970 with the National Environmental Protection Act followed by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Michigan Sites of Environmental Contamination List Act 307 in 1982 coincided with a sharp increase in coverage of the chemical industry in The Muskegon Chronicle. This increase is reflective of the general increase in public and government interest in environmental issues as well as the recognition of the potential risk posed by indiscriminate use and disposal of hazardous substances. The general increase in coverage of these issues is accompanied by an increasing reliance upon government agencies as a source of risk messages as predicted in hypothesis 1a[14]. However, a subjective reading of articles which cover the chemical manufacturing sites shows that environmental issues are frequently balanced with economic concerns. For example, a story might report that company X is required by the Michigan Department of Natural Resources (MDNR) to perform a level of cleanup effort along with the cost in revenues and lost jobs. Seldom is the cost of not cleaning up a hazardous substance reported in the article. In fairness to The Muskegon Chronicle staff, this type of information is not readily available and would require more time for research than is allowed for a front page story. Reporting of economic concerns was not included as a variable in the content analysis and no specific frequency of the appearance of these issues is available for this study. However, the prevalence with which these issues

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[14]Government officials will appear with increasing frequency as a result of the enactment of environmental legislation.

appear in articles covering environmental issues supports general hypothesis 3[15] as advanced in Chapter II.

Recent research indicates that the type of coverage afforded environmental issues in a community is influenced by the level of structural diversity and economic reliance of the community on manufacturing (Griffin and Dunwoody, 1993). Less structurally diverse communities are described as less pluralistic and less homogeneous in their demographic characteristics.

Several features associated with less pluralistic communities are descriptive of Muskegon County as described in Chapter IV and in the results of the content analysis presented in Chapter V. Griffin and Dunwoody (1993) found that newspapers in smaller communities tend to frame risk messages in "the context of a solution to a problem". Reporters at The Muskegon Chronicle consistently chose to utilize industry spokespeople as a source of risk information. The content analysis results indicate that industry, when it mentions risk at all, tends to portray the problem as being under control, albeit at a cost to the company. The issue of cost both to the company and to the community was a consistent theme of newsprint reports concerning the chemical industry. The influence of pro-growth sentiments can be seen as early as the siting and planing stages of the Hooker plant and is readily recognizable in the history of the region.

As depicted in the history of the region, economic conditions in Muskegon County had prompted local leaders to seek new industries to replace the loss of the old. The interest shown in the Muskegon area by Hooker Chemical fostered hopes of a chemical

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[15]The content of risk messages is affected by the economic circumstances in the surrounding community.

manufacturing empire to replace the loss of weapons manufacturing following WWII. The Muskegon Chronicle served as a channel for area leaders promoting these hopes to the public. Support for hypothesis 3a[16] is found in editorials written during this time period which not only refused to consider any potentially negative impacts but ridiculed persons who suggested them (The Muskegon Chronicle, 12/1/51, 4/11/51, 1/22/52). It may be argued that reporters and the print media serve only as conduits for the dissemination of information. However, it must be recognized that news staff are community members with personal views which influence both the type and framing of stories which are printed. Similarly, news agencies such as The Muskegon Chronicle have organizational views which originate from upper management.

The economic conditions in Muskegon County in the environmental era following 1970 support hypothesis 3b[17]. The primary source of well-paying jobs in Muskegon at the time of the discovery of many of the environmental problems was the very industry which was creating the contamination. Publishing reports of industry responsibility for environmental problems or the accompanying potential for public health effects requires a weighing of the benefits of informing the public and the potential harm to community and industry reputations. The pro-growth perspective of The Muskegon Chronicle seems to have tipped the balance, providing the incentive to frame environmental stories to provide support for industry. A common reporting theme throughout the articles

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[16]Economic conditions in Muskegon County in the 1950's prompted the downplay and dismissal of the potential risks of chemical manufacturing.

[17]Economic conditions in Muskegon County in the environmental era following 1970 affected the emerging depiction of risks associated with occupational and environmental exposure to hazardous substances at site of chemical manufacturing.

included in the content analysis uses government sources to confirm the presence of contamination followed by industry spokespeople assuring the public that the problem is under control at considerable cost to the responsible industry.

