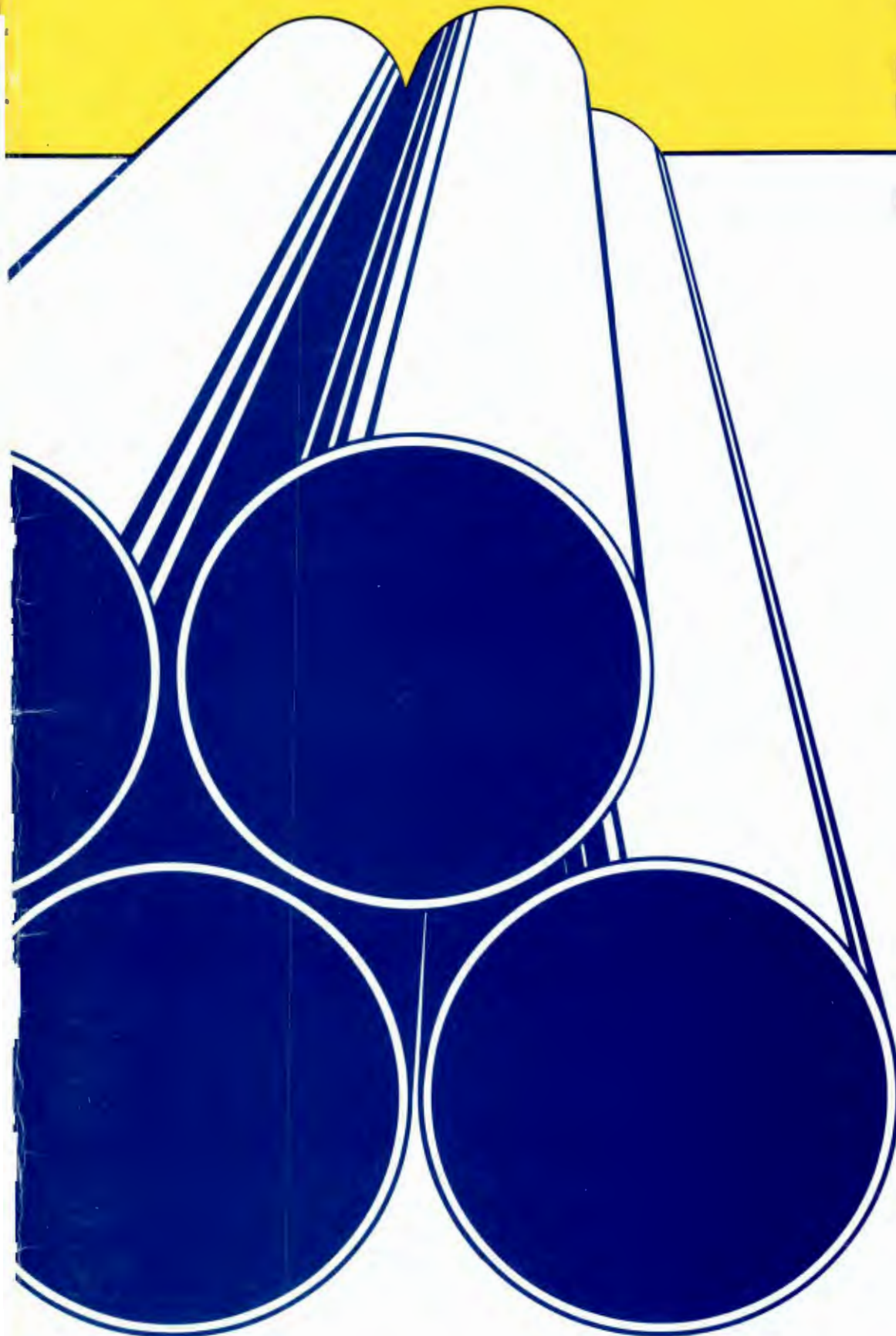


**Minnesota
Commission on
Pipeline Safety**

Findings and
Recommendations

December 1986



**MINNESOTA COMMISSION
ON PIPELINE SAFETY**

Findings and Recommendations

December 1986

Prepared by the Minnesota Department of Energy and
Economic Development, Policy Analysis Division.

The Minnesota Office of the Attorney General, the
State Planning Agency, the Pollution Control Agency,
and the Minnesota Departments of Public Safety and
Transportation provided staff support and other
assistance to the work of the commission.

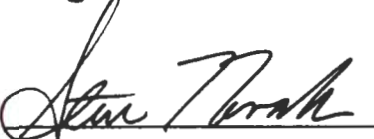
**The Honorable Rudy Perpich
Governor
State of Minnesota**

Governor Perpich:

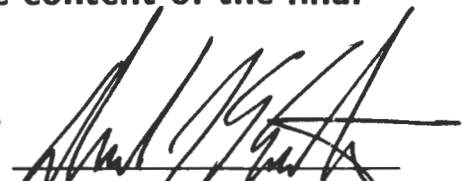
Transmitted herewith are the findings and recommendations developed by the Minnesota Commission on Pipeline Safety, fulfilling your charge to examine the safety and reliability of pipelines operating in Minnesota. The findings and recommendations address these specific concerns and other problems identified by the Commission during its four months of investigation and deliberation.

The recommendations suggest actions for state, local, and federal government, as well as for members of the pipeline industry. If implemented, we believe they will significantly improve the safety of Minnesota's citizens.


We the undersigned support and concur with the content of the final findings and recommendations.

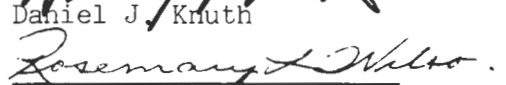

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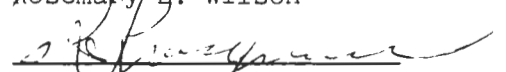

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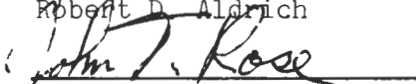

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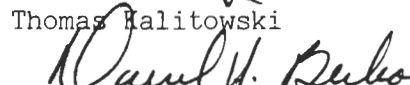

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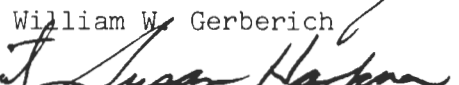

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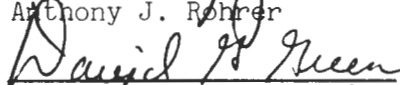

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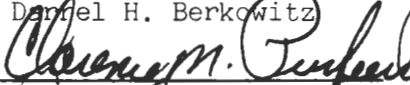

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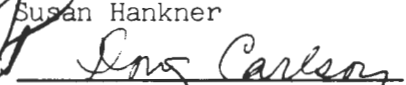

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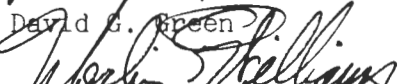

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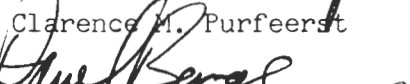

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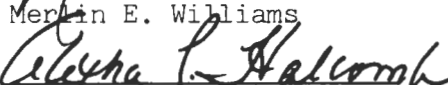

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EXECUTIVE SUMMARY

Governor Perpich established the Minnesota Commission on Pipeline Safety in July 1986 in the aftermath of a pipeline rupture and fire that took two lives in the community of Mounds View. The commission's charge was to investigate all aspects of the safety of pipelines operating in Minnesota, as well as the reliability of energy supplies transported by pipelines. Due to broad public concern raised by the accident, the commission elected to meet intensively over a four-month period and to complete their recommendations before the beginning of the 1987 session of the Minnesota Legislature in January.

The complete findings and recommendations of the commission are presented in Chapter 1 of this report and are divided into five general areas of pipeline safety. The topic areas include:

1. Steps to improve emergency response to pipeline leaks and spills,
2. Methods for reducing accidents caused by third-party dig-ins,
3. Federal and state pipeline inspection programs,
4. Government standards for existing pipelines, and
5. Government requirements for new pipeline design, construction and routing.

Federal, State and Local Roles in Pipeline Safety

Under the current division of federal, state and local authority, each level of government is responsible for various aspects of pipeline safety. The commission's recommendations are, therefore, directed at one of the three levels of government.

A principal factor determining the form of the recommendations is the dominant role of the federal Department of Transportation in pipeline regulation. Federal statutes specifically prohibit states from setting safety standards for interstate pipelines. States can be certified by the department to conduct their own inspection programs as an agent of the federal government. If state programs meet federal guidelines on qualifications of inspectors and thoroughness of the inspection program, then the department may authorize greater latitude for inspection of intrastate pipelines. The higher level of certification permits states to carry out their own enforcement actions and establish more stringent standards than required by federal regulation.

State participation in the inspection of interstate pipelines is very limited. Federal statutes do not permit the higher level of certification for state inspection and enforcement actions. In addition, the Department of Transportation has certified only 11 states to inspect interstate natural gas pipelines as an agent of the federal government. No states are currently certified to inspect interstate petroleum pipelines.

Recommendations for Federal Pipeline Inspection and Regulation

The Minnesota Commission on Pipeline Safety has concluded that the federal government should give states greater latitude in the regulation

of interstate pipelines. Maintaining a single federal regulatory authority for interstate pipelines may be more efficient than shared state/federal responsibility, but states have an overriding responsibility for the safety and welfare of their residents. Therefore, the commission makes the following recommendations (the number in parentheses following the recommendation is its number in the full set of Findings and Recommendations):

- Congress should direct the federal Department of Transportation to play an affirmative role in helping states develop inspection programs for interstate natural gas and hazardous liquid pipelines. (3.1)
- Congress should amend the Natural Gas Pipeline Safety Act of 1968 and the Hazardous Liquid Pipeline Safety Act of 1979 to give states authority to establish regulations for interstate pipelines as long as they are not inconsistent with federal regulations. (3.4)

In addition to overseeing greater inspection of pipelines at the state level, the commission recommends that federal inspection efforts be increased significantly.

- In those states that are not acting as an agent of the federal Department of Transportation, Congress should increase the number of federal inspectors to a level sufficient to inspect each interstate pipeline once per year. (3.2)

Additional recommendations on more stringent safety regulations for new and existing pipelines are summarized in the following section, which identifies recommendations intended for either federal or state implementation.

Seven issues addressed by the commission would require additional study before sufficiently well advised actions can be taken. Such research or study can be most effectively conducted at the federal level, and the commission recommends that a number of specific issues be given further attention.

- The federal Department of Transportation should develop and maintain a comprehensive database of all pipeline spills, leaks and testing, based on annual reports submitted by pipeline operators. (3.8)
- The National Transportation Safety Board should conduct a comprehensive study of longitudinal seam failures in electric resistance welded pipelines. (4.5)
- The federal Department of Transportation and the NTSB should sponsor or conduct increased research on pipeline safety technologies. The topics that should receive priority for further study include 1) incorporating new test procedures, such as standards for fracture toughness, into standards for pipeline materials, 2) using higher test pressures during hydrostatic testing to increase safety margins, and 3) improving and applying

test procedures currently being developed to evaluate the integrity of existing pipelines. (4.6)

- The federal Department of Transportation should, in general, upgrade regulations covering hazardous liquid pipelines to be comparable in stringency and thoroughness to regulations covering natural gas pipelines. (4.7)

Two recommendations relate specifically to additional study on two aspects of design and construction for new pipelines.

- The federal Department of Transportation should conduct extensive safety and economic analyses of seamless, single wall-welded, double casing, and reservoir pipeline systems. (5.5)
- The federal Department of Transportation should study the need for additional registration, licensing and certification requirements for pipeline design and construction personnel. (5.6)

More Stringent Federal or, if Authorized, State Regulations

The Minnesota Commission on Pipeline Safety urges Congress and the federal Department of Transportation to adopt the following recommendations to improve public education efforts and the safety of new and existing pipelines. If Congress amends current federal law to permit state standards for interstate pipelines, Minnesota should consider adopting these standards at the state level.

Requirements for increased public education would help to increase emergency preparedness in the event of a pipeline spill or leak and would reduce accidents caused by third-party dig-ins.

- Minnesota should draft state legislation or support the current federal effort to enact "right-to-know" provisions which require pipeline companies to increase efforts directed toward community awareness of pipeline locations, operations, testing and inspection. (1.4)
- The federal Department of Transportation or the State of Minnesota should establish requirements for continuing public education programs to be carried out by pipeline companies. (2.3)

Hazardous liquid pipelines often extend through populated and environmentally sensitive areas. More stringent regulations are needed to assure the safe operation of pipelines in these areas.

The federal Department of Transportation, or the State of Minnesota if authorized, should establish stricter standards for existing pipelines.

- The standards should require higher safety margins for operating pressures on hazardous liquid pipelines located in populated or environmentally sensitive areas. (4.1)
- The standards should require that pipeline companies submit comprehensive reports on the condition of each pipeline once

every one to four years, depending on the pipeline's location and other characteristics. Based on the reports, the pipeline company should be required to conduct appropriate tests (hydrostatic testing, instrumented [smart] pigs, etc.). (4.2)

- Pipeline operators should prepare contingency plans for the abandonment or utilization of pipelines that do not perform to the standards of federal regulations. (4.3)
- The standards should require that hazardous liquid pipeline operators take steps to improve their ability to rapidly locate and isolate pipeline leaks or spills. These steps should include:
 - a. Installation of remote-control shut-off valves at regular intervals along the pipeline.
 - b. Installation of remotely monitored pressure gauges and flow meters at regular intervals, and
 - c. More specific emergency response procedures and training for locating and isolating leaks and spills as rapidly as possible. (4.4)

More stringent requirements for new pipelines, whether implemented at the federal level or by permitting states to set standards, present an opportunity for use of improved pipeline materials, close monitoring of construction, and other steps to reduce the potential for safety problems.

