"A community expects far more of its fire service.
These are the ones whom the community will look to for leadership and guidance
in the event of a disaster."

— Auf der Heide, 1998

Standard of Coverage

February 2009

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According to the International Association of Fire Chiefs[1], the following is expectations should be met by the fire department:

The services provided by the fire department should reflect what the public desires and the taxpayers are willing to fund. In turn, the community should reasonably expect that:

- The taxpayers' money is spent in the best interests of firefighter and community safety
- The fire department will provide the services that are needed to keep citizens safe
- The fire department will respond in a timely manner
- The firefighters who respond to an emergency are trained and experienced
- Services will change to meet growing demand because of an increase in population

The local government expects that:

- The fire chief will inform them of what their options are and what the consequences of their decisions will be
- The fire department is a partnership with local government in community protection
- The fire chief will manage the department in compliance with local, state and federal laws and regulations
- They will have the right to decide if you will be an all-hazards response agency or respond only to fires, or anything in between
- The apparatus and equipment purchased will meet the needs of the public and is not extravagant
- The fire department has negotiated mutual-aid agreements with other agencies and departments for those calls that require greater resources than you have on-hand
- The fire department is part of a regional response network for infrequent but important response situations such as hazardous materials response or technical rescues
- The fire chief is accountable for the money they give to the fire department
- The fire chief has a strategic plan for growth

Through this Standard of Coverage and its future and associated processes, the Ephrata Fire Department hopes to meet these expectations.

This Standard of Coverage is due for annual review and updating in December, 2009.

[1] "The White Ribbon Report – Managing the Business of the Fire Department: Keeping the Lights On, the Trucks Running and the Volunteers Responding" by the International Association of Fire Chiefs, 2006

Record of Changes

Date	Section	Summary of Change

Introduction

Historically, the fire department in Ephrata has served as a source of pride.

Over the 93 years of its existence, many notable individuals have associated themselves with the fire service due to the good feeling most citizens have about their firefighters and the job they perform. Politicians and other civic leaders have often found it advantageous to support, and have received the support of, the fire service.

In reality, most individuals have a dramatically different interpretation of the job performed by the local fire service. These opinions range from, "they are fantastic" to "the fire department is just another form of government spending we should closely scrutinize or even do without."

In order to provide the citizens of Ephrata with a defined scope of service that is expected from their fire and emergency medical services provider, a true and honest response standard must be understood and maintained. A cooperative understanding between elected officials, the community, and the fire service must be fostered to first develop, and then maintain this standard.

For more than a century, both career and volunteer fire forces have faithfully served communities across the United States. Often times these functions are maintained without the help of a mutual understanding of the expected levels of service. Without this information a community often makes decisions to buy or not to buy an expensive piece of equipment based on emotion and not on the service the equipment will provide.

It remains the ongoing responsibility of the fire service to work with community decision makers to establish an appropriate level of service the community can accept. This practice of continuously evaluating the ongoing risk provides for the maintenance of the agreed upon standard of response.

The elements considered in the overall assessment of services must include an agreed upon standard of measurement. This measurement standard helps to identify the probability and consequences of the community's own risks.

The Commission on Fire Accreditation International (CFAI) defines the standards of response coverage for a fire department as being those "adopted written policies and procedures that determine the distribution, concentration and reliability of fixed and mobile response forces for fire, emergency medical services, hazardous materials and other forces of technical response" (CFAI, 1999). There have been many attempts to create a standard for the response of firefighters and paramedics without gaining national or even international consensus. Several industry standards have been adopted in the last decade, namely National Fire Protection Association (NFPA) standard 1720, attempting to create a standard for staffing of fire and medical response apparatus in a community. While many communities have adopted in theory the staffing and response mandates of NFPA 1720, few actually have the ability to completely comply.

This study is the first Standard of Coverage (SOC) ever conducted by the City of Ephrata. In today's world, an SOC typically serves as the basis for all decisions involving emergency services delivered by a providing agency. This document should be referenced when making key decisions by our elected officials, who can see the vision of the EFD and what it is tasked to do for the community.

The process of performing continuous risk assessment of the community provides vital information for not only our first responders, but for management as well. Important decisions cannot be made with properly assessing risk. From this basic risk assessment, a Standard of Coverage can be developed which brings together those aspects of the fire and emergency medical services, and in turn bring the services to the community. This document will follow this basic plan. It will serve to identify those areas of Ephrata, which by their risk levels, demand a particular level of service.

Variables for providing the appropriate level of service include the proper amount of adequately trained and equipped personnel and the location of emergency response units. In the case of a fire emergency, this deployment of resources will be measured in the time it takes to develop an appropriate fire flow to control the fire before it has reached its maximum intensity. For a medical emergency, this may require the initiating of advanced life support to a patient with delivery of them to a medical facility within a standard period of time. Creating this overall level of service consists of the decisions made regarding the distribution and concentration of resources in relation to the potential demand placed upon them by the level of risk in the community.

