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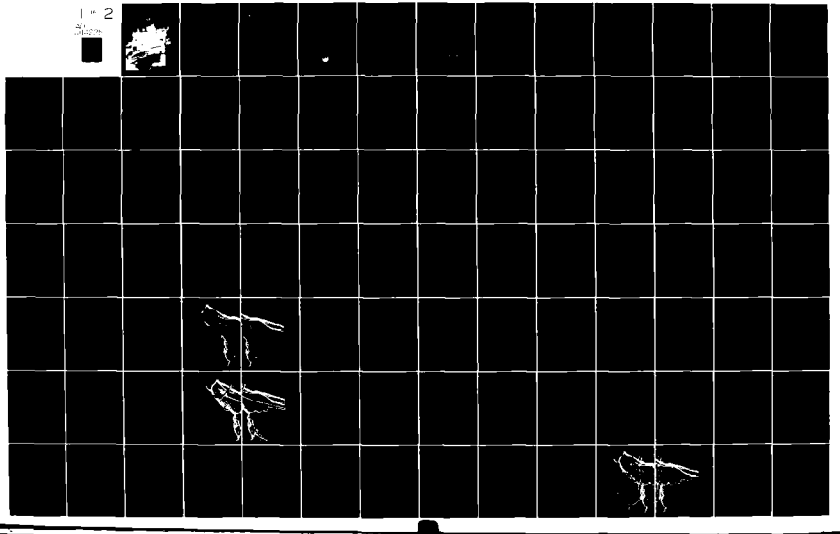

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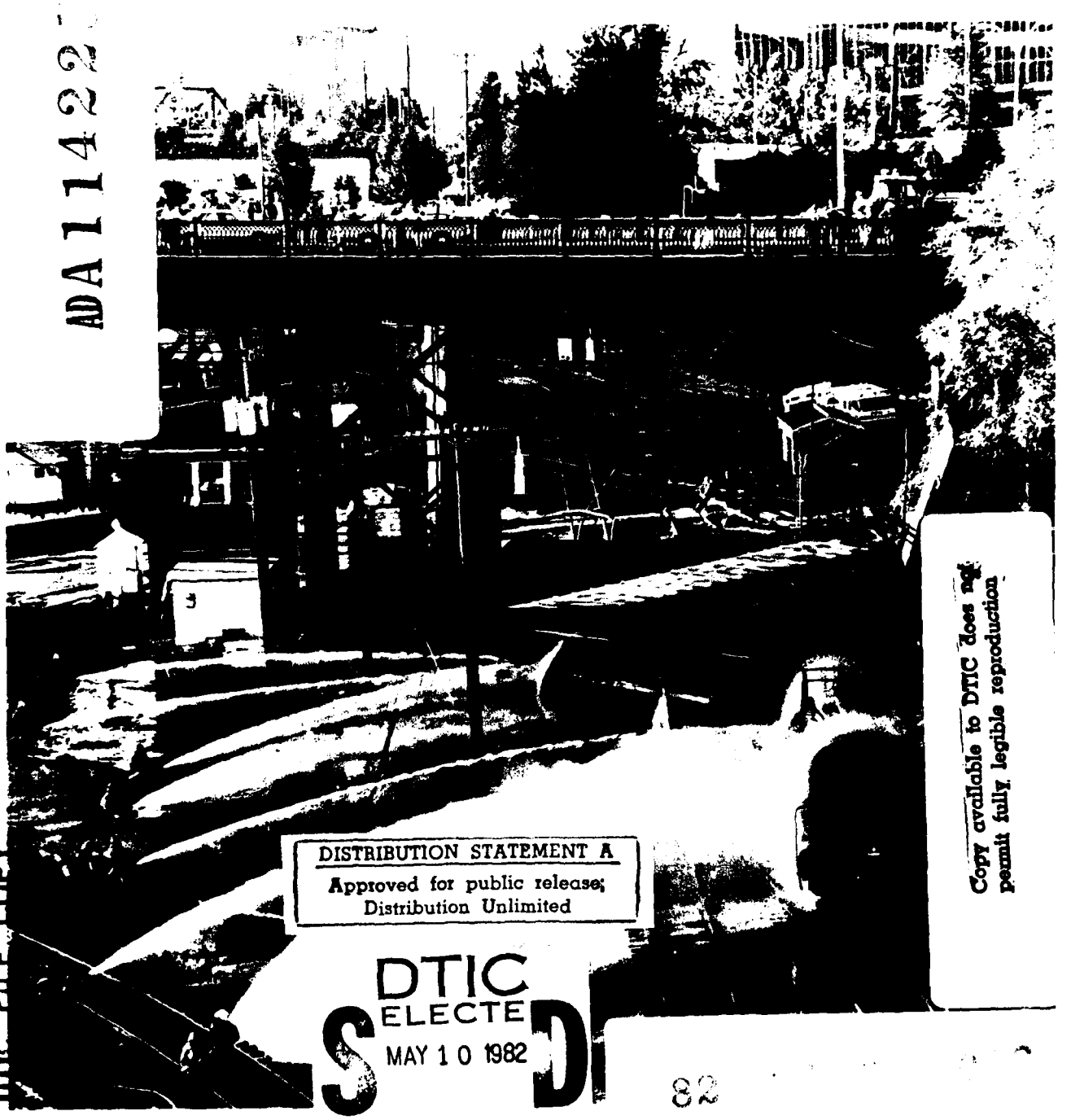
Hazardous Materials Hazard Analysis

Portland Office of Emergency Management



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Federal Emergency Management Agency

Washington, D.C. 20472

January 8, 1982

MEMORANDUM FOR THE RECORD

SUBJECT: City of Portland Plan

This document, the Hazardous Materials Hazard Analysis for the City of Portland, Oregon, was developed in parallel with a study project funded by the Federal Emergency Management Agency (Contract No. EMW-C-0326).

It has not received formal FEMA evaluation nor concurrence, but is regarded as a useful exemplar, likely to be of help to other jurisdictions confronting similar problems and their analysis. Portland and nearby Multnomah County have pioneered in plans for coping with hazardous materials threats.

James W. Kerr
Assistant Associate Director
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National Preparedness Programs

HAZARDOUS MATERIALS
HAZARD ANALYSIS

Portland, Oregon

Prepared by the City of Portland
Office of Emergency Management

Mayor Francis J. Ivancie,
Commissioner-In-Charge

JUNE 1981

CONTRACT EMW-C-0326

PREFACE

The risks associated with the use of chemicals and other hazardous materials appear to be increasing. This is of great concern to local fire and police agencies who may be required to risk their lives to protect the public. It is also of concern to local residents who note the alarming and dramatic accidents reported by the media.

These dangers are by no means new to local firefighters. In fact, many are curious about why the general public and other public agencies have waited so long in recognizing what is to them an indisputable problem. Most will tell you that it is not a matter of <u>if</u> a major accident will occur, but <u>when</u>.

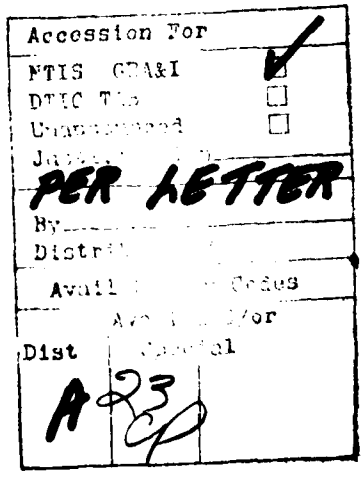
It is important that City of Portland Officials and local industries recognize their responsibilities to their employees and the general public. For the most part they do. It is similarly important that policy makers, the press, and the general public recognize the many benefits which are derived from the hazardous commodities which are found in Portland, and realistically assess the risks associated with them. Overall community safety is rarely enhanced by over-reaction and impassioned rhetoric based on incomplete analysis. Hazardous materials management is a field where such over-reaction is possible, especially following a major accident.

This report is presented as a first step in an on-going process of planning for prevention of and response to hazardous materials emergencies. Given the complexity of the current "management system" which works toward the safe handling of hazardous materials, such on-going planning must involve cooperation

and active participation by representatives from a myriad of government agencies and private industries. The tone of this report is intended to reflect the City of Portland's sincere interest in facilitating this cooperative planning.

This report is predicated on the assumption that local government agencies are the first line of defense against chemical catastrophies. Local fire and police personnel will always be the first public officials at the scene of an emergency. The actions they take in the first minutes can be vital in minimizing the effects of an accident so that it doesn't escalate into a disaster.

This report is also based on the premise that local officials have the opportunity and responsibility to be aware of unique local risks. In addition to enhancing response to emergencies, there is a very real and important local role in preventing such accidents.



ACKNOWLEDGEMENTS

This report would not have been possible without the gracious and patient cooperation of a number of individuals and organizations. Foremost on the list are all the members of the Portland Fire Bureau who provided guidance and collected data. Special thanks are due to Chief Francis J. Sargant, Assistant Chief Melvin W. Brink, and Assistant Chief James Klum. This project was also extremely well served by Lt. James Rice and Lt. James Klum, whose administration of the data collection process was vital.

Assistance was rendered by several individuals within the Portland Police Bureau, especially Officers Tony Ferriera and Ross Neely.

Several State and Federal agencies contributed information about the nature of the risks and their approaches to reducing it. These include: Paul Henry, Dave Astle, and their staffs of the Oregon Public Utility Commission; Michael J. Eyer, Bureau of Explosives; Bill Ingraham and Henry Jacobs, Federal Railroad Administration; Deputy Brian Reynolds, Multnomah County Division of Public Safety (and members of the Multnomah County hazardous materials response team); Robert Hagan, Federal Highway Administration; and Lt. Robert Segovis, U.S. Coast Guard.

Without some initial guidance from the staff of the Puget Sound Council of Governments Hazardous Materials project, this project may never have gotten off the ground.

Without the on-going intellectual and editorial guidance of my colleagues within the Portland Office of Emergency Management, the report may never have been completed. Without the help of Cherie Miller-Glaspey, it would be illegible.

Any misrepresentations or errors are of course the responsibility of this author.

Robert W. Robison

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LIST OF ABBREVIATIONS

U.S. DOT - U.S. Department of Transportation

LPG - Liquid Petroleum Gas

NFPA - National Fire Protection Association

EPA - U.S. Environmental Protection Agency

DEQ - Department of Environmental Quality

MSD - Metropolitan Service District

CERCLA - Comprehensive Environmental Response Compensation and Liability Act

ORM - Other Regulated Materials

BLEVE - Boiling Liquid Expanding Vapor Explosion

PUC - Public Utility Commission

OSC - On-Scene Coordinator

OARS - Oregon Accident Response System

CHEMTREC - Chemical Transportation Emergency Center

OSHA - U.S. Occupational Safety and Health Administration

FRA - Federal Railroad Administration (U.S. Department of Transportation)

OSP - Oregon State Police

NRC - National Response Center

EXECUTIVE SUMMARY

HAZARDOUS MATERIALS HAZARD ANALYSIS: EXECUTIVE SUMMARY

The frequency and severity of accidents involving hazardous materials appear to be increasing. As the major transportation hub and manufacturing center for Oregon, considerable quantities of hazardous materials are found in Portland.

Wherever such commodities are manufactured, stored and transported, the possibility of an accident exists. The accidents occurring most frequently have been, and will probably continue to be, relatively minor in nature. However, experiences in other communities makes it very clear that Portland should prepare for the possibility of a major hazardous materials spill or fire which would seriously threaten private citizens as well as the safety of fire and police personnel.

This report summarizes the findings of a joint research and planning effort by the Portland Office of Emergency Management and the Portland Fire Bureau. Funded in part by the Federal Emergency Management Agency, this project has made possible a thorough inventory and development of pre-emergency plans for all facilities which manufacture, store, and/or use hazardous materials. Available information about the transportation of hazardous materials by highway, rail, marine and pipeline has also been summarized and documented. Based on discussions with those responsible for the safe management of hazardous materials locally and in other municipalities, recommendations are proposed which will reduce the risks within Portland.

For several reasons it is difficult to precisely identify all specific commodities and quantities of hazardous materials transported within Portland. This is especially true for highway and

marine transportation. General information for current planning purposes is available, however, and is presented in this report.

Commodities which fall into each of the classifications used by the U.S. Department of Transportation are found in Portland. For the purposes of emergency planning, it should be assumed that any commodity permitted to be transported by the U.S. Department of Transportation could be involved in an accident.

The most prevalent hazardous materials stored and transported by all modes within Portland are flammable and combustible liquids, primarily petroleum products such as gasoline and fuel oil. Although less prevalent, compressed flammable gases (such as liquid petroleum gas) are transported within Portland and present a significant explosion risk if involved in a fire. Non-flammable gases (such as anhydrous ammonia and chlorine), which act as poisons, are also stored and shipped locally.

Conclusions and Recommendations

Conclusion: An ad-hoc set of procedures has evolved among the several City Bureaus which may become involved in hazardous materials emergencies. Most of the relevant Bureaus have developed emergency operating procedures. Although the ad-hoc inter-agency plan has been adequate for all incidents to date, it has not been tested for or by a major incident. There has been no formal attempt to insure that all of the plans mesh into a coordinated City-wide response.

Similarly, several City Bureaus share responsibilities for enforcing accident prevention and mitigation codes (Fire Bureau, Bureau of Buildings, Land Use Planning, Waste Water Treatment).

No formal attempt has been made to assure that these efforts are coordinated.

Recommendation: A formal City-wide emergency response plan outlining individual Bureau responsibilities, notification procedures, availability of outside assistance, etc., should be developed. The Office of Emergency Management could convene representatives from relevant Bureaus and document the plan. In addition, agencies involved in accident prevention should explore the opportunities for coordination of their efforts.

Conclusion: Evacuating a large number of people during a major incident is a crucial component of emergency response. Evacuation is also one of the most frequently mentioned and problematic aspects of the current ad-hoc plan.

Recommendation: Development of an evacuation plan should be a primary component of a formal City-wide emergency response plan.

Conclusion: Hazardous materials emergencies are extremely complex and often present unique problems for local emergency responders due to the need for:

- timely and accurate information about product characteristics and appropriate handling;
- coordination of all the public and private entities needing to be informed/involved;
- marshalling and use of unique and special equipment (e.g. diking materials, detection equipment, special protective clothing, etc.).

As currently structured, there is no assurance that City emergency response personnel with the most experience and training in managing hazardous materials emergencies will be called to the scene.

Recommendation: Establish a team of specialists representing both

the Fire and Police Bureaus to assist the Fire Bureau Incident Commander during hazardous materials emergencies. Such a team could also provide training to generalist personnel within their respective Bureaus.

In discussions with Police and Fire managers, administrative difficulties with such specialization have been identified. An alternative to such specialization would be an increased level of training for both police and fire commanding officers as well as all police officers likely to be the first on the scene of a hazardous materials accident.

Conclusion: A specialized hazardous materials response team would require appropriate equipment. If identifying a source of funds for this equipment becomes a problem, a concept of "taxing" those who present the hazard could be utilized. This concept of financing could also be used for other aspects of hazardous materials management.

Recommendation: Necessary equipment, as determined by the emergency response team, should be procured. If funding becomes a problem, the Fire Marshal's Permit system provides the authority and mechanism for "taxing" those who create the hazard. It could be revised to equitably represent the costs for the special protection required by each type of hazardous materials target hazard. Other alternatives to that system could be developed (e.g. building or business permits).

Conclusion: There are a number of public and private groups who may create and/or respond to a hazardous materials emergency within Portland or in the greater metropolitan area. There are also numerous agencies with some regulatory authority. There is little or no coordination in policy development, inter-jurisdictional (and inter-agency) emergency response, or accident prevention activities.

Recommendation: Establish a Policy and Program Advisory Group of public and private entities involved in hazardous materials management (major transporters, producers, emergency responders, regulators, etc.). Convened and staffed by the Office of Emergency Management, the group could further identify local problems and assist in identifying needed activities or programs (e.g. a clearing-house of training opportunities for businesses, recommendations for routing, assistance in conducting simulated disaster exercises, etc.). Such a group has been successfully convened in the Seattle area and is making significant contributions to training and emergency response capabilities.

Conclusion: The Banfield transportation corridor (I-84 through Sullivan's Gulch and beyond) presents unique risks. It is a major rail and highway route for hazardous materials, borders residential areas, and the ravine through which it runs makes access by emergency personnel difficult. The construction of the light-rail transit system will increase the risk by adding more commuters.

Recommendation: The Portland Fire Bureau's request for water protection in this area is strongly recommended as one way to mitigate this unique hazard. Ideally, water protection should be provided along all hazardous materials transportation routes within the City, including interstate freeways, rail corridors and switch yards.

Conclusion: The current level of safety inspections for all trucks is inadequate. Hazardous materials-laden trucks which rarely leave the metropolitan area and/or are not part of a larger fleet are seldom inspected.

Recommendation: The City of Portland should augment the current Federal, State, and County efforts of truck inspection. Special attention should be given those trucks hauling hazardous materials. To insure that consistent standards are enforced upon the indus-

tries, any local truck inspection program should be closely coordinated with the Oregon Public Utility Commission highway safety programs.

If increased inspection is not possible, other options to encourage compliance with established safety standards should be developed.

Conclusion: Recommended guidelines to be used in selecting preferred routes for highway shipments of hazardous materials have been published by the U.S. Department of Transportation. By comparing accident rates and population exposure, and working with potentially affected industries, the safest available alternative routes can be determined. The City of Portland has not thoroughly studied currently used routes or determined if these are the preferred safest routes.

Recommendation: A study should be conducted to determine currently used and preferred hazardous materials truck routes within the City. Such a study should be conducted jointly by the Office of Emergency Management and Bureau of Traffic Engineering, and should be based on the guidelines recommended by the U.S. Department of Transportation. The Office of Emergency Management would conduct a survey of local haulers and convene discussions with shippers, carriers, regulatory groups (e.g. Public Utility Commission, Federal Highway Administration) and emergency responders. Traffic Engineering would assess traffic flows and analyze accident statistics to determine relative safety of alternative routes.

Conclusion: Several officials responsible for port safety have observed that the level of marketing inquiries from hazardous materials shippers will increase as other west coast ports seek to more closely regulate their facilities. Port of Portland safety officials have begun training, notification and other emergency planning which will reduce the risks to dock workers and emergency responders.

Recommendation: The current planning by the Port of Portland should be continued. Policies on the development of hazardous materials and hazardous wastes markets should be established by the Port of Portland in conjunction with the Portland Fire Bureau. As new markets are developed, they should be coordinated with safety and emergency procedures within the Port, and with the U.S. Coast Guard and Portland Fire Bureau. Reasonable advance notification procedures should be developed and coordinated between the shippers, Port of Portland, U.S. Coast Guard and Portland Fire Bureau.

OVERVIEW OF STUDY

The types and quantities of hazardous materials used for agricultural, industrial and other modern technologies are changing each year. Several hundred new hazardous materials are introduced to the commercial market annually. The materials being developed are also becoming increasingly complex in the threats they pose to life, property and the environment, especially when improperly handled.

Hazardous materials accidents, especially those occurring during transportation, appear to be increasing in both frequency and severity. The U.S. Department of Transportation (U.S. DOT) estimates that hazardous materials shipments will double in the next 10 years. Without further attention to accident prevention, it can be expected that the rate of accidents will increase proportionately. In the years between 1971 and most of 1980, there have been in excess of 98,000 reported transportation accidents nationally. Each year more accidents are reported*--in 1975 there were 10,769 accidents and more than 17,500 in 1979. During the decade from 1970 to 1980 accidents caused 241 deaths, 6,667 injuries and over $114 million in property damages.

It is important to remember that hazardous materials have become an integral part of modern agriculture and industry and, therefore, our economy. As the major manufacturing and transportation center for Oregon, significant quantities and types of hazardous materials can be found in Portland. Although more highly concentrated in industrial areas of the City, they can be expected to be stored or used in a number of manufacturing, wholesale and retail establishments. Furthermore, the transportation of these commodities distributes them throughout the entire City.

* Due, in part, to more stringent reporting requirements.

Wherever hazardous materials are found, there is a possibility of an accident. It would be naive to believe that the presence of or the dangers involved with these commodities will disappear. A number of accidents reaching disaster magnitude have occurred nationally over the last several years and have increased both public concern and awareness at all levels of government that a hazard does exist. Rarely a week goes by when local newspapers do not report an accident occurring in some part of the country which endangers emergency responders and requires some level of evacuation. Accidents such as the following attest to the possible magnitude when hazardous materials are involved.

--Texas City, Texas, 1947--A ship being loaded with ammonium nitrate exploded, killing 468 people and injuring 2,000 others.

--Roseburg, Oregon, 1959--The explosion of a dynamite-laden truck killed 13 people, injured 125 others and destroyed property for several surrounding blocks.

--Crete, Nebraska, 1969--A release of anhydrous ammonia from a rail tank car punctured during a derailment killed 8 persons and required the hospitalization of 11 others.

--Kingman, Arizona, 1973--12 firefighters were killed and 95 people injured by an exploding Liquid Petroleum Gas (LPG) tanker.

--Culver City, California, 1976--Nine persons were killed, 14 injured and 7 buildings destroyed when a pressurized gasoline pipeline ruptured and ignited.

--Youngstown, Florida, 1978--8 persons were killed and 138 injured by chlorine released in a derailment.

--Waverly, Tennessee, 1978--2 days following a derailment, an LPG rail tanker exploded during clean-up and transfer of the fuel; 16 people were killed and 43 were injured.

--San Louis Potosi, Mexico, 1981--Fumes escaping from a derailment of chlorine tankers killed 29 persons and injured 1,000 others.

As long as people are involved in the use and transportation of hazardous materials, errors will be made and accidents will occur. However, programs to prevent accidents and preparation for responding to them when they do occur can substantially reduce the risk to emergency personnel and the general public.

The Purpose of This Study

This study has been conducted to gain a clearer understanding of the risks posed to Portland area residents and emergency response personnel by the transportation, use, and storage of hazardous materials. Estimates of the types, quantities and locations of hazardous materials commonly found within the Portland city limits are presented in this final report.

Through discussions with those familiar with hazardous materials management--representing both public and private concerns--recommended actions which are appropriate to a City government and which will reduce the risks have also been identified. The recommendations address both accident prevention and emergency response. They do not focus on particular safety standards or specific emergency response procedures. These are concerns best left to safety engineers and emergency response professionals. Rather, they focus on policies which need to be established, and

programs which need to be developed. Through discussions with the relevant City Bureau managers, these recommendations have been determined to be appropriate and feasible.

Methods of the Study

This study has been a cooperative effort of the Portland Fire Bureau and the Portland Office of Emergency Management. In addition, many other agencies and individuals provided valuable information. Much of the funding has been provided through a research contract by the Federal Emergency Management Agency.

A detailed survey of facilities which store or use hazardous materials in significant quantities was conducted by the firefighting crews of the Portland Fire Bureau. Completed as part of the annual pre-fire planning, the survey provided firefighters the opportunity to identify and prepare specific plans for each hazardous materials "target hazard"*. Information was also collected about the capabilities of private firms to prevent or respond to an emergency involving hazardous commodities.

An inventory of hazardous materials transportation patterns within Portland was conducted by staff of the Office of Emergency Management. This was accomplished primarily by reviewing secondary data from relevant agencies. To date, little information about specific frequencies, routes and products** has been requested directly from industries.

It was decided early in the project that no information would be requested from local industries unless a clear and specific use for the information was identified. Industries are required to report to a number of other local, state and federal

* "Target hazard" is a term used by the Fire Service to describe facilities which pose an unusual risk of life or property loss.

** Products common to Portland's transportation system have been identified through the pre-fire planning conducted by the Fire Bureau

agencies; such reports are time consuming and expensive. To minimize the disruption of business, secondary information available from other agencies has been analyzed. This by no means suggests that local hazardous materials-related industries do not have an important role in safety planning. On the contrary, as can be seen in many of the recommendations of this report, future accident prevention and emergency response planning will rely heavily on the cooperation and expertise found in local industries.

Identifying how the City of Portland could reduce the current risks inherent in the presence of hazardous materials has been based on discussions with local specialists, and through a review of programs established in other municipalities. The recommendations are by no means exhaustive. As proposed, the recommended Hazardous Materials Emergency Response Team and Policy and Program Advisory Group will provide a mechanism for the on-going identification of local hazards and development of prevention and emergency response capabilities.

Definition of Hazardous Materials and the Related Concerns

Several definitions and lists of substances with inherently dangerous properties have been developed by federal, state and trade associations (such as the National Fire Protection Association (NFPA)). Each list and definition is for a specific regulatory or safety purpose. It is quite easy to become confused about what constitutes "hazardous waste", "cargo of particular danger", "hazardous material", "toxic substance", etc.

Hazardous wastes are by-products of industrial processes. They present a threat to people and the environment and are of little or no commercial value to industry. The primary concern is for their safe disposal. Problems of improper hazardous waste disposal have received considerable public concern as a result of such incidents as that which occurred at Love Canal. "Cradle-to-Grave" regulatory programs are being implemented nationally by the U.S. Environmental Protection Agency (EPA), and in Oregon by the Department of Environmental Quality (DEQ). Local hazardous waste issues are also being addressed by the Metropolitan Service District (MSD) as part of its solid waste disposal responsibility.

As a consequence of the new programs, a reprocessing and disposal industry is being developed. A hazardous waste disposal site serving much of the Pacific Northwest is located in north-Central Oregon near Arlington. An increase in shipments of hazardous wastes through Portland to Arlington has been occurring as waste disposal practices change.

The U.S. Coast Guard has identified a number of commodities

which are identified as "Cargo of Particular Hazard" (See Appendix 8). Special reporting and advance notification of movement are required for these materials.

Several other federal laws and programs also establish unique definitions and lists of commodities considered dangerous to property, people or the environment. Many of these lists are amalgamated under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA, also known as "Superfund"), which establishes a definition of "hazardous substances." These are substances for which the federal government has established reserve funds to pay for clean-up of hazardous waste disposal sites and accidental spills.

The most useful definition for local fire and police services are those commercial commodities defined as "hazardous materials" by the U.S. DOT. These are commodities whose hazards make them an acute threat to public safety, property and the environment if involved in an accident. There are more than 1,600 commodities listed by the U.S. DOT as hazardous.

The U.S. DOT's definition of hazardous materials and classification system was used for this study. Hazardous materials "target hazards" have been defined as those facilities which involve these materials in quantities that pose unusual risks to emergency response personnel and/or may require an evacuation during an accident or fire. Attention has been focused on major storage or manufacturing facilities and bulk shipments.

A listing of the major hazard classes used by the U.S. DOT, associated risks and examples of commodities common to the Portland area is presented on the following pages.

TABLE 1

DOT HAZARDOUS MATERIALS CLASSES,
ASSOCIATED HAZARDS AND LOCALLY FOUND EXAMPLES

U.S. DOT Hazard Class	Nature of Hazards[1]	Common Examples
Explosives (Explosives A present major explosive threat. Explosives B & C may only burn unless purposefully ignited)	Starts and spreads fires scattering fragments blast and shock waves	Dynamite, Rocket motors, fireworks, ammunition
Flammable Compressed Gases	BLEVE[2] Movement along ground to ignition source Asphyxiation[3]	Propane, Liquid Petroleum Gas (LPG), Vinyl Chloride
Non-Flammable Gases	Asphyxiation May be poisonous May cause frost bite if liquid under pressure may react violently with other materials[4]	Chlorine, Anhydrous Ammonia
Flammable and Combustible[5] Liquids	Fire BLEVE May be toxic or corrosive May be reactive May move along ground to an ignition source Contamination of soil, water supply, and/or waste water treatment and sewerage facilities	Gasoline, Methanol, Fuel Oil, Diesel

U.S. DOT Hazard Class	Nature of Hazards	Common Examples
Flammable Solids	Easily ignitable and may burn explosively May be air or water reactive(2) May spontaneously combust May be toxic and/or corrosive	Phosphorous, Scrap paper, Sodium
Oxidizers (Yields oxygen readily to stimulate the combustion of other materials)	Sensitive to heat, shock, and/or friction Reacts spontaneously with organic matter May mix with other materials to form an an ignitable substance	Hydrogen Peroxide, Ammonium Nitrate
Organic Peroxides (Derivatives of Hydrogen Peroxide)	Highly flammable Sensitive to heat, shock, friction Release heat Toxic	Plastic Polymerizers (e.g. Benzoyl Peroxide) *Bleaching Peroxides*
Poisons and Irritating Materials (Poison A is much more dangerous than Poison B or "irritating agents")	Toxic by inhalation, ingestion, absorption May be flammable and produce toxic smoke Contamination of soil, water and sewerage/ waste water treatment facilities	Pesticides, insecticide (parathion), Tetraethyl lead (motor fuel anti-knock compound), Phenol (Carbolic Acid)
Corrosives	Contact or inhalation destroys tissue May be water reactive Toxic or thermally unstable May be an oxidizer	Caustic Soda (Sodium Hydroxide), alkaline battery fluid, sulfuric acid, nitric acid, hydrochloric acid

U.S. DOT Hazard Class	Nature of Hazards	Common Examples
Radioactive Materials (Levels 1, 2 and 3)	External or internal exposure (inhalation, absorption, ingestion) Can be carcinogenic, cause genetic damage or other forms of radiation sickness Contamination by smoke, steam or water run-off Fire may melt lead shielding	Iodine, Cobalt (medical purposes) Enriched Uranium (fuel element in nuclear power Spent fuel rods(6) (waste from nuclear power)
Etiologic Agents (Living micro-organisms used for medical purposes)	Disease causing by inhalation, absorption, ingestion Contamination of soil, water, waste water treatment	Biological and virus specimens, (e.g. measles or rabies)
Other Regulated Materials (ORM's) (Materials which do not meet the definition of one of the above Hazard classes but are dangerous	May cause damage to transport vehicle if leaked or spilled May injure passengers May present limited threat due to form, quantity or packaging	Carbon Tetrachloride (solvent), Quicklime, Excelsior, Magnatized material

NOTES

(1) Commodities are assigned to Hazard Classes for the purpose of labeling containers and placarding vehicles. Hazard Class is determined by the major hazard of a substance. However, many substances have multiple hazards, such as anhydrous ammonia which is labeled a non-flammable gas, but is also poisonous, corrosive, quite reactive with many substances and is flammable under many circumstances.

(2) BLEVE (Boiling Liquid Expanding Vapor Explosion)--an extremely violent explosion or a rail, truck or other tanker created when impinging flames increase vapor pressures beyond the tanks structural strength. A BLEVE can scatter tank car fragments, create a fire-ball and cause shock waves to threaten a $\frac{1}{2}$ mile area. In some instances, tank cars have ruptured near the ends and rocketed the entire tank car several thousand feet. The highest BLEVE risk is among Flammable Gas tankers and less so for Flammable and Combustible tank cars.

(3) Asphyxiants--suffocation through displacement of oxygen in lungs, blood cells, or tissue.

(4) Reactives--when combined with other materials, may produce explosive, toxic, or other hazards. Many commodities--such as anhydrous ammonia--react violently with water.

(5) By general definition, combustibles ignite at temperatures above 100 F; Flammable ignite at temperatures below 100 F.

(6) Only low-level radioactive waste materials are currently being shipped from local nuclear power facilities. There is on-site temporary storage space for spent fuel rods for another 9 years at the Trojan plant.

Levels of Emergencies

For the purpose of this study, hazardous materials emergencies have been categorized by severity into three levels:

Level 1: A routine spill or exposure to fire which does not require evacuation or the use of highly specialized knowledge or emergency equipment. This level of accident is handled exclusively by local personnel. Although dangerous, an incident of this type does not pose unusual or unique risks. An overturned gasoline or home heating fuel oil tanker or natural gas leak which does not ignite would be a Level 1 emergency.

Level 2: A spill or exposure to fire involving a commodity with inherent hazards or in quantities that require special equipment and knowledge and may require evacuation of local residents and businesses. The emergency is handled by local resources. A small chlorine spill or ignited overturned gasoline tanker would be a Level 2 emergency.

Level 3: A major incident of such magnitude that local resources are not capable of containment. A relatively large scale evacuation would probably be required. Considerable outside assistance from other jurisdictions, state, federal and private groups is required, and the coordination of resources becomes a major task. The emergency may extend for several hours or days. A large chlorine spill or fire impinging upon a Liquid Petroleum Gas (LPG) rail car near a residential area would be a Level 3 emergency.

The Possibility of an Accident

The precise probability of a hazardous materials accident is not known. Level 1 incidents are common and are handled almost daily by the Portland Fire Bureau. Although Level 2 incidents have been relatively infrequent, they appear to be an increasing threat. The probability of Level 3 accidents is statistically quite low--although their occurrence is by no means impossible. The commodities and circumstances exist within Portland for major incidents similar to those experienced in other communities.

The fact that major accidents do not occur more often is not mere luck. Safety procedures exist and--for the most part--industries take their responsibilities quite seriously.

Who Bears the Risk

Spillers are liable for any damages which result from a spill as well as responsible for clean-up costs. Sanctions for violations of safety standards can also be quite severe. For example, the U.S. DOT Federal Railroad Administration is authorized to levy civil fines up to $10,000 for knowing violations of federal regulations. Willful violation can result in fines of $25,000 and/or 5 years imprisonment. Nevertheless, emergency responders, as well as industry representatives, agree that the current safety system can fail.

Everyone involved with hazardous materials has an obvious interest in their safe handling. The general public is becoming increasingly aware and concerned about the threat to private

citizens posed by the transportation and use of hazardous materials in their community. Local emergency response personnel--firefighters and police--are responsible for containment and control during the first stages of an accident. Patrol officers as well as firefighters may not have the option of removing themselves from a hazardous environment. They are consequently most vulnerable to injury.

A key component in the protection of both emergency responders and private citizens is the ability to rapidly conduct an orderly evacuation from the hazard areas. In an emergency, private citizens should be evacuated if the slightest danger to them exists. Some situations may be so dangerous that fires should be left to burn and fumes to dissipate without risking the safety of firefighters or other responders. Under such circumstances, firefighting activities will need to be conducted from a safe distance and maximum containment procedures will not be possible.

Other situations may occur when the best tactic may be to advise residents to stay in their homes and close windows and doors to most effectively reduce exposure. Such a tactic would be advisable when fumes or smoke are dissipating rapidly and/or are too irritating to risk any exposure.

Determining the area of an evacuation zone depends on the characteristics of the commodity, quantity spilled, topography, wind direction and other weather conditions. An evacuation can range from several hundred feet to as much as 4.7 miles downwind. Recommended evacuation and isolation distances have been prepared by the U.S. DOT and are considered conservative (i.e. recommend evacuations somewhat beyond that which may be absolutely necessary). Since tank cars containing flammable or combustible liquids or gases involved in a fire have the potential of causing a BLEVE (Boiling Liquid Expanding Vapor Explosion), a standard recommended

evacuation zone is one half mile in all directions. Recommended evacuation zones for the most severe commodities are displayed in Table 2, p.22.

Hazardous materials accidents pose potential threats to the environment and property as well as to public safety. An oil, pesticide, or other type of spill into the Willamette or Columbia rivers could cause considerable damage to fish and wildlife. The derailment and consequent fire involving flammable liquid tank car which occurred in November, 1980 could have conceivably resulted in an explosion large enough to destroy the Steel Bridge.

Spills also threaten the City's severage and wastewater treatment facilities and personnel working near them. Fumes from flammable liquid spills, such as gasoline, can create an explosion threat in the sewers and pump stations. Poisons and corrosives can destroy the organisms essential to the Columbia Blvd. wastewater treatment facility.