- The federal Department of Transportation, or the State of Minnesota if authorized, should review and update existing standards for pipe manufacture, pipeline construction and pipeline operation, incorporating new developments that represent the "best available technology." (5.1)
- The federal Department of Transportation should be required to conduct regular site inspection of pipeline construction projects to ensure that federal standards are being met.
- Congress should amend federal statutes to permit states to inspect interstate pipeline construction as an agent of the federal Department of Transportation. If authorized, Minnesota should implement a program, through the Department of Labor and Industry, Division of Code Enforcement, for inspecting pipeline construction. (5.2)
- Whether federal or state, new standards should require remote shut-off valves on all new lines. (5.3)
- The federal Department of Transportation and the State of Minnesota should closely monitor the development of reliable technologies that can detect and locate pipeline leaks and spills. Any successful technology should be incorporated into new standards. (5.4)

State Legislation, Requirements and Programs

State government has clear authority in several areas of pipeline safety. These areas include coordination of emergency response to pipeline leaks, adoption of legislation to reduce third-party accidents and establishment of a state office of pipeline safety.

A number of actions at the state and local level would help to increase the speed and effectiveness of emergency response to pipeline accidents. One area of concern involves communication linkages between individuals who report a spill or leak, municipal and county emergency response personnel, appropriate state agencies, and the pipeline company. The commission recommends the following steps to improve communications and reduce the required response time to pipeline spills or leaks:

- Enact a statute which requires pipeline companies to notify the state duty officer at the Minnesota Department of Public Safety immediately if they believe that product is escaping from their pipeline.

Implement a system to disseminate advisory and warning information to potentially affected communities in the event of a reportable pipeline spill, leak or other failure that may result in a release of product.

Any statute passed which requires notification should also provide for appropriate and substantial fines or criminal penalties for failure to make the required notification. (1.1)

- Promote and implement the use of 911 as the appropriate number for the public to call if they discover a leak or spill.

Provide the state duty officer and emergency communication center with enhanced capability to coordinate the response of state resources and provide fast, accurate response information to local jurisdictions and the pipeline company. (1.2)

- Enact a statute which provides penalties for the removal or vandalism of pipeline right-of-way markers. (1.6)

A second area of concern is the ability of communities to respond effectively to the particular hazards and characteristics of pipeline accidents.

- The state should provide training in pipeline incident contingency planning and emergency response to all potentially affected communities on a regular basis. Pipeline companies would participate in these programs, which would include training and financial support. (1.3)
- The state should mandate all local units of government traversed by a pipeline to develop an emergency response plan. (1.5)

Third-party damage to pipelines by construction firms and individuals accounts for a substantial share of all pipeline accidents.

State-mandated one-call systems provide contractors and individuals with a single number to call to check for all underground utilities. These systems, along with associated damage prevention laws, are widely recognized as an effective method of reducing third-party dig-ins.

- Minnesota should adopt legislation which requires pipeline companies and all other underground utility owners to be members of a statewide one-call system. (2.1)
- Minnesota should adopt an underground utility damage prevention law which requires all persons, prior to excavation, demolition or blasting, to ascertain the location of all underground utilities that would be affected. (2.2)

Although the federal Department of Transportation has primary responsibility for regulation of pipeline safety, Minnesota can take steps to increase the scope of its current inspection activities. The Minnesota Department of Public Safety, Fire Marshal Division, currently employs three inspectors who staff the state inspection program for intrastate natural gas pipelines. Strengthening this program and placing it within an office of pipeline safety would increase Minnesota's ability to take responsibility for pipeline safety. After meeting challenges permitted by current state authority, the office could begin to monitor federal inspection of Minnesota's interstate pipelines and could also seek certification for inspecting interstate pipelines.

- Minnesota should seek to meet the conditions for inspecting interstate pipelines as an agent of the federal Department of Transportation. The state program should maintain staffing at a level sufficient to complete annual comprehensive inspections of both intrastate and interstate pipelines in Minnesota. (3.2)
- The Minnesota legislature should establish an office of pipeline safety in the Department of Public Safety responsible for the state inspection program, monitoring and reporting on the implementation of federal pipeline standards and regulations, coordination of emergency response activities, and implementation of state policies to reduce third-party accidents. (3.5)
- The office of pipeline safety should be advised by a pipeline safety commission made up of technical experts and representatives from the pipeline industry, state government and the public. (3.6)
- Minnesota should establish regulations governing the disposal and testing of removed pipeline sections that have experienced failure in the state. (3.9)

An effective pipeline inspection program requires inspectors with extensive knowledge of pipeline operations and pipeline safety. Therefore, the commission supports the implementation of two recommendations on qualifications of state inspectors.

- Individuals hired after Jan. 1, 1987, as inspectors for Minnesota's pipeline safety inspection program should have

engineering degrees from accredited engineering schools and be registered engineers with at least three years' experience in the pipeline industry or have more than 10 years of employment experience that demonstrates in-depth knowledge of pipeline engineering technology and pipeline safety. (3.10)

- Minnesota's pipeline safety inspection program should maintain a policy of having state inspectors complete courses at the Transportation Safety Institute and become certified as soon as possible. (3.11)

Two concerns involving licensing of pipeline construction personnel and routing of new pipelines to avoid populated and environmentally sensitive areas can be addressed at the state level.

- Minnesota should require the licensing of personnel involved in the repair or expansion of existing pipelines or the construction of new pipelines in the state. (5.6)
- The Minnesota Environmental Quality Board should be given pipeline routing control authority at the same level as its existing powerline routing authority. (5.7)

Finally, the state can encourage the adoption of a comprehensive and unified source of industry standards for pipeline safety.

- The State of Minnesota and its federal congressional representatives should encourage the American National Standards Institute Inc. to develop and publish a "National Pipeline Safety Code." (5.8)

In order to assure that adequate funding for pipeline safety can be maintained, the commission recommends that both Minnesota and the federal government recover program costs directly from the pipeline industry.

- Congress and the Minnesota Legislature should fund increased inspection and related activities entirely through user fees paid by pipeline operators. (3.7)

Local Government Responsibilities

The principal area in which the commission's recommendations affect local government responsibilities is emergency response and communication, which is discussed in the above section on state responsibilities. These recommendations provide for more rapid and complete information to local emergency response personnel, more ongoing information to local governments from pipeline companies, requirements for local contingency planning, and the support and participation of pipeline companies in training for local emergency service departments.

The commission also supports the adoption of local setback requirements from pipeline right-of-ways.

Local units of government should adopt zoning regulations requiring a setback from pipelines in areas zoned for residential or other

development, with provision for variances based on other setback requirements. (4.8)

While local city and county governments do not have a role in the regulation and inspection of pipelines, their responsibility for emergency response and the concern for the safety of their residents give them a strong interest in pipeline safety.

Corporate Responsibility for Pipeline Safety

In addition to its numerous recommendations to federal, state and local governments, the commission provided its view on appropriate safety performance by the Williams Pipeline Co. and the pipeline industry in general:

- Williams should undertake an aggressive program to meet or exceed current industry standards for a) public information; b) emergency response and communication; and c) pipeline construction, maintenance and repair.
- The pipeline industry, in general, should consider government requirements to be minimum, rather than maximum, standards. When public safety is at issue, the industry should attempt to exceed government requirements for pipeline operating and construction standards, materials performance, and public education and information.

These recommendations reflect the fact that pipeline safety is ultimately the responsibility of the pipeline industry and individual pipeline companies. Without continued efforts and improvements within the industry, successful government oversight of this important public concern would not be possible.

Conclusion

Minnesotans were shocked that a pipeline rupture and fire of such magnitude as the Mounds View incident could occur literally in their backyards. Residents and public officials need to know what can be done to keep such a serious accident from taking place again. The recommendations adopted by the Minnesota Commission on Pipeline Safety are intended to provide a first step in responding to this previously unrecognized public concern.

Pipeline safety has proved to be a complex subject, both in terms of its highly technical nature and the relationships among many different governments and pipeline companies. Nevertheless, the many recommendations included in this report demonstrate that steps can be taken to insure the safe operation of Minnesota's pipeline system.

FINDINGS AND RECOMMENDATIONS **OF THE COMMISSION**

BACKGROUND

The purpose of the Minnesota Commission on Pipeline Safety was not to investigate the Williams Pipeline Co. explosion in Mounds View July 8. Nevertheless, this incident created the impetus for forming the commission and continued to be an area of interest for the commission throughout its deliberations.

Testimony before the commission and at National Transportation Safety Board (NTSB) hearings indicated the following:

- 1) From 1980 through 1986, the Williams pipeline system accounted for seven of nine pipeline leaks in Minnesota, in excess of 10,000 gallons, that were not attributable to third-party damage.
- 2) One hour and 40 minutes passed from the time the emergency alarm sounded alerting the Mounds View Fire Department of the spill before the pipeline valve at milepost 10 was turned off. This allowed thousands of gallons of gasoline to back flow, feeding the fire.
- 3) On July 8, Williams officials did not notify the Mounds View fire chief of the spill.
- 4) Based on presentations to the commission, Williams' public information and education programs are not as extensive as Lakehead, Northern or Mid-America pipelines' efforts.
- 5) Testimony and exhibits received by the NTSB revealed that Williams was aware that the level of cathodic protection on the No. 2 eight-inch pipeline through Mounds View was below the company's criteria of .85 volts. This condition was indicated in cathodic protection surveys conducted by the company from 1980 through 1985.
- 6) The explosion and fire in Mounds View occurred slightly more than 20 minutes after instruments gave Williams the first indication that something was wrong with the Roseville-Superior pipeline. At no time prior to the explosion and fire did the pipeline company give any warning to communities along the line that there might be a leak of gasoline in their jurisdiction.

Based on the evidence cited above and other evidence received during four months of hearings and deliberations, the commission developed the findings and recommendations for federal, state and local government action delineated in Sections 1 through 5 of this report.

In addition, the commission has the following recommendations for the Williams Pipeline Co. and the pipeline industry:

- Williams should undertake an aggressive program to meet or exceed current industry standards for a) public information; b) emergency

response and communication; and c) pipeline construction, maintenance and repair.

- The pipeline industry, in general, should consider government requirements to be minimum standards, rather than maximum requirements. When public safety is an issue, the industry should attempt to exceed government requirements for pipeline operating and construction standards, materials performance, and public education and information.

SECTION 1
EMERGENCY RESPONSE

LEAK NOTIFICATION MECHANISM

Finding

- There is no adequate mechanism in place for expeditiously transmitting information regarding a pipeline leak or spill to the communities which may be affected by it.

The explosion and fire in Mounds View occurred slightly more than 20 minutes after instruments gave Williams the first indication that something was wrong with the Roseville-Superior pipeline. At no time prior to the explosion and fire did the pipeline company give any warning to communities along the line that there might be a leak of gasoline in their jurisdiction.

Currently, many hours often elapse between the time that a pipeline company is aware of a leak and the first notification to any unit of government. The need for timely advisory or warning information was expressed by communities and their public safety officials throughout the testimony presented to the commission.

Recommendation

- 1.1 Enact a statute which requires the pipeline companies to notify the state duty officer at the Minnesota Department of Public Safety immediately if they believe that product is escaping from their pipeline.

Implement a system to disseminate advisory and warning information to potentially affected communities in the event of a reportable pipeline spill, leak or other failure that may result in a release of product.

Any statute passed which requires notification should also provide for appropriate and substantial fines or criminal penalties for failure to make the required notification.

Due to the many jurisdictions potentially affected by each pipeline segment in the state, it would not be possible for a pipeline operator to directly contact all potentially affected communities in the event of a leak or spill. The best means of accomplishing this type of notification would be to require, through legislation, that the pipeline companies contact a single state answering point capable of providing the necessary response and notifications.

The Department of Public Safety Division of Emergency Services provides an on-call state duty officer to

handle calls coming into the statewide emergency number, coordinating State of Minnesota responses to a variety of emergency situations. In striving for a single state number to contact for all emergency notifications and assistance, the duty officer would be the most appropriate single contact for emergency response and notification. Upon receiving notice from a pipeline company that a hazard might exist, the duty officer could then notify all appropriate state and local agencies.

The Bureau of Criminal Apprehension, within the Department of Public Safety, operates the Criminal Justice Information System computer which is tied in to all county sheriffs' dispatching points and the dispatching centers of communities with populations greater than 7,500. This system has the ability to send messages either statewide or to predetermined regions virtually instantly 24 hours per day. It has been successfully used for some time to disseminate severe weather advisories to locally staffed public safety dispatching centers. It could be used with very little difficulty to provide pipeline information to communities. The duty officer, after notification by the pipeline company, could contact the BCA to have a message transmitted to the appropriate communities.

In order to provide timely and effective response, however, the state duty officer program should be enhanced by the provision of a full-time state emergency resource and communications center. Currently, the duty officer maintains an on-call status by the limited use of a pager and forwarding the state emergency number to their place of residence. In the event of an incident where a few minutes can be critical, the lack of advanced communication facilities and resource materials posed by this situation can provide obstacles to optimum response time and adequacy.

PUBLIC REPORTING MECHANISM

Finding

- There is often confusion regarding how to contact the appropriate responders from the pipeline company and the state when a pipeline leak is discovered by persons other than pipeline company representatives.

Generally, markers must be found and calls placed to remote dispatching locations in other states unfamiliar with the specific locale of the pipeline incident. This problem can be compounded by shared pipeline

rights-of-way which may contain multiple lines operated by different companies.

Recommendation

1.2 Promote and implement the use of 911 as the appropriate number for the public to call if they discover a leak or spill.

Provide the state duty officer and emergency communication center with enhanced capability to coordinate the response of state resources and provide fast, accurate response information to local jurisdictions and the pipeline company.

Minnesota Statutes Chapter 403 sets forth a requirement for statewide implementation and availability of 911 emergency communication by Dec. 15, 1986. Currently, slightly more than 80 percent of the state's population is covered by 911 service. Another 17 percent of the population has 911 on order or undergoing installation. At this time it appears that the only pipeline-containing area which does not plan to implement 911 service is Red Lake County.

Enhancement and promotion of the state duty officer position as discussed in the previous recommendation could provide one-call assistance to all Public Safety Answering Points (the centers accessed by any 911 call). Data communication could be provided which would link the state emergency communication center with data bases developed by the state one-call system or a state office of pipeline safety, if one was established.