It is with these factors in mind that the City must maintain a comprehensive risk assessment program for the community. We are confident the fire department can deliver, most of the time, the levels of service determined though this process. To maintain these levels, it will require a complete understanding between the community's elected officials, city staff and the firefighters themselves.

Alignment with Goals, Standards and Fire Service Industry Practice

This document is aligned with City Council Goals:

- *Safe City/Responsive Government:* This document provides the body politic and the citizens a true picture of the risks in their community and their fire department's capabilities to respond to and manage those risks.
- *Innovation/Courage in Leadership:* This is the first Standard of Coverage developed for the City. It will require courage and effort to identify and address our community's risks and vulnerabilities, and to develop methods strategies to mitigate, prepare for, respond to, and recover from emergencies.

This document fulfills the Ephrata Fire Department's community risk and disaster assessment requirements as outlined in the following standards:

- NFPA 1600 – 2007 ED., STANDARD ON DISASTER/EMERGENCY MANAGEMENT AND BUSINESS CONTINUITY PROGRAMS, §5.3 regarding risk assessment
- NFPA 1720 – 2004 ED., STANDARD FOR THE ORGANIZATION AND DEPLOYMENT OF FIRE SUPPRESSION OPERATIONS, EMERGENCY MEDICAL OPERATIONS, AND SPECIAL OPERATIONS TO THE PUBLIC BY VOLUNTEER FIRE DEPARTMENTS, §4.2 regarding community risk management

In addition, the fire service is widely responsible for emergency management functions and policy development in communities nationwide. Emergency management skills are required for completion of the National Fire Academy's Executive Fire Officer Program, which includes training and education on:

- risk assessment,
- incident documentation,
- media/political considerations,
- standards,
- legal mandates,
- capability assessment,
- damage assessment,
- emergency operations,
- Integrated Emergency Management System (IEMS),
- Multi-Agency Coordination Systems (MACS)
- Emergency Operations Center (EOC), and
- emergency information systems.

Executive Summary

It is impossible for a provider of emergency services to proclaim to a level of service, or demand more resources from a community, without first conducting a comprehensive risk assessment, which then allows a standard of coverage be established.

As a result of this comprehensive and on-going risk assessment, the fire department provides the community's elected officials accurate information to set the standard of coverage.

EMERGENCY MEDICAL SERVICE:

- For all CHARLIE, DELTA, or ECHO-level [critical conditions] EMS alarms within the city limits, EFD's goal is for the first EFD unit to arrive within 6 minutes 30 seconds total reflex time, 85 percent of the time.

FIRES:

- For all CHARLIE, DELTA, or ECHO-level [critical conditions] alarms of fire within the city limits, EFD's goal is for the first-due fire unit to arrive within 8 minutes 45 seconds total reflex time, 85 percent of the time.
- In the case of assignments where multiple units are responding to an emergency, EFD's goal is for the balance of the structural fire assignment to arrive within 12 minutes total reflex time, 90 percent of the time.

In this case, the recommended goals for the standard of coverage are:

These standards are aggressive in today's rural environment. However, in order to have the ability to have a chance to use the training and equipment provided them they must arrive within a specific window of time. Arrive too late and all the money in the world won't make a difference.

One primary policy recommendation which must be considered is also identified in this STANDARD OF COVERAGE:

EFD's response strength is completely dependent on the availability of the volunteer firefighters. Therefore, the quantity of staffing is not reliable.

The quantity of available and trained volunteers is the paramount concern for the Ephrata Fire Department. A high level of emphasis, planning and funding should be given towards recruiting, training, and retaining volunteer fire department members. This strategy is aligned with achieving the City Council's Goal of "Safe City".

Realizing the importance of the self-assessment process is key. Volunteer departments are under more community scrutiny than any time before. For this reason, the Ephrata Fire Department should have solid, written plans and justifications detailing what we are doing and reasons outlining why we are doing it. The self assessment process gives the management team a vehicle for creating these types of necessities.

Jeremy R. Burns
Chief

Ninety-one percent of Americans live in places at a moderate-to-high risk of earthquakes, volcanoes, tornadoes, wildfires, hurricanes, flooding, high-wind damage, or terrorism.

Hazards and Vulnerability Research Institute
at the University of South Carolina

Section 1 Community Baselines

The goal of the Community Risk Assessment is to evaluate the whole community to allow the elected officials the ability to make a calculated decision on the level of service they want from their fire and EMS services.

The first area examined in this assessment is the community itself. Section one will look at the history, demographics, geography and government infrastructure in Ephrata, Washington, and the impacts of these systems on emergency services.

Also reviewed in this section are the mission and vision statements of the fire department as they relate to the annual Strategic Plan document and the Standard of Coverage policy as stated in this document.

1.1 Community Overview

Historically speaking, the settlement of Ephrata is quite recent. There was no known settlement until 1886, just three years before Washington attained statehood. The horse rancher, Frank Beezley, was the first to settle near the natural springs, thus the area was known as Beezley Springs. As the climate and topography were not promising to settlement, the entire region remained sparsely populated until several federal congressional actions, including the Northern Pacific Land Grant Act, the Homestead Act, and Desert Claims Act, encouraged the settlement of this semi-arid desert. Originally, Douglas County spread over the entire territory of the Big Bend of the Columbia River.