TABLE 2

EVACUATION AND ISOLATION DISTANCES

Source: Hazardous Materials Emergency Response Guidebook, 1980, U.S. Department of Transportation

NAME OF MATERIAL SPILLING OR LEAKING (ID No.)	INITIAL EVACUATION — LARGE SPILL FROM A TANK (or from many containers, drums, etc.)		
	FIRST ISOLATE in all Directions feet	THEN EVACUATE IN A DOWNWIND DIRECTION Width miles	Length miles
Acrolein (1092)	1140	3.0	4.7
Acrylonitrile (1093)	60	0.1	0.2
Ammonia, anhydrous (1005)	200	0.4	0.7
Ammonia solution, not less than 44% (2073)	200	0.4	0.7
Boron trifluoride (1008)	670	1.7	2.6
Bromine (1744)	620	1.5	2.4
Carbon bisulfide (1131) Carbon disulfide (1131)	70	0.2	0.2
Chlorine (1017)	520	1.3	2.0
Dimethylamine, anhydrous (1032)	170	0.4	0.6
Dimethyl sulfate (1595)	170	1.4	2.2
Epichlorohydrin (2023)	80	0.2	0.3
Ethylene imine (1185)	570	1.4	2.2
Ethylene oxide (1040)	70	0.2	0.2
Fluorine, liquid (1045)	880	2.5	3.9
Hydrochloric acid, anhydrous (1050) Hydrogen chloride, anhydrous (1050) Hydrogen chloride, refrigerated liquid (2186)	450	1.0	1.4
Hydrocyanic acid (1051) Hydrogen cyanide, anhydrous (1051)	190	0.5	0.7
Hydrofluoric acid (1790) Hydrogen fluoride, anhydrous (1052)	490	1.2	1.8
Hydrogen sulfide (1053)	240	0.6	0.9
Methylamine, anhydrous (1061) Monomethylamine, anhydrous (1061)	220	0.5	0.8
Methyl bromide (1062)	90	0.2	0.3
Methyl chloride (1063)	60	0.1	0.2
Methyl mercaptan (1064)	770	1.9	3.0
Methyl sulfate (1595)	170	1.4	2.2
Nitric acid, fuming Nitric acid, red fuming (2032)	210	0.5	0.7
Nitric oxide (1660) Nitrogen dioxide (1067) Nitrogen tetroxide, and mixtures (1067)	220	0.5	0.8
Oleum (1831)	580	1.5	2.2
Perchloromethyl-mercaptan (1670)	450	1.1	1.6
Phosgene (1076)	1250	3.3	5.2
Phosphorus trichloride (1809)	220	0.5	0.8
Pyrosulfuric acid (1831)	580	1.5	2.2
Sulfur dioxide (1079)	220	0.5	0.8
Sulfuric acid, fuming (1831) Sulfuric anhydride (1829) Sulfur trioxide (1829)	580	1.5	2.2
Titanium tetrachloride (1838)	80	0.2	0.2
Trimethylamine anhydrous (1083)	170	0.4	0.6

THE EXISTING ACCIDENT PREVENTION AND EMERGENCY RESPONSE SYSTEM

In an attempt to provide for the safest possible management of hazardous materials, a complex system involving a number of individuals, agencies and private firms has evolved. Regulations, safety standards and enforcement programs have been developed by state and federal agencies. The most active include the U.S. Department of Transportation (DOT) (Federal Highway Administration, Federal Railroad Administration, U.S. Coast Guard); U.S. Environmental Protection Agency; and the Oregon Public Utility Commission (PUC) (Rail, Highway and Pipeline Safety Divisions). The national Uniform Fire and Building Codes also establish safe storage and manufacturing procedures and are enforced by the Portland Fire Marshal's Office and the Bureau of Buildings.

Emergency response capabilities have been developed by all levels of government and by many private chemical manufacturers. The more pertinent of these responders are briefly described further in this section.

The primary responsibility for handling local hazardous materials accidents rests with the Portland Fire Bureau. Although considerable back-up resources are available from state and federal agencies and private firms, it will always be local firefighters who will be required to take initial actions and will probably maintain command of the incident.

Emergencies involving hazardous materials are extremely complex and present unique problems to first responders. Crucial decisions and containment measures must often be made in the first minutes of the emergency.

The first, and perhaps most critical, phase of response is accurate identification of the commodity and information regarding its characteristics. There are over 1,600 commodities listed as hazardous by the U.S. DOT with generic names ("Proper shipping names") such as: Aminoethylpiperazine; Isocyanatobenzotrivluoride; Ethylene Glycol Mono-Ethyl Ether Acetate; Ethylene Glycol Mono-butyl Ether; Isopropanolamine, Do-decylbenzenesulfonate; etc. In addition to generic names, there are numerous trade and chemical names. Regulations do require proper labeling of materials on packages and use of generic names on transport shipping papers. However, errors in shipping papers are known to have occurred.

A commodity recently spilled in the Portland Guilds Lake rail terminal was mistakenly identified by the shipping papers as ethylene imine, an extremely dangerous commodity which would have required evacuation of resident 2.2 miles downwind. The commodity was acutally ethylene amine, which is not defined by the U.S. DOT as a hazardous material. It was also mistakenly identifed at one point as ethylamine--another hazardous material requiring different actions than ethylene imine. Fortunately, the spilled commodity was not particularly dangerous and the errors provided all involved an invaluable experience. If the error had been reversed, the consequences could have been disastrous. (A summary of the incident is presented in Appendix 1, page 112.).

The actions taken during the initial minutes of an accident are extermely important in mitigating its consequences. The reaction of a specific commodity involved in an accident or fire is not always known. Chemicals may react with one another or extinguishing/containment agents in unpredictable ways. Also, techniques of containment may be untested and/or result in

other unfortunate problems. These points are well illustrated by a rail car spill of phosphorous trichloride in Sommerville, Mass., which occurred in April, 1980. In order to protect the city's storm sewers and reduce vapor clouds which were threatening the public--and on the advice of federal and industry experts--firefighters applied water. The water reacted with the commodity and actually increased the toxic vapors. Largely as a result of this action, twenty-three thousand people were evacuated and over 400 were treated in local hospital (See Appendix 2, p.126).

Special equipment is often necessary to appropriately contain a spill. Special protective clothing, detection and diking materials and neutralization agents maybe required immediately, prior to arrival of clean-up resources.

Briefly, the major responsibilities of City Bureaus for hazardous materials emergencies are:

Fire Bureau--Assume incident command; assess the problem; establish evacuation parameters; make required City notifications and notify Oregon Accident Response System (See page 27); perform emergency containment procedures (the responsibility for clean-up always lies with the spiller).

Police Bureau--Maintain crowd and traffic control; supervise movement of evacuees.

Public Works, Wastewater Treatment Facility--Shunt any spilled commodity into isolated section of sewerage system and neutralize/contain as necessary.

Office of Emergency Management--Assist in notifications; serve as an advisor to the Mayor; procure outside resources; coordinate with City Bureaus and other public and private agencies as required.

These responsibilities have developed through experience with accidents of Level 1 and 2 magnitude. They are consistent with responsibilities outlined in the City of Portland Basic Emergency Plan. Operating procedures for handling hazardous materials emergencies have been developed by these bureaus. These established procedures have not been tested by a real or simulated Level 3 hazardous materials disaster.

In a major incident or any accident threatening the environment, numerous agencies require notification. They will offer advice and assistance, and may assume some responsibility for mitigation and clean-up. During the ethylene amine incident in Guilds Lake, 38 agencies were involved. Coordinating the information needs of these agencies was distracting to both Fire Bureau field commanders and dispatch operators. The dispatch operators were also involved in handling several other emergency incidents including another hazardous materials emergency--an overturned gasoline tank truck.

Twenty-four hour back-up assistance is available from a number of federal, state, local and private agencies. The following list includes those with major responsibilities:

National Response Center (NRC), U.S. Coast Guard--The National Oil and Hazardous Substances Pollution Control Plan is activated by one call to the NRC. They in turn notify a locally-based Federal On-Scene Coordinator (OSC). The Federal OSC has the authority to take command of a hazardous materials incident if he or she determines that local activities are not adequate. The Federal OSC will coordinate the various federal technical (e.g. National Oceanic Administration, Environmental Protection Agency) and financial (e.g. "Superfund") resources. The Federal OSC can request back-up assistance from federal Regional Response team and a National Response Team.

The Federal OSC for local spills which threaten navigable waters is the U.S. Coast Guard Marine Safety Officer (Captain of the Port or his designee). The Federal OSC for land spills is the Oregon Operations Officer of the U.S. Environmental Protection Agency.

Oregon Accident Response System (OARS)--Serves as a single-call contact point to activate all assistance available from the State of Oregon. This assistance may include: Department of Environmental Quality (which will act as lead agency for other State agencies), Health Division (including the Radiation Control Services), Highway Division, Department of Agriculture, Fish and Wildlife, State Police and Emergency Management. Notification of appropriate agencies will be done by the OARS operator consistent with established procedures.

Fire District 10/Multnomah County Office of Emergency Management Hazardous Materials Response Unit--Can provide a response team and a specially equipped van. The van is specifically equipped to provide precise tactical information from a computerized and manual reference library. Personal protection and detection equipment is also available. The Unit will respond within a 30 minute radius of Fire District 10, which includes Portland, upon request of the Portland Fire Bureau.

Private Clean-Up Firms--Several private firms have developed the capability to clean-up spills and restore the environment. These teams are well trained and equipped. Portland is fortunate to be the regional center for several such firms. They can usually respond to a spill in Portland within one hour.

CHEMTREC (Chemical Transportation Emergency Center)--A public service of the Chemical Manufacturers Association which pro-

vides immediate advice for those at the accident scene, and contacts the shippers for more detailed assistance and appropriate follow-up. Also, several major chemical manufacturers have established an emergency response capability for their own facilities and may assist local emergency responders. These teams are activated by CHEMTREC.

Recommendations

City-wide Plan

Although most City bureaus have ad-hoc plans or procedures for dealing with hazardous materials incidents, a City-wide plan has not been developed. It is recommended that development of such a plan be a high priority of the Office of Emergency Management with direction provided by the newly appointed Emergency Management Team comprised of the directors of the City's major operational bureaus. It is also recommended that this plan be routinely updated and periodically tested.

Evacuation Planning

Evacuation of a large number of people during a major incident is a crucial component of emergency response. It is also one of the most frequently mentioned and problematic aspects of the current ad-hoc plan, due to the multitude of resources required. Evacuation plans should be developed as a vital part of the hazardous materials response plan. Any plan so developed would be easily adaptable to other emergencies requiring evacuation.

Emergency Response Specialists

All Portland firefighters have some level of training in the handling of hazardous materials accidents. Fire Bureau Incident Commanders are well trained in on-scene command in emer-

gencies and have specialized training in hazardous materials. There are other Fire Bureau personnel whose training has provided them special expertise in hazardous materials. In addition, the Explosives Disposal Unit of the Portland Police Bureau has specialized training, experience and equipment to handle explosives and to dispose of small quantities of dangerous chemicals.

As currently structured, there is no assurance that Fire and Police personnel with the most expertise and training in handling the complexities of hazardous materials emergencies will be called to the scene of an accident. It is recommended that a team of specialists be established to assist the Fire Bureau Incident Commander. Such a team should represent the concerns and resources of both the Fire and Police Bureaus. A preliminary proposal for such a team has been developed by representatives of the Fire and Police Bureaus (See Appendix 3, p.127).

Financing

In the course of developing a specialized hazardous materials response team, team members will likely identify a need for equipment. It is premature to select that equipment now--it should be selected by those who will be using it.

If identifying a source of additional funds for an expanded hazardous materials response program becomes necessary, a concept of "taxing" those who present the hazard could be utilized. Two systems currently exist which may be used to apply such a tax.

The Fire Marshal's Permits issued by the Portland Fire Marshal's Office currently collect a relatively small fee. The fees range from a $100 initial fee to a $1.50 annual renewal. Fees have been kept low so as not to provide an incentive to avoid

application. Any adjustment should be made with this in mind. The permit is an important tool for enforcing the fire code and has not been used as a financing mechanism. The Fire Marshal's Permits will generate approximate $14,500 in 1981. A preliminary analysis of the Fire Marshal's Permits issued to Target Hazard Hazardous Materials facilities is presented in Appendix 4. A second alternative would be to increase the cost of Business License Fees for those firms dealing with significant quantities of hazardous materials.

Policy and Program Advisory Group (Multi-jurisdictional Coordination)

In the course of developing this report, numerous representatives of public regulatory agencies and private firms provided information and assistance. There is real concern among these individuals that the complex regulatory/enforcement/compliance/emergency response system function as effectively as possible. However, coordination of such a complex system, with so many different components, is difficult; and there is no one group attempting to carry-out such coordination. Similarly, there is no mechanism currently in place to focus the enormous resources of all these individuals and groups towards mitigating the unique hazards which exist within the City of Portland.

It is recommended that a policy and program advisory group of public and private entities involved in hazardous materials management (major transporters, producers, emergency responders, regulators, etc.) be established. Convened and staffed by the Office of Emergency Management, the group could review the hazardous analysis, further identify local problems and assist in identifying needed activities and programs. Suggestions for new programs which could be reviewed and assisted by this group include: a clearing-house of training opportunities for local businesses, reviewing potential highway routing recommendations (See page 91), establishing emergency response procedures and agreements, establishing emergency

drills, etc. There is general agreement by those involved in hazardous materials management that such an advisory group would be useful. Such a group has been successfully convened in the Seattle area and has made significant contributions to training and emergency response capabilities.

HAZARDOUS MATERIALS INCIDENTS IN PORTLAND

Complete records describing local hazardous materials incidents and their potential destructive capacity are not available. Firefighters recall a number of occurrences which could have been disasterous. For example, an LPG rail-tanker which was filled in Alaska began leaking as it was warmed and the commodity expanded. The car was successfully escorted out of the metropolitan area. However, it could have ignited and created a potential for an explosion threatening a ½ mile area (BLEVE).

A review of available Portland Fire Bureau records indicates that the majority of hazardous materials incidents involve residential use of natural gas and gasoline/fuel oil spills. Most accidents with these commodities are minor in nature. The potential for a major accident with natural gas, gasoline and fuel oil is always present; however, firefighters and others who handle these commodities are generally well aware of safety and emergency procedures.

Of greater concern are the hazardous materials that are expecially dangerous because they have unique and unpredictable characteristics or are infrequently encountered in emergency situations. These include many exotic chemicals with which firefighters are unfamilar and are shipped in bulk quantities. The growing rate at which new chemicals are being manufactured and shipped increases the probability that an accident involving such a commodity will occur.

A statistical summary of the hazardous materials incidents to which the Portland Fire Bureau responded from Janaury 1 to August 16, 1981 is presented in Table 3 . A narrative summary

of recent incidents which could have approached Level 3 magnitude, or were otherwise noteworthy, is also presented with that Table.

TABLE 3

PORTLAND FIRE BUREAU

HAZARDOUS MATERIALS INCIDENTS

January 1 to August 16, 1981

COMMODITY	NUMBER OF INCIDENTS	PERCENTAGE OF REPORTED INCIDENTS
Natural Gas	34	36.6%
Gasoline (1)	10	24.7%
Fuel Oil, Diesel (2)	13	
Explosives	12	12.9%
"Chemical" (3)	7	7.5%
Corrosives	5	5.4%
Propane	3	3.2%
Ammonia	2	2.2%
Hydrogen Sulfide	1	1.1%
Oxygen	2	2.2%
Acetylene	1	1.1%
Other	3	3.2%

NOTES:

(1) Does not include automobile fires or the daily incidents of "washdowns" of small quantity gasoline spills at service stations.

(2) Includes other combustible liquids.

(3) Chemicals not otherwise specified.

Narrative Summary of Recent Incidents

--On January 17, 1980, 3,000 gallons of diesel fuel were spilled on S.W. Arthur when a delievery truck overturned.

--On October 5, 1980, a westbound train derailed under Portland's Steel Bridge. As the train slowed for curves and slack was taken-up, weight from the rear lifted several empty cars from the tracks at the front of the train. A tank car loaded with methanol (methyl alcohol) ruptured and began burning next to a car of poly-vinyl chloride. Under certain conditions the tank car could have caused a severe explosion (BLEVE); fortunately, those conditions did not exist. The poly-vinyl chloride emitted a toxic hydrogen chloride gas as it burned. An evacuation of nearby businesses and residents was not determined necessary. However, firefighters were required to be exposed to an unusually hazardous situation.

--On April 21, 1981, a tank car located in Guilds Lake switching yard filled with non-hazardous ethylene amine was sabotaged and emptied. The commodity was mistakenly identified from the shipping papers as ethylene imine, an extremely dangerous commodity which would have required a downwind evacuation of 2.2 miles. Most components of the current emergency response system were activated before the error was made known to all agencies (See Appendix 1).

--Also on April 21, 1981--at the same time of the ethylene amine incident--a gasoline tank truck overturned at the intersection of Lombard and Marine Drive.

--On June 9, 1981, inattention to filling procedures resulted in approximately 400 gallons of an oil additive being spilled on private property off St. Helens Road.

--On June 17, 1981, a 108-car Union Pacific train derailed 9 cars below the N.E. 21st Street overpass in Sullivan's Gulch. No hazardous materials were released; however, an empty car of Caustic Soda (Sodium hydroxide) slammed into the bridge supports. A spill of Caustic Soda in usual tank car quantity would not have required a civilian evacuation, but special efforts to protect the environment and emergency crews would have been required. (It is important to note that numerous types of hazardous materials laden cars do pass along this same section of track. The potential consequences of this derailment could have been severe had the punctured tanker been filled with any one of a number of hazardous materials--LPG or anhydrous ammonia for example.)

--On June 30, 1981, a leaking valve on a 250 lbs. cylinder of Hydrogen Sulfide in a Northwest Portland truck terminal required the evacuation of a 21 block area surrounding the terminal. Firefighters in special protective clothing determined that the leaking container contained only trace amounts of the material.

--On July 11, 1981, leaking cannisters of the insecticide dimethoate at Port of Portland Terminal 4 required the temporary hospitalization of one security guard. Several others handling the dimethoate were also mildly affected.

HAZARDOUS MATERIALS FIXED FACILITY-- TARGET HAZARDS

Local Exposure

Hazardous materials are found in a great number of manufacturing, storage, wholesale and retail facilities. Small amounts of poisons and flammables are found in all agriculture and garden supply shops, automotive repair facilities, retail paint and hardware stores, etc. Relatively large quantities of gasoline are, of course, stored at service stations. Hospitals store and use numerous chemicals and radioactive isotopes. College, high school and other chemistry laboratories contain small quantities of dangerous substances.

It was beyond the resources available in this one year study to inventory and prepare plans for all facilities in which hazardous materials may be found. A priority was placed on those for which advance planning would reduce the greatest risk to the general public and emergency response personnel. Pre-fire plans were established for those facilities which had materials with extremely dangerous characteristics and/or in quantities that an emergency may require the evacuation of nearby businesses and residences and/or pose unusual risks to emergency responders. An example of such target hazards and possible emergencies is the fire and resulting toxic cloud produced last August at a chemical manufacturer near Kalama, Washington (See newspaper description of this and other examples in Appendix 9).

Some facilities with hazards which are quite well known to firefighters, or where considerable accident prevention planning having already been completed were not included in this

study. This includes gasoline stations and major petroleum transfer and storage facilities. The focus was on facilities which pose major risks. These facilities were considered to be hazardous materials "target hazards."

Pre-fire planning is done on a continuing basis by the Portland Fire Bureau. It was not possible to conduct and document the pre-fire planning for all hazardous materials target hazards prior to the completion of this report. It is believed, however, that the most significant hazards have been identified and inventoried. Table 4 summarizes the types and numbers of facilities identified to date. It includes examples of hazardous materials commonly found on the premises.

Map 1 identifies the approximate locations of those facilities where a fire, spill or leak may create an explosion, toxic fumes, or other hazards serious enough to require an evacuation of the population within several blocks.

TABLE 4

HAZARDOUS MATERIALS TARGET HAZARDS,

NOVEMBER, 1981

TYPE OF OCCUPANCY*	NUMBER OF FIRMS IDENTIFIED TO DATE	EXAMPLES OF COMMODITIES COMMONLY ENCOUNTERED
Chemical and Allied Products - Wholesale Trade	17	POISON: Copper Cyanide Cresylic Acid Malathion Paraquat Parathion Phenol Potassium Cyanide Sodium Cyanide Zinc Cyanide FLAMMABLE LIQUID: Ethanol Methyl Ethyl Ketone Morpholine Toluene CORROSIVE: Hydrochloric Acid Hydrofluoric Acid Potassium Hydroxide Sodium Hydroxide OXIDIZER: Ammonium Nitrate Ammonium Persulfate Sodium Nitrate POISON GAS: Methyl Bromide OTHER: Chromium Anhydride (Oxidizer, Corrosive) Cyclohexylamine (Flammable Liquid, Poison) Dinitrophenol (Poison, Explosive, Flammable) Hydrazine, Anhydrous (Flammable Liquid, Poison Gas) Hydrogen Chloride (Poison Gas, Corrosive)

* Organized by Standard Industrial Classifications

TYPE OF OCCUPANCY	NUMBER OF FIRMS IDENTIFIED TO DATE	EXAMPLES OF COMMODITIES COMMONLY ENCOUNTERED
Metal Plating, Coating and Engraving	7	POISON: Copper Cyanide Sodium Cyanide CORROSIVE: Chromic Acid Hydrochloric Acid Nitric Acid Phosphoric Acid Sodium Hydroxide Sulfuric Acid OTHER: Hydrogen Peroxide (Oxidizer, Corrosive)
Paint Manufacturers	5	POISON: Toluene Diisocyanate FLAMMABLE LIQUID: Acetone Alcohol Lacquer Methyl Ethyl Ketone Naptha Styrene Xylene CORROSIVE: Maleic Acid Phosphoric Acid Phthalic Anhydride Sodium Hydroxide COMBUSTIBLE LIQUID: Benzaldehyde OTHER: Acrylic Acid (Corrosive, Flammable Liquid) Di-tert-butyl Peroxide (Organic Peroxide, Flammable liquid)

TYPE OF OCCUPANCY	NUMBER OF FIRMS IDENTIFIED TO DATE	EXAMPLES OF COMMODITIES COMMONLY ENCOUNTERED
Soap and Detergent Manufacturers	3	FLAMMABLE LIQUID: Formaldehyde Isopropanol CORROSIVE: Phosphoric Acid Potassium Hydroxide Sodium Hydroxide OXIDIZER: Calcium Hypochlorite Sodium Dichloroisocyanate NON-FLAMMABLE GAS: Perchlorethylene POISON GAS: Ammonia OTHER: Acetic Acid (Flammable Liquid, Corrosive) Chlorine (Poison Gas, Oxidizer)
Adhesive and Sealant Manufacturers	2	POISON: Trichloroethane FLAMMABLE LIQUID: Toluene
Medicinal Chemicals, Botanical Products and Pharmaceutical Preparations	3	POISON: Dichloromethane Methylene Chloride FLAMMABLE LIQUID: Isopropyl Alcohol CORROSIVE: Hydrochloric Acid Potassium Hydroxide Sodium Hydroxide
Carbide Manufacturing	1	OTHER: Calcium Carbide (Water-Reactive)

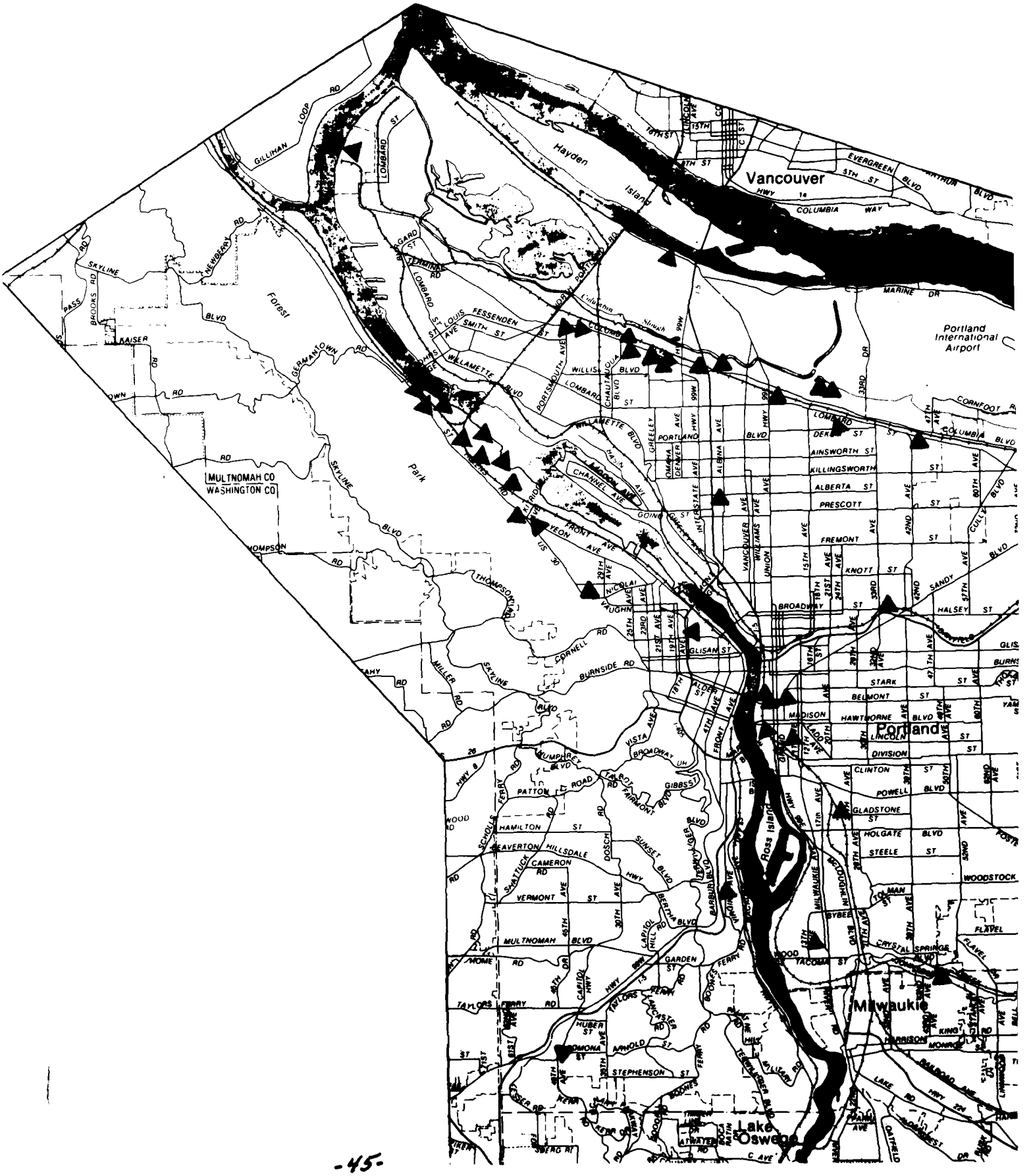
TYPE OF OCCUPANCY	NUMBER OF FIRMS IDENTIFIED TO DATE	EXAMPLES OF COMMODITIES COMMONLY ENCOUNTERED
Industrial Gas Manufacturing	2	NON-FLAMMABLE GAS: Liquid Nitrogen FLAMMABLE GAS: Acetylene Ethylene Oxide Hydrogen POISON GAS: Ammonia OTHER: Calcium Carbide (Water-Reactive) Dichlorosilane (Poison Gas, Flammable Gas) Liquid Oxygen (Non-Flammable Gas, Oxidizer) Phosphine (Poison Gas, Flammable Gas) Silane (Poison Gas, Flammable Gas)
Engraving, Photo Engraving and Plate Printing	2	POISON: Trichloroethane FLAMMABLE LIQUID: Acetone Toluene FLAMMABLE SOLID: Magnesium Engraving Plates CORROSIVE: Nitric Acid
Manufacturers of Metal Products	3	FLAMMABLE LIQUID: Ethylene Glycol Monoethyl Ether Acetate Naptha Solvent OTHER: Ethylene Glycol Monobutyl Ether (Poison, Flammable Liquid)

TYPE OF OCCUPANCY	NUMBER OF FIRMS IDENTIFIED TO DATE	EXAMPLES OF COMMODITIES COMMONLY ENCOUNTERED
Secondary Smelting and Refining of Non-Ferrous Metals	2	POISON: Sodium Cyanide CORROSIVE: Ammonium Chloride Nitric Acid Phosphoric Acid Sodium Hydroxide Sulfuric Acid OXIDIZER: Ammonium Nitrate Sodium Nitrate POISON GAS: Anhydrous Ammonia OTHER: Hydrogen Chloride (Poison Gas, Corrosive) Hydrogen Peroxide (Corrosive, Oxidizer)
Wood Products, Millwork and Preserving	2	POISON: Phenol FLAMMABLE LIQUID: Ethanol Formaldehyde Triethylamine CORROSIVE: Sodium Hydroxide OXIDIZER: Potassium Permanganate
Paper Coating	1	FLAMMABLE LIQUID: Industrial Alcohols Toluene

TYPE OF OCCUPANCY	NUMBER OF FIRMS IDENTIFIED TO DATE	EXAMPLES OF COMMODITIES COMMONLY ENCOUNTERED
Fiberglass Manufacturing	1	FLAMMABLE LIQUID: Acetone Styrene ORGANIC PERIOXIDE: Methyl Ethyl Ketone Peroxide
Compressed Gases and Welding Supplies	4	NON-FLAMMABLE GAS: Liquid Nitrogen FLAMMABLE GAS: Acetylene Hydrogen Propane Propylene Oxide OTHER: *Liquid Oxygen* (Non-Flammable Gas, Oxidizer)
Laboratory Supplies and Warehouse	1	FLAMMABLE LIQUID: Acetone Ethyl Ether Toluene CORROSIVE: Hydrochloric Acid Nitric Acid Phosphoric Acid Sulfuric Acid
Farm Supplies	3	POISON: Dinitrophenol Organic Phosphate Parathion OXIDIZER: Ammonium Nitrate Potassium Nitrate

TYPE OF OCCUPANCY	NUMBER OF FIRMS IDENTIFIED TO DATE	EXAMPLES OF COMMODITIES COMMONLY ENCOUNTERED
Extermination Services	2	POISON: Chloropicrin Cyanide Malathion CORROSIVE: Sulfuric Acid COMBUSTIBLE LIQUID: Chlordane POISON GAS: Methyl Bromide
Commercial Testing Labs	2	RADIOACTIVE: Iridium FLAMMABLE SOLID: Cobalt OTHER: Flammable Petroleum Distillates
Dairy Processing	1	CORROSIVE: Sodium Hydroxide POISON GAS: Anhydrous Ammonia OTHER: Chlorine (Poison Gas, Oxidizer)

MAP 1


Vancouver
Portland International Airport
Portland
Milwaukie
Lake Oswego
Hayden Island
Ross Island
Forest Park
MULTNOMAH CO
WASHINGTON CO
COLUMBIA WAY
MARINE DR
GILLIHAN LOOP RD
SKYLINE BLVD
GERMANTOWN RD
LOMBARD ST
WILLAMETTE BLVD
PORTLAND BLVD
FRONT AVE
BURNSIDE RD
CORNELL RD
THOMPSON RD
BARBUR BLVD
TERWILLIGER BLVD
MULTNOMAH BLVD
CAPITOL HWY
TAYLORS FERRY RD
MACADAM AVE
INTERSTATE AVE
MARTIN LUTHER KING JR BLVD
GRANDVIEW DR
SUNSET BLVD
BROADWAY
WILLIAMS AVE
VANCOUVER AVE
MISSISSIPPI AVE
ALBERTA ST
PRESCOTT ST
FREMONT ST
KNOTT ST
BROADWAY
HALSEY ST
STARK ST
BELMONT ST
MADISON
HAWTHORNE BLVD
DIVISION ST
CLINTON ST
POWELL BLVD
GLADSTONE ST
HOLGATE BLVD
STEELE ST
WOODSTOCK
FLAVEL
CRYSTAL SPRINGS BLVD
HARRISON
MONROE
KING RD
LAKE RD
OATFIELD
PATTON ROAD
GIBBS ST
HAMILTON ST
BEAVERTON HILLSDALE HWY
CAMERON RD
VERMONT ST
MULTNOMAH
GARDEN
HUBER ST
ARNOLD ST
STEPHENSON ST
MACADAM
TACOMA ST
SPOKANE ST
MILWAUKIE EXPY
MILWAUKIE AVE
MCLOUGHLIN BLVD
OSWEGO
RIVER RD
BOONES FERRY RD
TERWILLIGER BLVD
MACADAM AVE
SKYLINE BLVD
NEWBERRY RD
KAISER RD
GERMANTOWN RD
LOMBARD ST
WILLAMETTE BLVD
PORTSMOUTH AVE
CHAUTAUQUA BLVD
WILLIS BLVD
LOMBARD
CHANNEL AVE
GOING ST
YEON
VAUGHN
NICOLAI
GLISAN ST
ALDER ST
BURNSIDE
COLUMBIA BLVD
CORNFOOT
AINSWORTH ST
KILLINGSWORTH ST
PRESCOTT ST
FREMONT ST
KNOTT ST
SANDY BLVD
BROADWAY
HALSEY ST
STARK ST
BELMONT ST
MADISON
HAWTHORNE BLVD
DIVISION ST
CLINTON ST
POWELL BLVD
GLADSTONE ST
HOLGATE BLVD
STEELE ST
WOODSTOCK
FLAVEL
CRYSTAL SPRINGS BLVD
HARRISON
MONROE
KING RD
LAKE RD
OATFIELD
PATTON ROAD
GIBBS ST
HAMILTON ST
BEAVERTON HILLSDALE HWY
CAMERON RD
VERMONT ST
MULTNOMAH
GARDEN
HUBER ST
ARNOLD ST
STEPHENSON ST
MACADAM
TACOMA ST
SPOKANE ST
MILWAUKIE EXPY
MILWAUKIE AVE
MCLOUGHLIN BLVD
OSWEGO
RIVER RD
BOONES FERRY RD
TERWILLIGER BLVD
MACADAM AVE

Fixed Facility Target Hazards Which May Require Evacuation If Involved In A Fire

Safety and Inspection Programs

Most facilities which use large quantities of hazardous materials, such as petroleum tank farms and pesticide/insecticide manufacturers, have established emergency plans and procedures. Several of the large manufacturers have special fire brigades or response teams trained and equipped to handle their commodities in an emergency occurring either on site or in transport. Assistance from these groups is often available to local firefighters through CHEMTREC (See page 27).

Special information about the emergency preparedness of each target hazard has been collected in conjunction with this season's hazardous materials pre-fire planning effort. It will be useful in working with the local industries which have not established emergency procedures. A summary of this information is presented in Table 5.

TABLE 5

HAZARDOUS MATERIALS TARGET HAZARDS--
EMERGENCY PREPAREDNESS CHARACTERISTICS

	MAY REQUIRE EVACUATION*	WOULD NOT REQUIRE EVACUATION*	TOTAL
Safety Training Program	21 (64%)	20 (54%)	41 (59%)
Employee Evacuation Plan	12 (36%)	13 (35%)	25 (36%)
Warning & Alarm System	13 (39%)	13 (35%)	26 (37%)
Personnel with Expertise	32 (99%)	29 (78%)	62 (89%)
Specialized Response Teams	8 (24%)	5 (14%)	12 (17%)

* To date, 33 firms have been identified for which an evacuation may be required; 37 firms present unique risk to firefighters yet would not require evacuation.

Source: Portland Fire Bureau, 1980, Pre-fire Plans.

In addition to the efforts of industry, uniform safety standards are enforced by the following public agencies:

Portland Fire Bureau, Fire Marshal's Office--The Fire Marshal's Office enforces safety standards established by the Uniform Fire Code, National Fire Protection Association and Title 31 of the Portland City Code. Fire zones have been established to segregate facilities which present special hazards away from the central business districts. Facilities which present a unique and high risk must also obtain specific Council approval to build. Two inspectors are assigned full-time to work with the Bureau of Buildings to insure that construction of facilities which will store or manufacture hazardous materials are in compliance with the Uniform Fire and Building codes. There are also specialists within the Fire Marshal's Office which focus on alarm, sprinkler and other extinguishing systems. One inspector focuses on "special hazards" which includes petroleum tank firms, gas stations, oil burners, etc.

District Inspectors conduct routine systematic inspections to identify and mitigate specific hazards. Fire suppression companies conduct some fire prevention inspections, as well as establishing pre-fire plans, as described previously.

For further information contact:

Kenneth Owens, Portland Fire Marshal
Bureau of Fire
55 S.W. Ash
Portland, Oregon 97204

Telephone: 248-4363

Portland Bureau of Sanitary Engineering, Waste Water Management Division, Industrial Waste Section--The discharge of toxic and other pollutants incompatible with the Portland Waste Water Treatment facility is monitored primarily by the Industrial Waste Section. The focus is on developing spill prevention programs with the major industrial facilities that have a potential for severely harming the sewerage system. There are currently 5 field inspectors and 5 laboratory staff members.