LOCAL OFFICIAL TRAINING

Finding

- Training in both pipeline incident response and contingency planning must be made more available to communities which may be involved with pipeline incidents either directly or through mutual aid agreements.

Communities and their emergency responders have expressed a need for more training in pipeline incident emergency response and also for assistance in planning and resources for community preparedness.

Recommendation

1.3 The state should provide training in pipeline incident contingency planning and emergency response to all potentially affected communities on a regular basis. Pipeline companies would participate in these programs, which would include training and financial support.

Currently there exist a number of programs designed to train communities and their emergency responders in contingency planning and response. These programs are provided by the Division of Emergency Services, a number of vocational and technical schools, the U.S. Environmental Protection Agency's Chemical Emergency Preparedness Program and by a variety of private consulting concerns. Few, if any, deal specifically with the situation of pipeline incident response and contingency planning. These courses should be developed and targeted to the communities which could find themselves in a pipeline response situation.

PUBLIC INFORMATION REQUIREMENTS

Findings

- Communities must be made more aware and be kept better informed regarding the presence and operation of pipelines which may affect their jurisdiction.

With little more than the markers required at road crossings, many of the communities affected and their residents are unfamiliar with the locations, contents and operations of the pipelines in their neighborhoods.

- Currently, there are two bills before Congress which address the issue of community notification and communication with respect to pipeline operations.

Recommendation

- 1.4 Draft state legislation and/or support the current federal effort to enact "right-to-know" provisions which require pipeline companies to increase efforts directed toward community awareness of pipeline locations, operations, testing and inspection.

On a regular basis, pipeline companies would be required to establish contact with the fire department and public safety agency of communities affected and make them aware of the detailed location and operation of the pipeline, including advance notice of pipeline testing and provision of the results of said testing. Other required information should include the pipeline company's operations, maintenance and emergency manual, updated as appropriate. Additionally, detailed and accurate maps of pipeline locations and appurtenances would be filed with the state and offices of the recorder and sheriff in all affected Minnesota counties.

LOCAL GOVERNMENT EMERGENCY RESPONSE PLANS

Finding

- In their testimony to the commission, emergency response personnel and local government representatives have reported that communities vary widely in their preparedness for catastrophic pipeline failures. The number of residents served by an emergency service department, the level of financial support and other factors affect whether a community has prepared an effective plan of action for such extraordinary emergencies.

Recommendation

- 1.5 The state should mandate all local units of government traversed by a pipeline to develop an emergency response plan.

The Division of Emergency Services administers and assists with emergency preparedness and civil defense planning in accordance with the powers and duties set forth in Minnesota Statutes Chapter 12. Certain state and federal programs require that the emergency plans of virtually all Minnesota counties be reviewed and updated annually. The counties in turn coordinate emergency planning for their municipalities. This existing emergency planning network could be utilized to provide the assistance necessary for the required plans.

PROTECTION OF PIPELINE RIGHT-OF-WAY MARKERS

Findings

- Pipeline right-of-way markers are often vandalized or removed, increasing the likelihood of third-party damage and adding to the difficulty in obtaining aid in the event of a release.

In the course of testimony, pipeline company officials expressed concern regarding the vandalism and removal of pipeline markers.

Right-of-way markers are the primary means of making the presence of a pipeline known to communities and contractors. Additionally, they provide necessary information to the responders and the pipeline companies in the event of a product release.

Recommendation

- 1.6 Enact a statute which provides for penalties in cases involving the removal or vandalism of pipeline right-of-way markers.

The current federal statutes and rules governing pipeline operation contain no provision which explicitly protects pipeline right-of-way markers. Further, the penalty language which protects pipeline facilities does not appear to apply to the markers.

Since life safety issues are involved, it would seem appropriate to provide pipeline markers with protection similar to that afforded to traffic signs. Minnesota Statutes Chapter 160.27 states (paraphrased) that it is a misdemeanor to deface, mar, damage or tamper with any highway sign. This statutory language could be readily adapted to serve the function of protecting pipeline markers.

SECTION 2

METHODS FOR REDUCING THIRD-PARTY ACCIDENTS

General Findings

- Third-party damage to pipelines (damage done to pipelines and other underground services by excavators, contractors and other owners of underground facilities) accounts for a significant percentage of pipeline accidents.
- Statistics compiled by the Office of Pipeline Safety, the State Fire Marshal, the Pollution Control Agency and pipeline companies indicate that as many as one half or more of pipeline accidents are caused by third-party damage.
- Third-party damage is one of the leading causes of damage to all other underground utility services, including electricity, natural gas, communications, cable, wires, sewer and water.

Third-party damage which ruptures a pipeline or other underground service facility may result in fire, explosion, personal injury, property damage, project delay, financial losses for small business and environmental damage, and presents a threat to public safety and well-being.

ONE-CALL SYSTEM

Findings

- Third-party accidents may be avoided by excavators, contractors and owners and operators of underground services by notifying the appropriate company or utility of an intent to excavate.

By notifying the appropriate company of intent to excavate or dig near its facility, that company assumes responsibility for accurately locating and marking its facility in a timely manner. However, it is often difficult for an excavator to know what utilities to contact for markings. In some instances, it may be necessary for the contractor to call as many as 15 different utilities to determine if they have facilities in the vicinity of the proposed excavation. The more numbers there are to call, the greater the chances that a utility will be overlooked, which could result in damage assessment against the contractor, an interruption of service or other undesirable consequences.

- A one-call system provides excavating contractors and other underground facility owners planning excavation using power equipment with a single telephone number to call 48 hours prior to digging.

Utilities belonging to a one-call system receive notification of intent to excavate and are required to mark their facilities.

Damage reduction of 35 to 80 percent has been reported by one-call members in other states. Notifications increase because facility owners no longer have to depend upon excavators to make all the necessary notifications. A single number can be promoted more effectively and with more impact. Service outages are minimized.

- One-call systems are supported by owners and operators of underground facilities, excavation contractors, insurance companies and businesses.

Underground facility owners and operators support one-call systems because they have proven themselves to be efficient and effective. One-call systems provide many benefits: the systems save time since there is only one number to call, save money by reducing incidents involving damage assessment, reduce the possibility of accidents caused by striking undetected below-ground facilities, allow better work scheduling, reduce damages that are causing increases in insurance rates, eliminate confusion about whom to call and provide for greater service continuity.

- Participation by all underground facility owners increases one-call system effectiveness, by assuring excavation contractors, one-call system members and others that they can expect timely and accurate marking of underground facilities.

Without a one-call system, the process of locating underground facilities before excavation is more costly, confusing and time-consuming for all parties. Some one-call systems also provide contractors with information on overhead lines to help them meet their responsibilities under state and federal safety standards.

- Information provided by the American Public Works Association indicates that 29 states have a one-call system. Four states have enacted legislation requiring all owners of underground facilities to belong to a one-call system. The one-call system in Michigan has 518 members and in California there are 807 members.

Recommendation

- 2.1 Minnesota should adopt legislation which requires pipeline companies and all other underground utility owners to be members of a statewide one-call system.

DAMAGE PREVENTION LAW

Findings

- Underground utility damage prevention laws are an effective method for reducing third-party damage to underground facilities.

Underground utility damage prevention laws define the requirements and responsibilities of underground utility owners, operators and excavators with respect to notification, location and marking requirements. These laws frequently provide for civil penalties for excavators who damage utility systems or do not use a one-call system. These laws also frequently provide for the formation of one-call associations. Licensing of excavators does not appear to be necessary where damage prevention laws are in place.

- Information provided by the American Public Works Association indicates that 35 states currently have some form of underground utility damage prevention law.

Recommendation

- 2.2 Minnesota should adopt an underground utility damage prevention law which requires all persons, prior to excavation, demolition and blasting, to ascertain the location of all underground utilities that would be affected.

Other components of an underground utility damage prevention act could require: 1) all underground utility operators to file a list of the locations of all their underground utilities in each county; 2) notice of intent to excavate, demolish and blast with the one-call system or utility operator association; 3) creation of a one-call system association to provide for mutual receipt of notifications of intent to excavate or demolish; 4) timely and accurate marking of underground utilities which may be damaged; 5) precautions to be taken to avoid damage by the excavator; 6) civil penalties for any violation of the act and a "hold harmless" agreement, which protects excavators from liability if they use the one-call system.

EXCAVATOR EDUCATION

Findings

- Continuing public education programs established by pipeline, electric, telephone and other companies are designed to encourage excavators, landowners, homeowners and others to determine the location of underground facilities before digging.

- Natural gas pipeline companies must comply with the federal requirements for damage prevention (Section 192.614).

Many owners and operators carry out written communication programs with local units of government, property owners, excavators and others to make them aware of the presence of their facilities. Operators and owners also make safety presentations to excavator groups and hold open houses to establish working relationships with excavators.

- Hazardous liquid pipeline requirements for public information are not as specific or rigorous as those for natural gas pipelines.

Recommendation

- 2.3 The federal Department of Transportation or the State of Minnesota should establish requirements for continuing public education programs to be carried out by owners and operators of natural gas and hazardous liquid petroleum pipelines.

Federal rules for natural gas and hazardous liquid pipelines specify that "Each operator shall establish a continuing education program" However, these public education programs, as evidenced by testimony presented to the commission, indicate that some public education programs are more comprehensive than others. A requirement for a uniform public education program for operators of natural gas and liquid petroleum pipelines would insure that all affected citizens receive the same level of information about pipelines, their hazards, and what to do when an incident occurs.

SECTION 3

PIPELINE INSPECTION PROGRAMS

INCREASED GOVERNMENT INSPECTION

Findings

- The original goal of the federal Department of Transportation was to conduct annual comprehensive inspections of all pipelines. However, limited resources and additional experience with the program have led the department to develop a less frequent set of targets.

As of October 1986 the department's Office of Pipeline Safety employed 18 inspectors nationwide and two inspectors in its 10-state north central region. An increase to four inspectors in the north central region is planned for 1987. According to a 1984 report by the General Accounting Office, this level of staffing permits a comprehensive inspection of each pipeline once every four years.

The Department of Transportation has recently established a set of targets for frequency of inspection that vary according to the size of the pipeline operator and the presence of past safety problems. At least some portions of large pipeline operators' systems are to be inspected annually, and problem companies could be inspected twice annually. The overall frequency of inspections would average once every two to three years.

- The recent proliferation of hazardous liquid pipeline accidents in Minnesota that are not attributable to third-party damage demonstrates that Minnesota citizens are not being adequately protected by current inspection efforts.

The Minnesota Pollution Control Agency requires that hazardous liquid pipeline operators report all leaks. Their records show that pipelines currently in service have experienced nine leaks of more than 10,000 gallons since 1980 for reasons other than third-party accidents.

The Williams pipeline accident in a residential area of Mounds View July 8 resulted in the loss of two lives, demonstrating the serious hazards posed by pipelines. The resulting fire continued for more than three hours, and more than 22,000 gallons of gasoline were released into areas adjacent to the pipeline rupture.

The lack of adequate cathodic protection on the first 10 miles of the Williams pipeline between Roseville and Duluth is an example of the need for frequent pipeline

inspections. The National Transportation Safety Board is currently examining failure of the pipeline segment to consistently meet safety standards for cathodic protection since 1980. During this entire six-year period the federal Department of Transportation took no enforcement actions against Williams to correct the cathodic protection problem.

- The Minnesota Fire Marshal Division is responsible for inspecting intrastate natural gas pipelines in Minnesota. The division employs three inspectors and is able to perform an annual comprehensive inspection of each intrastate natural gas pipeline operator.

Recommendations

- 3.1 Congress should direct the federal Department of Transportation to play an affirmative role in helping states develop inspection programs for interstate natural gas and hazardous liquid pipelines. A state whose program meets the department's requirements would be permitted to inspect interstate pipelines as an agent of the federal Department of Transportation, as is currently provided for in federal statutes.
- 3.2 Minnesota should seek to meet the conditions for inspecting interstate pipelines as an agent of the federal Department of Transportation. The state program should maintain staffing at a level sufficient to complete annual comprehensive inspections of both intrastate and interstate pipelines in Minnesota.
- 3.3 In those states that are not acting as an agent of the federal Department of Transportation, Congress should increase the number of inspectors employed by the federal Department of Transportation to a level sufficient to comprehensively inspect each interstate pipeline once per year.

STATE SAFETY STANDARDS

Finding

- Authority for states to independently set higher safety standards for interstate pipelines is largely preempted by federal statute.

Recommendation

- 3.4 Congress should amend the Natural Gas Pipeline Safety Act of 1968 and the Hazardous Liquid Pipeline Safety Act of 1979 to give states authority to establish regulations for interstate pipelines as long as they are not inconsistent with federal regulations.

Once established, state inspection programs for interstate pipelines should not be entirely dependent on federal regulations. Well informed differences of viewpoint exist over the appropriateness of making some

standards more stringent. In addition, changes in technology require that old standards be updated and create opportunities for new methods of increasing pipeline safety. Some states that develop expertise in pipeline safety would be able to take advantage of these opportunities more quickly than would take place at the federal level.

STATE OFFICE OF PIPELINE SAFETY

Finding

- Responsibility for regulations affecting pipelines and emergency response to pipeline spills and leaks in Minnesota is shared by local government and several state departments, with very little coordination of the various pipeline safety functions.

Recommendations

- 3.5 The Minnesota Legislature should establish an office of pipeline safety in the Department of Public Safety responsible for the state inspection program, monitoring and reporting on the implementation of federal pipeline standards and regulations, coordination of emergency response activities, and implementation of state policies to reduce third-party accidents.
- 3.6 The office of pipeline safety should be advised by a pipeline safety commission made up of technical experts and representatives from the pipeline industry, state government and the public.

FUNDING THROUGH USER FEES

Finding

- Both the federal Department of Transportation and the Minnesota Fire Marshal Division have recently moved to funding their inspection programs through user fees paid by the pipeline industry. Adoption of user fees helps to assure that adequate funding for pipeline safety can be maintained without competing with other programs for general tax revenues.

Recommendation

- 3.7 Congress and the Minnesota Legislature should fund increased inspection and related activities entirely through user fees paid by pipeline operators.

