REGIONAL ALL HAZARD MITIGATION MASTER PLAN FOR BENTON, LANE, AND LINN COUNTIES

PHASE THREE

Prepared for:

Benton, Lane, and Linn Counties

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EXECUTIVE SUMMARY

Overview

For mitigation planning purposes, hazardous materials may be defined simply as materials that may have negative impacts on human health. That is, exposure to hazardous materials may result in injury, sickness or death. Hazardous materials are widely used in many industries as well as in commercial, public and residential buildings. The term "toxic" which is widely used to describe hazardous materials is simply a synonym for the more common terms "poison" or "poisonous."

For mitigation planning, small quantities of slightly or moderately hazardous materials being used by end users are rarely the focus of interest. Rather, mitigation planning is focused primarily on the larger quantities of hazardous materials in industrial use and on hazardous materials being transported, where the potential for accidental spills or releases is high. Hazardous materials designated as Extremely Hazardous Substances are of particular interest for mitigation planning.

Hazardous materials vary dramatically in their degree of toxicity to humans. The impact of a hazardous material release incident on an affected community depends on several factors including:

a) the toxicity of the hazardous material,
b) the quantity of the hazardous material released,
c) the dispersal characteristics of the hazardous material,
d) the local conditions such as wind direction and topography, and
e) the efficacy of response and recovery actions.

Summary

Chapter 1 provides an introduction, or primer, about hazardous materials. This chapter includes definitions of common terms, reviews commonly used classification schemes, reviews response protocols for hazardous materials incidents, and briefly summaries the key regulations governing reporting of hazardous material inventories. Chapter 1 also provides a brief summary of the most common mitigation measures to reduce the potential impacts of hazardous material incidents, including: physical safety measures, standard operating procedures, and mitigation and emergency response training.

Chapter 2 provides an overview of hazardous materials inventories in Benton, Lane and Linn counties at fixed sites such as industrial facilities. This inventory synopsis draws primarily on the Office of State Fire Marshall's Hazardous Substance Inventory System (HSIS) database. The HSIS database lists nearly 7,000 locations in the three county areas that contain one or more hazardous materials.

Chapter 3 provides inventory data and risk assessments for several example sites in each county that generally contain large quantities of extremely hazardous substances.

Chapters 4, 5, and 6 provide commodity flow assessments for hazardous materials in transit by road, rail, and pipeline, respectively. Data from many sources are provided as guidance for emergency planners and hazardous material incident responders on the types and quantities of hazardous materials being transported within or through the three counties.

Chapter 7 provides a brief summary of suggestions and recommendations. To reduce the potential impacts of hazardous materials incidents on affected communities there are two cornerstones of pre-incident actions:

1) Specific inventory awareness of the types, quantities and locations of hazardous materials posing a significant life safety threat to a community, including appropriate response protocols, and

2) Mitigation actions to reduce the probability (frequency) or severity of hazardous material incidents.

The Appendix contains comprehensive listings for the three county areas for all locations with hazardous materials subject to special reporting requirements, including Extremely Hazardous Substances and others.

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1.0 Hazardous Materials: A Primer

1.1 Introduction

For mitigation planning, hazardous materials may be defined simply as any materials that may have negative impacts on human health. That is, exposure to hazardous materials may result in injury, sickness, or death. The impacts of hazardous materials may be short-term with negative effects immediately or in a few seconds, minutes or hours or long-term with negative effects in days, weeks, or in some cases years after exposure.

Hazardous materials vary widely in their toxicity to humans. Some hazardous materials are highly toxic so that even brief exposures to small amounts may be dangerous or even fatal. Other hazardous materials are much less toxic and negative effects may occur only after exposure to large amounts over longer time periods. The technical term "toxic," which is widely used to describe hazardous materials, is simply a synonym for the more common terms "poison" or "poisonous."

Hazardous chemicals are widely used in heavy industry, manufacturing, agriculture, mining, the oil and gas industry, forestry, and transportation as well as in medical facilities and commercial, public, and residential buildings. There are literally hundreds of thousands of chemicals that may be hazardous to human health, at least to some extent. A typical single family home may contain dozens of potentially hazardous materials including fuels, paints, solvents, cleaning chemicals, pesticides, herbicides, medicines and others.

However, for mitigation planning, purposes, small quantities of slightly or moderately hazardous materials being used by end users are rarely the focus of interest. Rather, interest is focused primarily on larger quantities of hazardous materials in industrial use and on hazardous materials being transported, where the potential for accidental spills is high. Situations involving extremely hazardous materials or large quantities of hazardous materials in locations where accidents may result in significant public health risk are of special concern for planning purposes.

For mitigation planning purposes, the toxicity of particular hazardous materials is an important measure of the potential impact of hazardous materials on affected communities, but not the only important measure. Other characteristics of hazardous materials, especially the quantity of material and the ease of dispersal of the material may be as important, or more important than toxicity, in governing the level of potential threat to a community. For example, a small quantity of a very toxic solid hazardous material in a research laboratory may pose a much smaller level of risk for a community than a large quantity of a less toxic gaseous material in an industrial site upwind from a populated area.

The severity of any hazardous material release incident for an affected community depends on several factors, including:

a) the toxicity of the hazardous material,
b) the quantity of the hazardous material released,
c) the dispersal characteristics of the hazardous material,
d) the local conditions such as wind direction and topography, and
e) the efficacy of response and recovery actions.

1.2 Effects of Hazardous Materials on Humans

There are three principal modes of human exposure to hazardous materials:

a) Inhalation of gaseous or particulate materials via the respiratory (breathing) process,
b) Ingestion of hazardous materials via contaminated food or water, and
c) Direct contact with skin or eyes.

Exposure to hazardous materials can result in a wide range of negative health effects on humans. Hazardous materials are generally classified by their health effects. The most common classes of hazardous materials are summarized below.

Flammable materials are substances where fire is the primary threat, although explosions and chemical effects listed below may also occur. Common examples include gasoline, diesel fuel, and propane.

Explosives are materials where explosion is the primary threat, although fires and chemical effects listed below may also occur. Common examples include dynamite and other explosives used in construction or demolition.

Irritants are substances that cause inflammation or chemical burns of the eyes, nose, throat, lungs, skin or other tissues of the body in which they come in contact. Examples of irritants are strong acids such as sulfuric or nitric acid.

Asphyxiants are substances that interfere with breathing. Simple asphyxiants cause injury or death by displacing the oxygen necessary for life. Nitrogen is a good example. Nitrogen is a normally harmless gas that constitutes about 78% of the atmosphere. However, nitrogen release in a confined space may result in asphyxiation by displacing oxygen. Chemical asphyxiants are substances that prevent the body from using oxygen or otherwise interfere with the breathing process. Common examples are carbon monoxide and cyanides.

Anesthetics and Narcotics are substances with act on the body by depressing the central nervous system. Symptoms include drowsiness, weakness, fatigue, and incoordination, which may lead to unconsciousness, paralysis or the respiratory system and death. Examples include numerous hydrocarbon and organic compounds.

Hazardous materials may also have a wide variety of more specialized impacts on human health. Other types of toxic effects are briefly summarized in Table 1.1.

Table 1.1
Other Types of Hazardous Materials

Type of Hazardous Material	Effects on Humans
Hepatotoxin	Liver damage
Nephrotoxin	Kidney damage
Neurotoxin	Neurological (nerve) damage
Carcinogen	May result in cancer
Mutagen	May produce changes in the genetic material of cells
Teratogen	May have adverse affects on sperm, ova, or fetal tissue
Radioactive materials	May result directly in radiation sickness at high exposure levels or act as carcinogen, mutagen, or teratogen
Infectious substances	Biological materials such as bacteria or viruses that may cause illness or death

Much of the information above was summarized from Chapter Six of the **Handbook of Chemical Hazard Analysis Procedures**[1]. The first few chapters of this handbook contain a concise summary of many of the technical aspects of hazardous materials. These chapters may be useful to readers seeking a more technical introduction to the nomenclature and science of hazardous materials.

1.3 Classification System for Hazardous Materials

A standardized system is used to classify and identify hazardous materials. The **2000 Emergency Response Guidebook** (A Guidebook for First Responders During the Initial Phase of a Dangerous Goods/Hazardous Material Incident)[2] outlines the classification system shown below in Table 1.2.

The **2000 Emergency Response Guidebook** is an extremely useful reference book that provides standardized first response protocols and detailed reference sheets for the most common classes of hazardous materials. The **2000 Emergency Response Guidebook** also as more detailed information about hazardous material labeling including standardized ID numbers, chemical names, and shipping document requirements for many hazardous materials.

For mitigation planning purposes, the key information in the **2000 Emergency Response Guidebook** includes:

a) the four-digit ID number for each material,
b) the chemical name(s) for each material, and
c) the three-digit guide number for the class of material corresponding to the specific chemical.

The guide numbers for each class of material are essential for planning as well as for response and recovery actions. The specific technical and operational guidance about the level of hazard and appropriate response procedures is given by guide number for each class of material, rather than by each individual hazardous material.

Table 1.2
Hazard Classification System[2]

Class 1	**Explosives**	
	Division 1.1	Explosives with a mass explosion hazard
	Division 1.2	Explosives with a projection hazard
	Division 1.3	Explosives with predominantly a fire hazard
	Division 1.4	Explosives with no significant blast hazard
	Division 1.5	Very insensitive explosives; blasting agents
	Division 1.6	Extremely insensitive explosives; detonating articles
Class 2	**Gases**	
	Division 2.1	Flammable gases
	Division 2.2	Non-flammable, non-toxic compressed gases
	Division 2.3	Gases toxic by inhalation
	Division 2.4	Corrosive gases (Canada)
Class 3	**Flammable liquids (and Combustible liquids (U.S.))**	
Class 4	**Flammable solids; Spontaneously combustible materials, and**	
	Division 4.1	Flammable solids
	Division 4.2	Spontaneously combustible materials
	Division 4.3	Dangerous when wet materials
Class 5	**Oxidizers and Organic peroxides**	
	Division 5.1	Oxidizers
	Division 5.2	Organic peroxides
Class 6	**Toxic Materials and Infectious substances**	
	Division 6.1	Toxic materials
	Division 6.2	Infectious substances
Class 7	**Radioactive materials**	
Class 8	**Corrosive Materials**	
Class 9	**Miscellaneous dangerous goods**	

[2]2000 Emergency Response Handbook

1.4 Emergency Response for Hazardous Material Incidents

1.4.1 Overview

Hazardous material releases are predominantly accidental results of traffic accidents, equipment failures or human errors. In rare cases, hazardous material releases may result from deliberate actions of sabotage or terrorism.

First responders for hazardous material incidents are generally public safety personnel (police or fire). The standard protocols for first responders are briefly summarized below, following guidance in the **2000 Emergency Response Guidebook**.

The primary guidance for first responders is to:

a) resist rushing in,
b) approach the incident site from upwind, uphill or upstream, and
c) stay clear of all spills, vapors, fumes and smoke.

Upon approaching the incident site, a three-step procedure is recommended:

a) identify the material,
b) find the materials three digit guide number, and
c) read the numbered guide carefully and respond accordingly.

Identification of hazardous materials is by finding any one of the following:

a) the four-digit ID number on a placard or orange panel,
b) the four-digit ID number on a shipping document or package, or
c) the name of the material on a placard, shipping document or package.

Once identified by ID number or name, the material's three-digit guide number is looked up in either the ID number index or the name index. Then, the procedures and precautions outlined in the guide for the identified class of material are carefully followed. For each class of material, the guides have critical information on potential hazards, suggested evacuation distances for small and large spills, and recommended emergency response actions, including first aid. For further technical details see the **2000 Emergency Response Guidebook**.

1.4.2 Oregon: Response Teams and Protocols for Hazardous Material Incidents

In Oregon, the Office of State Fire Marshal has defined standard response protocols for hazardous materials incidents in a series of Standard Operating Guidelines.[3] This series of about a dozen standard operating guidelines covers every main aspect of emergency response and recovery, including decisions to respond, levels of response, general response guidelines, mitigation methods, decontamination procedures, personal protective equipment, and others.

In Oregon, there is a three-level response plan for hazardous material incidents involving first responders and specialized emergency response teams.

First responders are local staff, generally public safety staff (police and fire) that are trained in basic procedures for the initial (first) response to hazardous materials incidents. The responsibilities of first responders including securing the incident scene and making a preliminary assessment of the potential severity of the hazardous material incident and the level of threat, if any, to persons at and outside of the immediate incident area.

Emergency response teams are specialized teams, composed primarily of public safety staff, with higher-level training and more specialized equipment for dealing with hazardous materials incidents than first responders. In Oregon, there are fourteen emergency response teams, each with a defined geographic area of primary responsibility. Statewide, these emergency response teams respond to about 350 hazardous material incidents per year, or about one per day, on average (Standard Operating Guidelines, Team Background[3]). For the three county areas, the two emergency response teams with primary responsibility are the HM02 Eugene team with responsibility for Lane County and the HM05 Linn/Benton team with responsibility for Linn, Benton, and Lincoln Counties.

The three-level response plan for hazardous materials incidents is characterized as Level I Response, Level II Response and Level III response. The distinction between Levels I, II, and III depends on:

a) class of hazardous material
b) size of container
c) fire/explosion potential
d) leak severity and container integrity, and
e) threat to life safety.

Level I Responses are those incidents readily controlled or stabilized by first responders. The HazMat Emergency Response Team personnel may provide technical assistance via telephone or on-site assistance, but full response by an Emergency Response Team is not required.

Level II Responses are those incidents that require response from a HazMat Emergency Response Team for control or stabilization of the spill. The Emergency Response Team response level may be 2-4 personnel for identification of the material and guidance on appropriate response actions or the response level may be a small team response of 6-8 personnel.

Level III Responses are those incidents that require special resources, including one or more full Emergency Response Teams and possibly other outside agencies for support.

Further technical details of the Level I, II, and III responses are given in the Standard Operating Guidelines, Levels of Response to Hazardous Materials Incidents, T-003.[3] A very useful glossary of technical terms used for hazardous materials incidents is given in the Glossary of Terms (Standard Operating Guidelines, Glossary of Terms, SOG-T002.[3])

1.5 Statutory and Regulatory Context

The manufacture, storage, use, transportation, and disposal of hazardous materials are subject to a myriad of federal, state, and local regulations. In the present context of mitigation planning and emergency response, we focus narrowly on reporting requirements for chemicals subject to mandatory risk management planning and extremely hazardous substances subject to additional reporting and planning requirements.

1.5.1 Section 112(r) Chemicals

Section 112(r) of the Clean Air Act Amendments was designed to prevent accidental releases of hazardous substances. The paragraph below, quoted from the Office of State Fire Marshal, Hazardous Substance Information System (HSIS)[4], summarizes the intent of this section and the regulatory requirements.

"On January 31, 194, Environmental Protection Agency (EPA) promulgated a final rule under provisions of the Clean Air Act (CAA) Amendments s.112(r) for the prevention of accidental releases of hazardous substances. The rule establishes a list of chemicals and threshold quantities that identify facilities subject to subsequent accident prevention regulations. The listed substances have the greatest potential to pose the greatest hazard to public health and the environment in the event of an accidental release. On April 15, 1996 EPA proposed several amendments to the final rule. This list constitutes the first of two necessary elements for the prevention of chemical accidents under EPA's CAA mandate. The second element is the requirement for risk management planning. A facility that handles more than a threshold quantity of a listed substance in a process is subject to the risk management planning requirements of CAA Section 112(r)."[4]

The full list of Section 112(r) chemicals, including planning threshold quantities (TPQ) is given in Appendix 1, Table A1.1.

1.5.2 Toxics Release Inventory

Hazardous materials may be released to the environment either routinely during manufacturing and other ongoing processes or accidentally. Certain types of businesses are required to report such releases annually for a specified list of chemicals. The paragraph below, quoted from the Office of State Fire Marshal, Hazardous Substance Information System (HSIS)[4], summarizes the intent and content of the regulatory requirements for substances covered under the Toxic Release Inventory regulations.

"The Toxics Release Inventory (TRI) Program was established by section 113 of the Emergency Planning and Community Right to Know Act (EPCRA) of 1986. Under this program certain businesses are required to submit reports each year on the amounts of toxic chemicals their facilities release into the environment, either routinely or as a result of accidents. Following the passage of the Pollution Prevention Act of 1990, the TRI was expanded to include reporting of additional waste management and pollution prevention activities. The purpose of this reporting requirement is to inform government officials and the public about releases of toxic chemicals into the environment. Section 313 requires facilities to report releases to air, water, and land. The reports must be sent to the United States Environmental Protection Agency (EPA) and to designated state agencies. Reports are due by July 1 each year."[4]

1.5.3 Extremely Hazardous Substances

There are additional reporting and planning requirements for materials deemed to be extremely hazardous. The paragraphs below, quoted from the Office of State Fire Marshal, Hazardous Substance Information System (HSIS)[4], summarize the intent and content of the regulatory requirements for extremely hazardous materials.

"SARA Title III, section 302 requires owners and operators to notify the State Emergency Response Commission (SERC) regarding the presence of Extremely Hazardous Substances (EHS) at their facilities. Section 303 requires facilities that possess a threshold planning quantity (TPQ) of an EHS to develop a contingency plan in case of an accidental release, and assist emergency planners and emergency response organizations in developing a plan to protect the community from possible injury from a release of dangerous chemicals."

"Included in an emergency plan is a description of the facilities that possess EHS within a district and the transportation routes along which these chemicals may move within a district. Also the identification of additional facilities that may contribute or be subjected to additional risk due to the proximity to facilities subject to these planning requirements. Included are methods and procedures to be followed by facility owners and operators and local emergency medical personnel to respond to a release of EHS. Designate a community emergency coordinator and facility emergency coordinator, who shall make determinations necessary to implement the plan. Include procedures for providing reliable, effective, and timely notification by the facility emergency coordinators and the community emergency coordinator to persons designated in the emergency plan, and the public, that a release has occurred. Include methods for determining that a release of EHS has occurred, and the area of population likely to be affected by such release. Describe methods in place in the community and in each of the affected facilities for determining the areas likely to be affected by a release. Include a description of emergency equipment and facilities in the community and at each facility in the community subject to the requirements of this subtitle and an identification of the persons responsible for such equipment and facilities. Describe evacuation plans, including those for precautionary evacuations and alternative routes. Include the training programs, including schedules, for training of local emergency response and medical people. Include methods and schedules for exercising the emergency plan."

The full list of substances designated as Extremely Hazardous Substances (EHS) is given in Appendix 1 as Table A1.3.

1.6 Mitigation Measures for Hazardous Materials

The most common mitigation measures for reducing the potential of damaging hazardous materials incidents are briefly summarized in this section.

1.6.1 Physical Safety Measures

The tanks, other storage containers and transfer systems (valves, pipes etc.) for hazardous materials are frequently subject to damage in earthquakes, with a correspondingly high potential for accidental releases. Proper seismic design, bracing and anchoring of storage systems for hazardous materials can greatly reduce the potential of accidental releases during earthquakes. Bracing and anchoring measures for storage containers and transfer systems (e.g., piping) are often relatively inexpensive, with a large improvement in seismic performance. For small quantities of materials stored in bottles or jugs on shelving, bracing shelving and restraining containers so that they do not fall in earthquakes are particularly important.

Over time, the storage containers and other material handling elements for hazardous materials may be changed many times. In some cases, later modifications may not be designed to the same seismic standards as the original installation or later modifications may compromise the seismic stability of the original installation. Therefore, periodic review and inspections of seismic design, bracing and anchoring are highly recommended for all hazardous material facilities.

For facilities located in mapped flood plains or other areas subject to floodwaters there are two important physical safety measures. First, any containers subject to floating should be properly restrained. In many floods, improperly restrained tanks break free and float downstream, with high potential for negative impacts, including fires from tanks containing flammable materials as well as accidental releases of hazardous materials. Second, special precautions should be taken with water-reactive materials. Such materials should never be stored in low-elevation areas subject to flooding or in locations subject to water from storm water drainage or plumbing failures in a facility.

1.6.2 Standard Operating Procedures

Standard operating procedures for storing, transporting, and handling hazardous materials should be strictly enforced at all facilities. Appropriate training for all staff, with review courses and appropriate protective gear are essential for safety. Rigorous inspection and enforcement of hazardous materials regulations (federal, state, and local) are an important part of the overall process of ensuring safety.

1.6.3 Mitigation and Emergency Response Planning

Effective pre-event mitigation planning and emergency response planning can help reduce the severity of hazardous material incidents. From the mitigation planning perspective, specific inventory awareness of the types and quantities of hazardous materials present at each facility is particular important. Local fire departments and other responders should be thoroughly familiar with the specific inventory at each facility containing hazardous materials and with the appropriate response protocols for each hazardous material. First responders and emergency response teams must both have the full range of protective gear and equipment necessary for their respective roles in responding to hazardous materials incidents.

Emergency response planning should include thorough training in all aspects of hazardous materials response, including appropriate response protocols (procedures, protective gear and equipment). Frequent refresher training and frequent exercises (both tabletop and full field exercises) are essential for safe and effective emergency response. Training exercise should include both first responders and emergency response teams, to help ensure appropriate coordination of efforts during actual hazardous materials incidents.

2.0 Fixed Site Hazardous Materials Locations in Benton, Lane, and Linn Counties

2.1 Office of State Fire Marshal Hazardous Substance Information System (HSIS)

The Oregon Office of State Fire Marshal maintains a comprehensive listing of hazardous materials locations in Oregon[4]. This database contains extensive data on the types and quantities of hazardous materials located at thousands of sites throughout Oregon.

For the three county areas a summary of this Hazardous Substance Information System (HSIS) is given below in Table 2.1.

Table 2.1
Summary of Hazardous Substance Information System (HSIS) Data
For Benton, Lane, and Linn Counties

		Sites with:			
County	**Total Reports**	**Reportable Quantities**	**112(r)[1] Chemicals**	**313 (TRI)[2] Chemicals**	**EHS[3] Chemicals**
Benton	964	408	225	105	37
Lane	4474	1773	1048	450	157
Linn	1558	739	484	251	117
Totals	6996	2920	1757	806	311

[1] Chemicals reportable under Section 112(r)
[2] Chemicals reportable under Section 313,Toxics Release Inventory
[3] Extremely hazardous substances

For the three county areas, the HSIS database has hazardous materials reports for nearly 7000 companies and other entities such as cities and universities that have hazardous materials. Of the 6996 report locations, 2920, or nearly 42%, have reportable quantities of hazardous materials. The other 58% of these sites do not have reportable quantities of hazardous materials.

As shown in Table 2.1, the three counties also have 1757 sites with Section 112(r) chemicals, 806 sites with Section 313 Toxics Release Inventory chemicals, and 311 sites with Extremely Hazardous Substances.

The vast amount of hazardous materials data in the HSIS database (Microsoft Access) is searchable and sortable in many ways. For example, HSIS has data sheets for over 44,500 hazardous chemicals. Data sheets for each location with hazardous materials include facility information, contact person, lists and quantities of materials and other useful information.

The hazardous materials data reports can be looked up by company name or by ID number and sorted by county, city, street name, zip code, or fire department. Hazardous materials classified under Section 112(r), Section 313 Toxics Release Inventory, or Extremely Hazardous Substances are each sortable separately by city or county. The database can also be sorted by chemical, identifying all locations in a city or county that have a specified hazardous material on site.

All of the data tables in HSIS can be printed from HSIS or exported in Word Format for additional formatting or printing. If desired, data tables in Word table format can also be exported into Excel for additional formatting, sorting, etc.

Printing summaries of the nearly 7,000 locations in the three county areas shown in Table 2.1 along with the summaries of the Section 112(r), Section 313 (TRI), and Extremely Hazardous Substances (EHS) subsets of the database would require over 300 pages. Such a printout is neither practical nor desired, since any needed tables can be viewed or printed directly from the HSIS database.

However, for mitigation planning purposes, Extremely Hazardous Substances are of special concern and are thus discussed in more detail in the following section.

2.2 Sites with Extremely Hazardous Substances (EHS) in Benton, Lane and Linn Counties

As summarized above in Table 2.1, the HSIS database has detailed information on locations that contain hazardous materials and there are 311 locations in the three county areas with Extremely Hazardous Substances (EHS). These locations are summarized in Table 2.2, 2.3, and 2.4 below for Benton, Lane and Linn Counties, respectively.

Table 2.2
Benton County Locations with Extremely Hazardous Substances

County	ID No.	Company Name	Address	City	Chemical Trade Name	Maximum Amount	Units	Most Hazardous Ingredient
Benton	017808	ADAIR VILLAGE CITY OF	5011 NW HWY 20	ALBANY	CHLORINE	1,000-4,999	POUNDS	CHLORINE
Benton	017808	ADAIR VILLAGE CITY OF	5011 NW HWY 20	ALBANY	PRAESTOL 2515 TR	50-199	POUNDS	ACRYLAMIDE COPOLYMER
Benton	017806	FIR VIEW WATER COMPANY	4175 N RIDGE CREST AVE	ALBANY	CHLORINE	5-9	GALLONS	CHLORINE
Benton	004768	NATIONAL WOOD TREATING CO	1834 NW OAK GROVE	ALBANY	CHLOROPICRIN	200-499	GALLONS	TRICHLORONITROMETHANE
Benton	018916	BENTON COUNTY ALPINE DISTRICT	ALPINE TREATMT PLT	ALPINE	CHLORINE	20-49	GALLONS	CHLORINE
Benton	005785	ODFW	29050 FISH HATCHERY RD	ALSEA	FORMALDEHYDE	200-499	GALLONS	FORMALDEHYDE
Benton	017807	ADAIR VILLAGE CITY OF	6030 NE CARR AVE	CORVALLIS	CHLORINE	200-499	GALLONS	CHLORINE
Benton	004549	AVI BIOPHARMA INC	4575 SW RESEARCH WY STE 200	CORVALLIS	CHLOROFORM	50-199	GALLONS	CHLOROFORM
Benton	018955	CHATEAU COMMUNITIES PROP	5055 NE ELLIOTT CIR	CORVALLIS	CHLORINE GAS	20-49	GALLONS	CHLORINE
Benton	022386	CORVALLIS CITY OF	645 NW MONROE	CORVALLIS	CHLORINE	20-49	POUNDS	CHLORINE
Benton	019177	EVANITE FIBER CORP	1030 SE CRYSTAL LAKE DR	CORVALLIS	SULFURIC ACID	50-199	GALLONS	SULFURIC ACID
Benton	004769	FOSTER FARMS	855 NW 8TH	CORVALLIS	AMMONIA ANHYDROUS	500-999	GALLONS	AMMONIA
Benton	021272	GOOD SAMARITAN HOSPITAL	3600 NW SAMARITAN DR	CORVALLIS	ETHYLENE OXIDE	5-9	POUNDS	ETHYLENE OXIDE
Benton	005587	HEWLETT PACKARD	1000 NE CIRCLE BLVD	CORVALLIS	HYDROFLUORIC ACID 48.8-49.2%	200-499	GALLONS	HYDROFLUORIC ACID
Benton	005587	HEWLETT PACKARD	1000 NE CIRCLE BLVD	CORVALLIS	HYDROCHLORIC ACID	5,000-9,999	GALLONS	HYDROCHLORIC ACID
Benton	005587	HEWLETT PACKARD	1000 NE CIRCLE BLVD	CORVALLIS	BORON TRICHLORIDE	1,000-4,999	CUBIC FEET	BORON TRICHLORIDE
Benton	005587	HEWLETT PACKARD	1000 NE CIRCLE BLVD	CORVALLIS	SULFURIC ACID 10 TO 55%	200-499	GALLONS	SULFURIC ACID
Benton	005587	HEWLETT PACKARD	1000 NE CIRCLE BLVD	CORVALLIS	SULFURIC ACID	1,000-4,999	GALLONS	SULFURIC ACID
Benton	005587	HEWLETT PACKARD	1000 NE CIRCLE BLVD	CORVALLIS	CHLORINE	50-199	GALLONS	CHLORINE
Benton	005587	HEWLETT PACKARD	1000 NE CIRCLE BLVD	CORVALLIS	AMMONIA ANHYDROUS	50-199	GALLONS	AMMONIA
Benton	020396	MILLER PAINT & WALLPAPER	2811 NW GRANT	CORVALLIS	MURIATIC ACID	5-9	GALLONS	HYDROCHLORIC ACID
Benton	005743	ODFW	7118 NE VANDENBERG AVE	CORVALLIS	FORMALDEHYDE METHANOL	50-199	GALLONS	FORMALDEHYDE
Benton	064943	OSU	2004 SW MONROE ST	CORVALLIS	HYDROGEN CHLORIDE	200-499	CUBIC FEET	HYDROGEN CHLORIDE
Benton	003705	SCHAEFERS RECREATION	1425 NW 9TH	CORVALLIS	HYDROGEN	50-199	GALLONS	HYDROGEN PEROXIDE

		EQUIP CO			PEROXIDE			
Benton	043312	STAHLBUSH ISLAND FARMS INC	3122 STAHLBUSH ISLD RD	CORVALLIS	AMMONIA ANHYDROUS	500-999	GALLONS	AMMONIA
Benton	072809	VALLEY LANDFILLS INC	29000 COFFIN BUTTE RD	CORVALLIS	HYDROCHLORIC ACID	5,000-9,999	GALLONS	HYDROCHLORIC ACID
Benton	004940	WESTERN PULP PRODUCTS CO	5005 SW LOWE ST	CORVALLIS	SULFURIC ACID	1,000-4,999	POUNDS	SULFURIC ACID
Benton	014202	WILLAMETTE GRAYSTONE INC	121 SW MCKENZIE AVE	CORVALLIS	MURIATIC ACID	200-499	GALLONS	HYDROCHLORIC ACID
Benton	017136	WILBUR ELLIS CO	555 DEPOT ST	MONROE	ENDOSULFAN	10-19	GALLONS	ENDOSULFAN
Benton	017136	WILBUR ELLIS CO	555 DEPOT ST	MONROE	ALDICARB	1,000-4,999	POUNDS	O'S-DIMETHYL ACETYLPHOSPHORAMIDO-THIOATE
Benton	017136	WILBUR ELLIS CO	555 DEPOT ST	MONROE	PARAQUAT	50-199	GALLONS	1,1-DIMETHYL-4,4-BI-PYRIDINIUM
Benton	017136	WILBUR ELLIS CO	555 DEPOT ST	MONROE	ETHOPROP-LIQUID	50-199	GALLONS	ETHROPROP
Benton	049953	ATCO AMERICA INC	3200 W HILLS RD	PHILOMATH	AMMONIA ANHYDROUS	200-499	GALLONS	AMMONIA
Benton	017029	CORVALLIS CITY OF	22948 ROCK CREEK RD	PHILOMATH	CHLORINE	50-199	GALLONS	CHLORINE
Benton	017353	PHILOMATH CITY OF	4702 BELLFOUNTAIN RD	PHILOMATH	CHLORINE	50-199	GALLONS	CHLORINE
Benton	017351	PHILOMATH CITY OF	400 S 9TH ST	PHILOMATH	CHLORINE	50-199	GALLONS	CHLORINE
Benton	017352	PHILOMATH CITY OF	400 N 11TH ST	PHILOMATH	CHLORINE	10-19	GALLONS	CHLORINE

Table 2.3
Lane County Locations with Extremely Hazardous Substances

County	ID No.	Company Name	Address	City	Chemical Trade Name	Maximum Amount	Units	Most Hazardous Ingredient
Lane	16666	COTTAGE GROVE CITY OF	1800 N DOUGLAS	COTTAGE GROVE	CHLORINE	200-499	GALLONS	CHLORINE
Lane	17509	COTTAGE GROVE CITY OF	33300 ROW RIVER RD	COTTAGE GROVE	CHLORINE	200-499	GALLONS	CHLORINE
Lane	17508	COTTAGE GROVE CITY OF	MP 1 LAYNG CREEK	COTTAGE GROVE	CHLORINE	200-499	GALLONS	CHLORINE
Lane	5713	KIMWOOD CORP	77684 S HWY 99	COTTAGE GROVE	AMMONIA ANHYDROUS	20-49	GALLONS	AMMONIA
Lane	21216	CRESWELL CITY OF	34276 CLOVERDALE RD	CRESWELL	CHLORINE	1,000-4,999	POUNDS	CHLORINE
Lane	21214	CRESWELL CITY OF	E CAMAS SWALE RD	CRESWELL	CHLORINE	500-999	POUNDS	CHLORINE
Lane	21215	CRESWELL CITY OF	83136 MELTON RD	CRESWELL	CHLORINE	200-499	POUNDS	CHLORINE
Lane	21540	CRESWELL CITY OF	83293 DALE KUNI RD	CRESWELL	CHLORINE	200-499	POUNDS	CHLORINE
Lane	20466	AIRGAS NOR PAC INC	4141 W 11TH AVE	EUGENE	AMMONIA ANHYDROUS	1,000-4,999	POUNDS	AMMONIA
Lane	20466	AIRGAS NOR PAC INC	4141 W 11TH AVE	EUGENE	CHLORINE	1,000-4,999	CUBIC FEET	CHLORINE
Lane	76297	AT&T BIS	76 CENTENNIAL LP # E	EUGENE	SULFURIC ACID	500-999	POUNDS	SULFURIC ACID
Lane	50037	B & B BATTERY CO	1800 W 11TH AVE	EUGENE	SULFURIC ACID	0-4	GALLONS	SULFURIC ACID
Lane	50698	BUCKS SANITARY SERVICE	3980 W 12TH	EUGENE	FORMALDEHYDE 37%	200-499	GALLONS	FORMALDEHYDE
Lane	5378	CASCADE GLACIER ICE CREAM	885 GRANT ST	EUGENE	AMMONIA ANHYDROUS	5,000-9,999	GALLONS	AMMONIA
Lane	4832	CASCADE PLATING/MACHINE	3790 CROSS ST	EUGENE	SULFURIC ACID	50-199	GALLONS	SULFURIC ACID
Lane	1452	CENTRAL PRINT & BLUEPRINT	47 W 5TH	EUGENE	AMMONIA ANHYDROUS	500-999	POUNDS	AMMONIA
Lane	4637	CHIQUITA PROCESSED FOODS	799 FERRY ST	EUGENE	CHLORINE GAS	1,000-4,999	POUNDS	CHLORINE
Lane	29449	EMERALD SWIMMING POOLS	1885 N HWY 99	EUGENE	MURIATIC ACID	200-499	GALLONS	HYDROCHLORIC ACID
Lane	38081	ENGLANDS EUGENE MEMORIAL	202 E 18TH AVE	EUGENE	FORMALDEHYDE	10-19	GALLONS	FORMALDEHYDE
Lane	13422	EUGENE CITY OF	410 RIVER AVE	EUGENE	CHLORINE	10,000-49,999	GALLONS	CHLORINE
Lane	82690	EUGENE CITY OF	2760 HILYARD ST	EUGENE	MURIATIC ACID	50-199	GALLONS	HYDROCHLORIC ACID
Lane	13422	EUGENE CITY OF	410 RIVER AVE	EUGENE	SULFUR DIOXIDE	1,000-4,999	GALLONS	SULFUR DIOXIDE
Lane	33125	EUGENE FREEZING & STORAGE	310 S SENECA RD	EUGENE	AMMONIA ANHYDROUS	1,000-4,999	GALLONS	AMMONIA
Lane	5465	FORREST PAINT COMPANY	1011 W MCKINLEY	EUGENE	RESIN SOLUTION 16	50-199	GALLONS	METHYL AMYL KETONE