Contact: Harry Edmonds
Industrial Waste Section
Bureau of Sanitary Engineering
Room 912
621 S.W. Alder
Portland, Oregon 97205

Telephone: 248-4678

State of Oregon, Workers Compensation Department, Accident Prevention Division--Under contract to the U.S. Occupational Safety and Health Administration (OSHA), the State of Oregon enforces the federal OSHA work place safety standards pertaining to dangerous chemicals and other hazardous materials. National Fire Protection Association and U.S. Department of Transportation safety standards have also been adopted. Inspection and citation efforts focus on hazard identification and mitigation as well as training in emergency medical aid, necessary protective clothing, etc. The Portland area is divided by the Willamette River into two divisions.

For further information contact:

Barbara Woodhull, Senior Industrial Hygenist
Accident Prevention Division
Portland East Field Office
4531 S.E. Belmont
Portland, Oregon 97214

Telephone: 239-8600

Gregg Chryst, Senior Industrial Hygenist
Accident Prevention Division
Beaverton Office
Park Plaza West, Building 2, Suite 414
10700 S.W. Beaverton-Hillsdale Highway
Beaverton, Oregon 97005

Telephone: 643-0100

TRANSPORTATION OF HAZARDOUS MATERIALS

Hazardous materials are transported by rail, highway, waterway, pipeline and air. Since hazardous materials are not transported in bulk quantities by air, this study did not consider that transport mode. The most significant public safety threat in an air accident is the aircraft fuel*.

Estimating the quantities, types and locations of materials carried through pipeline and on rail is relatively easy. There are only four major pipelines and they are regulated by state and federal agencies. Oregon Public Utility Commission Rail Division administrative rules require each of the three railroads which service Oregon to report to local fire bureaus the annual number of hazardous materials carloads which are hauled through their jurisdiction.

Adequate and accurate highway transportation data has not been previously available. Until recently, it was not known which of the thousands of licensed truck firms were hauling hazardous materials in Oregon. The Oregon Public Utility Commission Highway Safety Division has just completed a survey (July, 1981) of the licensed carriers who serve Oregon, to identify those which haul hazardous materials. Additionally, the target hazard facilities which ship hazardous materials have now been identified by the Portland Fire Bureau. Record-keeping practices by the truck firms do not always lend themselves to easily reporting precise shipping patterns; and, many firms are reluctant to identify the specific commodities or destinations for fear of unduly raising public concern. They often see the requirement as a violation of business privacy. No clear mandate for collecting such information or precise purpose for it has ever been established. Unlike rail transporta-

* The samll quantities of hazardous materials transported by aircraft are, of course, an occupational safety concern for those who handle the commodities.

tion, there is no state or federal requirement that the highway carriers provide information about the hazardous materials that are transported within any jurisdiction. Information about traffic which passes through Portland by truck (i.e. not terminating or originating) will always be difficult to determine.

Complete statistics about marine shipments of hazardous materials are not currently kept by the Port of Portland or the U.S. Coast Guard. General information indicating the trends of hazardous materials shipments are, however, available from these agencies, the Portland Fire Bureau, and the U.S. Army Corps of Engineers.

Transportation Safety: National and State Overview

The relative safety records of the various transportation modes--and the likelihood of a Level 3 incident--can be assessed most accurately through analysis of national data. The number of accidents and resulting consequences for the last decade is presented in Table 6.

TABLE 6

SAFETY RECORD COMPARISON OF TRANSPORT MODES*

January, 1971 - August, 1980

TRANSPORT MODE	REPORTED INCIDENTS	DEATHS	INJURIES	DAMAGES
HIGHWAY	94,070 (92.3%)	270 (86%)	4,267 (65.8%)	63.9m (58.1%)
RAIL	7,537 (7.4%)	44 (14%)	2,139 (33%)	44.4m (40.4%)
WATER	230 (.2%)	-0-	83 (1.3%)	1.6m (1.5%)

* The data base from which these estimates are taken has received considerable criticism and undoubtedly under-represents actual accident rates. See U.S. General Accounting Office Report "Programs for Ensuring the Safe Transportation of Hazardous Materials Need Improvement," November 4, 1980.

Source: U.S. Department of Transportation
Materials Transportation Bureau

The highest frequency of incidents, deaths, injuries and damages has occurred in the trucking industry. The frequency of highway shipments is significantly higher than either marine or rail, thereby increasing the probability of accidents involving trucks. The number of independent operators also increases the difficulty of enforcing safety standards and providing safety training.

Although the rail industry has significantly fewer incidents, the ratio of the number of accidents to potential destructive consequences is quite high. Each railcar may carry tremendous volumes (up to 34,000 gallons) and each train can combine a wide variety of materials into one accident.

Based on this information, special attention has been given in this report to the safety of rail and highway transportation.

RAILROAD TRANSPORTATION OF HAZARDOUS MATERIALS

Local Exposure

Portland is served by three major railroads: Burlington Northern, Inc., Union Pacific Railroad, and the Southern Pacific Transportation Co. Each railroad owns and maintains switch yards and track within Portland. In addition to the three major railroads, two smaller companies manage local switching yards and one firm manages a short line east from Portland. The Portland Terminal Railroad, a private corporation owned by the three major railroads, manages two local switching yards where hazardous materials cars are likely to be found. The commodities handled by each of these three smaller railroads are included in the reports of the major railroads, and listed in Table 7.

Of all the transport modes, railroads provide the most complete information about which hazardous materials are hauled within Portland. PUC Rail Division rules (Pursuant to Oregon Revised Statutes 761.380) require railroads which operate within Oregon to supply an annual inventory to local fire bureaus of the hazardous materials which have been transported through their community. This inventory provides the basis for anticipating the next year's commodity flow. A standardized reporting format for use by all railroads has been developed this year, and will be used for the 1981 report.

Figure 1 displays, by DOT Hazard Classification, the commodities transported within the City of Portland by the three major railroads. Table 7 lists in more detail the estimates of the number of railcars transported annually by each railroad. Due to the different reporting formats used by each railroad

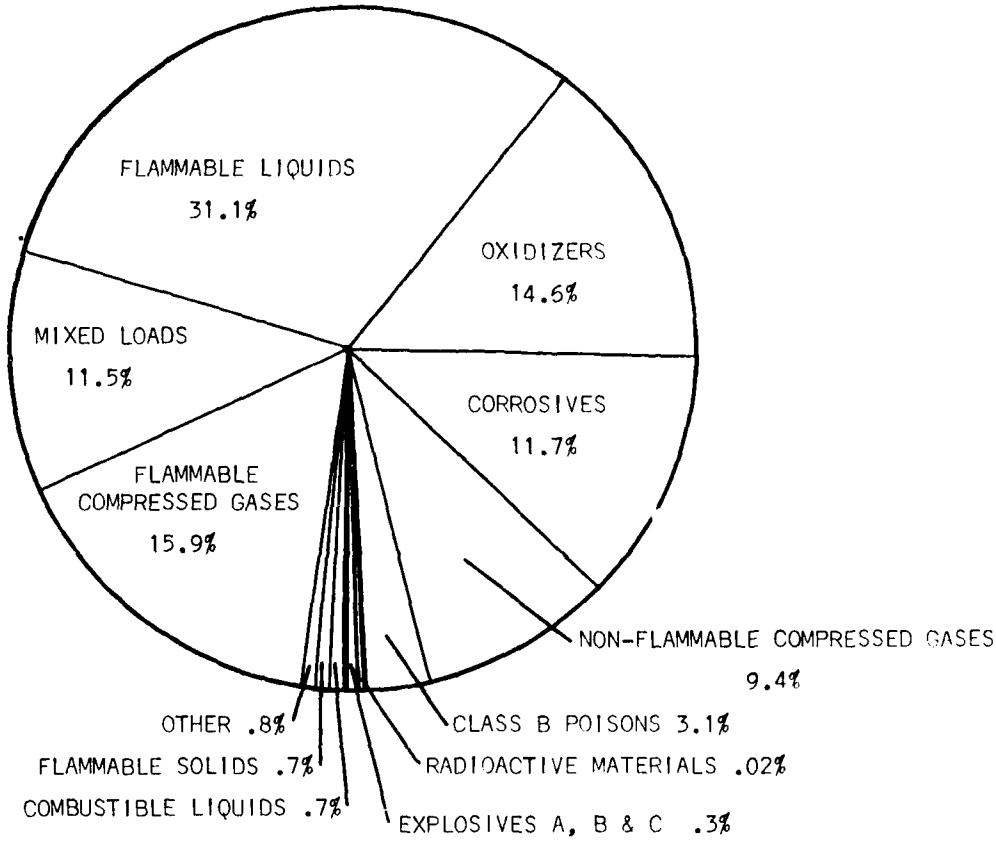
through 1980, these figures are most accurately described as estimates. There is probably an underestimation of flammable compressed gases (e.g. LPG) and non-flammable compressed gases (e.g. anhydrous ammonia, chlorine). Flammable liquids may be somewhat over-estimated. (The original reports provided by the railroads are found in Appendix 4)

Map 2 shows the locations of the main and secondary lines and switching yards located in the Portland area. Potential evacuation zones for a serious hazardous materials incident (½ mile) and speed limits for each section of the track are also depicted.

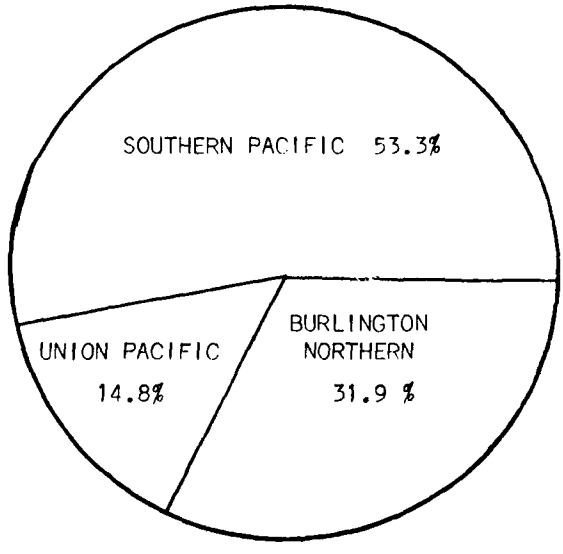
Rail cars containing any DOT regulated hazardous materials may be found on any main or secondary line, switch yard, or industrial spur. Highest concentrations are found on the main lines, and at three switching yards: Albina Yards, Guilds Lake, and Willbridge Yard.

FIGURE 1

SUMMARY ESTIMATES OF HAZARDOUS MATERIALS
SHIPPED BY RAIL THROUGH PORTLAND, 1980



PERCENTAGE OF HAZARDOUS MATERIALS
HAULED BY THE RAILROADS SERVING PORTLAND, 1980



Source: Annual Hazardous Materials Inventories, 1980

TABLE 7

ESTIMATED ANNUAL HAZARDOUS MATERIALS TRANSPORTED
BY RAIL WITHIN PORTLAND, 1980

HAZARD CLASS/COMMON EXAMPLES	RAIL CARS PER YEAR			TOTAL	PERCENTAGE
	S.P.(1)	U.P.(2)	B.N.(3)		
CLASS A EXPLOSIVES (Rocket Motors)	12	65	3	80	.2 %
CLASS B EXPLOSIVES	0	0	1	1	
CLASS C EXPLOSIVES	0	28	0	28	.08%
NON-FLAMMABLE COMPRESSED GASES (Chlorine, Anhyrous Ammonia)	720	768	1743	3231	9.4 %
FLAMMABLE COMPRESSED GASES (LPG)	2409	1110	1933	5452	15.9 %
FLAMMABLE LIQUIDS (Asphalt, Methy Alcohol)	(4) 8196	677	1772	10,645	31.1 %
COMBUSTIBLE LIQUIDS (Diesel, Fuel Oil)	(4)	134	124	258	.7 %
FLAMMABLE SOLIDS (Phospherous, Sodium)		219	16	235	.7 %
OXIDIZING MATERIALS (Hydrogen peroxide, Ammonium Nitrate)	4446	136	418	5000	14.6%
ORGANIC PEROXIDES		1	0	1	
POISON CLASS A	0	0	0	0	
POISON CLASS B (Carbolic Acid - Phenol)	767	129	159	1055	3.1 %
ETIOLOGICAL AGENTS	?	0	0	0	
RADIOACTIVE MATERIALS	0	4	0	4	
CLASS III	0	0	0	0	
CLASS II	0	3	0	3	
CLASS I (Industrial Wastes)	0	0	0	0	.02%

ESTIMATED ANNUAL HAZARDOUS MATERIALS TRANSPORTED BY RAIL WITHIN PORTLAND, 1980 (cont.)

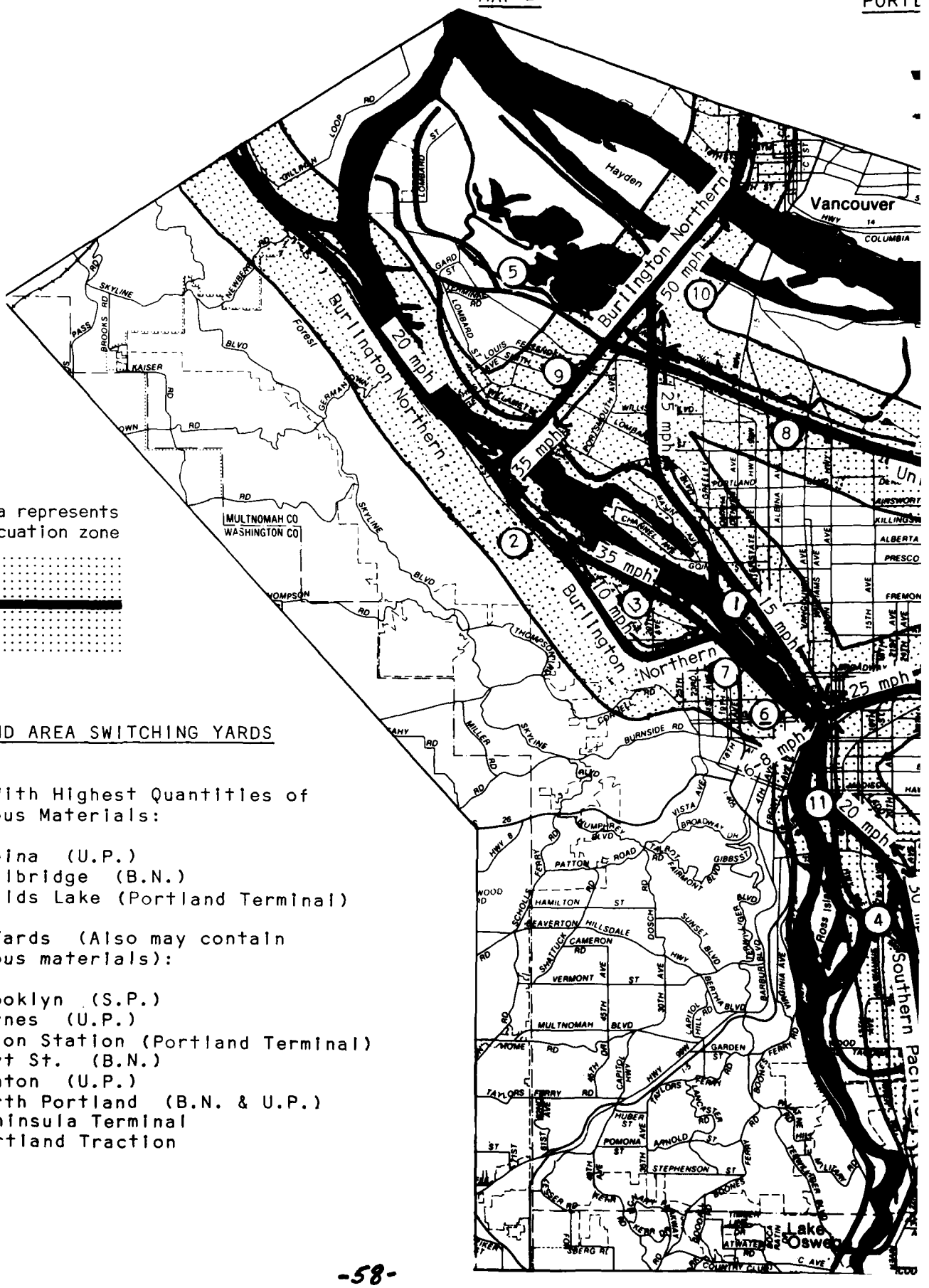
HAZARD CLASS/COMMON EXAMPLES	RAIL CARS PER YEAR			TOTAL	PERCENTAGE
CORROSIVE MATERIALS	S.P.(1)	U.P.(2)	B.N.(3)		
(Sulpheric and Hydrachloric Acids	1675	1535	787	3997	11.7 %
MIXED LOADS	?	265	3666	3931	11.5 %
OTHER					
(Pertachloraphenol)			291	291	.8 %
TOTAL	18,225	5,074	10,913	34,212	
Percentage of Hazardous Materials Transported by Rail Within Portland	53.3%	14.8%	31.9%		

NOTES

(1) Southern Pacific
(2) Union Pacific
(3) Burlington Northern
(4) The reporting format used by Southern Pacific Railroad was especially lacking in detail. No shipments were recorded in the following hazard classes: Non-Flammable Compressed Gases, Flammable Compressed Gases, Combustible Liquids, Flammable Solids or Mixed Loads. It has been assumed that the Flammable Compressed Gases and Combustible Liquids have been included with the Flammable Liquids. Figures shown for SPRR are composits of the PUC required report and a listing of "k" train shipments.

MAP 2

PORTL



Shaded area represents
½ mile evacuation zone

PORTLAND AREA SWITCHING YARDS

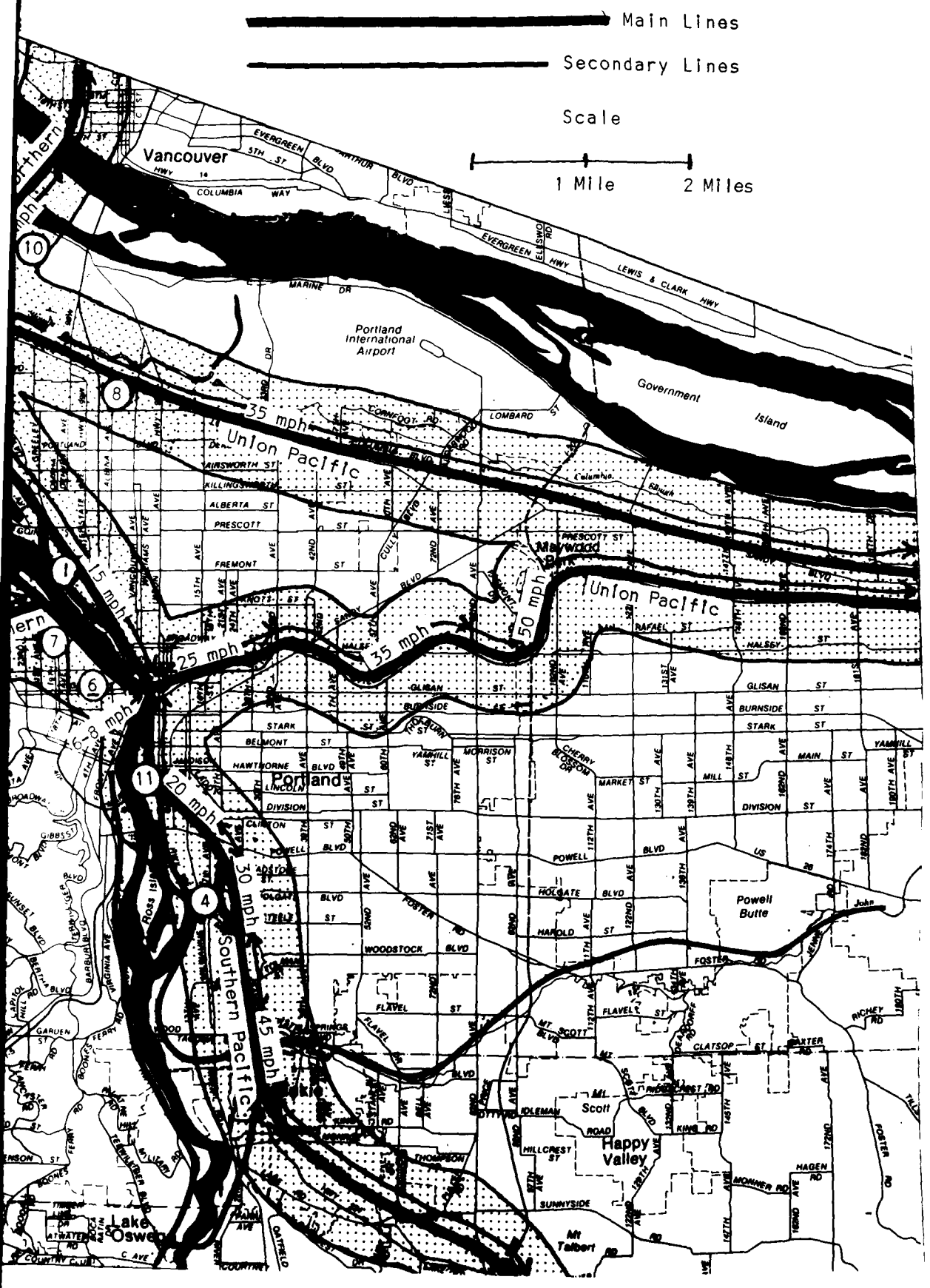
Yards With Highest Quantities of Hazardous Materials:

1. Albina (U.P.)
2. Willbridge (B.N.)
3. Guilds Lake (Portland Terminal)

Other Yards (Also may contain hazardous materials):

4. Brooklyn (S.P.)
5. Barnes (U.P.)
6. Union Station (Portland Terminal)
7. Hoyt St. (B.N.)
8. Kenton (U.P.)
9. North Portland (B.N. & U.P.)
10. Peninsula Terminal
11. Portland Traction

PORTLAND AREA RAIL LINES AND SWITCHING YARDS



The Nature of Rail Accidents

Examples of the serious potential of rail accidents are not difficult to provide. On November 10, 1979, a burnt axle bearing caused the derailment of a Canadian Pacific train in Mississauga, Ontario, near Toronto. During the first minutes of the accident, an exploding LPG tank car was hurled over 700 yards. When the cars came to rest, a leaking chlorine car was against two propane cars which were in danger of exploding. Within less than 24 hours, 240,000 people were successfully evacuated; including 311 patients from 6 nearby nursing homes and 2 hospitals. The evacuation lasted 6 days at an estimated overall cost of $25 million per day*. There were no fatalities in this incident. The success of emergency responders in avoiding tragedy has been attributed to luck (the accident occurred late at night and on a weekend) and adequate pre-planning.

On January 14th, 1980, a mud slide caused the derailment of a north-bound Burlington Northern train 3 miles north of Ridgefield, Washington. Two train crew members were killed by exposure to anhydrous ammonia which leaked from a 75 ton tanker.

As noted previously, at least two mainline derailments of cars carrying hazardous materials have occurred during the past year within Portland. The October 5th derailment below the Steel Bridge ruptured and ignited a tank car of flammable liquid. Fortunately, the June 17th derailment below the N.E. 21st Street overpass involved an empty** tank car which had been previously filled with a corrosive material and no product was released.

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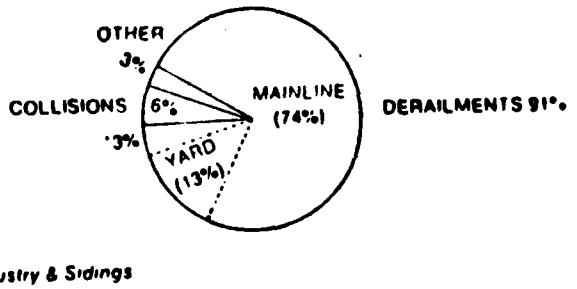
* Liverman, D., Wilson, J.; Whyte, A., "Preliminary Report on Survey of Households Evacuated During the Mississauga Chlorine Gas Emergency", Institute for Environmental Studies, University of Toronto: Toronto, Canada, 1980.

** It should be noted that tank cars placarded "empty" commonly contain significantly dangerous amounts of hazardous liquid or flammable explosive vapors. "Empty" placards do not indicate that the tank has been cleaned and purged. The International Association of Fire Chiefs, with Portland Fire Bureau support, have petitioned the U.S. DOT for a revision of this placarding requirement.

As Figure 2 shows, the majority of railcar spills involving hazardous materials which have occurred nationally were the result of a derailment. High speed mainline derailments obviously have the potential for involving more commodities in more cars, and for increasing damage to specialized containers. Historically, the most serious accidents reported--those which have required large-scale evacuations and threatened emergency responders--have involved mainline derailments and leakage of flammable or toxic commodities*.

FIGURE 2

TYPE OF ACCIDENTS RESULTING IN RELEASE OF HAZARDOUS MATERIALS



*Industry & Sidings

Source: Interindustry Task Force Rail Transportation of Hazardous Materials

As Table 8 indicates, a significant number of hazardous materials releases requiring civilian evacuation were caused by track, roadbed and/or structural problems. The number of track-caused accidents involving hazardous materials increased more than 100% between 1968 and 1978. However, it is also important to note, as Table 9 shows, that between 1978 and 1979, the consequences of rail accidents were much less severe. Two particularly unfortunate derailments occurred in 1978 which resulted in the combined deaths of 24 people. These were the accidents which occurred in Youngstown, Florida and Waverly, Tennessee.

* Inter-Industry Task Force, Rail Transportation of Hazardous Materials, Phase I Final Report, Systems Safety Analysis Subcommittee, American Association of Railroads: Washington, D.C., 1978.

TABLE 8

CAUSE OF TRAIN ACCIDENTS RESULTING IN THE RELEASE OF HAZARDOUS MATERIALS AND EVACUATION OF CIVILIANS, 1979(1)

CAUSE	NUMBER OF TRAINS TRANSPORTING HAZARDOUS MATERIALS INVOLVED IN ACCIDENTS	NUMBER OF CARS RELEASING HAZARDOUS MATERIALS	PEOPLE EVACUATED
Track, Roadbed and Structures	394 (41%)	89 (54%)	9,803 (58%)
Mechanical and Electrical Failure	209 (22%)	42 (25%)	3,683 (22%)
Train Operation-- Human Factors	241 (25%)	20 (12%)	2,197 (13%)
Miscellaneous Factors	113 (12%)	14 (8%)	1,111 (6%)
TOTAL	957	165	16,794

(1) For an accident to be included in the data base from which Table is summarized, it must meet a property damage threshold of $2900. For this and other reasons, many hazardous materials accidents may be unreported. Table 6 is therefore a conservative estimate.

Source: U.S. Department of Transportation, Federal Railroad Administration, Accident/Incident Bulletin No. 148, Calendar Year 1979.

TABLE 9

CONSEQUENCES OF HAZARDOUS MATERIALS RAIL ACCIDENTS, 1978 and 1979

	1978	1979
Cars Damaged	1,205	1,057
Cars Releasing Contents	338	165
People Evacuated	25,981	16,793
People Killed	24	0
People Injured	221	15

Source: Fawcett, H.H., Journal of Hazardous Materials; based on FRA data.

Oregon has a relatively good rail safety record. In 1979 (the most recent year for which statistics are available), there were 17 accidents reported to the Federal Railroad Administration involving trains hauling hazardous materials. Only 6 cars with hazardous materials were damaged--none released their contents and no evacuations were necessary. One explanation for this may be the quality of Oregon's track-bed. Public Utility Commission records indicate that, in the 126 derailments which occurred during 1979, cause was almost evenly spread between track, mechnical human failures and collisions (See Table 10). The rate of track-caused derailments is much lower than that found nationally.

TABLE 10

DERAILMENTS IN OREGON, 1979

CAUSE	NUMBER OF DERAILMENTS
Track	26 (20.6%)
Mechanical	30 (23.8%)
Human	23 (18.2%)
Collisions	29 (23. %)
Miscellaneous, unknown	18 (14.3%)
TOTAL	126

Source: PUC of Oregon, Railroad Accidents in Oregon, 1979.

The PUC Rail Division has recorded hazardous materials rail incidents since April, 1977. From that time to April, 1981, there have been 15 incidents which the PUC determined were serious enough to note. These incidents have been almost equally distributed between tank car leaks (valves, seals, etc.) and derailments. The October 5th derailment below the Steel Bridge was the only accident reported to the PUC during this time period which occurred

in Portland. Incidents which have occurred in Oregon are more fully described in Appendix 6, page 151.

Minimum standards for track bed maintenance are enforced by the Oregon Public Utility Commission Rail Division and the Federal Railroad Administration. The PUC track inspector responsible for the Portland area is confident that local track is quite good. He notes, however, that one section of track within the inner City is difficult to maintain: that between S.E. Water and 2nd Avenues from the Burnside Bridge to S.E. Clay St. (through the inner southeast produce and warehouse district). Frequent truck traffic and established pavement make major improvements to this area of track difficult.

One way by which the risk of derailments is minimized is by regulating train speeds. Trains are required to travel more slowly on less well maintained track, and on roadbed with characteristics which make train handling difficult, such as grade and curves.

As Map 2 indicates, almost all the main line tracks within the City of Portland are limited to speeds of 35 mph or less. The exceptions are: the east-west line paralleling I-84 east of 82nd Street (50 mph) and the north-south line running through the north Portland industrial area to Vancouver (50 mph).

As Table 11 shows, based on a national sample, derailments of all trains tend to occur less frequently on track maintained at higher standards and therefore for trains traveling at higher speeds; but again, the release of a hazardous material is much more likely during a higher speed derailment. As Figure 3 shows, the correlation between speed during derailment and product release is less strong above 30 miles per hour (i.e. the probability of product release is not significantly higher at 50 mph than it

is at 30 mph). It is important to note that this Table and much of the data presented in this discussion are based on accidents prior to the safety retrofitting of pressurized tank cars, which is described below.

TABLE 11

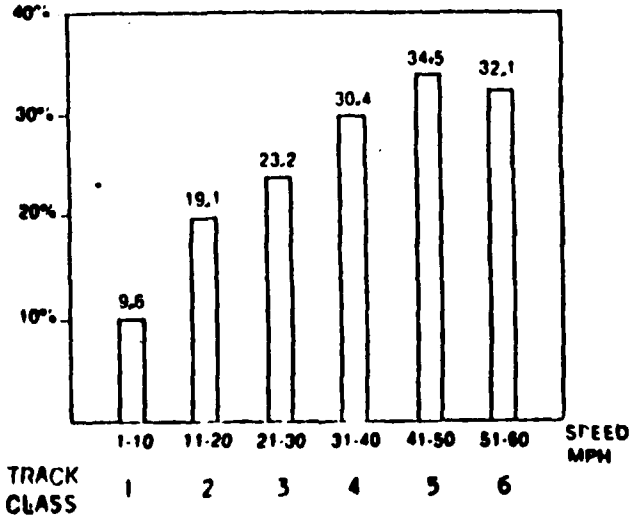
DERAILMENT BY TRACK CLASSIFICATION, 1979

TRACK CLASS	MAXIMUM MPH	NUMBER OF DERAILMENTS
?		305 (4%)
1	1 - 10	3,814 (50.9%)
2	11 - 20	1,426 (19%)
3	21 - 30	1,163 (15.5%)
4	31 - 40	684 (9.1%)
5	41 - 50	88 (1.2%)
6	51 - 60	2
	TOTAL	7,482

Source: Accident/Incident Bulletin No. 148, 1979, FRA, p. 26.

FIGURE 3

PERCENTAGE OF DAMAGED/DERAILED HAZARDOUS MATERIALS LADEN CARS WHICH RELEASED PRODUCT



Source: Interindustry Task Force, Rail Transportation of Hazardous Materials, Final Report, p.

Several serious accidents have occurred during derailments when the coupler of one car punctured the end of an adjoining tank car. In addition to allowing product to escape, such a puncture increases the likelihood of fire and possible explosion. To reduce this risk, railroads have begun installing headshields, shelf couplers and thermal insulation. Headshields provide extra shielding at both ends of a tank car to deflect coupler puncture. Shelf couplers lock the cars more tightly together, reducing the possibility of a coupler rising vertically and puncturing another car. Shelf couplers also reduce the risks of several cars piling on top of one another. Thermal insulation acts to keep a product cool within a tank and thereby reduces the risk of a tanker explosion (BLEVE) when flames impinge upon it.

Federal regulations have required certain large capacity (maximum 34,000 gallon) tank cars carrying propane, anhydrous ammonia and some other compressed liquified gases be retrofitted with headshields, shelf couplers and insulation as of December 31, 1980. All tank cars carrying bulk quantities of compressed gases (11,000 gallon average) will be required to be retrofitted with shelf couplers by February 28th, 1982. All tank cars carrying any type of hazardous material will be retrofitted with shelf couplers by February 28th, 1985.

The shelf couplers, insulation and headshields appear to be quite effective in reducing the risks associated with bulk liquid and gas shipments. Preliminary evaluation by the Association of American Railroads indicates that head-punctures have been reduced about 1/20th of the previous rate and rupture due to fire about 1/16th.

In the opinion of the Federal Railroad Administration Hazardous Materials Inspector for the Portland Region, the rup-

ture and consequent fire of methyl alcohol involved in the Steel Bridge incident may well have been averted by shelf couplers. The same inspector also points out, however, that the punctured anhydrous ammonia tanker which killed the two crew members in the Ridgefield derailment occurred in spite of the installation of shelf couplers and a headshield.

Risk Locations

An accident involving a rail shipment of hazardous materials may occur at any location along shipping routes and in switching yards. As noted, the most frequent accidents which result in product release are mainline derailments.

It is believed by Portland Fire Bureau and Office of Emergency Management officials that, for several reasons, a unique risk exists in the I-84 (Banfield) transportation corridor (through Sullivan's Gulch). In this area lies a major interstate truck and commuter automobile route, freight rail line and a proposed light-rail transit system. This corridor runs through a ravine from 39th Avenue west to the north-south freeway interchange (approximately 2.5 miles). Much of the corridor between the City limits and approximately N.E. 17th St. is bordered by residential neighborhoods. Schools and one hospital also lie near the corridor.

I-84 is the major east-west hazardous materials truck route serving Portland. As noted in the discussion of highway risk locations, there are several spots where truck accidents occur and a hazardous materials spill is possible.

The freight rail line paralleling I-84 is described as a "moderate" downgrade (i.e. more than slight) and contains several curves. The track and roadbed through this area are maintained

to high standards and reduced train speeds are adhered to. In the last year there have been two derailments which may relate to several combined forces of the train dynamics, including slowing to enter the City, downgrade and curves. One derailment resulted in the rupture and consequent fire of a flammable liquid tanker; the other involved an empty tanker of corrosive liquid from which no product was released.

Upon completion of the light-rail transit system, the number of commuters traveling along this corridor will increase dramatically. It is estimated that during peak hours a train will travel through the area as frequently as every five minutes and carry as many as 330 people in each train.

The Portland Fire Bureau has strongly requested a water fire hydrant system to be installed in conjunction with the light-rail. This would substantially reduce the risk in this corridor. Ample water supply is an important agent in mitigating many hazardous materials accidents. It is useful to dissipate toxic vapor clouds, cool tank cars exposed to flames and quickly dilute water soluble commodities. At this time, the closest available hydrants are located at the top of the ravine, which slows emergency response considerably. As of this writing, it is estimated that a hydrant system would cost approximately $250,000.

Rail Safety and Inspection Programs

Each of the three Portland area railroads offers special training to their employees for the safe transportation of hazardous materials. The railroads also provide training to local fire, police and other emergency responders. This training is intended to familiarize personnel with the characteristics of the equipment and commodities which may be involved in an accident.

The Southern Pacific Railroad has instituted special handling procedures for trains which carry particularly dangerous materials. Termed "k" trains, they include one or more of the following materials: chlorine, flammable gas, anhydrous ammonia, acrylonitrile, sulphur dioxide, Explosives A, Hydrogen Chloride or radioactive materials. The special handling procedures for "k" trains involve a maximum speed of 50 mph or less in urban areas and limit train length to 8,000 feet (approximately 150 cars). Similarly, the Union Pacific restricts the speed of trains carrying tank cars to 50 mph and does not normally operate trains with more than 130 cars.