The user fees may include an annual flat fee per operator and a variable component based on miles of pipeline or other factors. The method used should distribute costs equitably and should not create an undue administrative burden.

SYSTEMATIC INFORMATION ON PIPELINE LEAKS AND SPILLS

Findings

- The national data base on pipeline leaks maintained by the federal Department of Transportation is inadequate for analyses of key factors related to the cause of leaks. The data base is limited to leaks that cause substantial property loss, injury or death, excluding information on the large majority of potentially serious leaks.
- Pipeline companies often dispose of pipeline sections that have failed in service before complete metallurgical testing has been performed. This practice can lead to the loss of vital information on potentially systematic problems present in a pipeline. Extensive metallurgical tests prior to disposal are consistently performed only when the pipeline spill or leak has resulted in substantial property loss, injury or death.

Recommendations

- 3.8 The federal Department of Transportation should develop and maintain a comprehensive database of all pipeline spills, leaks and testing, based on annual reports submitted by pipeline operators.

The annual reports should include for each pipeline leak or spill the type and quantity of product lost; the state, county and county subdivision of occurrence; the cause of the leak or spill; type and age of pipeline; and date of occurrence.

- 3.9 Minnesota should establish regulations governing the disposal and testing of removed pipeline sections that have experienced failures in the state.

Pipeline operators should be required to seek state approval for disposal of pipeline sections. Approval should be based on whether additional test information could potentially be useful at a future time.

LICENSING OF STATE PIPELINE INSPECTORS

Findings

- An effective pipeline inspection program requires inspectors who have extensive knowledge of pipeline operations and all aspects of pipeline safety. They must also be trained in the application of inspection procedures and pipeline safety standards.
- Training for pipeline safety inspection is available at the Transportation Safety Institute operated by the federal Department of Transportation in Oklahoma City.

State pipeline inspectors must successfully complete a series of training courses over a six-year period to be certified by the federal Department of Transportation. States use the training and resulting certification to ensure that their inspectors are fully qualified.

Recommendations

- 3.10 Individuals hired after Jan. 1, 1987, as inspectors for Minnesota's pipeline safety inspection program should have engineering degrees from accredited engineering schools and be registered engineers with at least three years' experience in the pipeline industry or have more than 10 years of employment experience that demonstrates in-depth knowledge of pipeline engineering technology and pipeline safety.
- 3.11 Minnesota's pipeline safety inspection program should maintain a policy of having state inspectors complete courses at the Transportation Safety Institute and become certified as soon as possible.

SECTION 4

STANDARDS FOR EXISTING PIPELINES

HIGHER STANDARDS FOR OPERATING PRESSURES

Findings

- Safety hazards for existing pipelines are much greater in urban areas, where residential neighborhoods, highways and other development coexist with pipeline right-of-way. Greater emphasis needs to be placed on increasing the margin of safety for pipelines in developed areas.
- Hazardous liquid pipeline spills and leaks result in a number of serious adverse environmental impacts. Petroleum products can contaminate ground water supplies, creating a threat to health if undetected, and resulting in substantial costs for finding alternative sources of potable water. Reclamation of contaminated topsoil can be costly and can require many years before the area is fully restored. Petroleum products entering lakes, rivers or wetlands can cause extensive environmental damage. Impacts on wildlife habitat can be pronounced.

Because natural gas disperses into the atmosphere, the environmental impacts of natural gas leaks are not a serious concern when compared to hazardous liquid pipeline spills.

- Federal policies require that operating pressures on hazardous liquid pipelines remain below 80 percent of maximum pressures established by hydrostatic testing. Federal and industry standards do not specify that this margin of safety should be higher for pipelines located in urban areas.
- Federal regulations and industry guidelines require more stringent standards for natural gas pipelines in urban areas. If sufficient development occurs adjacent to a natural gas transmission line, the pipeline operator must adhere to a higher safety margin for operating pressures and may need to undertake capital expenditures to meet the more stringent requirements.

Recommendation

- 4.1 The federal Department of Transportation, or the State of Minnesota if authorized, should require higher safety margins for operating pressures on hazardous liquid pipelines located in populated or environmentally sensitive areas.

A pipeline could be considered to be located in a "populated area" if one of the following criteria is met:

- 1) There are 46 or more buildings intended for occupation in an area that extends 220 yards on either side of a one-mile length of the pipeline.
- 2) The pipeline lies within 100 yards of a building that is occupied by 20 or more persons during normal use or a small, well defined outside area that is occupied by 20 or more persons during normal use, such as a playground or recreation area.

A pipeline could be considered to be located in an "environmentally sensitive" area if a pipeline spill or leak would either:

- 1) adversely impact an endangered species whose habitat is located adjacent to the pipeline; or
- 2) contaminate a ground water recharge area of particular resource value.

Pipeline operators would meet the above standards by 1) hydrostatically testing pipelines at higher pressures, where permitted by federal requirements, or 2) reducing operating pressures and, if necessary, installing additional pumping stations or other capital improvements to restore capacity.

REQUIRED TESTING OF PIPELINES

Finding

- Pipeline operators need to periodically conduct tests to verify that the condition of their hazardous liquid and natural gas transmission lines have not deteriorated and to locate any weak spots that might eventually rupture during normal operation. Test procedures (hydrostatic testing, smart pigs, etc.) are used most extensively after a pipeline accident has caused death or injury. Increased emphasis should be given to testing as a means of preventing accidents from taking place.

Recommendations

- 4.2 The federal Department of Transportation, or the State of Minnesota if authorized, should 1) require that pipeline operators periodically submit comprehensive reports on the condition of their hazardous liquid and natural gas transmission pipelines, 2) require appropriate testing based on concerns identified in the reports, and 3) apply these requirements much more rigorously to transmission pipelines in populated or environmentally sensitive areas.

The comprehensive reports should be required at least once every four years for pipelines less than 15 years old up to annually depending on age, type of pipeline, incidence and nature of leaks and spills, and

population densities adjacent to the pipeline. The reports should cover all leaks and causes of leaks, results of cathodic protection surveys and studies, and findings of past testing.

If a report reveals significant areas of concern, the department should require appropriate tests (hydrostatic testing, instrumented (smart) pigs, more detailed evaluations of cathodic protection, etc.). When necessary, the department should require the operator to reduce operating pressures, recondition the line or remove the pipeline from service.

- 4.3 Congress should require pipeline operators to establish contingency plans for the abandonment or utilization of pipelines that do not perform to the standards of federal regulations.

Replacement or rerouting of a pipeline can impose a serious financial burden on a pipeline company. Preparation of contingency plans for pipelines that have experienced problems would identify the costs of alternatives to the current pipeline and the necessary preparations for meeting capital requirements.

RAPID DETECTION AND ISOLATION OF LEAKS AND SPILLS

Finding

- Leak detection procedures used by hazardous liquid pipeline operators do not permit rapidly locating and isolating pipeline ruptures.

Pipeline ruptures are immediately detected by sudden drops in pressure levels monitored at pumping stations along the pipeline. However, a pipeline company must visually inspect the pipeline route by airplane or by foot to determine the exact location of the break, unless a local resident or emergency response personnel contact the company first.

Once a rupture is located, the size of the spill can often be reduced by shutting one or both of the nearest pipeline valves if they are located uphill from the leak. The effectiveness of closing valves is limited because most valves must be operated manually and are located many miles from the pipeline company's local offices. Pipeline companies have installed a limited number of remotely operated motorized valves as a method of eliminating this problem. Companies also express the concern that malfunctions can lead the valves to close during normal operations.

Recommendation

- 4.4 The federal Department of Transportation, or the State of Minnesota if authorized, should require that hazardous liquid pipeline operators take steps to improve their ability to rapidly locate and isolate

pipeline leaks or spills. The regulations should include the following:

- a) Remote-control shut-off valves should be installed at a distance of no less than four to 10 miles in urban areas and 20 to 60 miles in rural areas, depending on type and density of development, the presence of environmentally sensitive areas, and the application of appropriate engineering standards. The installation of remote valves should include design features and safety procedures to minimize risks associated with valve malfunctions.
- b) Remotely monitored pressure gauges and flow meters should be installed at each pump station and remote valve location.
- c) More specific regulations should be established for emergency response procedures, combined with thorough training, for shutting down pumps, locating leaks and spills, and shutting appropriate valves as rapidly as possible.

FURTHER STUDY OF ISSUES RELATED TO EXISTING PIPELINES

Findings

- Records maintained by the Minnesota Pollution Control Agency show that, after third-party accidents, longitudinal seam failures in electric resistance welded (ERW) pipelines are the principal cause of leaks in Minnesota's hazardous liquid pipelines.
- The character and extent of problems in ERW pipelines are not clear. Testimony before the commission has suggested that defective welds in longitudinal seams could be related to pipeline manufactured by Jones and McLaughlin Steel Co. in the 1950s, the low-frequency welding process widely used before 1968, the steel industry practice of conducting X-ray inspections on only a portion of longitudinal welds until the early 1960s, or the tendency of corrosion problems to begin in weld seams where the character of the metal can vary slightly from the rest of the pipeline.
- The federal Department of Transportation and the National Transportation Safety Board exchanged communications on apparent problems with seam failures in ERW pipelines in the late 1970s, but the question did not receive detailed study.

Recommendation

- 4.5 The National Transportation Safety Board should conduct a comprehensive study on the extent to which longitudinal seams in some electric resistance welded pipelines are prone to experience failures.

The study should seek to identify the specific subsets of all ERW pipelines that are more prone to failure by developing and evaluating data on leaks and spills by age of pipeline, geographic region, manufacturer, percentage of specified minimum yield strength at which the leak occurred, presence of cathodic protection problems, and other appropriate variables.

Finding

- Testimony to the commission identified several areas in the field of pipeline safety, including the issues listed below, where additional research is needed:
 - a) Federal Department of Transportation and industry standards for existing and new pipeline materials do not systematically incorporate newer test procedures available to the industry. For example, development of standards for fracture toughness offer the potential for significantly augmenting the evaluation of pipeline materials.
 - b) Further study is needed on the extent to which higher pressures during hydrostatic testing may provide an additional margin of safety for the operation of pipelines. Additional study is also needed on the potential negative effects of higher test pressures on pipeline integrity.
 - c) In addition to corrosion, metallurgical studies demonstrate that metal fatigue can eventually affect metals continually under stress, with potential effects from seasonal ground temperature changes and brief pressure surges not generally detected by pressure gauges.
 - d) Further advancements in instrumentation for smart pigs, the analysis of acoustic emissions, and other testing procedures may ultimately permit much more comprehensive testing of the integrity of existing pipelines.

Recommendation

- 4.6 The federal Department of Transportation and the National Transportation Safety Board should sponsor or conduct increased research on pipeline safety technologies, including standards for pipeline materials. The topics identified in the above finding should be a priority for initial research reports.

FEDERAL REGULATIONS FOR HAZARDOUS LIQUID PIPELINES

Finding

- The federal Department of Transportation regulations covering natural gas pipelines are stronger and more complete than the regulations for hazardous liquid pipelines. The difference is due in part to the

Hazardous Liquid Pipeline Safety Act of 1979 being established much more recently than the Natural Gas Pipeline Safety Act of 1968. Nevertheless, liquid pipelines present hazards that are as great as hazards for natural gas pipelines.

Recommendation

- 4.7 The federal Department of Transportation should, in general, upgrade regulations covering hazardous liquid pipelines to be comparable in stringency and thoroughness to regulations covering natural gas pipelines.

SETBACK REQUIREMENTS

Findings

- The safety of residential and other development adjacent to pipelines cannot be completely assured. Until implemented and proven effective, the stricter standards identified in other recommendations by the commission may not provide a fully adequate margin of safety for urban development along existing pipelines.
- Setback requirements for new development could, in some cases, help to reduce the safety hazard of pipeline ruptures, but the overall level of safety would be limited by the tendency of pipeline spills to migrate considerable distances. Hazardous liquid spills generally flow downhill into more distant developed areas, and migration of natural gas after a pipeline break depends on wind speed and direction.

Recommendation

- 4.8 Local units of government should adopt zoning regulations requiring a setback from pipelines in areas zoned for residential or other development, with provision for variances based on other setback requirements.

Developed areas or land for which permits have been approved should not be covered by these requirements.

SECTION 5

NEW PIPELINE CONSTRUCTION

UPDATED STANDARDS FOR NEW CONSTRUCTION

Findings

- The federal Department of Transportation standards for pipeline material and manufacture as well as certain quality tests of finished pipes and site and construction oversight have not been fully reviewed or updated in several years.
- Techniques in manufacture and construction have changed substantially in recent years.

Recommendation

- 5.1 The federal Department of Transportation, or the State of Minnesota if authorized, should review and update existing standards for pipe manufacture, pipeline construction and pipeline operation. New developments representing "best available technology" should be incorporated in their standards for pipe manufacture, pipeline construction and reconstruction.

INSPECTION OF NEW PIPELINE CONSTRUCTION

Findings

- The federal Department of Transportation does not regularly visit pipeline construction sites to inspect new pipeline installations to assure that standards are met.

The department does not have the authority to regulate construction of new pipelines. Rather, they set construction standards that must be met in order to operate a pipeline.

- In the construction of new pipelines, pipeline companies conduct extensive on-site inspection of contractors' work. Inspection of new pipelines by the industry includes such testing as X-ray inspection of every weld.

Recommendation

- 5.2 The federal Department of Transportation should be required to conduct regular site inspection of pipeline construction projects to ensure that federal standards are being met.

Congress should amend the Natural Gas Safety Act of 1968 and the Hazardous Liquid Pipeline Safety Act of 1979 to give states authority

to inspect construction of new interstate pipelines, as an agent for the federal Department of Transportation.

If authorized, the Minnesota legislative and executive branches should develop and implement a program through the Department of Labor and Industry, Division of Code Enforcement - High Pressure Piping, for inspecting new pipeline installations.

SHUT-OFF VALVES AND LEAK SENSORS

Findings

- Pipeline failures would be less costly in terms of property and life loss and in costs of disaster control if each line was equipped with remote-control valves placed at closer intervals.