C. Environmental Reporting in The Muskegon Chronicle

Coverage of environmental issues is sometimes depicted as a "tail wagging the dog" dilemma (Stephens, 1992). Is the mass media responding to an issue of legitimate public concern, or conversely, is the coverage afforded to an issue producing a level of concern which might not otherwise exist? Power and credibility of a source in risk communication may be viewed in much the same light. The inherent question is whether the consistent appearance of representatives of any of the source groups is indicative of the degree of power and credibility held by that group. Or, conversely, whether the consistent reliance on any one source represents an institutional agenda espoused by the news agency which serves to promote certain groups at the expense of others.

The results of the content analysis indicated that, contrary to hypothesis 1c[18] stated in Chapter II, individuals, experts, and grass root or community organizations did not appear with increasing frequency as the source of risk quotes (or any other type of quote). With the exception of the statements made by a Michigan State University researcher (circa 1979) concerning levels of contaminants in trout and pike taken from White Lake, these sources receive very little attention from Chronicle writers.

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[18]Sources such as individuals, grass root or community organizations will appear with increasing frequency over time.

Based on interviews with Chronicle staff, several reasons may be suggested for the underrepresentation of these source categories in The Muskegon Chronicle. John Stephens, city editor of The Muskegon Chronicle, categorizes environmental articles into three types; emergency situations which require immediate response, cleanup operations which can be investigated at a more leisurely pace and "discovery" situations in which government agencies and/or the press are alerted to contamination of unknown origin and impact. The method of information gathering may be very different for each of these types.

One way information may be gathered is by talking directly with informed individuals. Chronicle sources say, "We'll talk to anyone who has knowledge" (Burns, 1992). In most cases, this means the designated media contact at a site of action. For example, when a cleanup operation is in progress, one member of the crew is chosen as the spokesperson and inquiries are directed to that person. This is also true in an emergency situation such as a accidental release or an explosion. Following resolution of the immediate situation, the reporter will attempt to talk to the responsible parties, employees of a involved company, and witnesses and bystanders if possible.

The "discovery" news article is much more difficult to investigate. A common scenario for this type of situation is described by Editor John Stephens:

> The lake is polluted! Who did it? Environmentalists want to point fingers, the bureaucrats would rather not talk about it except to issue a sterile report of chemical x present in x parts per whatever, and the chemical companies don't want to answer the phone.

State officials are usually the preferred source of information in this case, however, in the initial stages following discovery very little information may be available. Sandman (1989) reports similar results with government sources accounting for 37% - 48% of paragraphs in environmental stories appearing in selected New Jersey news reports. The information most often requested by reporters falls into two categories: "Is the hazardous substance present, and in what quantity?" and "What problems will it cause?" Information of the former type is most readily available and most often given by government agencies. The more important question, from the public's point of view, is "what harm will the substance cause?" This information is often not readily available even to the agency charged with regulation of the substance. As discussed in Chapter II, the level of scientific uncertainty regarding environmental risk precludes a swift and ready answer to reporters questions.

Local environmentalists have a very different view of environmental reporting by The Muskegon Chronicle. The Michigan Director of the Lake Michigan Federation states;

> There's just so much power in what they do... They can quote you and make you look stupid, they can take something you say and put it out of context. If whatever you say doesn't fit in with what they want to say in the story then it doesn't go in.
>
> (Cabala, 1992)

The feeling of powerlessness is reiterated by many individuals who consider themselves environmentalists. The preference for "hard" scientific facts in news

reporting often discredits preliminary information perceived as being less scientifically valid. Chronicle staff asserts that no conscious effort has been made to downplay environmental issues, however, they are not reluctant to state that the economic growth of Muskegon is an issue of paramount importance to the newspaper and its readers (Stephens, 1992). Local environmentalists, however, assert that the Chronicle does not see its role as informing the public but rather as pushing a private agenda which favors economic development at the expense of the environment (Cabala, 1992).