All three railroads also retain the services of a private firm specializing in emergency response and clean-up. Portland is fortunate in that it is a regional center for the firm currently holding this contract.

Although Federal laws largely preempt in the field of railroad regulation, some state and local ordinances focusing exclusively on hazardous materials have been adopted. For example, the City of Seattle has worked cooperatively with the railroads to limit the speeds of trains carrying hazardous materials, as well as restricting them from the downtown/waterfront area during business hours. Similarly, the Oregon PUC has established administrative rules augmenting Federal standards. Briefly, PUC rules require the following:

--advance notification of each shipment of Class A Poisons and Class A Explosives;

--annual inventories by the railroads reported to local emergency response agencies indicating the types of hazardous materials transported through their jurisdiction, as well as other information pertinent to emergency response;

--radio compatibility between train crews and dispatchers;

--visual inspection by railroad employees of Explosives A, Flammable Gas, and Poison Gas placarded cars which remain in a yard or station for more than two hours;

--notification of State Emergency Management Division of any incident of a magnitude requiring notification of Federal authorities.

U.S. Department of Transportation, Federal Railroad Administration (FRA)

Two regional FRA employees focus exclusively on the adequancy of rail cars carrying hazardous materials. They cover all of Oregon, Southern Washington, Southern Idaho and Southern Wyoming. Portland area terminals are inspected approximately once each month. Three additional FRA employees inspect regional equipment, crossings, and other aspects of overall system safety.

For further information: Henry Jacobs,
Hazardous Materials Inspector
U.S. Department of Transportation
302 Mead Building
421 S.W. 5th
Portland, Oregon 97204-2276
Telephone: 221-3011

Public Utility Commission Rail Program

State safety enforcement efforts do not focus specifically on rail cars carrying hazardous materials; but their focus on overall rail safety obviously affects the safe transportation of hazardous materials. PUC inspectors include:

--2 Equipment Safety Inspectors who cover the entire State and inspect the equipment on railcars. They provide a

cursory special inspection of hazardous materials cars. They inspect Portland yards approximately 4 times each year.

--2 Track Safety Specialists who cover the entire State, focusing on populated areas such as Portland. They inspect local main-lines approximately twice and secondary track once each year.

--3 Employee Safety Inspectors who work closely with the railroads on safety training programs.

For further information: Dave Astle, Assistant Commissioner
Public Utility Commission
Labor & Industries Building
Salem, Oregon 97310
Telephone: 378-6351

Bureau of Explosives

The Bureau of Explosives is a part of the American Association of Railroads. It performs independent safety compliance audits for both member chemical manufacturers and all American railroads. The audits are focused exclusively on issues of hazardous materials safety. Prior to the establishment of the U.S. Department of Transportation, the Bureau of Explosives conducted all rail inspections and established safety standards. In an emergency, the Bureau of Explosives staff assists in the representation of the rail industry's interests, as well as providing technical emergency information.

There is one Bureau of Explosive representative for this region. He covers Oregon, Washington, Idaho and Montana. Portland yards are inspected by the Bureau of Explosives two or three times per year.

For further information: Michael J. Eyer, District Inspector
Bureau of Explosives
Box 571
Portland, Oregon 97207
Telephone: 241-4560

HIGHWAY TRANSPORTATION OF HAZARDOUS MATERIALS

Local Exposure

Obtaining an accurate picture of truck transportation of hazardous materials within Portland has, until recently, been difficult. Since the target hazards have been identified by the Portland Fire Bureau and new information is available from the Public Utility Commission, gathering more complete information will be relatively easy. In the interim, information from other State and local studies has been available and provides useful insight into local patterns.

In June, 1981, the Public Utility Commission Highway Division completed a survey asking each of the 28,000 carriers they license for information regarding the hazardous materials they haul within Oregon. The survey asked what commodities (by U.S. DOT hazard class) are hauled; it did not request identification of quantities or routes. The response rate was high (78.6%) and indicated that approximately 1,800 (8.2%) haul hazardous materials. The PUC has also established an on-going system to identify hazardous materials carriers when PUC permits are issued. There are about 6,000 new permits issued annually.

The PUC survey identified 260 PUC licensed hazardous materials haulers garaged within the Portland City Limits. Commodities hauled by these carriers are listed in Table 12. There are about 100 more haulers garaged around the metropolitan area who undoubtedly also haul hazardous materials within the City. It is not known which of the remaining 1,450 firms identified by the PUC may carry hazardous loads to, from, or through Portland.

TABLE 12

HAZARDOUS MATERIALS WHICH ARE TRANSPORTED
BY PORTLAND-BASED TRUCK FIRMS

DOT HAZARD CLASS	NUMBER OF FIRMS	PERCENTAGE OF FIRMS WHICH HANDLE THIS COMMODITY
Explosives A	5	2%
Explosives B	8	3%
Explosives C	21	8%
Flammable Liquids	150	58%
Flammable Solids	36	14%
Flammable Gases	53	20%
Non-Flammable Gases	52	20%
Corrosive Materials	93	36%
Oxidizing Materials	41	16%
Poisons A	5	2%
Poisons B	32	12%
Combustible Liquids	116	45%
Radioactive Materials	12	5%
Organic Peroxides	13	5%
Irritating Materials	28	10%
Other Regulated Materials	32	12%
Hazardous Waste	25	10%
Etiologic Agents	6	2%
Chlorine	19	7%
Blasting Agents	0	

Source: Oregon Public Utility Commission

The most common hazardous materials carriers are private firms which haul their own commodity. This is consistent with PUC observations that private firms using their own truck fleets haul a higher overall tonnage and more commonly haul bulk shipments of hazardous materials. On the other hand, common carriers (for public hire) ship hazardous materials more frequently, but in much smaller quantities.

Of the 260 Portland-based firms, 93 (36%) hauled combustible and/or flammable liquids exclusively. These firms are primarily gasoline and fuel-oil haulers.

In February of 1979, the PUC conducted a seven-day surveillance of hazardous materials placarded trucks passing the 33 Oregon weighstations. The estimates from such a study do not indicate important seasonal variations, and are limited in accuracy due to the relatively short observation times at many of the weighstations. The study found that, on a state-wide basis, 5.2% of all trucks were carrying hazardous materials in quantities requiring placarding. Interstate 5 between Salem and Portland was by far the most heavily populated with hazardous materials-laden trucks.

The frequency of placards observed on a state-wide basis are displayed in Table 13. A map and display of the observations made along highways feeding into or out of Portland are presented in Table 14 and on Map 3. The short observation times and the relative infrequency of hazardous materials placarded trucks make difficult a more precise estimate of the types of commodities hauled into or out of Portland.

TABLE 13

OBSERVED HAZARDOUS MATERIALS SHIPMENT
FREQUENCY BY HAZARD CLASS - February, 1979

Flammable	63%
Corrosive	12%
Combustible	6%
"Dangerous"	4%
Non-Flammable Gas	4%
Flammable Gas	3%
Poison	3%
Oxidizer	2%
Flammable Solid	1%
Explosives A & B	1%
Radioactive	.4%

Source: Oregon Public Utility Commission

TABLE 14

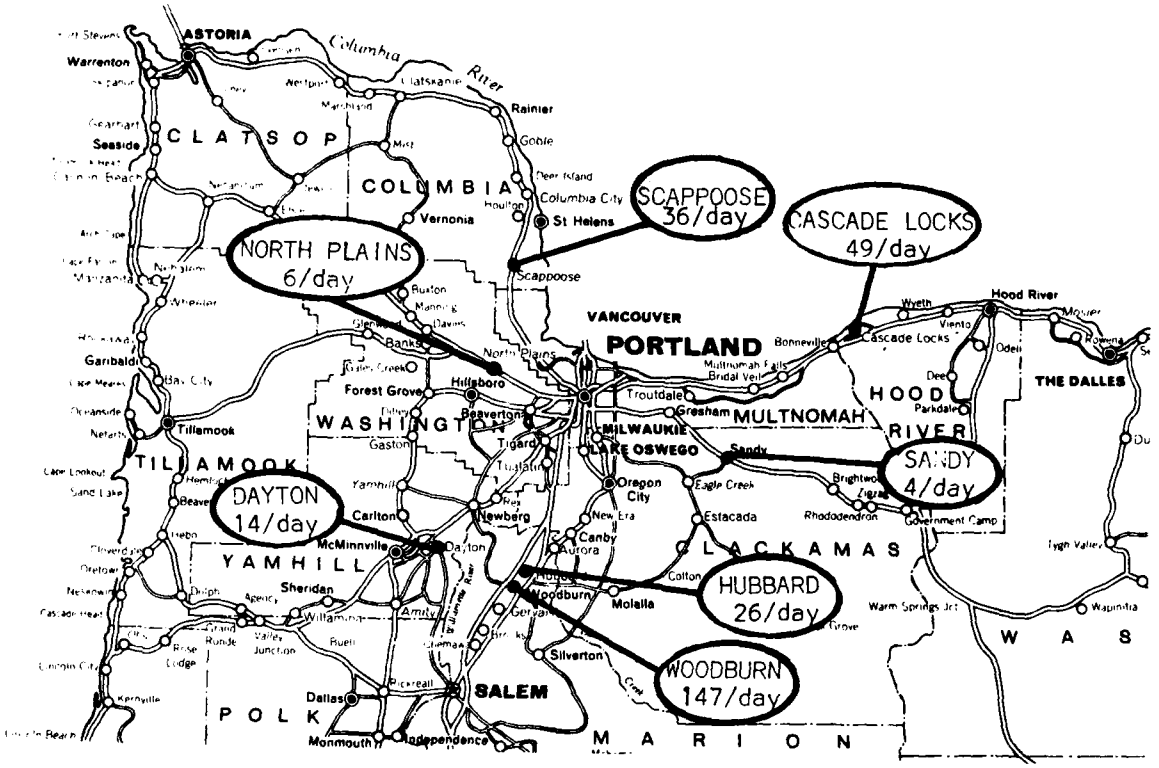
PUBLIC UTILITY COMMISSION SEVEN-DAY SURVEILLANCE OF HAZARDOUS MATERIALS TRUCKS:

OBSERVATIONS SITES NEAR PORTLAND

HIGHWAY	OBSERVATION POINT	PERCENTAGE OF ALL TRUCKS PLACARDED	PROJECTIONS
I-5 TOTAL		8.45%	147
Northbound	Woodburn	.8 %	136
Southbound		7.65%	11
I-84 TOTAL		8.6 %	49
Eastbound	Cascade Locks	7.6 %	43
Westbound		1. %	6
Hwy 30			
Westbound	Scappoose	10.4 %	36
99-E TOTAL		11. %	
Northbound	Hubbard	8. %	26
Southbound		3. %	
99W Southbound Only	Dayton	4.6 %	14
Hwy 26			
Eastbound	North Plains	2.9 %	6
Hwy 26			
Westbound	Sandy	1.2 %	4

MAP 3

PUBLIC UTILITY COMMISSION SEVEN-DAY SURVEILLANCE
OF HAZARDOUS MATERIALS TRUCKS:
OBSERVATIONS SITES NEAR PORTLAND



Estimates of the classes of hazardous materials that are hauled most frequently and consititue the bulk tonnage are available from a study conducted under contract to the Multnomah County Office of Emergency Management. The contractors telephoned each of the major firms within the County that manufacture, distribute or otherwise handle hazardous materials. For the purpose of this study, data was gathered on commodities which fell into one of 4 hazard classes (flammable, combustible, poison or corrosive). This methodology resulted in an estimate of traffic volumes for shipments originating or terminating within the Portland area. It did

not address through traffic* and excluded several important classes which, although infrequently hauled, could have severe consequences if involved in an accident (e.g. explosives and radioactive materials). Based on this data, the estimates displayed in Table 15 can be made.

TABLE 15

ESTIMATED MONTHLY SHIPMENTS OF FLAMMABLE COMBUSTIBLE POISON AND CORROSIVES ORIGINATING OR TERMINATING IN MULTNOMAH COUNTY

COMMODITY TYPE	NUMBER OF TRUCKS PER MONTH (1)	PERCENTAGE OF TOTAL
Flammable	25,343	69.2%
Combustible	9,546	26. %
Poison	792	2.2%
Corrosive	955	2.6%

(1) For the purpose of the study, one truck was estimated to carry 5,000 gallons of product

Source: Hazardous Materials Risk Analysis Report, Multnomah County Office of Emergency Management, May, 1980.

It can be assumed that hazardous materials-laden trucks may be found on any street or highway within Portland, since there are no designated routes. Little detailed or documented information is available about the routes commonly used to transport hazardous materials. However, based on the location of industrial zones where large quantities of hazardous materials are used or stored and the major truck routes, it can be assumed that the

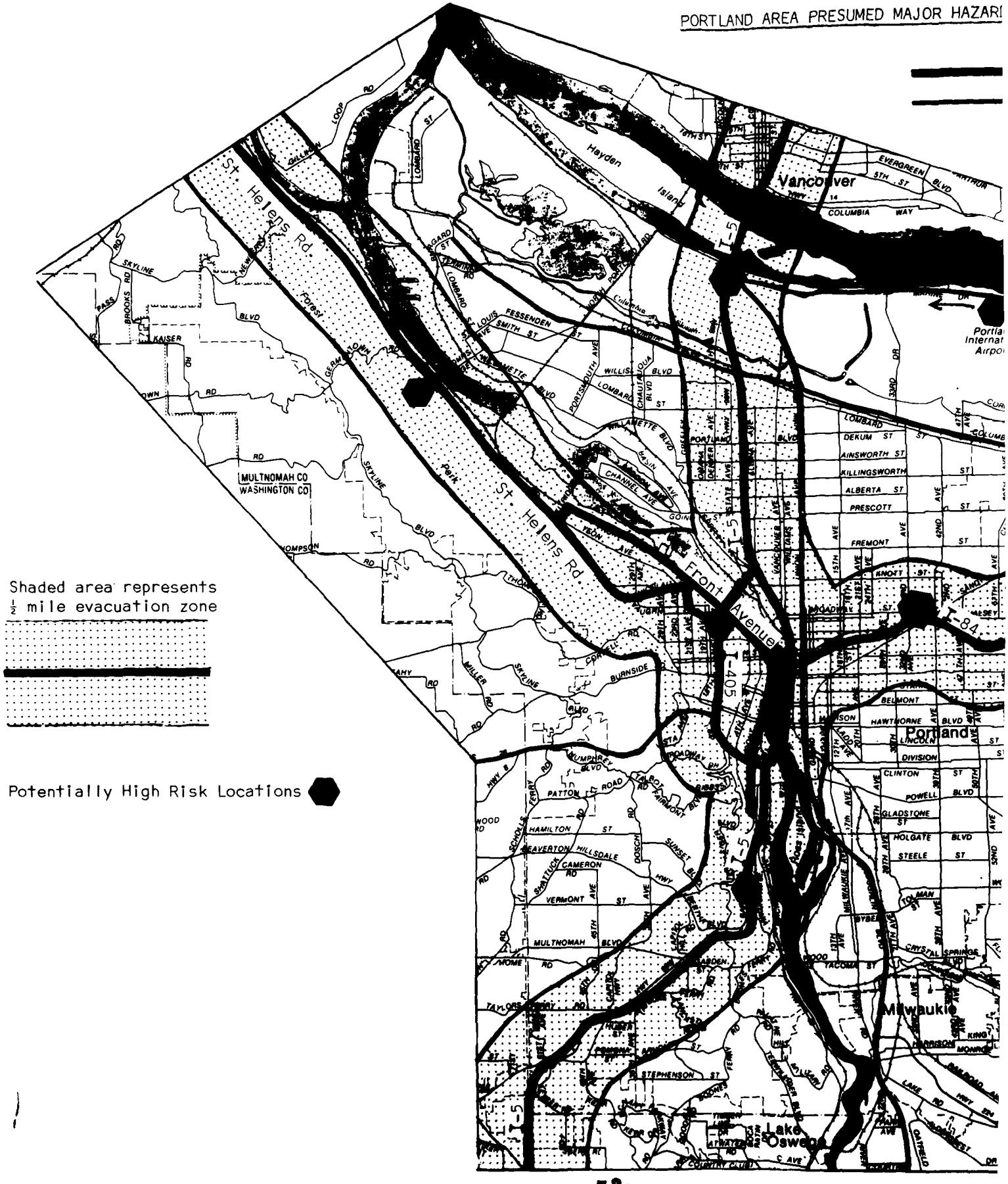
* Truck traffic not originating or terminating within the City is difficult to assess.

following routes carry large amounts of hazardous materials:

- I-5
- I-405 (including that section connecting to Hwy 26 West)
- I-84
- N.W. Front Avenue
- N.W. St. Helens Road (and the truck route through N.W. Portland)
- Columbia Blvd.

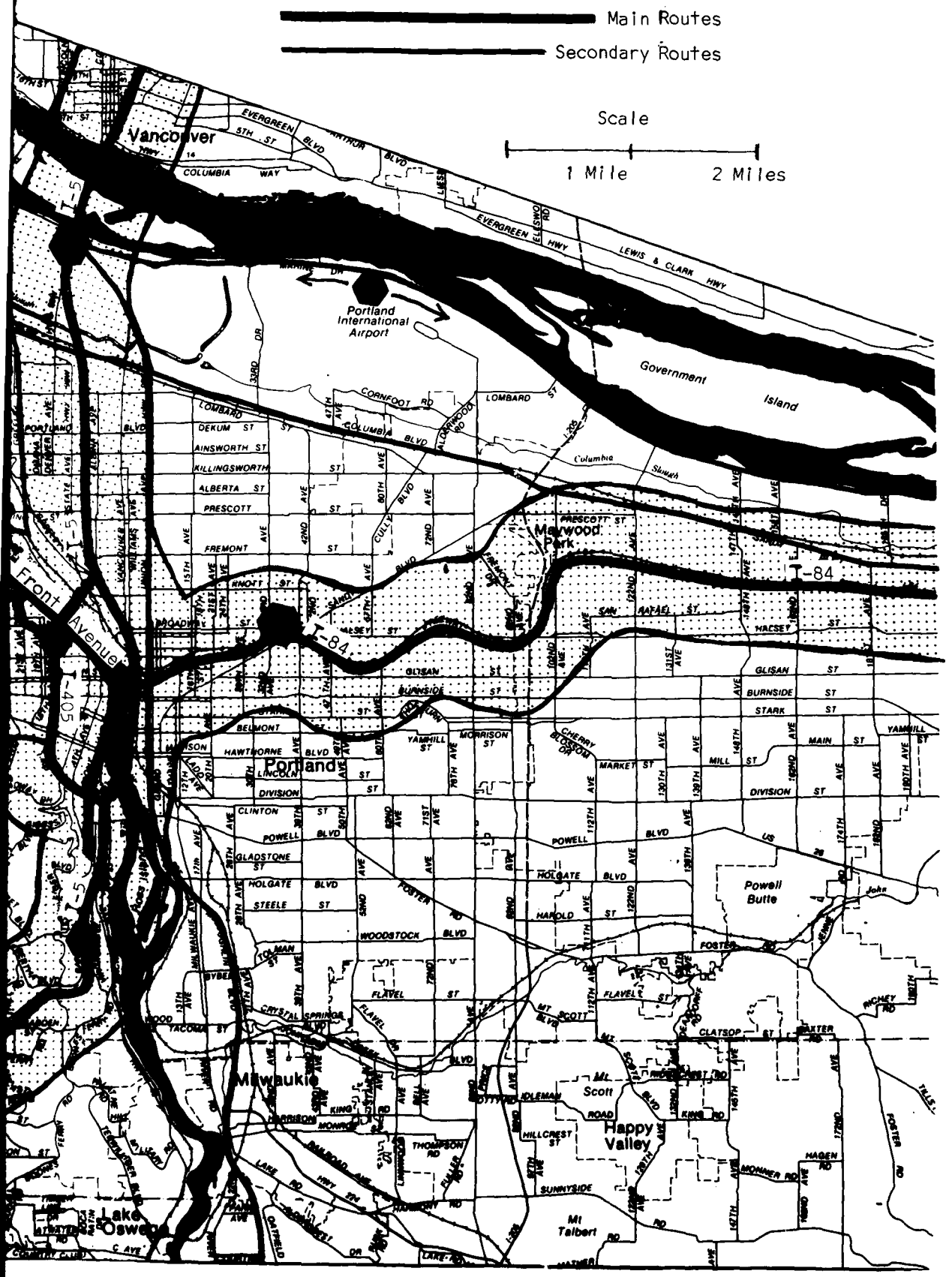
Map 4 displays these routes and, for illustrative purposes, indicates a ½ mile potential evacuation perimeter.

PORTLAND AREA PRESUMED MAJOR HAZARI



PORTLAND AREA PRESUMED MAJOR HAZARDOUS MATERIALS HIGHWAY ROUTES

MAP 4



The Nature of Truck Accidents

The PUC has recorded vehicle accidents involving trucks hauling hazardous materials since 1976. Tables 16 through 21 provide some insight into the commodities, frequency, causes and locations of spills state-wide. A listing of the accidents recorded by the PUC that occurred in the Portland area is included in Appendix 6, p.151. Information has not been available about the characteristics of accidents related to the trucking industry that were not classified as moving vehicle accidents (such as those which occur during loading/unloading and freight dock operations).

TABLE 16

OREGON HAZARDOUS MATERIALS TRUCK ACCIDENTS, 1976-1980

Year	Trucks Hauling Hazardous Materials	Accidents Resulting In Spills	Percentage of Accidents Resulting In Spills	Deaths	Injuries
1976	66	15	22.7%	0	15
1977	47	10	21.3%	0	6
1978	68	14	20.6%	1	8
1979	61	13	21.6%	3	8
1980	52	19	36.5%	0	10
TOTAL	294	71	24.5%	4	47

TABLE 17

TYPE OF ACCIDENTS RESULTING IN SPILLS, 1976-1980

	NUMBER OF SPILLS	PERCENTAGE OF ALL SPILLS
Single Vehicle Accident	60	84.5%
Collision	11	15.5%

TABLE 18

CLASSIFICATION OF HIGHWAYS WHERE HAZARDOUS MATERIAL-LADEN TRUCK ACCIDENTS AND SPILLS OCCURRED, 1976-1980

HIGHWAY CLASS	ACCIDENTS	PERCENTAGE OF ACCIDENTS	SPILLS	PERCENTAGE OF SPILLS
Interstate	47	16.1	15	21.4
Urban (Within City)	110	37.7	19	12.3
Secondary Highway	79	27.0	24	34.4
Primary Highway	43	14.7	15	21.4
County Road	13	4.5	7	10.0

TABLE 19

COMMODITIES SPILLED*, 1976-1980

COMMODITY	PERCENTAGE OF ALL SPILLS
Gasoline	47.3
Diesel	23.0
Asphalt	8.2
Fuel Oil	4.1
Others (See list below)	17.4

* Thirteen commodities reporting one incident each:

Sodium Hydroxide (Corrosive)

2-4-D (Other Regulated Material)

Batteries (Corrosive)

Paint (Flammable Liquid)

Anydrous Ammonia (Non-flammable Compressed Gas)

Propane (Flammable Gas)

Sodium Chlorite (Oxidizer)

Acrylic

Dynamite (Explosive A)

Dichloropropene (Poison)

Telon (Poison)

Dyfonate (Poison)

AD-A114 225 PORTLAND OFFICE OF EMERGENCY MANAGEMENT OR HAZARDOUS MATERIALS HAZARD ANALYSIS, PORTLAND, OREGON.(U) JUN 81 EMW-C-0326 F/G 13/12

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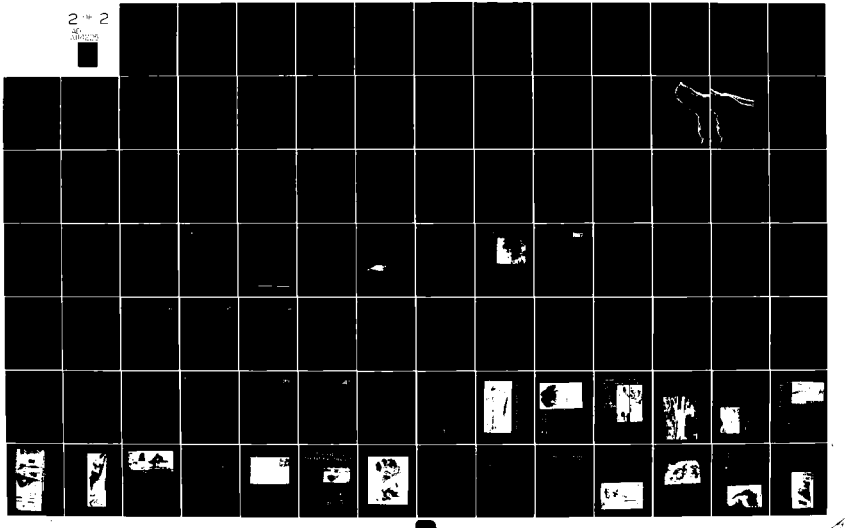


TABLE 20

CAUSE OF ACCIDENTS, INVOLVING HAZARDOUS MATERIALS
1976-1980

RESPONSIBILITY	NUMBER OF ACCIDENTS	PERCENTAGE
Commercial Vehicle Driver	45	63.4
Mechanical	9	12.7
Other Auto Driver	6	8.5
Undetermined	5	7.0
Other Unknown	3	4.2
None	2	2.8
Unknown	1	1.4

TABLE 21

CAUSE OF DRIVER FAULT ERRORS,
1976-1980

CAUSE	NUMBER	PERCENTAGE
Driving Errors(1)	35	77.8
Mechanical Errors	7	15.6
Loading Errors	3	6.7

(1) Includes: Road conditions, animals, some mechanical, and weather besides driver failures, according to PUC data collection system.

Based on this information, the following conclusions can be drawn:

--The most commonly spilled commodity is flammable liquids (82.0%). This is consistent with the high volume and frequency of shipments of this commodity. However, although infrequent, some very dangerous commodities have been spilled despite container engineering safety regulations (e.g. propane, anhydrous ammonia and several poisons).

--The majority of accidents resulting in a spill involves only the truck hauling the hazardous materials. The most common cause of accidents is a driving error by the vehicle driver. This is consistent with the summary on contributing circumstances for all truck accidents within Portland for 1976-1979, displayed in Table 22. Hazardous materials truck safety programs should therefore not only focus on vehicle safety inspections, but assure that drivers are attentive and adequately trained.

--Although a relatively high number of accidents occur within urban boundries, they are less likely to result in a commodity spill. On the other hand, those occurring on interstate highways (such as I-5, I-84, I-405) are more likely to result in a spill. As a hub for such freeways, Portland may be particularly vulnerable.

TABLE 22

PORTLAND TRUCK ACCIDENTS, CONTRIBUTING FACTORS, 1976-1979

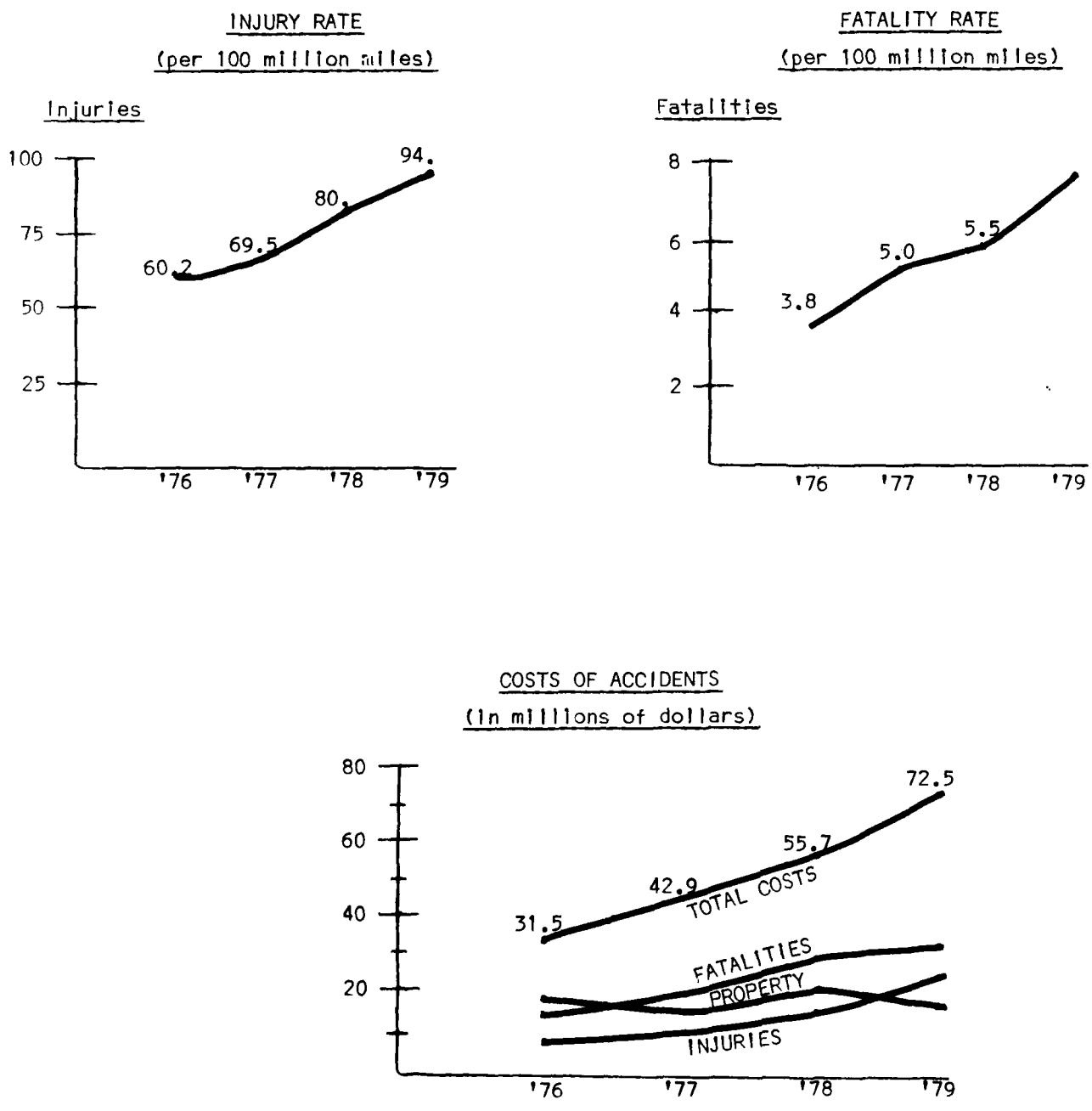
	TOTAL	PERCENTAGE OF TOTAL
Speed too fast	124	4.4%
Failed to Yield right-of-way	261	9.2
Passed stop sign	36	1.3
Disregarded traffic signal	125	4.4
Drove left of center	37	1.3
Improper overtaking	343	12.1
Followed too closely	82	2.9
Made improper turn	572	20.1
Had been drinking	44	1.5
Other improper driving	1035	36.4
Mechanical defect	116	4.1
Other	69	2.4
TOTAL	2844	

Source: Oregon Department of Transportation, Motor Vehicles Division

During the summer of 1980, the Oregon Senate Interim Committee on the Regulation of the Motor Carrier Industry conducted hearings on truck safety. The members were quite concerned to find a steady and high increase in the rate of fatalities, injuries and property damage caused by truck accidents. During the period from January 1976 through December 1979, PUC commerical vehicle accident records indicate a 250% increase in fatalities and a 91% increase in injuries per 100 million miles travelled (See Figure 4). As gasoline prices rise and the economy slumps, trucks become larger and longer and owners may become less concerned over marginal safety requirements.

FIGURE 4

CONSEQUENCES OF COMMERCIAL VEHICLE ACCIDENTS IN OREGON, 1976-1979



Source: Oregon Senate Interim Committee

Although trucks hauling hazardous materials are believed by the PUC Highway Division to have a somewhat better safety record than other trucks, it is important to remember that on some highways--such as I-5 Southbound out of Portland--as many as 8% of all trucks may be hauling dangerous goods. There have been consistent increases in the number of all truck accidents along routes known to carry high volumes of hazardous materials within Portland, as shown in Table 23 .

TABLE 23

TRUCK ACCIDENTS OCCURRING ON KNOWN PORTLAND HAZARDOUS MATERIALS ROUTES, 1977-1979

	1977	1978	1979	Total
I-5	83	105	117	305
St. Helens Road	25	41	37	103
I-84	22	29	31	82
Columbia Blvd.	28	18	24	70
I-405	15	20	17	52
Front Avenue	16	9	10	35
Marine Drive	4	4	5	13
TOTAL	193	226	241	

Source: Portland Traffic Engineering Analysis of Motor Vehicle Division Reports

Portland's truck safety record appears better than that state-wide. However, the risks associated with Portland's highways are reflected by the fact that insurance rates for trucks operating here are still the highest in the State and are approximately 32% higher than in Seattle.

Equipment violations on trucks are so frequent that from 44-55% of the trucks inspected are determined unsafe and placed out of service. The most common violation is inadequate brakes. As can be seen in Table 24, inadequate brakes are also the single most common reason for mechanically-caused accidents. For example, Oregon State Police inspectors recently discovered a truck loaded with 40,000 lbs. of Class A Explosives (dynamite) with no trailer brakes!

TABLE 24

PRIMARY CAUSE OF MECHANICAL PROBLEMS RESULTING IN TRUCK ACCIDENTS, Oregon 1976-1979

	NUMBER OF ACCIDENTS/Year					PERCENTAGE OF MECHANICAL PROBLEMS	PERCENTAGE OF ALL ACCIDENTS
	'76	'77	'78	'79	Total		
Brakes	67	84	85	101	337	48.9%	2.7%
Steering	13	6	10	15	44	6.4	.4
Tire	19	17	15	19	70	10.1	.6
Trailer Connection	17	18	27	18	80	11.6	.7
Other	49	34	37	38	158	22.9	1.3
			TOTAL		689		5.7

Source: Oregon Traffic Accidents; Focus on Trucks, Oregon Motor Vehicles Division, Salem, 1976-79.

Risk Locations

A truck accident involving hazardous materials may occur wherever such trucks are located. A definitive survey of hazardous materials routes has not been conducted, nor has there been a thorough analysis of locations and severity of truck accidents.

For the purposes of this report, officers with the Portland Police Bureau have reported their impressions of the locations where trucks frequently spill. These are noted on Map 3 and described below.

-- I-5 Terwilliger Curves (South of City Center);
-- I-5 entrance ramps from Marine Drive and Union Avenue (North of City Center);
-- I-405 connection to I-5 Southbound (South and East of 4th Avenue);
-- I-5 exit to Front Avenue;
-- I-5 exit to U.S. 30 Westbound (Vaughn Street);
-- Western approach to the St. John's Bridge (N.W. Bridge Avenue);
-- I-84 at the 33rd Street overpass;
-- I-84 between 100th and 105th (outside the City limits);
-- Marine Drive (narrow roadway, steep banks).

Officers also report that trucks accidents resulting in spilled loads are probable at all freeway entrances and exits.

Truck Safety Inspection Programs

There are four types of truck inspections conducted in Oregon either at truck terminals or on the road:

--full safety inspections which require crawling below the trailer to inspect brake adjustments and other safety requirements;
--"walk-around" inspections for obvious and glaring problems;
--over-dimensional inspections; and,
--PUC plates (or passes) for weight-mile tax compliance.

Minimum standards for a "full-inspection" have been established by the Commercial Vehicle Safety Alliance (a consortium of Western State truck safety agencies) and are consistent with federally established standards. Any inspection of the first 3 types will generally include a check for PUC weight-mile compliance.

Uniform national safety standards are established by the U.S. Department of Transportation. Hazardous Materials Standards are promulgated in Title 49, Subchapter B, Parts 100 to 199 of the Code of Federal Regulations. These regulations cover packaging, labeling and placarding. Standards for all truck safety (regardless of commodity hauled) are codified in CFR 49, Subchapter B, Parts 300 to 399 under the Federal Motor Carrier Safety Regulations. These regulations cover such things as driver qualifications, safe vehicle standards, etc. The State of Oregon has adopted, by reference, both of these standards.