To be most effective, shut-off valves should be controllable by manual and remotely controlled electronic devices.

- The federal Department of Transportation has no specific requirement on placement of remote-control valves on new hazardous material pipelines. In current proposed federal pipeline legislation, such devices are required on all new pipelines.
- New technologies may soon make it possible to detect and pinpoint the exact location of pipeline leaks and spills. The incorporation of these technologies for new pipelines would make it possible for the pipeline operator to instantaneously take appropriate actions to minimize the size of the leak and initiate an emergency response.

Recommendations

- 5.3 Whether federal or state, new standards should require remote shut-off valves on all new lines. The valves should be placed no farther apart than 20 miles in rural environments and four miles in urban areas, subject to engineering standards. Standards for periodic testing of valves must be developed and implemented.
- 5.4 The federal Department of Transportation and the State of Minnesota should closely monitor the development of reliable technologies that can detect and geographically locate pipeline leaks and spills. The department or the State of Minnesota, if authorized, should incorporate them into standards for new pipelines.

DOUBLE WALL REQUIREMENTS

Findings

- As yet there are few instances where federal Department of Transportation requirements direct installation of double piping.

With double piping or casing, pipes are protected to a great extent from third-party damage, leaks are contained and with sensing equipment leaks are easier to locate. Associated with encased piping is the use of reservoir facilities to hold liquids lost from pipe leaks but contained by pipe casings. Again, federal requirements do not address this issue.

- There are no existing studies which address the economic benefits or safety features of the various kinds of single or double casing pipe or reservoir pipeline construction systems.

Recommendation

- 5.5 The federal Department of Transportation should conduct extensive safety and economic analyses of seamless, single-wall welded, double casing and reservoir possibilities. If effective use can be demonstrated, the systems should be incorporated in state or federal standards for new pipeline systems.

CERTIFICATION OF PIPELINE DESIGN AND CONSTRUCTION PERSONNEL

Findings

- The Office of Pipeline Safety has no requirements for registration, licensing or certification of engineers involved in the design of pipelines.
- Although Minnesota and other states require registration of engineers, there is no "pipeline design" specialty.
- The Office of Pipeline Safety does not directly enforce the certification or licensing of welders on pipeline construction projects. Federal standards require that the pipeline companies certify their own welders on construction or maintenance projects.

Recommendation

- 5.6 The federal Department of Transportation should study the need for additional registration, licensing and certification requirements for pipeline design and construction personnel. Licensing of personnel in Minnesota should be required when existing pipelines need repair, or when extensions on existing pipelines are built, or when there is construction of new pipelines in the state.

PIPELINE ROUTING

Findings

- Appropriate planning and site control can reduce the conflict of urban development -- especially sensitive land use such as schools, hospitals, etc. -- encroaching on pipeline routes.

- The Minnesota Environmental Quality Board is responsible for environmental review of pipeline siting proposals. They do not have control over site locations. The board does have full siting control over powerline locations.
- Routing of pipelines is specifically not preempted by federal law.

Recommendation

- 5.7 The Environmental Quality Board should be given pipeline routing control authority at the same level as its existing powerline routing authority.

NATIONAL PIPELINE SAFETY CODE

- 5.8 The State of Minnesota and its federal congressional representatives should encourage the American National Standards Institute Inc. to develop and publish a "National Pipeline Safety Code."

CHAPTER II

INTRODUCTION AND OVERVIEW

On July 8, 1986, at 4:24 a.m. the Williams Pipeline Co.'s no. 2 north line ruptured in a residential area of the City of Mounds View. The flash fire and sewer explosions resulting from the rupture caused two deaths and one serious injury. This event prompted Governor Rudy Perpich to form the Minnesota Commission on Pipeline Safety. The Governor also took into consideration the extended history of pipeline failures in Minnesota in his decision to create the commission.

The Governor's charge to the commission was as follows:

The terrible tragedy in Mounds View underscores the need for the greatest vigilance in assuring that our citizens are protected from pipeline leaks and their disastrous consequences. As an energy-importing state, Minnesota has a special vulnerability. I charge this commission with the responsibility to investigate all aspects of safety of pipelines operating in Minnesota as well as the reliability of the vital energy supply which they bring into our state."

The commission members were selected from a diverse group of individuals with expertise or interest in the field of pipeline safety. The 26 members selected to form the commission included six legislators, five engineers, two environmentalists, two representatives each from the petroleum and welding industry, three public/industrial safety experts and six public members. [See Appendix for a list of commission members.]

A technical work group was formed in conjunction with the Minnesota Commission on Pipeline Safety, comprised of representatives from various state agencies that have state jurisdiction over many aspects of the pipeline industry. Staff from the Departments of Public Safety, Transportation, and Energy and Economic Development, and the State Planning and Pollution Control Agencies formed the technical work group. Their role was to provide technical and legal information to the commission, arrange meetings and process the various recommendations of the commission and compile and draft the final report.

The membership developed a specific mission statement for the commission. The mission statement is as follows:

The mission of the Minnesota Commission on Pipeline Safety is to investigate and determine whether current pipeline safety conditions, standards, siting, regulatory control, operating procedures and emergency response practices adequately protect the safety of Minnesota's citizens and its environment. This determination must balance the paramount concern for public safety against Minnesota's need for reliable, economical energy supplies.

Based on its findings, the commission will develop recommendations to minimize all pipeline failures. These recommendations may include

additions to or modifications of current pipeline safety laws, rules or regulatory practices and communications networks. The commission's findings and recommendations will be submitted to the Governor, legislature, federal Department of Transportation, Minnesota's congressional delegation, or other appropriate public bodies.

The commission met initially on July 30, 1986, and then met twice monthly through October. Throughout November, weekly meetings were held until the final recommendations were approved on November 25, 1986. The twice-monthly meetings during August, September and October provided expert testimony to the commission members to inform them of and provide a forum to discuss the pipeline industry and pipeline safety issues.

After hearing all the testimony, recommendations were developed at three November meetings. Draft recommendations were prepared by the technical work group based on survey responses from commission members to a mail survey. The survey requested recommendations for five areas of pipeline safety: (a) emergency response and communications for pipeline ruptures, (b) government inspection programs for pipelines, (c) standards and requirements for construction of new pipelines, (d) methods for reducing third-party accidents and (e) operating requirements for existing pipelines.

Summary of Testimony

The commission heard approximately 30 hours of testimony at five separate meetings. A summary of that testimony is provided below.

Testimony began on July 30, 1986, with Charles Batten, chief of the Hazardous Materials and Pipeline Safety Division of the National Transportation Safety Board (NTSB). He discussed overall safety issues and the role of the NTSB in the investigation of accidents and NTSB's relationship to the federal Department of Transportation. Cindy Douglas, administrator of the Research and Special Programs Administration, federal Department of Transportation, addressed the role of the federal government in regulating and inspecting interstate and intrastate natural gas lines and hazardous liquid pipelines.

Lee Munnich, assistant commissioner for Policy Analysis, Minnesota Department of Energy and Economic Development, spoke about his division's role in monitoring Minnesota's supply of petroleum products and provided an overview of Minnesota's pipeline transportation system.

On August 21, 1986, the commission held its second meeting. This session was devoted to legal issues involving pipeline jurisdictional matters, such as federal preemption of state authority, and technical issues regarding the composition of piping and testing methods used to determine the integrity of the piping.

Attorney General Hubert H. Humphrey introduced Leroy Paddock and Allan Mitchell, special assistant attorneys general, who spoke about legal issues involving federal and state roles in pipeline regulation. Mr. Mitchell also spoke about state regulations regarding pipelines and stipulation agreements that have been made between the Minnesota Pollution Control Agency and pipeline companies regarding accidents causing environmental damage.

Dr. John Kiefner, associate manager, Mechanics Section, Battelle Columbus Laboratories, discussed different types of welding that have been implemented in the pipeline industry. Larry Clynch, of Continental Pipeline, discussed corrosion on pipelines and the use of cathodic protection as a means of deterring corrosion. Dr. Richard Oriani from the University of Minnesota's Department of Chemical Engineering presented information regarding metal and corrosion fatigue of pipelines. The presenters then formed a panel to discuss factors that affect the physical life of a pipeline.

The afternoon presentations provided information on non-destructive testing methods, such as acoustic emission and magnetic flux leakage technologies, otherwise known as smart pigs. The presentations and discussion were led by Mark Ferdinand from Acoustic Engineering International, Inc., and Dr. Oriani, who specifically discussed the use of magnetic flux leakage devices. Dr. Kiefner also presented information regarding standard procedures for hydrostatic testing.

The session on September 4, 1986, began with a history of pipeline failures in Minnesota by Russell Felt of the Pollution Control Agency. The remainder of the day allowed representatives of the various pipeline companies transporting product in Minnesota to discuss their individual companies' operation and safety procedures. Williams Pipeline was represented by President Steve Cropper. Amoco was represented by area manager Richard Peterson. John Caskey represented Northern Natural Gas, Dave Luddeke Mid-America Pipeline Co., and John E. Staudohaur Lakehead Pipeline Co.

The fourth session on September 18, 1986, was devoted to leak detection, emergency response and federal and state inspection programs.

David Bull from Heath Consultants spoke about leak detection methods and their reliability and a leak classification system for pipelines. Ron Fagerstrom, fire chief for Blaine/Mounds View/Spring Lake Park, discussed his department's response to the Mounds View incident and his opinions on how the emergency response could have been more efficient. Thomas Alcorn of the Hazardous Materials Response Team, Division of Emergency Services, reviewed the operation and procedures of the hazardous response team of his division. Russell Felt followed with a brief description of the Minnesota Pollution Control Agency's response to notification of hazardous liquid spills. Dick Holmes, State Fire Marshal Division inspector, discussed regulations for inspection of natural gas pipelines versus hazardous liquid pipelines in the State of Minnesota. Walter Hernandez of the California State Fire Marshal's Office, explained the inspection role in intrastate hazardous liquid pipelines. He also discussed the California code regarding regulating intrastate hazardous liquid pipeline facilities.

The October 2, 1986, meeting was devoted to the construction standards for pipe, safety and economics of pipeline transportation, the Northeastern Minnesota petroleum supply outlook and local government concerns and recommendations regarding pipelines and pipeline safety.

Steve Keefe, commissioner of the Minnesota Department of Labor and Industry, along with Al Justin and Paul Hackl of his staff discussed the

inspection of high-pressure piping and certification requirements and experience and training of high-pressure steam pipe inspectors.

Cecil Selness, director, Office of Railroad and Waterways, Minnesota Department of Transportation, presented graphics showing the comparative difference between pipelines and other modes of transportation.

Greg Holman, petroleum analyst, Minnesota Department of Energy and Economic Development, presented DEED's estimates of the winter petroleum production shortfall in northeastern Minnesota and the cost factors involved in the transportation of petroleum products.

Freeman Mast, Marathon Oil, appeared as a representative of the American Petroleum Institute. Mr. Mast discussed exchange agreements between petroleum industry businesses. He also discussed various products transported by pipelines and the cost of pipeline transportation versus other modes of transportation.

Miles Hall, president of Como Oil in Duluth, Minnesota spoke about the cost of transporting product from the Twin Cities to Duluth and possible problems that may be caused by the continued shutdown of the Williams pipeline to Duluth.

During the afternoon of October 2, 1986, Jerry Linke, mayor of Mounds View, provided a video presentation of the July 8 fire in his community. Michele Timmons, Ramsey County attorney, outlined her county's concern regarding the ruptured pipe in Mounds View and other sections of pipeline that traverse Ramsey County.

The following local officials testified before the commission, presenting their concerns and suggestions for improving pipeline safety:

1. Steve North, assistant city manager, Roseville
2. Bruce Ryden, fire marshal, Roseville
3. Kenneth Haider, public works director, City of Maplewood
4. Connie Morrison, mayor, City of Burnsville
5. John Hohenstein, administrative assistant, City of Eagan
6. Doug Reed, fire marshal, City of Eagan
7. Darrell Berkowitz, city engineer, City of Afton
8. Mike Reber, fire marshal, City of Woodbury
9. Lowell Johnson, emergency services manager, Washington County

The morning of October 27, 1986, was set aside for presentations by Senator David Durenberger and Congressmen Bruce Vento and Gerry Sikorski. Senator Durenberger and Congressman Vento reviewed their proposed legislation. Congressman Sikorski delivered a brief statement expressing his concerns over the problems experienced by pipeline companies in Minnesota. Tom Regan from Congressman James Oberstar's office read a brief message from the congressman stating his concern and support for improving pipeline safety. A panel discussion followed with members of the commission directing their specific inquiries to the senator or congressmen regarding their proposed legislation and the support of the congressional delegation for the findings and recommendations of the commission.

The afternoon session began with a slide and overhead presentation by Charles Morin, president of Packer Engineering, who reviewed the completed and partial test results of the pipeline extending from Newport, Minnesota, to Wausau, Wisconsin, and from Roseville, Minnesota, via Duluth, Minnesota, to Superior, Wisconsin.

The commission developed its final findings and recommendations on three consecutive Thursdays during November beginning on November 6, 1986. A total of 16 hours were spent in the development of the final findings and recommendations. The final findings and recommendations were ratified on November 25, 1986.

CHAPTER III

DESCRIPTION OF MINNESOTA'S PIPELINE SYSTEM

In 1985, Minnesotans and Minnesota businesses consumed 3.4 billion gallons of petroleum products and 257 billion cubic feet of natural gas. Virtually all of this petroleum or the crude oil used in its production and all of the natural gas was transported by underground pipeline. Clearly, the state's pipeline network is a critical link in Minnesota's energy supply system.

Minnesota has separate pipelines for four different types of petroleum products:

Miles of Pipeline In Minnesota

Liquid petroleum products (gasoline, etc.)	1,320
Crude oil	1,630
LPG pipelines	3,450
Natural gas - transmission lines	3,900
- local gas mains	16,500

Differences in the characteristics of and demand for each type of product result in four different methods of pipeline distribution.