Lane	4493	GEORGIA-PACIFIC RESINS INC	2665 HWY 99N	EUGENE	SULFURIC ACID 93%	1,000-4,999	GALLONS	SULFURIC ACID
Lane	4493	GEORGIA-PACIFIC RESINS INC	2665 HWY 99N	EUGENE	FORMALDEHYDE	10,000-49,999	GALLONS	FORMALDEHYDE
Lane	4493	GEORGIA-PACIFIC RESINS INC	2665 HWY 99N	EUGENE	HYDROCHLORIC ACID	200-499	GALLONS	HYDROCHLORIC ACID
Lane	4493	GEORGIA-PACIFIC RESINS INC	2665 HWY 99N	EUGENE	ETHYLENEDIAMINE	50-199	GALLONS	ETHYLENEDIAMINE
Lane	4493	GEORGIA-PACIFIC RESINS INC	2665 HWY 99N	EUGENE	RESIN POLYAMIDE	250,000-499,999	GALLONS	EPICHLOROHYDRIN
Lane	4493	GEORGIA-PACIFIC RESINS INC	2665 HWY 99N	EUGENE	PHENOL	250,000-499,999	GALLONS	PHENOL
Lane	1792	GHEEN IRRIGATION	1248 WILLAGILLESPIE RD	EUGENE	SULFURIC ACID	1,000-4,999	GALLONS	SULFURIC ACID
Lane	33109	GRAIN MILLERS INC	315 MADISON ST	EUGENE	METH-O-GAS	1,000-4,999	POUNDS	METHYL BROMIDE
Lane	65038	HYNIX SEMICONDUCTOR MFG AMER	1830 WILLOW CREEK CIR	EUGENE	HYDROFLUORIC ACID 49%	1,000-4,999	GALLONS	HYDROFLUORIC ACID
Lane	65038	HYNIX SEMICONDUCTOR MFG AMER	1830 WILLOW CREEK CIR	EUGENE	HYDROGEN CHLORIDE	200-499	GALLONS	HYDROGEN CHLORIDE
Lane	65038	HYNIX SEMICONDUCTOR MFG AMER	1830 WILLOW CREEK CIR	EUGENE	AMMONIA ANHYDROUS	50-199	GALLONS	AMMONIA
Lane	65038	HYNIX SEMICONDUCTOR MFG AMER	1830 WILLOW CREEK CIR	EUGENE	NITRIC ACID 70%	1,000-4,999	GALLONS	NITRIC ACID
Lane	65038	HYNIX SEMICONDUCTOR MFG AMER	1830 WILLOW CREEK CIR	EUGENE	SULFURIC ACID 36%	5,000-9,999	GALLONS	SULFURIC ACID
Lane	65038	HYNIX SEMICONDUCTOR MFG AMER	1830 WILLOW CREEK CIR	EUGENE	CHLORINE	1,000-4,999	GALLONS	CHLORINE
Lane	65038	HYNIX SEMICONDUCTOR MFG AMER	1830 WILLOW CREEK CIR	EUGENE	SULFURIC ACID 97%	5,000-9,999	GALLONS	SULFURIC ACID
Lane	65038	HYNIX SEMICONDUCTOR MFG AMER	1830 WILLOW CREEK CIR	EUGENE	BORON TRICHLORIDE	50-199	GALLONS	BORON TRICHLORIDE
Lane	23742	INDUSTRIAL WELDING SUPPLY	4280 W 11TH	EUGENE	AMMONIA ANHYDROUS	200-499	CUBIC FEET	AMMONIA
Lane	2571	J H BAXTER & CO	85 N BAXTER RD	EUGENE	SULFURIC ACID	50-199	GALLONS	SULFURIC ACID
Lane	67709	KING ESTATE WINERY INC	80854 TERRITORIAL RD	EUGENE	SULFUR DIOXIDE	200-499	POUNDS	SULFUR DIOXIDE
Lane	20197	KOMAG INC	3590 W THIRD AVE	EUGENE	SULFURIC ACID	1,000-4,999	GALLONS	SULFURIC ACID
Lane	20197	KOMAG INC	3590 W THIRD AVE	EUGENE	HYDROGEN PEROXIDE	50-199	GALLONS	HYDROGEN PEROXIDE
Lane	20197	KOMAG INC	3590 W THIRD AVE	EUGENE	CHEMCID 2218	50-199	GALLONS	FERRIC SULFATE
Lane	4104	MAC'S BATTERY & FILTER	1330 W 6TH AVE	EUGENE	SULFURIC ACID	1,000-4,999	GALLONS	SULFURIC ACID
Lane	5644	MOLECULAR PROBES INC	4849 PITCHFORD AVE	EUGENE	WASTE CHLOROFORM	500-999	GALLONS	CHLOROFORM
Lane	5644	MOLECULAR PROBES INC	4849 PITCHFORD AVE	EUGENE	CHLOROFORM	200-499	GALLONS	CHLOROFORM
Lane	5644	MOLECULAR PROBES INC	4849 PITCHFORD AVE	EUGENE	SULFURIC ACID	10-19	GALLONS	SULFURIC ACID
Lane	5959	ODOT	2141 E 15TH ST	EUGENE	PHOSPHORUS	200-499	POUNDS	PHOSPHORUS
Lane	18122	OREGON MEDICAL LAB	722 E 11TH AVE	EUGENE	CHLOROFORM	0-4	GALLONS	CHLOROFORM

Lane	18122	OREGON MEDICAL LAB	722 E 11TH AVE	EUGENE	WASTE MERCURIC CHLORIDE	10-19	GALLONS	MERCURIC CHLORIDE
Lane	18122	OREGON MEDICAL LAB	722 E 11TH AVE	EUGENE	FORMALDEHYDE	10-19	GALLONS	FORMALDEHYDE
Lane	15334	ORKIN PEST CONTROL	90047B PRAIRIE RD	EUGENE	METH-O-GAS	5-9	GALLONS	METHYL BROMIDE
Lane	35217	PACIFIC MATERIALS HANDLING SOL	3350 ROOSEVELT BLVD	EUGENE	SULFURIC ACID	50-199	GALLONS	SULFURIC ACID
Lane	22337	PAPE BROS INC	2300 HENDERSON AVE	EUGENE	SULFURIC ACID	200-499	GALLONS	SULFURIC ACID
Lane	2373	PEPSI COLA BOTTLING CO	3030 JUDKINS RD	EUGENE	AMMONIA ANHYDROUS	500-999	GALLONS	AMMONIA
Lane	4108	PIERCE MANUFACTURING COM INC	10 N GARFIELD ST	EUGENE	SULFURIC ACID	1,000-4,999	GALLONS	SULFURIC ACID
Lane	15501	PROFESSIONAL SERVICE IND	2710 W 5TH AVE	EUGENE	SULFURIC ACID	5-9	GALLONS	SULFURIC ACID
Lane	23199	QUALITY METAL FINISHING INC	1260 WALLIS ST	EUGENE	HYDROCHLORIC ACID	50-199	GALLONS	HYDROCHLORIC ACID
Lane	23199	QUALITY METAL FINISHING INC	1260 WALLIS ST	EUGENE	SULFURIC ACID	50-199	GALLONS	SULFURIC ACID
Lane	70807	SCHARPFS TWIN OAK BUILDER SUP	990 W 1ST	EUGENE	MURIATIC ACID	500-999	GALLONS	HYDROCHLORIC ACID
Lane	14160	SCOT SUPPLY CO INC	700 CONGER	EUGENE	INDUSTRIAL AMMONIA	50-199	GALLONS	AMMONIA
Lane	85808	TERRITORIAL VINEYARDS LLC	907 W 3RD AVE	EUGENE	SULFUR DIOXIDE	5-9	GALLONS	SULFUR DIOXIDE
Lane	15875	TIMBERCO INC DBA TECO	86305 COLLEGE VIEW RD	EUGENE	SULFURIC ACID	20-49	GALLONS	SULFURIC ACID
Lane	63607	U OF O	1254 FRANKLIN BLVD	EUGENE	SODIUM CYANIDE	10-19	POUNDS	SODIUM CYANIDE
Lane	63586	U OF O	1390 FRANKLIN BLVD	EUGENE	ACRYLAMIDE	10-19	POUNDS	ACRYLAMIDE
Lane	21294	U OF O	1230 FRANKLIN BLVD	EUGENE	AMMONIA ANHYDROUS	50-199	GALLONS	AMMONIA
Lane	23545	U OF O	1370 FRANKLIN BLVD	EUGENE	SULFURIC ACID	20-49	GALLONS	SULFURIC ACID
Lane	21294	U OF O	1230 FRANKLIN BLVD	EUGENE	FORMALDEHYDE	5-9	GALLONS	FORMALDEHYDE
Lane	21294	U OF O	1230 FRANKLIN BLVD	EUGENE	SULFURIC ACID	5-9	GALLONS	SULFURIC ACID
Lane	63586	U OF O	1390 FRANKLIN BLVD	EUGENE	CHLOROFORM	5-9	GALLONS	CHLOROFORM
Lane	6802	U OF O	1295 FRANKLIN BLVD	EUGENE	AMMONIA ANHYDROUS	10-19	GALLONS	AMMONIA
Lane	23545	U OF O	1370 FRANKLIN BLVD	EUGENE	AMMONIA ANHYDROUS	500-999	GALLONS	AMMONIA
Lane	63607	U OF O	1254 FRANKLIN BLVD	EUGENE	CHLOROFORM	5-9	GALLONS	CHLOROFORM
Lane	63582	U OF O	1371 E 13TH AVE	EUGENE	CHLOROFORM	5-9	GALLONS	CHLOROFORM
Lane	23545	U OF O	1370 FRANKLIN BLVD	EUGENE	HYDROGEN SULFIDE	50-199	CUBIC FEET	HYDROGEN SULFIDE
Lane	23545	U OF O	1370 FRANKLIN BLVD	EUGENE	CHLOROFORM	10-19	GALLONS	CHLOROFORM
Lane	21294	U OF O	1230 FRANKLIN BLVD	EUGENE	CHLOROFORM	5-9	GALLONS	CHLOROFORM

Lane	63582	U OF O	1371 E 13TH AVE	EUGENE	AMMONIA ANHYDROUS	50-199	CUBIC FEET	AMMONIA
Lane	21294	U OF O	1230 FRANKLIN BLVD	EUGENE	HYDROGEN CHLORIDE	50-199	CUBIC FEET	HYDROGEN CHLORIDE
Lane	5212	WHITTIER WOOD PRODUCTS CO	3787 W 1ST AVE	EUGENE	CASCOREZ IB-575	10-19	GALLONS	VINYL ACETATE
Lane	5544	WILLAMETTE GRAYSTONE INC	3700 FRANKLIN BLVD	EUGENE	HYDROCHLORIC ACID	500-999	GALLONS	HYDROCHLORIC ACID
Lane	15025	WILLAMETTE VALLEY COMPANY	675 MCKINLEY ST	EUGENE	CHEMSTRIP	50-199	GALLONS	METHYLENE CHLORIDE
Lane	42659	MCKENZIE SCHOOL DISTRICT #68	51187 BLUE RIVER DR	FINN ROCK	AMMONIA	50-199	GALLONS	AMMONIA
Lane	34544	ACE BLDG CENTER INC	3231 N HWY 101	FLORENCE	PRESSURE TREATED WOOD	200-499	POUNDS	ARSENIC PENTOXIDE
Lane	17556	FLORENCE CITY OF	2455 WILLOW ST	FLORENCE	CHLORINE	1,000-4,999	POUNDS	CHLORINE
Lane	17557	FLORENCE CITY OF	794 RHODODENDRON DR	FLORENCE	PERCOL 779	50-199	GALLONS	ACRYLAMIDE COPOLYMER
Lane	33718	HECETA WATER DISTRICT	CLR LAKE PUMP ST	FLORENCE	CHLORINE	500-999	POUNDS	CHLORINE
Lane	8726	HUNTONS SURE CROP FARM	28410 MILLIRON RD	JUNCTION CITY	DYFONATE	50-199	GALLONS	O-ETHYL-S-PHENYLETHYL-PHOSPHONODITHIOATE
Lane	8726	HUNTONS SURE CROP FARM	28410 MILLIRON RD	JUNCTION CITY	AMMONIA ANHYDROUS	10,000-49,999	GALLONS	AMMONIA
Lane	24458	JUNCTION CITY CITY OF	1100 ELM ST	JUNCTION CITY	CHLORINE	10-19	GALLONS	CHLORINE
Lane	62257	JUNCTION CITY CITY OF	13TH & ELM	JUNCTION CITY	CHLORINE	10-19	GALLONS	CHLORINE
Lane	83030	JUNCTION CITY CITY OF	1325 ELM ST	JUNCTION CITY	CHLORINE	10-19	GALLONS	CHLORINE
Lane	83031	JUNCTION CITY CITY OF	1405 ELM ST	JUNCTION CITY	CHLORINE	10-19	GALLONS	CHLORINE
Lane	17781	JUNCTION CITY CITY OF	805 FRONT ST	JUNCTION CITY	CHLORINE	10-19	GALLONS	CHLORINE
Lane	17782	JUNCTION CITY CITY OF	1515 LAUREL ST	JUNCTION CITY	CHLORINE	10-19	GALLONS	CHLORINE
Lane	17784	JUNCTION CITY CITY OF	820 DEAL ST	JUNCTION CITY	CHLORINE	5-9	GALLONS	CHLORINE
Lane	17785	JUNCTION CITY CITY OF	320 CEDER ST	JUNCTION CITY	CHLORINE	5-9	GALLONS	CHLORINE
Lane	17786	JUNCTION CITY CITY OF	537 1/ 2 MAPLE ST	JUNCTION CITY	CHLORINE	10-19	GALLONS	CHLORINE
Lane	17783	JUNCTION CITY CITY OF	28441 HIGHPASS RD	JUNCTION CITY	CHLORINE	20-49	GALLONS	CHLORINE
Lane	7409	LOCHMEAD DAIRY INC	1120 IVY ST	JUNCTION CITY	AMMONIA	500-999	GALLONS	AMMONIA
Lane	7410	LOCHMEAD FARMS INC	96428 HWY 99W	JUNCTION CITY	PARASITE-S	200-499	GALLONS	FORMALDEHYDE
Lane	7410	LOCHMEAD FARMS INC	96428 HWY 99W	JUNCTION CITY	CHLORINE GAS	50-199	CUBIC FEET	CHLORINE
Lane	5771	ODFW	43863 GREER DR	LEABURG	HYDROGEN PEROXIDE	500-999	GALLONS	HYDROGEN PEROXIDE
Lane	5781	ODFW	90700 FISH HATCHERY RD	LEABURG	PARASITE-S	200-499	GALLONS	FORMALDEHYDE

Lane	5771	ODFW	43863 GREER DR	LEABURG	FORMALIN	500-999	GALLONS	FORMALDEHYDE
Lane	24853	BLM	26350 SIUSLAW RIVER RD	LORANE	LINDANE	5-9	GALLONS	HEXACHLOROCYCLOHEXANE
Lane	16726	LOWELL CITY OF	LOWELL W WATER TRMT	LOWELL	SULFUR DIOXIDE	10-19	GALLONS	SULFUR DIOXIDE
Lane	16726	LOWELL CITY OF	LOWELL W WATER TRMT	LOWELL	SULFURIC ACID 75%	5-9	GALLONS	SULFURIC ACID
Lane	16726	LOWELL CITY OF	LOWELL W WATER TRMT	LOWELL	CHLORINE	20-49	GALLONS	CHLORINE
Lane	42354	MAPLETON SCHOOL DIST 32	10868 E MAPLETON RD	MAPLETON	CHLORINE	50-199	GALLONS	CHLORINE
Lane	55331	MAPLETON WATER DISTRICT	BERKSHIRE CRK	MAPLETON	CHLORINE GAS	50-199	GALLONS	CHLORINE
Lane	42434	MARCOLA SD 79J	38300 WENDLING RD	MARCOLA	HYDROCHLORIC ACID	0-4	GALLONS	HYDROCHLORIC ACID
Lane	5793	ODFW	76389 FISH HATCHERY RD	OAKRIDGE	PARACIDE F	1,000-4,999	GALLONS	FORMALDEHYDE
Lane	5793	ODFW	76389 FISH HATCHERY RD	OAKRIDGE	HYDROGEN PEROXIDE	1,000-4,999	GALLONS	HYDROGEN PEROXIDE
Lane	70765	BIG HORN ENVIRONMENTAL QUALITY	858 RIVER HILLS	SPRINGFIELD	SULFUR DIOXIDE	200-499	CUBIC FEET	SULFUR DIOXIDE
Lane	70765	BIG HORN ENVIRONMENTAL QUALITY	858 RIVER HILLS	SPRINGFIELD	HYDROGEN SULFIDE	200-499	CUBIC FEET	HYDROGEN SULFIDE
Lane	4615	BORDEN CHEMICAL INC	470 S SECOND ST	SPRINGFIELD	PHENOL	50,000-99,999	GALLONS	PHENOL
Lane	4615	BORDEN CHEMICAL INC	470 S SECOND ST	SPRINGFIELD	MURIATIC ACID	20-49	GALLONS	HYDROCHLORIC ACID
Lane	4615	BORDEN CHEMICAL INC	470 S SECOND ST	SPRINGFIELD	SULFURIC ACID	5,000-9,999	GALLONS	SULFURIC ACID
Lane	6449	DYNEA CORP	475 N 28TH ST	SPRINGFIELD	FORMALDEHYDE SOLUTION 50%	250,000-499,999	GALLONS	FORMALDEHYDE
Lane	6449	DYNEA CORP	475 N 28TH ST	SPRINGFIELD	PHENOL	100,000-249,999	GALLONS	PHENOL
Lane	6449	DYNEA CORP	475 N 28TH ST	SPRINGFIELD	AMMONIA ANHYDROUS	5,000-9,999	GALLONS	AMMONIA
Lane	17906	EUGENE WATER & ELECTRIC	3957 HAYDEN BRIDGE RD	SPRINGFIELD	SULFUR DIOXIDE	1,000-4,999	MILLICURES	SULFUR DIOXIDE
Lane	17906	EUGENE WATER & ELECTRIC	3957 HAYDEN BRIDGE RD	SPRINGFIELD	CHLORINE	1,000-4,999	GALLONS	CHLORINE
Lane	21285	MCKENZIE WILLAMETTE HOSPITAL	1460 G ST	SPRINGFIELD	ETHYLENE OXIDE	1,000-4,999	CUBIC FEET	ETHYLENE OXIDE
Lane	51174	MERRY X RAY CHEMICAL CORP	1161 N 28TH ST	SPRINGFIELD	HYDROQUINONE	1,000-4,999	POUNDS	HYDROQUINONE
Lane	19079	QUADRA CHEMICALS WESTERN	3500 COMMERCIAL AVE	SPRINGFIELD	SULFURIC ACID SEMI GRADE	20-49	GALLONS	SULFURIC ACID
Lane	19079	QUADRA CHEMICALS WESTERN	3500 COMMERCIAL AVE	SPRINGFIELD	SULFURIC ACID 35% 1.265 SP	500-999	GALLONS	SULFURIC ACID
Lane	19079	QUADRA CHEMICALS WESTERN	3500 COMMERCIAL AVE	SPRINGFIELD	SULFURIC ACID 98%	1,000-4,999	GALLONS	SULFURIC ACID
Lane	19079	QUADRA CHEMICALS WESTERN	3500 COMMERCIAL AVE	SPRINGFIELD	SULFURIC ACID 50%	200-499	GALLONS	SULFURIC ACID
Lane	19079	QUADRA CHEMICALS WESTERN	3500 COMMERCIAL AVE	SPRINGFIELD	SULFURIC ACID 66 BE	1,000-4,999	GALLONS	SULFURIC ACID
Lane	19079	QUADRA CHEMICALS WESTERN	3500 COMMERCIAL AVE	SPRINGFIELD	HYDROFLUORIC ACID 49%	1,000-4,999	GALLONS	HYDROFLUORIC ACID

Lane	19079	QUADRA CHEMICALS WESTERN	3500 COMMERCIAL AVE	SPRINGFIELD	FORMALDEHYDE	500-999	GALLONS	FORMALDEHYDE
Lane	33736	RAINBOW WATER DISTRICT	1550 N 42ND ST	SPRINGFIELD	CHLORINE	50-199	GALLONS	CHLORINE
Lane	48669	SONY DISC MANUFACTURING	123 INTERNATIONAL WY	SPRINGFIELD	SULFURIC ACID SOLUTION 35%	200-499	GALLONS	SULFURIC ACID
Lane	10803	SPRINGFIELD RADIATOR SVC	2430 MAIN ST	SPRINGFIELD	HYDROCHLORIC ACID	10-19	GALLONS	HYDROCHLORIC ACID
Lane	48687	SPRINGFIELD SCIENTIFIC INC	2600 MAIN	SPRINGFIELD	FORMALDEHYDE	50-199	GALLONS	FORMALDEHYDE
Lane	48687	SPRINGFIELD SCIENTIFIC INC	2600 MAIN	SPRINGFIELD	HYDROGEN PEROXIDE	50-199	GALLONS	HYDROGEN PEROXIDE
Lane	48687	SPRINGFIELD SCIENTIFIC INC	2600 MAIN	SPRINGFIELD	HYDROCHLORIC ACID	50-199	GALLONS	HYDROCHLORIC ACID
Lane	48687	SPRINGFIELD SCIENTIFIC INC	2600 MAIN	SPRINGFIELD	HYDROFLUORIC ACID	20-49	GALLONS	HYDROFLUORIC ACID
Lane	48687	SPRINGFIELD SCIENTIFIC INC	2600 MAIN	SPRINGFIELD	CHLOROFORM	10-19	GALLONS	CHLOROFORM
Lane	48687	SPRINGFIELD SCIENTIFIC INC	2600 MAIN	SPRINGFIELD	SULFURIC ACID	50-199	GALLONS	SULFURIC ACID
Lane	67901	SPRINGFIELD SCIENTIFIC SUPPLY	1134 MAIN ST	SPRINGFIELD	SODIUM CYANIDE	200-499	POUNDS	SODIUM CYANIDE
Lane	67901	SPRINGFIELD SCIENTIFIC SUPPLY	1134 MAIN ST	SPRINGFIELD	POTASSIUM CYANIDE	20-49	POUNDS	POTASSIUM CYANIDE
Lane	62406	SPRINGFIELD UTILITY BOARD	3900 SPORTS WY	SPRINGFIELD	CHLORINE	20-49	GALLONS	CHLORINE
Lane	22405	SPRINGFIELD UTILITY BOARD	998 N 66TH	SPRINGFIELD	CHLORINE	1,000-4,999	POUNDS	CHLORINE
Lane	22406	SPRINGFIELD UTILITY BOARD	1300 S 26TH	SPRINGFIELD	CHLORINE	1,000-4,999	POUNDS	CHLORINE
Lane	23778	SPRINGFIELD UTILITY BOARD	1799 N 28TH ST	SPRINGFIELD	CHLORINE	200-499	POUNDS	CHLORINE
Lane	36399	TRU SERV	2150 OLYMPIC ST	SPRINGFIELD	MURIATIC ACID	1,000-4,999	GALLONS	HYDROCHLORIC ACID
Lane	6505	WEYERHAEUSER CO	785 N 42ND ST	SPRINGFIELD	SULFURIC ACID	10,000-49,999	GALLONS	SULFURIC ACID
Lane	6505	WEYERHAEUSER CO	785 N 42ND ST	SPRINGFIELD	SULFUR DIOXIDE	500-999	CUBIC FEET	SULFUR DIOXIDE
Lane	6505	WEYERHAEUSER CO	785 N 42ND ST	SPRINGFIELD	NITRIC OXIDE	500-999	CUBIC FEET	NITRIC OXIDE
Lane	20566	J CHEM RESEARCH	88587 ELLMAKER RD	VENETA	AMMONIA ANHYDROUS	20-49	GALLONS	AMMONIA
Lane	24023	VENETA CITY OF	W END OF SERTIC RD	VENETA	CHLORINE	1,000-4,999	POUNDS	CHLORINE

Table 2.4
Linn County Locations with Extremely Hazardous Substances

County	ID No.	Company Name	Address	City	Chemical Trade Name	Maximum Amount	Units	Most Hazardous Ingredient
Linn	018057	ALBANY CITY OF	408 NE WAVERLY DR	ALBANY	CHLORINE	10,000-49,999	CUBIC FEET	CHLORINE
Linn	072528	ALBANY CITY OF	300 VINE ST SW	ALBANY	CHLORINE	5,000-9,999	POUNDS	CHLORINE
Linn	004937	ALBANY INDUSTRIAL MACHINE	1495 INDUSTRIAL WY	ALBANY	HYDROCHLORIC ACID	500-999	GALLONS	HYDROCHLORIC ACID
Linn	004937	ALBANY INDUSTRIAL MACHINE	1495 INDUSTRIAL WY	ALBANY	SULFURIC ACID	20-49	GALLONS	SULFURIC ACID
Linn	050798	C G INDUSTRIES INC	1282 COMMERCIAL WY	ALBANY	SULFURIC ACID	50-199	GALLONS	SULFURIC ACID
Linn	020221	DOE	1450 SW QUEEN AVE	ALBANY	HYDROCHLORIC ACID	50-199	GALLONS	HYDROCHLORIC ACID
Linn	002154	EKA CHEMICALS, INC	140 SW QUEEN AVE	ALBANY	FORMALDEHYDE 37% METHANOL 25%	1,000-4,999	GALLONS	FORMALDEHYDE
Linn	002154	EKA CHEMICALS, INC	140 SW QUEEN AVE	ALBANY	HYDROCHLORIC ACID	200-499	GALLONS	HYDROCHLORIC ACID
Linn	007950	GEORGIA PACIFIC RESINS	2190 NE OLD SALEM RD	ALBANY	FORMALDEHYDE	2,500,000-4,999,999	GALLONS	FORMALDEHYDE
Linn	007950	GEORGIA PACIFIC RESINS	2190 NE OLD SALEM RD	ALBANY	PHENOL	1,000,000-2,499,999	GALLONS	PHENOL
Linn	049551	GREATER ALBANY PUB SCH DIST 8J	2150 SE 36TH AVE	ALBANY	CHLORINE GAS	50-199	GALLONS	CHLORINE
Linn	015524	INDUSTRIAL WELDING SUPPLY	3415 S PACIFIC BLVD	ALBANY	AMMONIA ANHYDROUS	200-499	GALLONS	AMMONIA
Linn	054104	INLAND QUICK FREEZE & STORAGE	200 NE MADISON ST	ALBANY	AMMONIA ANHYDROUS	1,000-4,999	GALLONS	AMMONIA
Linn	022569	KEMIRON NORTHWEST INC	2800 OLD SALEM RD	ALBANY	SULFURIC ACID	10,000-49,999	GALLONS	SULFURIC ACID
Linn	003157	METAL TECHNOLOGY INC	173 QUEEN AVE SE	ALBANY	HYDROCHLORIC ACID	20-49	GALLONS	HYDROCHLORIC ACID
Linn	003157	METAL TECHNOLOGY INC	173 QUEEN AVE SE	ALBANY	HYDROFLUORIC ACID	50-199	GALLONS	HYDROFLUORIC ACID
Linn	003157	METAL TECHNOLOGY INC	173 QUEEN AVE SE	ALBANY	SULFURIC ACID	20-49	GALLONS	SULFURIC ACID
Linn	005525	NATIONAL FROZEN FOODS CORP	745 SW 30TH	ALBANY	AMMONIA ANHYDROUS	5,000-9,999	GALLONS	AMMONIA
Linn	005350	OREGON FREEZE DRY INC	525 SW 25TH AVE	ALBANY	SULFURIC ACID	50-199	GALLONS	SULFURIC ACID
Linn	005349	OREGON FREEZE DRY INC	770 W 29TH AVE	ALBANY	SULFURIC ACID	50-199	GALLONS	SULFURIC ACID
Linn	005349	OREGON FREEZE DRY INC	770 W 29TH AVE	ALBANY	AMMONIA ANHYDROUS	5,000-9,999	GALLONS	AMMONIA
Linn	005350	OREGON FREEZE DRY INC	525 SW 25TH AVE	ALBANY	AMMONIA ANHYDROUS	5,000-9,999	GALLONS	AMMONIA

Linn	005350	OREGON FREEZE DRY INC	525 SW 25TH AVE	ALBANY	HYDROCHLORIC ACID	10,000-49,999	POUNDS	HYDROCHLORIC ACID
Linn	023220	OREGON WOOD STOVES AND SPAS	1620 SE 9TH AVE	ALBANY	MURIATIC ACID	5-9	GALLONS	HYDROCHLORIC ACID
Linn	043293	OREMET WAH CHANG	1600 NE OLD SALEM RD	ALBANY	HYDROFLUORIC ACID	10,000-49,999	GALLONS	HYDROFLUORIC ACID
Linn	024604	OREMET WAH CHANG	1600 NE OLD SALEM RD	ALBANY	HYDROFLUORIC ACID	50-199	GALLONS	HYDROFLUORIC ACID
Linn	024604	OREMET WAH CHANG	1600 NE OLD SALEM RD	ALBANY	HYDROCHLORIC ACID	200-499	GALLONS	HYDROCHLORIC ACID
Linn	043293	OREMET WAH CHANG	1600 NE OLD SALEM RD	ALBANY	HYDROCHLORIC ACID	100,000-249,999	GALLONS	HYDROCHLORIC ACID
Linn	043293	OREMET WAH CHANG	1600 NE OLD SALEM RD	ALBANY	NITRIC ACID 70%	200-499	GALLONS	NITRIC ACID
Linn	043293	OREMET WAH CHANG	1600 NE OLD SALEM RD	ALBANY	TITANIUM TETRACHLORIDE	100,000-249,999	GALLONS	TITANIUM TETRACHLORIDE
Linn	043293	OREMET WAH CHANG	1600 NE OLD SALEM RD	ALBANY	CHLORINE	100,000-249,999	CUBIC FEET	CHLORINE
Linn	005913	OREMET WAH CHANG	530 SW 34TH AVE	ALBANY	SULFURIC ACID	10,000-49,999	GALLONS	SULFURIC ACID
Linn	043293	OREMET WAH CHANG	1600 NE OLD SALEM RD	ALBANY	SULFURIC ACID	250,000-499,999	GALLONS	SULFURIC ACID
Linn	024604	OREMET WAH CHANG	1600 NE OLD SALEM RD	ALBANY	SULFURIC ACID	200-499	GALLONS	SULFURIC ACID
Linn	005913	OREMET WAH CHANG	530 SW 34TH AVE	ALBANY	MURIATIC ACID	200-499	GALLONS	HYDROCHLORIC ACID
Linn	078451	PACIFIC CAST TECHNOLOGIES INC	150 QUEEN AVE SW	ALBANY	MURIATIC ACID	1,000-4,999	GALLONS	HYDROCHLORIC ACID
Linn	078451	PACIFIC CAST TECHNOLOGIES INC	150 QUEEN AVE SW	ALBANY	AMMONIA ANHYDROUS	200-499	GALLONS	AMMONIA
Linn	078451	PACIFIC CAST TECHNOLOGIES INC	150 QUEEN AVE SW	ALBANY	SULFURIC ACID	50-199	GALLONS	SULFURIC ACID
Linn	078451	PACIFIC CAST TECHNOLOGIES INC	150 QUEEN AVE SW	ALBANY	HYDROFLUORIC ACID 49%	1,000-4,999	GALLONS	HYDROFLUORIC ACID
Linn	056706	PACIFIC PAINT & COATINGS INC	310 SE 2ND AVE	ALBANY	TRITON CF-10	200-499	POUNDS	BENZYL CHLORIDE
Linn	001239	PLYWOOD COMPONENTS INC	6523 NE OLD SALEM RD	ALBANY	ANTIPHON LIM (TYPE VEL25)	500-999	GALLONS	VINYL ACETATE
Linn	017812	POLAR CRYOGENICS INC	5877 OLD SALEM RD BLDG B	ALBANY	BORON TRICHLORIDE	500-999	CUBIC FEET	BORON TRICHLORIDE
Linn	017812	POLAR CRYOGENICS INC	5877 OLD SALEM RD BLDG B	ALBANY	HYDROGEN SULFIDE	1,000-4,999	CUBIC FEET	HYDROGEN SULFIDE
Linn	017812	POLAR CRYOGENICS INC	5877 OLD SALEM RD BLDG B	ALBANY	NITRIC OXIDE	200-499	CUBIC FEET	NITRIC OXIDE
Linn	017812	POLAR CRYOGENICS INC	5877 OLD SALEM RD BLDG B	ALBANY	AMMONIA ANHYDROUS	50-199	GALLONS	AMMONIA
Linn	005030	SELMET INC	33992 SE 7 MILE LN	ALBANY	MURIATIC ACID	20-49	GALLONS	HYDROCHLORIC ACID
Linn	005030	SELMET INC	33992 SE 7 MILE LN	ALBANY	HYDROFLUORIC ACID 49%	200-499	GALLONS	HYDROFLUORIC ACID
Linn	005030	SELMET INC	33992 SE 7 MILE LN	ALBANY	NITRIC ACID 67%	500-999	GALLONS	NITRIC ACID