The issue of a "private agenda" has also been raised by other sources, such as the most often quoted source in The Muskegon Chronicle, state government officials. Environmental reporters are seen as espousing a private accrediting system which allows the acceptance of statements from some sources without verification while others are closely scrutinized. The difference in treatment of sources may be attributable to personal bias, however, the acknowledgment must be made that public views have changed considerably within the last 20 years in regard to polluting industries. The change can be illustrated by a comparison of the coverage of the Hooker plant closing and coverage of the recent revelations of worker conditions at Lakeway Chemical. Loss of the Hooker plant was seen as a severe economic blow to the Muskegon economy and Hooker's detractors were portrayed as lacking credibility (The Muskegon Chronicle, 5/21/76). By contrast, the 1992 series which depicted the health problems of Lakeway workers, portrayed a company which was insensitive to the plight of its workers to the point of ignoring scientific evidence of the carcinogenic potential of its products (The Muskegon Chronicle, 12/6/92). These two very different series of articles illustrate a

shift in emphasis from the economic to the personal/societal perspective which may represent not only the reporter's view, but that of Chronicle management.

However, a pro-industry sentiment on the part of The Muskegon Chronicle and its staff writers is still very much in evidence. A recent page A1 article (02/12/93) hails the agreement by the responsible parties at the Ott/Story/Cordova site to provide $25 million in costs to support groundwater cleanup efforts. The continuation on the page A2 clarifies that these moneys are provided to an escrow account pending appeal of a court decision which hold the parties responsible. Only in the last few paragraphs of the article on A2 is it made clear that the responsible parties would have been required to pay triple the cleanup costs should their appeal fail and the $25 million was in effect insurance against this eventuality. It is beyond the scope of this research to investigate the motivations for this type of reporting. These examples nevertheless serve to illustrate that while reporters and editors are often portrayed as impartial purveyors of information, news coverage is a normative process.

An additional factor which may contribute to the lack of precise risk information in environmental reporting is that while reporters may attend conferences and seminars designed to improve coverage of scientific issues, the reporters themselves often have no technical training or background. This observation holds true for the majority of reporters who have covered the environmental beat at The Muskegon Chronicle as well as for the reporters interviewed by Peter Sandman in New Jersey (1989). A seasoned Chronicle reporter describes his job as:

> "...an interpreter who takes envirobabble and turns it into words that the readers can understand."
>
> (Burns, 1992)

Reporters should be careful, however, when translating "envirobabble" not to sensationalize or downplay the information. Additional questioning of sources may be necessary to ensure that the information to be reported is thoroughly understood.

In recent years a new type of story has begun to appear in The Muskegon Chronicle which portrays the problems of people who have to deal with contamination on a daily basis. These articles tend to feature individuals, workers, and medical specialists describing the effects of toxic chemicals in the workplace and in the environment. The messages conveyed by workers and citizens in these articles as well as the results of the content analysis indicate support for hypothesis 2b[19]. Perhaps the best example is the multi-page series which ran during the week of December 6, 1992 (after the 1991 cut off for archive articles). In this series the historical facts surrounding Lakeway's production of dichlorobenzidine were set forth along with moving accounts of employee's and their family's struggle with cancer. Unfortunately for this analysis, this type of article rarely appears on page A1 of the Chronicle but is usually consigned to page B1, the front page of the Local section. This section was instituted in 1980 as a result of the overall growth of the Chronicle. Staff admit that the decision to place environmental articles on page B1 may be a reflection of the reluctance to paint Muskegon as a "toxic hellhole" (Stephens, 1992). Articles which appear on A1 are more

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[19]Sources such as individuals, grass roots or community organizations will produce messages which affirm the riskiness of a potentially polluting industry.

likely to be widely distributed via major newswires than those printed in local sections and thus reach a more diverse audience. This aversion to printing articles which are not favorable to industry is not unique to Muskegon but rather is reflected by many communities which are heavily reliant on manufacturing for their tax base (Griffin and Dunwoody, 1993). Chronicle staff, however, believe that the degree and flavor of coverage afforded environmental issues reflects public sentiments. They are convinced that no effort, conscious or other wise, has been made to influence public opinion in favor of either the chemical industry or any other type of major manufacturing (Stephens, 1992).