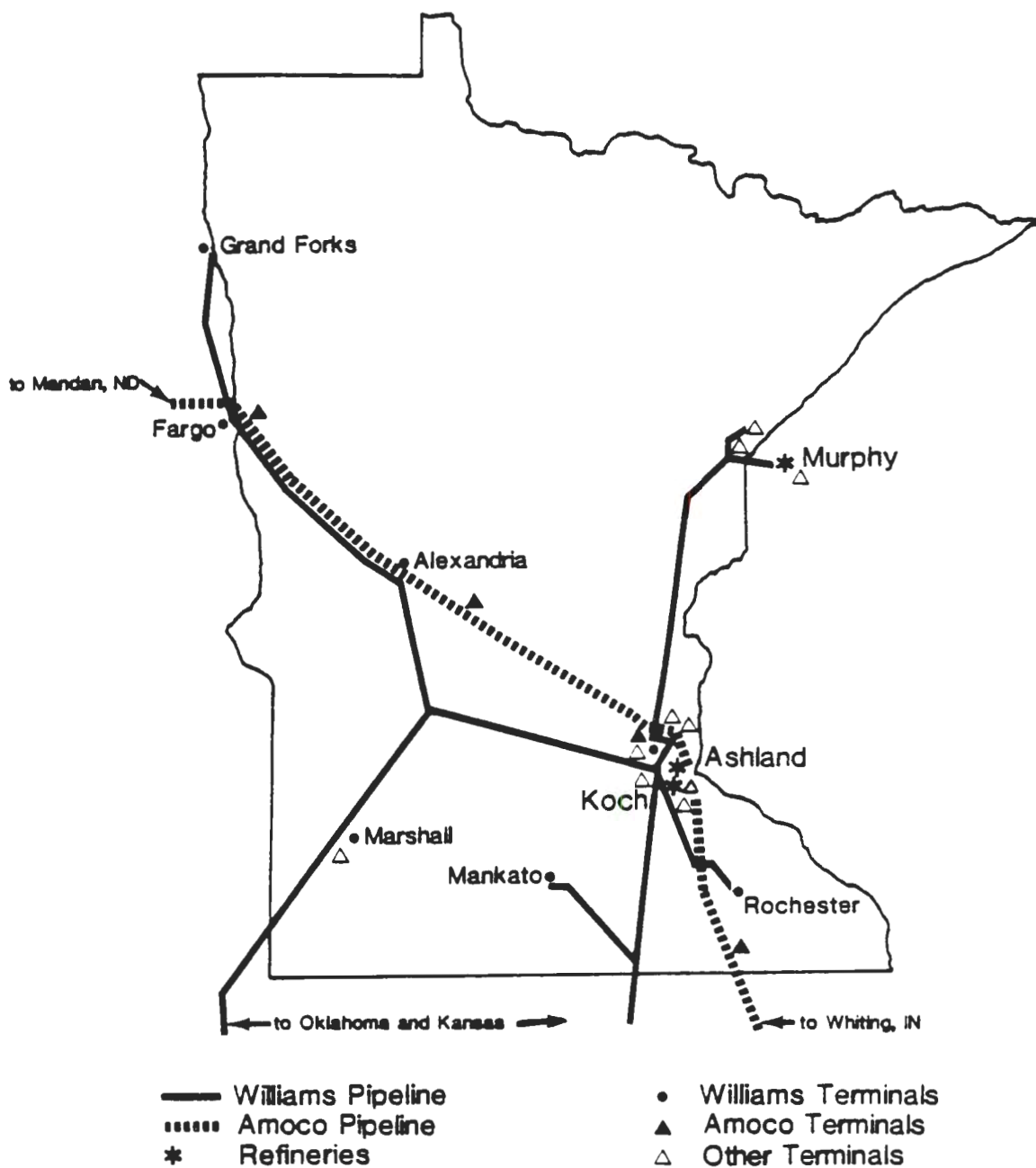
Liquid petroleum products

Liquid petroleum products include gasoline, distillate (fuel oil and diesel) and jet fuel. More specialized products include kerosene, aviation gasoline and liquid fertilizer. The various liquid petroleum products are all shipped on the same pipeline in a never-ending series of batches. Very little mixing occurs. At the point where two batches come into contact, a small amount of each fuel is removed to avoid any contamination of either product.

There are two liquid product pipeline systems in Minnesota (see map). Minnesota's largest petroleum product pipeline operator is the Williams Pipeline Co., with 970 miles of pipeline in Minnesota. The Williams pipeline system links two refineries in the Twin Cities (operated by Koch Refining and Ashland Oil) with distribution terminals located in Minnesota, North and South Dakotas, western Wisconsin and Iowa. The Williams pipeline segment also links the Murphy refinery in Superior, Wisconsin, to the Twin Cities.

The entire Williams system covers a 12-state region, and links the Minnesota area to several refineries located in Oklahoma and Kansas. The Williams system is also linked by pipeline to the nation's largest refining center on the Gulf Coast of Texas and Louisiana.

The other major liquid petroleum product pipeline operator in Minnesota is Amoco, with 350 miles of pipeline in the state. The Amoco pipeline supplies four distribution terminals in Minnesota from its own



Petroleum Product Pipelines and Terminals in Minnesota¹

SOURCE: Minnesota Department of Energy and Economic Development, Policy Analysis Division

¹Crude oil and propane pipelines are not shown

refineries in Mandan, North Dakota, and Whiting, Indiana.

Total petroleum production by the three local refineries and pipeline shipments from Amoco are roughly sufficient to meet Minnesota's supply needs, but supply companies also ship a portion of Minnesota's petroleum product needs north on the Williams system from refineries in Oklahoma and Kansas. The Williams pipeline between the Twin Cities and Des Moines, Iowa, can also be reversed so that some locally produced supplies are shipped south into Iowa.

There are 15 terminals, sometimes called "tank farms," for distributing petroleum products in Minnesota and eight terminals that serve Minnesota distributors from nearby locations in Superior, Wisconsin, North and South Dakota, and Iowa. Three of the terminals are located at our local refineries, and a small terminal in Winona, Minnesota, receives its supplies by barge. The 19 remaining terminals receive their petroleum supplies by pipeline.

Petroleum products are distributed by truck from the 23 terminals serving Minnesota to local distribution points. Large transport trucks are loaded with 7,000-8,000 gallons of gasoline or diesel fuel and may carry the fuel to storage facilities (called bulk plants) owned by distributors for further distribution by smaller tankwagon trucks. Many retail gasoline stations receive their supplies directly by transport truck.

The enormous quantity of petroleum products shipped by pipelines gives pipelines a unique importance as a mode of transportation. A typical pipeline segment in Minnesota transports between 200,000 and 2 million gallons of petroleum products per day. By comparison, it would require 130 fully loaded transport trucks per day to ship a daily supply of one million gallons. Minnesota's total consumption of petroleum products averages 9,200,000 gallons per day.

Natural Gas Pipelines

Because of its gaseous state, natural gas has the unique characteristic of being transported entirely by pipeline. With more than 20,000 miles of pipeline, it accounts for many more miles of pipeline than the other types of fuel.

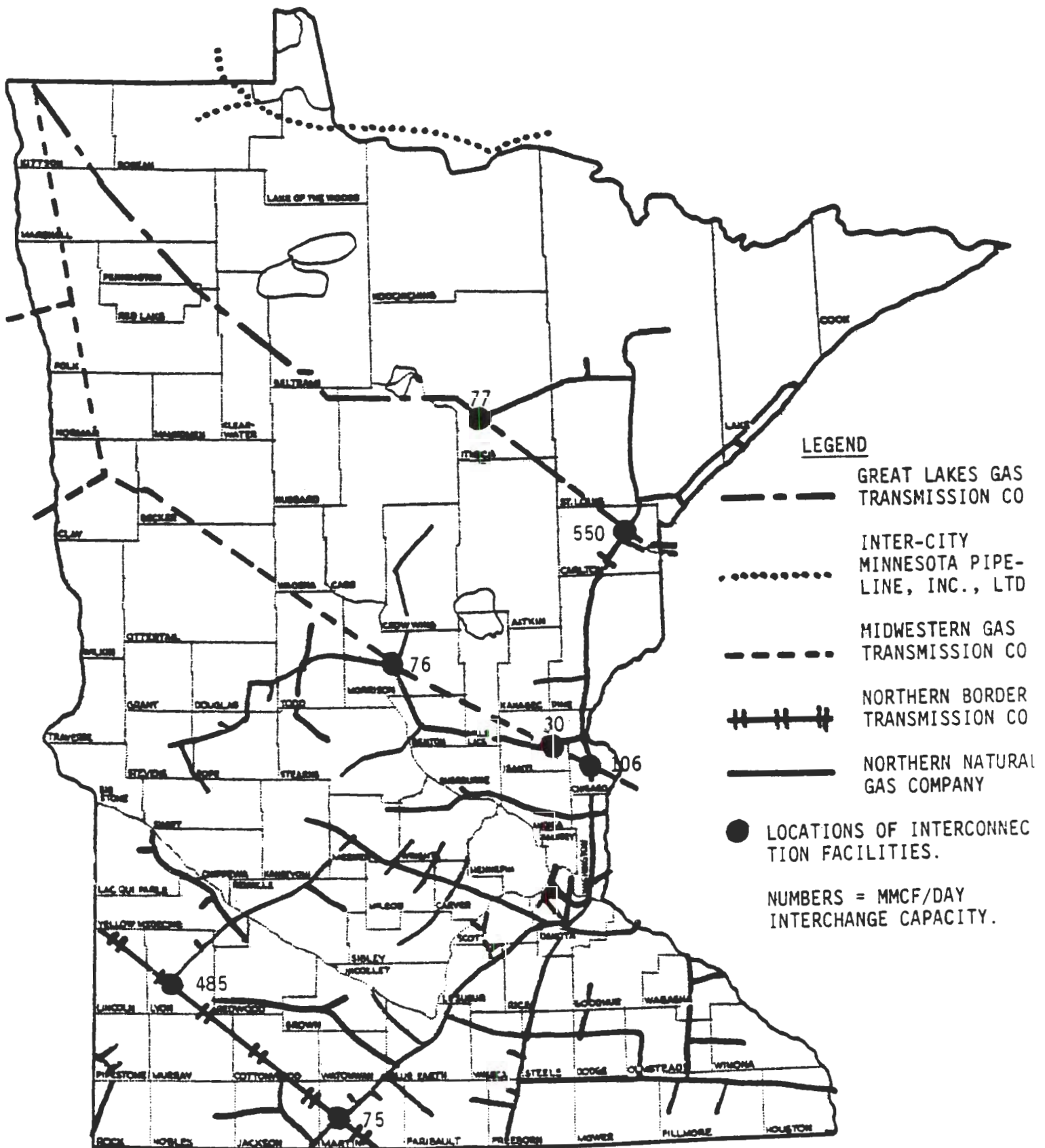
Four interstate pipeline companies transport natural gas into Minnesota from producing regions of the country through natural gas transmission lines (see map). The largest company, Northern Natural Gas, operates 76 percent of the total miles of transmission lines in Minnesota.

The transmission companies supply local utilities, which in turn distribute supplies to individual customers through local gas mains. There are four times as many miles of local gas mains as interstate pipeline in Minnesota, but the local mains operate at much lower pressures and most carry very small quantities of natural gas.

LPG Pipelines

Liquefied petroleum gas (LPG) products include propane, ethane, butane and unprocessed mixtures of these fuels. However, propane is the only LPG

GAS TRANSMISSION PIPELINES IN MINNESOTA



fuel that is widely used in Minnesota. LPG fuels are found in combination with natural gas and are also produced as a by-product of petroleum refining.

LPG is kept under pressure in a liquid form to reduce transportation and storage costs. At normal atmospheric pressure and temperature, it vaporizes into a gas.

There are three LPG pipelines, covering ⁴⁵⁰~~900~~ miles, that supply a number of terminals in southern Minnesota. The Cochin Pipeline, the largest of the three pipelines, ships LPG from western Canada to several Midwestern states. The other two pipelines ship domestic propane supplies into Minnesota from the south. Many propane retailers in northern Minnesota receive propane shipments by rail because there are no nearby pipelines.

Crude Oil

There are four crude oil pipelines in Minnesota that bring supplies to Minnesota's three local refineries for distillation into petroleum products (see map). The largest of these pipelines is the Interprovincial/Lakehead Pipeline, which ships crude oil from western Canada to refineries east of Chicago, as well as to our three local refineries. The Lakehead Pipeline right-of-way in Minnesota includes three pipelines that transport 1.5 million barrels of crude oil per day, more than six times Minnesota's total consumption of petroleum products.