Linn	033147	SNO TEMP COLD STORAGE	3815 MARION ST	ALBANY	AMMONIA ANHYDROUS	1,000-4,999	GALLONS	AMMONIA
Linn	022484	SYNTHETECH INC	1290 INDUSTRIAL WY	ALBANY	THIOPHENOL	50-199	GALLONS	THIOPHENOL
Linn	022484	SYNTHETECH INC	1290 INDUSTRIAL WY	ALBANY	HYDROGEN CHLORIDE	1,000-4,999	CUBIC FEET	HYDROGEN CHLORIDE
Linn	022484	SYNTHETECH INC	1290 INDUSTRIAL WY	ALBANY	FORMALDEHYDE 37%	50-199	GALLONS	FORMALDEHYDE
Linn	022484	SYNTHETECH INC	1290 INDUSTRIAL WY	ALBANY	BENZYL CHLORIDE	200-499	GALLONS	BENZYL CHLORIDE
Linn	022484	SYNTHETECH INC	1290 INDUSTRIAL WY	ALBANY	SULFURIC ACID 96%	1,000-4,999	GALLONS	SULFURIC ACID
Linn	022484	SYNTHETECH INC	1290 INDUSTRIAL WY	ALBANY	PYRIDINE	50-199	GALLONS	PYRIDINE
Linn	022484	SYNTHETECH INC	1290 INDUSTRIAL WY	ALBANY	PIPERIDINE	5-9	GALLONS	PIPERIDINE
Linn	022484	SYNTHETECH INC	1290 INDUSTRIAL WY	ALBANY	PHENOL	200-499	POUNDS	PHENOL
Linn	022484	SYNTHETECH INC	1290 INDUSTRIAL WY	ALBANY	TRIMETHYLCHLOR OSILANE	1,000-4,999	GALLONS	TRIMETHYLCHLOROSILANE
Linn	067113	WILBUR ELLIS CO	30665 SW HWY 34	ALBANY	OXAMYL	20-49	GALLONS	OXAMYL
Linn	067113	WILBUR ELLIS CO	30665 SW HWY 34	ALBANY	PARAQUAT	50-199	GALLONS	1,1-DIMETHYL-4,4-BI-PYRIDINIUM
Linn	067113	WILBUR ELLIS CO	30665 SW HWY 34	ALBANY	ENDOSULFAN	50-199	POUNDS	ENDOSULFAN
Linn	067113	WILBUR ELLIS CO	30665 SW HWY 34	ALBANY	ETHOPROP	200-499	POUNDS	ETHOPROP
Linn	067113	WILBUR ELLIS CO	30665 SW HWY 34	ALBANY	ETHOPROP-LIQUID	50-199	GALLONS	ETHROPROP
Linn	006870	WILLAMETTE INDUSTRIES INC	3251 OLD SALEM RD NE	ALBANY	CHLORINE	10-19	GALLONS	CHLORINE
Linn	006870	WILLAMETTE INDUSTRIES INC	3251 OLD SALEM RD NE	ALBANY	AMMONIA ANHYDROUS	10,000-49,999	GALLONS	AMMONIA
Linn	006870	WILLAMETTE INDUSTRIES INC	3251 OLD SALEM RD NE	ALBANY	NOX CEM GAS	200-499	CUBIC FEET	NITRIC OXIDE
Linn	006870	WILLAMETTE INDUSTRIES INC	3251 OLD SALEM RD NE	ALBANY	SULFURIC ACID	10,000-49,999	GALLONS	SULFURIC ACID
Linn	006870	WILLAMETTE INDUSTRIES INC	3251 OLD SALEM RD NE	ALBANY	HYDROCHLORIC ACID	50-199	GALLONS	HYDROCHLORIC ACID
Linn	023917	WORLDCOM	DEVER CONNOR RD	ALBANY	SULFURIC ACID	200-499	GALLONS	SULFURIC ACID
Linn	005468	WYMAN-GORDON TITANIUM CASTINGS	150 SW QUEEN AVE	ALBANY	SULFURIC ACID	200-499	GALLONS	SULFURIC ACID
Linn	005468	WYMAN-GORDON TITANIUM CASTINGS	150 SW QUEEN AVE	ALBANY	HYDROFLUORIC ACID	10,000-49,999	GALLONS	HYDROFLUORIC ACID
Linn	005468	WYMAN-GORDON TITANIUM CASTINGS	150 SW QUEEN AVE	ALBANY	AMMONIA ANHYDROUS	50,000-99,999	CUBIC FEET	AMMONIA
Linn	005468	WYMAN-GORDON TITANIUM CASTINGS	150 SW QUEEN AVE	ALBANY	MURIATIC ACID	1,000-4,999	GALLONS	HYDROCHLORIC ACID
Linn	022315	BROWNSVILLE CITY OF	28266 LINN WAY PUMP BLDG	BROWNSVILLE	CHLORINE	50-199	GALLONS	CHLORINE
Linn	062411	BROWNSVILLE CITY OF	34731 HWY 228	BROWNSVILLE	CHLORINE	20-49	GALLONS	CHLORINE

Linn	004035	GEORGIA PACIFIC CORP	30470 AMERICAN DR	HALSEY	SULFURIC ACID	1,000-4,999	GALLONS	SULFURIC ACID
Linn	004035	GEORGIA PACIFIC CORP	30470 AMERICAN DR	HALSEY	HYDROGEN PEROXIDE	10,000-49,999	GALLONS	HYDROGEN PEROXIDE
Linn	024038	HALSEY CITY SEWAGE & WTR TRTMT	14 S 4 W SECTION	HALSEY	CHLORINE GAS	500-999	POUNDS	CHLORINE
Linn	020932	POPE & TALBOT	30480 AMERICAN DR	HALSEY	CHLORINE	50,000-99,999	GALLONS	CHLORINE
Linn	020932	POPE & TALBOT	30480 AMERICAN DR	HALSEY	HYDROGEN PEROXIDE	10,000-49,999	GALLONS	HYDROGEN PEROXIDE
Linn	020932	POPE & TALBOT	30480 AMERICAN DR	HALSEY	SULFURIC ACID	5,000-9,999	GALLONS	SULFURIC ACID
Linn	020932	POPE & TALBOT	30480 AMERICAN DR	HALSEY	MURIATIC ACID	200-499	GALLONS	HYDROCHLORIC ACID
Linn	017139	WILBUR ELLIS CO	1115 W O ST	HALSEY	PARAQUAT	10-19	GALLONS	1,1-DIMETHYL-4,4-BI-PYRIDINIUM
Linn	017139	WILBUR ELLIS CO	1115 W O ST	HALSEY	OXAMYL	20-49	GALLONS	OXAMYL
Linn	017139	WILBUR ELLIS CO	1115 W O ST	HALSEY	ENDOSULFAN	0-4	GALLONS	ENDOSULFAN
Linn	023919	WORLDCOM	AMERICAN DR & BURLINGTON	HALSEY	SULFURIC ACID	200-499	POUNDS	SULFURIC ACID
Linn	016708	HARRISBURG CITY ADMIN OF	23914 PEORIA RD	HARRISBURG	CHLORINE	1,000-4,999	CUBIC FEET	CHLORINE
Linn	019119	HARRISBURG CITY OF	790 S 2ND	HARRISBURG	CHLORINE	1,000-4,999	CUBIC FEET	CHLORINE
Linn	020121	K J KAYNER CO	420 TERRITORIAL RD	HARRISBURG	VYDATE	200-499	GALLONS	OXAMYL
Linn	003678	LANGDON IMPLEMENT CO	30600 DIAMOND HILL DR	HARRISBURG	CHLOROPICRIN	10-19	CUBIC FEET	TRICHLORONITROMETHANE
Linn	024097	R C O INC	24875 PEORIA RD	HARRISBURG	CHLOROPHACINONE	1,000-4,999	POUNDS	CHLOROPHACINONE
Linn	024097	R C O INC	24875 PEORIA RD	HARRISBURG	DIPHACINONE	1,000-4,999	POUNDS	DIPHACINONE
Linn	024097	R C O INC	24875 PEORIA RD	HARRISBURG	STRYCHNINE	20-49	POUNDS	STRYCHNINE
Linn	024097	R C O INC	24875 PEORIA RD	HARRISBURG	ZINC PHOSPHIDE	10-19	POUNDS	ZINC PHOSPHIDE
Linn	000138	SMUCKER MFG CO	22919 N COBURG RD	HARRISBURG	SULFURIC ACID	5-9	GALLONS	SULFURIC ACID
Linn	079009	WILCO FARMERS	560 LASALLE	HARRISBURG	TEMIK 15G	500-999	POUNDS	ALDICARB
Linn	005800	ODFW	HC 73 BOX 71	IDANHA	FORMALDEHYDE	50-199	GALLONS	FORMALDEHYDE
Linn	005723	ENTEK INTERNATIONAL LLC	250 N HANSARD AVE	LEBANON	SULFURIC ACID	50-199	GALLONS	SULFURIC ACID
Linn	027212	JONES POOLS	29400 SANTIAM HWY	LEBANON	CHLORINE	50-199	POUNDS	CHLORINE
Linn	023803	LEBANON COMMUNITY SD 9	1700 S 5TH ST	LEBANON	CHLORINE	50-199	CUBIC FEET	CHLORINE
Linn	023803	LEBANON COMMUNITY SD 9	1700 S 5TH ST	LEBANON	MURIATIC ACID	5-9	GALLONS	HYDROCHLORIC ACID
Linn	079032	OMC	1240 E GRANT ST	LEBANON	MURIATIC ACID	0-4	GALLONS	HYDROCHLORIC ACID

Linn	063543	WALMART	3002 S SANTIAM HWY	LEBANON	SULFURIC ACID	5,000-9,999	POUNDS	SULFURIC ACID
Linn	005798	ODFW	42279 FISH HATCHERY DR	SCIO	FORMALIN PARACIDE-F	200-499	GALLONS	FORMALDEHYDE
Linn	016565	SCIO CITY OF	38861 SW 6TH ST	SCIO	CHLORINE	5,000-9,999	GALLONS	CHLORINE
Linn	017138	WILBUR ELLIS CO	30055 1ST ST	SHEDD	ENDOSULFAN	5-9	GALLONS	ENDOSULFAN
Linn	017138	WILBUR ELLIS CO	30055 1ST ST	SHEDD	PARAQUAT	20-49	GALLONS	1,1-DIMETHYL-4,4-BI-PYRIDINIUM
Linn	005768	ODFW	43182 N RIVER DR	SWEET HOME	FORMALIN 37%	200-499	GALLONS	FORMALDEHYDE
Linn	016564	SWEET HOME CITY OF	1357 PLEASANT VALLY RD	SWEET HOME	SULFUR DIOXIDE	50-199	GALLONS	SULFUR DIOXIDE
Linn	016564	SWEET HOME CITY OF	1357 PLEASANT VALLY RD	SWEET HOME	SULFURIC ACID	0-4	GALLONS	SULFURIC ACID
Linn	018108	SWEET HOME CITY OF	1730 N 9TH AVE	SWEET HOME	CHLORINE	50-199	GALLONS	CHLORINE
Linn	016564	SWEET HOME CITY OF	1357 PLEASANT VALLY RD	SWEET HOME	CHLORINE	200-499	GALLONS	CHLORINE
Linn	016780	TANGENT CITY ADMIN OF	33324 HINCK RD	TANGENT	CHLORINE GAS	10-19	GALLONS	CHLORINE
Linn	016780	TANGENT CITY ADMIN OF	33324 HINCK RD	TANGENT	SULFURIC ACID	0-4	GALLONS	SULFURIC ACID
Linn	015092	WESTERN FARM SERVICE INC	32092 HWY 34	TANGENT	TEMIK 15G	50-199	POUNDS	ALDICARB
Linn	015092	WESTERN FARM SERVICE INC	32092 HWY 34	TANGENT	AMMONIA ANHYDROUS	100,000-249,999	POUNDS	AMMONIA
Linn	015092	WESTERN FARM SERVICE INC	32092 HWY 34	TANGENT	IMIDAN	50-199	POUNDS	PHOSMET

2.3 Commentary on Inventory of Extremely Hazardous Substances (EHS)

As noted above, there are a total of 311 sites in Benton, Lane, and Linn Counties with reportable quantities of extremely hazardous substances (EHS). Of these 311 sites about 69% 214 of 311) are located in the four largest cities: Albany, Corvallis, Eugene and Springfield. The other 31% of sites (97 of 311) are scattered in 25 other cities/towns that have one or more sites with EHS. These data on the geographic distribution of EHS sites in the three county area are summarized below in Table 2.5.

Table 2.5
Geographic Distribution of Extremely Hazardous Substances (EHS) Sites in Benton, Lane, and Linn Counties

Benton County			Lane County			Linn County	
City	Number of EHS Sites		City	Number of EHS Sites		City	Number of EHS Sites
Albany	4		Cottage Grove	4		Albany	73
Alpine	1		Creswell	4		Brownsville	2
Alsea	1		Eugene	77		Halsey	11
Corvallis	22		Finn Rock	1		Harrisburg	10
Monroe	4		Florence	4		Idanha	1
Philomath	5		Junction City	15		Lebanon	6
			Leaburg	3		Scio	2
			Lorane	1		Shedd	2
			Lowell	3		Sweet Home	5
			Mapleton	2		Tangent	5
			Marcola	1			
			Oakridge	2			
			Springfield	38			
			Veneta	2			
Total	37		Total	157		Total	117

The total inventory of 311 sites contains about 50 different Extremely Hazardous Substances, as the most hazardous component in the on-site chemicals. However, the majority of these sites contain four common Extremely Hazardous Substances or strong acids, as shown below in Table 2.6. The four most common EHS are ammonia, chlorine, chloroform and formaldehyde. The strong acids are hydrochloric acid, hydrofluoric acid, nitric acid and sulfuric acid. The four most common EHS and the strong acids constitute 41% and 32%, respectively of the total inventory of most hazardous components. Together these materials constitute 73% of the total number of EHS in the three county areas.

There are 43 other EHS as most hazardous components that constitute the remaining 27% of sites in the three county areas. These 43 EHS include wide variety of chemicals including pesticides, herbicides, and various other toxic organic and inorganic chemicals. Most of these EHS are present at only 1 or 2 sites in the three county areas. For reference, a complete list of these other Extremely Hazardous Substances is given below in Table 2.7.

Table 2.6
Inventory of Extremely Hazardous Substances
Common EHS as the Most Hazardous Component

	Number of Sites with Specific EHS[1]			
Chemical	**Benton County**	**Lane County**	**Linn County**	**Totals**
Ammonia	4	18	11	33
Chlorine	11	35	17	63
Chloroform	1	9	0	10
Formaldehyde	2	12	6	20
Subtotal	18	74	34	126
Hydrochloric Acid	4	10	16	30
Hydrofluoric Acid	1	4	6	11
Nitric Acid	0	1	2	3
Sulfuric Acid	4	29	22	55
Acids (subtotal)	9	44	46	99
All other EHS	10	39	37	86
Total	37	157	117	311

[1] Most hazardous component as per Extremely Hazardous Sustances (EHS) listing for each county in HSIS.

Table 2.7
Other Extremely Hazardous Substances at Locations in Benton, Lane, and Linn Counties

	Number of Sites with Specific EHS[1]			
Chemical	**Benton County**	**Lane County**	**Linn County**	**Totals**
1,1-dimethyl-4,4,-bipyridium	1		3	4
Acrylamide		1		1
Acrylamide copolymer	1	1	2	4
Aldicarb			2	2
Arsenic pentoxide		1		1
Benzyl chloride			2	2
Boron trichloride	1	1	1	3
Chlorophacinone			1	1
Diphacinone			1	1
Endosulfan	1		3	4
Epichlorohydrin		1		1
Ethoprop			1	1
Ethroprop	1		1	2
Ethylene oxide	1	1		2
Ethylenediamine		1		1
Ferric sulfate		1		1
Hexachlorocyclohexane		1		1
Hydrogen chloride	1	2	1	4
Hydrogen peroxide	1	4	2	7
Hydrogen sulfide		2	1	3
Hydroquinone		1		1
Mercuric chloride		1		1
Methyl amyl ketone		1		1
Methyl bromide		2		2
methylene chloride		1		1
O-ethyl-S-phenylethyl-phophonodithioate		1		1
O'S-dimethyl acetylphosphoramidothioate	1			1
Oxamyl			3	3
Phenol		3	2	5
Phosmet			1	1
Phosphorus		1		1
Piperidine			1	1
Potassium cyanide		1		1
Pyridine			1	1
Sodium cyanide		2		2
Sulfur dioxide		7	1	8
Strychnine			1	1
Thiophenol			1	1
Titanium tetrachloride			1	1
Trichloronitromethane	1		1	2
Trimethylchlorosilane			1	1
Vinyl acetate		1	1	2
Zinc phosphide			1	1
Total	10	39	37	86

In total, the 311 sites in the three county areas that have Extremely Hazardous Chemicals have 51 different chemicals reported as the most hazardous component. As noted in Section 1.1, the toxicity of particular hazardous materials is an important measure of the potential impact of hazardous materials on affected communities, but not the only important measure. Other characteristics of hazardous materials, especially the quantity of material and the ease of dispersal of the material may be as important, or more important, in governing the level of potential threat to a community.

A full review of the potential public health impacts of accidents or deliberate acts at each of the above 311 sites is beyond the scope of this mitigation plan. For planning purposes, however, the following observations are made about sites where the combination of toxicity, quantity, and potential dispersal may warrant further evaluation.

There are about a dozen sites with significant quantities of pesticides and herbicides. Because of the toxicity of these materials and the potential for injury from inhalation or skin contact, proper storage, handling, and transport of such materials is essential.

There are several sites with extremely toxic substances such as potassium cyanide, sodium cyanide, arsenic pentoxide, strychnine and mercuric chloride. Such materials are potentially of interest to terrorists. For such sites, security as well as safety precautions should be evaluated and upgraded if necessary.

A list of sites with the largest quantities of several EHS materials is given below in Table 2.8. In Benton County, the EHS sites have generally small quantities of materials, compared to some of the larger industrial and other sites in Lane and Linn Counties. There are 6 sites in Lane County and 10 sites in Linn County with reportable quantities of EHS exceeding 10,000 gallons or 10,000 cubic feet for one or more substances. Of these 16 sites, there are 8 sites with reportable quantities of EHS exceeding 100,000 gallons or 100,000 cubic feet for one or more substances. There is one site (Georgia-Pacific Resins, Albany) with greater than 1,000,000 gallons of two EHS: formaldehyde and phenol.

These sites with large quantities of EHS are not necessarily the sites with the greatest potential for negative impacts on affected communities because the toxicity and ease of dispersal of EHS materials vary significantly. Nevertheless, further evaluation of these sites may be warranted because of the large quantities of EHS present.

Table 2.8
Sites with Greater than 10,000 Gallons or 10,000 Cubic Feet of Extremely Hazardous Substances (EHS)

County	Site	EHS	Maximum Quantity	Units
Lane	Borden Chemical Inc. 470 S. Second St. Springfield	Phenol	50,000 - 99,999	gallons
Lane	City of Eugene 410 River Ave. Eugene	Chlorine	10,000 - 49,999	gallons
Lane	Dynea Corp 475 N. 28th St. Springfield	Formaldehyde Phenol	250,000 - 499,000 100,000 - 249,999	gallons gallons
Lane	Georgia-Pacific Resins 2665 Hwy 99 Eugene	Resin polyamide with ephichlorohydrin Phenol Formaldehyde	250,000 - 499,999 250,000 - 499,000 10,000 - 49,999	gallons gallons gallons
Lane	Huntons Sure Crop Farm 28410 Milliron Rd. Junction City	Ammonia anhydrous	10,000 - 49,999	gallons
Lane	Weyerheuser Co. 785 N. 42nd St. Springfield	Sulfuric acid	10,000 - 49,999	gallons
Linn	City of Albany	Chlorine	10,000 - 49,999	cubic feet
Linn	Georgia-Pacific Resins 2190 NE Old Salem Rd., Albany	Formaldehyde Phenol	2,500,000 - 4,999,999 1,000,000 - 249,999	gallons gallons
Linn	Kemiron Northwest Inc. 2800 Old Salem Rd., Albany	Sulfuric acid	10,000 - 49,999	gallons
Linn	Oregon Freeze Dry Inc. 525 SW 25th St., Albany	Hydrochloric acid	10,000 - 49,999	gallons
Linn	Oremet Wah Chang 1600 NE Old Salem Rd., Albany	Hydrofluoric acid Hydrochloric acid Titanium tetrachloride Chlorine Sulfuric acid	10,000 - 49,9999 100,000 - 249,999 100,000 - 249,999 100,000 - 249,999 250,000 - 499,000	gallons gallons gallons cubic feet gallons
Linn	Willamette Industries Inc. 3251 Old Salem Rd. NE, Albany	Ammonia, anhydrous Sulfuric acid	10,000 - 24,999 10,000 - 49,999	gallons gallons
Linn	Wyman-Gordon Titanium Castings 150 SW Queen Ave., Albany	Hydrofluoric acid ammonia anhydrous	10,000 - 49,999 50,000 - 99,999	gallons gallons
Linn	Georgia-Pacific Corp 30470 American Dr., Halsey	Hydrogen peroxide	10,000 - 49,999	gallons
Linn	Pope & Talbot 30480 American Dr. Halsey	Chlorine Hydrogen peroxide	50,000 - 99,999 10,000 - 49,999	gallons gallons
Linn	Western Farm Service 32092 Hwy 34, Talbot	Ammonia anhydrous	100,000 - 249,999	gallons

Note: For Benton County, there are no sites with 10,000 gallons or 10,000 cubic feet of reportable Extremely Hazardous Substances.

2.4 Nuclear Reactors

Nuclear reactors are not separately included on the State Fire Marshal's database of hazardous materials (HSIS). Rather, sites with nuclear reactors are included only to the extent that they contain reportable or non-reportable quantities of hazardous materials.

For mitigation planning purposes, nuclear reactors are of sufficient importance to warrant separate consideration. In the United States, all operating or decomissioned nuclear reactors are under the strict regulatory control of the United States Nuclear Regulatory Commission (NRC). The NRC website (**www.nrc.gov**) has a wealth of information about reactors and their regulatory aspects as well as databases for reactors throughout the United States.

Current NRC data indicate that there are 140 nuclear reactors currently licensed to operate in the United States. Of these 140 reactors, 104 are power-generating reactors, which produce about 20% of the nation's electricity, and 36 are research reactors. In addition, there are 18 other reactors, under NRC regulatory control, that are permanently shut down and are in various phases of the decommissioning process. Of these 158 reactors, only three are located in Oregon and only one is in the three county areas. These NCR data (**www.nrc.gov** June 26, 2002) are summarized below in Table 2.9.

Table 2.9
Nuclear Reactors in the United States

Type of Reactor	Number of Reactors		
	United States	**Oregon**	**Three County Area**
Power Reactor	104	0	0
Research Reactor	36	2	1
Reactor in Decommissioning Process	18	1	0
Total	158	3	1

In Oregon, there are no operating power reactors, two operating research reactors and one reactor in the decommissioning process. The two operating reactors are located at: 1) Reed College in Portland, and 2) Oregon State University in Corvallis. Both of these research reactors are small reactors. Further analysis of the Oregon State University reactor in Corvallis is given in Section 3.1.2 of this report.

The reactor in the decommissioning process is the Trojan reactor in Portland. This reactor was permanently shut down in November 1992 and is currently undergoing dismantlement. The major reactor elements have been dismantled and shipped to the Hanford, Washington storage site. Transfer of the spent nuclear fuel that is currently stored on site and decommissioning of the spent fuel pool are currently projected for 2003 and 2005 respectively (**www.nrc.gov**, June 26, 2002).

In addition to the nuclear reactors shown above in Table 2.9, under the regulatory control of the NRC, there are additional military reactors under the control of the Department of Defense and/or Department of Energy. These military reactors include fixed site reactors on military reservations for research and for production of nuclear materials and mobile reactors on naval vessels. However, none of these military reactors are located in Oregon.

3.0 Vulnerability and Risk Assessments: Selected Extremely Hazardous Substances Sites in Each County

This section contains brief vulnerability and risk assessment for several sites containing Extremely Hazardous Substances (EHS) in each county. These evaluations include a description of the facility, the reported inventory of Extremely Hazardous Substances, vulnerability, emergency response capability, and the potential impacts on the affected communities. For each county, the county's Emergency Management Manager selected the list of example sites evaluated.

For each site, there is a summary of the types and quantities of Extremely Hazardous Substances and/or the largest volume hazardous materials located at the site, using data from the Office of State Fire Marshal's Hazardous Substances Information System (HSIS) database. Each hazardous material is also characterized by the type of hazard posed to humans.

Using the HSIS database to find information on the types and quantities of chemicals at a given location is a several step process:

1. From the **Main Menu**, select **Queries and Reports**.

2. From **Queries and Reports**, select **City Search** or **County Search** for an alphabetical listing of companies or public agencies with chemical inventories.

3. Scroll down the alphabetical listing and select the entity of interest.

4. The summary page for the selected entry contains brief descriptions of the facility with contact information and summaries of the number of chemicals reported, the numbers of EHS and Section 112(r) chemicals, the location of the emergency plan and other useful information.

5. From the Summary Page, selecting the **Company Chemicals** button leads to a complete listing of half-page reports for each reported chemical at the facility.

6. The **Company Info Rpt** (Information Report) button produces a summary report for the facility listing the name and quantity of each reported chemical. This report can be printed directly from HSIS or exported to Word.

Following these synopses of hazardous materials at the sites in each county, Table 3.13 in Section 3.4 has important reference and response information for each of these hazardous materials. Table 3.13 includes references to the appropriate emergency response Guide Number as well as recommended initial isolation distances, protection distances downwind (day and night) for both small and large spills (**2000 Emergency Response Guidebook**).

> **In combination, the type and quantity of the identified hazardous materials at each facility, the reference information in the appropriate Guide Number and the initial isolation and protection distances provide guidance on the extent of impacts on affected communities of potential hazardous materials spills at each of these evaluated facilities.**

3.1 Benton County

3.1.1 Hewlett Packard, Corvallis

The Hewlett Packard facility, located at 1000 NE Circle Blvd, Corvallis, which manufactures semiconductor components and computer peripheral equipment, employs about 4400 people. The State Fire Marshal's Hazardous Substance Information System (HSIS) reports for this facility list a total of 101 different chemicals at this facility. These 101 different chemicals contain a wide range of ingredients as the most hazardous component. However, most of these chemicals are present in small quantities. Seven of the chemicals at this site are included on the Benton County list of Extremely Hazardous Substances (EHS). These EHS are listed below in Table 3.1.

Table 3.1
Extremely Hazardous Substances at the Hewlett Packard Facility, Corvallis

Chemical Trade Name	Most Hazardous Component	Form	Maximum Quantity	Units	Hazard Type	Protect Distance (km)[1]
Ammonia, anhydrous	Ammonia	gas	50 - 199	gallons	corrosive, acute health hazard	1.1
Boron trichloride	Boron trichloride	gas	1,000 – 4,999	cubic feet	corrosive, poisonous gas	1.6
Chlorine	Chlorine	gas	50 – 199	gallons	poisonous gas	6.8
Hydrochloric acid	Hydrochloric acid	liquid	5,000 – 9,999	gallons	corrosive, acute health hazard	4.3
Hydrofluoric acid	Hydrofluoric acid	liquid	200 – 499	gallons	corrosive, acute health hazard	2.9
Sulfuric acid 10 to 50%	Sulfuric acid	liquid	200 – 499	gallons	corrosive, acute health hazard	5.6
Sulfuric acid	Sulfuric acid	liquid	1,000 – 4,999	gallons	corrosive, reactive material acute health hazard	5.6

[1] Protect distance (km) is for nighttime large spills. Distances for small spills and for daytime spills are given in Table 3.13.

For each of these hazardous materials, Table 3.13 in Section 3.4 has important reference and response information. Table 3.13 includes references to the appropriate emergency response Guide Number, initial isolation distances, protection distances downwind (day and night) for both small and large spills (**2000 Emergency Response Guidebook**).

This facility has an emergency plan and procedures in place under the auspices of the EHS Office in Building 4.

Potential community impacts are moderate for this facility. Spills of any of the EHS listed above in Table 3.1, or spills of other chemicals at this site, might result in a hazardous plume downwind. However, most of the quantities at this facility are relatively small and, therefore, the potential for a major hazardous materials incident is relatively low.

3.1.2 Oregon State University Nuclear Reactor, Corvallis

In the United States, nuclear reactors have been operating since the 1940s, with a generally excellent overall safety record. Nevertheless, because of a general fear of radiation, and the possibility of significant accidents such as that at the Three Mile Island power plant in Pennsylvania or a major accident such as that at Chernobyl in the former Soviet Union, the safety of nuclear reactors certainly warrants evaluation.

The OSU research reactor, operating by the Department of Nuclear Engineering, is much smaller than reactors used for commercial production of electric power. The OSU reactor is licensed by the NRC to operate at a maximum sustained power of 1.1 megawatts (1100 kilowatts) or about 1000 times less than the power levels typical in commercial power reactors.

The OSU reactor is a TRIGA Mk. II reactor manufactured by the General Atomics Company. General information about the OSU reactor is given on the OSU Radiation Center website (www.ne.orst.edu/facilities/radiation/ostr.html). The reactor is a water-cooled swimming pool type reactor which uses uranium/zirconium hydride fuel elements in a circular grid array. The reactor core is surround by a ring of graphite that serves to reflect neutrons back into the core. The core is situated near the bottom of a 22 feet deep water-filled tank, and the tank is surrounded by a concrete monolith that acts as a radiation shield and also provides structural support for the tank.

Commercial power reactors in the United States are of two basic design types: pressurized water systems and boiling water systems. Operational safety for either design type is provided by robust design and testing of components, by multiply redundant backup safety systems, and by massive containment buildings around reactors. However, both these types of reactors rely on active safety control systems. In the event of failures of the primary reactor control mechanisms, active systems involving electric power, pumps, cooling water etc. are triggered to control the nuclear core and prevent "runaway" reactions that could lead, in the worst case scenario, to major accidents with substantial release of radiation.

The OSU reactor is a completely different design than designs used by commercial power reactors. For the OSU reactor, operational safety is inherent to the design and achieved passively, rather than relying on external, active controls. If normal control of the OSU reactor is lost, for any reason, the reactor reduces power within a few thousands of a second. This almost instantaneous passive control is achieved by the fuel rod design. If the normal graphite control rods are removed, the fuel rods begin to warm due to the ongoing nuclear decay in the fuel. However, for the OSU reactor design this warming immediately results in lower nuclear activity and a consequent decrease in operating power. This self-regulating, passive control system thus does not depend on any external system to prevent runaway reactions. In other words, the fuel rod system is inherently stable with runaway heating being physically impossible.

In total, the small reactor size, the inherently stable passive safety design, and the concrete containment structure provide an extraordinarily high level of operational safety for the OSU reactor. The possibility of significant radiation leakage due to accidents is thus essentially zero.

However, especially in the post September 11th environment, the possibility of deliberate terrorist actions aimed at the OSU reactor, while remote, cannot be categorically excluded. A large conventional explosive device detonated near the reactor core could, in effect, produce a “dirty bomb” or “radiological” bomb. A “dirty” or “radiological” bomb is a device that uses conventional explosives to disperse radioactive materials. Although there is absolutely no possibility of a nuclear explosion, a “dirty” bomb event could locally disperse radiation with resulting significant public health and severe decontamination problems. In light of this possibility, however remote, a review of the physical and operational security of the OSU reactor site is warranted to determine whether or not additional security measures may be appropriate.

For the OSU reactor, separate from the operational safety issues (which are minimal) and the potential terrorist threat (which is remote, but cannot be categorically denied), there are also small quantities of hazardous materials on site. The reports in the Office of State Fire Marshal’s Hazardous Substance Information System (HSIS) lists three materials present at the OSU reactor: compressed gas cylinders with argon and oxygen, and small quantities (less than 5,000 millicuries) of solid radioactive isotopes. Per se, none of these materials pose a significant public health risk. However, the small quantities of radioactive isotopes are of potential terrorist interest for making “dirty” bombs. In this context, a review of the physical and operational security for these radioactive isotopes is warranted to determine whether or not additional security measures may be appropriate.

The OSU reactor has a formal emergency operations plan, outlined in a procedures book, last updated on December 17, 2001 (memo from Steven R. Rease, OSU Reactor Administrator).

Potential community impacts are low for this facility. The possibility of a reactor core accident is negligible, due to the passive safety design of the reactor itself. There are only small quantities of a few hazardous materials at this site. However, the possibility, however, remote, of deliberate terrorist actions cannot be disregarded for this facility and appropriate security measures and emergency planning are recommended.

3.1.3 Western Pulp Products, Corvallis

The Western Pulp Products facility, located at 5005 SW Lowe St., Corvallis, which manufactures molded pulp products and converted paper products, employs about 65 people. The State Fire Marshal’s Hazardous Substance Information System (HSIS) reports for this facility list a total of 32 different chemicals at this facility. These 32 different chemicals contain a wide range of ingredients as the most hazardous component. However, most of these chemicals are present in small quantities. The company data sheet in the Office of State Fire Marshal’s Hazardous Substances Information System (HSIS) indicates that none of the chemicals at this site are included on the list of Extremely Hazardous Substances (EHS). However, the individual chemical data sheets include sulfuric acid, which is on the EHS list and a chemical with trade name Afranil SLO, which is stated to contain formaldehyde as its most hazardous ingredient. Formaldehyde is also on the EHS list. The chemical inventory data for this site also includes fairly large quantities of a chemical with trade name Amres Pr-475 S Wet Strength, which is stated to contain 1,3-dichlor-2-propanol as its most hazardous component.

These chemicals are listed below in Table 3.2.

Table 3.2
Extremely Hazardous Substances and Other Chemicals at the Western Pulp Products Facility, Corvallis

Chemical Trade Name	Most Hazardous Component	Form	Maximum Quantity	Units	Hazard Type	Protect Distance (km)[1]
Afranil SLO	Formaldehyde	liquid	1,000 – 4,999	pounds	flammable liquid - corrosive	N/A[2]
Amres Pr-475 S Wet Strength	1,3-dichloro-propanol	liquid	10,000 – 49,999	pounds	substances – toxic and/or corrosive (combustible)	N/A[2]
Sulfuric acid	Sulfuric acid	liquid	1,000 – 4,999	pounds	corrosive, reactive material acute health hazard	5.6

[1] Protect distance (km) is for nighttime large spills. Distances for small spills and for daytime spills are given in Table 3.13.