> The nation wide psyche has changed from profit margins to environmental preservation, a change in the way we look at things and a change in what we're doing. Whether we have been a leader or a follower is an interesting question and I would suggest we have been a follower.
>
> (Stephens, 1992)

Coverage of the problems associated with production at Bofors Lakeway Inc. exemplifies the type of coverage afforded occupational and environmental exposure to hazardous substances following the introduction of chemical manufacturing into Muskegon County. In an article dated November 8, 1979 the Chronicle reports that The International Chemical Workers Union asked the EPA to ban the production of Oryzalin, an herbicide produced by Lakeway, on the basis of evidence that it was implicated in causing fatal birth defects in workers children. While the article does admit that several infant deaths were reported in workers at another manufacturing site it goes on to state that the unions charges were "unfounded based on the best available scientific evidence

we have." A large portion of the article is devoted to government statistics which seemingly refute the notion that job related illnesses are on the rise. Thus while not overtly refuting Union claims, the article never-the-less leaves the impression that Union concerns are unfounded.

Articles of this flavor are characteristic of the type of coverage afforded environmental issues throughout the 1970's and into the 1980's. These articles mix statements made by state agencies affirming the risk or presence of contamination along with dollar estimates made by industry spokespeople of the cost of cleanup. Often industry is quoted as doubting the necessity of aggressive action and decrying government intervention into manufacturing processes. Coverage surrounding benzidine production at Lakeway is a good example of this type of coverage. Throughout the 1970's as government officials cited production practices as unsafe, the Chronicle consistently quoted industry spokesman defending their practices as stringently controlled and mindful of worker safety. The 1992 expose of working conditions at the Lakeway site revealed that at the time of the 1970's articles, workers were sometimes knee deep in dichlorobenzidine, a chemical which Lakeway officials knew to be carcinogenic.

In contrast to hypothesis 2a[20] the results of the content analysis indicate a readiness on the part of state government to affirm the riskiness of a substance and/or the presence of a risky substance at a particular site. Close to half of all statements affirming risk are in fact made by state officials. A subjective reading of the risk affirming quotes indicates, however, that these statements are for the most part merely

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[20]Sources such as industry and government officials are likely to produce messages which deny or downplay risks associated with a potentially polluting industry.

validations of information which is readily available through freedom of information provisions. Risk affirming statements made by government agencies tend to contain sterile facts such as the degree of contamination in parts per million or billion. Two obvious problems arise in giving the public information in this form. First, very few people readily assimilate information presented in several orders of magnitude. Explanations which attempt to create a common analogy (i.e., one drop in a swimming pool) may be perceived as patronizing and condescending. Secondly, presentation of the sterile facts does little to allay public concern over potential health effects. The readiness of state officials to produce this information cannot be construed as an indication of the desire to inform the public but rather as an acceptance of public duty. In actuality, many agency officials perceive public demands for information as a nuisance and an intrusion into daily routines.

In support of hypothesis 1b[21], industry remains a consistent source of information concerning the chemical industry throughout the study period. In fairness it should be stated that the economic well being of a community is of paramount importance to its residents. Heavy reliance on industry spokespeople, however, may produce news coverage which is one-sided and biased in favor of polluting industries. It may be argued that industry spokespeople are in a position to know exactly what is happening on-site. However, motivational factors must be considered when judging the validity of information given to the press as well as the press' motivation in presenting it. Companies want to be viewed in the best possible light and would be reluctant to offer information which might endanger their relationship with the hosting community.

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[21]Industry sources will appear with consistent frequency over time.

Staff at The Muskegon Chronicle admit that the concern exists that publication of denials of industry wrong doing will create an irreversible association of a company with a problem in the public mind. Overall, industry is as unlikely to make statements which affirm risk as environmental groups are to make statements of safety.

D. Conclusions

The above discussion supports the conclusion that the conventional press in Muskegon County is very much a part of the "center" in terms of environmental risk. Their consistent reliance upon industry and government sources for information indicates an agenda very different than that of local environmentalists.

A baseline survey of the public perception of chemical risks suggests that the public receives most of the information it gets about environmental risks from newspapers (McCallum and Covello, 1990). In the same survey, respondents saw reporters as receiving their information from outside sources and the indicated that the credibility of the information is dependent not upon the news agency but rather upon the source of the message. Reporters are seen as being less informed on the technical issues than the sources which provide environmental information. Given the lack of scientific and technical background of environmental reporters at The Muskegon Chronicle the publics assumptions on this score may be accurate.