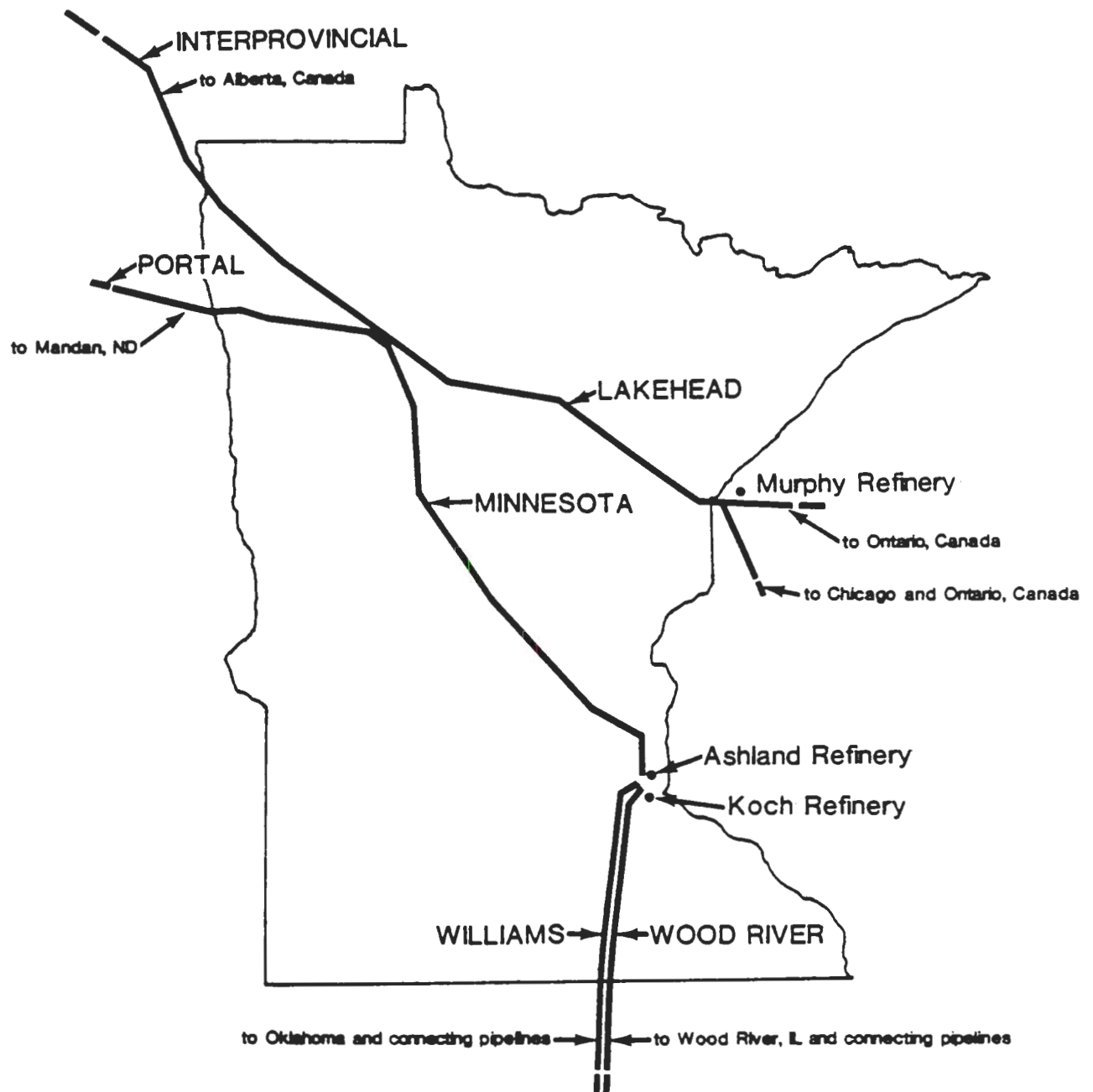
The three local refineries also receive crude oil from North Dakota via the Portal Pipeline. Canadian and North Dakota supplies account for 90 percent of the refineries' crude oil supplies.

Two pipelines give the Ashland and Koch refineries access to domestic and foreign crude oil supplies from the south. The Wood River Pipeline extends south from the Twin Cities in the same right-of-way as the Williams Pipeline and continues south to connecting pipelines in southern Illinois. Williams Pipeline Co. can also ship crude oil to Minnesota from Oklahoma and Texas on its petroleum product pipeline.

Summary

In Minnesota, the most significant dependence on pipelines is for the state's natural gas supplies. Natural gas provides more energy than any other individual fuel that is shipped by pipeline and relies completely on local gas mains for distribution to customers.

However, gasoline is the second most significant fuel, and petroleum products as a group are by far the largest source of fuel shipped by pipeline. While the importance of petroleum product pipelines in Minnesota is reduced somewhat by the presence of the three local refineries, these refineries rely totally on pipelines to ship the crude oil supplies that supply feedstock for the refining process.



Crude Oil Pipelines in Minnesota

SOURCE: Minnesota Department of Energy and Economic Development, Policy Analysis Division

CHAPTER IV

MINNESOTA'S PIPELINE LEAK HISTORY

Although Minnesota's pipeline system is essential to the efficient transportation of petroleum products, crude oil and natural gas, accidents resulting in the release of products do occur. The following section reviews the recent history of pipeline leaks and spills on Minnesota's pipeline system.

Natural Gas Pipeline Leaks in Minnesota

According to state regulations, natural gas companies are required to submit all leak data in annual reports to the state Fire Marshal Division. They are also required to immediately submit information to the state on all leaks that cause the following events: (1) a death or personal injury necessitating inpatient hospitalization, (2) estimated property damage, including cost of gas lost, of \$5,000 or more, (3) an event that results in an emergency shutdown of an liquified natural gas storage facility, (4) an event that is significant in the judgment of the operator, even though the event does not meet the criteria in nos. 1-3. The federal Department of Transportation has similar reporting requirements. However, in 1984 the standard for reporting spills that caused only property damage was raised to \$50,000 from the \$5,000 level.

During the period of 1970 through 1984, 25 incidents on transmission lines that caused over \$5,000 worth of damage were reported to the federal Department of Transportation. Also reported during this same period were three injuries and no fatalities. There were 315 incidents reported with 93 injuries and 10 fatalities on distribution lines from 1970 through 1984. The numbers of spills reported for the latter half of 1984 through the present are very small because of the change in the federal reporting requirements.

The 1985 annual report data collected by the Fire Marshal Division indicated seven leaks on 182 miles of intrastate gas transmission pipelines. There were also 3,748 leaks on 16,500 miles of gas distribution mains. In addition, there were 12,201 leaks reported on Minnesota's 999,434 individual service lines. Data for previous years are inaccurate because of duplication and other data collection problems.

The causes of leaks during 1985 are listed below for gas transmission lines and for gas distribution lines.

Total Leaks Eliminated/Repaired

<u>Cause</u>	<u>Transmission Pipelines</u>	<u>Distribution Lines</u>	
		<u>Mains</u>	<u>Services</u>
Corrosion	1	463	1,404
Third Party		183	2,108
Outside Forces	1	912	694
Construction Defect		174	1,053
Material Defect		1,871	5,003
Const./Mat. Defects	5		
Other		145	1,939
TOTAL	7	3,748	12,201

The preceding information was obtained from the Fire Marshal Division's 1985 Annual Report to the Research and Special Programs Administration of the federal Department of Transportation.

Hazardous Liquid Pipeline Spills in Minnesota

The most detailed information available regarding hazardous liquid pipeline failures in Minnesota has been assembled by the Minnesota Pollution Control Agency (PCA). Since its creation in 1967, the PCA has put particular emphasis on responding to leaks or spills which might have an adverse effect on the environment. This has been enabled by Minnesota Statute Chapter 115.061, which requires the reporting of and response to a release of any material which might cause pollution. This statute is unique because it does not exempt small leaks from reporting requirements.

The uniqueness of the spill records was recently illustrated by the results of a federal Environmental Protection Agency (EPA) study of leaks from underground storage tanks. In the course of this study, the EPA surveyed the spill records of all 50 states and United States territories. Of those surveyed, Minnesota was said to have the most complete and detailed records.

In the monitoring of spills in the state, the PCA has paid particular attention to releases resulting from pipeline failures. As an environmental agency, the PCA has confined its attention to those incidents with the potential for adverse environmental effects, primarily consisting of efforts to protect the surface and ground water of the state. This objective has led the agency to focus on liquid pipeline releases and to exclude gas pipeline leaks, which have a limited propensity for pollution. The following table presents reportable spills by pipeline company. The accident totals exclude two Williams pipeline segments that were removed from service in 1984.

HAZARDOUS LIQUID PIPELINE INCIDENTS
(JANUARY 1975 TO SEPTEMBER 1986)

<u>Pipeline</u>	<u>Pipeline Accidents</u>			<u>Terminal Incidents</u>	<u>Hydro-Static Testing</u>	<u>Total Reported Incidents</u>
	<u>3rd Party</u>	<u>Other</u>	<u>Sub Total</u>			
Lakehead	1(1)	14(5)	15(6)	13(1)	0	28(7)
Minnesota/ Wood River	2(0)	9(4)	11(4)	2(2)	1	14(6)
Amoco	3(2)	1(1)	4(3)	0(0)	0	4(3)
Williams	16(7)	10(10)	26(17)	32(1)	36	94(18)
LPG Pipeline	(5)	(0)	(5)	(1)		(6)
TOTALS	22(15)	34(20)	56(35)	47(5)	37	140(40)

NOTE: Incidents reported to the federal Department of Transportation, Research and Special Projects Administration are shown in parentheses.

Approximately 40 percent of hazardous liquid pipeline accidents between 1975 and 1986 were attributable to third-party error, such as excavation accidents. Williams Pipeline Co., with half of the hazardous liquid pipeline in Minnesota, reported 46 percent of the third-party spills, followed by the Lakehead pipeline with 27 percent.

Leaks not attributable to third-party error are especially serious because they may indicate materials failure that could cause future leaks. Of 34 pipeline spills not attributable to third-party error between 1975 and 1986, 10 occurred on the Williams pipeline system and 14 on the Lakehead pipeline system.

The second table summarizes more detailed information on causes of spills occurring in line pipe, excluding third-party dig-ins by construction firms and individuals. The data show that longitudinal seam welds have been the most significant cause of pipeline failures in Minnesota's current hazardous liquid pipelines, after third-party damage.

HAZARDOUS LIQUID PIPELINE INCIDENTS OCCURRING
IN LINE PIPE DURING NORMAL OPERATION,
(JANUARY 1985 TO SEPTEMBER 1986)

(Third-party incidents, hydrostatic testing and pipelines no longer in operation are excluded.)

<u>Pipeline</u>	<u>CAUSE</u>					<u>TOTAL</u>
	<u>Longitudinal Seam Weld</u>	<u>Girth Weld</u>	<u>Corrosion</u>	<u>Equipment Failure</u>	<u>Other</u>	
Lakehead	8	1	2	1	2	14
Minnesota/ Wood River	7		1		1	9
Amoco			1			1
Williams	6	2	2			10
<hr/>						
TOTAL	21	3	6	1	3	34

CHAPTER V

REVIEW OF STATE AND FEDERAL PIPELINE REGULATION

All aspects of Minnesota's pipeline industry are regulated, either by federal or state and local government agencies. Because it is an area of interstate commerce, regulation of pipeline safety is primarily a federal responsibility. Standards for the safe operation of pipelines are set by the federal Department of Transportation. States may obtain approval from the department for a limited role in the inspection of pipelines and the department encourages states to develop programs for inspecting intrastate pipelines, with federal oversight. However, federal statutes largely prohibit or preempt states from establishing state safety standards and independent inspection programs for pipelines.

Federal Regulation

The responsibility for inspection, safety and enforcement of petroleum and natural gas pipelines is determined in part by the type of product carried and whether the pipeline is interstate or intrastate. Two pipeline safety programs exist, one for natural gas and the other for hazardous liquids.

The federal Natural Gas Pipeline Safety Act (NGPSA) of 1968 covers those pipeline facilities used to transport natural gas, flammable gas or gas which is toxic or corrosive. The Hazardous Liquid Pipeline Safety Act (HLPESA) of 1979 covers the transportation of petroleum, petroleum products and anhydrous ammonia.

The NGPSA provides for federal safety regulation of facilities used in the transportation of natural and other gases by pipeline. The federal Department of Transportation is responsible for inspection, safety and enforcement of interstate natural gas transmission lines. Under the provisions of the NGPSA a state may petition the Department of Transportation to become an agent of the federal government for the purposes of safety and inspection of interstate gas pipelines. The federal government retains authority for enforcement of violations.

The NGPSA provides for grants to states for establishing regulatory and enforcement authority for intrastate natural gas pipelines. States may be reimbursed for up to 50 percent of expenses incurred in running their programs. Under the provisions of the NGPSA, nearly all of the states have established safety programs by adopting the federal safety regulations. Enforcement is often similar to the sanctions imposed by the federal Department of Transportation. In Minnesota, the Fire Marshal Division is responsible for inspection, safety and enforcement for intrastate natural gas pipelines (see Minnesota Statutes, Section 299F.56 and Minnesota Rules, parts 7510.6100 through 7510.6910) and has adopted standards, which in some cases are more stringent than the federal standards.

The Hazardous Liquid Pipeline Safety Act (HLPESA) authorizes the federal Department of Transportation to regulate petroleum pipelines for safety purposes. This statute is very similar to the NGPSA in that it

establishes: (1) federal safety standards; (2) a federal/state partnership for regulating intrastate pipelines; (3) financial assistance to state agencies adopting and enforcing the federal standards for intrastate pipelines; and (4) civil enforcement remedies for violations of the federal standards.

Because most petroleum pipelines are considered to be interstate pipelines, the federal Department of Transportation is responsible for inspection, safety and enforcement. All of the nearly 3,000 miles of crude oil and petroleum product pipelines in Minnesota are considered to be interstate pipelines.

Several of the major oil-producing states (Texas, Louisiana and California) regulate inspection and safety of intrastate oil pipelines, but no states currently inspect interstate oil pipelines.

The federal statutes permit the Department of Transportation to certify state safety programs at either of two levels. At the "5A" level, the state has exclusive authority for inspection and enforcement and can set more stringent standards. At the "5B" level, the state has authority for inspection, while the federal government retains sole authority for enforcement and standards. State inspection programs for intrastate pipelines can be certified at either of the two levels, but federal statutes permit only the 5B level for state inspection of interstate pipelines.

Federal Office of Pipeline Safety. The federal Department of Transportation, Office of Pipeline Safety, is responsible for establishing and enforcing safety standards for both interstate and intrastate pipeline operators. As of October 1986, the Office of Pipeline Safety had a staff of 18 inspectors nationwide for five regional offices. Minnesota is in the Central Region with Wisconsin, Michigan, Ohio, Indiana, Illinois, Missouri, Nebraska and Kansas. The Central regional office has two inspectors for the 10-state area and will be increasing its staff to four inspectors in 1987.

National Transportation Safety Board. Under the provision of Section 304 of the Independent Safety Act of 1974, investigation of pipeline accidents in which there is at least one fatality or substantial property damage is primarily the responsibility of the National Transportation Safety Board's Hazardous Materials and Pipeline Accident Division. The board investigates accidents and prepares a report including recommendations to submit to Congress. The NTSB recommendations are not enforceable without the specific approval and action of Congress.

State and Local Regulation

The following overview provides a brief description of state and local pipeline regulations in Minnesota.