[2] N/A indicates that protection distances are not give in the **2000 Emergency Response Guidebook**.

For each of these hazardous materials, Table 3.13 in Section 3.4 has important reference and response information. Table 3.13 includes references to the appropriate emergency response Guide Number, initial isolation distances, protection distances downwind (day and night) for both small and large spills (**2000 Emergency Response Guidebook**). For materials without specific, initial isolation distances, protection distances downwind (day and night) for small and large spills, the generic public safety guidance is an immediate isolation distance of 25 to 50 meters from a spill site.

The Office of State Fire Marshal's Hazardous Material Information System (HSIS) database does not indicate that this facility emergency procedures/plans in place.

Potential community impacts are moderate for this facility, which has only one EHS, sulfuric acid. Spills of any of the materials listed above in Table 3.2, or spills of other chemicals at this site, might result in a hazardous plume downwind. However, most of the quantities at this facility are relatively small and, therefore, the potential for a major hazardous materials incident is relatively low.

3.1.4 Wilbur Ellis Co., Monroe

The Wilbur Ellis Co. facility, located at 555 Depot St., Monroe, which provides agricultural chemicals and fertilizer products, employs about 6 people. The State Fire Marshal's Hazardous Substance Information System (HSIS) reports for this facility list a total of 43 different chemicals at this facility. These 43 different chemicals contain a wide range of ingredients as the most hazardous component. However, most of these chemicals are present in small quantities. The company data sheet in the Office of State Fire Marshal's Hazardous Substances Information System (HSIS) indicates that four of the chemicals at this site are included on the Benton County list of Extremely Hazardous Substances (EHS). These EHS chemicals are listed below in Table 3.3

Table 3.3
Extremely Hazardous Substances at the Wilbur Ellis Co Facility, Monroe

Chemical Trade Name	Most Hazardous Component	Form	Maximum Quantity	Units	Hazard Type	Protect Distance (km)[1]
Endosulfan	Endosulfan	liquid	10 – 19	gallons	substances – toxic (non-combustible)	N/A[2]
Aldicarb	0'S-dimethyl acetylphosphoramidothioate	solid	1,000 – 4,999	pounds	substances – toxic (non-combustible)	N/A[2]
Paraquat	1,1-dimethyl-bi-pyridiniuim	liquid	50 – 199	gallons	substances – toxic (non-combustible)	N/A[2]
Ethroprop	Ethroprop	liquid	50 – 199	gallons	substances – toxic (non-combustible)	N/A[2]

[1] Protect distance (km) is for nighttime large spills. Distances for small spills and for daytime spills are given in Table 3.13.

[2] N/A indicates that protection distances are not give in the **2000 Emergency Response Guidebook**.

None of these hazardous materials have specific, initial isolation distances, protection distances downwind (day and night) for small and large spills (**2000 Emergency Response Guidebook**). The generic public safety guidance is an immediate isolation distance of 25 to 50 meters from a spill site.

The Office of State Fire Marshal's Hazardous Material Information System (HSIS) database indicates that this facility has emergency procedures/plans in place, with plans etc. located at the plant office.

In addition to the above EHS materials, this facility also sometimes has large quantities of ammonium nitrate fertilizer, with the maximum amount listed as 500,000 to 749,999 pounds. This material is not particularly toxic, but is of potential terrorist interest as an ingredient for explosives. In this context, a review of the physical and operational security for this material is warranted to determine whether or not additional security measures may be appropriate.

Potential community impacts are moderate for this facility. Spills of any of the EHS listed above in Table 3.3, or spills of other chemicals at this site, might result in a hazardous plume downwind. However, most of the quantities at this facility are relatively small, these hazardous materials are not especially prone to dispersion, and, therefore, the potential for a major hazardous materials incident is relatively low.

3.2 Lane County

3.2.1 Borden Chemical, Springfield

The Borden Chemical facility located at 470 S. Second Street in Springfield, which manufactures and processes synthetic resins, employs about 75 people. The State Fire Marshal's Hazardous Substance Information System (HSIS) reports for this facility list a total of 111 different chemicals at this facility. These 111 different chemicals contain a wide range of ingredients as the most hazardous component. However, most of these chemicals are present in small quantities. The company data sheet in the Office of State Fire Marshal's Hazardous Substances Information System (HSIS) indicates that three of the chemicals at this site are included on the Lane County list of Extremely Hazardous Substances (EHS). These EHS chemicals are listed below in Table 3.4

Table 3.4
Extremely Hazardous Substances at the Borden Chemical Facility, Springfield

Chemical Trade Name	Most Hazardous Component	Form	Maximum Quantity	Units	Hazard Type	Protect Distance (km)[1]
Phenol	Phenol	liquid	50,000 – 99,999	gallons	combustible, acute health hazard	N/A[2]
Muriatic acid	Hydrochloric acid	liquid	20 - 49	gallons	corrosive, acute health hazard	4.3
Sulfuric acid	Sulfuric acid	liquid	5,000 – 9,999	gallons	corrosive, acute health hazard, reactive material	5.6

[1] Protect distance (km) is for nighttime large spills. Distances for small spills and for daytime spills are given in Table 3.13.

[2] N/A indicates that protection distances are not give in the **2000 Emergency Response Guidebook**.

For each of these hazardous materials, Table 3.13 in Section 3.4 has important reference and response information. Table 3.13 includes references to the appropriate emergency response Guide Number, initial isolation distances, protection distances downwind (day and night) for both small and large spills (**2000 Emergency Response Guidebook**). For materials without specific, initial isolation distances, protection distances downwind (day and night) for small and large spills, the generic public safety guidance is an immediate isolation distance of 25 to 50 meters from a spill site.

At various times, this site also contains large quantities of acetone resin (combustible material), Cascamid PAB-50 (diethylene triamine, misc. hazardous material), formaldehyde solution (corrosive, combustible material, chronic health hazard), LIG-036 (sodium lignosulfonate, corrosive), melamine (misc. hazardous material), methyl alcohol (flammable liquid, acute health hazard, poisonous material), phenol formaldehyde resin (flammable liquid, reactive material, corrosive), polyamide resin (flammable liquid, acute health hazard), and others.

The Office of State Fire Marshal's Hazardous Material Information System (HSIS) database indicates that this facility has emergency procedures/plans in place, with plans etc. located a box at the north entrance behind a shed.

Potential community impacts are moderate to high for this facility. Spills of any of the EHS listed above in Table 3.4, or spills of other chemicals at this site, might result in a hazardous plume downwind. The large quantity of phenol is also flammable. This site also has large quantities of hazardous materials, including flammable liquids, not on the list of EHS. Given the quantities of materials at this site, the potential for a major hazardous materials incident is moderate to high.

3.2.2 City of Eugene Waste Water Treatment Plant, Eugene

The City of Eugene Waste Water Treatment Plant facility located at 420 River Avenue in Eugene, which treats wastewater, employs about 75 people. The State Fire Marshal's Hazardous Substance Information System (HSIS) reports for this facility list a total of 21 different chemicals at this facility. These 21 different chemicals contain a wide range of ingredients as the most hazardous component. However, most of these chemicals are present in small quantities. The company data sheet in the Office of State Fire Marshal's Hazardous Substances Information System (HSIS) indicates that two of the chemicals at this site are included on the Lane County list of Extremely Hazardous Substances (EHS). These EHS chemicals are listed below in Table 3.5

Table 3.5
Extremely Hazardous Substances at the City of Eugene Waste Water Treatment Plant, Eugene

Chemical Trade Name	Most Hazardous Component	Form	Maximum Quantity	Units	Hazard Type	Protect Distance (km)[1]
Chlorine gas	chlorine	gas	10,000 – 49,999	gallons	poison gas, oxidizer	6.8
Sulfur dioxide	sulfur dioxide	gas	1,000 – 4,999	gallons	acute health hazard, chronic health hazard	7.2

[1] Protect distance (km) is for nighttime large spills. Distances for small spills and for daytime spills are given in Table 3.13.

For each of these hazardous materials, Table 3.13 in Section 3.4 has important reference and response information. Table 3.13 includes references to the appropriate emergency response Guide Number, initial isolation distances, protection distances downwind (day and night) for both small and large spills (**2000 Emergency Response Guidebook**).

At various times, this site also contains large quantities of activated carbon (combustible material), and methane (flammable gas).

The Office of State Fire Marshal's Hazardous Material Information System (HSIS) database indicates that this facility has emergency procedures/plans in place, with plans etc. located in the operations building at the operations console.

Potential community impacts are moderate to high for this facility. Spills of chlorine or sulfur dioxide are likely to result in a hazardous plume downwind. The potential for a major hazardous materials incident is moderate to high, reflecting the dispersion characteristics and quantities of the two EHS at this site.

3.2.3 Dynea Corporation, Springfield

The Dynea Corporation facility located at 475 North 28th Street in Springfield, which manufactures adhesives for the wood industry, employs about 97 people. The State Fire Marshal's Hazardous Substance Information System (HSIS) reports for this facility list a total of 113 different chemicals at this facility. These 113 different chemicals contain a wide range of ingredients as the most hazardous component. However, most of these chemicals are present in small quantities. The company data sheet in the Office of State Fire Marshal's Hazardous Substances Information System (HSIS) indicates that three of the chemicals at this site are included on the Lane County list of Extremely Hazardous Substances (EHS). These EHS chemicals are listed below in Table 3.6

Table 3.6
Extremely Hazardous Substances at the Dynea Corporation Facility, Springfield

Chemical Trade Name	Most Hazardous Component	Form	Maximum Quantity	Units	Hazard Type	Protect Distance (km)[1]
Formaldehyde solution (50%)	Formaldehyde	liquid	250,000 – 499,999	gallons	combustible acute health hazard chronic health hazard	N/A[2]
Phenol	Phenol	liquid	100,000 – 249,999	gallons	combustible, acute health hazard	N/A[2]
Ammonia, anhydrous	Ammonia	gas	5,000 – 9,999	gallons	corrosive, acute health hazard	1.1

[1] Protect distance (km) is for nighttime large spills. Distances for small spills and for daytime spills are given in Table 3.13.

[2] N/A indicates that protection distances are not give in the **2000 Emergency Response Guidebook**.

For each of these hazardous materials, Table 3.13 in Section 3.4 has important reference and response information. Table 3.13 includes references to the appropriate emergency response Guide Number, initial isolation distances, protection distances downwind (day and night) for both small and large spills (**2000 Emergency Response Guidebook**). For materials without specific, initial isolation distances, protection distances downwind (day and night) for small and large spills, the generic public safety guidance is an immediate isolation distance of 25 to 50 meters from a spill site.

At various times, this site also contains large quantities of ammonium sulfate (acute health hazard), catalyst-metal oxide (molybdenum trioxide, chronic health hazard), hexamethylenetetramine (flammable solid, acute health hazard), melamine (misc. hazardous material), methanol (flammable liquid, acute health hazard, chronic health hazard), resorcinol (combustible, acute health hazard), sodium hydroxide (corrosive, acute health hazard), sodium sulfate (acute health hazard), sulfamic acid (corrosive, acute health hazard, urea (acute health hazard), and others.

The Office of State Fire Marshal's Hazardous Material Information System (HSIS) database indicates that this facility has emergency procedures/plans in place, with plans etc. located in the Resin Plant lunch room.

Potential community impacts are moderate for this facility. Spills of any of the EHS listed above in Table 3.6, or of other chemicals at this site, might result in a hazardous plume downwind.. However, most of these hazardous materials are not especially prone to dispersion and, therefore, the potential for a major hazardous materials incident is moderate. Ammonia is lighter than air and thus tends to dissipate upwards into the atmosphere more quickly that heavier gases.

3.2.4 Georgia Pacific Resins, Eugene

The Georgia Pacific Resin facility located at 2665 Highway 99 North in Eugene, which manufactures synthetic adhesives, employs about 25 people. The State Fire Marshal's Hazardous Substance Information System (HSIS) reports for this facility list a total of 58 different chemicals at this facility. These 58 different chemicals contain a wide range of ingredients as the most hazardous component. However, most of these chemicals are present in small quantities. The company data sheet in the Office of State Fire Marshal's Hazardous Substances Information System (HSIS) indicates that six of the chemicals at this site are included on the Lane County list of Extremely Hazardous Substances (EHS). These EHS chemicals are listed below in Table 3.7

Table 3.7
Extremely Hazardous Substances at the Georgia Pacific Resins Facility, Eugene

Chemical Trade Name	Most Hazardous Component	Form	Maximum Quantity	Units	Hazard Type	Protect Distance (km)[1]
Sulfuric acid 93%	Sulfuric acid		1,000 – 4,999	Gallons	Corrosive, Acute health hazard	5.6
Formaldehyde	Formaldehyde		10,000 - 49,999	Gallons	Combustible, Acute health hazard, Chronic health hazard	N/A[2]
Hydrochloric acid	Hydrochloric acid		200 – 499	Gallons	Corrosive, Acute health hazard	4.3
Ethylenediamine	Ethylenediamine		50 – 199	Gallons	Corrosive, Acute health hazard	N/A[2]
Resin polyamide	Epichlorohydrin		250,000 – 499,999	Gallons	Misc. hazardous material	N/A[2]
Phenol	Phenol		250,000 – 499,999	Gallons	Combustible, Acute health hazard	N/A[2]

[1] Protect distance (km) is for nighttime large spills. Distances for small spills and for daytime spills are given in Table 3.13.

[2] N/A indicates that protection distances are not give in the **2000 Emergency Response Guidebook**.

For each of these hazardous materials, Table 3.13 in Section 3.4 has important reference and response information. Table 3.13 includes references to the appropriate emergency response Guide Number, initial isolation distances, protection distances downwind (day and night) for both small and large spills (**2000 Emergency Response Guidebook**). For materials without specific, initial isolation distances, protection distances downwind (day and night) for small and large spills, the generic public safety guidance is an immediate isolation distance of 25 to 50 meters from a spill site.

At various times, this site also contains large quantities of adipic acid (misc. hazardous material), diethylenetriamine (corrosive, acute health hazard), hexamethylenetetramine (flammable solid, acute health hazard), melamine (misc. hazardous material), methanol (flammable liquid, chronic health hazard, acute health hazard), resorcinol (combustible, acute health hazard), sodium hydroxide (corrosive, acute health hazard), urea (acute health hazard), and others.

The Office of State Fire Marshal's Hazardous Material Information System (HSIS) database indicates that this facility has emergency procedures/plans in place, with plans etc. located in the control room.

Potential community impacts are moderate to high for this facility. Spills of any of the EHS listed above in Table 3.7, or of other chemicals at this site, might result in a hazardous plume downwind. The potential for a major hazardous materials incident is moderate to high, based on the number and quantities of hazardous materials at this site.

3.2.5 Hunton's Sure Crop Farm, Junction City

The Hunton's Sure Crop Farm facility located at 28410 Milliron Road, in Junction City, which is a wholesale/retail store for fertilizer and agricultural chemicals, employs about 18 people. The State Fire Marshal's Hazardous Substance Information System (HSIS) reports for this facility list a total of 102 different chemicals at this facility. These 102 different chemicals contain a wide range of ingredients as the most hazardous component. However, most of these chemicals are present in small quantities. The company data sheet in the Office of State Fire Marshal's Hazardous Substances Information System (HSIS) indicates that two of the chemicals at this site are included on the Lane County list of Extremely Hazardous Substances (EHS). These EHS chemicals are listed below in Table 3.8

Table 3.8
Extremely Hazardous Substances at the Hunton's Sure Crop Farm Facility, Junction City

Chemical Trade Name	Most Hazardous Component	Form	Maximum Quantity	Units	Hazard Type	Protect Distance (km)[1]
Dyfonate	O-ethyl-s-phenyethyl-phophonodithioate	liquid	50-199	gallons	pesticide, acute health hazard	N/A[2]
Ammonia, anhydrous	Ammonia	gas	10,000 – 49,999	gallons	corrosive, acute health hazard	1.1

[1] Protect distance (km) is for nighttime large spills. Distances for small spills and for daytime spills are given in Table 3.13.

[2] N/A indicates that protection distances are not give in the **2000 Emergency Response Guidebook**.

For each of these hazardous materials, Table 3.13 in Section 3.4 has important reference and response information. Table 3.13 includes references to the appropriate emergency response Guide Number, initial isolation distances, protection distances downwind (day and night) for both small and large spills (**2000 Emergency Response Guidebook**). For materials without specific, initial isolation distances, protection distances downwind (day and night) for small and large spills, the generic public safety guidance is an immediate isolation distance of 25 to 50 meters from a spill site.

At various times, this site also contains large quantities of ammonium polyphosphate, ammonium thiosulfate, ammonium sulfate, mono-ammonium phosphate (all of which are misc. hazardous materials), urea (acute health hazard), and others. This facility also has relatively small quantities of numerous pesticides and herbicides.

The Office of State Fire Marshal's Hazardous Material Information System (HSIS) database indicates that this facility has emergency procedures/plans in place, with plans etc. located in the main office.

Potential community impacts are moderate to high for this facility. Spills of any of the EHS listed above in Table 3.8, or of other chemicals at this site, might result in a hazardous plume downwind. The potential for a major hazardous materials incident is moderate to high, based on the number and quantities of hazardous materials at this site.

3.3 Linn County

3.3.1 Georgia Pacific Corporation, Halsey

The Georgia Pacific Corporation facility located at 30470 American Drive in Halsey, which is a paper mill and converting facility, employs about 570 people. The State Fire Marshal's Hazardous Substance Information System (HSIS) reports for this facility list a total of 67 different chemicals at this facility. These 67 different chemicals contain a wide range of ingredients as the most hazardous component. However, most of these chemicals are present in small quantities. The company data sheet in the Office of State Fire Marshal's Hazardous Substances Information System (HSIS) indicates that two of the chemicals at this site are included on the Linn County list of Extremely Hazardous Substances (EHS). These EHS chemicals are listed below in Table 3.9

Table 3.9
Extremely Hazardous Substances at the Georgia Pacific Corporation Facility, Halsey

Chemical Trade Name	Most Hazardous Component	Form	Maximum Quantity	Units	Hazard Type	Protect Distance (km)[1]
Sulfuric acid	Sulfuric acid	liquid	1,000 – 4,999	gallons	corrosive, reactive material, acute health hazard	5.6
Hydrogen peroxide	Hydrogen peroxide	liquid	10,000 – 49,999	gallons	corrosive, oxidizer, acute health hazard	N/A[2]

[1] Protect distance (km) is for nighttime large spills. Distances for small spills and for daytime spills are given in Table 3.13.

[2] N/A indicates that protection distances are not give in the **2000 Emergency Response Guidebook**.

For each of these hazardous materials, Table 3.13 in Section 3.4 has important reference and response information. Table 3.13 includes references to the appropriate emergency response Guide Number, initial isolation distances, protection distances downwind (day and night) for both small and large spills (**2000 Emergency Response Guidebook**). For materials without specific, initial isolation distances, protection distances downwind (day and night) for small and large spills, the generic public safety guidance is an immediate isolation distance of 25 to 50 meters from a spill site.

At various times, this site also contains large quantities of AMRES C-25 (1,3-dichloro-2-propanol, misc. hazardous material), sodium hypochlorite (oxidizer, corrosive), carboxy methylcellulose (misc. hazardous material), debonder (quartenary amine, acute health hazard), propane (flammable gas, acute health hazard), resin FJ45 (glyoxyl, acute health hazard), sodium hydrosulfite (flammable solid, dangerous when wet, acute health hazard), sodium sulfite (acute health hazard), ammonium nitrate (misc. hazardous material), and others,

The Office of State Fire Marshal's Hazardous Material Information System (HSIS) database indicates that this facility has emergency procedures/plans in place, with plans etc. located in the fire house.

Potential community impacts are moderate to high for this facility. Spills of any of the EHS listed above in Table 3.9, or of other chemicals at this site, might result in a hazardous plume downwind. The potential for a major hazardous materials incident is moderate to high, based on the number and quantities of hazardous materials at this site.

3.3.2 Oregon Freeze Dry, Albany

The Oregon Freeze Dry facilities located at 770 W 29th Avenue and 525 SW 25th Avenue in Albany, which process freeze dried foods and other materials, employ about 280 people. The State Fire Marshal's Hazardous Substance Information System (HSIS) reports for this facility list a total of 30 and 31 different chemicals at these two facilities, respectively. These different chemicals contain a wide range of ingredients as the most hazardous component. However, most of these chemicals are present in small quantities. The company data sheet in the Office of State Fire Marshal's Hazardous Substances Information System (HSIS) indicates that three of the chemicals at this site are included on the Linn County list of Extremely Hazardous Substances (EHS). These EHS chemicals are listed below in Table 3.9

Table 3.10
Extremely Hazardous Substances at the Oregon Freeze Dry Facilities, Albany

Chemical Trade Name	Most Hazardous Component	Form	Maximum Quantity	Units	Hazard Type	Protect Distance (km)[1]
Sulfuric acid	Sulfuric acid	liquid	50 - 199	gallons	corrosive, reactive material, acute health hazard	5.6
Ammonia, anhydrous	Ammonia	gas	5,000 – 9,999	gallons	corrosive, acute health hazard	1.1
Hydrochloric acid	Hydrochloric acid	liquid	10,000 – 49,999	gallons	corrosive, acute health hazard	4.3

[1] Protect distance (km) is for nighttime large spills. Distances for small spills and for daytime spills are given in Table 3.13.

Sulfuric acid and ammonia are located at both of the Oregon Freeze Dry facilities. Hydrochloric acid is listed for only the 25th Avenue facility.

For each of these hazardous materials, Table 3.13 in Section 3.4 has important reference and response information. Table 3.13 includes references to the appropriate emergency response Guide Number, initial isolation distances, protection distances downwind (day and night) for both small and large spills (**2000 Emergency Response Guidebook**

At various times, these sites also contain large quantities ammonium nitrate (corrosive, acute health hazard), and TRIS Nitro 50% solution (TRIS(Hydroxymethyl)nitro methane, pesticide), and others.

The Office of State Fire Marshal's Hazardous Material Information System (HSIS) database indicates that this facility has emergency procedures/plans in place, with plans etc. located in the engineering office and posted in work areas.

Potential community impacts are moderate to high for this facility. Spills of any of the EHS listed above in Table 3.10, or of other chemicals at this site, might result in a hazardous plume downwind. The potential for a major hazardous materials incident is moderate to high, based on the number and quantities of hazardous materials at this site.

A undated, recent risk management summary published by Oregon Freeze Dry notes that the facilities had accidental releases of ammonia in 1997, 1998, and 1999. These releases were 100 pounds, 1,375 pounds, and 3 pounds, respectively. In the 1998 accident, one employee was killed. None of these accidental releases had off-site effects.

The risk management summary noted two worst case scenario accidents for ruptures of tanks at two plants, releasing 3,999 pounds and 2375 pounds of ammonia, respectively. For these two scenarios, under worst-case weather scenarios, the ammonia clouds were estimated to travel 1.6 and 1.4 miles, respectively, affecting 9,763 and 7,032 people, respectively. These worst-case scenario impacts are useful for emergency planning purposes.

NOTE: for this report, specific histories of accidental releases and the evaluation of worst-case scenarios were available only for the Oregon Freeze Dry facilities. Given the large number of chemicals at many other sites, accidental releases are likely at other sites as well. Similarly, worst-case scenarios are a useful part of emergency planning and presumably exist for other sites as well. These examples are presented here for the Oregon Freeze Dry facilities for the sole purpose of illustrating these planning concepts. Inclusion of these summaries here should not be interpreted to mean that the potential for future accidents is higher at Oregon Freeze Dry than at the other example facilities in this report.

3.3.3 Pope & Talbot, Halsey

The Pope & Talbot facility located at 30480 American Drive in Halsey, which is a bleached kraft paper, employs about 200 people. The State Fire Marshal's Hazardous Substance Information System (HSIS) reports for this facility list a total of 54 different chemicals at this facility. These 54 different chemicals contain a wide range of ingredients as the most hazardous component. However, most of these chemicals are present in small quantities. The company data sheet in the Office of State Fire Marshal's Hazardous Substances Information System (HSIS) indicates that four of the chemicals at this site are included on the Linn County list of Extremely Hazardous Substances (EHS). These EHS chemicals are listed below in Table 3.11

Table 3.11
Extremely Hazardous Substances at the Pope & Talbot Facility, Halsey

Chemical Trade Name	Most Hazardous Component	Form	Maximum Quantity	Units	Hazard Type	Protect Distance (km)[1]
Sulfuric acid	Sulfuric acid	liquid	1,000 - 4999	gallons	corrosive, reactive material, acute health hazard	5.6
Hydrogen peroxide	Hydrogen peroxide	liquid	10,000 – 49,999	gallons	corrosive, Oxidizer, acute health hazard	N/A[2]
Chlorine	Chlorine	gas	50,000 – 99,999	gallons	oxidizer, poison gas	6.8
Muriatic acid	Hydrochloric acid	liquid	200 – 499	gallons	corrosive, acute health hazard	4.3

[1] Protect distance (km) is for nighttime large spills. Distances for small spills and for daytime spills are given in Table 3.13.

[2] N/A indicates that protection distances are not give in the **2000 Emergency Response Guidebook**.

For each of these hazardous materials, Table 3.13 in Section 3.4 has important reference and response information. Table 3.13 includes references to the appropriate emergency response Guide Number, initial isolation distances, protection distances downwind (day and night) for both small and large spills (**2000 Emergency Response Guidebook**). For materials without specific, initial isolation distances, protection distances downwind (day and night) for small and large spills, the generic public safety guidance is an immediate isolation distance of 25 to 50 meters from a spill site.

At various times, this site also contains large quantities of anthraquinone (acute health hazard), black liquor (sodium hydroxide, corrosive, acute health hazard), fuel oil (combustible), chlorine dioxide (oxidizer, poison gas), green liquor (sodium hydroxide, acute and chronic health hazard), lime (calcium oxide, corrosive and acute health hazard), methanol (flammable liquid and acute and chronic health hazard), monoethanolamine (corrosive, acute and chronic health hazard), propane (flammable gases, acute health hazard), sodium carbonate (dangerous when wet, corrosive), sodium bisulfite (acute health hazard) sodium chlorate (oxidizer, pesticide), sodium hydroxide (corrosive, reactive material, acute health hazard), white liquor (sodium hydroxide, corrosive, acute health hazard), and others,

The Office of State Fire Marshal's Hazardous Material Information System (HSIS) database indicates that this facility has emergency procedures/plans in place, with plans etc. located in the human resources office.

Potential community impacts are moderate to high for this facility. Spills of any of the EHS listed above in Table 3.11, or of other chemicals at this site, might result in a hazardous plume downwind. The potential for a major hazardous materials incident is moderate to high, based on the number and quantities of hazardous materials at this site.

3.3.4 Wyman-Gordon Titanium Castings, Albany

The Wyman-Gordon Titanium Castings facility located at 150 SW Queen Drive in Albany, which produces titanium metal castings, employs about 230 people. The State Fire Marshal's Hazardous Substance Information System (HSIS) reports for this facility list a total of 25 different chemicals at this facility. These 25 different chemicals contain a wide range of ingredients as the most hazardous component. However, most of these chemicals are present in small quantities. The company data sheet in the Office of State Fire Marshal's Hazardous Substances Information System (HSIS) indicates that two of the chemicals at this site are included on the Linn County list of Extremely Hazardous Substances (EHS). These EHS chemicals are listed below in Table 3.12

Table 3.12
Extremely Hazardous Substances at the Wyman-Gordon Titanium Casting Facility, Albany

Chemical Trade Name	Most Hazardous Component	Form	Maximum Quantity	Units	Hazard Type	Protect Distance (km)[1]
Sulfuric acid	Sulfuric acid	liquid	200 - 499	gallons	corrosive, reactive material, acute health hazard	5.6
Hydrofluoric acid	Hydrofluoric acid	liquid	10,000 – 49,999	gallons	corrosive, reactive material, poisonous	2.9
Muriatic acid	Hydrochloric acid	liquid	1,000 – 4,999	gallons	corrosive pesticide acute health hazard	4.3
Ammonia, anhydrous	Ammonia	gas	50,000 – 99,999	cubic feet	corrosive, acute health hazard	1.1

[1] Protect distance (km) is for nighttime large spills. Distances for small spills and for daytime spills are given in Table 3.13.

[2] N/A indicates that protection distances are not give in the **2000 Emergency Response Guidebook**.

For each of these hazardous materials, Table 3.13 in Section 3.4 has important reference and response information. Table 3.13 includes references to the appropriate emergency response Guide Number, initial isolation distances, protection distances downwind (day and night) for both small and large spills (**2000 Emergency Response Guidebook**).

At various times, this site also contains large quantities of acetylene (flammable gas, acute health hazard), BC-100 (glycol ether, misc. hazardous material), ethyl alcohol (flammable liquid, poisonous material), nitric acid (corrosive, oxidizer) and others,

The Office of State Fire Marshal's Hazardous Material Information System (HSIS) database indicates that this facility has emergency procedures/plans in place, with plans etc. located in the safety coordinators office.

Potential community impacts are moderate to high for this facility. Spills of any of the EHS listed above in Table 3.12, or of other chemicals at this site, might result in a hazardous plume downwind. The potential for a major hazardous materials incident is moderate to high, based on the number and quantities of hazardous materials at this site.

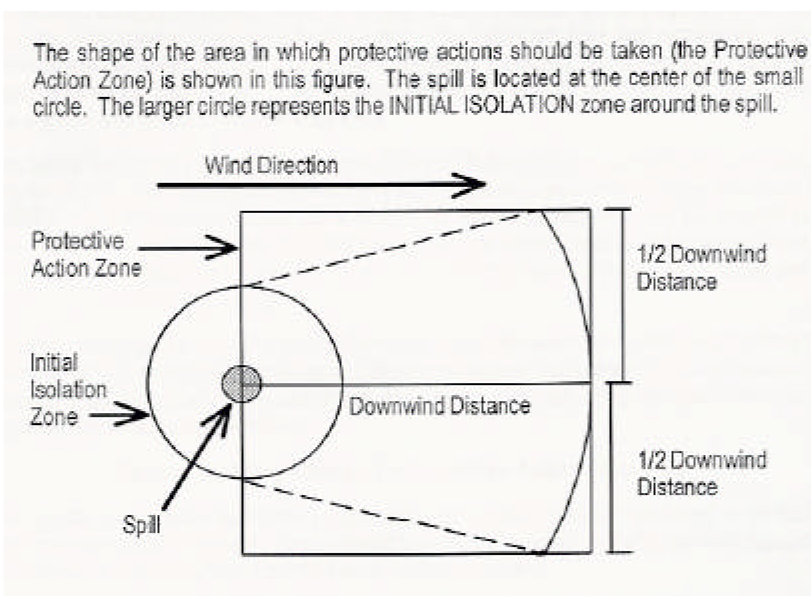
3.4 Reference Information for Hazardous Materials Incidents Emergency Response

Sections 3.1, 3.2 and 3.3 reviewed the inventories of the most hazardous materials at selected sites in Benton, Lane, and Linn Counties, respectively. For each of these identified hazardous materials, this section provides references to the appropriate Guide Number in the **2000 Emergency Response Guidebook**, along with the corresponding initial isolation distances and protective action distances. Initial isolation distances are given for both large and small spills. Protective action distances are given for both small and large spills and for day and night conditions. See Table 3.13 below; all of this information is from the **2000 Emergency Response Guidebook**.

As per the **2000 Emergency Response Guidebook**, small spills are defined as one that involves a single small package (e.g., a drum containing up to approximately 200 liters), a small cylinder or a small leak from a large package. A large spill is one that involves a spill from a large package or multiple spills from many small packages. For very large spills, that involve more than one tank car, cargo tank, portable tank or large cylinder, the large spill distances may need to be increased.

As per the **2000 Emergency Response Guidebook**, protective distances are defined in the downwind direction from the spill site. The width of the protective distance is equal to 50% of the downwind protect distance on each side of the wind direction. In other words, the total protect area is a square with sides equal to the defined protect distance. See Figure 3.1 below from the **2000 Emergency Response Guidebook**.

Figure 3.1
Initial Isolation Zone and Protective Action Zones for Hazardous Material Spills



See the **2000 Emergency Response Guide** section on Introduction to the Table of Initial Isolation and Protective Action Distances (Page 311) for factors which may increase or decrease Protective Action Distances

Table 3.13
Extremely Hazardous Substances: Reference Data from 2000 Emergency Response Guide

Most Hazardous Ingredient	Guide Number	Guide Category	Small Spills			Large Spills		
			Isolation Distance (m)	Day Protect Distance (km)	Night Protect Distance (km)	Isolation Distance (m)	Day Protect Distance (km)	Night Protect Distance (km)
Ammonia	125	Gases - corrosive	30	0.2	0.2	60	0.5	1.1
Boron trichloride	125	Gases - corrosive	30	0.2	0.3	60	0.6	1.6
Chlorine	124	Gases – toxic and/or corrosive - oxidizing	30	0.3	1.1	275	2.7	6.8
Hydrochloric acid[1]	157	Substances – toxic and/or corrosive (non-combustible/water-sensitive)	30	0.2	0.6	185	1.6	4.3
Hydrofluoric acid	157	Substances – toxic and/or corrosive (non-combustible/water-sensitive)	30	0.2	0.6	125	1.1	2.9
Sulfur dioxide	125	Gases – corrosive	30	0.3	1.1	185	3.1	7.2
Sulfuric acid	137	Substances – water reactive - corrosive	60	0.3	1.1	305	2.1	5.6

[1] For hydrochloric acid and hydrofluoric acid, the isolation and protect distances are for hydrogen chloride anhydrous and hydrogen fluoride anhydrous, respectively, because the 2000 ERG did not have specific listing for these acids.

The **2000 Emergency Response Guidebook** has excellent general guidance on the decision factors that govern protective actions appropriate for a given incident. This guidance is given below verbatim.

The protective action distances given above in Table 3.13 are for general guidance only. For each specific hazardous material incident, the HazMat Response Team incident commander makes incident specific decisions based on the specific conditions of each incident.