Based on information about increasing accident rates and low compliance with safety standards, the Oregon Senate Interim Committee requested the relevant State agencies to increase truck inspections. The truck inspection rates are lower in Oregon than in adjoining states. In response to this Senate request, the PUC Highway Division, State Weighmasters and the Oregon State Police began cross-training and an increased inspection effort.

In the last year, twelve Oregon State Police Officers who patrol highways around the Portland area have been trained and certified by the PUC to conduct thorough truck inspections. However, the Oregon State Police (OSP) do not patrol the Interstate freeways or other highways within Portland (indeed, at the time this report is written, no police agency is specifically patrolling Portland freeways). Furthermore, the 1981 State Legislature discontinued funding for a $4.2 million dollar contract between

the PUC and the OSP for truck inspections. Consequently, the State Police are not inspecting any trucks around the Portland area, including those hauling hazardous materials.

Oregon Public Utility Commission, Motor Carrier Program

Six PUC inspectors cover the entire State. They focus on full safety inspections and audits conducted at truck terminals; they conduct very few on-road inspections. The Portland area terminals receive approximately 1 full-time inspector. Through agreement with the Commercial Vehicle Safety Alliance, a color coded "sticker" system for identifying trucks which have passed a full inspection within the last 4 months has been developed. Stickers will be applied by inspectors for the PUC and the Weighmasters. It is currently unclear if inspectors from a local government could be certified to issue the stickers.

Contact: Paul Henry, Administrator
Motor Investigations Division
Public Utility Commission
Labor and Industries Building
Salem, Oregon 97310
Telephone: 378-6736

Oregon Department of Transportation Weighmasters

The Weighmasters have recently been certified by the PUC to conduct full truck inspections, as well as checking for weight/mile violations. Two inspectors cover the 11 counties around the Portland area. This two-person team spends about 2 days/week at scales around the Portland area (.8 full-time equivalency), to

inspect 8 trucks per day. Many of the trucks inspected will be hauling in or out of the City of Portland.

Contact: Arch Shelley, Assistant Chief Weighmaster
Oregon Department of Transportation
P.O. Box 14030
Salem, Oregon 97310
Telephone: 378-1550

Multnomah County Sheriff

Two Sheriff's Deputies focus on truck inspections within Multnomah County: one on over-dimensional and PUC weight-mile tax violations, the other on hazardous materials violations. The hazardous materials inspector also responds to hazardous materials accidents and spends approximately 70% of his time conducting on-road inspections.

Contact: Deputy Brian Reynolds
Multnomah County Division of Public Safety
12240 N.E. Glisan
Portland, Oregon 97230
Telephone: 255-3600

U.S. Department of Transportation, Federal Highway Administration Motor Carrier Safety

There are two investigators who represent the Motor Carrier Safety section of the Federal Highway Administration in Oregon. These inspectors cover all aspects of trucking laws and truck firm operations, including compliance with safety standards. Relatively little time is spent inspecting trucks, and there is

little attempt to conduct on-road inspections.

Contact: Robert Hagan, Officer in Charge
Federal Highway Administration, Field Section
100 Equitable Building
503 Center Street, N.E.
Salem, Oregon 97310
Telephone: 378-3832

Oregon State Fire Marshal and the Portland Fire Bureau

State Fire Code requires inspection and licensing of all vehicles garaged in Oregon which carry Liquid Petroleum Gas, following National Fire Protection Association standards. These standards do not include a full inspection of the vehicle vis-a-vis U.S. Department of Transportation standards. The inspections are conducted by representatives of the State Fire Marshal's Office and the Portland Fire Bureau. There are approximately 13 LPG trucks garaged in Portland.

Portland Police

One Portland Police Officer conducts PUC permit and weight-mile inspections.

Recommendations

Truck Inspection

Truck accident rates have shown considerable increases statewide. The risk of Portland highways is reflected in the fact that Portland truck insurance rates are approximately 32% higher than

Seattle's. The primary cause of truck accidents is the truck driver. Equipment violations on trucks are so prevalent that at least 44% of the trucks inspected are determined unsafe and placed out of service.

The PUC estimates that only about 10% of all trucks on Oregon's highways receive a thorough annual inspection. Special attention to hazardous materials vehicles results in a higher inspection rate--approximately 20% are inspected each year.

Trucks hauling hazardous materials should be in the best of mechanical condition. Inspections are important to insure this. In addition to checking equipment necessary for any truck to be safely operated, a thorough inspection of hazardous materials-laden trucks will include a review of shipping papers, driver qualifications and special safety equipment. If accurately completed, shipping papers provide information vital to Police and Fire during an accident for correctly identifying the commodity and determining appropriate procedures. As was pointed out previously, driver qualifications are important in that the majority of accidents is driver caused. Many large tank-trailers have special release valves and other safety equipment important to mitigate the consequences of an accident.

There is currently the equivalent of 2 to 4 full-time inspectors focusing on trucks in Portland. There is only one inspector who focuses exclusively on hazardous materials-laden trucks. Although the State Police were conducting thorough safety inspections, this has been discontinued because of the lack of funding. Without State Police involvement, the level of inspection is clearly inadequate.

Truck terminal inspections by the PUC tend to focus on firms with a relatively large fleet. On-road inspections by the weigh-

masters provide some coverage for inter-city and inter-state carriers. The one County Deputy who does inspect trucks around the Portland area chooses to patrol I-84 beyond the City limits during dry months, and the northwest industrial area (St. Helen's Road) in rainy months.

A gap in the current inspection system exists. Although the entire trucking fleet which services Portland is not adequately inspected, the small operators who rarely leave the City seem to be the least inspected. Numerous other inter-city and inter-state carriers also avoid inspections.

Any local truck inspection program needs to be based on existing federal safety standards and developed in concert with other enforcement efforts. This will insure that the trucking industry is required to comply with one uniform standard and be inspected at a reasonable frequency. A truck inspector training and certification program has been established by the PUC and can be made available to City of Portland Officers.

Highway Routing

The Federal regulations that provide guidance to shippers and carriers in selecting hazardous materials routes are quite vague. Found in Section 397.9 of Title 49 CFR, they read:

> "Unless there is practicable alternatives, a motor vehicle which contains hazardous materials must be operated over routes which do not go through or near heavily populated areas, places where crowds are assembled, tunnels, narrow streets, or alleys. Operating convenience is not a basis for determining whether it is practicable to operate a motor vehicle in accordance with this paragraph."

The U.S. Department of Transportation has recommended guidelines to be used by state and local governments in designating

hazardous materials routes. It also has overruled municipalities which have attempted to merely shift the hazards from their community to another by banning hazardous materials shipments.

By applying the DOT guidelines, preferred routes can be identified which have lower accident rates and a less dense adjoining population. In designating routes, full consideration must be given to overall safety. Routes selected consistent with the federally established guidelines, which do indeed reduce the overall risk, will undoubtedly stand. Furthermore, if these routes are reasonable and established in cooperation with representatives of local truckers and hazardous materials manufacturers, there is little reason to believe they would be challenged. Truck firms' liabilities for an accident are high and they surely would hope to reduce their own risks.

Little is known about the local routes currently used for specific hazardous materials or the pick-up/delivery patterns. Upon completion of the identification of fixed facilities by the Portland Fire Bureau, and with the identification of hazardous materials haulers which is now available from the PUC, a more complete analysis can be conducted with relative ease.

Portland's freeways can present a difficult transit for drivers not familiar with them. Establishing preferred routes for through traffic would, therefore, be advisable. Upon completion, I-205 will provide one clear alternative route to I-5 for North-South traffic passing through Portland (i.e. not originating or terminating). In addition to being a safer route (less curves, bridges, and congestion), population densities are significantly lower, easing the problems of a potential evacuation. Use of I-205 as an alternative to I-5 would also be consistent with DOT established policies favoring use of interstate circumferential or bypass routes around a City (see U.S. DOT rules

regulating the highway shipment of radioactive materials, HM-164, Federal Register, January 19, 1981, pp. 5309).

Identifying preferred routes for traffic which originates and/or terminates in Portland is more complex than for through traffic. It may be that current routes chosen by drivers are the safest. For example, a large number of placarded trucks can be seen along S.W. Front Avenue, in the central business district. This is presumably an alternative to I-405 for access to the Northwest industrial areas. Why drivers choose this alternative and whether it is indeed more safe is not clear. Similarly, many drivers familiar with Portland choose Columbia Blvd. as an alternative to I-84. A recent eastbound shipment of high explosives was escorted by a Multnomah County Sheriff's Deputy along this alternate route because it was believed to be safer. There are undoubtedly numerous other frequently used routes for which alternatives may be available.

At one time Portland had designated "Flammable Liquids Truck Routes". They were established by Traffic Engineering, prior to the building of the Interstate freeway system and the increased presence of hazardous materials that are much more exotic and dangerous than flammable liquids. It is not clear when or why a policy of selective routing was abandoned.

Identifying preferred routes should be done in close cooperation with the industries which would be affected. This will help insure reasonable choices. Garnering industry support may also reduce the need for local enforcement efforts if alternative routes are chosen.

The City of Portland Bureau of Traffic Engineering has reviewed the recommended federal guidelines for route selection.

Traffic Engineering personnel have determined that, with assistance in coordinating other relevant public and private groups, application of the guidelines is feasible and could be conducted with the addition of a 6-month temporary research assistant.

MARINE TRANSPORTATION OF HAZARDOUS MATERIALS

Local Exposure

Hazardous materials enter Portland by ship and barge in break-bulk, containerized, or bulk tank shipments. It can be assumed that as much as 30% of the cargo entering Portland harbor is classified as hazardous. Several agencies with record-keeping and regulatory responsibilities maintain statistics that are somewhat helpful in determining hazardous materials types and quantities. However, no one agency has established a data base which accurately or comprehensively reflects which hazardous materials pass Portland docks.

The majority of bulk hazardous materials marine shipments into Portland are petroleum products such as gasoline, fuel oil and other combustible/flammable liquids. These products are transferred at private terminals adjacent to the tank farms in Linnton, St. Johns, and at the foot of Doan St. along Front Avenue. Several monthly shipments of anhydrous ammonia and lesser quantities of Sodium Hydroxide (Caustic Soda) also leave one private manufacturing terminal located in the Rivergate area.

Container and break-bulk cargo are, for the most part, handled exclusively at Port of Portland terminals. In break-bulk quantities and located on the terminals, these hazardous materials are a risk primarily to personnel working on the docks, Port property, and emergency responders. (See Map 5, p.104).

An estimate of the combined bulk, containerized and break-bulk hazardous cargo shipped across Portland's docks is available from U.S. Army Corps of Engineers records. This information is presented in Table 25 . Not all regulated materials are in-

cluded in this list and many of the listed "chemicals" would not be hazardous.

TABLE 25

ESTIMATED HAZARDOUS MATERIALS TONNAGE, 1979

COMMODITY	SHORT TONS
Residual Fuel Oil	2,526,130
Distalliate Fuel Oil	2 330,571
Gasoline	1,899,138
Asphalt Tar and Pitches	473,294
Crude Petroleum	453,111
Jet Fuel	104,098
Kerosene	77,193
Crude Tar, Oil, Gas Products	3,171
Petroleum and Coal Products, NEC (a)	86
Paints	1,562
Naptha, Petroleum Solvents	12,279
Benzene and Toluene (b)	728
Sodium Hydroxide (c)	2,400
Basic Chemicals and Prod, NEC (a)	692,307
Misc. Chemical Products (a)	5,279
Chemical Fertilizers (d)	238,563
Fertilizer and Materials	4,109
Insecticide, Disinfectants	578
Liquified Gases	4
Ordnance and Accessories (e)	218
Radioactive Materials, Wastes	1
TOTAL	8,824,820
TOTAL PORT CARGO	29,536,590
HAZARDOUS MATERIALS AS PERCENTAGE OF TOTAL PORT TONNAGE	29.8%

Source: U.S. Army Corps of Engineers: Waterborne Commerce of the U.S., 1979

(a) No further breakdown available, NEC is "not elsewhere classified".
(b) Flammable poisonous liquids.
(c) Corrosive.
(d) Many chemical fertilizers contain ammonia nitrate.
(e) Fireworks, bullets and construction related explosives. Port records indicate that twice this amount of explosives shipments took place in 1980.

Coast Guard inspection boardings indicate that approximately 12 to 17% (or 150 to 120 ships) of all ships entering the port annually contain some containerized or break-bulk hazardous materials (See Table 26). This is not based on a randomly selected sample of inspections, and may, therefore, be a somewhat high estimate.

TABLE 26

ANNUAL ESTIMATE OF HAZARDOUS MATERIALS-LADEN SHIPS ENTERING PORTLAND HARBOR, 1980

TYPE OF CARGO	ESTIMATED NUMBER OF SHIPS
Bulk Oil Products (1)	
Ships	98
Barges	1,121
Other Tankers (2)	
Ships	10
Barges	120
Break-bulk, Containerized (1)	
Cargo Ships	155 to 220

(1) U.S. Coast Guard estimates.
(2) Primarily Anhydrous Ammonia, as reported by the manufacturer.

Port of Portland record-keeping procedures do not currently lend themselves to accurately analyzing the flow of hazardous materials across the Port docks. Discussions with terminal managers conducted in April of 1981 revealed that at that time* there was very little awareness of which dangerous commodities were common to each terminal. It can be surmised, however, that hazardous materials are handled and stored at Terminals 2, 4 and 6. (See Map 5)

The commodities found on Port of Portland Terminals range in hazardness from scrap paper (flammable or combustible) to

* See following discussion on improvements in Port hazardous materials management program.

insecticides, and irritating poison gases, such as anhydrous ammonia and sulfer dioxide. In addition to the commodities listed in Table 25 (p.98), the following materials have also been reported on Port terminals: methyl ethyl ketone (flammable and irritant); monochloracetic acid (corrosive); lead nitrate and hydrogen peroxide (oxidizers); nitrophenols (poisons); and sulphur dioxide (irritating gas).

The Portland Fire Bureau Harbor Master receives advance notification of many hazardous materials-laden ships, especially those carrying explosives (primarily fireworks which are Class B explosives). From August 1980 through August 1981, there were 11 fireworks shipments.

Harbor Safety and Inspection Programs

Spill prevention and emergency clean-up procedures are established for all the bulk oil terminals along the waterfront. The Clean Rivers Cooperative, a consortium of all but 2 of the firms which handle bulk petroleum, retains the 24-hour services of a private spill clean-up firm.

The U.S. Coast Guard requires notification of any shipments (excluding barges) of particularly dangerous hazardous materials defined as "certain dangerous cargo"; these commodities are listed in Appendix B. The Coast Guard and the Portland Fire Bureau Harbor Master also request notification of all ships which enter Portland's harbor with any U.S. DOT regulated hazardous materials. The Coast Guard boards ships to enforce safety standards, to the extent manpower limitations allow. There are currently 4 Coast Guard Boarding Officers assigned to the Portland harbor.

Port of Portland safety officials have observed that the level of marketing inquiries from hazardous material shippers may increase as other West Coast ports seek to more closely regulate the transporting of these commodities through their facilities. These safety personnel expressed their concern that, should Portland become a more popular port for such cargo, precaution for protecting life and property must increase proportionately. During the course of this study, one firm expressed interest in developing a market of transporting hazardous wastes through Portland for disposal at Arlington. The size of the barges would have precluded shipments through the locks upstream from Portland; therefore, container-handling facilities in Portland would have been necessary. This inquiry did not, however, develop into a feasible project and was later withdrawn.

Port of Portland officials handle many particularly hazardous shipments as special projects. A recent shipment of high explosives into Portland demonstrates the way in which such shipments can be coordinated. The terminals were evacuated except for necessary personnel, special inspections were conducted, and the Portland Fire Bureau was on hand. Each truck handling the loads was individually and thoroughly inspected. The trucks were then escorted through Portland and Multnomah County via Columbia Blvd. by the Multnomah County Sheriff's Office hazardous materials truck safety inspector.

Aware of the potential danger--and stimulated by the July 11 dimethoate incident at Terminal 4--the Port of Portland has begun implementation of several safety measures. Marine terminal personnel have been trained in the hazards associated with these commodities and appropriate emergency response and notification procedures. An Interim Emergency Procedures and Notification manual has been prepared. Procedures to be followed by the

steamship firms and agents in notifying the Port of arriving hazardous cargo are being developed.

The safety policies and procedures emerging within the Port of Portland will reduce the risks to both terminal personnel and emergency responders. They should be continued. Policies on the development of hazardous materials and hazardous wastes markets should be established by the Port of Portland in conjunction with the Portland Fire Bureau. As new markets are developed, they should be coordinated with safety and emergency procedures within the Port, and with the U.S. Coast Guard and Portland Fire Bureau.

The U.S. Coast Guard, Portland Fire Bureau and the Port of Portland all have the need for advance notification of marine shipments of hazardous materials entering Portland. The number of shipments and current procedures used by the shipping industry makes such pre-notification feasible. The pre-notification procedures should be strengthened and coordinated between these three agencies. From such a coordinated pre-notification procedure, records more accurately reflecting the types, frequencies and quantities of break-bulk and containerized shipments of hazardous materials should be kept. Such records will assist in long range planning, developing training programs, etc.

FOR FURTHER INFORMATION CONTACT:

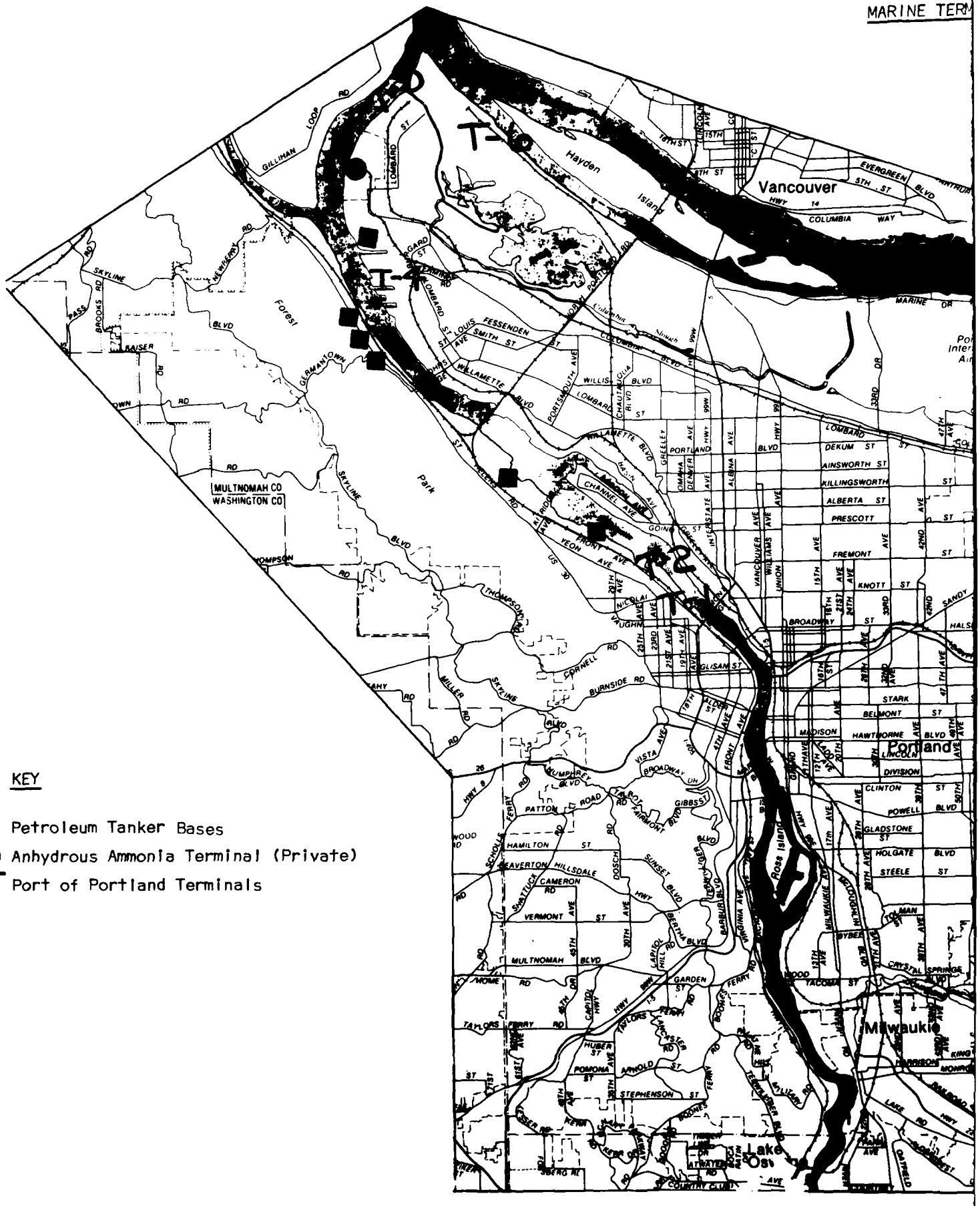
Lt. Bill Grace, Harbor Master
Portland Fire Bureau
55 S.W. Ash St.
Portland, Oregon 97204
Telephone: 248-4363

U.S. Coast Guard
Captain of the Port
ATTN: Chief of Inspection Department
6767 N. Basin
Portland, Oregon 97219
Telephone: 221-6326

Port of Portland
Donald H. Rosson, Safety Manager
Box 3529
Portland, Oregon 97208
Telephone: 231-5000

Clean Rivers Cooperative
Doug Fraley, Manager
2416 N. Marine Drive
Portland, Oregon 97217
Telephone: 285-1025

MARINE TERM


Vancouver
Portland
Milwaukie
Lake Oswego
Hayden Island
Forest Park
MULTNOMAH CO
WASHINGTON CO
COLUMBIA WAY
MARINE DR
LOMBARD ST
PORTLAND BLVD
KILLINGSWORTH ST
ALBERTA ST
PRESCOTT
FREMONT
KNOTT ST
BROADWAY
GLISAN ST
BURNSIDE RD
STARK
BELMONT ST
HAWTHORNE BLVD
DIVISION
CLINTON ST
POWELL BLVD
GLADSTONE
HOLGATE BLVD
STEELE ST
TACOMA ST
SPRINGWATER
MACADAM AVE
GARDEN
TAYLORS FERRY RD
BOONES FERRY RD
MULTNOMAH BLVD
VERMONT ST
CAMERON RD
HAMILTON ST
PATTON ROAD
BEAVERTON HILLSDALE
SUNSET BLVD
GIBBS ST
BARBUR BLVD
CAPITOL HWY
GERMANTOWN RD
SKYLINE BLVD
THOMPSON RD
CORNELL RD
MILLER RD
BURNSIDE
GILLIHAN LOOP RD
NEWBERRY RD
SKYLINE RD
BROOKS RD
KAISER RD
LOMBARD
WILLAMETTE BLVD
PORTSMOUTH AVE
CHAUTAUQUA BLVD
WILLIS BLVD
LOUIS SMITH ST
FESSENDEN ST
COLUMBIA BLVD
MARINE DR
EVERGREEN BLVD
5TH ST
15TH ST
18TH ST
99W
99E
I-5
US 30
HWY 14
HWY 26
HWY 8
HWY 43
HWY 99W
HWY 99E
I-205
I-84
INTERSTATE AVE
MLK JR BLVD
GRANDVIEW AVE
VANCOUVER AVE
WILLIAMS AVE
ALBINA AVE
OMAHA DELMER
GRAHAM AVE
CHANNEL AVE
GOING ST
FRONT AVE
YEON AVE
NICOLAI
VAUGHN
UNION
15TH AVE
21ST AVE
23RD AVE
28TH AVE
33RD AVE
42ND AVE
47TH AVE
SANDY
HALSEY
ROSS ISLAND
MILWAUKIE EXPY
OLD OREGON TRAIL
CRYSTAL SPRINGS
MORRISON
KING
LAKE RD
OATFIELD
RIVERGROVE
STEPHENSON ST
POMONA ST
ARNOLD ST
HUBER ST
LANCASTER RD
TERWILLIGER BLVD
VISTA AVE
HUMPHREY BLVD
PORT OF PORTLAND
FAIRMONT BLVD
DOSCH RD
SCHOLLS FERRY RD
WOOD RD
SHATTUCK RD
BERTHA BLVD
CAPITOL HILL RD
HUNZIKER
BOYER
COUNTRY CLUB
ATWATER
JOHNSON CREEK BLVD
TERWILLIGER BLVD
MILLIGAN
KERR
KEY
Petroleum Tanker Bases
Anhydrous Ammonia Terminal (Private)
Port of Portland Terminals

MARINE TERMINALS: KEY HAZARDS MAP 5

PIPELINE TRANSPORTATION OF HAZARDOUS MATERIALS

Pipelines used to transport hazardous materials are capable of causing injury when punctured. Although a hazard within any community, the relative risks are much lower than rail, highway and marine transport. For this reason, pipelines are only briefly addressed in this study.

The major hazardous materials pipelines in the Portland area carry petroleum products (gasoline, diesel and aviation fuel) and natural gas. Numerous other pipelines carrying hazardous gases and liquids are to be found within major chemical manufacturing plants (See Fixed Facility Section) and petroleum tank farms.

The three major petroleum pipelines which travel through Portland are as follows:

--Southern Pacific Pipeline, Inc., from 6565 St. Helen's Rd. directly south through Forest Park towards its end in Eugene;

--Olympic Pipeline: from Sauvies Island along U.S. 30, St. Helen's Rd., and Front Avenue to the 4400 block of Front Avenue;

--Chevron Oil (Aviation fuel); from N.W. Doan between Front Avenue and St. Helen's Rd. below the Willamette River through N. and N.E. Portland to the northwest corner of the Portland Airport.

Natural gas pipelines are below virtually every street. Five feeder lines which carry larger quantities of natural gas

are located as follows:

--from the southwest tip of Sauvies Island east across the Willamette River and running east the full length of Columbia and Sandy Blvd;

--Southeast along U.S. 30 from the city limits, along N.W. Front and under the Willamette River near the Marquam Bridge to the Central Service Center storage facility on S.E. 9th just north of Powell Blvd;

--From the Central Service Center east along S.E. Clinton St. (and straight east beyond) to approximately S.E. 66th St.;

--South from N.E. Columbia Blvd and N.E. 82nd Avenue, curving westward and continuing south between S.E. 66th and S.E. 72nd Avenues.

For further information:

- Portland City Engineer (siting procedures for local pipelines)
  Larry Miller
  621 S.W. Alder
  Portland, Oregon 97204
  Telephone: 248-4340

- Northwest Natural Gas, Engineering Department
  (Natural gas pipeline locations and safety procedures)
  Bill Gibbs
  123 N.W. Flanders
  Portland, Oregon 97209
  Telephone: 226-4211

- Oregon Public Utility Commission
  H.R. Garabrant (pipeline inspection)
  Labor and Industries Building
  Salem, Oregon 97310
  Telephone: 378-6628

- U.S. Department of Transportation
  Office of Pipeline Safety
  Telephone: (415) 876-9085

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REFERENCES

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Hazardous Materials Contingency Plans have been received from the following communities:

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Memphis, Tennessee
Seattle, Washington
Tukwila, Washington
Pierce County, Washington

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APPENDICES

APPENDICES

APPENDIX 1

SUMMARY OF NOTIFICATION SEQUENCE

April 21, 1981 Release of Ethyleneamine

08:00 (estimated time)

An open valve and leak discovered at 3900 block of Yeon by Portland Terminal Railroad (PTR).

08:05

PTR Yard Supervisor notified Van Waters and Rogers (VW&R) of release.

08:25

VW&R provided PTR with information about properties of ethyleneamine.

08:30

PTR notified Oregon Emergency Services Division (OESD) (in accordance with requirements of ORS 761.405) that spilled material is ethylene, commodity code #490-6220 (from waybill). OESD recommended contacting Portland Fire Bureau (PFB). PTR attempted to notify U.S. DOT Coast Guard National Response Center (CGNRC) at (202) 426-1830. PTR was told to call back, as there were two other calls being taken at that time (the CGNRC emergency reporting number has been changed to 800-424-8802 or (202) 426-2675).

08:32

ODFS notified Oregon Department of Environmental Quality (O-DEQ) in accordnace with Oregon Accident Response System (OARS).

08:35

PTR notified PFB Dispatch Center of "ethylene" release and Commodity Code #490-6220.

PTR notified Environmental Emergency Services Co.

08:40

OESD notified PIR and O-DEQ of the significant hazards of ethylene imine (after having checked commodity code #490-6220 in Bureau of Explosives publication Emergency Handling of Hazardous Materials in Surface Transportation).

08:40

PFB arrived on scene. After short search finds VW&R's representative who has Product Safety Data Sheet. After discussion and reference to Data Sheet, flooding/dilution tactic was decided upon and begun.

08:41

PFB Dispatch Center notified of gasoline truck overturned at the intersection of Lombard and Marine Drive (note: this is a second hazardous materials incident being handled by PFB concurrent with the ethyleneamine incident. Although not detailed further in this report, it is of interest to the City of Portland for purposes of response planning).

08:46

PFB Dispatch Center provided responding company with information that the commodity is ethylene imine, dangerous, and requires using self-contained breathing apparatus and full protective clothing (Information acquired from Bureau reference materials located at dispatch center).

08:48

Assistance requested by first-in Fire Company--chemical suits requested and full "Box" assignment (total 41 firefighters, 8 trucks/engines).

08:50

Dow Chemical Emergency Response Coordinator (located in Pittsburgh, California) notified by VW&R. Dow Chemical remained in telephone contact with VW&R and requested technical product safety data from Dow manufacturers in Freeport, Texas.

08:50

ODES notified following agencies of ethylene imine release:

--Portland Office of Emergency Services (OES)
--State Fire Marshall
--State Health Division, Emergency Medical Section
--Multnomah County Office of Emergency Management (MCOEM)
--Federal Emergency Management Agency (FEMA), Region X
--Governor's Office

08:57

PFB supplied further specific information on the characteristics of ethylene imine--to protect sewage exposures by diking, etc.

08:59

On Scene PFB Commander ordered streets closed and requested Police assistance to do so.

09:02 -9:07 (approximate)

PFB Dispatch Center notified:

--Waste Water Treatment Facility
--OARS (Notification through Oregon Emergency Services Division)
--Local Coast Guard

09:03

Two Police units dispatched to close streets.

09:04

One police unit arrived.

09:24

Second police unit arrived.

09:25

VW&P's advised by Dow Chemical that reportable quantity

09:25 (cont.)

Of ethyleneamine was 1,000 lbs. This and other briefing information was passed on to PTR with suggestion to file report with U.S. DOT (CGNRC).

09:30 (or before)

Local radio station provided live interview with PFB On-Scene Commander, and other information to the public.

09:30

DEQ field representative arrived.

09:37

MCOEM notified Fire District 10 Hazardous Materials Response Unit. Response Unit put on stand-by.

09:45

Environmental Emergency Services arrived on scene.

09:50

PTR notified U.S. Coast Guard National Response Center.

10:04

National Response Center notified local Coast Guard. Local Coast Guard in turn notified:

--Regional Response Center
--Regional Response Team
--U.S. Environmental Protection Agency
--Pacific Strike Team
--Airstation Astoria
--Air National Guard
--National Oceanic Administration
--National Weather Service
--Washington State Emergency Services
--Oregon Emergency Services Division
--Federal Emergency Management Agency
--U.S. Fish and Wildlife
--CHEMTREC
--Clear Rivers Cooperative
--Oregon Department of Environmental Quality
--Crowley Environmental Services

10:04 (cont.)

--Environmental Emergency Services
--Columbia River Pilots Association
--Devine Salvage Company

10:30

MCOEM notified Regional Hospital (Providence Medical Center) of potential for contaminated emergency response personnel.

10:35

Industrial Waste section of Waste Water Treatment facility dispatched personnel to assess threat to sewage system.

10:51

Regional Hospital notified other local hospitals and ambulance crews through HEAR system.

12:20

Dow Chemical Emergency Response team left Pittsburgh, California (could have left within one hour of being notified).

04:10

Dow Chemical Emergency Response team arrives. Clean-up strategy negotiated between principles involved; guard is posted and clean-up began Wednesday morning, April 22 by Environmental Emergency Services Co.

OBSERVATIONS: ETHYLENEAMINE INCIDENT

Prepared by Portland
Office of Emergency Services

This event made several aspects of emergency management of hazardous materials quite clear:

--Accurate identification of the commodity involved is essential. The typographical error by the carrier on the Waybill (which altered ethyleneamine to ethylene imine) created a drill for us. Had the mistake been reversed, it may have created a disaster.

--38 agencies were somehow involved or notified. In a major spill an overabundance of representatives from local, state, federal and private organizations will need or want to become involved (or course, the Portland Fire Bureau retains on-scene command authority). Special efforts will need to be made to coordinate the special expertise and information needs of all these agencies.

--The Fire Alarm Telegraph was busy with 2 hazardous materials and several other incidents. It's capabity to notify those who want to know and to provide information to the public and the press quickly becomes strained.

--It can happen here! If the valve had been opened on a car of ethylene imine, a major evacuation could have been required and multiple injuries or deaths realized (See attached description of ethylene imine).

4-30-81
RWR

Agencies/Organizations Involved*--
(in order of notification)

1. Portland Terminal Railroad (PTR)--

   Carrier and in possession of the ethyleneamine when accidently released--liable for damages and responsible for clean-up.

2. Van Waters and Rogers (VW&R) consignee--

   Knew the commodity to be ethyleneamine; had product safety data sheets and contact with manufacturer (Dow Chemical) for information on product characteristics.

3. Oregon Emergency Services Division--

   Contact point for Oregon Accident Response System (OARS) notification system (Determination of which agencies are notified through the OARS system is subject to senior staff's discretion). Identified commodity as ethylene imine, based on Commodity Code #490-6220 reported by carrier.

4. Portland Fire Bureau (PFB)--

   First-in emergency response personnel. If ethylene imine, PFB would have: established perimeter and ordered evacuation, conducted any rescue possible, and, if necessary contained situation until specially trained personnel arrived. However, with accurate information the PFB assessed the situation, and diluted ethyleneamine with water (also appropriate for ethylene imine). Also investigating the cause of the release.

5. Oregon Department of Environmental Quality--

   Would provide technical assistance to local government, if requested, about potential impact and mitigation of environmental damage.

---

* It is important to note that not all agencies which would have been involved in a major incident became involved. This review will not attempt to identify all the potential actors in a major incident; there would be considerably more involved.

6. Dow Chemical Emergency Response Coordinator (Pittsburgh, California)--

Provides technical assistance for accidents involving Dow products. Notified by CHEMTREC or otherwise; on 24 hour call and can be dispatched within one hour of notification.

7. Portland Office of Emergency Services--

On alert standby; would participate in coordinating major evacuation or other activities, if state of emergency is declared by Mayor.

8. State Fire Marshall-

On alert standby; would implement provisions of State Confligration Act, if necessary.

9. State Health Division, Emergency Medical Section-

On alert standby; would provide technical assistance, if requested, to local government on public health and safety issues.

10. Multnomah County Office of Emergency Management (MCOEM)--

(Notified as local jurisdiction adjacent to City of Portland). On alert standby; participates in Fire District 10 Response Unit; would participate in coordination of activities if State of Emergency declared; responsible for notification of HEAR system.

11. Fire District 10 Hazardous Materials Response Unit.

Specialized Response Unit for Hazardous Materials incidents; on standby alert; available as back-up to Portland Fire Bureau if requested through mutual aid agreements.

12. Federal Emergency Management Agency (FEMA), Region X--

On alert standby; would provide technical and possible financial assistance to local government, if requested, notified FEMA National Operations Center.

13. Oregon Governor's Office--

On alert standby; Governor would declare State of Emergency and request outside assistance if situation warrents.

14. Portland Police Bureau--

Traffic control as requested by PFB, would manage major evacuation if necessary. Assisting Portland Fire Bureau to investigate cause of the release.

15. Portland Waste Water Treatment Facility--

On alert standby; if material had entered sewage system would have evacuated personnel, isolated and stored material to the extent time and storage capacity allow.

16. Portland Sanitary Engineering--

On alert standby, conducted field inspection for the Waste Water Treatment facility.