Intrastate Natural Gas Pipeline Inspection. As noted earlier, the Minnesota Fire Marshal Division of the Department of Public Safety has authority at the "5A" level for safety, inspection and enforcement for intrastate gas transmission lines and distribution systems. The Fire Marshal Division has a staff of three inspectors. These inspectors

annually inspect all intrastate natural gas pipeline operators, in addition to investigating accidents or making site visits for other reasons.

Certificate of Need. A certificate of need is required from the Minnesota Public Utilities Commission (PUC) for construction of a large oil or gas pipeline or a significant expansion of an existing pipeline. Interstate gas pipelines requiring a certificate of public convenience and necessity from the Federal Energy Regulatory Commission (FERC) are not subject to the certificate of need process in Minnesota.

A certificate of need is granted by the PUC when: (1) a need exists for the energy to be provided by the proposed facility; (2) meeting the need is in the public interest; (3) the proposed facility is the best way to meet the need; and (4) the proposed facility complies with applicable laws and rules, and is consistent with public policy.

The certificate of need rules for both oil and gas pipelines require the applicant to provide information on measures that would be taken to prevent oil spills, fires and explosions or to minimize the environmental impact of a spill, fire or explosion. The applicant is also required to indicate the types of environmental monitoring, if any, that are planned for the facility and describe relevant environmental monitoring data already collected.

Legislation passed in 1979 requires all companies proposing new pipeline construction in Minnesota, except interstate gas pipelines, to produce and distribute to all affected landowners an information book which describes (1) the proposed project; (2) Minnesota statutory, permit and environmental review requirements; and (3) construction procedures. This statute also requires the company to hold a public meeting in each county crossed by the pipeline and to bury the pipeline 4-1/2 feet under cultivated agricultural land and public roads, unless the property owner or governmental unit signs a waiver of the minimum depth requirement. The law allows the county board to establish agricultural protection standards and each county board to appoint a county inspector to insure compliance with the provisions of Chapter 116I.

Environmental Review. The Minnesota Environmental Quality Board (EQB) is responsible for carrying out environmental review of pipeline construction projects. Minnesota rules require the preparation of an Environmental Assessment Worksheet (EAW) for a gas or oil pipeline greater than six inches in diameter and having more than 50 miles of its length in Minnesota. If it is a natural gas pipeline, pressure must be in excess of 200 pounds per square inch. After preparation, circulation and review of the EAW, the EQB formally decides whether to order preparation of an Environmental Impact Statement (EIS).

An EIS, when ordered, provides information to state agencies, local governments and private individuals to help make decisions on permits for any action that may significantly affect the environment. The EIS is not a permit or license, but rather a study of the environmental impacts of a proposed action; alternatives to the action; unavoidable adverse environmental, economic and employment effects of the action; any major commitment of necessary resources; and, if possible, a description of ways

to mitigate the adverse effects of the action.

Pipeline Construction Permits. Pipeline construction requires permits and approvals from state agencies and local governments as follows:

1) Minnesota Department of Natural Resources

- Approval of plans prior to exercise of eminent domain (Minnesota Statutes, Section 117.49).
- Utility Crossing License (state land and protected waters).
- Appropriation of water permit for pipeline hydrostatic testing.

2) Minnesota Pollution Control Agency

- 401 certification for discharge of pollutants into United States waters.
- Permit for liquid storage sites during construction.
- National Pollutant Discharge Elimination System (NPDES) permit for discharge of pipeline hydrostatic test water.

3) Minnesota Department of Transportation

- Permit (right-of-way) for each crossing of each trunk highway.
- Permit for overweight and over-length transportation during construction.

4) Counties

- Permits for crossing county roads.
- Conditional use permits, if required.

5) Cities and Townships

- Permits needed to comply with local zoning ordinances and road crossings.

Environmental Clean-up. The Water Pollution Control Act (Minnesota Statutes, Section 115.061) requires that the Pollution Control Agency (PCA) be notified immediately by the responsible party of the discharge, accidental or otherwise, of any substance or materials under its control which, if not recovered, may cause pollution of waters of the state. Agency staff are frequently dispatched to the site of the spill to oversee efforts to contain the spill and minimize environmental damage.

Besides notifying the PCA, the pipeline company is required to notify the federal Environmental Protection Agency and the federal Department of Transportation. The PCA is responsible for notifying all concerned state agencies in the event of an oil spill.

The Pollution Control Agency does not directly regulate the pipeline industry, but the agency has had some success in obtaining operational and maintenance concessions from pipeline companies as a part of the agency's environmental enforcement actions.

Emergency Response. Local fire departments and other emergency response personnel are responsible for responding to pipeline spills or leaks that present public safety hazards. In the event of a fire, small fire departments call on emergency service departments from nearby communities for assistance.

As a backup to local emergency response, the State of Minnesota maintains a hazardous materials response team, and several state agencies have been assigned responsibilities for dealing with HAZMAT incidents. Four cars equipped to respond to incidents are assigned to the Department of Agriculture, Pollution Control Agency and the Department of Transportation.

The state also maintains a hazardous materials response van that may be activated with trained personnel from the Department of Health - Emergency Medical Services Section, the Department of Public Safety - Fire Marshal Division and Division of Emergency Services, and the Department of Natural Resources.

Generally, individuals from the various state agencies assigned to the equipped cars decide whether an incident requires the HAZMAT response van. Local units of government may activate the van under extreme circumstances without waiting for state personnel to assess the situation by contacting the Department of Public Safety - Division of Emergency Services.

Petroleum Supply Assessment. The Department of Energy and Economic Development, Policy Analysis Division, works with petroleum industry representatives to maintain adequate petroleum supplies in the state. The division collects, analyzes and distributes information on Minnesota's petroleum production and inventories on an ongoing basis. One example of the division's work has been its close monitoring of the supply situation in Northeastern Minnesota to determine the effect of the closure of the Williams No. 2 north pipeline on the inventories in that portion of the state.

APPENDIXES

APPENDIX 1

AGENDA SUMMARY

JULY 31

- | | |
|---|---|
| 1. Charles Batten, chief, Hazardous Materials and Pipeline Division of the National Transportation Safety Board. | Pipeline Safety Issues |
| 2. Cindy Douglass, administrator, Research and Special Programs Administration, U.S. Department of Transportation | The Role of the Federal Government in Pipeline Regulation |
| 3. Lee Munnich, assistant commissioner for Policy Analysis, Minnesota Department of Energy and Economic Development | Pipeline and Oil Supplies in Minnesota |

AUGUST 21

- | | |
|---|---|
| 1. Hubert H. Humphrey, III, Minnesota Attorney General

Leroy Paddock, special assistant attorney general

Alan Mitchell, special assistant attorney general | Legal Issues Involving Federal and State Regulation of Pipeline Safety |
| Dr. John Kiefner, associate manager, Mechanics Section, Battelle

Larry Clynych, general manager, Continental Pipeline Co.

Dr. Richard A. Oriani, professor, director of corrosion research, Department of Chemical Engineering, University of Minnesota | Panel Discussion:
Physical Integrity of Pipelines

1. Welds and electric resistance welded pipe
2. Corrosion, cathodic Protection
3. Metal and corrosion fatigue |
| Dr. Richard Oriani

Mr. Mark Ferdinard, representative of Acoustic Engineering International, Inc.

Dr. John Kiefner | Panel Discussion:
Methods of Testing

1. Magnetic flux leakage (smart pigs)
2. Acoustic Emission
3. Proof Pressurization (Hydrostatic Testing) |

SEPTEMBER 4

**David Bull, regional manager,
Central Office, Heath Consultants**

**Detecting and Locating
Pipeline Leaks and Ruptures**

**Panel Discussion:
Emergency Response and
communication for
pipeline ruptures/
recommendations for
improvement**

**Ron Fagerstrom, fire chief,
Blaine/Mounds View/Spring Lake Park**

- 1. Local Perspective**
- 2. State Hazardous
Materials Program**
- 3. Pollution Control
Agency Perspective**

**Thomas Alcorn, Coordinator,
Hazardous Materials Response Team,
Division of Emergency Services,
Minnesota Department of Public Safety**

**State Pipeline Inspections
Programs**

**Dick Holmes, state inspector,
Fire Marshal Division, Minnesota
Department of Public Safety**

- 1. Minnesota Natural Gas
Pipeline Inspection
Program**
- 2. California Inspection of
Interstate Hazardous
Liquid Pipelines**
- 3. Relationship of Federal
and State Inspection
Programs.**

**Walter Hernandez, chief,
Division of Hazardous Liquids,
Pipeline Safety and Enforcement,
California State Fire Marshal's Office**

**Ed Ondak, chief, Central Region,
Office of Pipeline Safety**

SEPTEMBER 18

Russell Felt, chief of the Regulatory Compliance Division of Water Quality, Minnesota Pollution Control Agency

History of Pipeline Failures in Minnesota

Steve Cropper, president, Williams Pipeline Co.

Operation and Safety Procedures for the Williams Pipeline System

Richard Peterson, area manager, Amoco Pipeline Co.

Operation and Safety Procedures for Pipeline Companies in Minnesota

John Caskey, DOT compliance engineer, Northern Natural Gas Co.

David Luddeke, assistant manager of engineering, mechanical and electrical design, Mid-America Pipeline Co.

John S. Staudohaur, executive to the president, Lakehead Pipeline Co.

OCTOBER 2

Steve Keefe, commissioner,
Minnesota Department of Labor and
Industry

Cecil Selness, director, Office
of Railroads and Waterways, Minnesota
Department of Transportation

Greg Holman, petroleum analyst,
Minnesota Department of Energy and
Economic Development

Freeman R. Mast, manager of
national accounts, Marathon Petroleum

Greg Holman, petroleum analyst,
Minnesota Department of Energy and
Economic Development

Miles Hall, president, Como Oil,
Duluth, Minnesota

Jerry Linke, mayor, City of
Mounds View

Michele Timmons, Ramsey County
Attorney's Office

Connie Morrison, mayor, Burnsville

Tom Hohenstein, administrative
assistant, City of Eagan

Steve North, assistant city
manager, City of Roseville

Kenneth Haider, public works
director, City of Maplewood

Darrel Berkowitz, city engineer,
Afton, Minnesota

Mike Reber, fire chief, City
of Woodbury

Lowell Johnson, emergency services
manager, Washington County

Inspection and Construction
of High-Pressure Piping

Safety and Economics of
Pipeline Transportation
Modes

Overview of Minnesota's
Petroleum Supply Sources

Petroleum Product Pipelines
and Transportation Economic
and Supply Issues

Northeastern Minnesota
Distillate Supply Outlook

Northeastern Minnesota
Supplies, Jobber Perspective

Video of Mounds View
accident and recommendation
followup

Local Government Concerns
and Recommendations

OCTOBER 27

	Review of Proposed Federal Legislation, Concerns of Minnesota's Congressional Delegation
Senator David Durenburger	Review of Proposed Senate Legislation
Representative Bruce Vento	Review of Proposed House Legislation
Representative Gerry Sikorski	Comments on Pipeline Safety
Tom Regan, administrative assistant to Representative James Oberstar	Comments on Pipeline Safety
Charles Morin, president, Packer Engineering	Review of Completed Test Results for the Williams Pipeline

**NOTE: Agendas for November 6, 13 and 20 were devoted to approving the
commission's final findings and recommendations.**

APPENDIX 2

TECHNICAL WORKGROUP MEMBERS

MINNESOTA COMMISSION ON PIPELINE SAFETY

Dick Larsen
State Fire Marshal
Dept. of Public Safety

Greg Holman
Petroleum Analyst
Dept. of Energy & Economic
Development

Dick Holmes
State Fire Safety Inspector
Dept. of Public Safety

Abby McKenzie
Director, Economic Analysis
Dept. of Energy & Economic
Development

Larry Hartman
Project Manager
State Planning Agency

Steve Gustafson
Petroleum Analyst
Dept. of Energy & Economic
Development

Russell Felt
Chief, Regulatory Compliance Section
Pollution Control Agency

Lee Paddock
Spec. Ass't. Atty. General
Attorney General's Office

Cecil Selness
Office Director
Railroads, Waterways, Pipelines
Department of Transportation

Bill Newstrand
Director of Waterways and
Pipelines
Department of Transportation

Patrick Mader
Supervisor of Water Quality
Pollution Control Agency

Jeri Aune
Spec. Ass't. Atty. General
Attorney General's Office

APPENDIX 3

Members of the Minnesota

Commission on Pipeline Safety

Robert Aldrich, Fire Chief, Fridley

Michael Anderson, Congressman Vento's Community Liaison

Thor G. Bank, Engineer, Roseville

Darrel H. Berkowitz, Toltz, King, Duvall, Anderson, and
Associates, Inc.

Representative David T. Bishop, Rochester

Marjorie A. Brimi, Chemical Engineering, Honeywell

Darrel Bunge, Minnesota Petroleum Council

Harvey E. Burski, Associate Professor, University of
Minnesota at Duluth

Representative Douglas W. Carlson, Sandstone

Bob Dunn, Princeton

Dr. William W. Gerberich, Associate Dean for Chemical
Engineering, University of Minnesota

David Green, Plumbers & Pipefitters Local #126, Detroit Lakes

Jon R. Grunseth, Vice President, Economics Laboratory

Aletha Halcomb, Teacher, Minneapolis

Sue Hankner, Mounds View City Council

Tom Kalitowski, Minnesota Pollution Control Agency

Bob Krogman, Northwest Petroleum Association

Representative Daniel J. Knuth, New Brighton

Senator Steven G. Novak, New Brighton

Naomi Perman, North Star Chapter of the Sierra Club

Jack Pitel, Director of Safety, Soo Line Railroad

Senator Clarence M. Purfeerst, Faribault

Tony Rohrer, Pipefitters Union Local #455, St. Paul

Representative John T. Rose, Roseville

Merlin E. Williams, Consulting Metallurgical Engineer, Waseca

Rosemary, L. Wilson, Government Affairs, Burlington Northern
Railroad Company

**Minnesota Department of
Energy and Economic
Development**

Policy Analysis Division