PROTECTIVE ACTION DECISION FACTORS TO CONSIDER

"The choice of protective actions for a given situation depends on a number of factors. For some cases, evacuation may be the best option; in others, sheltering in-place may be the best course. Sometimes, these two actions may be used in combination. In any emergency, officials need to quickly give the public instructions. The public will need continuing information and instructions while being evacuated or sheltered-in-place.

Proper evaluation of the factors below will determine the effectiveness of evacuation or in-place protection. The importance of these factors can vary with emergency conditions. In specific emergencies, other factors may need to be identified and considered as well. This list indicates what type of information may be needed to make the initial decision.

The Dangerous Goods

- Degree of health hazard
- mount involved
- Containment/control of release
- Rate of vapor movement

The Population Threatened

- Location
- Number of people
- Time available to evacuate or shelter in-place
- Ability to control evacuation or shelter in-place
- Building types and availability
- Special institutions or population, e.g., nursing homes, hospitals, prisons

Weather Conditions

- Effect on vapor and cloud movement
- Potential for change
- Effect on evacuation or shelter-in-place"

Evacuate means to move all people within the protective distance area to a safer place. To evacuate, there must be enough time for people to be warned, to get ready, and to leave the area. If there is enough time, evacuation is usually the best protective action. Evacuations are usually progressive with the first evacuees being people closest to the incident location.

Shelter in-place means that people within the protective distance area are advised to seek shelter inside a building and remain inside until the danger passes. Sheltering in-place is used when evacuation would cause greater risk than staying put, or when an evacuation cannot be performed. For shelter in-place, occupants are advised to close all doors and windows and to shut off all ventilating, heating and cooling systems. Shelter in-place may not be appropriate if: a) vapors are flammable, b) it will take a long time for the hazardous material to clear the area, c) if buildings cannot be closed tightly or d) the hazardous material incident may increase in severity (such as an ongoing fire that might result in release of additional quantities of the hazardous material) .

4.0 Hazardous Materials Commodity Flow Assessment: Truck Shipments

Hazardous materials may be transported once or many times during their "life cycle" of raw materials, manufacturing, incorporation in other products, wholesale and retail trade, use, waste disposal, and recycling. The transport of hazardous materials may be local within a single city or across a state, across the country or internationally.

Hazardous materials may be transported by any transport mode: surface, water or air as well as by pipeline. However, the most common transport modes for hazardous materials are by surface (truck and rail) and by pipelines. In general, hazardous material shipments by air are limited to very small quantities. For Benton, Lane and Linn Counties, shipment of hazardous materials by air and water are minor and are not evaluated in this report.

The United States Department of Transportation (USDOT), Office of Hazardous Materials Safety presented a survey of hazardous materials shipments in the United States.[5] These data are summarized below in Table 4.1

Table 4.1
Hazardous Materials Shipments, Movements and Tons[5]

Product Group	Daily Shipments	Daily Movements	Annual Tons Shipped	Annual Tons Moved
Chemicals & Allied	500,000	900,000	0.53 billion	0.85 billion
Petroleum Products	300,000	300,000	2.60 billion	3.03 billion
Other	10,000	10,000	0.01 billion	0.02 billion
Totals	>800,000	>1,200,000	>3.1 billion	>3.9 billion

In this context, shipment is a delivery of a commodity while movement includes transfers. Transfers may be intramodal (e.g., from one truck to another) or intermodal (e.g., from truck to rail). Single shipments may be a single movement of a commodity or a single shipment may involve several transfers before reaching the delivery point. For planning purposes, the number of movements is significant because accidents may happen during transfers as well as during shipments.

As shown above, the highest percentage of shipments and movements are chemicals, while the highest percentage of tonnage is petroleum products, reflecting the large quantities of petroleum products shipped via pipelines. A detailed breakdown by numbers and percentages of shipments, movements, and tonnage by transportation mode is given below in Table 4.2.

Table 4.2
HazMat Shipments, Movements and Tons by Mode[5]

MODE	Shipments		Movements		Tons Shipped		Tons Moved	
	Number	%	Number	%	Tons	%	Tons	%
Truck	768,907	93.98%	1,154,450	91.83%	3,709,180	42.94%	3,794970	35.27%
Rail	4,315	0.53%	12,945	1.03%	378,916	4.39%	1,136,748	10.57%
Pipeline	873	0.11%	873	0.07%	3,273,750	37.90%	3,273,750	30.43%
Water	335	0.04%	670	0.05%	1,272,925	14.73%	2,545,850	23.66%
Air	43,750	5.35%	87,500	6.96%	4,049	0.05%	8,098	0.08%
Daily Total	818,180	100%	1,256,438	100%	8,838,820	100%	10,759,416	100%

This chapter reviews transport of hazardous materials in the three county areas by truck. Chapters 5 and 6 deal with transport of hazardous materials by rail and pipelines, respectively.

4.1 Shipment of Hazardous Materials by Truck: Overview

The United States Department of Transportation (USDOT) has reviewed historical data on hazardous materials shipments and outlined suggested protocols for conducting hazardous materials commodity flow studies[6]. National data from USODT[5] provide a useful overview of hazardous material transport by truck.

For the time period 1982-1993, about 1.5 billion tons of hazardous materials were transported by truck or rail in the United States[6]. Nearly 50% of this material was gasoline and related petroleum products. Of the total hazardous material shipments, 927 million tons, or about 62% of the total, were transported by truck. These truck shipments were shipped in a total of 467 thousand trucks, which accounted for 93.6 billion ton-miles of hazardous materials traffic. These data indicate an average shipping distance of about 100 miles. During this time period, there was an average of 6175 incidents per year involving a release of hazardous materials. These incidents resulted in an annual average of about 11 fatalities and 249 injuries, including both vehicular accidents and other causes (such as faulty valves). Given the large volume of shipments of hazardous materials, the overall safety record for truck shipments is reasonably good.

The USODT[6] compiled a list of 147 large production volume chemicals that constitute over 80% of the total shipment of hazardous materials by truck in the United States. This list is given below as Table 4.3. For hazard mitigation planning purposes, this list provides general guidance. For example, the nationwide data show sulfuric acid and propane as the two largest volume shipments. These two materials are also likely to be common shipments to and through the three county areas. Other common, widely used materials in the list such as ammonia and chlorine are also likely to be common shipments in and through the three county areas.

However, especially for chemicals used in specific manufacturing processes, there are wide variations from region to region in the volume of shipments. Some large shipping volume chemicals are likely restricted to specific locations with few, if any, shipments to or through the three county areas. On the other hand, the specific mix of industry in the three county areas will necessarily generate shipments of the materials necessary for this industry. Thus, the relative proportions of some hazardous materials will differ substantially for Benton, Lane and Linn

Counties, compared to the national data. For example, as shown in Table 2.8, local industries use large volumes of formaldehyde and phenol. Thus, shipments of these materials will constitute larger proportion of hazardous materials shipments for the three county areas than reflected in the national data.

Table 4.3
USDOT List of Large Production Volume (thousands of short tons) Hazardous Chemicals[6]

Chemical	Volume	Chemical	Volume
Sulfuric Acid	39,235	Acrylic Acid	550
Propane	26,896	Hexamethylenediamine	543
Nitrogen	24,515	Isobutylene	518
Oxygen	16,669	Hydrogen Cyanide	516
Ammonia	16,100	Methyl Methacrylate	514
Calcium Oxide	15,733	Phthalic Anhydride	508
Sodium Hydroxide	11,486	O-Xylene	470
Chlorine Gas	11,019	Methylene-Diphenylene	
Phosphoric Acid	10,685	Diisocynate	467
Sulfur	10,321	Cyclohexanone	465
Carbon Dioxide	8,307	Barite	448
Ethylene Dichloride	7,878	Aniline	430
Ammonium Nitrate	7,612	Hexane	426
Nitric Acid (100% HNO3)	7,225	Phosgene	421
Benzene	5,904	Linear Alkylate Sulfonate	399
Ethylbenzene	4,630	Hydrogen	389
Vinyl Chloride	4,201	Carbon Tetrachloride	374
Styrene	4,007	Acetaldehyde	363
Methanol	3,769	Toluene Diisocyanate	357
Toluene	3,223	Methylchloroform	347
Ethylene Oxide	2,921	Phosphorus	344
Hydrochloric Acid (100%)	2,869	Methyl Ethyl Ketone	336
P-Xylene	2,578	Sodium Chlorate	289
Methyl- T -Butyl Ether	1,757	Tripropylene (Nonene)	275
Phenol	1,676	Hydrofluoric Acid	274
Acetic Acid, Synthetic	1,623	Methyl Chloride	261
1,3-Butadiene	1,465	Methylene Dichloride	259
Ethanol (Synthetic)	1,434	N-Butyl Acrylate	258
Aluminum Sulfate	1,426	Potassium Hydroxide	246
Carbon Black	1,362	Perchloroethylene	237
Vinyl Acetate	1,253	1-Butene	231
Acrylonitrile	1,250	Calcium Carbide	230
Formaldehyde	1,232	Sulfur Dioxide	29
Cyclohexane	1,137	Epichlorohydrin	25
Propylene Oxide	1,105	Chloroform	224
Acetone	1,048	Propylene Tetramer	200
Butyraldehyde	879	Maleic Anhydride	193
Acetic Anhydride	858	Dichlorodifluoromethane	184
Adipic Acid	795	Acetylene	182
Isopropanol	685	Carbon Disulfide	180
Nitrobenzene	625	Ethylene Glycol Monoobutyl Ether	175
1-Butanol	575	Bromine	168
Argon	560	Ethyle Acrylate	162

Table 4.3 (continued)
USDOT List of Large Production Volume (thousands of short tons) Hazardous Chemicals[6]

Hydrogen Peroxide	153
Chlorodifluoromethane (F22)	142
N-Pentane	142
Propionaldehyde	140
Ferric Chloride	137
Nonylphenol	137
Sodium Chromate/Dichromate	128
Chlorobenzene	123
Naphthalene	121
Monoethanolamine	116
Activated Carbon	109
Ethyl Acetate	107
Phosphorus Trichloride	102
N-Butyl Acetate	101
Isobutyraldehyde	99
Trichloroethylene	98
N-Propanol	93
Barium Sulfide	92
N-Heptane	89
Calcium Hypochlorite	88
Sodium Cyanide	85
Isobutanol	83
Pinene	78
Sodium Hydrosulfite	78
Ethyl Chloride	77
Tetrahydrofuran	77
Methyl Isobutyl Ketone	76
Chloronitrobenzene	73
Sodium (Metal)	72
Phosphorus Pentasulfide	70
Hexene-1	61
Propionic Acid	59
Acrylamide	56
Chlorinated Isocyanurates	55
Isoprene	54
Zinc Sulfate	54
Ethylene Glycol Monoethyl Ether	53
P-Dichlorobenzene	52
Dicyclopentadiene	50
Hydrofluosilicic Acid	50
Benzoic Acid	48
Isobutyl Acetate	44
Atrazine	43
Ethylene Glycol Monoethyl Ether Acetate	42
Ethylenediamine Tetraacetic Acid	41
Furfural	40
Sodium Hydrosulfide	40
Ethylenediamine	39
Dimethylamine	37
Cupric Sulfate	36
Ethylene Glycol Monomethyl Ether	36
N-Propyl Acetate	35
Aluminum Chloride	33
Benzyl Chloride	33
Phosphorus Oxychloride	31
Ethylene Dibromide	30
Zinc Chloride	28
Isopropyl Acetate	27
Isopropylamine, Mono	27
Methylamine	26
Sodium Phosphate, Tribasic	26
Amyl Alcohol	25
Total for 147 Chemicals	**288,792**

4.2 Protocols for Conducing Commodity Flow Studies for Truck Shipments

The USDOT reports[5,6] reviewed several sources of generalized statistical information about truck shipments of materials, including hazardous materials. However, such generalized statistical information does not include specific identification of hazardous materials cargoes and routes. Thus, the only way to obtain specific state or local data on commodity flows is by surveys to sample the actual population of shipments.

Surveys to determine actual hazardous material commodity flows along a particular segment of highway can be conducted, to some extent, by simple counting of placarded vehicles. However, specific identification of hazardous materials requires inspection of shipping documents. Thus, detailed commodity flow studies can be done only with governmental authorization and are most commonly done in conjunction with other administrative inspections of trucks, such as weight checks or safety inspections. The USDOT[6] report contains useful protocols and suggestions for data gathering and statistical analysis of the resulting commodity flow data.

Detailed surveys of hazardous material commodity flows are very time consuming and as a result relatively few surveys have been completed. The USDOT[6] report and Wemple's 1999 study[7] together reference only seven studies for the United States as a whole. These references include five statewide studies (one of which is Oregon) and two local studies. The USDOT[6] report notes that the 1987 Oregon study[8] involved continuous monitoring of 11 sampling sites (weight stations) for 72 hour periods and that this survey effort involved 3,460 person-hours for the survey alone, not including the time for truck inspections. For the current project, there is neither the necessary budget nor official authorization from transportation officials to conduct a new commodity flow study for the three county areas. Rather, conclusions will be drawn from existing data, compiled from available sources.

4.3 Hazardous Materials Commodity Flow Studies: Oregon

For Oregon as a whole and for Benton, Lane and Linn Counties specifically there are three primary data sources for hazardous materials commodity flows by truck:

1) the 1987 Oregon study[8] which includes county-specific data
2) annual reports of Hazardous Materials Incidents in Oregon from the Office of State Fire Marshal[9], and
3) estimates of hazardous shipments as a percentage of total traffic flows, as in the Wemple study[7], using ODOT traffic volume data.

4.3.1 Hazardous Material Movements on Oregon Highways (1987)

In 1987, the Public Utility Commission of Oregon and the Oregon Department of Transportation conducted a detailed hazardous materials commodity flow study for truck shipments[8]. Although this report is somewhat dated, this is one of the most comprehensive such commodity flow studies completed to date anywhere in the United States and the general conclusions from this study are still valid. At present, the Oregon Department of Transportation (ODOT) is in process of updating this study, but published results are not yet available (telephone discussion with Michael H. Gillett, ODOT, June 28, 2002).

The 1987 study[8] tabulated data on several thousand shipments of hazardous materials at 11 weigh stations: five on interstate highways and six on state or federal highways. Of the stations of interstate highways, three were on I-5 and two were on I-84. Of the non-interstate highways, one was on S.R. 6, two were on S.R. 99 and one each were on highways U.S. 26, U.S. 30, and U.S. 97. Although none of these stations were in Benton, Lane or Linn Counties, the survey included origin and destination data and so county specific data are included in the report. Survey data were taken at 7 sites near Portland and at 4 sites representative of flows to/ Oregon from neighboring states. Of nearly 50,000 trucks surveyed at the weigh stations, 2,511 (5.5%) contained hazardous material shipments. These 2,511 vehicles contained 3,637 shipments of hazardous materials, with many vehicles containing more than one shipment and more than one material. In total, there were 208 different hazardous materials.

Relevant data from this study[8] are summarized below in Table 4.4 and 4.5. These data are not representative of specific hazardous material flows at any single location, but present a useful overview of the most common shipments of hazardous materials in Oregon.

Table 4.4
Hazardous Material Movements on Oregon Highways[8]
By Hazard Class

Hazard Class	Shipments	Vehicles (percent)
Flammable gas	1351	53.80%
Corrosive	410	16.33%
Other regulated material	229	9.12%
Nonflammable gas	162	6.45%
Dangerous	151	6.01%
Flammable gas	96	3.82%
Explosive	40	1.59%
Poison	27	1.08%
Oxidizer	20	0.80%
Flammable solid	13	0.52%
Radioactive	11	0.44%
Organic peroxide	1	0.04%
Subtotal	**2511**	**100.00%**

The hazard classes used in the 1987 study are somewhat archaic, differing from current classifications, but these1987 hazard class descriptors are self-explanatory.

Table 4.5
Hazardous Material Movements on Oregon Highways[7]
Most Common Hazardous Materials

7 Sites Outside Portland		
	Commodity	**Shipments**
	gasoline	649
	fuel oil, diesel	382
	hazardous waste	163
	sodium hydroxide liquid	133
	paint, lacquer base	100
	battery, wet with acid	80
	oxygen	54
	liquefied petroleum gas	48
	compound, cleaning liquid	46
	oxygen, referigerated liquid	41
	Subtotal	**1696**
4 Points of Entry into Oregon		
	Commodity	**Shipments**
	paint	65
	paint related material	33
	corrosive liquid	33
	compound, cleaning liquid	33
	battery, wet with acid	31
	gasoline	27
	resin solution	26
	flammable liquid	26
	fuel oil, diesel	20
	corrosive solid	15
	Subtotal	**309**

The 1987 study[7] has data on a county basis, derived from shipping origins and destinations. These data are incomplete, representing only the 11 weigh-station sampling points. Nevertheless, these sampling points include the major entry points for shipments from outside Oregon and the major routes from Portland south towards the three county areas. Thus, these data are probably representative of the majority of hazardous materials shipments to and through the three county areas. Detailed statistics are given in the 1987 study[7], for the mitigation planning purposes, we review a few of the main conclusions that may be drawn from these ODOT data. The 1987 study[7] data for each county are presented in summary tables. There are some minor inconsistencies in these data (totals and subtotals don't always match exactly), but the general trends are clear and informative.

Data for Benton, Lane and Linn Counties are summarized in the three paragraphs below, with summary tables following.

For Benton County, of the 80 shipments tracked, 51 were destined from Benton County while 29 were destined to pass through Benton County. The relatively small number of pass through vehicles reflects the fact there are no interstate highways passing through Benton County. Of the vehicles destined for Benton County, 38 were for Corvallis, 8 for Philomath and one each for Alsea and Monroe. Of the 51 vehicles destined for Benton County nearly all (47) were west on Highways 20 or 34 from I-5, with three south on Highway 99 and one east on Highway 34. This pattern reflects the concentration of both population and industry in the Corvallis-Philomath area; thus, the 2002 pattern is likely generally similar to that observed in 1987.

For Lane County, of the 604 shipments tracked, 169 (28%) were destined for Lane County while 435 (72%) were destined to pass through Lane County. The high number of pass through vehicles reflects I-5. Of the 169 vehicles destined for Lane County, the vast majority (about 160) were destined for Eugene and/or Springfield. Other destinations included Cottage Grove (6), Creswell (4), Florence (2), Junction City (4), Marcola (1), and Oakridge (2). Of the vehicles destined for Lane County 167 were on I-5 with 150 being south from Portland and 17 being north. The other two vehicles were on Highway 58 west towards Oakridge. This pattern reflects the concentration of both population and industry in the Eugene-Springfield area; thus the 2002 pattern is likely generally similar to that observed in 1987.

For Linn County, of the 830 shipments tracked, 173 (21%) were destined for Linn County while 657 (79%) were destined to pass through Linn County. The high number of pass through vehicles reflects I-5 as a major corridor and vehicles destined from Portland to Lane County. Of the vehicles destined for Linn County, Most were destined for Albany (98) or Halsey (44). Other destinations included Harrisburg (2), Lebanon (8), Lyons (4), Millersburg (3), Scio (1), Sweet Home (7) and Tangent (6). Of the vehicles destined for Linn County all were on I-5 with 160 being south from Portland and 5 being north from Lane County. This pattern reflects the concentration of both population and industry in the Albany. The concentration of shipments to Halsey is surprising, based on population alone, but reflects the concentration of industry in Halsey (e.g. Georgia Pacific, Pope & Talbot and others). The 2002 pattern is likely generally similar to that observed in 1987.

Table 4.6a
Benton County Hazardous Materials Shipments[8]

Shipments	
To Benton County	51
Through Benton County	29
Total	80
Benton County Destinations	
Corvallis	36
Philomath	8
Alsea	1
Monroe	1
Routes for Shipments to Benton County	
West on Highway 20 or 34	47
South on Highway 99	3
East on Highway 34	1

Table 4.6b
Lane County Hazardous Materials Shipments[8]

Shipments	
To Lane County	169
Through Lane County	435
Total	604
Lane County Destinations	
Eugene/Springfield	160
Cottage Grove	6
Creswell	4
Junction City	4
Florence	2
Oakridge	2
Marcola	1
Routes for Shipments to Lane County	
South on I-5	150
North on I-5	17
West on Highway 58	2

Note: total destinations exceed the number of shipments (169) because some vehicles had multiple destinations.

Table 4.6bc
Linn County Hazardous Materials Shipments[8]

Shipments	
To Linn County	173
Through Linn County	657
Total	830
Linn County Destinations	
Albany	98
Halsey	44
Lebanon	8
Sweet Home	7
Tangent	6
Lyons	4
Millersburg	3
Harrisburg	2
Scio	1
Routes for Shipments to Linn County	
South on I-5	160
North on I-5	5
West on Highway 58	2

Notes: total destinations exceed the number of shipments (169) because some vehicles had multiple destinations. Route totals are as reported in the 1987 ODOT report.[8]

The current rate of shipments of hazardous materials to Benton, Lane, and Linn Counties is almost certainly underestimated by the above 1987 data. First, in the 15 years since 1987, the number of shipments has likely grown approximately proportionately with the population growth. Between 1990 and 2000, the population of the three county areas grew by about 13.8%. Between 1987 and 2002, the population is thus estimated to have grown about 20%. Similarly, the number of shipments of hazardous materials is likely to have grown by about 20%.

Second, the 1987 data only sampled hazardous material shipments at 11 weigh stations. These sampling points likely captured most, but not all, of the shipments passing to or through the three counties from major origins north or south along I-5 and points connected via I-5. However, the 1987 data would not have captured shipments along smaller highways not included in the sampling or shipments from one of the three counties to another or to and from other counties not on the major transportation routes.

4.3.2 Hazardous Materials Incidents in Oregon

A different perspective on shipment of hazardous materials by truck is provided by annual statistics of hazardous materials incidents[9], prepared by the Office of State Fire Marshal. These incident reports include all reported hazardous material incidents, except generally excluding:

a) motor fuels which are spilled in quantities less than 42 gallons,
b) sewage overflows,
c) structure fires or other emergencies where hazardous substances are involved as exposures, if the quantities exposed are less than 42 gallons.

For 2000, there were a total of 399 incidents or slightly more than one per day. Reported incidents for Benton, Lane and Linn Counties are given below in Table 4.7.

Table 4.7
Hazardous Material Incidents in 2000[9]
Benton, Lane and Linn Counties

County	Total Incidents
Benton	12
Lane	34
Linn	9

Statewide, 153 incidents, or about 37% of the total incidents occurred on roads or highways. Interestingly, of the 153 reported incidents on roads, only 8 occurred on interstate highways (I-5, I-84, I-105). A classification of release sources noted 56 from cars and 81 from commercial vehicles (presumably trucks). Totals and percentages may not match exactly because of reporting inconsistencies in the 2000 report[9]. Only 36 incidents were identified as being due to motor vehicle accident. The majority of reported incidents on roads must therefore be a result of equipment failures (e.g., leaking tanks) or law enforcement actions (e.g., drug lab chemicals).

Most of the reported year 2000 incidents involve a relatively small number of hazardous materials, as shown below in Table 4.8.

Table 4.8
Hazardous Materials Incidents in 2000[9]
Top Twenty Chemicals Involved

Chemical	Number of Incidents
Drug lab chemicals	66
Diesel	63
Natural gas	45
Unknown chemical	44
Gasoline	32
Propane	14
No chemical involved	10
Hydraulic fluid	9
Motor oil	9
Red phosphorus	8
Antifreeze	6
Hydrochloric acid	6
Iodine	5
Ammonia	4
Fuel oil	4
Sodium hydroxide	4
Sulfuric acid	4
Transmission fluid	4
Chlorine	3
Transformer oil	3
Total Incidents classified	343

As shown in Table 4.8 above, the vast majority of reported incidents classified involve only a few categories of hazardous materials. For mitigation planning purposes, these data are sorted into categories of hazardous materials and shown below in Table 4-9.

Table 4.9
Hazardous Materials Incidents in 2000[9]
Reported Categories of Hazardous Materials

Chemical	Number of Incidents
Drug lab chemicals	66
Diesel, gasoline, fuel oil	99
Antifreeze, motor oil, hydraulic fluid, transmission fluid	29
Natural gas	45
Propane	14
No chemical involved	10
Subtotal	263

Unknown chemical	44
Red phosphorus	8
Hydrochloric acid	6
Iodine	5
Ammonia	4
Sodium hydroxide	4

Sulfuric acid	4
Chlorine	3
Transformer oil	3
Subtotal	81

As shown above, of the top twenty chemicals hazardous materials other than drug lab chemicals, fuels, and vehicle fluids total only 81 incidents, most of which involved unknown chemicals. In total, the 2000 report[8] lists 112 different chemicals identified in the total reported incidents. Most of these chemicals, about 90, were involved in only 1 or 2 incidents.

The complete list of 112 chemicals that were involved in incidents during 2000 is shown below in Table 4-10, from the Annual Report of Hazardous Materials Incidents in Oregon.[9]

These statewide data present a very useful overview of hazardous material incidents in Oregon. For Benton, Lane and Linn Counties the general pattern of hazardous materials is likely to be similar to the statewide pattern above. Most of the hazardous materials incidents in the three county areas are likely to be the most commonly involved materials as shown above (i.e., drug lab chemicals, fuels, and motor vehicle fluids). However, for chemicals with industrial uses, the distribution of chemicals involved in hazardous materials incidents will likely vary markedly from county to county, depending on the specific materials in use and thus transported within each county. For these more specialized chemicals, the chemical inventory data summarized in Chapter 2 and the complete chemical inventory data in the Office of State Fire Marshall's Hazardous Substance Information System (HSIS) database provide more detailed information for the three Counties.

Table 4-10
Complete List of 112 Chemicals Involved in Incidents in 2000[9]

Material Spilled	Frequency	Material Spilled	Frequency
ACETIC ACID	1	LIGHT DUTY 65D	1
ACETONE	1	LIME SALTS	1
ACIDS	1	MAE (TM) ETCHANTS	1
ADHESIVES	1	MAGNESIUM OXIDE	1
AGRICULTURAL LIME-CALCIUM CARBONATE	1	MERCURY	1
AIR FUEL GAS	1	METHANOL	1
ALUMINUM DROSS	1	METHYL BROMIDE	1
AMMONIA	4	METHYL ETHYL KETONE	1
AMMONIUM PHOSPHATE	1	MILLER KRIL COAT PAINT	1
ANTIFREEZE	6	MONITOR	2
ARGON	2	MOTOR OIL	9
ASCORBIC ACID	1	MULTI-DRESSING RUBBER VINYL	1
ASPHALT	1	NATURAL GAS	45
ASPHALT LIQUID	1	NITRIC ACID	1
BENZENE	1	NO CHEMICAL INVOLVED	10
BENZOIN TINCTURE COMPOUND	1	NOMAR 70AF	1
BORIC ACID	1	OIL	1
BRAKE FLUID	1	OXYGEN LIQUID	1
C-RED POWDERED CLAY	1	PAINT EPOXY	1
CAUSTIC SODA	1	PAINT THINNER	2
CFC	1	PERCHLORIC ACID	1
CHLORINE	3	PETROLEUM ETHER	1
CHLORODIFLUOROMETHANE	1	PETROLEUM OIL	2
CITRIC ACID	1	PHENOL	2
CLEAR O/D COATING	2	PHOSPHORIC ACID	1
COLEMAN FUEL	1	PHOTOBROME TABLETS	1
COOLANT	1	POLYMERIC BEADS	1
DIAMONT BR 50	1	POTASSIUM HYDROXIDE	1
DICHLOROMETHANE	1	PROPANE	14
DIESEL	63	QUADRIS	1
DISAPPEARING INK	1	RED DEVIL	1
DITHANE	1	RED PHOSPHORUS	8
DRUG LAB CHEMICALS	66	RICIN	2
ELECTRIC ARC FURNACE DUST	1	ROOF COATING	1
EPHEDRINE	1	SALT	1
EPOXY RESIN	1	SILANE	1
ETHANOL	2	SILICONE OIL	1
ETHER	2	SODIUM BICARBONATE	1
FERTILIZER-LAWN BLEND	1	SODIUM HYDROSULFITE	1
FREON	1	SODIUM HYDROXIDE	4
FUEL OIL	4	SODIUM HYPOCHLORITE	1
GASOLINE	32	SOLVENTS	1
GLYCERINE	1	STEP 1 ACTIVATOR	1
GOAL 2XL	1	SULFURIC ACID	4
GREASE BLUE HIGH TEMP	1	TITANIUM TETRACHLORIDE	1
HAVOC	1	TOLUENE	2
HYDRAULIC FLUID	9	TOMAHAWK	1
HYDROCARBON MIXTURE	2	TRANSFORMER OIL	3
HYDROCHLORIC ACID	6	TRANSMISSION FLUID	4
HYDROCYANIC ACID	1	TRICINE P-32	1
HYDROFLUORIC ACID	1	UNKNOWN CHEMICAL	44
HYDROGEN PEROXIDE	1	WASH SOLVENT	1
HYPOCHLORITE SOLN	1	WASTE LEAD PAINT	1
IODINE	5	WASTE OIL	3
JET FUEL	2	WASTE PAINT & RELATED MATERIAL	1
KEROSENE	1	WORTMANNIN FROM PENICILLIUM FUMICULOSUM	1

4.3.3 Hazardous Materials Commodity Flow Study for Linn, Benton, and Lincoln Counties, Oregon[7]

This study[7] by Bryan Wemple is a 1999 Master's Thesis at Oregon State University. The thesis contains an excellent review of the principles of conducting hazardous material commodity flow studies, including the regulatory context. For shipments by truck, the primary data reviewed by Wemple were the 1987 Hazardous Material Movements on Oregon Highways study[8] and the annual reports of hazardous materials incidents by the Office of State Fire Marshal. Both of these data sources were summarized above in Section 4.3.2.

Wemple[7] also summarized data from a United States Department of Transportation database on hazardous materials incidents, but noted, correctly, that the national database is much less inclusive than the Oregon Office of State Fire Marshal's database and is thus of limited usefulness. For example, for the three counties (Benton, Linn, and Lincoln) in Wemple's study, the federal database had a total of only 40 incidents between 1971 and 1997, or only a little more than one reported incident per year.

Wemple[7] suggested another method of estimating the numbers of trucks carrying hazardous materials on specific highways in a study area. This level of detail does not exist in any published database. Wemple's suggestion was to use ODOT traffic count data for trucks for specific segments of major roads, assuming that an average of 5.5% of trucks carry hazardous materials. The 5.5% figure is based on the 1987 study's result that an average about 5.5% of trucks contained hazardous materials.

This approach is approximately correct, especially for commodities such as gasoline in widespread use. The consumption of such widely used commodities is predominantly proportional to population and thus traffic counts may give a generally good idea of the relative distribution of truck shipments of widely used commodities. Hazardous materials for which this method may me useful include: gasoline, diesel, fuel oil, propane, and motor vehicle fluids (oil, antifreeze, transmission fluids etc.), as well as drug lab chemicals (cf. Tables 4.8 and 4.9).

However, many hazardous materials, including nearly all of the most hazardous materials, have specialized industrial uses. For such materials, the commodity flow patterns will be governed almost entirely by the location of sources of such materials and by the locations where such materials are used. Thus, for these materials a simple proportionality to traffic counts will most likely be inaccurate and potentially highly misleading.

For example, as illustrated by the sample sites examined above in Chapter 3, large industrial sites in Benton, Lane and Linn Counties use (and thus transport) large quantities of a few Extremely Hazardous Substances (EHS), including sulfuric acid, hydrochloric acid, chlorine, phenol and many others. For these types of industrial commodities, a simple proportionality between traffic counts and hazardous material shipments, as suggested by Wemple[7] would be misleading. For these commodities, as shown by the data in Table 4.6 and accompanying text, shipments are highly concentrated on only a handful of Interstate Highways and major arteries and vehicles carrying these shipments travel only on the direct routes to the industrial sites, not on local roads overall.

Therefore, for mitigation planning purposes, the method of estimating hazardous material commodity flows suggested by Wemple[7] is of limited usefulness, only for widely used commodities such as fuels, motor vehicle fluids, and drug lab chemicals.

Detailed traffic counts and crash rate data are available for numerous segments of state highways throughout Oregon. The Oregon Department of Transportation compiles these statistics annually; the most recent publication, dated October 2001, is for 2000.[10] These data could be used to estimate, approximately, the relative probabilities of hazardous materials incidents on state highways in the three county areas. For example, if a given segment of highway has 10 times the traffic count and 8 times the number of accidents as another segment, then the probability of hazardous materials incidents is also likely between 8 and 10 times higher. For city streets and local highways, similar inferences could be drawn from local traffic count and/or accident rate data. However, as cautioned above, such inferences would be approximately valid only for hazardous materials in widespread use and would not be applicable to industrial chemicals that have much more restricted traffic flow patterns.

4.4 Nationwide Hazardous Materials: Incidents During Transportation

The previous sections have reviewed available data on shipments of hazardous materials within the three county areas and for Oregon as a whole. For completeness, nationwide data are briefly summarized below.

The United States Department of Transportation compiles annual reports on hazardous materials incidents during transportation. The most recent available data are for 1997.[5] The reporting standards are more restrictive for these reports than for the Oregon reports discussed above. Nevertheless, these nationwide reports provide another useful perspective on the absolute numbers of hazardous materials incidents and on the relative number of incidents for various types of hazardous materials.

For reference, two summary tables are given below. Table 4.11 contains data on the Top 50 Hazardous Materials, by number of transportation incidents for incidents of all types. Table 4.12 contains data on the Top 50 Hazardous Materials, by the number of transportation incidents, for serious incidents only. Serious incidents are defined as those which involve a fatality or major injury, closure of a major transportation artery or facility, evacuation of six or more persons, or a vehicle accident or derailment. These data commingle hazardous material incidents for truck and rail shipments, but still provide a useful overview, especially for commodities in widespread use such as fuels.