The first official name, recorded by the Great Northern Railroad in 1892, was “Station 11”, an unglamorous name for the water stop near Beezley Springs. Local legend has it that a worker on the rail line found that the orchards and the landscape were similar to the Holy Land and christened the area “Ephrata”– Hebrew for “fruitful” and an older name for Bethlehem.

Ephrata was a convenient stop for the trains, and also for travelers and wagons moving from Walla Walla to the northern Okanogan region. As more settlers moved into Washington, the town was first platted in 1901 and then began to build schools, stores, newspapers, and the like.

The region was known at the turn of the century for the great herds of wild horses that roamed the land. Horse trading was an important element of the local economy, and Ephrata served as the staging area for the horse round-ups. The last "Grand Horse Round-up" was held in Ephrata in 1906. Ephrata then developed as a trade and service center for cattle and sheep ranches in the area until the construction of the Columbia Basin Reclamation Project.

In 1909 the town incorporated and was given the county seat for the newly created Grant County. Ephrata allegedly won the seat by intentionally intoxicating the representative from a rival community just before making competing presentations to the state legislature.

Beginning in July 1918, several prominent Ephrata residents started the promotion of a wild scheme to redirect waters of the Columbia River in order to irrigate the dry but fertile soils of the Big Bend country. Labeled "The Dam University", Ephrata residents persistently lobbied at the local, state, and federal levels to gather support for the project. Initial funding for the Grand Coulee Dam was through the Public Works Administration created under Franklin Roosevelt's promise of a "New Deal" in 1933. However, the irrigation waters would not be released as the nation focused on ending World War II during the 1940s. During this era, Grand Coulee Dam's main mission was to produce electricity for the Hanford Reservation and for aluminum manufacturing, vital to military aircraft production. When the war ended, the Project returned to its original mission to irrigate the desert.

In 1934, the Ephrata Municipal Airport was built, and in early 1940, the War Department took an interest in the airfield and Ephrata's location, which was considered ideal for aircraft and bomber training operations. To support efforts during WW2, Ephrata Army Air Field was established May 25th, 1942. The base was a replacement training unit for twin-engine fighter pilots, and home to the several Bombardment Squadrons, B-24s to P-39s. With the massive influx of military personnel and their families, Ephrata's population swelled. According to the Grant County Journal on March 26, 1943, "Ephrata firemen and a crew of volunteers made a careful house to house check of the town's population Sunday and report that the population now totals 1,830, a gain of about 100 percent over the population of three years ago."

With the end of the war, the base began downsizing in January 1945, and by the end of that year only a small group of servicemen remained. Through 1946, many of the buildings on the base were moved; among the relocated buildings was the base chapel, which exists today as the Memorial Christian Church, 453 Division Ave East. The base's land and remaining facilities operate today as Ephrata Municipal Airport.

The construction of the Irrigation Project and the military activity increased the population of Ephrata 689% between 1940 and 1960. As the federal projects phased out, the town experienced a devastating population decrease of 22% between 1960 and 1975. The population stabilized between 1975 and 1982, with a slight decrease between 1980 and 1990. The city has seen steady population growth since 1990. The present population is 6,895. Three factors are expected to greatly affect future growth projections in Ephrata.

First, Ephrata remains a desirable bedroom community to the neighboring communities. Good schools, low crime, aesthetically appealing downtown, close central proximity to the major retail center of Moses Lake, and comparatively low cost of living, contribute to making this a community of choice. As the industrial base in neighboring communities continues to grow and prosper, so shall Ephrata's new housing starts and consequent population.

Second, there has been a sharp increase in new housing unit building permits issued by the City since 1990 and particularly since 1993. Forty-one residential permits were issued in 1993 and sixty-one in 1994; 1995 permits issued for new housing units numbered 94, of which 39 were manufactured homes. This compares with a low of three permits for the entire year of 1988. This surge in new home construction implies a growth rate exceeding the previous decade's growth. Projections indicate that Ephrata will continue to see a 3% per year increase in population.

A third factor that could greatly affect population and general economic growth in Ephrata is the development of the Port of Ephrata. With over 2,000 acres of industrial and commercially zoned land, Grant County Port District #9 is the largest single landholder within the City of Ephrata corporate limits. Development on the port property now includes a large complex operated by Katana-Summit, a worldwide leader in wind generator manufacturing. Additional lots are available for future industrial expansion.

1.2 City Governance Model

The City of Ephrata is governed by a strong mayor form of government. The Ephrata City Council is comprised of a eight member body. All council seats are elected to four-year alternating terms and are selected by vote of city residents. The following individuals represent the current elected officials of the City of Ephrata, Washington as well as the basic demographics of the community.

Mayor……..…Bruce Reim

Mayor Pro Tem……..…William Coe

Council Member……Kathleen Allstot

Council Member……Valli Millard

Council Member……Matt Moore

Council Member……Tony Mora, Jr.