17. Environmental Emergency Services Co.--

Private contractor clean-up firm; retained by PTR for clean-up and disposal.

18. United States Department of Transportation (U.S. DOT), Coast Guard National Response Center (CGNRC), Washington, D.C.--

Receives notification of spills which require the notification of Environmental Portection Agency (Reportable Quantities), activation of Clean Waters Act, and/or Superfund federal clean-up assistance, etc. Notified local and regional federal response teams.

19. U.S. Coast Guard Marine Safety Officer, Portland--

On alert standby; would provide technical assistance as requested; might assume oversight responsibility for spills which enter navigable waterways; notified 19 agencies to be on alert standby (see page 4.).

20. Regional Hospital for Hospital Emergency Administrative Radio (HEAR) system (Providence Medical Center)--

Activated HEAR system to notify local hospitals of potential contaminated patients. Gathered statistics as to the number of critical/non-critical patients each facility can handle. Provides medical decisions as to where patients would be sent. Each hospital activated it's own standard operating procedures.

ETHYLAMINE

Guide 29

FIRE OR EXPLOSION

Will burn. May be ignited by heat, sparks and flames.
Flammable vapor may spread away from spill.
Container may explode in heat of fire.
Vapor explosion hazard indoors, outdoors or in sewers.
Runoff to sewer may create fire or explosion hazard.

HEALTH HAZARDS

If inhaled, may be harmful.
Contact may cause burns to skin and eyes.
Fire may produce irritating or poisonous gases.
Runoff from fire control or dilution water may cause pollution.

EMERGENCY ACTION

Keep unnecessary people away, isolate hazard area and deny entry.
Stay upwind; keep out of low areas.
Wear self-contained breathing apparatus and full protective clothing.
Isolate for 1/2 mile in all directions if tank or tankcar is involved in fire.
FOR EMERGENCY ASSISTANCE CALL CHEMTREC **(800) 424-9300.**
Also, in case of water pollution, call local authorities.

FIRE

Some of these materials may react violently with water.
Small Fires: Dry chemical, CO_2, water spray or foam.
Large Fires: Water spray, fog or foam.
Move container from fire area if you can do it without risk.
Stay away from ends of tanks.
Do not get water inside container.
Cool containers that are exposed to flames with water from the side until well after fire is out.
Withdraw immediately in case of rising sound from venting safety device or discoloration of tank.

SPILL OR LEAK

No flares, smoking or flames in hazard area.
Do not touch spilled material.
Stop leak if you can do it without risk.
Use water spray to reduce vapors.
Do not get water inside containers.
Small Spills: Take up with sand or other noncombustible absorbent material, then flush area with water.
Large Spills: Dike far ahead of spill for later disposal.

FIRST AID

Move victim to fresh air; call emergency medical care.
If not breathing, give artificial respiration.
If breathing is difficult, give oxygen.
Remove and isolate contaminated clothing and shoes.
In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes.
Keep victim quiet and maintain normal body temperature.

SOURCE: 1980 Hazardous Materials Emergency Response Guidebook, U.S. Department of Transportation, page

TABLE OF ISOLATION & EVACUATION DISTANCES

NAME OF MATERIAL SPILLING OR LEAKING (ID No.)	INITIAL ISOLATION: SPILL or LEAK FROM (drums, smaller container, or small leak from tank)	INITIAL EVACUATION: LARGE SPILL FROM A TANK (or from many containers, drums, etc.)		
	ISOLATE in all Directions feet	FIRST ISOLATE in all Directions feet	THEN EVACUATE IN A DOWNWIND DIRECTION Width miles	Length miles
Acrolein (1092)	550	1140	3.0	4.7
Acrylonitrile (1093)	30	60	0.1	0.2
Ammonia, anhydrous (1005)	100	200	0.4	0.7
Ammonia solution, not less than 44% (2073)	100	200	0.4	0.7
Boron trifluoride (1008)	320	670	1.7	2.6
Bromine (1744)	300	620	1.5	2.4
Carbon bisulfide (1131) Carbon disulfide (1131)	30	70	0.2	0.2
Chlorine (1017)	250	520	1.3	2.0
Dimethylamine, anhydrous (1032)	80	170	0.4	0.6
Dimethyl sulfate (1595)	80	170	1.4	2.2
Epichlorohydrin (2023)	40	80	0.2	0.3
Ethylene imine (1185)	270	570	1.4	2.2
Ethylene oxide (1040)	40	70	0.2	0.2
Fluorine, liquid (1045)	460	880	2.5	3.9
Hydrochloric acid, anhydrous (1050) Hydrogen chloride, anhydrous (1050) Hydrogen chloride, refrigerated liquid (2186)	190	450	1.0	1.4
Hydrocyanic acid (1051) Hydrogen cyanide, anhydrous (1051)	90	190	0.5	0.7
Hydrofluoric acid (1790) Hydrogen fluoride, anhydrous (1052)	240	490	1.2	1.8

SOURCE: 1980

Ethyleneimine

(Flammable, Thermally Unstable, Poisonous)

Potential Hazards

Fire —Highly flammable
—Flammable vapors may spread from spill.

Explosion —Container may explode due to heat of fire
—Runoff may create fire or explosion hazard in sewer system

Health —Vapors extremely irritating. Contact may cause burns to skin and eyes.
—Fire may produce irritating or poisonous gases.
—*Vapors may be fatal if inhaled*
—Runoff may pollute water supply.

Immediate Action

—Get helper and notify local authorities
—If possible, wear self-contained breathing apparatus and full protective clothing
—Eliminate all open flames. No smoking. No flares. Keep internal combustion engines at least 20 yards away from spill
—Keep upwind and estimate *Immediate Danger Area.*
—Evacuate according to *Evacuation Table.*

Immediate Follow-up Action

Fire —**Small Fire:** Dry chemical or CO_2.
—**Large Fire:** Water spray or fog.
—Move containers from fire area if without risk
—Cool containers with water from *maximum distance* until well after fire is out
—For massive fires in cargo area, use unmanned hose holder or monitor nozzles. If this is impossible, withdraw from area and let fire burn
—Stay away from ends of tanks
—Withdraw immediately in case of rising sound from venting safety device

Spill or Leak —Do not touch spilled liquid.
—Stop leak if without risk
—Use water spray to reduce vapors
—**Large Spills:** Dike for later disposal
—**Small Spills:** Take up with sand, earth or other noncombustible, absorbent material

First Aid —Remove victim to fresh air. Call for emergency medical care. *Effects of contact or inhalation may be delayed.*
—If victim is not breathing, give artificial respiration. If breathing is difficult, give oxygen
—If victim contacted material, immediately flush skin or eyes with running water for *at least 15 minutes.*
—Remove contaminated clothes.
—Keep victim warm and quiet.

For Assistance Call Chemtrec toll free (800) 424-9300

In the District of Columbia, the Virgin Islands, Guam, Samoa, Puerto Rico and Alaska, call (202) 483-7616.

Additional Follow-up Action

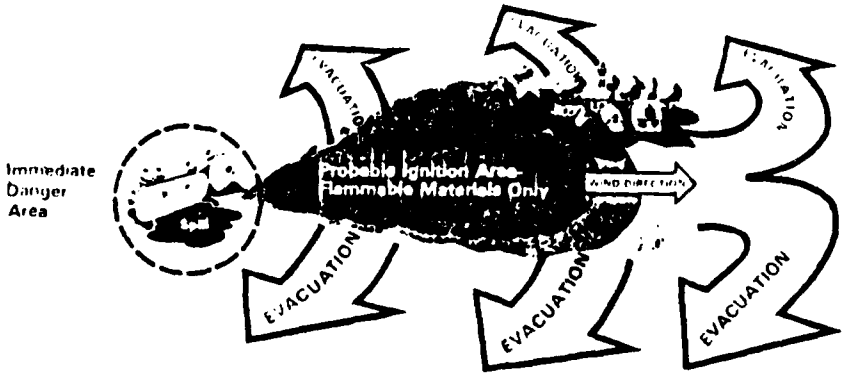
— For more detailed assistance in controlling the hazard, call Chemtrec (Chemical Transportation Emergency Center) toll free (800) 424-9300. You will be asked for the following information:

- Your location and phone number.
- Location of the accident
- Name of product and shipper, if known
- The color and number on any labels on the carrier or cargo.
- Weather conditions.
- Type of environment (populated, rural, business, etc.)
- Availability of water supply

— Adjust evacuation area according to wind changes and observed effect on population.

Water Pollution Control

— Prevent runoff from fire control or dilution water from entering streams or drinking water supply. Dike for later disposal. Notify Coast Guard or Environmental Protection Agency of the situation through Chemtrec or your local authorities.



Evacuation Table — Based on Prevailing Wind of 6-12 mph.

Approximate Size of Spill	Distance to Evacuate From Immediate Danger Area	For Maximum Safety, Downwind Evacuation Area Should Be
200 square feet	180 yards (216 paces)	1 mile long, 1/2 mile wide
400 square feet	260 yards (312 paces)	1 1/2 miles long, 1 mile wide
10 square feet	325 yards (390 paces)	2 miles long, 1 mile wide
800 square feet	380 yards (456 paces)	2 miles long, 1 1/2 mile wide

In the event of an explosion the minimum safe distance from flying fragments is 2,000 feet in all directions

31

ETHYLENE AMINE INCIDENT:
List of Abbreviations Used

FHWA - Federal Highway Administration
PRT - Portland Terminal Railroad
VW & R - Van Waters & Rogers
OESD - Oregon Emergency Services Division
PFB - Portland Fire Bureau
CGNRC - Coast Guard National Response Center
O-DEQ - Oregon Department of Environmental Quality
OES - Office of Emergency Services
MCOEM - Multnomah County Office of Emergency Management
FEMA - Federal Emergency Management Agency
HEAR - Hospital Emergency Administrative Radio

Washington Scene

Federal Regs Hindered Haz Mats Clean-up

Federal and industry guidelines and the technical advice of the shipper and others hampered rather than helped fire fighters trying to clean up a hazardous materials spill in Somerville, Massachusetts, last April, according to a report released by the National Transportation Safety Board (NTSB).

The safety board's report was the result of a special investigation of the spill, from a punctured railroad tank car, which produced clouds of acid vapor hundreds of feet high and ultimately forced the evacuation of 23,000 persons.

The NTSB's report held that Somerville fire fighters were following U.S. Department of Transportation (DOT) and Bureau of Explosives emergency guidelines for spills of the liquid chemical involved when they first directed fire hoses on the liquid to try to keep it out of the city's storm sewer system. The natural reaction of the chemical (phosphorous trichloride) to the heavy streams of water produced billowing new clouds of acid vapor.

Representatives of the shipper, Monsanto Industrial Chemical Company, later suggested fire fighters flood with water the chemical trapped in a pit dug to contain it, according to the board's report. Because water earlier had worsened the problem, the fire chief declined to follow the advice.

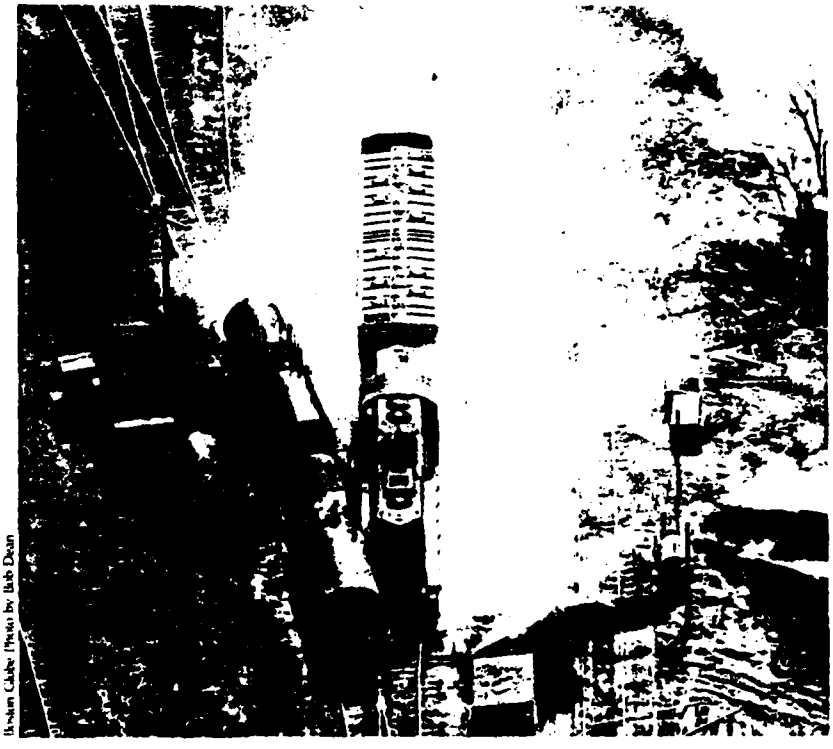
Five hours after the accident, the safety board investigation disclosed, representatives of the U.S. Environmental Protection Agency urged fire fighters to throw up a curtain of water downwind of the pit to reduce the acid cloud that was rising and drifting away. The fire department strongly opposed the idea, but complied reluctantly. A wind shift pushed the water spray directly onto the pit, causing new clouds of acid vapor and requiring further evacuation.

The safety board said the Somerville accident was the latest in a series of hazardous materials spills with which local safety officials have had to try to cope by "trial and error." Guidelines and technical advice from the federal government, the shipper and others were shown in Somerville to be "inadequate, inconsistent and confusing," the board said.

The board recommended that DOT "investigate the adequacy and consistency" of hazardous materials emergency guidelines and other advice now available to local officials, and "clarify the ambiguous language on the use of water in handling large spills" of phosphorous trichloride. (Editor's Note: It should be pointed out that the new *Emergency Response Guidebook*, recently published by DOT, still advises that, in large spills of phosphorous trichloride, emergency responders should "dike for later disposal and dilute with large amounts of water.")

The board did commend DOT for "significant improvement" in the *Guidebook*, and said this new guidance should reduce injuries such as Somerville fire fighters suffered. The injuries included burns and respiratory problems from the liquid chemical and its vapors. The safety board noted that the fire fighters' regular turnout gear was not designed to protect them from corrosive materials, and they were not aware of the need for special protection.

The board's report, *Special Investigation: Phosphorous Trichloride Release in Boston and Maine Yard 8 During Switching Operations, Somerville, Massachusetts, April 3, 1980*, may be obtained without charge by writing the *Publications Branch, National Transportation Safety Board, Washington, D.C. 20594*.



Boston Globe Photo by Bob Dean

Somerville, Massachusetts was the location of an accident in which a punctured railroad car (above) released clouds of acid vapor and forced the evacuation of 23,000 persons.

APPENDIX 3

PRELIMINARY PROPOSAL :

Hazardous Materials Response Team

DRAFT

Prepared by:

Asst. Chief J. Klum, PFB
Lt. J. Klum, PFB
Lt. J. Rice, PFB
Fire Investigator D. Murphy
Officer T. Ferriera, PPB
Bob Robison, OES

Background:

The representatives listed above from Portland Fire and Police Bureaus andthe Office of Emergency Services met to discuss the City's current capability to respond to a hazardous material accident. There was general agreement that, although recent accidents have been quite adequately handled, the City could be better prepared to handle a major accident.

Problem:

Accidents involving hazardous materials are on the increase. The quantities and types of hazardous materials in manufacturing and agricultural processes have increased dramatically over the last several years. This increased presence will continue. We will probably see more accidents.

Managing a hazardous material accident can be extremely complex. By their nature, hazardous materials emergencies require unique actions. Managing a major hazardous material accident would require knowledge, skills, equipment and the back-up resources of several City Bureaus and State and Federal agencies. Although private contractors are available for clean-up and advice, Portland Fire and Police will almost always be the first on-scene. Important decisions which may save lives of civilian and emergency

responders must often be made before private firms arrive.

As currently structured, there is no assurance that City emergency response personnel with the most training in hazardous materials emergencies will be called to respond. Although some Portland Fire and Police personnel have received special training in hazardous materials, none have been identified or specifically trained to act as special advisors in the event of a major or complex incident.

Proposal:

To train and equip a cadre of personnel from the Portland Fire and Police Bureaus as a Hazardous Materials Response Team.

Team Responsibilities:

The primary responsibility of the Team members would be to advise the incident commander on the characteristics of the commodity involved, tactics, equipment, and back-up resources. In almost all cases, the incident commander would be the senior Fire Bureau Officer. The Team would also be equipped with specialized containment or detection equipment.

Examples of issues on which the team would be prepared to give advice include:

--Information about the product and/or other information sources from where further information is available.

--probable area of contamination.

--ways in which contamination can be minimized and decontamination should be done.

--need for civilian and response-crew evacuation.

--perimeter for an evacuation (considering wind and other weather conditions, topography, population density, etc.).

--supervision of the evacuation.

--accurate information for public dissemination (assist Public Information Officer).

--establishing authority to order a private clean-up firm if the spiller abdicates his or her responsibility.

--development of notification/information processes to satisfy the needs of the plethora of agencies which demand information and notification.

In addition to consulting during emergencies, the Team could provide general training to other Bureau members. Team members might also provide assistance and leadership in other areas of hazardous materials planning.

It is strongly believed that experience is the key to successful handling of hazardous materials incidents. Of course experience is augmented by training. A specialized Team concept would insure that members would gain experience on all local spills.

Team Composition:

There are already people trained for hazardous materials emergencies within the Police and Fire Bureau. However, they have never trained together and, in many cases, have never met one another.

Team members should be hand-picked volunteers with a minimum of 10 years service remaining, if possible.

The resources of both the Fire and Police Bureaus would be important to the Team. The Fire Bureau handles most hazardous materials incidents. Police Bureau members of the Explosives Disposal Unit (EDU) also handle small quantities of dangerous chemcials. It is generally agreed that marshalling back-up assistance of Fire and Police resources would be greatly aided if both bureaus were represented on the Team. Fire and Police dispatchers, and others, seem to respond more directly to members of their own Bureaus.

A minimum of 6 specialists would be required to cover the 3 Fire Bureau Shifts. If possible, a Specialist Inspector from the Fire Marshal's Office dedicated to hazardous materials issues would be helpful. An Inspector on the Team would insure that prevention issues are addressed and that someone working on a 5-day work week was available to provide administrative continuity.

Police Bureau members of the EDU currently provide 24-hour

coverage for bomb-related incidents. Although carrying a "beeper" is inconvienient, it does work. Police Bureau members could respond to the scene of an incident within a maximum of one hour, and probably much more quickly in most cases.

Equipment:

Equipment should be chosen by the Team members who will use it.

The Fire District 10 Hazardous Materials Response Unit is well equipped, especially with information. A Portland team should be well integrated with the resources of F.D. 10, and only procure any equipment not already available or needed in a more timely manner.

It may take as long as an hour for F.D. 10 to arrive on scene. Entering a dangerous environment to close a valve or plug a leak may be required before an hour elapes. Similarly, immediately containing a spill through diking or use of absorbants could substantially reduce any property loss.

One or two standardized trailers loaded with containment equipment would probably be adequate. The costs for a trailer would be much lower than a motorized rig. Such an apparatus has been established by the Tukwilla Fire Department, south of Seattle.

Attached is an inventory of the equipment used by Tukwilla.

Safety:

It is believed that by specially training and equipping a hand-picked cadre of volunteers, everyone's safety would be enhanced. Specialists will be more adequately prepared to size-up the real dangers of a situation and know the limits of themselves and their equipment.

A policy of zero-exposure should be established. That is, that no one should be exposed to unreasonable risks--evacuation and retreat may at times be the wisest action. Thorough medical exams should be routinized and used to insure that exposures to residually toxic materials will not affect Team members health.

Costs:

The expense to establish a Team would be realized in training and equipment. It seems too early to estimate these costs.

With the approval from superiors and assistance of the Police and Fire training divisions, we could develop and determine the costs of a training program. Attached is a quick survey of training opportunities. We could also contract with local consultants and rely on our own experts to assist in establishing a training program to fit this jurisdiction's needs.

Equipment would be chosen and ordered by Team members. Tukwilla Fire Department estimates that it cost $6,000 to build the trailer, including labor costs. They have a maximum of about $3,000 in diking and clean-up materials (they have found that inexpensive materials such as sawdust and sandbags work just as well as more exotic and expensive items). Other equipment on the Tukwilla rig (acid suits, flood lights, reference materials, etc.) is insured for $40,000.

Any special authorization for start-up costs could be put in the Office of Emergency Services budget. If the Team is composed of both Police and Fire personnel, this would be especially appropriate. That approach worked quite well for outfitting the Comm 1 rig.

Abbreviations Used In This Proposal

PPB - Portland Police Bureau
EDU - Explosives Disposal Unit
F.D. 10 - Fire District 10
Comm 1 - Communications Van 1

City of Tukwila

Fire Department

Frank Todd
Mayor

Hubert H. Crawley
Fire Chief

WEEKLY CHECK LIST

HAZARDOUS INCIDENT VEHICLES & EQUIPMENT INVENTORY

EFFECTIVE: MARCH 1981

UNIT 56: (4 x 4 Towing vehicle, 10,000 pound wench, 200 feet of 3/8 inch cable, foam tank containing 105 gallons of 3% AFFF. Mobile radio 4 freguency, portable 5 watt, 4 frequency.) TOW VEHICLE OF TRAILER " A ".

Unit 53: (Towing vehicle with bed covered. Mobile radio 4 frequency, portable 5 watt, 4 frequency.) TOW VEHICLE FOR TRAILER " B ".

TRAILER " A ": (INVENTORY)

( ) 50 Gallons of 6/9% Alcohol AFFF
( ) 65 Gallons of 6% AFFF
( ) 30 Gallons of Protein Foam
( ) 50 Gallons of High Expansion Foam
( ) 200 Lbs. of Dike and Plug Leak Powder
( ) 2 100 foot chains w/o hooks.
( ) 1 Radiological Monitoring Kit (Containing):
    1 CDV 715 Monitor
    1 CDV 717 Monitor
    1 CDV 700 Monitor
    6 Dosimeters
    1 Headset
    1 CDV 750 Dosimeter Charger
    8 Batteries "D" Size
( ) 11 Rolls of bright surveyors Tape (10 Min.)
( ) 2 Nucle - Clean Suits w/decontamination kits
( ) 18 Disposable, Yellow hooded, acid suits
( ) 24 Pair of Gloves with safety rings
( ) 3 Fully self-contained acid suits, blue, L.S.I.
( ) 1 Smoke Ejector
( ) 1 Tarp, Plastic/Nylon, 18 x 12 feet.
( ) 2 40 foot absorbent booms
( ) 3 Bales absorbent pads, 3M, (2 bale min.)
( ) 4 4-hour rebreathers, Scott.

ty of Tukwila
re Department
Frank Todd
Mayor
Hubert H. Crawley
Fire Chief

HAZARDOUS INCIDENT VEHICLES & EQUIPMENT INVENTORY

PAGE 2

( ) 1 Spare O^2 Cyclinder for Rebreathers
( ) 4 Replacement Canisters for Rebreathers
( ) 1 Homelite Pump (150 GPM w/10 feet of hard suction-2½inch)
( ) 1 Electrical Cord Reel w/100 feet of No. 14 cord.
( ) 2 Sections of 1½ inch hose, rubber exterior.
( ) 1 5/8 inch garden hose 100 feet long.
( ) 2 Cans of Soda Ash, 100 lbs. each.
( ) 1 500 Watt Portable Flood Light
( ) 2 500 Watt Fixed Flood Lights
( ) 1 120 GPM AFFF eductor
( ) 1 240 GPM AFFF eductor
( ) 1 240 GPM Foam Nozzle
( ) 3 Corn Brooms (household type)
( ) 2 Rolls of Black Visqueen (14 x 50 feet x 8 mill)
( ) 3 Scoop Shovels
( ) 1 Shovel, square pointed, long handle
( ) 1 100 GPM High Expansion Foam Nozzle to 1:3000
( ) 2 One ton come-a-longs, w/hooks
( ) 1 Portable Chalk Board (green)
( ) 6 Traffic Cones
( ) 2 Pails of Met-x Powder, 50 lbs each (for class " D " fires)
( ) 4 Hard Hats
( ) 1 64 unit First Aid Kit
( ) 2 Rubber Hold Downs (24 inch)
( ) 6 Fluorescent Vest (5-" TEAM ", 1- "TEAM COMMANDER")
( ) 12 55 Gallon Plastic Drum Liners
( ) 4 Disposable Blankets
( ) 16 Road Flares (12 min.)
( ) 4 Nomes Flash Hoods, white

City of Tukwila ■ Fire Department, 444 Andover Park East, Tukwila, Washington 98188 (206) 575-4404

City of Tukwila
Fire Department

Frank Todd
Mayor

Hubert H. Crawley
Fire Chief

HAZARDOUS INCIDENT VEHICLES & EQUIPMENT INVENTORY.

( )	2	Rolls of Duct Tape, 2" x 60 yds
( )	2	Boxes of Dust Respirators, 24 each box, dispasable
( )	6	Pair Safety Goggles, green
( )	3	Cans of 3M Insudtrail Sealant, 1 lb each.
( )	10	Bars of Ivory Soap, individual size
( )	10	Smoke Bombs, one minute size
( )	1	Bottle of Paby Powder
( )	1	Jar of Vasoline Jelly, one pound size
( )	1	Container of Acid/Akline Test paper
( )	1	All purpose drum wrench, brass
( )	5	Mechanical Leak Stoppers
( )	2	Cartridges for Ansul Extinguishers, 30 lbs size
( )	2	Cans of Anti-Fog Spray
( )	2	Cans of Lense Cleaner
( )	5	Assorted Size Redwood plugs
( )	18	Zip Lock Bags
( )	1	Package of Disposable Towels
( )	2	5 Gallon Plastic Buckets
( )	1	2½ Quart Bucket
( )	4	Quarts of Wet Water
( )	100	Surveyors Flags

EXTERIOR:

( )	2	30 lb. Class D Extinguishers
( )	2	30 lb. Class B Extinguishers
( )	1	20 lb. Class C Extinguisher
( )	2	2½ Gallon Pressurized Water Extinguishers
( )	1	12 Trickle Battery Charger
( )		Portable Generator Mounting Platform (3500 Watt)
( )	1	Pack of Absorbant Acid Pads, 24 pillows

REFERENCE LIBRARY:

EQUIPMENT LIST
DIST TO HM VAN

4 ea	Acid King - Encapsulated Chemical Suits
4 ea	Chemical Suite - raingear type
4 ea	Bump Bats with chemical face shields (Long)
4 ea	Chemical Goggles
4 ea	MSA Positive Pressure Breathing Equipment
4 ea	Spare MSA Bottles
4 ea	Turnouts, Nomex
4 ea	Coveralls, Nomex
4 ea	Coveralls, Cotton
4 ea	Gloves, Natural rubber
4 ea	Gloves, Neoprene
4 ea	Gloves, Plastic
4 ea	Gloves, Leather
2 ea	Turnouts, reflectorized aircrash type
4 ea	Day Boots (hip boots)
30 gals	3, 6, 10 alcohol foam
20 gals	Light water
100 lbs	Plug and Dike
10 lbs	Dux-Seal
2 ea	Shovels; scoop; non-sparking
2 ea	Shovel; round nose; non-sparking and regular
2 ea	Shovel; square nose
1 ea	Pickaxe
1 ea	Ax, firefighting
2 ea	Crowbars; non-sparking and regular
1 ea	Pry bar - 42"
2 ea	Rolls plastic sheeting
1 ea	Ambu-bag

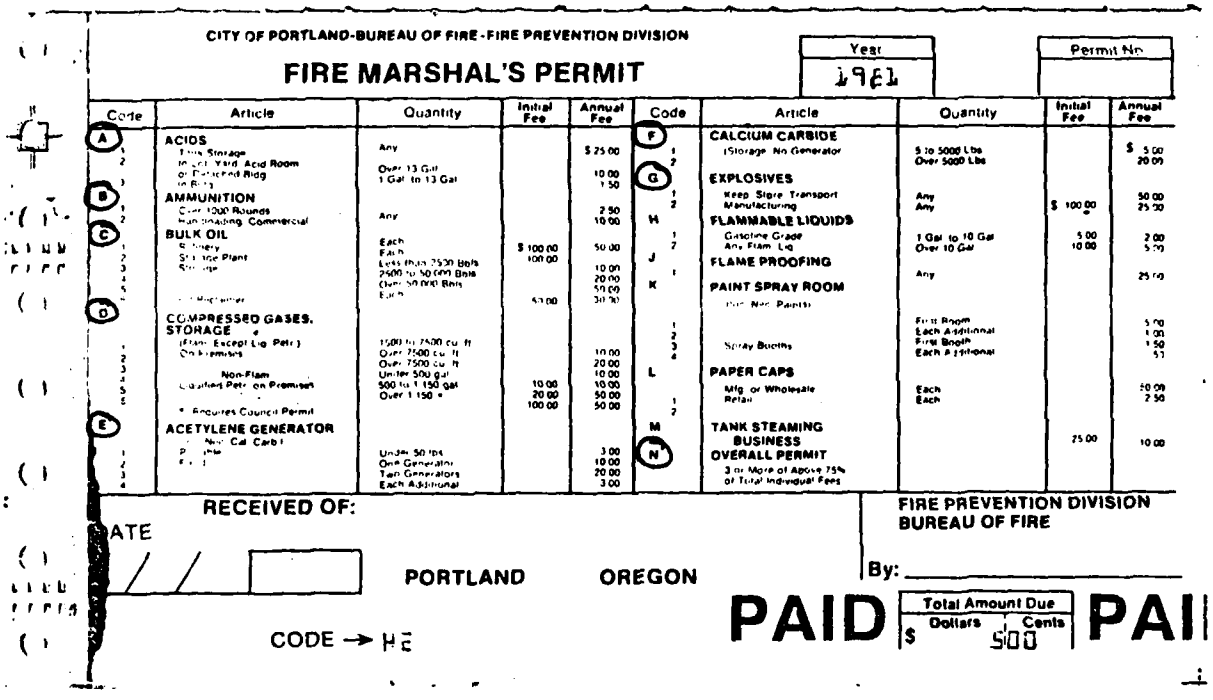
1 ea	Resuscitator, oxygen
1 ea	First Aid Kit (With atropine sulfate and 2 PAM)
6 ea	Poison Kit, cyanide
1 ea	Bonding and grounding cables, 12'
1 ea	Extension cord, 50'
1 ea	Trouble light, 10'
4 ea	Hand lights, explosion proof
4 ea	Hand Lantern
1 ea	Eductor/Proportioner (foam of light water)
1 case	Organic vapor monitors
1 ea	Broom, straw
1 ea	Broom, street
2 case	Absorbant pads, 3M oil
2 cases	Absorbant pads, Hazardous materials
50 lbs	Soda ash
50 lbs	Lime
2 ea	Radiation monitoring kits (spare dosimeters)
1 ea	Probeye (infrared detector)
1 ea	PH Meter, digital
1 ea	Explosion meter, (measures oxygen deficiency, LEL & UEL in one operation)
1 ea	Binoculars, 8 - 24 X (zoom)
1 ea	Dreager Kit, 62 products in kit
1 ea	5' probe for explosion meter
1 ea	Tool Kit, non-sparking
	6", 8", 12" Regular screwdrivers 6", 8", 12" Phillips screwdrivers Pliars, battery Pliars, round nose Pliars, linemans Pliars, diagonal cutting 6", 8", 10", 14" Crescent wrench 8", 12", 20" Pipe wrench

	Tool Kit, non-sparking Cont.
	Pry Bars
	Hand scrapers
	Cold Chisels
	Ball peen hammer
	Sledge hammer - 5lb
	Chipping hammers
lea	*Tool Kit, regular steel*
	Die set
	Cold Chisel (assortment)
	Level
	Pliars, battery
	Pliars, diagonal
	Pliars, electric cutter
	Pliars, vise grip
	Pliars, linemans
	Point gauge tool
	Center punch's
	Hacksaw/extra blades
	Screwdriver assortment, regualr
	Screwdriver assorement, phillips
	Socket set, ¼"
	Socket set, 3/8"
	Socket set, ½"
	Tow clamps
	Wrench set, open end
	Wrench set, box
	Wrench set, allen
	Wrench set, crescent
	Wrench set, pipe
2 ea	*Smoke bombs, 30 second and 5 minute*
600 ft	*Rope, nylon ½"*
1 ea	*extinguisher, metal-X*
1 ea	*Extinguisher, Halon 1211*
1 ea	*Extinguisher, ABC dry chemical*
1 ea	*File cabinet*
1 ea	*Generator, 4kw*
2 cases	*Barricade tape*
1 ea	*Camera Kit, with lens, 35mm*
1 ea	*Computer, Texas Instruments*
1 ea	*Television, color, 15"*
1 ea	*Library, assorted, 90 books*

4 ea	*Radio portable, fire, 8 channel*
1 ea	*Radio portable, police, 8 channel*
3 ea	*Radio, portable, team use UHF*
1 ea	*Radio, base, fire, 8 channel*
1 ea	*RAdio base, police, 8 channel*
1 ea	*Radio, CB, 40 channel*
1 ea	*Scanner, Bearcat 250*
1 ea	*RAdio telephone*

FIRE MARSHAL'S PERMITS
1981

Hazardous Materials Target Hazards (encircled codes):



CITY OF PORTLAND-BUREAU OF FIRE-FIRE PREVENTION DIVISION

FIRE MARSHAL'S PERMIT

Year: 1981 | Permit No.:

Code	Article	Quantity	Initial Fee	Annual Fee
A	**ACIDS**			
1	Tank Storage	Any		$25.00
2	In Acid Yard, Acid Room or Detached Bldg	Over 13 Gal 1 Gal to 13 Gal		10.00 1.50
B	**AMMUNITION**			
1	Over 1000 Rounds Handloading, Commercial			2.50
2		Any		10.00
C	**BULK OIL**			
1	Refinery	Each		
2	Storage Plant	Each	$100.00	50.00
3	Storage	Less than 2500 Bbls	100.00	
4		2500 to 50,000 Bbls		10.00
5		Over 50,000 Bbls		20.00
6		Each		50.00
D	**COMPRESSED GASES, STORAGE**			
1	(Flam. Except Liq. Petr.)	1500 to 7500 cu. ft		
2	On Premises	Over 7500 cu. ft		10.00
3		Over 7500 cu. ft		20.00
4	Non-Flam	Under 500 gal		10.00
5	Liquified Petr. on Premises	500 to 1,150 gal	10.00	10.00
6		Over 1,150 *	20.00	50.00
	* Requires Council Permit		100.00	50.00
E	**ACETYLENE GENERATOR**			
1	Portable	Under 50 lbs		3.00
2	Fixed	One Generator		10.00
3		Two Generators		20.00
4		Each Additional		3.00

Code	Article	Quantity	Initial Fee	Annual Fee
F	**CALCIUM CARBIDE**			
1	(Storage, No Generator	5 to 5000 Lbs		$ 5.00
2		Over 5000 Lbs		20.00
G	**EXPLOSIVES**			
1	Keep, Store, Transport	Any		50.00
2	Manufacturing	Any	$ 100.00	25.00
H	**FLAMMABLE LIQUIDS**			
1	Gasoline Grade	1 Gal to 10 Gal	5.00	2.00
2	Any Flam. Liq.	Over 10 Gal	10.00	5.00
J	**FLAME PROOFING**			
1		Any		25.00
K	**PAINT SPRAY ROOM**			
	(Incl. Non-Paints)			
1		First Booth		5.00
2		Each Additional		1.00
3	Spray Booths	First Booth		1.50
4		Each Additional		.50
L	**PAPER CAPS**			
1	Mfg. or Wholesale	Each		50.00
2	Retail	Each		2.50
M	**TANK STEAMING BUSINESS**		25.00	10.00
N	**OVERALL PERMIT**			
	3 or More of Above 75% of Total Individual Fees			

RECEIVED OF:

DATE

PORTLAND OREGON

CODE → HE

FIRE PREVENTION DIVISION
BUREAU OF FIRE

By: _____

PAID Total Amount Due $ Dollars 500 Cents PAI

I. SUMMARY

	Permits Issued			General Fund Reserve
	New	Renewal	Total	
Target Hazard Occupancies	12	225	237	$3,602.00
Other Occupancies	8	867	875	10,952.00
TOTALS	20	1092	1112	$14,554.00*

*Reported by the Budget Office as of June 3, 1981

II. TARGET HAZARDS (In Ranked Order of Most Frequent)

CODE	COMMODITY	TOTAL NUMBER OF PERMITS*	PERCENTAGE OF TARGET HAZARD PERMITS
	ACIDS TOTAL	105	
A - 1	Tank Storage	3	30.5%
A - 2	Detached	46	
A - 3	In Building	56	
	COMPRESSED GASES	102	
D - 1	Flam (Except LPG)	52	29.7%
D - 2	Flam, over 7500 cu. ft.	13	
D - 3	Non-flam, under 500gal	10	
D - 4	LPG, Under 500gal	19	
D - 5	LPG, 500-1,150gal	4	
D - 6	LPG over 1,150gal	4	
	OVERALL PERMITS		
N	3 or more Articles	60	17.4%
	AMMUNITION	36	
B - 1	Over 1000 Rounds	31	10.5%
B - 2	Handloading Commercial	5	
	BULK OIL	19	
C - 1	Refinery	2	5.5%
C - 2	Storage Plant	0	
C - 3	Storage, 2500 Bbls	3	
C - 4	Storage, 2500-50,000 Bbls	3	
C - 5	Storage over 50,000 Bbls	11	
C - 6	Reclaimer	0	
	ACETYLENE GENERATOR	12	
E - 1	Portable	7	3.5%
E - 2	Fixed--One Generator	5	
E - 3	Fixed--Two Generators	0	
E - 4	Fixed--More than 2		
	CALCIUM CARBIDE		
	Storage, No Generator	7	
F - 1	5 to 5,000 lbs.	5	2.%
F - 2	Over 5,000 lbs.	2	
	EXPLOSIVES	3	
G - 1	Keep, Store, Transport	3	.8%
G - 2	Manufacturing	0	
	TOTALS	344	

*Most occupancies (181 or 75%) were issued one permit for more than one hazard. The remaining 25% occupancies (56) were issued permits for only one hazard.