Table 4.11
Nationwide Data on Hazardous Materials Transportation Incidents

Incidents by Top 50 Hazardous Materials - 1997

Rank	Hazardous Material	Hazard Class	Incidents	Percent of Total Incidents	Rank	Hazardous Material	Hazard Class	Incidents	Percent of Total Incidents
1	Corrosive Liquids n.o.s.	Corrosive Material	1,055	7.6	26	Compound Cleaning Liquid	Corrosive Material	136	1.0
2	Flammable Liquids n.o.s.	Flammable - Combustible Liquid	917	6.6	27	Dichloromethane	Poisonous Materials	134	1.0
3	Resin Solution	Flammable - Combustible Liquid	515	3.7	28	Xylenes	Flammable - Combustible Liquid	132	1.0
4	Sodium Hydroxide Solution	Corrosive Material	461	3.3	29	Methanol	Flammable - Combustible Liquid	126	0.9
5	Hydrochloric Acid Solution	Corrosive Material	358	2.6	30	Extracts Flavoring Liquid	Flammable - Combustible Liquid	124	0.9
6	Adhesives	Flammable - Combustible Liquid	333	2.4	31	Ammonia Solutions 10-35%	Corrosive Material	110	0.8
7	Gasoline	Flammable - Combustible Liquid	301	2.2	32	Acetone	Flammable - Combustible Liquid	103	0.7
8	Isopropanol	Flammable - Combustible Liquid	289	2.1	32	Petroleum Crude Oil	Flammable - Combustible Liquid	103	0.7
9	Phosphoric Acid	Corrosive Material	277	2.0	34	Ammonia Anhydrous	Nonflammable Compressed Gas	97	0.7
10	Sulfuric Acid	Corrosive Material	261	1.9	35	Diesel Fuel	Flammable - Combustible Liquid	92	0.7
11	Paint or Paint Related	Flammable - Combustible Liquid	259	1.9	36	Paint Related Material	Flammable - Combustible Liquid	84	0.6
12	Corrosive Liq Acidic Inorganic	Corrosive Material	248	1.8	36	Toxic Liquid Organic n.o.s.	Poisonous Materials	84	0.6
13	Corrosive Liq Basic Inorganic	Corrosive Material	246	1.8	38	Petroleum Gases Liquefied	Flammable Gas	80	0.6
14	Petroleum Distillates n.o.s.	Flammable - Combustible Liquid	245	1.8	39	Trichloroethylene	Poisonous Materials	78	0.6
15	Potassium Hydroxide Solution	Corrosive Material	212	1.5	40	Flammable Liquid Corrosive	Flammable - Combustible Liquid	77	0.6
16	Caustic Alkali Liquid n.o.s.	Corrosive Material	209	1.5	40	Environmentally Haz Solid	Miscellaneous Hazardous Material	77	0.6
17	Fuel Oil (No. 1,2,4,5,6)	Flammable - Combustible Liquid	189	1.4	42	Alcohols n.o.s.	Flammable - Combustible Liquid	74	0.5
18	Printing Ink Flammable	Flammable - Combustible Liquid	184	1.3	42	Methyl Methacrylate Inhibited	Flammable - Combustible Liquid	74	0.5
19	Corrosive Liq Acidic Organic	Corrosive Material	182	1.3	44	Compound Cleaning Liquid	Flammable - Combustible Liquid	71	0.5
20	Hydrogen Perox-Peroxyacetic	Oxidizer	171	1.2	45	Fuel Oil No. 1,2,4,5,6	Combustible Liquid	69	0.5
21	Ethanol	Flammable - Combustible Liquid	169	1.2	46	Corrosive Liq Basic Organic	Corrosive Material	68	0.5
22	Compound Cleaning Liq Pho	Corrosive Material	156	1.1	47	Amines Liquid Corrosive n.o.s.	Corrosive Material	67	0.5
23	Hypochlorite Solution 5-16%	Corrosive Material	153	1.1	48	Fuel Oil	Combustible Liquid	66	0.5
24	Environmentally Haz Liquid	Miscellaneous Hazardous Material	143	1.0	48	Hazardous Waste Solid n.o.s.	Miscellaneous Hazardous Material	66	0.5
25	Combustible Liquid n.o.s.	Combustible Liquid	142	1.0	50	Acetic Acid Solution	Corrosive Material	61	0.4
							TOTALS	9,928	71.7

Note: Percentage figures are based on 13,853 incidents reported in 1997.

Table 4.12
Nationwide Data on Hazardous Materials Transportation Incidents: Serious Incidents Only

Serious Incidents by Hazardous Material - 1997

Rank	Hazardous Material	Hazard Class	Incidents	Percent of Total Incidents
1	Gasoline	Flammable - Combustible Liquid	62	0.4
2	Petroleum Gases Liquefied	Flammable Gas	27	0.2
3	Hydrochloric Acid Solution	Corrosive Material	13	0.1
3	Fuel Oil (No. 1,2,4,5,6)	Flammable - Combustible Liquid	13	0.1
5	Sodium Hydroxide Solution	Corrosive Material	12	0.1
5	Sulfuric Acid	Corrosive Material	12	0.1
5	Diesel Fuel	Flammable - Combustible Liquid	12	0.1
5	Elevated Temp Material Liquid	Miscellaneous Hazardous Material	12	0.1
9	Flammable Liquids n.o.s.	Flammable - Combustible Liquid	11	0.1
10	Environmentally Hazardous Liquid	Miscellaneous Hazardous Material	10	0.1
11	Adhesives	Flammable - Combustible Liquid	7	0.1
11	Corrosive Liquids n.o.s.	Corrosive Material	7	0.1
11	Phosphoric Acid	Corrosive Material	7	0.1
11	Resin Solution	Flammable - Combustible Liquid	7	0.1
15	Ammonia Anhydrous	Nonflammable Compressed Gas	6	<.1
15	Hazardous Waste Solid n.o.s.	Miscellaneous Hazardous Material	6	<.1
17	Ammonia Solutions 10-35%	Corrosive Material	5	<.1
17	Combustible Liquid n.o.s.	Combustible Liquid	5	<.1
17	Fuel Oil No. 1,2,4,5,6	Combustible Liquid	5	<.1
20	Petroleum Crude Oil	Flammable - Combustible Liquid	4	<.1
20	Fuel Oil	Combustible Liquid	4	<.1
20	Nitric Acid <70%	Corrosive Material	4	<.1
20	Nitrogen Refrigerated Liquid	Nonflammable Compressed Gas	4	<.1
20	Environmentally Hazardous Solid	Miscellaneous Hazardous Material	4	<.1
20	Gaschol	Flammable - Combustible Liquid	4	<.1
20	Denatured Alcohol	Flammable - Combustible Liquid	4	<.1
27	Acetone	Flammable - Combustible Liquid	3	<.1
27	Alcohols n.o.s.	Flammable - Combustible Liquid	3	<.1
27	Ammonium Nitrate <0.2%	Oxidizer	3	<.1
27	Calcium Hypochlorite Hydrated	Oxidizer	3	<.1
27	Coating Solution	Flammable - Combustible Liquid	3	<.1
27	Fuel Aviation Turbine	Flammable - Combustible Liquid	3	<.1
27	Hypochlorite Solution 5-16%	Corrosive Material	3	<.1
27	Methyl Ethyl Ketone	Flammable - Combustible Liquid	3	<.1
27	Potassium Hydroxide Solution	Corrosive Material	3	<.1
27	Radioactive Material n.o.s.	Radioactive Material	3	<.1
27	Sodium Chlorate	Oxidizer	3	<.1
27	Styrene Monomer Inhibited	Flammable - Combustible Liquid	3	<.1
27	Toluene	Flammable - Combustible Liquid	3	<.1
27	Trichloroethylene	Poisonous Materials	3	<.1
27	Methanol	Flammable - Combustible Liquid	3	<.1
27	Corrosive Liq Acidic Organic	Corrosive Material	3	<.1
27	Aerosols Flammable	Flammable Gas	3	<.1
27	Kerosene	Flammable - Combustible Liquid	3	<.1
45	*33 materials tied for this rank*	....	2 each	....
79	*95 materials tied for this rank*	....	1 each	....
		TOTAL		3.0

Note: Percentage figures are based on 13,853 incidents reported in 1997.

5.0 Hazardous Materials Commodity Flow Assessment: Railroads

5.1 Overview of Railroads in Oregon

There are 21 railroads currently operating in Oregon, according to 2002 data from the Oregon Department of Transportation website (**www.odot.state.or.us/rail**). Addresses and contact information for all of these railroads are given on the above referenced website, as are website addresses for several of the larger railroads. These Oregon railroads are listed below in Table 5.1

Table 5.1
Oregon Railroads

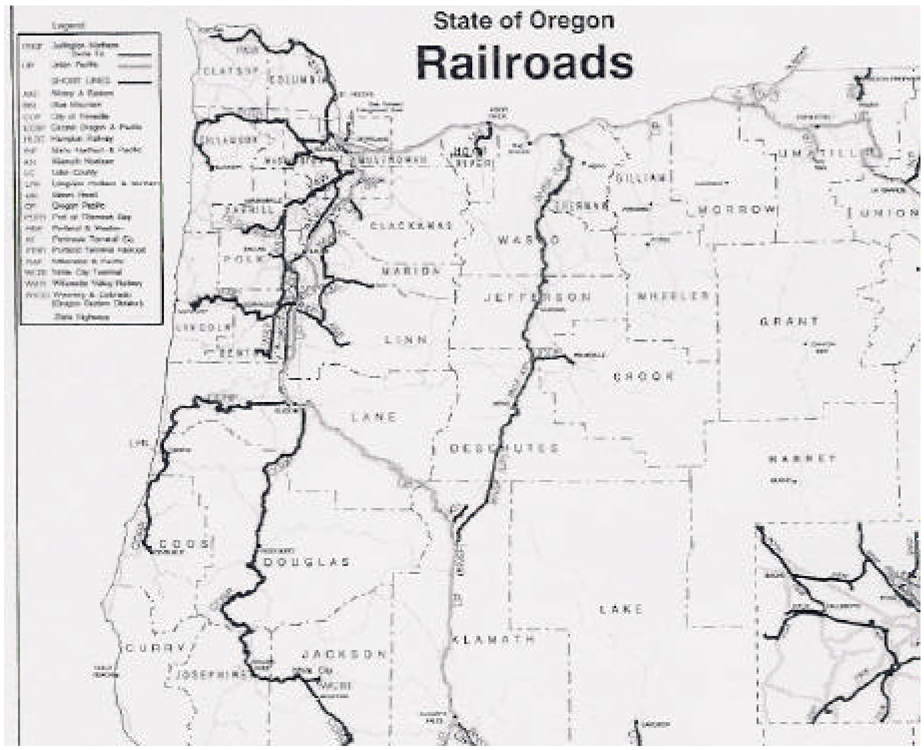
Company
Class 1 Railroads
Burlington Northern & Santa Fe
Union Pacific Railroad Co.
Shortline Railroads
Albany & Eastern Railroad
Central Oregon & Pacific
City of Prineville Railway
Klamath Northern
Hampton Railway
Idaho Northern & Pacific
Lake County Railroad
Mt. Hood Railway
Oregon Pacific Railroad Co.
Palouse River & Coulee City Railroad
Peninsula Terminal Railroad
Port of Tillamook Bay Railroad
Portland & Western Railroad
Portland Terminal Railroad
Sumpter Valley Railroad
White City Terminal Railroad
Willamette & Pacific Railroad
Willamette Valley Railroad
Wyoming & Colorado Railroad

The two Class 1 railroads are major interstate railroads that carry a full range of freight shipments. In Oregon, these Class 1 railroads operate four main lines. One main line runs more or less parallel to Interstate I-5, including through Linn and Lane Counties. From Eugene/Springfield this line runs in a southeasterly direction and connects with a second main line in Klamath County. The second main line also runs north-south, further east in Central Oregon. The third main line runs through northeastern Oregon, while the fourth main line runs east-west along the Columbia River.

The 19 shortline railroads primarily carry bulk freight materials for large industrial sites, including the wood and paper industry, the chemical industry, and the petroleum products industry. Several of these shortline railroads operate in the three county areas. The Willamette & Pacific Railroad operates in Benton and Linn Counties. The Albany & Eastern Railroad operates in Linn County. The Central Oregon & Pacific Railway operates in Lane County.

In recent years, there have been many mergers and acquisitions in the United States railroad industry. As a result, the names of operating railroads have frequently changed over time. This trend is likely to continue for the foreseeable future. A map from the ODOT website showing the operating tracks for these Oregon railroads as of mid-2002 is shown below as Figure 5.1.

Figure 5.1
Oregon Railroad Map



5.2 Train Frequencies for Benton, Lane and Linn Counties

Rose Gentry of ODOT (FAX, August 5, 2002) provided current data on the weekly frequency of freight and passenger trains for Benton, Lane, and Linn counties. These data are summarized in Table 5.2 below.

Table 5.2
Train Frequency Data (Weekly)

County	Route/Area	Freight Trains	Passenger Trains
Benton	Corvallis to Monroe	2	
	North Corvallis	7	
	Corvallis to Toledo	5	
	Corvallis switcher	5	
Linn County	Throughout County	154	42
	Albany to Eugene	5	
	Albany to Sweet Home	5	
	Lebanon	15	
Lane County	Throughout County	154	42
	Eugene	5	
	Eugene to Coquille	10	
	Springfield to Cottage Grove	10	
	TOTAL	**223**	**42**

As shown in Table 5.2, a total of 223 freight trains and 42 passenger trains travel within or through the three county areas each week. In the above table, the "throughout the county" figures for Linn and Lane Counties represent through trains on the main line. Thus, the totals for the two counties represent the same trains passing through both counties.

5.3 Hazardous Materials Shipments by Rail

The Oregon Department of Transportation is currently in process of updating reports on hazardous materials shipments by rail in Oregon. However, published reports will not be available for several months. In the interim, the best available data has been gathered. Although some of the data reported below are several years old, the general patterns are still representative and valid.

Wemple[7] gathered rail data for Benton and Linn Counties, including hazardous materials shipments on the main line through Albany to Eugene/Springfield. These data are summarized below in Table 5.3.

The Burlington Northern & Santa Fe Railroad provided data on the numbers of carloads of hazardous materials for several segments of BNSF lines in the three county areas. These data are summarized below in Table 5.4.

Finally, ODOT provided 2001 data for the Union Pacific Railroad main lines in the three county areas. These data, covering 13,385 carloads of hazardous materials are summarized below in Table 5.5.

Table 5.3
Mid-1990s Data on Hazardous Materials Shipments by Rail
Wemple[7]

Commodity hazard Class and STCC	Number of carloads transported annually
Burlington Northern Santa Fe (1995), Albany-Eugene line	
Class 6.1, Poison, #49212	84
Class 2.1, Flammable gases, #49054-49058	66
Class 3, Flammable and combustible liquids, #49060-49155	42
Class 9, Miscellaneous, #49403,49601,49621,49633	14
Class 2.3, Poison gas, #49205	4
	210
Burlington Northern Santa Fe (1995), Albany-Foster line	
Class 9, Corrosive, #49300	2
Class 2.3, Poison gas, #49205	1
	3
Southern Pacific RR, Main line Eugene to Portland (1993)	
Class 3.1-3.3, Flammable liquids, #49060-49155	2,020
Class 2.1, Flammable compressed gases, #49054-49058	2,000
Class 2.2 & 2.4, Nonflammable compressed gases, #49040-49048	1,820
Class 8, Corrosives, #49300-49365	1,800
Classes 1.1-8, "Mixed loads", #49501,	1,350
Class 6.1, Class B Poisons, #4210-49239	940
Class 5.1, Oxidizing materials, #49181-49189	220
Class 1.3, Class B Explosives, #49021-49028	45
Class 6.2, Irritating materials & etiologic agents, #49251-49259	44
Class 1.4, Class C Explosives, #49031-49036	25
Class 4.1-4.3, Flammable solids, #49161-49174	16
Class 1.1-1.2,Class A Explosives, #49011-49108	8
Empty tank cars w/ 1%-3% residues of hazardous materials	8,710
	18,998
Willamette & Pacific (1998)	
Class 5.1, Oxidizing materials, #49183, Ammonium Nitrate	18
Class 5.1, Oxidizing materials, #49188, Ammonium Nitrate	7
	25
Albany & Eastern (1998), Albany-Foster line	
Class 9, Corrosive, #49365, Metam sodium	100
Tetrachloride	200
Formaldehyde	200
	500

Table 5.4
Hazardous Materials Shipments, 1998
Burlington Northern & Santa Fe Railroad[11]

Railroad Segment	Hazardous Commodity	Number of Car Loads
Albany to Foster		
	Poison gases	11
	Corrosive materials	27
	Total (as reported)	38
United Junction (Merie) to Albany		
	Flammable gases	100
	Non-Flammable gases	7
	Poison gases	314
	Oxidizers	1
	Poisonous materials	26
	Corrosive materials	634
	Miscellaneous materials	15
	Total (as reported)	1,111
Albany to Eugene		
	Flammable gases	115
	Poison gases	139
	Flammable liquids	27
	Corrosive materials	317
	Miscellaneous materials	16
	Total (as reported)	641

Table 5.5
Hazardous Materials Shipments, 2001
Union Pacific Railroad

Material	Total Car Loads
Hazardous waste, solid	111
Ammonia, anhydrous	170
Carbon dioxide, refrigerated liquid	52
Propane	1,542
Butane	529
Petroleum gases, liquefied	200
Isobutane	340
Vinyl chloride, inhibited	105
Styrene monomer, inhibited	113
Vinyl acetate, inhibited	88
Flammable liquid, corrosive	13
Hexanes	12
Denatured alcohol	39
Ethanol	83
Methanol	1,883
Flammable liquids	36
Resin solution	62
Butyl acrylates, inhibited	35

Combustible liquid	28
Aluminum smelting by-products	50
Ammonium nitrate	341
Hydrogen peroxide, stabilized	72
Chromium trioxide, anhydrous	34
Ammonium nitrate fertilizer	290
Sodium chlorate	50
Hydrogen Peroxide, aqueous solution	42
Sulfur dioxide	116
Chlorine	1,333
Phenol, molten	168
Arsenic acid, liquid	22
Sodium cyanide	15
Sulfuric acid	102
Corrosive liquids	99
Nitric acid	100
Hydrochloric acid	60
Phosphoric acid	38
Corrosive liquid, acidic	95
Formaldehyde solutions	113
Silicon tetrafluoride	41
Bisulfites, aqueous solutions	17
Potassium hydroxide solution	10
Sodium hydroxide	692
Batteries, wet acid	170
Hazardous materials	3,375
Environmentally hazardous substance	77
Engines, internal combustion	19
Benzaldehyde	47
Elevated temperature liquid	60
Others	296
TOTAL	**13,385**

Notes: Total car loads includes car loads and intermodal loads (trailer or sea cargo containers).
Data in Table 5.5 above list all shipments of 10 or more total carloads.
Data as reported by BNSF except that few entries are combined totals for two or more listings.
BNSF data reported by STCC number.

Together, the data in Tables 5.3, 5.4 and 5.5 indicate that over 15,000 carloads per year of hazardous materials pass within or through the three county areas each year. These carloads include large quantities of flammable substances, corrosives, and poisonous gases (including 1,333 carloads of chlorine).

Given the large numbers of carloads of a wide range of hazardous materials, the potential for accidental releases cannot be ignored. For mitigation planning purposes, the above inventories of hazardous materials shipments serve the same purpose as the inventories of fixed site hazardous materials discussed in Chapters 2 and 3. Knowledge of the specific inventories of fixed or in-transit hazardous materials helps planners and responders prepare more effectively for response and recovery actions.

6.0 Hazardous Materials Commodity Flow Assessment: Pipelines

There are three types of major fuel pipeline systems in the three county areas:

1) the Williams natural gas transmission line which runs from British Columbia, through Oregon and Washington to California,
2) natural gas distribution systems run by utilities in most cities, and
3) the Kinder Morgan petroleum products pipeline which runs from Portland to Eugene/Springfield.

6.1 Williams Natural Gas Transmission Pipeline

The Williams natural gas transmission pipeline runs from British Columbia through Washington and Oregon into California, with branches extending eastward to Colorado. Basic information about the pipeline is given in the Williams Public Safety Response Manual (February 21, 2000):

> "The pipeline has the capacity to deliver nearly 2 billion cubic feet per day of natural gas at pressures up to 960 pounds per square inch. This compares with pressures in a (local) distribution system of approximately 40 pounds per square inch. Flow of gas through 22-inch, 24-inch, 26-inch and 30-inch diameter mainline is maintained by 40 compressor stations located in Washington, Oregon, Idaho, Utah, Wyoming, and Colorado. All of these stations are remotely operated from our headquarters in Salt Lake City, Utah. Several other compressor stations are located on laterals extending from the mainline."

The Williams natural gas transmission pipeline runs in a generally north-south direction through Linn and Lane Counties. The pipeline route enters Linn County near Marion, runs east of I-5 between Albany and Lebanon and then crosses west of I-5 near Halsey. From Halsey, the pipeline runs west of I-5 south through Eugene, crossing I-5 and leaving Lane County south of Cottage Grove. There is a compressor station located on the pipeline between Albany and Lebanon and interconnects to local pipelines at Jefferson, at the compressor station, and near Halsey, Coburg (2), Eugene (2), Creswell, and Cottage Grove. The pipeline route is shown in Figure 6.1 below.

The United States Department of Transportation Office of Pipeline Safety regulates interstate pipelines. USDOT imposes a broad range of standards and inspection requirements for pipeline design, material specifications, construction standards, maintenance and testing requirements. For the United States as a whole, a network of about 300,000 miles of natural gas transmission lines serve about 1.5 million miles of distribution system lines which serve about160 million customers. Overall, the safety record of natural gas pipelines is good with relatively few significant accidents.

Natural gas is not toxic (i.e., not poisonous). However, natural gas can be an asphyxiant if it displaces oxygen in an enclosed space. Natural gas burns readily when ignited, but only when gas concentrations are between 4% and 15% in air. In its pure state, natural gas is both colorless and odorless. The strong odor normally associated with natural gas is an odorant deliberately introduced at low concentrations to serve as a warning of the presence of natural gas.

Figure 6.1
Williams Natural Gas Transmission Route

Pennwell Natural Gas Atlas, 2001 Edition, Map Panel 100.

The pipeline route is shown above as the black line running approximately north-south through Linn and Lane Counties. The route is east of Albany, then south through Eugene/Springfield and then further south, passing west of Cottage Grove.

The strong odorant is generally added to natural gas at the local distribution level, by local gas utilities. Thus, the gas in major transmission lines, such as the Williams line in Oregon, most commonly is not odorized. In the absence of the characteristic odor, natural gas leaks in transmission lines are most commonly indicated by:

1) a blowing or hissing sound,
2) dirt being blown in the air,
3) bubbles or water being blown in the air at a pond, creek or river,
4) fire apparently emanating from the ground or burning above the ground, or
5) vegetation turning brown on or near the pipeline right-of-way (leaking gas will cause vegetation to turn brown and eventually die).

Fires and/or explosions from natural gas leaks in pipelines are rare. In part, the rarity of fires and/or explosions is due to the fact that natural gas is about 1/3rd less dense than ordinary air. Thus, leaking natural gas does not accumulate near the ground or “pond” in low-lying areas (as heavier gases such as liquefied natural gas or gasoline fumes may do). Instead, leaking natural gas rises rapidly and is dissipated by dilution in the atmosphere. The fires and /or explosions that do occur from natural gas leaks are generally in buildings where the confined space allows leaking gas to accumulate until ignited.

Major gas transmission lines, such as the Williams line in Oregon, are heavily engineered and generally constructed of welded steel pipe that is strong and reasonably flexible. Major failures are rare, but may occur due to natural or man-made causes. Pipeline breaks due to natural causes may occur due to landslides or earthquakes. Earthquake induced pipe breaks for natural gas transmission lines are most likely to occur in areas of soft soils subject to liquefaction and/or lateral spreading which cause significant pipe displacements. The most likely locations for such breaks during an earthquake are on slopes of soft ground near where pipelines cross rivers or streams.

The most common man-made cause of pipeline breaks is pipeline rupture due to pipes breaking when heavy construction equipment is used to excavate for construction projects. Most such breaks occur in local distribution lines. For major transmission lines, such breaks are possible, but much less common, because of the robustness of the transmission pipelines and because the major transmission lines are generally well marked with frequent warning signs.

Pipeline breaks can also be caused by deliberate actions of sabotage or terrorism. Although pipelines are not symbolic targets with political, historical, and cultural significance, they are potential targets for terrorist actions. Major pipeline breaks could disrupt gas service over wide areas with resulting significant economic impacts. In some cases, interruption of gas service could also lead to electric power outages by cutting off gas supply to gas-fired power plants. Gas transmission lines are inherently vulnerable to terrorist actions because long stretches of pipelines pass through remote, lowly populated areas, and most control facilities (compressor stations, valves and such are located in buildings normally unmanned.

The Williams pipeline is the major natural gas transmission line for the entire West Coast region. Because of the very large economic impacts if this pipeline were to be rendered inoperable and because the pipeline is not redundant (there is no other transmission pipeline on this route), it is certainly a potential terrorist target.

Mitigation of potential terrorist threats to the pipeline is very difficult, because of the extent of the pipeline. Consideration of enhanced physical security at compressor stations and interconnects may be warranted, along with additional emergency planning for rapid response and recovery from accidental or deliberate ruptures of the pipeline. Where the pipeline passes through heavily populated areas (i.e., Eugene), local emergency planning should consider the possibility of pipeline rupture. Evacuations for natural gas pipeline ruptures are generally limited to the immediate area of the break.

6.2 Natural Gas Distribution Systems

The transmission line discussed above carries bulk natural gas from production fields in Canada to local gas utilities in Washington, Oregon and California. Gas is transferred from the transmission line to local utility distribution lines at interconnects as noted above.

Local natural gas distribution lines consists of an interconnected grid of mains and progressively smaller distribution lines that bring natural gas to each city, each neighborhood, each block and eventually to each building served. All of the major cities and most of the smaller cities in Benton, Lane and Linn Counties are served by natural gas systems. Thus, the network of mains and distribution lines for the natural gas system runs throughout the three county areas. The service provider for this region is Northwest Natural Gas.

The natural gas pipeline systems of local gas utilities almost always follow road and street patterns because of established utility rights of way and because of the need to connect with each building served. Thus, for areas served by natural gas, the local street network is essentially identical to the natural gas distribution pipe network. Thus, although the scale of the distribution network is too fine to be presented on a three-county map or even on separate maps for each county, the natural gas distribution network in most areas is well defined by the local street pattern.

As discussed above for transmission lines, distribution lines for natural gas are subject to accidental or deliberate rupture. The 2000 Annual Report of Hazardous Materials Incidents in Oregon[8] listed 45 incidents involving natural gas. This report also classified 39 incidents as involving pipelines (presumably natural gas). Thus, about 6 natural gas incidents likely involved significant gas leaks in buildings. The report noted 24 incidents due to excavation; most likely these are ruptures of natural gas lines due to excavation for construction with the remainder of pipeline incidents being due to other causes. The Annual Report does not break down pipeline incidents on a county-by-county basis, but this pattern of natural gas incidents applies throughout the state, including Benton, Lane and Linn Counties.

Most natural gas incidents involve relatively small distribution system pipelines because transmission lines and major mains are better marked and less likely to be ruptured by accident. Although fire/explosion is always possible, most such incidents do not involve fires, because natural gas rises in the atmosphere and thus tends to be naturally diluted and dissipated.

Natural gas utilities and local emergency responders are generally well prepared to deal with natural gas breaks, because such incidents occur relatively frequently with well-standardized response procedures. Evacuations for natural gas pipeline ruptures are generally limited to the immediate area of the break.

Natural gas distribution systems are potentially targets of terrorism, but the possibility of such events appears minimal. Deliberate rupture of distribution lines would have only highly localized disruptions of service, with low probability of casualties. Deliberate gas leaks could be initiated in target facilities with deliberate ignition, but this possibility seems remote for Benton, Lane and Linn Counties given the absence of facilities with national political, historical and cultural significance. Even if targets were selected, attacks by more direct means such as arson or explosives seem more likely than an indirect attack via the natural gas distribution system.

6.3 Kinder Morgan Petroleum Pipeline

The Kinder Morgan petroleum pipeline transports refined petroleum products, including gasoline, diesel fuel and both commercial and military jet fuel. This pipeline runs from Portland to the Eugene terminal, with an intermediate truck-loading terminal near Albany. From the terminals, petroleum products are transported by truck to customers.

The pipeline route closely parallels the Williams natural gas pipeline discussed above in Section 6.1. See Figure 6.2 for a map of the Kinder Morgan Pipeline route. The operating characteristics and potential for accidental or deliberate ruptures are similar to those discussed above for the natural gas transmission line.

Figure 6.2
Kinder Morgan Refined Petroleum Products Pipeline Route

Pennwell Refined Products Atlas, 2000 Edition, Map Panel 100
The pipeline is shown above as the black line running approximately north-south through Linn and Lane Counties. The route is east of Albany, then south to Eugene/Springfield.

Major petroleum transmission lines, such as the Kinder Morgan line in Oregon, are heavily engineered and generally constructed of welded steel pipe that is strong and reasonably flexible. Major failures are rare, but may occur due to natural or man-made causes. Pipeline breaks due to natural causes may occur due to landslides or earthquakes. Earthquake induced pipe breaks for petroleum transmission lines are most likely to occur in areas of soft soils subject to liquefaction and/or lateral spreading which cause significant pipe displacements. The most likely locations for such breaks during an earthquake are on slopes of soft ground near where pipelines cross rivers or streams.

The most common man-made cause of pipeline breaks is pipeline rupture due to pipes breaking when heavy construction equipment is used to excavate for construction projects. Most such breaks occur in local natural gas distribution lines. For major transmission lines, including this pipeline, such breaks are possible, but much less common, because of the robustness of the transmission pipelines and because the major transmission lines are generally well marked with frequent warning signs.

Pipeline breaks can also be caused by deliberate actions of sabotage or terrorism. Although pipelines are not symbolic targets with political, historical, and cultural significance, they are potential targets for terrorist actions. Major pipeline breaks could disrupt petroleum fuel service in the service area. However, the impact of this would be much less than would be the case if the Williams natural gas transmission line were ruptured because the petroleum pipeline serves a much smaller population and alternative means of delivery (i.e., trucks) exist. However, transmission lines are inherently vulnerable to terrorist actions because long stretches of pipelines pass through remote, lowly populated areas, with control facilities, pumping stations, and valves often at unmanned locations.

Mitigation of potential terrorist threats to the pipeline is very difficult, because of the extent of the pipeline. Consideration of enhanced physical security, especially at terminals, may be warranted, along with additional emergency planning for rapid response and recovery from accidental or deliberate ruptures of the pipeline. Where the pipeline passes near populated areas, local emergency planning should consider the possibility of pipeline rupture. Evacuations for petroleum pipeline ruptures are generally limited to the immediate area of the break, but the possibility of fires is probably higher than with natural gas pipeline breaks.

7.0 Summary and Recommendations

7.1 Planning and Response

Hazardous materials vary dramatically in their degree of toxicity to humans. The impact of a hazardous material release incident on an affected community depends on several factors including:

a) the toxicity of the hazardous material,
b) the quantity of the hazardous material released,
c) the dispersal characteristics of the hazardous material,
d) the local conditions such as wind direction and topography, and
e) the efficacy of response and recovery actions.

Effective mitigation planning and effective emergency response planning can help reduce the number or frequency of hazardous materials incidents and also reduce the severity of incidents that do occur. In combination, these benefits can significantly reduce the negative impacts of hazardous materials incidents on affected communities. The general principles of mitigation planning, emergency response planning (and training) are well standardized and practiced by each of the three counties as well as by most cities and many other public and private entities.

Perhaps the single most critical factor in enhancing both mitigation planning and emergency response planning is **specific inventory awareness** for major hazardous materials sites within each jurisdiction. Specific inventory awareness means detailed knowledge of the types of hazardous materials, quantities of hazardous materials and locations of every location in a jurisdiction with significant quantities of hazardous materials. In this context, what constitutes a significant quantity varies depending on the toxicity of the material, the dispersal characteristics and the nature and population of nearby areas likely to be affected by hazardous materials incidents.

The Office of State Fire Marshall's Hazardous Substance Information System (HSIS) database contains a vast amount of information on the inventories of hazardous materials at fixed locations throughout Oregon. This detailed inventory information, and inventory information about hazardous materials being transported within or through the three county areas, provides the basic data for specific inventory awareness. In combination, with the chemical data and emergency response information provided in the **2000 Emergency Response Guide** and in other sources, these are the basic data necessary for effective planning and effective emergency response.

In total however, these comprehensive data sources are almost overwhelming. For fixed sites alone, the HSIS database lists nearly 7,000 sites in Benton, Lane and Linn counties, with many sites containing dozens of hazardous materials and some sites containing over 100 individual hazardous materials. The HSIS database has literally dozens of menus, selection buttons, report options, data sorting capabilities and so on.

The complexity and overload of information is compounded by numerous labeling, placarding, and classification systems for hazardous materials, with countless cross references to guide numbers, material safety reports and so on.

Because of this vast amount of complex information, effective mitigation planning and emergency response planning must occur before an incident occurs, not after. During an incident, the most effective response is precluded and impossible to achieve if emergency personnel are thumbing through databases trying to figure out what hazardous materials are at a given location and what the appropriate response precautions and protocols are for the specific materials involved in a hazardous materials incident.

Specific inventory awareness means that for every site with hazardous materials of sufficient toxicity, dispersal characteristics and quantities to pose a significant life safety risk to on-site employees and nearby residents must be identified in advance. Ideally, each jurisdiction (county, city, fire department) should have detailed specific inventory awareness of every significant fixed site in its jurisdiction. Similarly, each jurisdiction should have specific inventory awareness of the most toxic, most common, large volume shipments of hazardous materials within and through the jurisdiction. For each hazardous material deemed to pose a significant life safety threat, the necessary chemical data, response protocols, initial isolation distances, protection distances for small and large spills, and all other data necessary for safe and effective response should be compiled and readily available before incidents occur.

7.2 Mitigation Measures

Specific inventory awareness is one cornerstone of reducing the potential for negative impacts from hazardous materials incidents by helping to optimize emergency planning and response planning. The other cornerstone is pro-active mitigation actions to reduce the number and severity of hazardous materials incidents.

The most common mitigation measures for reducing the potential of damaging hazardous materials incidents are briefly summarized below.