The comments made by members of local environmental groups, supported by the results of the content analysis, indicate that groups and individuals who have sought to make public the risks associated with the chemical manufacturing in Muskegon have consistently been denied access to coverage in The Muskegon Chronicle. By contrast,

industry and local government representatives have consistently been afforded a forum for the dissemination of information which depicted a safe and responsible industry which held out the promise of economic prosperity. In defense of Chronicle staff, the recent feature articles previously discussed indicate the trend is toward a more skeptical view of industry supported by investigative reporting which was not characteristic of the Chronicle's earlier efforts.

E. Implications for Improving Risk Communication

Communication of the risks posed by chemical industries in Muskegon County by The Muskegon Chronicle fits the message transmission model depicted in Chapter II. This model is characterized by a one-way flow of information and does not provide the public with an opportunity for active communication with the source of the message. Sources of problems identified by Covello et al (1986, 1987) as endemic to this style of communication include; the message itself, the sources of the message, channels of communication including the mass media, and the receiver. While state and federal agencies may provide the opportunity for public meetings under the requirements of environmental legislation, it is important to note that the balance of the public receives risk information from the mass media. Improving communication under these circumstances could be accomplished either by implementing other means of providing information or by improving the current methods.

Since state and federal government representatives are the most often quoted source of risk information in newspaper coverage of environmental contamination this would seem to be the place for improvements on the current methods. These officials

are required to provide information as it becomes available to local officials, local and regional news agencies, and concerned citizens listed in the Community Action Plan contained in the administrative record for an NPL site. In crafting these news releases, these government officials should consider both the needs of the immediate recipient as well as the eventual target, the general public. The effect of the size and diversity of the community should be noted. Information provided to The Muskegon Chronicle may need to be very different from that provided to The Detroit Free Press.

Public health and risk information should be provided in a format that is clear to the educated layman without paternalism or scientific chauvinism. Comparisons of the risks of environmental contamination with more every day risks such as driving a car or smoking should be avoided. However, some clarification of the units of measurement should be included. It is especially important to provide information concerning the possible harm that can occur from exposure to the chemical in general and under the specific circumstances likely at the site. McCallum and Covello's (1990) survey results indicate that the public is unaware of the dose-response relationship and believes that any exposure to chemicals can produce harmful effects. These results indicate both a lack of public knowledge and a persistent belief that all chemicals are harmful at all dosages. Activities to be avoided as well as simple safeguard which can be practiced are important to provide the public with positive actions that can be taken to safeguard themselves and their families and provide greater peace of mind.

It is unlikely, however, in situations of intense public concern that a reporter will wait for a routine press release. As noted earlier, most reporters operate under deadlines and prefer to make immediate contact with state and federal agency officials.

Unfortunately, state officials are rarely provided with either the training or information to respond appropriately to requests for information. Programs to provide information and training should be instituted along with the development of some basic contingency situations which would provide a general framework for communication. Officials should be aware that misquotes are a fact of life and should take steps to ensure that information is conveyed simply and accurately.

Reporters and their editors should make every effort to become more knowledgeable about the issues they report. Where possible, reporters should not be required to cover conflicting beats, for example a business reporter would be expected to carry some prejudice into environmental reporting. Lastly, accurate and unbiased reporting dictates that alternative sources be consulted where time permits.

F. Suggestions for Future Research

As stated in Chapter I, the emphasis in the present dissertation was to investigate the role of the media in the risk communication process. A logical follow-up to these efforts would concentrate on defining the effects on the public of over forty years of the type of information depicted in the case analysis. Relationships to be explored include the correlation of proximity to a waste site or direct effects from a waste site (ie illness, loss of income etc.) to viewpoints on environmental issues. In addition, contingency analysis may be used to analyze the effects of both individual risk messages and the frame in which they're presented on the reader. In contingency studies, subjects are presented with simulated circumstances or "contingencies" and asked to define their responses within this context. For example, several different news stories which vary

on factors such as detail, length and technical content may be devised to determine the effects of the frame of risk messages (Johnson, et al. 1994).