III. OTHER OCCUPANCIES (non-target hazards)

Code	Commodity	Total Permits
	FLAMMABLE LIQUIDS	898
H - 1	Gasoline Grade, 1-10gal	109
H - 2	Any Flam Liquid over 10gal	789
J	FLAME PROOFING	0
	PAINT SPRAY ROOM	81
K - 1	Paint Rooms	39
K - 2	Additional Rooms	2
K - 3	Paint Spray Booths	36
K - 4	Additional Booths	4
	PAPER CAPS	11
L - 1	Mfg. or Wholesale	2
L - 2	Retail	9
	TANK STEAMING BUSINESS	1
M		1
	MULTIPLE COMMODITY OCCUPANCIES	106

BURLINGTON NORTHERN

1101 N.W. Hoyt Street
P. O. Box 571
Portland, Oregon 97207

OPERATIONS DEPARTMENT

241-6222

February 27, 1981

Chief
Portland Fire Bureau
55 S. W. Ash
Portland, Oregon 97204

Dear Chief:

The enclosed information is provided in line with state requirements with respect to transportaing hazardous materials. A description and volume of material transported in your area during 1980 is included.

I would like to take this opportunity to express my appreciation for the cooperation of your department and if we can be of further assistance please do not hesitate to call me.

Yours truly,

R J Seeley

R. J. Seeley
Superintendnet

EAB:pd
Encl.

BURLINGTON NORTHERN

NORTH PORTLAND - PORTLAND

	BOX	FLAT	HOPPER	TANK	VAN/CON
CHLORINE				1463	
CAUSTIC SODA	20			260	
MIXED FRT	2615				1051
PET. PROD.				828	
LPG				1503	
FLAMMABLE ALCOHOL	1			443	
FUEL OIL				11	
C-ACID				394	
FLAMMABLE PAINT	2			9	
CHEMLS	16	2	1	248	
ANHYAM				249	
FLAM GAS				429	
FERTZ	44		279		
ALCHOL				14	
FLAM. LIQ.	3			57	
FLAM SOLID	2	13	1		
ACID		1		1	
CBL. LIQ.	1			66	
OXMTRL	4			9	
PHENOL				144	
NF GAS				31	
ARSNIC	4		9		
FLAM OIL				9	
GLUE	4			4	
NAPHTA				25	
FUEL				46	
GASOLINE				274	
F-CHEM	1			32	
FLAM ACID				26	
POTCMP			1		
POT ASH				3	
C CHEMS				102	
ACETONE				17	
BROMIDE				6	
DETERG			1	1	
OX CHEM	3		84	4	
BATTERIES	3	1			
PN CHEM	2				
LIQUOR				1	
SODIUM HYDROXIDE	5				
TARS				21	
COMPND				10	
PM FUEL				4	
FIREWORKS	1				
AMMO	3				
POT CHL				1	
DRESNG	1				
BUTANE				1	
AGI CHEM				2	

UNION PACIFIC RAILROAD COMPANY
OPERATING DEPARTMENT

M. E. MERRITT
GENERAL MANAGER-NORTHWESTERN DISTRICT

726 PITTOCK BLOCK
POST OFFICE BOX 4265
PORTLAND, OREGON 97208

February 20, 1981

Portland Fire Department
55 S. W. Ash
Portland, OR 97204

Re: Report on Movement of Hazardous Materials by Rail through Various Emergency Response Districts -- 1980

Gentlemen:

Railroads are required by Rule 46-510 of the Oregon Public Utility Commissioner (OAR 840.46.510) to notify each Emergency Response District of the volume of hazardous materials moving by rail through its jurisdiction during the past year. We supplied your organization a detailed inventory of the required information for the year 1978 and updating information for the year 1979. The attached sheet(s) represents the volume and type of hazardous materials moving through your jurisdiction during 1980, based on our local traffic figures.

If you have any questions, please contact Mr. Gary B. Wright at (503) 249-2325. In the event of a hazardous materials accident, please call our Chief Dispatcher at Portland, telephone (503) 287-9188.

Very truly yours,

ME Merritt

M. E. MERRITT

Attach.
GBW/dg

UNION PACIFIC HAZARDOUS MATERIALS MOVEMENTS

1980

FIRE DISTRICT: (1) City of Portland

HAZARDOUS COMMODITY/STCC	CAR TYPES					
	BOX	TANK	PRESS. TANK	REFRIG	FLAT	HOPPER
CLASS A EXPLOSIVES 49 01	65	-	-	-	-	-
CLASS B EXPLOSIVES 49 02	-	-	-	-	-	-
CLASS C EXPLOSIVES 49 03	-	-	-	-	28	-
NONFLAMMABLE COMPRESSED GASES 49 04	-	-	759	-	9	-
FLAMMABLE COMPRESSED GASES 49 05	-	-	1,100	-	10	-
FLAMMABLE LIQUIDS 49 06	-	-	-	-	-	-
49 07	1	53	-	-	-	-
49 08	1	30	-	-	2	-
49 09	-	80	-	-	7	-
49 10	1	262	-	178	60	2
COMBUSTIBLE LIQUIDS 49 12	-	-	-	-	-	-
49 13	-	2	-	-	-	-
49 15	-	132	-	-	-	-
FLAMMABLE SOLIDS 49 16	91	-	-	-	50	1
49 17	40	-	-	30	7	-
OXIDIZING MATERIALS 49 18	30	6	-	-	3	97
ORGANIC PEROXIDES 49 19	-	1	-	-	-	-
POISON CLASS A 49 20	-	-	-	-	-	-
POISON CLASS B 49 21	-	51	20	-	1	-
49 23	-	-	-	-	-	97
IRRITATING MATERIALS AND ETIOLOGIC AGENTS 49 25	-	-	-	-	-	-
RADIOACTIVE MATERIALS 49 26	-	-	-	-	4	-
RADIOACTIVE MATERIALS, FISSILE CLASS III 49 27	-	-	-	-	-	-
RADIOACTIVE MATERIALS, FISSILE CLASS II 49 28	-	-	3	-	-	-
RADIOACTIVE MATERIALS, FISSILE CLASS I 49 29	-	-	-	-	-	-
CORROSIVE MATERIALS 49 30	-	241	-	-	2	-
49 31	-	-	-	-	-	-
49 32	-	-	-	-	-	-
49 33	-	-	-	-	-	-
49 34	-	-	-	-	-	-
49 35	14	1252	-	2	4	1
49 36	-	3	1	-	15	-
MIXED LOADS 49 50	2	-	-	-	263	-

Southern Pacific
Transportation Company

Room 251-N Union Station • 800 Northwest Sixth Avenue • Portland, Oregon 97209

L. L. PHIPPS
SUPERINTENDENT
R. E. MELPO
ASSISTANT SUPERINTENDENT
E. A. HOWDEN
ASSISTANT SUPERINTENDENT
J. W. FERGUSON
REGIONAL ENGINEER
R. A. ENGELBERT
AREA ENGINEER

IN REPLY PLEASE REFER TO

February 24, 1981

626-56

To all District Fire Marshals and/or Chiefs:

Attached is an updated sheet indicating hazardous material movement through your area and also shows stop-off of hazardous material for the year 1980. This will indicate expected movement for 1981.

Please remove previously issued pages for 1979 and place updated page in your book.

Sincerely yours,

L L Phipps

SOUTHERN PACIFIC

HAZARDOUS MATERIAL MOVEMENT 1980

FIRE DEPT: PORTLAND FIRE BUREAU

MAIN LINE

TERMINATING TRAFFIC

Flammable Liquid Tanks	40
Corrosive Tanks	26
Oxidizer Hoppers	
Class A Poison	
Class B Poison	
Class A Explosive	
Class B Explosive	
Radio-Active Material	

THROUGH TRAFFIC

Flammable Liquid Tanks	8156
Corrosive Tanks	1649
Oxidizer Hoppers	4446
Class A Poison	
Class B Poison	767
Class A Explosive	2
Class B Explosive	
Radio-Active Material	

DRAFT

1979 Shipments of "K" Commodities

Southern Pacific Railroad

Commodity	Percentage of Railcars
Chlorine	605
Flammable Gas Tankers (95% or more is LPG)	2,400
Flammable Gas Flatcars	9
Anhydrous Ammonia	20
Sulpher Dioxide	95
Class A Explosives	12
Other Tank and Box Cars	6,448
Containers on Flat Cars	1,796

APPENDIX 6

DRAFT

Hazardous Materials Rail Incidents Recorded
to the Oregon PUC Rail Division

TYPE OF INCIDENT	COMMODITY	LOCATION	DATE	COMMENTS
Leak	LPG	Southerland	4-77	Cause unclear
Leak	Methanol	Eugene	4-77	Repaired in Yard
Leak	Methanol	Medford	4-78	Repaired by rail crew in Yard
Leak	LPG	Roseburg	6-78	Overfilled by 200 gallons in Fidalgo, WA, all seals leaked, had been shipped through Portand
Leak	Propane	Corvallis	7-77	Cause: deteriorated gasket
Leak	Molten Sulpher	Newberg	8-79	Some vegetation damage; slightly sickened 3 nearby children
Leak	Sodium chlorate	Hinkle	4-80	No significant hazard
Leak	Ethylene amine	Portland	4-81	Mislabeled as a hazardous material--no significant hazard
erailment	Formaldehyde	Coos Bay	5-79	No container rupture--no release
erailment	?	Medford	5-79	Empty cars derailed--fumes created fire hazard--no actual fire
erailment	Chlorine	Hinkle	8-79	Switching derailment--no rupture, no release
erailment	LPG	Riddle/Glendale	2-80	2 cars; no explosion
erailment	Methanol, Poly-vinyl Chloride	Portland	10-80	Alcohol fire, impinging upon PVC
erailment	Chlorine & Ammonium Nitrate	Salem	3-81	No rupture; no release
ire	Sulpher	20 miles north of Madras	4-80	

APPENDIX 7

ACCIDENT SUMMARIES--HAZARDOUS MATERIALS TRUCK ACCIDENTS AND SPILLS IN THE PORTLAND AREA

Source: Oregon PUC

1976

6/21/76 Gasoline spill-2,000 gallons on I-80N, E. Grand Avenue. Single commercial vehicle overturned on road, caused by appearance of "phantom vehicle". Resulted in spill and injury to the truck driver. Conditions cloudy and wet.

9/28/76 Diesel spill-4,000 gallon on I-80N, Union Avenue Overpass. Single Commercial vehicle involved in a unit separation where a coupling device failed. Resulted in spill, property damage only.

1977

1/11/77 Fuel oil spill--10 gallons in Portland on I-5. Single commercial vehicle involved--driver ran into a fixed object due to cloudy weather conditions and icy road. Property damage only.

12/7/77 Fuel oil spill--300 gallons on unspecified urgan road in Portland. Two or more autors were involved in a rear-end collision due to brake failure in rainy conditions. Truck driver injured.

1978

9/14/78 Asphalt spill-2,500 gallons on unspecified urban road in Portland. Commercial vehicle driver failed to maintain control, ran into a fixed object and overturned off of the road. Resulted in spill and injury to the driver. Conditions clear and dry.

1979

2/6/79 Diesel spill-amount unspecified. Seven miles east of Portland on I-80N. Auto involved in sideswipe, driver failed to maintain control in the rain. Resulted in hazardous materials spill release and injury to the driver.

1980

1/17/80 Diesel spill-3,000 gallons in Portland. Single commercial vehicle involved. Driver fault--too fast for conditions, vehicle overturned on road. Hazardous material spill and release, no injuries. Conditions clear and dry.

2/1/80 Gasoline spill-4,900 gallons in Portland. Single commercial vehicle involved. Driver fault--icy road conditions caused truck to jack-knife and skid. Resulted in hazardous material spill and relase and property damage.

APPENDIX 8

U.S. Coast Guard "Certain Dangerous Cargo" or "Cargo of Particular Hazard"

(Requires 24-hour advance notification to Captain of the Port before movement)

(c) "Certain dangerous cargo" includes any of the following:

(1) Class A explosives, as defined in 46 CFR 146.20-7 and 49 CFR 173.53.

(2) Oxidizing materials or blasting agents for which a permit is required under 49 CFR 176.415.

(3) Large quantity radioactive material, as defined in 49 CFR 173.389(b), or Fissile Class III shipments of fissile radioactive material, as defined in 49 CFR 173.389(a)(3).

(4) Each cargo under Table I of 46 CFR Part 153 when carried in bulk.

(5) Any of the following when carried in bulk:

Acetaldehyde
Ammonia, anhydrous
Butadiene
Butane
Butene
Butylene Oxide
Chlorine
Ethane
Ethylene
Ethylene Oxide
Methane
Methyl Acetylene, Propadiene Mixture, Stabilized
Methyl Bromide
Methyl Chloride
Phosphorous, elemental
Propane
Propylene
Sulfur Dioxide
Vinly Chloride

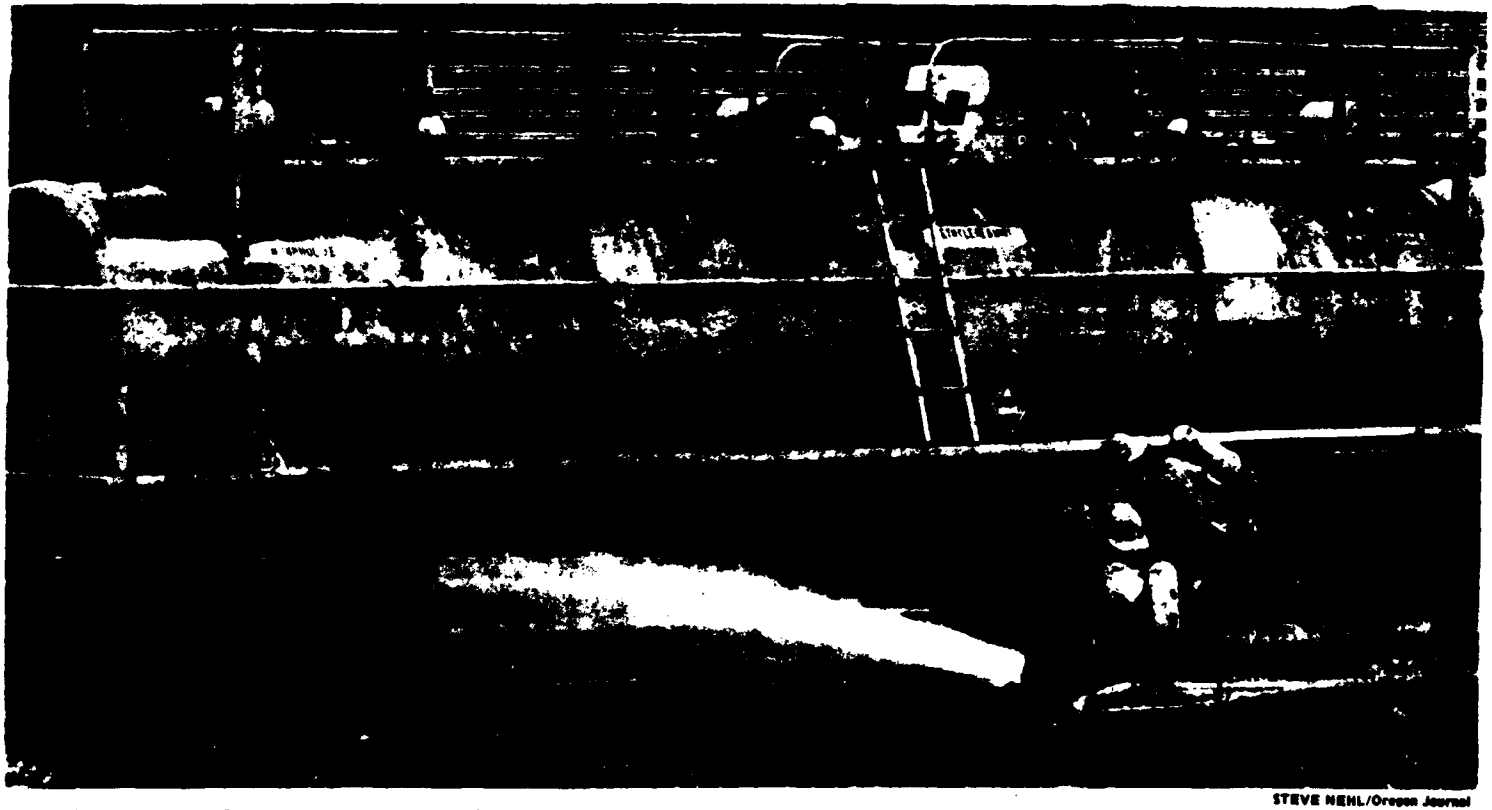
Acetic acid
Acetic anhydride
Acetone cyanohydrin
Acetonitrile
Acrylic acid
Acrylonitrile
Adiponitrile
Allyl alcohol
Allyl chloride
Aminoethylethanolamine
Ammonium hydroxide (28 pct or less NH_3).
Aniline
Benzene
Benzyl chloride
(iso-, n-) butyl Acrylate
(iso-, n-, sec-, tert-) Butylamine
(n-) Butyl ether
Butyl methacrylate
(iso-, n-, crude) butyraldehyde.
Camphor oil
Carbolic oil

Carbon disulfide
Carbon tetrachloride
Caustic potash solution
Caustic soda solution
(mono-) Chlorobenzene
Chloroform
(crude) Chlorohydrins
Chloroprene
Chlorosulfonic acid
Coal tar naphtha
Creosote
Cresols
Crotonaldehyde
Cyclohexanone
Cyclohexylamine
(iso-, n-) Decyl acrylate
Dibutylamine
Dichlorobenzene
1,1-Dichloroethane
2,2'-Dichloroethyl ether
Dichloromethane
1,1- or 1,2-Dichloropropane.
1,3-Dichloropropene
Diethanolamine

Furfural
Hydrochloric acid
2-Hydroxyethyl acrylate
Isoprene
Mesityl oxide
Methyl acrylate
2-Methyl-5-Ethyl pyridine
Methyl methacrylate
(alpha-) Methyl styrene
Morpholine
Motor fuel anti-knock compounds (containing lead alkyls).
Naphthalene (liquid)
Nitric acid (70 pct or less)
(mono-) Nitrobenzene
1- or 2-Nitropropane
(ortho-, para-) Nitrotoluene
Oleum
Paraldehyde
Pentachloroethane
Phenol
Phosphoric acid
Phthalic anhydride (liquid)

(iso-, n-) Propanolamine
Propionic acid
Propionic anhydride
(iso-, n-) Propylamine
Propylene oxide
Pyridine
Sodium hydrosulfide solution (45 pct or less).
Sodium hypochlorite solution (15 pct or less).
Styrene
Sulfur (liquid)
Sulfuric acid
1,1,2,2-Tetrachloroethane
Tetraethylene-pentamine
Tetrahydrofuran
Toluene Diisocyanate
Tricresyl phosphate (containing 1 pct or more of the ortho isomer).
Triethanolamine
Triethylamine
Triethylenetetramine
Urea, ammonium nitrate solution (containing more than 2 pct NH_3).
(iso-, n-) Valeraldehyde
Vinyl acetate
Vinylidene chloride

Diethylamine
Diethylenetriamine
Diethylethanolamine
Diisopropanolamine
Diisopropylamine
Dimethylamine (40 pct or less)
Dimethylethanolamine
Dimethylformamide
1,4-Dioxane
Epichlorohydrin
Ethanolamine
Ethyl acrylate
Ethylene chlorohydrin
Ethylene cyanohydrin
Ethylenediamine
Ethylene dibromide
Ethylene dichloride
Ethyl ether
2-Ethylhexyl acrylate
Ethyl methacrylate
2-Ethyl-3-Propyl acrolein
Formaldehyde solution (37 to 50 pct)
Formic acid



STEVE NEHL/Oregon Journal

Firemen wash away remains of chemical spill that caused evacuation of several Northwest Portland businesses

Toxic spill empties nearby offices

Two separate accidents Tuesday morning resulted in temporary evacuation of several Northwest Portland businesses and slight injuries to a gasoline truck driver.

About 2,000 gallons of ethyleneamine leaked from a tank car in railroad yards near NW 40th Ave. and Yeon St. before firemen were able to secure the faulty valve. The leak was discovered when a passerby saw a cloud of vapor forming from the leaking chemical.

Ethyleneamine is a clear, colorless liquid used in textile manufacturing. It has an ammonia-like odor and is flammable at 200 degrees Celsius.

When the leak was discovered, firemen evacuated personnel from businesses within 500 yards of the leak.

As soon as the leak was stopped, firemen used hoses on the spill to disperse the liquid.

Also loaded in the Dow Chemical car were morpholine and polyglycols.

In the other accident, driver Pete Kolleas was headed east on NE Marine Drive in a Mobil Oil Co. tanker truck when he was involved in a collision with a westbound tractor-trailer.

The impact shunted the gasoline truck to the edge of the shoulder, just east of NE Lombard Street. Kolleas told officers the truck stood there "for a little while" and then the ground gave way under the right front wheels and the loaded tanker rolled down the embankment.

Firemen stood by, liberally spraying foam on the tanker as two tow trucks righted the vehicle, which was only slightly damaged.

Officials blow up derailed tank cars

MOLINO, Fla. (AP) — Demolition experts blasted six derailed tank cars with a powerful plastics explosive Tuesday night, sending a giant mushroom-shaped cloud into the dusky sky in hopes of averting a runaway propane explosion.

The blast, which could be seen more than 20 miles away, tore holes in the tankers so their dangerous liquid propane cargo could escape and feed the flames. Three of the cars had been burning for three days.

"It was just a large fireball that came up above the trees," a sheriff's communications officer said.

Ron Vallela, an aide to Gov. Bob Graham, termed the strategy of blowing up the cars to avoid an uncontrolled explosion successful. But Al Smith of the U.S. Environmental Protection Agency said it was too early to tell for sure.

The tank cars derailed Sunday when a Louisville & Nashville Railroad train hit a section of washed-out track. About 500 persons later were evacuated from their homes by officials fearful of an uncontrolled propane explosion.

As the powerful charge was set off, disaster officials huddled two miles away, unable to hear or feel the detonation. Only the short-lived fireball told the tale as it boiled 2,000 feet above the Florida Panhandle woodlands.

"It was beautiful," said Buck Renfroe, county civil defense coordinator.

Volunteers and their fire trucks from 14 communities stood by.

No injuries were reported from the blast. Deputies had scoured the woods and homes in a final sweep minutes before the explosion to make sure everyone was safely out of the rural area.

The demolition team headed by Wayne Rutledge of Jet Research Inc. of Arlington, Texas, had staked out a ditch 1,000 feet from the train as its safest spot during the explosion.

Smith said the federal government would foot the estimated $25,000 to $50,000 bill for the work done by the Texas company. But he said the government may seek reimbursement from L&N.

Earlier, hundreds of anxious nearby residents taped windows in their homes, packed up their pets and precious belongings and moved out of the area.

Residents of this sparsely populated area of northwest Florida were ordered to evacuate their homes until the danger was over. Sheriff's deputies Tuesday checked to make sure everyone had left the 2½-mile radius danger zone, including some residents who returned to check property and feed livestock.

Associated Press Laserphoto

FIREBALL — Mushroom-shaped cloud billows skyward after demolition team exploded derailed tank cars filled with propane gas near Molino, Fla.

Gas leaks from derailment send 2 crewmen to hospital

1/15/80

Photo on Page B1 also

By JOHN SIRILL
and PAUL PIETARINEN
of The Oregonian staff

RIDGEFIELD, Wash. — Two Burlington Northern railroad employees were critically injured Monday when a northbound freight train carrying liquid ammonia derailed in an isolated area three miles north of here.

Engineer Charles B. Maughlin, 53, and head brakeswoman Koral L. Watters, 24, both of Seattle, originally were listed in critical condition at Vancouver Memorial Hospital, but Ms. Watters later improved to serious condition. Both were in the hospital's intensive care unit after inhaling the caustic fumes.

Pat Moeller, nursing supervisor at the hospital, said both would be given oxygen and might require mechanical assistance with breathing because of lung damage from the fumes.

A third member of the four-member crew, brakeswoman Mary Jo Branley, 23, of Redmond, Wash., inhaled a small quantity of the fumes and was released after treatment, Ms. Moeller said.

Maughlin and Ms. Watters were in the lead locomotive of the train, a railroad spokesman said. Ms. Branley was riding in the caboose with the conductor.

Nineteen freight cars and two locomotives in the 80-car train derailed sometime after 5 p.m., said railroad spokesman Kim Forman in Seattle. All 80 cars belonged to Burlington Northern, he added.

The derailment was caused by a mudslide that apparently was triggered by ground vibrations as the train moved through a rain-soaked gorge, said Dave Westergren, Burlington Northern yardmaster in Vancouver. The mudslide knocked clumps of trees into the front end of the train and may have washed out sections of track, Forman said.

The ammonia cars were bound for a paper company in Everett, Wash., and each was filled with 75 tons of liquid ammonia, said Harold Nordgren, 61, of Seattle, conductor on the train.

Nordgren said two of the train's four locomotives were derailed about three miles north of Ridgefield and went over an embankment and into Lancaster Lake, a slough near the Columbia River about 15 miles north of Portland.

The other two locomotives were blocking both tracks running through the area, he added.

Lorraine Haines, who lives on a cliff above the tracks, said she saw the train derail just as she was going to her pumphouse at about 5 p.m.

"There was white smoke everywhere," she said. "The end of the train was all jumbled up."

One deputy at the scene said he was told by a resident that a cloud of gas was visible shortly after the tank cars derailed. The cloud drifted in the direction of Longview, the deputy said.

Deputies notified nearby residents of the derailment and "six or seven families" voluntarily left, one deputy said.

Rescue teams from the Clark County sheriff's office, the Washington State Patrol and the Vancouver Fire Department were using emergency breathing apparatus to get to the scene of the derailment. One tank car was leaking ammonia, Forman said, but was not punctured by the derailment. The fumes were strongly noticeable from about ¼ mile from the derailment.

Forman later said the leak, which apparently was in a valve, had been sealed.

An official of the Pennwalt Corp. said the ammonia was chilled to a liquid state at 35 degrees below zero before it was loaded into the cars. He said the liquid would have turned to gas immediately upon contact with the air.

Associated Press Laserphoto

GASSED — Ambulance takes engineer Charles Maughlin from scene of train derailment where tanker car of ammonia was leaking deadly fumes.

Associated Press Laserphoto

INJURED — Koral Watters, 23, was one of the Burlington Northern employees injured in derailment of freight train Monday evening.

DERAILMENT SCENE — Missouri Pacific Railroad trains litter tracks after collision Saturday near O'Kean, Ark. Town's residents were evacuated because officials feared a burning tanker loaded with ethylene oxide might explode.

Burning tanker could explode

WALNUT RIDGE, Ark. (AP) — Authorities said Sunday that there was a "50-50" chance a burning railroad tanker loaded with ethylene oxide would explode in a tiny northeast Arkansas community where 220 persons were forced to flee.

The residents of the community of O'Kean were evacuated Saturday night when two Missouri Pacific Railroad freight trains collided, several tankers were knocked off the tracks and one burst into flames.

A train crewman suffered minor burns, the only injury reported.

Emergency crews were kept at bay as officials waited for the tanker fire to burn itself out.

Charles Dettmann of North Little Rock, general manager for the railroad, said there was a "50-50 chance" of an explosion. But he said the fumes from the chemical were not toxic or hazardous.

"If it would blow, it would cause extreme property damage within a one-mile area," Dettmann said.

Jim Shell, assistant chief of water resources for the state Pollution Control and Ecology Department, said state officials at first thought the tanker was carrying vinyl chloride but later determined it was ethylene chloride. At least six others containing vinyl chloride were derailed in a ditch.

Joe Coker, director of emergency services for nearby Lawrence County, said railroad crews had removed the remaining railroad cars from the area.

"There is still an extremely dangerous situation," Coker said.

Coker said officials believe a tanker of vinyl chloride may have been ruptured, but no leak has been detected.

Lt. Jewell Woodson of the Walnut Ridge Fire Department said railroad officials told emergency crews they believed it was inevitable that the tanker of ethylene oxide would eventually explode.

Associated Press Laserphoto

DERAILED — Four tanker cars containing explosive liquid propane lie askew along tracks near Flagstaff, Ariz. Authorities ordered an estimated 2,000 persons evacuated from the area after propane began leaking.

Derailed cars leak propane, force evacuation of 2,000

FLAGSTAFF, Ariz. (AP) — About 2,000 people were evacuated from homes and businesses under National Guard supervision Tuesday after explosive liquid propane leaked from a derailed freight train, authorities said.

One man was slightly injured when 13 cars of a Santa Fe train derailed Monday night. Four of the cars carried the fuel.

While people were being evacuated, Gov. Bruce Babbitt ordered about 50 National Guardsmen to the area to provide traffic control and security, said the governor's press aide Jim West.

Capt. Gary Latham of the Flagstaff Police Department said no one would be allowed to return to the area until the four tank cars were removed.

"The leaks are very minimal, but as the day warms up the leaks could become worse, and there are three leaks," said Steve Hermann, head of the hazardous materials division of the Arizona Corporation Commission.

The four tank cars were loaded with 130,000 gallons of liquid propane. The freight cars left the track about 2½ miles from downtown Flagstaff, Hermann said.

3/8/80 Oregonian

Leaking propane clogs NYC roads

NEW YORK (AP) — Thousands of commuters jammed alternative routes Thursday after the biggest entryway to the city, the 14-lane George Washington Bridge, was closed when a tanker truck began leaking its 9,000-gallon cargo of explosive propane gas.

The leak, which began shortly after 10 a.m., was capped at 5:20 p.m.

Hundreds of residents were evacuated from a six-block area of Manhattan's Upper West Side. The Port Authority Bus Terminal at the bridge was closed.

Traffic was thrown into knots in the city and across the Hudson River in New Jersey as Port Authority police began clearing vehicles from the two levels of the 4,760-foot bridge, which handles 240,000 vehicles daily.

It took an hour to get what one policeman described as "wall-to-wall cars" off the bridge.

By midafternoon, traffic jams had clogged the Holland and Lincoln tunnels to the south, which also connect Manhattan with New Jersey, and stretched 15 miles to the Tappan Zee Bridge in Tarrytown, the nearest Hudson River crossing to the north, Deputy Fire Chief Gerard Kerins said.

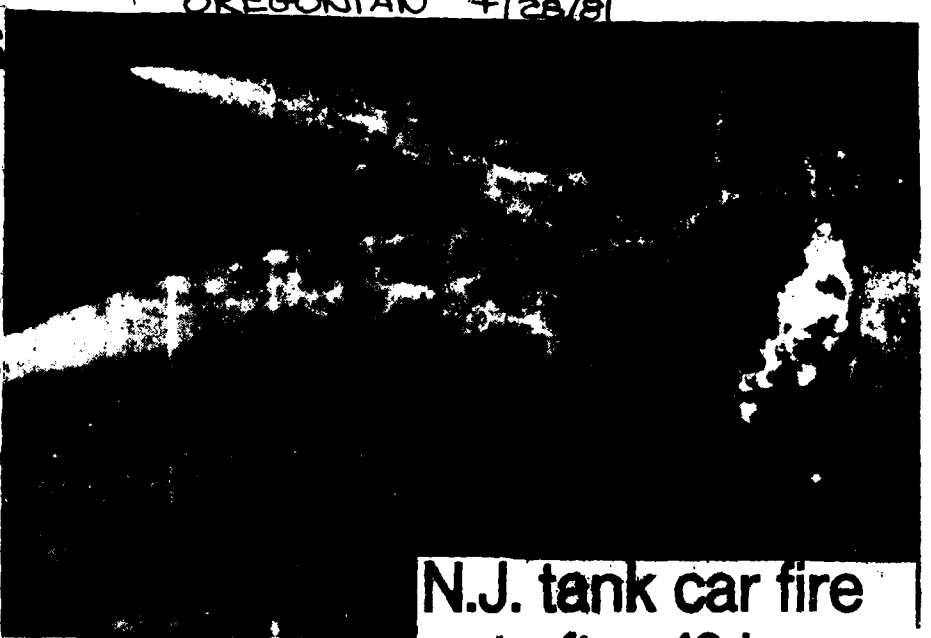
The controller in the city Bureau of Traffic Operations said that as early as 4 p.m., the jam on the West Side of Manhattan was "already one of the biggest in the city's history. . . . Nothing's moving."

Half an hour earlier, the Port Authority of New York and New Jersey advised the hundreds of thousands of commuters between here and New Jersey, in effect, to abandon hope of a normal trip home.

Paul DeFalco, vice president of Ritter Transportation Inc. of Rahway, N.J., said "likelihood of a major mishap is almost nil," but he conceded that a flame within 6 feet of the leak could touch off the gas. He went to the scene with other company officials.

The leak, from a malfunctioning valve, occurred shortly after the morning rush period on the bridge, which links the Washington Heights section of upper Manhattan and Fort Lee, N.J.

The tanker, rolling from Linden, N.J., to Trumbull, Conn., got to the bridge at about 10 a.m. Halfway across, Ritter driver Walter Caulder heard hissing from the valve atop the 13-foot-high tank.



INTERMINABLE FLAME — Tank car of a toxic chemical continues to burn in New Jersey late Monday after catching fire about 1:30 a.m. Fire officials said they would let it burn itself out — "some time" Tuesday.

Associated Press Laserphoto

OREGONIAN 7/28/81

Thousands evacuated from fire

By ROBERT WADE

NEWARK, N.J. (AP) — Thousands of people were evacuated from businesses, an airport terminal and a motel Monday as a chemical pouring from a punctured railroad car burned with flames 50 feet high and threatened an explosion.

Nearby highways were closed for several hours, and the world's largest container port was shut down until the threat of toxic fumes and an explosion lessened.

Flights continued at nearby Newark International Airport, but controllers diverted planes around the fire, which was burning in an industrial area near the airport.

"It wasn't as bad as we originally thought. We caught it in time," said Newark Fire Director John Caufield.

But officials, who evacuated a mile of the area around the fire, cautioned there was still some danger.

"The worst thing that could happen is that the tank car could take off like a rocket," said James Ross, chief of the state Department of Environmental Protection's Bureau of Emergency Response Coordination.