7.2.1 Physical Safety Measures

The tanks, other storage containers and transfer systems (valves, pipes etc.) for hazardous materials are frequently subject to damage in earthquakes, with a correspondingly high potential for accidental releases. Proper seismic design, bracing and anchoring of storage systems for hazardous materials can greatly reduce the potential of accidental releases during earthquakes. Bracing and anchoring measures for storage containers and transfer systems (e.g., piping) are often relatively inexpensive, with a large improvement in seismic performance. For small quantities of materials stored in bottles or jugs on shelving, bracing shelving and restraining containers so that they do not fall in earthquakes are particularly important.

Over time, the storage containers and other material handling elements for hazardous materials may be changed many times. In some cases, later modifications may not be designed to the same seismic standards as the original installation or later modifications may compromise the seismic stability of the original installation. Therefore, periodic review and inspections of seismic design, bracing and anchoring are highly recommended for all hazardous material facilities.

For facilities located in mapped flood plains or other areas subject to floodwaters there are two important physical safety measures. First, any containers subject to floating should be properly restrained. In many floods, improperly restrained tanks break free and float downstream, with high potential for negative impacts, including fires from tanks containing flammable materials as well as accidental releases of hazardous materials. Second, special precautions should be taken with water-reactive materials. Such materials should never be stored in low-elevation areas subject to flooding or in locations subject to water from storm water drainage or plumbing failures in a facility.

7.2.2 Standard Operating Procedures

Standard operating procedures for storing, transporting, and handling hazardous materials should be strictly enforced at all facilities. Appropriate training for all staff, with review courses and appropriate protective gear are essential for safety. Rigorous inspection and enforcement of hazardous materials regulations (federal, state, and local) are an important part of the overall process of ensuring safety.

7.2.3 Mitigation and Emergency Response Planning

Effective pre-event mitigation planning and emergency response planning can help reduce the severity of hazardous material incidents. From the mitigation planning perspective, specific inventory awareness of the types and quantities of hazardous materials present at each facility is particular important. Local fire departments and other responders should be thoroughly familiar with the specific inventory at each facility containing hazardous materials and with the appropriate response protocols for each hazardous material. First responders and emergency response teams must both have the full range of protective gear and equipment necessary for their respective roles in responding to hazardous materials incidents.

Emergency response planning should include thorough training in all aspects of hazardous materials response, including appropriate response protocols (procedures, protective gear and equipment). Frequent refresher training and frequent exercises (both tabletop and full field exercises) are essential for safe and effective emergency response. Training exercise should include both first responders and emergency response teams, to help ensure appropriate coordination of efforts during actual hazardous materials incidents.

References

1. **Handbook of Chemical Analysis Procedures**, Federal Emergency Management Agency, U.S. Department of Transportation, and U.S. Environmental Protection Agency, U.S. Government Printing Office, 1988.

2. **2000 Emergency Response Guidebook** (A Guidebook for First Responders During the Initial Phase of a Dangerous Goods/Hazardous Material Incident), developed jointly by the U.S. Department of Transportation, Transport Canada, and the Secretariat of Transport and Communications of Mexico, 2000.

3. **Hazardous Materials Emergency Response Teams Standard Operating Guidelines**, May 7, 2001 Office of State Fire Marshal (Oregon). This series of about a dozen standard operating guidelines covers every main aspect of emergency response and recovery, including decisions to respond, levels of response, general response guidelines, mitigation methods, decontamination procedures, personal protective equipment, and others.

4. **Hazardous Substance Information System** (HSIS), Office of State Fire Marshall, Version 1.3P, March 2002. Microsoft Access Database on CD-ROM.

5. **Hazardous Materials Shipments**, United States Department of Transportation, Office of Hazardous Materials Safety Research and Special Programs Administration, October 1998.

6. **Guidance for Conduction Hazardous Materials Flow Surveys**, United States Department of Transportation, Final Report, January 1995, DOT-VNTSC-RSPA-94-2.

7. **Hazardous Materials Commodity Flow Study for Linn, Benton, and Lincoln Counties, Oregon,** Bryan E. Wemple, Master Thesis, Oregon State University, May 13, 1999.

8. **Hazardous Material Movements on Oregon Highways**, Public Utility Commission of Oregon and Oregon Department of Transportation. 204 pages, undated report (1987).

9. **Annual Report of Hazardous Materials Incidents in Oregon** as Reported by Oregon Fire Service, Office of State Fire Marshal (Oregon), 2000 and earlier years.

10. **2000 State Highway Crash Rate Tables**, Oregon Department of Transportation, Transportation Data Section, Crash Analysis and Reporting Unit, October 2001.

11. **1998 Milepost Inventory Update Form**, Burlington Northern & Santa Fe Railroad, April 30, 1999.

APPENDIX

Lists of chemicals included under the reporting requirements of:

Section 112(r),
Toxics Release Inventory (TRI), and
Extremely Hazardous Substances (EHS)

All of these tables were printed from the Office of State Fire Marshal, Hazardous Substance Information System (HSIS) database, Version 1.3P, March 2002.

Table A.1
U.S. Environmental Protection Agency
Section 112(r) Chemical List
Threshold Planning Quantities (TPQ)

CHEMICAL NAME	TPQ Pounds	TPQ Cubic Feet	TPQ Gallons	MSDS File
Acetaldehyde	10000		1545	000942.TXT
Acetylene	10000	147000	1950	000011.TXT
Acrolein	5000		717	000956.TXT
Acrylonitrile	20000		3012	000976.TXT
Acrylylchloride	5000			
Allyl alcohol	15000		2126	001032.TXT
Allylamine	10000		1798	
Ammonia (anhydrous)	10000	415600	1565	
Ammonia (aqueous) Conc. >=20%	20000		3912	
Arsenous trichloride	15000		841	
Arsine	1000	5000	45	000046.TXT
Bis(chloromethyl)ether	1000		100	
Boron Trichloride	5000	16500	816	000848.TXT
Boron Trifluoride	5000	28000	384	000069.TXT
Boron Trifluoride w/methyl ether(1:1)	15000		1238	
Bromine	10000		386	001339.TXT
Bromotrifluoroethylene	10000			
Butadiene (1,3-)	10000	69000	1854	
Butane	10000	63356	2008	001372.TXT
Butene	10000			003371.TXT
Butene (1-)	10000	65510	272	
Butene (2-)	10000			
Butene-cis (2-)	10000	65230	259	
Butene-trans (2-)	10000	65245	267	
Carbon Disulfide	20000		1854	001433.TXT
Carbon Oxysulfide (Carbonylsulfide)	10000	280266	574	
Chlorine	2500	41239	193	000111.TXT
Chlorine Dioxide	1000	41239	80	000855.TXT
Chlorine Monoxide	10000			
Chloroform	20000		1618	
Chloromethyl ether	5000		564	
Chloropropylene (1-)	10000		1279	
Chloropropylene (2-)	10000		1279	
Crotonaldehyde	20000		2935	
Crotonaldehyde, (E)-	20000		2802	
Cyanogen	10000	241082		

CHEMICAL NAME	TPQ Pounds	TPQ Cubic Feet	TPQ Gallons	MSDS File
Cyanogen chloride	10000	280266	1004	
Cyclohexylamine	15000		2077	001616.TXT
Cyclopropane	10000	100762	1673	
Diborane	2500	35125		
Dichlorosilane	10000	464441		000141.TXT
Difluoroethane	10000	57400	502	
Dimethylamine	10000	86000	1772	
Dimethyldichlorosilane	5000		560	
Dimethylhydrazine (1,1-	15000		2285	
Dimethylpropane (2,2-)	10000	78875		
Epichlorohydrin	20000		2037	001794.TXT
Ethane	10000	125151	2677	001805.TXT
Ethyl acetylene	10000	72000	1792	
Ethyl chloride	10000	44042	1310	001814.TXT
Ethyl ether	10000		1697	001815.TXT
Ethyl isocyanate	10000		1255	
Ethyl nitrate	10000		1268	
Ethylamine	10000		1754	
Ethylene	10000	127000	2114	003372.TXT
Ethylene oxide	10000	87800	1385	001822.TXT
Ethylenediamine	20000		2677	001823.TXT
Ethyleneimine	10000		1448	
Explosives (DOT 49 CFR 172.101	5000			
Fluorine	1000	10170	109	FLUORINE.PDF
Formaldehyde (solution)	15000		2217	
Furan	5000		644	
Hydrazine	15000		1800	000870.TXT
Hydrochloric acid (soln.Conc. >=30%)	15000		1689	
Hydrocyanic acid(Hydrogen cyanide)	2500		437	
Hydrogen	10000	192000	5900	HYDROGEN.PDF
Hydrogen chloride	5000	54500	475	002040.TXT
Hydrogen fluoride/Hydrofluoric acid (conc.>=50%)	1000		105	
Hydrogen selenide	500		28	
Hydrogen sulfide	10000	266920	1017	002048.TXT
Iron, Pentacargonyl-	2500		202	
Isobutane	10000	63355	2077	003374.TXT
Isobutyronitrile	20000		3171	
Isopentane	10000		1943	003375.TXT
Isoprene	10000		1769	
Isopropyl chlorid	10000		1398	

CHEMICAL NAME	TPQ Pounds	TPQ Cubic Feet	TPQ Gallons	MSDS File
Isopropyl chloroformate	15000			
Isopropylamine	10000		1746	
Methacrylonitrile	10000		1506	
Methane	10000	236113	2175	002245.TXT
Methyl chloride	10000	75000	1310	002266.TXT
Methyl chloroformate	5000		493	
Methyl ether	10000	88217	1823	
Methyl formate	10000		1229	
Methyl hydrazine	15000		2068	
Methyl mercaptan	10000	116110	1385	002215.TXT
Methyl propene (2-)	10000	80076	2000	
Methyl thiocyanate	20000			
Methyl trichlorosilane	5000		473	
Methyl-1-butene (2-)	10000			
Methyl-1-butene (3-)	10000	83706	879	
Methylamine	10000	121000	1336	
Nickel carbonyl	1000		91	
Nitric acid (Conc. EPA >=80%, OSHA >= 94.5%)	15000		1202	
Nitric oxide	10000	130000	949	002437.TXT
Oleum (OSHA Conc.5 – 80%)	10000			
Pentadiene (1,3-)	10000		1828	
Pentane	10000		1923	002534.TXT
Pentene (1-)	10000		1883	
Pentene (2-) (E)-	10000		1883	
Pentene (2-) (Z)-	10000		1883	
Peraceticacid/ Peroxyacetic acid (OSHA Conc. >60% Acetic acid	10000		1048	
Perchloromethyl-mercaptan	10000		700	
Phosgene	500	1950	43	000869.TXT
Phosphine	5000	79008	508	PHOSPHINE.PDF
Phosphorus oxychloride (phosphoryl chloride)	5000		359	
Piperidine	15000		2097	PIPERIDINE.TXT
Propadiene	10000			
Propane	10000	84515	2358	PROPANE.PDF
Propionitrile	10000		1545	
Propyl chloroformate	15000			
Propylene	10000	88750	2362	002722.TXT
Propylene oxide	10000		1403	002725.TXT
Propyleneimine (2-methyl aziridine)	10000		1506	
Propyne	10000	97000		
Silane	10000	120000	1772	SILANE.PDF

CHEMICAL NAME	TPQ Pounds	TPQ Cubic Feet	TPQ Gallons	MSDS File
Sulfur dioxide (anhydrous)	5000	29950	413	
Sulfur tetrafluoride	2500			
Sulfur trioxide (sulfuric anhydride)	10000		628	
Tetrafluoroethylene	10000			
Tetramethyllead	10000		604	
Tetramethylsilane	10000		1859	
Tetranitromethane	10000		735	
Titanium tetrachloride	2500		175	003424.TXT
Toluene 2,4-diisocyanate	10000		984	
Toluene diisocyanate	10000		984	003380.TXT
Trichlorosilane	10000		1012	003381.TXT
Trifluorochloroethylene	10000	174165	898	
Trimethylamine	10000	64000	1812	
Trimethylchlorosilane	10000		1401	TRIMETHYLCHLOROSILANE.TXT
Vinyl acetate monomer	15000		1407	
Vinyl acetylene	10000	91647	1939	
Vinyl chloride	10000	62500	1316	
Vinyl ethyl ether	10000		1321	
Vinyl fluoride	10000		1557	
Vinyl methyl ether	10000	100095	1600	
Vinylidene fluoride	10000	82345	1946	

Table A.2
Toxics Release Inventory (TRI) Chemical List

CHEMICAL NAME	CAS NO	MSDS File
1,1,1-TRICHLOROETHANE	71-55-6	003467.TXT
1,1,2-TRICHLOROETHYLENE	79-01-6	003452.TXT
1,2,4-TRICHLOROBENZENE	120-82-1	000902.TXT
1,4-DIOXANE	123-91-1	000145.TXT
2,4-D	94-75-7	003480.txt
2,4-D AMINE 4	2008-39-1	2_4_D_AMINE_4.PDF
2,4-D BUTYL ESTER		
2,4-D GRANULAR		
2,4-D LVE 4	94-75-7	
2,4-DB	94-82-6	000908.TXT
2,4-DB AMINE		000709.TXT
ACEPHATE	30560-19-1	
ACETALDEHYDE	75-07-0	000942.TXT
ACETAMIDE	60-35-5	000943.TXT
ACETONE	67-64-1	ACETONE.TXT
ACETONE PURE 99.5%	67-64-1	
ACETONE SOLUTIONS	67-64-1	
ACETONE-REDUCER THINNER	67-64-1	
ACETONE/MEK/TOL/METHANOL	67-64-1	
ACETONE/XYLENE	67-64-1	
ACETONITRILE	75-05-8	000950.TXT
ACID CLEANER 880	62-56-6	
ACROLEIN	107-02-8	000956.TXT
ACRYLAMIDE	79-06-1	000957.TXT
ACRYLIC ACID	79-10-7	000960.TXT
ACRYLONITRILE	107-13-1	000976.TXT
ADDITIVE 20	112-34-5	ADDITIVE_20.pdf
ALACHLOR	15972-60-8	
ALBATROSS SPIF CLEANING FLUID	75-09-2	ALBATROSS_SPIF_CLEANING_FLUID.pdf
ALDICARB	116-06-3	
ALDRIN	309-00-2	003382.TXT
ALLYL ALCOHOL	107-18-6	001032.TXT
ALLYL CHLORIDE	107-05-1	001033.TXT
ALUMINUM BORINGS		
ALUMINUM DROSS		001050.TXT
ALUMINUM DUST	7429-90-5	
ALUMINUM FLAKE POWDER	7429-90-5	
ALUMINUM GRINDINGS		
ALUMINUM OXIDE	1344-28-1	ALUMINUM_OXIDE.TXT
ALUMINUM OXIDE C-70	1344-28-1	
ALUMINUM PHOSPHIDE	20859-73-8	ALUMINUM_PHOSPHIDE.TXT
ALUMINUM POWDER	7429-90-5	

CHEMICAL NAME	CAS NO	MSDS File
ALUMINUM POWDER 805	7429-90-5	
ALUMINUM POWDER 807	7429-90-5	
ALUMINUM POWDER ATOMIZED	7429-90-5	
AMMONIA	7664-41-7	
AMMONIA ANHYDROUS	7664-41-7	AMMONIA_ANHYDROUS.TXT
AMMONIA LIQUID	7664-41-7	
AMMONIA R-717	7664-41-7	
AMMONIA SOLUTIONS	7783-20-2	001075.TXT
AMMONIUM HYDROXIDE	1336-21-6	AMMONIUM_HYDROXIDE.TXT
AMMONIUM HYDROXIDE (HYUNDAI)	1336-21-6	
AMMONIUM HYDROXIDE 15%	1336-21-6	003465.TXT
AMMONIUM HYDROXIDE 19%	1336-21-6	
AMMONIUM HYDROXIDE 26 BE	1336-21-6	
AMMONIUM HYDROXIDE 28%	1336-21-6	003465.TXT
AMMONIUM HYDROXIDE 29%	1336-21-6	
AMMONIUM HYDROXIDE 30%	1336-21-6	003465.TXT
AMMONIUM HYDROXIDE 32%	1336-21-6	003465.TXT
AMMONIUM HYDROXIDE ACS GRADE	1336-21-6	
AMMONIUM HYDROXIDE RECOVERED	1336-21-6	
AMMONIUM HYDROXIDE SOLUTION	1336-21-6	003465.TXT
AMMONIUM HYDROXIDE-4 ETHER	1336-21-6	
AMMONIUM HYDROXIDE-MALLINCKRODT	1336-21-6	
AMMONIUM NITRATE SOL	6484-52-2	001088.TXT
AMMONIUM SULFATE SOLUTION	7783-20-2	
ANILINE	62-53-3	001111.TXT
ANILINE HCL RING-CARBON 14		
ANSULITE 3% AFFF	112-34-5	ANSULITE_3_AFFF.pdf
ANTIMONY	7440-36-0	
ARABLEND #5	111-76-2	ARABLEND_5.pdf
ARSENIC	7440-38-2	001148.TXT
ASBESTOS	1332-21-4	001151.TXT
ATRAZINE	1912-24-9	ATRAZINE.TXT
ATRAZINE-LIQUID	1912-24-9	
BARIUM 133		
BENDIOCARB	22781-23-3	000247.TXT
BENOMYL	17804-35-2	001236.TXT
BENZENE	71-43-2	001242.TXT
BENZIDINE	92-87-5	
BENZOQUINONE	106-51-4	
BENZOYL CHLORIDE	98-88-4	001247.TXT
BENZOYL PEROXIDE	94-36-0	000059.TXT
BENZYL CHLORIDE	100-44-7	001249.TXT
BERYLLIUM	7440-41-7	001250.TXT
BOOMER RID	57-24-9	
BORON TRICHLORIDE	10294-34-5	000848.TXT

CHEMICAL NAME	CAS NO	MSDS File
BORON TRIFLUORIDE	7637-07-2	000069.TXT
BRAVO 720	1897-45-6	000562.TXT
BRITE LUME	7664-39-3	BRITE_LUME.PDF
BROM-O-GAS	74-83-9	000843.TXT
BROMACIL	314-40-9	001338.TXT
BROMINE	7726-95-6	001339.TXT
BROMOTRIFLUOROMETHANE	75-63-8	001340.TXT
BROMOXYNIL	1689-99-2	001341.TXT
BROMOXYNIL OCTANOATE	1689-99-2	
BUTADIENE	106-99-0	001371.TXT
BUTYL ACRYLATE	141-32-2	001378.TXT
BUTYL ALCOHOL	71-36-3	BUTYL_ALCOHOL.TXT
BUTYL ALCOHOL SECONDARY	71-36-3	
BUTYL BENZYL PHTHALATE	85-68-7	
CADMIUM	7440-43-9	000079.TXT
CADMIUM 109	14109-32-1	
CADMIUM ANODES	7440-43-9	CADMIUM_ANODES.TXT
CALCIUM CYANAMIDE	156-62-7	
CAPTAN	133-06-2	001422.TXT
CARBARYL	63-25-2	001427.TXT
CARBARYL 4L	63-25-2	
CARBARYL 50WP	63-25-2	
CARBARYL-LIQUID	63-25-2	
CARBOFURAN	1563-66-2	003383.TXT
CARBON DISULFIDE	75-15-0	001433.TXT
CARBON TETRACHLORIDE	56-23-5	001435.TXT
CARBOXIN	5234-68-4	000699.TXT
CFC REFRIGERATION	75-71-8	
CHLORAMBEN	1954-81-0	
CHLORDANE	57-74-9	
CHLORINE	7782-50-5	000111.TXT
CHLORINE DIOXIDE	10049-04-4	000855.TXT
CHLORINE GAS	7782-50-5	
CHLORINE LIQUID	7782-50-5	
CHLOROBENZENE	108-90-7	001520.TXT
CHLORODIFLUOROMETHANE	75-45-6	001521.TXT
CHLOROFORM	67-66-3	
CHLOROPICRIN	76-06-2	CHLOROPICRIN.TXT
CHLOROTHALONIL	1897-45-6	
CHLORPYRIFOS-METHYL	5598-13-0	
CHLORSULFURON	64902-72-3	
CHROMIUM	7440-47-3	
CHROMIUM 3	1308-38-9	
CHROMIUM 51	10039-53-9	
CHROMIUM ALLOYS	7440-47-3	

CHEMICAL NAME	CAS NO	MSDS File
CHROMIUM METAL & ALLOYS	7440-47-3	
CHROMIUM METAL VMG	7440-47-3	
COBALT	7440-48-4	
COBALT 57		
COBALT 59		
COBALT 60		
COBALT METAL	7440-48-4	
COKE GOPHER BAIT	57-24-9	
COPPER	7440-50-8	
COPPER (SHEET, PLATE)	7440-50-8	
COPPER ALLOY INGOTS	7440-50-8	
COPPER ALLOYS	7440-50-8	
COPPER ANODE BALLS	7440-50-8	COPPER_ANODE_BALLS.PDF
COPPER ANODE NUGGETS	7440-50-8	
COPPER ANODES	7440-50-8	
COPPER ANODES CHUNK/BALL	7440-50-8	COPPER_ANODE_BALLS.PDF
COPPER ANODES/WIRE	7440-50-8	
COPPER BALLS/CU-BRITE	7440-50-8	COPPER_ANODE_BALLS.PDF
COPPER DUST		
COPPER FOIL	7440-50-8	
COPPER METAL	7440-50-8	001578.TXT
COPPER PLATE	1310-73-2	
COPPER SCRAP	7440-50-8	001580.TXT
CU-PHOS	7440-50-8	COPPER_ANODE_BALLS.PDF
CYANAZINE	21725-46-2	001613.TXT
CYCLOATE	1134-23-2	
CYCLOHEXANE	110-87-7	
DAZOMET	533-74-4	
DEHP	117-81-7	
DIAZINON	333-41-5	000166.TXT
DIAZINON 14G	333-41-5	
DIAZINON 25%	1330-20-7	
DIAZINON 4 SPRAY	333-41-5	
DIAZINON 4AG	333-41-5	
DIAZINON 4E	333-41-5	
DIAZINON 4EC	333-41-5	
DIAZINON 4L	333-41-5	
DIAZINON 500	333-41-5	000733.TXT
DIAZINON 500 AG	333-41-5	
DIAZINON 50W	333-41-5	000575.TXT
DIAZINON 50WP	333-41-5	000732.TXT
DIAZINON 5G	333-41-5	
DIAZINON 8EC	333-41-5	
DIAZINON AG 500	333-41-5	000574.TXT
DIAZINON AG 500/4AG	333-41-5	

CHEMICAL NAME	CAS NO	MSDS File
DIAZINON GRANULES	333-41-5	000171.TXT
DIAZINON MG-8	333-41-5	000253.TXT
DIBROM 8	300-76-5	000576.TXT
DICAMBA	1918-00-9	001682.TXT
DICHLORODIFLUOROMETHANE	75-71-8	001685.TXT
DICHLOROPROPENE	542-75-6	
DICLOFOP-METHYL	25551-13-7	
DICOFOL	115-32-2	
DICOFOL 4EC	115-32-2	000826.TXT
DIFLUBENZURON	35367-38-5	
DIMETHOATE	60-51-5	003388.TXT
DIMETHYL PHTHALATE	131-11-3	001701.TXT
DIMETHYLAMINE 60	124-40-3	001705.TXT
DIMETHYLBENZENE	1330-20-7	001709.TXT
DIMETHYLFORMAMIDE	68-12-2	001711.TXT
DINOCAP	39300-45-3	
DIOCTYL PHTHALATE	117-81-7	000144.TXT
DIPHENAMID	957-51-7	
DIURON	330-54-1	
DOWPER (R) SOLVENT	127-18-4	DOWPER_R_SOLVENT.TXT
ELECTROLYTIC CHROME	7440-47-3	ELECTROLYTIC_CHROME.PDF
ELSTON GOPHER GETTER	57-24-9	
EPICHLOROHYDRIN	106-89-8	001794.TXT
ETHOPROP	13194-48-4	003395.TXT
ETHOPROP-LIQUID	13194-48-4	
ETHYL ACRYLATE	140-88-5	001813.TXT
ETHYL CHLORIDE		001814.TXT
ETHYLENE	74-85-1	003372.TXT
ETHYLENE DICHLORIDE	107-06-2	001817.TXT
ETHYLENE GLYCOL	107-21-1	ETHYLENE_GLYCOL.TXT
ETHYLENE GLYCOL (& COOLANT)	107-21-1	
ETHYLENE GLYCOL 50/50	107-21-1	001819.TXT
ETHYLENE GLYCOL INHIBITED	107-21-1	
ETHYLENE OXIDE	75-21-8	001822.TXT
EXCEL ULTRA 5000 POLYMER	64742-47-8	EXCEL_ULTRA_5000_POLYMER.pdf
FENBUTATIN OXIDE	13356-08-6	
FERBAM	14484-64-1	
FIRE CAT	75-45-6	
FLAMAL 29	115-07-1	FLAMAL_29.PDF
FLUOMETURON	2164-17-2	
FLUORINE	7782-41-4	FLUORINE.PDF
FLUOROCARBON 11	75-69-4	
FLUVALINATE	69409-94-5	
FORANE 22	75-45-6	001907.TXT
FORANE 502	75-45-6	

CHEMICAL NAME	CAS NO	MSDS File
FORANE FX-10	75-45-6	
FORANE FX-56	75-45-6	
FORMALDEHYDE	50-00-0	000537.TXT
FORMALDEHYDE SOLUTION	50-00-0	FORMALDEHYDE_SOLUTION.TXT
FREON	75-71-8	
FREON 11	75-69-4	001899.TXT
FREON 113	76-13-1	001900.TXT
FREON 114 RACON 114	75-43-4	
FREON 115	76-15-3	001902.TXT
FREON 12	75-71-8	FREON_12.PDF
FREON 123	306-83-2	FREON_123.pdf
FREON 22	75-45-6	001907.TXT
FREON 22-RECOVERED	75-45-6	
FREON 500	75-72-9	001908.TXT
FREON 502	75-45-6	001909.TXT
FREON MP39	75-45-6	
FREON MP66	75-45-6	
FUMITOXIN	7803-51-2	FUMITOXIN.TXT
GAMMA-MEAN 400	58-89-9	000747.TXT
GENETRON	75-71-8	
GENETRON 114	76-14-2	001944.TXT
GENETRON 12	75-71-8	FREON_12.PDF
GENETRON 22	75-45-6	GENETRON_22.PDF
GENETRON MP39	75-45-6	MP39_R401A.PDF
GLACIAL ACRYLIC ACID	79-10-7	001953.TXT
GLYCOL ETHER	111-90-0	
GLYCOL ETHERS		
GOPHER BAIT SYK/MILO	57-24-9	
GOPHER GRAIN	57-24-9	
GOPHER MIX	57-24-9	
HALOCARBON-22	75-45-6	
HALON 1211	353-59-3	001993.TXT
HALON 1301	75-63-8	001994.TXT
HAZARDOUS HEAVY METAL COMPOUND		
HAZARDOUS HEAVY METAL COMPOUND-BARIUM		
HEPTACHLOR	76-44-8	
HEXACHLOROBENZENE	118-74-1	
HEXANE	110-54-3	002011.TXT
HEXAZINONE	51235-04-2	
HEXYL CARBITOL	112-59-4	HEXYL_CARBITOL.pdf
HI-YIELD ACEPHATE	30560-19-1	
HIGH TEMP AEROSOL	108-88-3	HIGH_TEMP_AEROSOL.pdf
HOUSEHOLD AMMONIA	7664-41-7	002020.TXT
HYDRAZINE	302-01-2	000870.TXT
HYDRAZINE AQUEOUS SOLUTION		

CHEMICAL NAME	CAS NO	MSDS File
HYDROCHLORIC ACID	7647-01-0	002034.TXT
HYDROCHLORIC ACID (<32%)	7647-01-0	003493.txt
HYDROCHLORIC ACID (35-40%)	7647-01-0	
HYDROCHLORIC ACID (TECH)	7647-01-0	
HYDROCHLORIC ACID 20 BE	7647-01-0	002035.TXT
HYDROCHLORIC ACID BATH	7647-01-0	
HYDROCHLORIC ACID BATHS	7647-01-0	
HYDROCHLORIC ACID PPB	7647-01-0	HYDROCHLORIC_ACID_PPB.PDF
HYDROCHLORIC ACID, CONC.	7647-01-0	
HYDROCHLORIC/MURIATIC ACID	7647-01-0	
HYDROFLUORIC ACID	7664-39-3	HYDROFLUORIC_ACID.TXT
HYDROFLUORIC ACID 48 & 52%	7664-39-3	003441.TXT
HYDROFLUORIC ACID 48%-50%	7664-39-3	HYDROFLUORIC_ACID_48_50.TXT
HYDROFLUORIC ACID 50%	7664-39-3	
HYDROFLUORIC ACID 70%	7664-39-3	002037.TXT
HYDROFLUORIC ACID 70% TECH	7664-39-3	002037.TXT
HYDROGEN CHLORIDE	7647-01-0	002040.TXT
HYDROGEN CYANIDE	74-90-8	003373.TXT
HYDROGEN FLUORIDE	7664-39-3	000854.TXT
HYDROQUINONE	123-31-9	HYDROQUINONE.TXT
HYUNDAI AMMONIUM HYDROXIDE	1336-21-6	
I6-LO REFRIGERANT	75-71-8	
ILF DETERGENT #14	9016-45-9	ILF_DETERGENT_14.pdf
ILF DETERGENT #15	64742-95-6	ILF_DETERGENT_15.pdf
IMAZALIL	73790-28-00	
INDUSTRIAL AMMONIA	1336-21-6	
ISOFENPHOS	25311-71-1	000394.TXT
ISOPROPYL ALCOHOL	67-63-0	ISOPROPYL_ALCOHOL.TXT
ISOPROPYL ALCOHOL 450-06	67-63-0	
ISOPROPYL ALCOHOL 99%	67-63-0	
ISOPROPYL ALCOHOL DILUTE	67-63-2	
ISOPROPYL ALCOHOL WASTE		
ISOPROPYL ALCOHOL, ANHYDROUS	67-63-0	
ISOTRON 22	75-45-6	
KELTHANE 35W	115-32-2	000600.TXT
KLEANZIT	127-18-4	
LA 6000S NITRO WHITE LAQUER	108-10-1	
LANNATE L	16752-77-5	000604.TXT
LEAD	7439-92-1	LEAD.pdf
LEAD ALLOYS AND SCRAP	7439-92-1	
LEAD ANODES	7439-92-1	
LEAD CALCIUM BATTERY	7439-92-1	LEAD_CALCIUM_BATTERY.pdf
LEAD DROSS	1317-36-8	
LEAD FRIT		
LEAD SOFT		

CHEMICAL NAME	CAS NO	MSDS File
LEAD WEIGHTS		
LEAD WHEEL WEIGHTS		
LINDANE	58-89-9	000182.TXT
LINDANE 20	58-89-9	
LINDANE 200 SPRAY		
LINDANE 30C		
LINDANE 40		
LINDANE 400		
LITHIUM CARBONATE	554-13-2	LITHIUM_CARBONATE.TXT
LOW LEVEL RADIOACTIVE SOURCE		
LT 34		
MALATHION	121-75-5	
MALATHION 25	121-75-5	
MALATHION 25W	121-75-5	002187.TXT
MALATHION 4	121-75-5	
MALATHION 400	121-75-5	
MALATHION 5	121-75-5	
MALATHION 50 (CYTHION)	121-75-5	000162.TXT
MALATHION 50W	121-75-5	
MALATHION 57	121-75-5	
MALATHION 57 EC	121-75-5	
MALATHION 5E	121-75-5	
MALATHION 5EC	121-75-5	
MALATHION 6% DUST	121-75-5	
MALATHION 8	121-75-5	
MALATHION 8EC	121-75-5	
MALATHION EC	121-75-5	
MALATHION EM5		
MALATHION METHOXYCHLOR	72-43-5	
MALATHION ULV	121-75-5	000274.TXT
MALEIC ANHYDRIDE	108-31-6	
MANEB	12427-38-2	
MANGANESE	7439-96-5	
MANGANESE METAL & ALLOYS	7439-96-5	
MASCO CURE & SEAL	1330-20-7	MASCO_CURE_SEAL.pdf
MBI	101-68-8	
MCK AMMONIUM HYDROXIDE SEMI	1336-21-6	MCK_AMMONIUM_HYDROXIDE_SEMI.PDF
MCK SULFURIC ACID CMOS	7664-93-9	MCK_SULFURIC_ACID_CMOS.PDF
MEK	78-93-3	002212.TXT
MEK SOLUTIONS		
MERCURY	7439-97-6	002224.TXT
MERCURY RELAY SWITCHES	7439-97-6	
METABROM 99 1/4%	74-83-9	000844.TXT
METH-O-GAS	74-83-9	000764.TXT
METHANOL	67-56-1	002247.TXT

CHEMICAL NAME	CAS NO	MSDS File
METHANOL ABSOLUTE		
METHANOL SOLUTION		
METHANOL TECHNICAL	67-56-1	
METHANOL/METHYL ALCOHOL	67-56-1	
METHANOL/WATER 50/50	67-56-1	
METHIOCARB	2032-65-7	003402.TXT
METHOXYCHLOR	72-43-5	002256.TXT
METHOXYCHLOR 2		
METHOXYCHLOR 2E	72-43-5	
METHOXYCHLOR 2EC	72-43-5	002257.TXT
METHOXYCHLOR 50W	72-43-5	002258.TXT
METHYL ACRYLATE	96-33-3	002259.TXT
METHYL BROMIDE	74-83-9	000338.TXT
METHYL CHLORIDE	74-87-3	002266.TXT
METHYL CHLOROFORM	71-55-6	002265.TXT
METHYL ETHYL KETONE	78-93-3	002267.TXT
METHYL ISOBUTYL KETONE	108-10-1	METHYL_ISOBUTYL_KETONE.TXT
METHYL ISOCYANATE	624-83-9	003376.TXT
METHYL METHACRYLATE	80-62-6	002271.TXT
METHYL PARATHION	298-00-0	003418.TXT
METHYL PYRROLIDONE	872-50-4	
METHYL PYRROLIDONE 840-15	872-50-4	
METHYL-N 2 PYRROLIDONE	872-50-4	METHYL_N_2_PYRROLIDONE.pdf
METHYLENE CHLORIDE	75-09-2	002277.TXT
METHYLENE CHLORIDE FCC/NF	75-09-2	002278.TXT
METHYLENE CHLORIDE URETHANE	75-09-2	002279.TXT
METHYLENE CHLORIDE URETHANE GRADE	75-09-2	002280.TXT
METHYLENE CHLORIDE-RECYCLED	75-09-2	
METHYLENE CHLORIDE/VAPOR DEGREASING	75-09-2	
METHYLTRICHLOROSILANE-ARGON	75-79-6	002281.TXT
METRIBUZIN	21087-64-9	
MEVINPHOS	7786-34-7	003403.TXT
MEVINPHOS 400	7786-34-7	
MGC SUPER PURE AMMONIUM HYDROXIDE	1336-21-6	
MOLE BAIT	57-24-9	
MONOCHLOROACETIC ACID FLAKE	79-11-8	
MURIATIC ACID	7647-01-0	MURIATIC_ACID.PDF
N,N-DIMETHYLANILINE	121-69-7	002336.TXT
N-BUTYL ALCOHOL	71-36-3	002342.TXT
NAPHTHALENE	91-20-3	002393.TXT
NICKEL	7440-02-0	002414.TXT
NICKEL 63		
NICKEL ALLOY PRODUCTS	7440-02-0	
NICKEL AND NICKEL ALLOYS	7440-02-0	
NICKEL ANODES	7440-02-0	