APPENDICIES

APPENDIX A

CODING SHEET

Record Number_____ Headline _____

Newspaper _____

Date _____ Byline _____ # of Paragraphs _____

	Quotes															
SOURCE	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Federal government	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
State government	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
County/local government	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Industry & industry assns.	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Workers & unions	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Advocacy/envl/citizen's groups	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Citizens/bystanders/individuals	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Experts (not involved)	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Unattributed	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9	9
Mixed attribution	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10	10
Other List:	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
RISK																
Claims the stuff is risky	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Denies the stuff is risky	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Can't tell/mixed op. if risky	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Claims risky stuff is present	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Denies risky stuff is present	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Can't tell/mixed op. if present	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Zilch	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Risk is present but under control	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8

APPENDIX B

PERMISSION FORM

I agree to an interview with Linda D. Larsen for the purpose of her Ph.D. dissertation research on Toxic Waste Issues in Muskegon County. I understand that I do not have to answer any questions if I do not wish to and that I can stop the interview at any time.

UNLESS THE BOX BELOW IS CHECKED, PERMISSION TO RECORD THIS INTERVIEW IS DENIED.

[ ] I further grant permission to Linda D. Larsen to tape record this interview. I understand that any comments made during the interview and recorded on tape may appear as direct quotes in Ms. Larsen's doctoral dissertation and any material published subsequent to the dissertation.

_____
signature

_____
date

APPENDIX C

UNIVERSITY COMMITTEE ON RESEARCH INVOLVING HUMAN SUBJECTS LETTER

MICHIGAN STATE UNIVERSITY

OFFICE OF VICE PRESIDENT FOR RESEARCH
AND DEAN OF THE GRADUATE SCHOOL

EAST LANSING • MICHIGAN • 48824-1046

June 4, 1992

Linda D. Larson
303 Natural Resources Bldg.

RE: A HISTORY OF PUBLIC ATTITUDES TOWARD THE CHEMICAL INDUSTRY IN MUSKEGON COUNTY, MICHIGAN, IRB #92-200

Dear Ms. Larson:

The above project is exempt from full UCRIHS review. The proposed research protocol has been reviewed by a member of the UCRIHS committee. The rights and welfare of human subjects appear to be protected and you have approval to conduct the research.

You are reminded that UCRIHS approval is valid for one calendar year. If you plan to continue this project beyond one year, please make provisions for obtaining appropriate UCRIHS approval one month prior to May 28, 1993.

Any changes in procedures involving human subjects must be reviewed by UCRIHS prior to initiation of the change. UCRIHS must also be notifed promptly of any problems (unexpected side effects, complaints, etc.) involving human subjects during the course of the work.

Thank you for bringing this project to my attention. If I can be of any future help, please do not hesitate to let me know.