Firefighters were allowing the escaping ethylene oxide to burn off and were pumping nitrogen gas into the tank car to displace oxygen that could fuel an explosion.

They also were ready to pump water into the tank once the fire burned out to neutralize remaining chemical.

The fire was expected to go out once the liquid drained to a level below the puncture, "some time" Tuesday, said Chris Clune, Conrail Fire Marshall.

The fire began around 1:30 a.m. in a Conrail yard as crews were hooking cars together and "one of the (coupling) knuckles jumped and punctured the side of the car," said Fire Chief Thomas Boyle.

The ethylene oxide was draining at a rate of five to 10 gallons per minute from the 55,000-gallon tanker, said Boyle.

Caufield said original estimates of 24,000 gallons of liquid in the tanker were increased to "26,000 or 27,000."

A spokesman for BASF Wyandot Corp., which leased the tank car, said ethylene oxide is a clear liquid used in making antifreeze, cosmetics, pharmaceuticals and detergent. He said it also is used to sterilize new surgical instruments before packaging them.

The chemical is on the U.S. Environmental Protection Agency's list of hazardous substances and is explosive and toxic, said Paul Elliot, EPA's chief of emergency response for New Jersey and New York.

Some 150 guests were evacuated from a Holiday Inn near the airport, as well as workers at seven businesses and people in the airport's old North Terminal.

There are no houses in the area, which is on the southern outskirts of this city of 330,000.

Officials closed Routes 1 and 9 between Elizabeth and Jersey City and the Pulaski Skyway. All routes except the Skyway were reopened by late afternoon, said city police.

Conrail employees were ordered to keep at least three-quarters of a mile away from the fire at the Oak Island Freight Yard, said fire department spokesman Lonnie Tucker.

Around 1 p.m., some 4,000 workers were allowed back into Port Newark, which, combined with nearby Port Elizabeth, is the largest container port in the world, said Joseph Lanciotti, a Port Authority spokesman.

N.J. tank car fire out after 40 hours

NEWARK, N.J. (AP) — A fire feeding on a toxic chemical pouring from a punctured railroad tank car burned itself out Tuesday, allowing authorities to lift a state of emergency more than 40 hours after it began.

Earlier in the day, firefighters had tapped a valve on the tank, attached a pipeline to lead the ethylene oxide away from the tank car and set a second fire to speed up the burning of the 27,000-gallon load.

"We laid that secondary burn line 400 feet, and that thing worked so much better than we hoped," said Fire Director John Caufield. "It worked so well, we literally ran out of stuff to burn."

"There were no injuries and no property damage of any kind except for the tank car itself," Caufield said.

The fire was in a Conrail railroad yard near major air, sea and rail transportation routes. Thousands were affected as businesses in the area were forced to evacuate and major highways were closed.

Caufield said the greatest danger of the fire was the instability of the chemical, which was boiling inside the tank car. "Any time you have an unstable chemical burning in an area, you have to be concerned," he said.

The tank car was punctured Monday by a coupling on another tank car and the leaking ethylene oxide caught fire. Authorities decided to let the chemical burn off to lessen the chance of an explosion.

But by dawn Tuesday, officials said some 12,000 gallons of the clear, highly flammable liquid remained in the tank, so they attached the pipeline to increase the rate of draining.

"The idea was to let it burn" from the hole in the tanker, Caufield said. "And that could have worked all the way down the line, but we would have been here an extra two or three days."

Worker recovering from pesticide accident

LEAK SOUGHT — Crews from Environmental Emergency Services search for leaky chemical containers that exposed 150 dock workers and Port of Portland personnel to toxic fumes.

A longshoreman was in good condition Sunday in a Portland hospital after he and 149 other dock workers and personnel were exposed to toxic pesticide fumes Saturday at the Port of Portland's Terminal 4.

Frank Wilson, 25, of Portland was admitted to Holladay Park Hospital after complaining of nausea and dizziness, said Jan Crowley, a hospital nursing supervisor.

Eight others — four other men at Holladay Park and four at Providence Medical Center — were treated for milder symptoms and released Saturday.

About 100 dock workers and [illegible] management and security personnel from the Port were exposed to the dimethoate fumes when some of the 1,060 barrels being unloaded from a Chinese ship began leaking, Dick Montgomery, a spokesman for the Port, said Sunday.

By 8:10 p.m. Sunday, the leaking material was transferred to safe containers, marked and ready for transport by truck or rail to its final destination in San Francisco, said Darrel Buttice, another Port spokesman.

The containers were part of the general cargo of the Tong Cheng, owned by the China Ocean Shipping Co. of Shang[illegible]

Montgomery said the unloading ar[illegible] cleared late Saturday afternoon when several persons complained of t[illegible] strong acrid odor of the pesticide fumes.

The Port contacted Environmental Emergency Services, a division of Riedel International Inc., which by Sunday morning had located at least five of the damaged 110-pound containers.

The emergency services crew, dressed in protective overalls and respirator masks, moved all the drums from the warehouse onto open-air platforms where any fumes would present no danger, said Ed Minugh, Western regional manager for Environmental Emergency Services.

Minugh said the pesticide has a low toxicity level and would require three [illegible] to four hours of prolonged exposure in a non-ventilated area to cause vomiting, throat irritation or muscle cramping.

He said the fumes in the warehouse never reached a level that would seriously endanger the workers' safety.

The pesticide is destined for San Francisco, but Portland is the first port of call for all Chinese cargo, Montgomery said.

Saturday's leak tested the emergency chain of events followed in such an accident.

Port officials contacted the Multnomah County sheriff's office of emergency management, which handles crowd control; the county health department; and the Portland Fire Bureau, which is responsible for immediate action in any accident that might threaten public safety.

In turn, the Fire Bureau contacted the Coast Guard, since the accident involved a ship.

Port officials were uncertain if the Oregon Department of Environmental Quality was notified. Usually, the state agency becomes involved only in major pollution accidents.

The bulk of the investigative work was done by Environmental Emergency Services. The company will be in charge of assessing cleanup responsibilities and costs.

(8) Oregon Journal, April 21, 19[illegible]

STEVE NEWL/Oregon Journal

SAFETY MEASURE — Firemen spray overturned tanker truck with chemical foam to prevent ignition of any spilled gasoline as two wreckers (out of the picture) attempt to right the overturned vehicle loaded with gasoline. The accident occurred at NE Marine Drive and Lombard St. Tuesday morning.

United Press International

TRUCK FLIPS — Firemen hook up hoses to spray water on an overturned propane tank truck at Falmouth, Maine, after an ice-covered roadway caused the driver to lose control while coming off the Maine Turnpike's Falmouth spur onto I-95 Thursday. Officials were forced to close an 8-mile section of both roadways. About 2,000 persons were evacuated from a nearby business district.

Chemical cars derail; families forced to flee

LOUISVILLE, Ky. (AP) — Five cars of a freight train, including two carrying hazardous chemicals, derailed near downtown Sunday night, forcing the evacuation of an estimated 100 families in a four-block area, authorities said.

Four of the cars, three empty liquefied petroleum tankers and another loaded with hydrofluoric acid, were returned to the tracks and removed from the area late Sunday, official said.

The fifth car contained acrylonitrile, a flammable, caustic chemical used in the production of plastic. The car remained upright and was not leaking, authorities said.

"We do know that, if a leak should develop, it is a toxic chemical that would be harmful to the people that live in the neighborhood if they inhaled it, ingested it or got it on their skin in any way," said Maj. Robert Bailey of the city fire department.

The derailment from a Chesapeake & Ohio Railroad freight train occurred shortly before 9 p.m. EST, about 100 yards from the site of a similar accident three weeks ago which prompted the evacuation of about 200 people.

Officials were uncertain of the number of persons involved in Sunday night's evacuation, but one official estimated that 100 families were forced from their homes.

The train was en route to a Du Pont chemical plant in Louisville, Bailey said, adding that Du Pont officials were coming to the derailment to assist in returning the car to the tracks.

Evacuees were taken to Louisville's Red Cross center. Many of those evacuated went to the homes of friends or relatives, Bailey said.

The cause of the derailment was not immediately determined.

Leaking transformer spatters PCB on I-5

REDDING, Calif. (AP) — Motorists on Interstate 5 north of here might have been sprayed with the toxic chemical PCB when it leaked from a transformer on a tractor-trailer truck, the Highway Patrol reported.

The patrol advised motorists sprayed with the chemical Friday to contact a doctor.

The truck's driver, Collin Bradley, 27, of Warren, Pa., and several motorists traveling behind the truck were screened at Mercy Medical Center here, the patrol reported. None was admitted for treatment.

The patrol called in an environmental clean-up team from the I.T. Corp. in Martinez to remove the transformer.

PCB-tainted material found would be sealed in containers and taken to a federally approved dump, said John Theiss, a vice president for the environmental management firm.

Theiss said the transformer contained about 1,600 gallons of oil saturated with PCB. He did not know how much PCB leaked when a lid flew off the unit, he said.

State officials were determining if it would be necessary to treat the entire 20-mile stretch where the spill occurred, Theiss said.

The truck was transporting the transformer from an Oregon power firm to Southern California, where it was to be shipped to a new owner, the patrol said.

PCB, polychlorinated biphenyl, was used as a chemical insulator in transformers, capacitors and other electrical components for decades.

Manufacture of the chemical was banned in the United States after it was linked to skin and liver irritations. It also is suspected of causing cancer.

Earlier this year, several California utility companies, including Pacific Gas & Electric Co. and Southern California Edison Co., announced multimillion-dollar programs to replace capacitors containing PCB.

6/27/80 Oregonian

Spill on bridge tangles up traffic for San Francisco

SAN FRANCISCO (AP) — The upper deck of the San Francisco-Oakland Bay Bridge reopened early Thursday morning after being closed for 10 hours while authorities tested and removed a white chemical powder that blanketed the roadway.

The chemical, not yet identified, was presumed to be toxic.

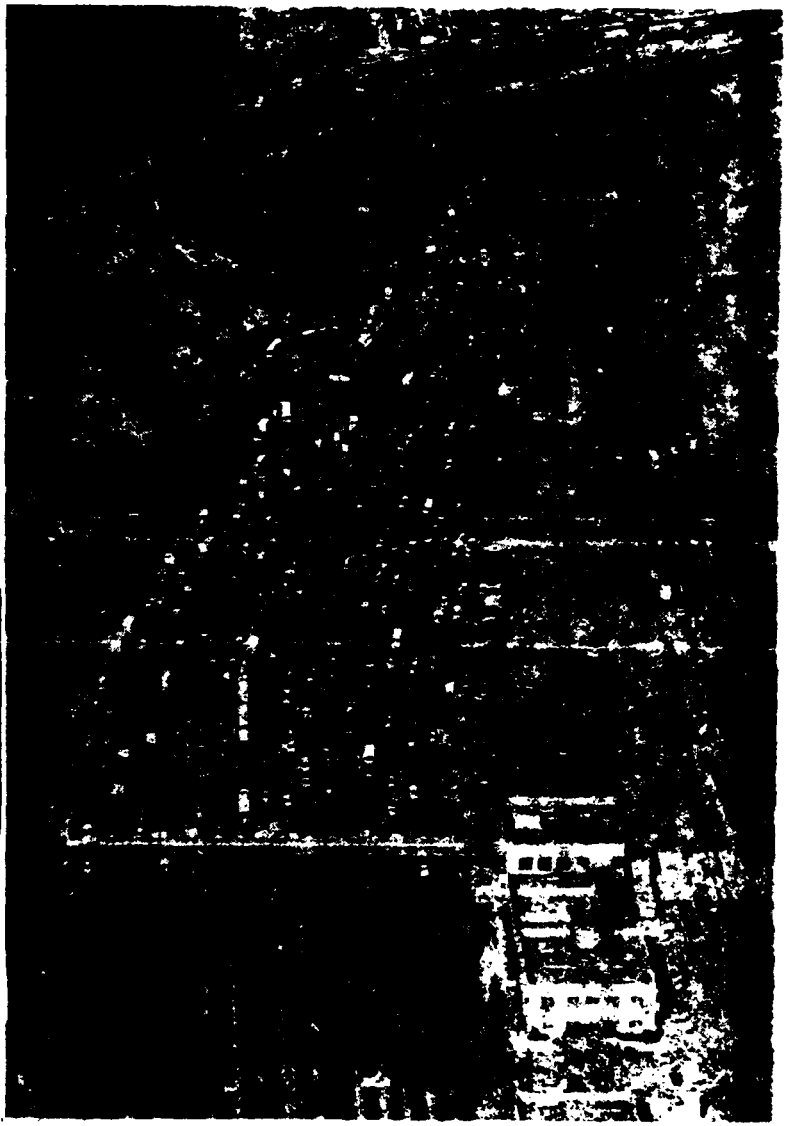
The closure of the San Francisco-bound lanes at 3:30 p.m. Wednesday snarled thousands of commuters in a long traffic jam.

By 1:15 a.m. only a few cars were waiting to cross into San Francisco since most had managed to turn around and take another route, said Chuck Mitchell of the California Transportation Department.

Officials said the powder spilled from a bag that apparently tumbled off a truck and spread across four the bridge's five lanes for 300 feet.

Preliminary tests showed the powder was toxic, possibly a pesticide, but the substance still was undergoing analysis.

After tests showed the powder was soluble in methyl alcohol, workers doused it with alcohol, washed it with water, vacuumed it up and took it to a chemical dump in Kettleman City in the San Joaquin Valley.



Associated Press Laserphoto

MASSIVE TANGLE — Spilled chemical on the San Francisco Bay Bridge closed the span Wednesday to inbound traffic for San Francisco. Bridge reopened Thursday morning after crews cleaned up the white powder.

Fire, explosion blacken Kalama plant

OREGONIAN 8-30-81

By RICHARD READ
of The Oregonian staff

KALAMA, Wash. — Hundreds of containers of toxic chemicals exploded in fireballs visible up to 25 miles away during a fire that began late Friday at the Kalama Chemical Inc. plant.

Two firefighters and two plant employees were injured, and an Oregon State Police trooper went to Columbia District Hospital in St. Helens complaining of dizziness after a thick cloud of smoke drifted toward him across the Columbia River while he was patrolling on U.S. 30.

The two company employees were injured as they helped fight the blaze, said Greg Conn, production superintendent for the firm.

Bradley Porter, 20, was treated for neck strain and released, and Donna John, 27, was admitted for acute lower back strain, the St. Johns Hospital spokeswoman said. Ms. John was reported in satisfactory condition Saturday evening.

Firefighters Michael Imboden, 31, of Kalama and Stephen Morrill, 27, of Longview were treated for toxic inhalation and released, said a spokeswoman at St. Johns Hospital in Longview.

The trooper, Ron Ruecker, 26, of Columbia City, was admitted for observation for possible toxic inhalation but was later released, according to a nurse at the hospital.

Conn identified the chemicals involved as benzaldehyde, benzoic acid and phenol, which are used for industrial purposes ranging from plywood resin application to food preservation.

Wayne Ostermiller, director of manufacturing for the company, said that approximately 500 55-gallon drums and 16,000 bags of chemicals were destroyed.

He said the chemicals involved are reasonably flammable but not toxic when burned. Conn, however, explained that of the three chemicals, phenol is the most dangerous.

Officer James Pine of the Kalama Police Department said firefighters "could feel a burning sensation on their faces. . . . The firemen said the back spray from their hoses felt like needles pressing against their faces."

Ralph M. Rodia, assistant manager of the accident prevention division of the Oregon Workers' Compensation Department, told The Oregonian Saturday that phenol "is a deadly material" that can be absorbed through the skin. "It has a corrosive effect on skin tissue. . . . Fumes from smoke could lead to irritation such as the needlelike sensation reported by the firemen."

Staff photo by BOB ELLIS

BLACKENED — Charred automobile sits outside storage area containing the remains of chemical containers burned during Friday night blaze in Kalama, Wash. Fire officials believe the fire could have been far worse.

Kalama Fire Chief Mike O'Neil said no cause had been established for the blaze, which sparked several spot fires during the late morning.

"As far as we can tell, the fire started in the benzoic acid storage area, which is the confusing part since that chemical would have to reach 120 degrees centigrade to ignite," Conn said. There was no immediate damage estimate, according to company officials and the Kalama Police Department.

Witnesses said flames reached 1,000 feet into the sky and billowed into a mushroom-shaped cloud.

Also destroyed were three vehicles and a trailer. A storage shed nearby was singed by the flames.

Effects of the fire, which started about 11:40 p.m. Friday, could have been much worse, said Ben Bena, Cowlitz County sheriff's deputy and emergency services coordinator for the county.

Wind blew most of the smoke and fumes from the blaze south along the Columbia River, away from Kalama, officials said. One deputy reported seeing the fire from Castle Rock, 25 miles to the north.

Firefighters from Kalama, Rural District 2, Longview and Kelso were able to prevent the flames from reaching two railroad cars, one of which was marked flammable. Bill Castleberry, a foreman at the plant, said flames came dangerously close to a propane tank.

"The general feeling here is that there was a great lack of anybody taking responsibility to do anything," Pine said. "The company didn't want to say exactly what was in the containers. The police agencies were all trying to figure out who would be in charge."

Employees were still hosing down the blackened storage yard Saturday afternoon. Kalama Chemical Inc., owned by Dow Chemical Co. until 1971, normally employs 70 persons. It had sales of $24 million in 1980.

In November 1979, more than 69,000 gallons of toluene leaked into the ground from the plant, and clean-up crews swept the area to contain a small quantity feared to have leached into the water.

OREGONIAN 8-30-81

Associated Press Laserphoto

BLAST — Plumes of flame shoot 1,000 feet above Kalama Chemical Inc. during fire at Kalama, Wash., plant Friday night. Hundreds of drums of toxic chemicals exploded in fire, forcing closure of nearby Interstate 5.

Cleanup continues in wake of explosive blaze

OREGONIAN 8-30-81

Story on Page One also

By RICHARD READ
of The Oregonian staff

KALAMA, Wash. — This small town on the banks of the Columbia River resumed its usual air of tranquility Saturday afternoon, as Kalama Chemical Inc. employees hosed down the company's storage yard blackened by Friday night's explosive blaze, readying charred and twisted storage containers for disposal in a landfill near Arlington, Ore.

Visitors to the site smelled a pungent odor and experienced a tightening of the throat and a slight ache in the sinuses, all of which company employees said were usual features of working with phenol, the deadly chemical that burned along with benzoic acid and benzaldehyde in the fire.

But Kalama Fire Chief Mike O'Neil remained concerned.

"If the wind had shifted in the opposite direction, I think the whole plant would have gone and then some," he said. "If the dry cedar logs (in an adjoining yard) had caught, we probably would have lost the whole industrial area — the log dock yard, the sawmill, the lumber company, the shake mill and then the marina."

The plant is surrounded by tanks of the highly explosive chemical toluene, he said, as well as adjoining a repackaging plant stocked with chlorine, also flammable.

And Kelso Fire Chief Bob Davidson reported that his crew arrived to find a tank car close to the conflagration "hot as a pistol." It was hand-labeled as containing benzine, another inflammable agent. For some 20 minutes, none of the firefighters knew the content of the flaming drums and bags, O'Neil said.

No one doubted the power of the fire, witnesses interviewed Saturday said. "It was scary," said Ann Gilliam, a worker at the Kalama Cafe. "I got a call around 1 a.m. and I thought Trojan had gone up." (The Trojan nuclear power plant is directly across the Columbia River from the fire site.)

"There are ashes on our lawn today and our house is three miles away," said Jeff Meyer, 16.

Fear of toxic fumes led Oregon and Washington officials to close a section of U.S. 30, as well as 20 miles of Interstate 5 in the Kalama area for three hours.

Since the chemical company is outside the Kalama city limits, and because a reciprocal firefighting agreement with Kelso expired in 1971 when the present owners bought the company from Dow Chemical Co., Kalama Chemical will "likely" end up paying for the fire protection, according to R.A. Kirchner, one of the company's owners.

Although firefighters reported a needlelike sensation on their faces as they fought the blaze, Kirchner termed that "ridiculous. It was the same kind of smoke you'd have in burning leaves, except maybe more of it," he said.

"I don't want to bad-mouth the company," O'Neil said, "but something's got to be worked out — a reasonable agreement so we know what's burning and we know who is going to pay to put it out."

In Kalama

Oregonian 8-31-81

Fire chief questions probe of fire

By TOM HALLMAN JR.
of The Oregonian staff

KALAMA, Wash. — The fire chief of this small community said Sunday that he was upset with the way officials of a chemical company were handling the investigation of a Saturday morning fire in which hundreds of containers of toxic chemicals exploded.

Five persons were injured and another complained of dizziness after exposure to the thick cloud of smoke.

Since Kalama Chemical Inc. is outside the city limits, and because a reciprocal firefighting agreement with Kelso expired in 1971, city officials must depend on the company to investigate the cause of the blaze.

However, Fire Chief Mike O'Neil said Sunday that he was "a little concerned" with the company's actions.

Hours after the blaze was out, company officials had tractors cleaning up debris at the site of the fire, O'Neil said.

"We came back from a call and saw them going great guns. It's going to be impossible to determine a cause now," he said. "Once you plow a tractor through the place, it's too hard to find out what happened."

He said he doubted any state agency would investigate the fire.

"With the debris cleaned up, it would be impossible for the state fire marshal to investigate," he said. "The state Department of Ecology was here during the fire, but they were concerned about the unburned chemicals and where the water and the chemicals were draining. But the company had its own (wastewater) system so there was nothing to worry about."

O'Neil said that if the city had had jurisdiction, he would have sealed the site so investigators could probe the debris to see how the fire started.

"But it looks like we're going to have to eat it," he said. "I hope the company cooperates and at least speculates on a cause."

Wayne Ostermiller, director of manufacturing for the company, said Sunday that company officials had not determined the cause of the fire and would be meeting with insurance agents Monday. He could not be reached later in the day for further comment on O'Neil's concerns about the company's actions.

O'Neil said he and his firefighters, all volunteers who earned $1.50 for fighting the fire, were "stuck between a rock and a hard place."

"We had no choice but to respond," he explained. "If the wind had been blowing in a different direction, it could have been worse for the company. The fire and smoke would have been carried into the main section of the plant. And we had to watch out for the people in our district."

An estimated 500 50-gallon drums and 16,000 bags of chemicals were destroyed in the blaze, sending plumes of fire and fumes high into the air. Chemicals involved were benzaldehyde, benzoic acid and phenol, used for industrial purposes ranging from plywood resin application to food preservation. Officials had said phenol was the most dangerous.

It was reported Saturday that some firefighters had felt a burning sensation on their faces while fighting the fire.

O'Neil said Sunday that all of his men had headaches, but he did not know if it was the result of fatigue or from exposure to the chemicals.

"I plan to contact officials and the local hospital to see what they can tell me," he said. "And I plan to submit a bill to the company. We used taxpayers' money to fight this . . ."

He said the bill could be about $5,000, but he would not know for certain until he added up truck time.

THE OREGONIAN, FRIDAY, MAY 30, 1980

Rotten-egg odor proves smell of death in small Illinois town

By WAYNE SLATER

DEPUE, Ill. (AP) — The air smelled like rotten eggs the morning Josephine Huerta died.

Always before, dawn broke and the sky cleared and a brisk wind blew, and the odor people in DePue sometimes smelled at night would disappear. This time it was different.

A toxic gas had spilled into the sewer system. Fumes had seeped into the basement of the two-story house where Jose and Josephine Huerta lived next to Garcia's pool hall. She went downstairs to investigate; her husband followed.

"I was waiting for Millie to open up for coffee when Ricky Huerta comes running across the street all freaked out about his parents," said Mike Torri, a spindly young garage mechanic.

"The smell in the basement was so bad I couldn't take it for more than a few seconds. Everything started getting blurry. I saw Mrs. Huerta on the floor, kind of hiccuping. It was too late for her."

Firefighters in gas masks and oxygen tanks retrieved her body. Huerta revived after emergency treatment at St. Margaret's, the hospital where his wife worked as the linen lady.

Eight blocks were evacuated near the Mobil Chemical Co. plant, the only industry in town. Schools were closed. State health officials were called.

Mobil Chemical admits that on the morning of May 15 about 1,000 gallons of sulfuric acid had gushed into the sewers from a ruptured pipe, forming a billowing cloud of concentrated hydrogen sulfide gas. The coroner's report on the 60-year-old Mrs. Huerta listed cause of death as asphyxiation from toxic gas. But the company refuses to link the death with its spill.

The gas apparently formed when the acid washed over zinc pellets trapped in the sewer system, possibly from New Jersey Zinc Co., the previous plant on the site, the state Environmental Protection Agency said.

"We consider (hydrogen sulfide) one of the most dangerous gases we have to work with," said Jim Kelly of the state EPA. "One hundred parts per million will kill you in eight minutes."

Several investigations are under way, and Mobil Chemical officials have promised to take steps to avoid a repeat of the spill.

DePue, a community of about 2,800 on the Illinos River, is a company town. Until the early 1970s, the company was New Jersey Zinc. Its fertilizer operations often were cited for spewing acid mists that killed grass and blistered paint on cars. Torri said his garage went out of business briefly because cars parked outside were being ruined before he could fix them.

New Jersey Zinc closed. In 1972, Mobil Chemical took over the low cluster of stone and iron buildings in the center of town.

Mobil Chemical makes fertilizer, too, by producing sulfuric acid, cooling it, then combining it with chemical phosphate. It is dirty and it is dangerous, and it employs 120 people.

Mayor Jack Pirog said Mobil Chemical is the lifeblood of the town.

"Sure there's some concern, but nobody's beating on my door saying we should shut the plant down," he said. "And I wouldn't go along with that anyway. The only thing I'll go along with is that they never put acid in our sewers again."

Mobil Chemical has had other spills. In 1974, sulfuric acid leaking into a cooling water system made its way into a lagoon on Lake DePue, a backwater of the Illinois River, and killed hundreds of fish.

A resident who requested anonymity reported seeing Lake DePue turn from muddy brown to murky gray, then blue, then green. He said he saw a flock of migrating geese stop to drink. Many flew off but others died, their bodies left bobbing like buoys on the water.

The state assessed Mobil Chemical $7,500 to repair the damage.

Most residents won't even talk about the plant.

"Everybody knows things happen, but nobody is going to say anything when their livelihood is at stake," Torri said. He started to say something else but stopped. "Look," he said, smiling, "I've got a business here, too."

The Huertas came to DePue from Texas looking for work about 10 years ago. He found a job at the Motor Wheel Corp. in Mendota. She distributed the hospital linen each morning in nearby Spring Valley.

"We called her Josie. She always had a smile and something happy to say," her supervisor, Carla Holdcraft said. "We called on her to help out interpreting for nurses who didn't speak Spanish. She would tell what was wrong with a patient, where it hurt, what a patient wanted."

Associated Press Laserphoto

DEADLY MUSHROOM — Cloud hangs over Drexel Chemical Co. plant in Memphis, Tenn., Thursday as fire sweeps through pesticide plant. Toxic cloud forced evacuation of plant area and closing of Mississippi River traffic.

Chemical plant blaze injures 58 in Memphis

MEMPHIS, Tenn. (AP) — A mushroom cloud of toxic pesticide erupted from a burning chemical plant Thursday, forcing at least 2,000 residents from their homes and closing Mississippi River traffic.

At least 58 persons were injured — including three plant workers who suffered serious burns, officials said.

Firefighters dodged exploding 55-gallon chemical drums and battled heat and poisonous fumes for more than three hours before the fire at the Drexel Chemical Co. was brought under control.

At the height of the fire, police and fire dispatchers broadcast warnings that the smoke cloud contained nerve gas, and police, firefighters and reporters at the scene were warned to stay out of the smoke. The Coast Guard blocked river traffic on the nearby Mississippi for a time as the chemical cloud moved westward.

Thirty-three persons were treated for possible chemical poisoning, but none was admitted, a hospital spokeswoman said. Another 25 persons were treated for burns or smoke inhalation, including the three plant workers and six firefighters. The firefighters' injuries were not considered serious, officials said.

Drexel President Robert Shockey said damage to his company could reach $4 million, and they might lose as much as $8 million in sales.

About 30 employees were in the Drexel plant in southwest Memphis when an 8,000-gallon tank of methyl parathion exploded. Parathion affects the central nervous system and is considered extremely dangerous.

"It was like a dull boom and I saw the doors of the warehouse coming off," said Robert Belden, a plant employee. "Then it knocked me down...."

When the first firefighters arrived, about half the 60,000-square-foot plant was in flames. Firefighters, wearing air masks, could do little more than aim their deluge guns — water cannons — and move back as the fire roared through the plant.

A mushroom-shaped cloud on a fiery base rose more than 1,000 feet into the sky. Exploding chemical barrels whistled through the air, occasionally slamming into a piece of firefighting equipment.

As the firefighters worked, Civil Defense officials issued the first of several evacuation orders which eventually covered a five-square-mile area.

Police helicopters hovered over the area, broadcasting the evacuation order and urging people to flee from the chemical cloud. Later, some residents returned to their homes after being advised it was safe to do so, but others were advised to stay away.

Drexel uses the parathion to make an organic phosphate-based pesticide.

"This material is very toxic," said Carroll Southards, head of the University of Tennessee agricultural biology department in Knoxville. "It is one of the most potent pesticides we have.... It is extremely poisonous."

Dr. George Wood, a toxicologist at the university's Center for Health Sciences in Memphis, said the chemical could get into the body either through inhalation or contact with the skin.

Oregonian 9-24-80 p.E26

Associated Press Laserphoto

FIERY FUMES — Fire rages in a rubber plant at Hamilton Township, N.J., Tuesday, sending billowing clouds of cyanide fumes into the air. Authorities evacuated more than 100 residents.

Residents flee factory fire, fumes of hydrogen cyanide

HAMILTON TOWNSHIP, N.J. (AP) — More than 100 people were evacuated Tuesday as a fire raging through a rubber products plant spread potentially lethal hydrogen cyanide fumes and billowing clouds of dense smoke.

Mayor Jack Rafferty declared an emergency and ordered the evacuation of an eight-block area surrounding the Acme-Hailton Rubber Co. plant.

"It wasn't a set fire. It appears to be accidental," said Chief William Kiernan of the Enterprise Fire Co. "Workers were cutting steel inside the building."

A total of 128 people were temporarily sheltered at Grice and Reynolds Junior High schools, about five miles from the scene, civil defense officials said.

About 1,500 people live in the evacuated area, said Arthur Julian, township business administrator, but it was not known how many were displaced. Police reported some people prematurely returned to their neighborhoods.

Emergency officials reported eight injuries during the fire, all of them relatively minor. Also, two bedridden invalids were removed from houses in the area. One was later hospitalized after suffering an asthma attack.

Except for the workmen, the huge plant was unoccupied, said police Sgt. Robert Diletto.

THE SUNDAY OREGONIAN, DECEMBER 16, 1979

Blasts rip oil refinery; 5,000 people evacuated

By KATHY HORAK

TAYLOR, Mich. (AP) — A 1.2 million-gallon gasoline storage tank was rocked by several explosions at an oil refinery in this Detroit suburb Saturday, forcing the evacuation of about 5,000 people as flames licked a nearby trailer park.

Looters began entering houses immediately after the residents were forced to flee during the early morning hours.

"They were breaking into homes, trailers and garages and taking anything they could get out," said Trooper David Maliscewski of the Michigan State Police.

Six people were taken into custody, and three of them were held pending the filing of formal charges by prosecutors later, police said.

No serious injuries were reported, but one fireman was overcome by heat.

The first explosion occurred about 3 a.m. in one of five large fuel storage tanks at the Clark Oil refinery. Two other large explosions were noted during the day — one at about 10:30 a.m. and another at about 6:30 p.m.

Saturday evening, Taylor Fire Marshal Ken Lentz said: "They're using the foam about as fast as they can carry it back there. We've put enough foam in there to put 20 of these things out."

After the third explosion, Sgt. Barry Trombly of the state police fire marshal's division, said, "We're back to square one."

He added that it appeared that the blaze would continue to burn through the night. It was not known when the evacuees would be allowed to return.

After the first blast, flames shot hundreds of feet in the air, and the glow was visible in downtown Detroit, 15 miles away.

"All of the sudden the sky lit up," said Ken Mauck, 16. "I looked like the sun was coming up, so I looked at my watch and it was 2:56."

"I seen it explode," said Judy Allen, one of those forced from their homes. "It looked just like daylight."

"It shook the house," she said of the first explosion. "There were three booms. The first one I thought was just an airplane. The lights went out for a second, but then they came back on."

About 7½ hours later, another explosion rocked the tank as firefighters were spraying water on the remaining tanks — two containing fuel oil and two gasoline — to keep them cooled down. The tanks were 75 to 100 yards apart.

The refinery is separated by railroad tracks from a mobile home park a few hundred yards away. Three house trailers went up in flames, and two of them were gutted.

Officials said the storage tank exploded the first time while a tanker was filling up with fuel. The second blast occurred when a safety valve at the base of the tank broke off as firefighters were trying to close it.

Fire Chief Russell McNamee said the exact cause of the initial blast had not been determined.

But Kenneth Baum, a fire deparment engineer, said the storage tank that exploded was overfilled and "there was gas around the bottom and a vapor cloud spread across the (railroad) tracks to a trailer court."

"It could have been the pilot on a hot-water tank in the court that started the fire and it came right back to the tank," Baum said.

McNamee said firefighters would allow the fire to burn itself out unless the top collapsed, which would allow them to spray foam on it.

"These are once-in-a-lifetime fires," he said as flames reached the crown of the charred tank. "The fire depends on whether there are any new leaks or high winds."

Within five minutes after the first explosion, police drove through the streets with loudspeakers telling residents to leave their valuables and get out of the homes at once. Residents were told to evacuate to about four community schools and centers.

Evacuees, many with pets in tow, were taken to a high school, junior high school, community center and a restaurant.

A volunteer firemen, Ronald Baum, 30, said he was awakened by the blast and he arrived at the scene in about 20 minutes. "The fire was so intense it backed us off at first," he said.

"It got so hot that it burst the water hoses and melted some of them," Baum said.

Associated Press Laserphoto

BATTLE BLAZE — Firefighters pour water on burning gasoline tank in a suburb of Detroit early Saturday. Shortly after picture was taken a second explosion in the tank rocked the area.

END 5-82

Worn pipeline blamed in blast

LONG BEACH, Calif. (AP) — A rupture in a thin-skinned section of buried pipeline was blamed Tuesday for releasing a stream of blazing napthalene through a residential neighborhood Monday, injuring four people and destroying nine homes.

The conflagration caused an estimated $600,000 damage. Firefighters said they didn't know what ignited the napthalene, a substance that is usually distilled into products such as cleaning solvent and lighter fluid.

The wall of a 10-inch-diameter pipe owned by Four Corners Pipeline Co. had worn at the site of the rupture from five-eighths of an inch thickness to only one-sixteenth of an inch, said Fire Department spokesman Allan Maranto.

Napthalene moved through the pipe at a standard pressure of 800 pounds per square inch and may have simply worn it down, he said.

The fireball that erupted Monday evening left a gaping 5-foot hole in the pavement. Flames leaped 100 feet into the air, and oily smoke poured over the area.

Firefighters sprayed 6 feet of foam in their 2½-hour battle to control the fire, which reignited each time embers touched the napthalene.

Two firefighters were treated at the scene for smoke inhalation and minor burns. A neighborhood resident, Richard Nieto, was hospitalized in fair condition Tuesday with burns on his hands, face and feet.

Another resident, Robert Davis, suffered third-degree burns on 40 percent of his body and was hospitalized in critical but stable condition. Davis had just come home from work Monday about 6:30 p.m. when the pipe burst, said Bennie Davis, his brother.

"So he started going door to door warning the neighbors to get out because it might explode. Before he got down to the end of the block, it exploded and caught him on fire," his brother said.

"It was like a nightmare," said Georgia Moore, who lost her home. "We looked out the door and all we could see was fire. So I told my children, 'Let's get out of the house.' "

Along with nine destroyed homes, four other homes were heavily damaged by the flames. Six cars were burned, and fire blistered the paint on two fire engines.

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Associated Press Laserphoto

HOT FIRE — Firefighters retreat from intense heat of fire that destroyed several homes after a napthalene pipeline exploded Monday night in a residential area of Long Beach, Calif.