CHEMICAL NAME	CAS NO	MSDS File
NICKEL CHIPS DS	7440-02-0	NICKEL_CHIPS_DS.PDF
NICKEL METAL	7440-02-0	
NICKEL PELLETS	7440-02-0	
NICKEL POWDER (& TYPE 123)	7440-02-0	
NICKEL S ROUND	7440-02-0	
NICKEL SHOT	7440-02-0	
NICKEL SLAG	7440-02-0	
NICOTINE	54-11-5	002423.TXT
NITRIC ACID	7697-37-2	002432.TXT
NITRIC ACID 38BE	7697-37-2	NITRIC_ACID_38BE.PDF
NITRIC ACID 42 BE	7697-37-2	002434.TXT
NITRIC ACID 42 DEG BAUME	7697-37-2	NITRIC_ACID_42_DEG_BAUME.PDF
NITRIC ACID 67%	7697-37-2	
NITRIC ACID 69%	7697-37-2	
NITRIC ACID 70%	7697-37-2	002435.TXT
NITRILOTRIACETIC ACID	139-13-9	002438.TXT
NITROBENZENE	98-95-3	003407.TXT
NITROGLYCERINE	55-63-0	
NORFLURAZON	74037-35-7	
OLIN HUNT AMMONIUM HYDROXIDE	1336-21-6	
OLIN HUNT AMMONIUM HYDROXIDE PPB FMI	1336-21-6	
OLIN HUNT DILUTE HYDROFLUORIC ACID 10:1	7664-39-3	OLIN_HUNT_DILUTE_HYDROFLUORIC_ACID_10_1.PDF
ORCO BOOMER-RID	57-24-9	
ORCO GOPHER AND MOLE BAIT	57-24-9	
ORCO GOPHER BAIT	57-24-9	
ORCO GOPHER GRAIN BAIT	57-24-9	
ORCO GOPHER POISON	57-24-9	
ORCO OMEGA GOPHER BAIT	57-24-9	
ORZALIN	19044-88-3	
OSMIUM TETROXIDE	20816-12-0	
OXYDEMETON METHYL	301-12-2	
OXYFLUORFEN	42874-03-3	
PARAQUAT	1910-42-5	002516.TXT
PARAQUAT PLUS	1910-42-5	
PARAQUAT/GRAMOXONE SUPER	1910-42-5	
PARATHION	56-38-2	002517.TXT
PARATHION 25W	56-38-2	000186.TXT
PARATHION 3-6E	56-38-2	
PARATHION 4	56-38-2	
PARATHION 4E	56-38-2	PARATHION_4E.TXT
PARATHION 4EC	56-38-2	
PARATHION 8 AQUA	56-38-2	
PARATHION 8EC	56-38-2	PARATHION_8EC.TXT
PARATHION SF	56-38-2	
PARATHION WP	56-38-2	

CHEMICAL NAME	CAS NO	MSDS File
PARATHION-METHYL	56-38-2	
PCB	1336-36-3	002523.TXT
PCB CONTAMINATED TRANSFORMER OIL	1336-36-3	
PCB TRANSFORMER 1000KVA	1336-36-3	
PCB TRANSFORMER 1500 KVA	1336-36-3	
PCB TRANSFORMER FLUID	1336-36-3	
PCB TRANSFORMER OIL	1336-36-3	
PCB TRANSFORMERS	1336-36-3	
PCNB	82-68-8	000695.TXT
PCNB SEED COAT		000695.TXT
PENDIMETHALIN	40487-42-1	
PENTACHLOROPHENOL	87-86-5	002533.TXT
PENTACHLOROPHENOL SOLN	87-86-5	
PERCHLOROETHYLENE	127-18-4	PERCHLOROETHYLENE.TXT
PERCHLOROETHYLENE TYPE IV	127-18-4	PERCHLOROETHYLENE_TYPE_IV.PDF
PERMETHRIN	52645-53-1	002544.TXT
PHENOL	108-95-2	002553.TXT
PHENOL LIQUIFIED	108-95-2	PHENOL_LIQUIFIED.TXT
PHENOL, CRYSTALS	108-95-2	
PHOSGENE	75-44-5	000869.TXT
PHOSPHINE	7803-51-2	PHOSPHINE.PDF
PHOSPHOR BRONZE ALLOYS	7440-50-8	PHOSPHOR_BRONZE_ALLOYS.pdf
PHOSPHORIC ACID	7664-38-2	000832.TXT
PHOSPHORIC ACID 75%	7664-38-2	002564.TXT
PHOSPHORIC ACID 75% FG	7664-38-2	002565.TXT
PHOSPHORIC ACID 75% TECH	7664-38-2	
PHOSPHORIC ACID 85%	7664-38-2	002566.TXT
PHOSPHORIC ACID FOOD GRADE	7664-38-2	
PHOSPHORUS	7723-14-0	002567.TXT
PHTHALIC ANHYDRIDE	85-44-9	002572.TXT
PHTHALIC ANHYDRIDE FLAKE	85-44-9	002573.TXT
PICRIC ACID	88-89-1	002575.TXT
PIPERONYL BUTOXIDE	51-03-6	000295.TXT
POLYCHLORINATED BIPHENYLS	1336-36-3	002523.TXT
POLYMERIC MDI	9016-87-9	POLYMERIC_MDI.pdf
PROFENOFOS	41198-08-7	
PROMETRYN	7287-19-6	
PROPACHLOR	1918-16-7	
PROPICONAZOLE	60207-90-1	
PROPIONALDEHYDE	123-38-6	002717.TXT
PROPOXUR	114-26-1	
PROPYLENE OXIDE	75-56-9	002725.TXT
PYRIDINE	110-86-1	002735.TXT
QUINOLINE	91-22-5	
QUINOLINE REFINED	91-22-5	

CHEMICAL NAME	CAS NO	MSDS File
R 500	75-71-8	
R&M POCKET GOPHER BAIT	57-24-9	
R-12 FREON	75-71-8	FREON_12.PDF
R-22	75-45-6	GENETRON_22.PDF
R-M GOPHER OAT BAIT	57-24-9	
R-M MILO GOPHER BAIT	57-24-9	
RACON 12	75-71-8	
RACON 22	75-45-6	
RACON 502	75-45-6	
REACTITE 8143	101-68-8	
REFRIGERANT	75-69-4	
REFRIGERANT 11	75-69-4	
REFRIGERANT 12	75-71-8	FREON_12.PDF
REFRIGERANT 12/114	76-14-2	
REFRIGERANT 22	75-45-6	GENETRON_22.PDF
REFRIGERANT 414B	75-45-6	REFRIGERANT_414B.pdf
REFRIGERANT 500	75-71-8	
REFRIGERANT 502	75-45-6	
REFRIGERANT MP 66	75-45-6	
REFRIGERANT MP39	75-45-6	
RESIN SOLUTION 16	110-43-0	RESIN_SOLUTION_16.pdf
RESMETHRIN	10453-86-8	RESMETHRIN.txt
RIDOMIL/BRAVO 81W	57837-19-1	000633.TXT
SACCHARIN MAINTENANCE	81-07-2	
SEC-BUTYL ALCOHOL	78-92-2	003461.TXT
SELENIOUS ACID WASTE	7783-00-8	
SELENIUM	7782-49-2	SELENIUM.PDF
SELENIUM 600	10102-18-8	
SETHOXYDIM	74051-80-2	
SHERWIN WILLIAMS R2K1-TOLUOL	108-88-3	SHERWIN_WILLIAMS_R2K1_TOLUOL.PDF
SHERWIN WILLIAMS REDUCER #54	108-10-1	SHERWIN_WILLIAMS_REDUCER_54.pdf
SHERWIN WILLIAMS XYLENE REDUCER	1330-20-7	SHERWIN_WILLIAMS_XYLENE_REDUCER.pdf
SILVER	7440-22-4	002955.TXT
SIMAZINE	122-34-9	
SIMAZINE 4L/PRINCEP 4L	122-34-9	
SIMAZINE 4L/SIM-TROL 4L	122-34-9	
SIMAZINE DF90	122-34-9	
SODIUM AZIDE	26628-22-8	003412.TXT
SODIUM NITRITE	7632-00-0	002892.TXT
SODIUM PENTACHLOROPHENATE	131-52-2	003423.TXT
ST-26S POSITIVE RESIST STRIPPER	112-34-5	ST_26S_POSITIVE_RESIST_STRIPPER.pdf
STRYCHNINE	57-24-9	003414.TXT
STRYCHNINE (GOPHER BAIT)	57-24-9	
STRYCHNINE ALKALOID	57-24-9	
STRYCHNINE COATED GRAIN	57-24-9	

CHEMICAL NAME	CAS NO	MSDS File
STRYCHNINE OATS	57-24-9	
STRYCHNINE TECH ALKALOID	57-24-9	
STYRENE	100-42-5	002996.TXT
STYRENE MONOMER	100-42-5	STYRENE_MONOMER.PDF
SULFURIC ACID	7664-93-9	
SULFURIC ACID 48-93%	7664-93-9	SULFURIC_ACID_48_93.PDF
SULFURIC ACID 50%	7664-93-9	SULFURIC_ACID_50.PDF
SULFURIC ACID 66 BE	7664-93-9	
SULFURIC ACID 92% SOLN.	7664-93-9	000803.TXT
SULFURIC ACID 93%	7664-93-9	003015.TXT
SULFURIC ACID, CONC.	7664-93-9	
SULFURIC-HYDROFLUORIC ACID 140:1	7664-93-9	
SULFURYL FLUORIDE/VIKANE		
SUVA HP81	75-45-6	003048.TXT
SYNTHETIC THINNER	1330-20-7	
TEBUTHIURON	34014-18-1	
TERBACIL	5902-51-2	
TERT-BUTYL ALCOHOL	75-65-0	
TETRACHLOROETHYLENE	127-18-4	003432.TXT
THALLIUM 201	55172-29-7	
THALLIUM 204		
THALLIUM RADIOACTIVE		
THIABENDAZOLE	148-79-8	
THIOPHANATE	23564-06-9	
THIOPHANATE-METHYL	23564-05-8	
THIOUREA	62-56-6	
THORIUM OXIDE	1314-20-1	THORIUM_OXIDE.PDF
TITANIUM TETRACHLORIDE	7550-45-0	003424.TXT
TOLUENE	108-88-3	003053.TXT
TOLUENE 420-2	108-88-3	
TOLUENE DIISOCYANATE	91-08-7	003380.TXT
TOLUENE SOLUTIONS	108-88-3	
TOLUENE/ DIISOCYANATE	26471-62-5	
TOLUENE/DIISOCYANATE	26471-62-5	
TOLUENE/SOLVENT	108-88-3	
TOXAPHENE 40WP	8001-35-2	
TREFLAN EC	1582-09-8	000651.TXT
TRIALLATE	2303-17-5	
TRICHLORFON	52-68-6	
TRICHLOROETHYLENE	79-01-6	
TRICHLOROETHYLENE WASTE	79-01-6	
TRICHLOROFLUOROMETHANE	75-69-4	003496.txt
TRIETHYLAMINE	121-44-8	TRIETHYLAMINE.TXT
TRIFORINE	26644-46-2	
URETHANE	101-68-8	003216.TXT

CHEMICAL NAME	CAS NO	MSDS File
V-23	75-71-8	
VALCOOL	64742-52-5	VALCOOL.pdf
VANADIUM EB FURNACE SLAG	1314-34-7	
VANADIUM METAL POWDER	7440-62-2	
VARMIT BAIT	57-24-9	
VINCLOZOLIN	50471-44-8	
VINYL ACETATE	108-05-4	003254.TXT
VULCAN	127-18-4	
WACKER BS 29A	9043-30-5	WACKER_BS_29A.pdf
WASH V-120	64742-95-6	WASH_V_120.pdf
WASTE AMMONIUM HYDROXIDE	1336-21-6	
WASTE NITRIC ACID	7697-37-2	
WB-6008-RB	108-05-4	WB_6008_RB.pdf
X919-1 NYLON PRIMER	75-09-2	X919_1_NYLON_PRIMER.PDF
XYLENE	1330-20-7	XYLENE.TXT
XYLENE AEROSOL SPRAY		003429.TXT
XYLENE CHEM CHIP	7664-93-9	
XYLENE EB BLEND		003429.TXT
XYLENE WASCO		003429.TXT
XYLENE/EB BLEND	1330-20-7	003429.TXT
XYLOL	1330-20-7	003429.TXT
XYLOL PAINT REDUCER	1330-20-7	003429.TXT
XYLOL THINNER	1330-20-7	003429.TXT
ZINC	7440-66-6	003352.TXT
ZINC 65		
ZINC ALLOY	7440-66-6	
ZINC ANODES		
ZINC DROSS		
ZINC DUST	7440-66-6	003355.TXT
ZINC DUST #44	7440-66-6	
ZINC DUST #64	7440-66-6	
ZINC DUST #84	7440-66-6	
ZINC FLAT BAR	7440-66-6	
ZINC INGOTS	7440-66-6	
ZINC METAL	744066-6	003356.TXT
ZINC POWDER	7440-66-6	003359.TXT
ZINC-MOLTEN		
ZINSSER COVER-STAIN PRIMER	64742-89-8	ZINSSER_COVER_STAIN_PRIMER.pdf

Table A.3
Extremely Hazardous Substance List

CHEMICAL NAME	TPQ	MSDS File	CAS NO
Acetone Cyanohydrin	1,000	000948.TXT	75-86-5
Acetone Thiosemicarbazide	1,000/10,000		1752-30-3
Acrolein	500	000956.TXT	107-02-8
Acrylamide	1,000/10,000	000957.TXT	79-06-1
Acrylonitrile	10,000	000976.TXT	107-13-1
Acrylyl Chloride	100		814-68-6
Adiponitrile	1,000		111-69-3
Aldicarb	100/10,000		116-06-3
Aldrin	500/10,000	003382.TXT	309-00-2
Allyl Alcohol	1,000	001032.TXT	107-18-6
Allylamine	500		107-11-9
Aluminum Phosphide	500	ALUMINUM_PHOSPHIDE.TXT	20859-73-8
Aminopterin	500/10,000		54-62-6
Amiton	500		78-53-5
Amiton Oxalate	100/10,000		3734-97-2
Ammonia	500		7664-41-7
Amphetamine	1,000		300-62-9
Aniline	1,000	001111.TXT	62-53-3
Aniline, 2,4,6-Trimethyl-	500		88-05-1
Antimony Pentafluoride	500		7783-70-2
Antimycin A	1,000/10,000		1397-94-0
ANTU	500/10,000		86-88-4
Arsenic Pentoxide	100/10,000		1303-28-2
Arsenous Oxide	100/10,000		1327-53-3
Arsenous Trichloride	500		7784-34-1
Arsine	100	000046.TXT	7784-42-1
Azinphos-Ethyl	100/10,000		2642-71-9
Azinphos-Methyl	10/10,000		86-50-0
Benzal Chloride	500		98-87-3
Benzenamine, 3-(Trifluoromethyl)-	500		98-16-8
Benzene, 1-(Chloromethyl)-4-Nitro-	500/10,000		100-14-1
Benzenearsonic Acid	10/10,000		98-05-5
Benzotrichloride	100		98-07-7
Benzyl Chloride	500	001249.TXT	100-44-7
Benzyl Cyanide	500		140-29-4
Bis(Chloromethyl) Ketone	10/10,000		534-07-6
Bitoscanate	500/10,000		4044-65-9
Boron Trichloride	500	000848.TXT	10294-34-5
Boron Trifluoride	500	000069.TXT	7/2/37

CHEMICAL NAME	TPQ	MSDS File	CAS NO
Bromadiolone	100/10,000		28772-56-7
Bromine	500	001339.TXT	7726-95-6
Cadmium Oxide	100/10,000	001396.TXT	1306-19-0
Cadmium Stearate	1,000/10,000		2223-93-0
Calcium Arsenate	500/10,000		7778-44-1
Camphechlor	500/10,000		8001-35-2
Cantharidin	100/10,000		56-25-7
Carbachol Chloride	500/10,000		51-83-2
Carbofuran	10/l0,000	003383.TXT	1563-66-2
Carbon Disulfide	10,000	001433.TXT	75-15-0
Carbophenothion	500		786-19-6
Chlordane	1,000		57-74-9
Chlorfenvinfos	500		470-90-6
Chlorine	100	000111.TXT	7782-50-5
Chlormephos	500		24934-91-6
Chlormequat Chloride	100/10,000	003384.TXT	999-81-5
Chloroacetic Acid	100/10,000		79-11-8
Chloroethanol	500		107-07-3
Chlorethyl Chloroformate	1,000		627-11-2
Chloroform	10,000		67-66-3
Chloromethyl Ether	100		542-88-1
Chloromethyl Methyl Ether	100		107-30-2
Chlorophacinone	100/10,000	001523.TXT	3691-35-8
Chloroxuron	500/10,000	003385.TXT	1982-47-4
Chlorthiophos	500		21923-23-9
Chromic Chloride	1/10,000	003386.TXT	10025-73-7
Cobalt Carbonyl	10/10,000		10210-68-1
Colchicine	10/10,000		64-86-8
Coumaphos	100/10,000		56-72-4
Coumatetralyl	500/10,000		5836-29-3
Cresol, o-	1,000/10,000		95-48-7
Crimidine	100/10,000		535-89-7
Crotonaldehyde	1,000		4170-30-3
Crotonaldehyde, (E)-	1,000		123-73-9
Cyanogen Bromide	500/10,000	001614.TXT	506-68-3
Cyanogen Iodide	1,000/10,000		506-78-5
Cyanophos	1,000		2636-26-2
Cyanuric Fluoride	100		675-14-9
Cycloheximide	100/10,000		66-81-9
Cyclohexylamine	10,000	001616.TXT	108-91-8
Decaborane(14)	500/10,000		17702-41-9
Demeton	500		8065-48-3

CHEMICAL NAME	TPQ	MSDS File	CAS NO
Demeton-S-Methyl	500	003389.TXT	919-86-8
Dialifos	100/10,000		10311-84-9
Diborane	100		19287-45-7
Dichloroethyl Ether	10,000		111-44-4
Dichloromethylphenylsilane	1,000		149-74-6
Dichlorvos	1,000		62-73-7
Dicrotophos	100	003387.TXT	141-66-2
Diepoxybutane	500		1464-53-5
Diethyl Chlorophosphate	500		814-49-3
Diethylcarbamazine Citrate	100/10,000		1642-54-2
Digitoxin	100/10,000		71-63-6
Diglycidyl Ether	1,000		7/5/38
Digoxin	10/10,000		20830-75-5
Dimefox	500		115-26-4
Dimethoate	500/10,000	003388.TXT	60-51-5
Dimethyl Phosphorochloridothioate	500		2524-03-0
Dimethyl Sulfate	500	001702.TXT	77-78-2
Dimethyl Sulfide	100		75-18-3
Dimethyldichlorosilane	500		75-78-5
Dimethylhydrazine	1,000		57-14-7
Dimethyl-p-Phenylenediamine	10/10,000		99-98-9
Dimetilan	500/10,000		644-64-4
Dinitrocresol	10/10,000		534-52-1
Dinoseb	100/10,000	001712.TXT	88-85-7
Dinoterb	500/10,000		1420-07-1
Dioxathion	500		78-34-2
Diphacinone	10/10,000		82-66-6
Diphosphoramide, Octamethyl-	100		152-16-9
Disulfoton	500	003390.TXT	298-04-4
Dithiazanine iodide	500/10,000		514-73-8
Dithiobiuret	100/10,000		541-53-7
Emetine, Dihydrochloride	1/10,000		316-42-7
Endosulfan	10/10,000	003393.TXT	115-29-7
Endothion	500/10,000		4/3/78
Endrin	500/10,000		72-20-8
Epichlorohydrin	1,000	001794.TXT	106-89-8
EPN	100/10,000		2104-64-5
Ergocalciferol	1,000/10,000		50-14-6
Ergotamine Tartrate	500/10,000		379-79-3
Ethanesulfonyl Chloride, 2-Chloro-	500		1622-32-8
Ethanol, 1,2-Dichloro-, Acetate	1,000		10140-87-1
Ethion	1,000	003394.TXT	563-12-2

CHEMICAL NAME	TPQ	MSDS File	CAS NO
Ethoprophos	1,000		13194-48-4
Ethylbis(2-Chloroethyl)Amine	500		538-07-8
Ethylene Fluorohydrin	10		371-62-0
Ethylene Oxide	1,000	001822.TXT	75-21-8
Ethylenediamine	10,000	001823.TXT	107-15-3
Ethyleneimine	500		151-56-4
Ethylthiocyanate	10,000		542-90-5
Fenamiphos	10/10,000	003396.TXT	22224-92-6
Fenitrothion	500		122-14-5
Fensulfothion	500		115-90-2
Fluenetil	100/10,000		4301-50-2
Fluorine	500	FLUORINE.PDF	7782-41-4
Fluoroacetamide	100/10,000		640-19-7
Fluoroacetic Acid	10/10,000		144-49-0
Fluoroacetyl Chloride	10		359-06-8
Fluorouracil	500/10,000		51-21-8
Fonofos	500	003397.TXT	944-22-9
Formaldehyde	500	000537.TXT	50-00-0
Formaldehyde Cyanohydrin	1,000		107-16-4
Formetanate Hydrochloride	500/10,000		23422-53-9
Formothion	100		2540-82-1
Formparanate	100/10,000		17702-57-7
Fosthietan	500		21548-32-3
Fuberidazole	100/10,000		3878-19-1
Furan	500		110-00-9
Gallium Trichloride	500/10,000		13450-90-3
Hexachlorocyclopentadiene	100		77-47-4
Hexamethylenediamine, N,N'-Dibutyl-	500		11/4/35
Hydrazine	1,000	000870.TXT	302-01-2
Hydrocyanic Acid	100	003392.TXT	74-90-8
Hydrogen Chloride (Gas Only)	500		7647-01-0
Hydrogen Fluoride	100	000854.TXT	7664-39-3
Hydrogen Peroxide (Conc > 52%)	1,000		7722-84-1
Hydrogen Selenide	10		7/5/83
Hydrogen Sulfide	500	002048.TXT	6/4/83
Hydroquinone	500/10,000	HYDROQUINONE.TXT	123-31-9
Iron, Pentacarbonyl-	100		13463-40-6
Isobenzan	100/10,000		297-78-9
Isobutyronitrile	1,000		78-82-0
Isodrin	100/10,000		465-73-6
Isofluorphate	100		55-91-4
Isophorone Diisocyanate	100		4098-71-9

CHEMICAL NAME	TPQ	MSDS File	CAS NO
Isopropyl Chloroformate	1,000		108-23-6
Isopropyl Formate	500		625-55-8
Lactonitrile	1,000		78-97-7
Leptophos	500/10,000		21609-90-5
Lewisite	10		541-25-3
Lindane	1,000/10,000	000182.TXT	58-89-9
Lithium Hydride	100		7580-67-8
Malononitrile	500/10,000		109-77-3
Mechlorethamine	10		51-75-2
Mephosfolan	500		950-10-7
Mercuric Acetate	500/10,000	002217.TXT	1600-27-7
Mercuric Chloride	500/10,000	002219.TXT	7487-94-7
Mercuric Oxide	500/10,000	002221.TXT	21908-53-2
Methacrolein Diacetate	1,000		10476-95-6
Methacrylic Anhydride	500		760-93-0
Methacrylonitrile	500		126-98-7
Methacryloyl Chloride	100		920-46-7
Methacryloyloxyethyl Isocyanate	100		30674-80-7
Methamidophos	100/10,000	003400.TXT	10265-92-6
Methanesulfonyl Fluoride	1,000		558-25-8
Methidathion	500/10,000	003401.TXT	950-37-8
Methiocarb	500/10,000	003402.TXT	2032-65-7
Methomyl	500/10,000	003398.TXT	16752-77-5
Methoxyethylmercuric Acetate	500/10,000		151-38-2
Methyl 2-Chloroacrylate	500		80-63-7
Methyl Bromide	1,000	000338.TXT	74-83-9
Methyl Chloroformate	500		79-22-1
Methyl Disulfide	100		624-92-0
Methyl Hydrazine	500		60-34-4
Methyl Isocyanate	500	003376.TXT	624-83-9
Methyl Isothiocyanate	500		556-61-6
Methyl Mercaptan	500	002215.TXT	74-93-1
Methyl Phenkapton	500		3735-23-7
Methyl Phosphonic Dichloride	100		676-97-1
Methyl Thiocyanate	10,000		556-64-9
Methyl Vinyl Ketone	10	METHYL_VINYL_KETONE.TXT	78-94-4
Methylmercuric Dicyanamide	500/10,000		502-39-6
Methyltrichlorosilane	500		75-79-6
Metolcarb	100/10,000		1129-41-5
Mevinphos	500	003403.TXT	7786-34-7
Mexacarbate	500/10,000	003404.TXT	315-18-4
Mitomycin C	500/10,000		50-07-7

CHEMICAL NAME	TPQ	MSDS File	CAS NO
Monocrotophos	10/10,000		6923-22-4
Muscimol	10,000		2763-96-4
Mustard Gas	500		505-60-2
Nickel Carbonyl	1		13463-39-3
Nicotine	100	002423.TXT	54-11-5
Nicotine Sulfate	100/10,000	NICOTINE_SULFATE.TXT	65-30-5
Nitric Acid	1,000	002432.TXT	7697-37-2
Nitric Oxide	100	002437.TXT	10102-43-9
Nitrobenzene	10,000	003407.TXT	98-95-3
Nitrocyclohexane	500		1122-60-7
Nitrogen Dioxide	100	003409.TXT	10102-44-0
Nitrosodimethylamine	1,000		62-75-9
Norbormide	100/10,000		991-42-4
Organorhodium Complex	10/10,000		0
Ouabain	100/10,000		630-60-4
Oxamyl	100/10,000	000781.TXT	23135-22-0
Oxetane, 3,3-Bis(Chloromethyl)-	500	003408.TXT	78-71-7
Oxydisulfoton	500		7/6/97
Ozone	100	003410.TXT	10028-15-6
Paraquat	10/10,000	002516.TXT	1910-42-5
Paraquat Methosulfate	10/10,000		2074-50-2
Parathion	100	002517.TXT	56-38-2
Parathion-Methyl	100/10,000		298-00-0
Pans Green	500/10,000		12002-03-8
Pentaborane	500		19624-22-7
Pentadecylamine	100/10,000		2570-26-5
Peracetic Acid	500		79-21-0
Perchloromethylmercaptan	500		594-42-3
Phenol	500/10,000	002553.TXT	108-95-2
Phenoxarsine, 10, 10'-Oxydi-	500/10,000		58-36-6
Phenyl Dichloroarsine	500		696-28-6
Phenylhydrazine Hydrochloride	1,000/10,000		59-88-1
Phenylmercury Acetate	500/10,000		62-38-4
Phenylsilatrane	100/10,000		2097-19-0
Phenylthiourea	100/10,000		103-85-5
Phorate	10		298-02-2
Phosacetim	100/10,000		4104-14-7
Phosfolan	100/10,000		947-02-4
Phosgene	10	000869.TXT	75-44-5
Phosmet	10/10,000	PHOSMET.PDF	732-11-6
Phosphamidon	100	003420.TXT	13171-21-6
Phosphine	500	PHOSPHINE.PDF	7803-51-2

CHEMICAL NAME	TPQ	MSDS File	CAS NO
Phosphorus	100	002567.TXT	7723-14-0
Phosphorus Oxychloride	500	002568.TXT	10025-87-3
Phosphorus Pentachloride	500	002569.TXT	10026-13-8
Phosphorus Pentoxide	10	002570.TXT	1314-56-3
Phosphorus Trichloride	1,000		12/2/19
Physostigmine	100/10,000		57-47-6
Physostigmine, Salicylate (1:1)	100/10,000		57-64-7
Picrotoxin	500/10,000		124-87-8
Piperidine	1,000	PIPERIDINE.TXT	110-89-4
Piprotal	100/10,000		5281-13-0
Pirimifos-Ethyl	1,000		23505-41-1
Potassium Arsenite	500/10,000		10124-50-2
Potassium Cyanide	100	002662.TXT	151-50-8
Potassium Silver Cyanide	500	002681.TXT	506-61-6
Promecarb	500/10,000		2631-37-0
Propargyl Bromide	10		106-96-7
Propiolactone, Beta-	500		57-57-8
Propionitrile	500		107-12-0
Propionitrile, 3-Chloro-	1,000		542-76-7
Propiophenone, 4-Amino-	100/10,000		70-69-9
Propyl Chloroformate	500		109-61-5
Propylene Oxide	10,000	002725.TXT	75-56-9
Propyleneimine	10,000		75-55-8
Prothoate	100/10,000		2275-18-5
Pyrene	1,000/10,000		129-00-0
Pyridine, 2-Methyl-5-Vinyl-	500		140-76-1
Pyridine, 4-Amino-	500/10,000		504-24-5
Pyridine, 4-Nitro, 1-Oxide	500/10,000		1124-33-0
Pyriminil	100/10,000		53558-25-1
Salcomine	500/10,000		14167-18-1
Sarin	10	003421.TXT	107-44-8
Selenious Acid	1,000/10,000		7783-00-8
Selenium Oxychloride	500		7791-23-3
Semicarbazide Hydrochloride	1,000/10,000		563-41-7
Sodium Arsenate	1,000/10,000		7631-89-2
Sodium Arsenite	500/10,000	002934.TXT	7784-46-5
Sodium Azide (Na(N3))	500		26628-22-8
Sodium Cacodylate	100/10,000		124-65-2
Sodium Cyanide (Na(CN))	100		143-33-9
Sodium Fluoroacetate	10/10,000		62-74-8
Sodium Pentachlorophenate	100/10,000	003423.TXT	131-52-2
Sodium Selenate	100/10,000		13410-01-0

CHEMICAL NAME	TPQ	MSDS File	CAS NO
Sodium Selenite	100/10,000	003413.TXT	10102-18-8
Sodium Tellurite	500/10,000		10102-20-2
Stannane, Acetoxytriphenyl-	500/10,000		900-95-8
Strychnine	100/10,000	003414.TXT	57-24-9
Strychnine, Sulfate	100/10,000		60-41-3
Sulfotep	500	003415.TXT	3689-24-5
Sulfoxide, 3-Chloropropyl Octyl	500		3569-57-1
Sulfur Dioxide	500	003013.TXT	9/5/46
Sulfur Tetrafluoride	100		7783-60-0
Sulfur Trioxide	100		11/9/46
Sulfuric Acid	1,000		7664-93-9
Tabun	10		77-81-6
Tellurium	500/10,000		13494-80-9
Tellurium Hexafluoride	100		7783-80-4
TEPP	100		107-49-3
Terbufos	100	003091.TXT	13071-79-9
Tetraethyliead	100		78-00-2
Tetraethyltin	100		597-64-8
Tetramethyliead	100		75-74-1
Tetranitromethane	500		509-14-8
Thallium Sulfate	100/10,000		10031-59-1
Thallous Carbonate	100/10,000		6533-73-9
Thallous Chloride	100/10,000		7791-12-0
Thallous Malonate	100/10,000		2757-18-8
Thallous Sulfate	100/10,000		7446-18-6
Thiocarbazide	1,000/10,000		2231-57-4
Thiofanox	100/10,000		39196-18-4
Thionazin	500		297-97-2
Thiophenol	500	THIOPHENOL.TXT	108-98-5
Thiosemicarbazide	100/10,000		79-19-6
Thiourea, (2-Chlorophenyl)	100/10,000		5344-82-1
Thiourea, (2-Methylphenyl)	500/10,000		614-78-8
Titanium Tetrachloride	100		7550-45-0
Toluene 2,4-Diisocyanate	500		584-84-9
Toluene 2,6-Diisocyanate	100		91-08-7
Trans-1,4-Dichlorobutene	500		110-57-6
Triamiphos	500/10,000		1031-47-6
Thazofos	500		24017-47-8
Trichloroachety Chloride	500		76-02-8
Trichloreothylsilane	500		115-21-9
Trichloronate	500		327-98-0
Trichlorophenylsilane	500		98-13-5

CHEMICAL NAME	TPQ	MSDS File	CAS NO
Trichloro(Chloromethyl)Silane	100		1558-25-4
Trichloro(Dichlorophenyl)Silane	500		27137-85-5
Triethoxysilane	500		998-30-1
Trimethylchlorosilane	1,000	TRIMETHYLCHLOROSILANE.TXT	75-77-4
Trimethylolpropane Phosphite	100/10,000		824-11-3
Trimethyltin Chloride	500/10,000		1066-45-1
Triphenyltin Chloride	500/10,000		639-58-7
Tris(2-Chloroethyl)Amine	100		555-77-1
Valinomycin	1,000/10,000		2001-95-8
Vanadium Pentoxide	100/10,000	003230.TXT	1314-62-1
Vinyl Acetate Monomer	1,000		108-05-4
Warfarin	500/10,000	003417.TXT	81-81-2
Warfarin Sodium	100/10,000		129-06-6
Xylylene Dichloride	100/10,000	003425.TXT	28347-13-9
Zinc Phosphide	500	003426.TXT	1314-84-7