Sincerely,

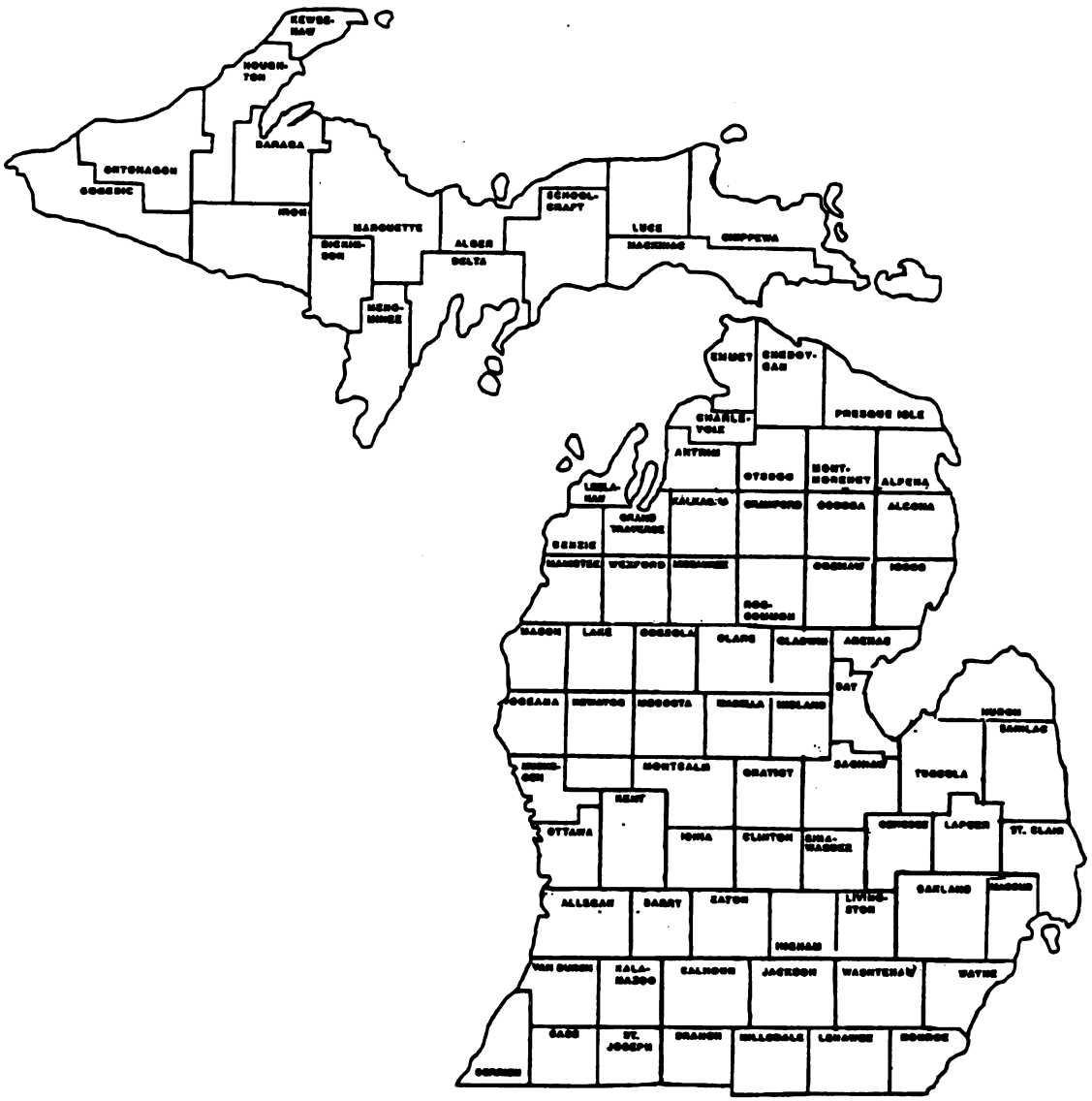
David E. Wright, Ph.D., Chair
University Committee on Research Involving
Human Subjects (UCRIHS)

DEW/pjm

cc: Dr. Dan Bronstein

APPENDIX D

MAP OF MICHIGAN



APPENDIX E

PERSONAL INTERVIEWS

I would like to thank the following individuals for providing valuable information and insight into the history of Muskegon County and the sites of chemical manufacturing addressed in this dissertation. Tape recorded, in-person interviews were conducted with the following:

Tanya Cabala, Director, Muskegon Office of the Lake Michigan Federation, November 17, 1992, 10:00 am-12:00 pm.

John Stephens, City Editor, The Muskegon Chronicle, November 9, 1992, 1:00-3:30 pm.

Robert Burns, Staff Reporter, The Muskegon Chronicle, November 9, 1992, 1:00-3:30 pm.

Telephone interviews were conducted with the following residents of Muskegon County:

Marion Schroeder, November 10, 1992, 10:30 -11:15 am.
Diane Dobson, November, 10, 1992, 12:30-12:50 am.
Owen Davis, November, 17, 1992, 1:00-1:35 pm
Kathy Evans, November, 17, 1992, 2:15-2:45 pm
Joseph Headen, November, 17, 1992, 2:50-3:20 pm

I'd also like to thank Dr. Daniel Yakes, Instructor, Muskegon Community College, for his insight into the history of Muskegon County and his assistance in locating historical documentation.

The following MDNR employees provided information on the history and current status of the sites of chemical contamination discussed in this dissertation:

Roger Prybyz, Grand Rapids District Office, Environmental Response Division, Michigan Department of Natural Resources.

Heather Hopkins, Grand Rapids District Office, Environmental Response Division, Michigan Department of Natural Resources.

David O'Donnell, Grand Rapids District Office, Environmental Response Division, Michigan Department of Natural Resources.

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