Council Member……Mark Wanke

Council Member……Stephanie Knitter

The City Administrator, Wes Crago, is responsible for carrying out council policies through a professionally trained and experienced staff.

1.3 The Ephrata Fire Department

A museum photograph on a wall inside Ephrata's Fire Station 21 depicts the first volunteer fire brigade in Ephrata in 1911. The grainy image features 19 community members, a high-wheeled hose cart, and an equally high-wheeled cart containing two small soda and acid tanks. These carts were either pulled by hand or drawn behind a car. If drawn behind a car, top speed was 15 miles an hour. Otherwise, the wheels were in danger of collapsing.

If the fire could not be handled by the soda and acid tanks, the regular two and one-half inch fire hose were hooked up provided water was available from the mains. At that time Ephrata had but one small water reservoir and often there was not enough water pressure to throw a stream ten feet in the air. When that happened, the only thing to do was to move the furniture out of the house and let it burn.

In February 1935, after local citizens were forced to stand by helplessly and watch a large two-story house burn to the ground from a tiny "hatful of fire" originating in the eaves, action was taken to obtain some firefighting equipment for the town. A group of men met in a

service station operated by Idell Dudley to discuss the organization of a fire department. Dudley, V.E. Lemon, and Warren Greenlee made arrangements to buy a 300 gpm front mounted fire pump with suction hose and mounted it and a water tank on a second hand truck. The entire layout cost: $365. A small group of volunteer firemen was recruited in July, and by September the fire truck was ready for action. The Ephrata Volunteer Fire Department was established by council resolution and the fire engine was housed in a garage next to city hall on Division Avenue West between today's C and Basin streets, where the US Bureau of Reclamation office operates today.

In May 1939, a new Ford 500 gpm pumper truck with 250-gallon auxiliary tank was delivered. That truck carried 1200 feet of 2½" inch hose, ladders and other equipment. Later that same year, the fire truck was moved from the old fire hall to a new brick city hall.

In 1949, a 240 hp General truck with a 125-gallon auxiliary tank and a pump that could throw 750 gpm at 150 lbs. pressure was delivered. The truck carried 1100 feet of 2½ inch hose and had capacity for more if needed. (Both of these trucks, in beautiful original condition, are now housed at the Grant County Historical Museum).

In 1951, the fire department moved into a modern fire station at 45 A St NW (the site of today's Ephrata Library). The building had three deep stalls, chief's office, communications office, kitchen, dormitory, and recreation room. The new station represented an investment of $26,000 (about $216,000 in today's economy). A few years later, a panel truck was acquired for use as a first aid truck. It responded on all calls and stood by until the men left the scene.

In 1955, the population of Ephrata was about 8,000, and the fire department ran about 85 calls per year.

In 1986, the current Ephrata Fire Station #21 was built at 800 A Street SE. The facility (after several remodels) features two administrative offices, four sleeping quarters, training room, and a seven stall apparatus bay.

From 1911 through the early-1980s, Ephrata was protected by an all-volunteer fire department. It wasn't until the early-1980s that the city hired Ron Renken as the city's first fire marshal. In 1987, James R. "Ron" Burns was appointed as the first career fire chief of Ephrata, a post he filled until an on-the-job injury forced him to retire in mid-2004. Ron's son, Jeremy, was hired in 2001 as the assistant chief, and was appointed chief by the city council after Ron retired in 2004.

In 2003, six firefighter/EMTs and six firefighter/paramedics were hired to provide ambulance services. Due to extreme budget shortfalls, the Ephrata Ambulance Service (EAS) was dissolved in 2005. Since firefighters' salaries were funded via EAS revenues, the twelve firefighters were terminated. Ambulance services are now provided by Grant County Fire District 5 of rural Moses Lake, for a contract price of $70 per call, or an annual contract price of just under $30,000. In many cases, the GCFD 5 ambulance responds from Moses Lake and has an extended response time. Operating within a two-tiered EMS system, the fire department responds to the more critical calls, treats and stabilizes the patient and then loads the patient into a GCFD 5 ambulance for transport to a medical facility. These duties are currently being ran by American Medical Response.

In 2006, Misty Fairchild was hired as a part-time Administrative Assistant, and was hired full-time in 2008. Her duties include data entry; records custodian; and submitting National Fire Incident Reports to the State Fire Marshal's Office.

In 2008, the possibility of annexing the city into Grant County Fire District 13 (Ephrata rural) was explored as an option to cut costs and consolidate resources. This idea was deemed unachievable after it was concluded early in the process that Fire District 13's taxing

levy was grossly insufficient to provide an equal quality of service already enjoyed by the residents of Ephrata. Achieving the necessary tax initiatives to support a consolidated operation was highly unlikely.

In October of 2010, Anthony Graaff was hired as the Deputy Fire Chief. The roles and responsibilities of that position include fire marshal duties and training officer.

The Ephrata Fire Department provides twenty-four hour emergency service 365 days a year. Although the most commonly thought of service that is provided is fire protection, the EFD routinely provides a wide variety of other public safety related services. These services include building construction plans review and inspections, emergency management, public education and risk reduction activities.

Today, the EFD is comprised of one career fire chief, one career deputy chief and 30 volunteers, and is formally organized and structured in traditional fire service, chain-of-command style. The Fire Chief serves as the organization's Chief Administrative Officer and is supported by a command staff management team consisting of a Deputy Fire Chief and a volunteer Assistant Chief. Three volunteer Captains provide direct company supervision and leadership of direct tactical efforts. An administrative assistant supports the EFD's clerical responsibilities, and volunteer support services personnel provide public education and incident scene assistance duties.

The EFD is complimented by an admirable fleet of 13 apparatus. Three engines, one ladder truck company, one rescue unit, one water tender, five wildland engines, three support units and three command staff units help deliver the department's service.

The fire chief, or his designee, is responsible for all fire inspections, and the management and review of commercial construction plans for compliance with the most current edition of the INTERNATIONAL FIRE CODE. The fire chief, or his designee, also serves as the fire investigator to identify the causes of fires within the community.

1.4 Fire Protection Class Rating

The Insurance Services Office (ISO) serves the insurance marketplace with statistical, actuarial, underwriting, and claims data, policy language, information about specific locations, fraud identification, and information for marketing, loss control and premium audit. Through their Public Protection Classification (PPC) program, ISO evaluates municipal fire protection efforts in communities throughout the United States.

ISO provides two primary support roles to the fire department in the area of hazard analysis and needs assessment. The MUNICIPAL FIRE SUPPRESSION RATING SCHEDULE evaluates four major areas of the fire department operation:

- the fire department,
- fire safety control
- water supply, and
- emergency communications.

In Washington State, the evaluation of these criteria is conducted by the WASHINGTON SURVEY & RATING BUREAU. When completed, the process provides an assessment of each area, complete with ratings which are translated into an insurance rate for the community. The process also facilitates the development of improvement statements, indicated deficiencies and needed improvement in the area of staffing, water supply, equipment, apparatus, pumping capacity, aerial capacity, etc.

The rating is based on a scale of Class 1 to Class 10 (Class 1 being the best). The lower the rating, the lower the homeowners' insurance premium cost. The last such evaluation was conducted in 1992. Ephrata is rated a public protection Class 5 for insurance rating purposes and reflects that community fire suppression services are improving in the face of the demands of a changing environment. The study evaluates the receiving and handling of fire alarms, the fire department, and the water supply.

1.5 Sampling of Major Fire Incidents in Ephrata

- 1950s: Wenatchee Bottling Works (6th & Basin SW)
- 1970s: House Laundry (3rd and Alder NW)
- 1980s: Basin Street Inn (13th & Basin SW), Basin House Restaurant, Wiley Hunter's Garage, Ping Electric (3rd & Basin NW), Old Hospital Building (B St SE & Nat Washington Way
- 2000s: Renaissance Technology Warehouse (18th & Basin SW, 2006)

1.6 Current Level of Service, Personnel & Staffing

Of the total 30,300 fire departments in the U.S., the Ephrata Fire Department is one of the 4,092 departments classified as "mostly volunteer".[2] The EFD provides an admirable array of community risk reduction and emergency services, and is currently staffed by one full-time uniformed employee (the chief), a full-time non-uniformed administrative assistant, and 27 volunteers. This quantity, of course, does not mean 27 volunteers will be responding to every call. Factors which influence the amount of volunteers on a call include time of day, day of week, and the general availability of volunteers at any given moment. Due to budget limitations, the city relies almost exclusively on volunteers to deliver the majority of fire and emergency medical services to the residents and guests of Ephrata.

The average amount of EFD volunteers which respond to a call is 6 (see sections 3.5 and 3.6 for minimum staffing for critical tasking). It is an assumed risk that a basic or large incident may occur, and a small amount of EFD volunteers might respond. Mutual aid resources could be requested, but even the closest mutual aid resources are all volunteers with the same staffing variables affecting their response. The minimum amount of responders needed to control basic or complex incidents may not be assembled until critical incident benchmarks have passed.

1.7 Existing Apparatus Resource Complement

Each type of apparatus (emergency vehicle) operated by the Ephrata Fire Department fulfills a certain role. The quantity maintained is the minimum needed in order to provide the basic level of service to our community and the particular hazards encountered, i.e. a structural fire engine is not suited for wildland firefighting, and likewise, a brush truck is not suitable for vehicle or structural firefighting.

The vehicles maintained as EFD's rolling fleet are the minimum necessary to respond to the risks within the City of Ephrata. Reduction of these vehicles will not lead to any cost savings, and may, in fact, either increase the risk for loss of property or life within our community.

[2] U.S. Fire Department Profile through 2005. National Fire Protection Association, Quincy, MA, October, 2006.

Resource	Quantity	Purpose	Staffing	Replacement Year	Estimated Replacement Cost[3]	Vehicle History
Type 1 Fire Engine (Pumper) E 2111 E 2112	2 front line	Provide necessary basic fire suppression role at vehicle, structural and other fires. Carries basic firefighting tools.	E2111: Min 3/Max 6 E2112: Min 3/Max 5	30 year replacement cycle. • E2111 due in 2024 • E2112 due in 2028	$450,000 ea	• E2111 was purchased new in 1994. It is in good condition. • E2112 was purchased new in 1998. It is in good condition. •
Type 1 Ladder Platform, 95' L 2195	1	Provides access to residential and commercial rooftops and access large square footage buildings; capable of suppressing large fires via 1,000 gpm master stream nozzle. Carries large amount of specialized tools not carried on pumpers.	Min 4/Max 6	30 year replacement cycle. 2032	$1-million	L2195 was purchased new in 2003. It is in very good condition.
Light Duty Rescue Unit R 2141	1	Provides response to emergency medical calls for on-scene treatment; carries extrication equipment (aka Jaws of Life). Not licensed to transport customers to hospital.	Min 3/Max 5	Not on an established schedule, but should be replaced with an actual rescue vehicle by 2012.	$150,000	R2141, a former Ephrata Ambulance vehicle, was retained after the EAS was dissolved, and the vehicle converted for rescue unit use. Although it is in good condition, it lacks the necessary storage compartment space which a true rescue unit would feature. This is the most used response vehicle in the fleet.
Type 1 Water Tender T 2131	1	Provides 3,000 gallons of water supply to areas beyond the reach of the city's water supply system	Min 1/Max 2	30 year replacement cycle. 2038	$400,000	T2131 was purchased new in 2008 with Homeland Security grant funds. It is in excellent condition.
Type 6 Wildland Engines (Brush Trucks) B 2121 B 2122 B 2124 B 2125	4	Four wheel drive access to wildland fires. Multiple units needed in order to effectively contain wildfires.	Min 2/Max 2	Brush trucks have varying replacement years, but generally last 8-10 years.	$40,000 each if built by EFD volunteers. $90,000 each if purchased by manufacturer.	Brush trucks are built by EFD volunteers, and are exceptionally well done. They are built on used 1-ton GM or Ford truck chassis. Due to the extreme environment these trucks must perform in, damage occurs often and may shorten the effective and safe life of the vehicle. Washington DNR grants have subsidized 50% of the construction costs of two of these vehicles.
Type 3 Wildland Engine B 2123	1	Four wheel drive access to wildland fires. four-wheel-drive needed for extremely aggressive terrain.	Min 2/Max 2	Brush trucks have varying replacement years, but generally last 8-10 years.	$80,000 each if built by EFD volunteers. $200,000 each if purchased by manufacturer.	Due to the extreme environment these trucks must perform in, damage occurs often and may shorten the effective and safe life of the vehicle. Washington DNR surplus vehicle program provided military 4WD chassis. DNR grant subsidized 50% of the construction costs of this vehicle in 2012.
Rehab/ Incident Safety Unit S2163	1	Provides on-scene health services for firefighters; assists with compliance with heat-related illness law. Carries specific equipment not carried on other vehicles	Min 1/Max 3	No replacement schedule for this vehicle. Believe this vehicle will last 10 years.	$35,000	Van purchased for $2800 by Ephrata Firefighters Association in 2008. State surplus vehicle with 90,000 miles when purchased. It is in good condition.
Customer Support/ Salvage Unit S 2161	1	Provides materials and construction tools for securing buildings after fires. Also carries absorbent material for minor fuel spills.	Min 1/ Max 2	No replacement schedule for this vehicle.	$70,000	Acquired from Washington DNR surplus. Vehicle in fair condition. This vehicle carries equipment essential to our mission.
Command/ Staff Support Units	3	Each carries basic and advanced incident management equipment. Used as command posts	Min 1/Max 1	Command units are driven daily, and accumulate the most road mileage	$50,000 each for SUV/ pickup	Command vehicles must be of "state–spec, public safety use" quality to endure the demands of

[3] Estimated replacement cost: this figure is a projected estimate, factoring inflation, and the fact that fire apparatus of same capabilities will have technologically advanced by the time the vehicle is replaced.

C 2170 C 2171 C 2172		at incident scenes, and transportation for business and training. Three is the minimum essential quantity to provide basic coverage.		(approximately 10,000 each per year). Command units should be on a 10 year replacement schedule.		emergency response. Heavy duty features help prolong vehicle life and decrease repair time. C2171 and C2172 each have over 100,000 miles. The newest vehicle, C2170, was purchased new in Nov. 2008.

1.8 Requests for Service (Call Volume) Trends

As mentioned in section 1.3, the Ephrata Fire Department responded to 85 requests for service (calls) in 1955. Over the next 40 years, the call volume gradually increased to about 180 calls per year.

The call volume increased dramatically in 2003-04 when the Ephrata Fire Department began responding to emergency medical service (EMS) calls. Between 2003 and 2004, EFD experienced a nearly 104% increase in calls, from 180 to 375. The call volume experienced a modest increase between 2003-05, leveling and sustaining at about 394 calls per year through 2007. Approximately 70% of EFD's current call volume is response to EMS incidents.

Year	Call Volume	Change	Calls per Day Average
2002	180		0.493
2003	375	+104%	1.027
2004	380	+0.52%	1.041
2005	394	+1.03%	1.079
2006	393	-0.1%	1.076
2007	395	+0.2%	1.082
2008	413	+0.96%	1.131

This quantity of calls is large for a volunteer force with two paid staff members. This quantity of calls was manageable when the department employed 12 paid staff, but with the loss of the paid staff in 2005, it has caused increased demands upon the volunteers. In general, the fire service recognizes that once the daily call volume reaches one call per day, career staff is necessary to augment the volunteers.

Higher call volume creates an interesting dichotomy. Volunteers gain increased on-the-job experience which strengthens EFD capabilities and has created a professional level of service to which the community has become accustomed; higher call volume also causes increased demands on the volunteers' time away from their families and jobs.

Calls which occur during weekdays between 8 a.m. and 5 p.m. account for nearly 40% of the current call volume. This period of time is the time when EFD's volunteers are less likely

to be able to respond, and staffing is greatly reduced to even basic calls. Evenings and weekends – the time when volunteers are not at work – are generally much better staffed. Accordingly, response to moderate to major incidents occurring during weekday business hours pose a much greater risk of insufficient EFD manpower to manage or mitigate the emergency.

With any growth in the community, the number of requests for service will certainly increase as well.

1.9 EFD Vision, Values and Mission Statements

With our Vision being:

> *By embracing technology, diversity, and individual talent, we will be recognized, within and beyond our community, as a fire department of progressive excellence.*

And our Values being based upon:

> *Service, Bravery, Safety, Honor, Dedication, and Preparedness*

Our Mission will always remain:

> *…to protect and preserve life and property from fire, medical or environmental emergencies through prevention, education, preparedness, and emergency response.*

"There are four stages of preparedness denial:
One is, it won't happen.
Two is, if it does happen, it won't happen to me.
Three: if it does happen to me, it won't be that bad.
And four: if it happens to me and it's bad,
there's nothing I can do to stop it anyway."

Eric Holdeman, Former Director
King County (Wash.) Emergency Management

Section 2 Risk Assessment

The only true way to adequately and properly provide services to a community is to assess the risk being protected. Unfortunately, many communities across the country never actually assess the risks they are assigned to protect; they base their levels of protection on past-practice or common expectations. Those communities have spent dollars and wasted resources on uneducated decisions about public safety services. In the case of fire services, a community must assess the risk it protects to be able to educate their elected officials and decision makers on what resources are needed to protect the community.

One reason communities often struggle with risk assessment is that evaluation tools are difficult to use. Most fire chiefs can tell you what structures cause them the greatest concern in their community; what they cannot do is place an educated answer as to why they need the resources they ask for each year.

Community budgets are growing ever smaller. Each tax dollar spent must be supported by accurate data. A community must demand that their fire officials conduct ongoing risk assessment and apply that data to the delivery of emergency services.

In Ephrata, we feel a more detailed and community-oriented program would be easier to implement and maintain.

This section will assess the immediate population served, the assessment tool used, and a comprehensive review of fire and non-fire risks.

2.1 Population Served

The current population of Ephrata is richly diverse. Over the past several decades, Ephrata has continued to evolve into a predominately residential community. The once smaller, wood frame homes of less than 1500 square feet are being slowly replaced by larger, multi-story homes. Along with this growth of personal dwellings, the commercial community has also seen a modest redevelopment. This section outlines those keys factors continuously considered during the development and maintenance of a community standard.

Community Profile	
Population	7,065
Demographics	The 2000 Census indicated 83% of Ephrata's population was white, 13% African American, 2.5% Hispanic, 0.9% Asian, 0.3% Native American, and 0.2% from other races. The population distribution by sex: 45% male and 55% female.
Family Household Income	$43,500
Median Household Income	$35,060
Median Citizen Age	35.7
Citizens Over Age 65	1,097 (16.1%)
Percentage of High School Graduates	3,591 (83.8%)
Percentage of College Graduates	904 (21.1%)
Total Housing Units	2,788
Grant County Population[4] (2008 estimate)	85,120
Families Below Poverty Level	156 (8.7%)
Individuals Below Poverty Level	839 (12.9%)

Educational Institutions			
Elementary Schools	3	**Enrollment**	703
Intermediate School (grades 5-6)	1	**Enrollment**	335
Middle School	1	**Enrollment**	380
High School	1	**Enrollment**	675
Private Schools	2	**Enrollment**	194
Alternative Schools	1	**Enrollment**	69
		Total Enrollment	**2,356**

Public Utility Infrastructure	
Electricity	Grant County Public Utility District #2
Telephone	Qwest
Cable Television	Northland Cable Television
Internet Service Providers	Amerion, Televar, Genext,
Reclaimed Water Management	City of Ephrata
Solid Waste	Consolidated Disposal Service, Inc.
Major Industry	Agricultural support Local, State and Federal Government Agencies

Hospital	
Columbia Basin Hospital	200 Nat Washington Way

[4] Grant County Economic Development Council

Transportation	
Airport	Ephrata Municipal Airport
State Highways	• SR 28 goes through Ephrata. • SR 283 & SR 28 intersect five miles south of town. • SR 17 is five miles away via SR 282.
Rail	• Burlington Northern Santa Fe Railway - Seattle to Chicago Class One corridor through downtown • 22 freight trains daily • Two AmTrak passenger trains daily
Bus	• Grant Transit Authority provides public transportation with Ephrata as a hub • Other passenger bus lines also use Ephrata as a hub

Correctional Facilities	
Grant County Jail	Grant County Youth Services Detention Center
Grant County Work Release Facility	

Major Employers	
Grant County Public Utility District #2	577
Grant County Government	565
Katana Summit	180
Columbia Basin Hospital	160
Ephrata School District	144

Government Infrastructure	
City of Ephrata	Washington Department of Corrections
Washington Dept. of Fish & Wildlife	Washington Dept. of Natural Resources
US Department of Reclamation	Washington Dept. of Transportation
Grant County Courthouse	Washington State Patrol
Grant County Public Works	US Department of Agriculture
US Post Office	

Major Apartment Complexes	
Apartment Building	200 block C St SE
Baird Springs Apartments	1120 3rd Avenue NE
Basin Retirement Home **TARGET HAZARD**	109 C St SW
Beezley Hills Apartments	1121 2nd Ave NE
Bell Hotel Apartments	210 Division Ave E
Chinook Apartments	435 Basin St NW
Dawn Village Apartments	318 E St NE
Ephrata Manor	15 D St NE
Karen Lane Apartments	269 D St SE
Summerwind Apartments	340 E St NE
Sun City Apartments **TARGET HAZARD**	530 C St NW
Sundowner Apartments	318 E St NE
Yakima Street Apartment	1204 Yakima St SE

Manufactured Home Communities	
"A" Street Mobile Home Park and Mini Storage	1175 A St SE
Easy Livin' Trailer Park **TARGET HAZARD**	620 and 630 Basin St SW

Ping's Mobile Home Park	2285 Basin St SW
Sunrise Mobile Home Park	2201 Basin St SW
Urban Village Trailer Park	126 4th Ave SW

Assisted Living/Retirement Homes	
Garden Oasis Assisted Living	200 Nat Washington Way

2.2 Anticipated Community Growth

Industry/economy: Although statistics specific to Ephrata are not readily available, statistical data gathered by the Grant County Economic Development Council identifies the following top six industries as the leading contributors to the county's economy:

Sector	Jobs	Earnings(K)	Jobs %	Earnings %
Agriculture	8,382	$225,046	25%	22%
Manufacturing	7,692	$267,933	23%	27%
Government	6,515	$239,825	20%	24%
Services	3,034	$67,327	9%	7%
Visitors	2,459	$55,103	7%	6%
All Other	1,607	$53,755	5%	5%

Population: According to the Washington State Office of Financial Management, Ephrata's population is forecasted to increase 38% from 6,930 residents in 2005 to 9,352 residents in 2025. There is little doubt these new residents will be looking for a clean, safe place to live, and Ephrata stands to be an excellent choice for these new county residents.

Office of Financial Management Official Growth Management Population Projections High Series 2000-2025 Ephrata							
Year	**Population**	**Population Change**	**Percent Change**	**Year**	**Population**	**Population Change**	**Percent Change**
2000	6808			2017	8,513	110	1%
2005	6930	122	7%	2018	8,622	109	1%
2010	7,666	736	11%	2019	8,730	108	1%
2011	7,782	116	2%	2020	8,837	107	1%
2012	7,916	134	2%	2021	8,938	101	1%
2013	8,049	133	2%	2022	9,040	102	1%
2014	8,180	131	2%	2023	9,143	103	1%
2015	8,310	130	2%	2024	9,247	104	1%
2016	8,403	93	1%	2025	9,352	105	1%

Land use: According to the City of Ephrata's 2007 Comprehensive Plan,

- 51% of the total land designated for residential use is available;
- 72% of the Industrial zoned land and 77% of the Industrial designated land (outside of the Port District) is vacant;
- 36% of land is designated for commercial use is vacant; and
- 48% of land designated for Public Facilities and Open Space use in Ephrata is vacant.

These data sets illustrate the potential for our community growth, and to meet that need, the fire department needs to grow with the community. There are many opportunities for industry, businesses, and new community citizens to move to Ephrata, increasing the need for fire and life safety services.

2.3 Risk Assessment Process

This section contains an analysis of the various risks considered within the legal jurisdiction of the city of Ephrata. As part of the analysis, historical, statistical data is used in order to determine trends based on type and location of the emergency. Additional parameters utilized are natural barriers or locations for risk potential, mobility of risks, and socio-economic factors that might contribute to the risk within the city, economic impact factors if applicable, and the likelihood for an incident occurring.

However, in the spirit of some standardization, the following hazards were identified and considered:

- Railroad related incidents
- Severe Weather
- Flood
- Wildland-Urban Interface Fire
- Structure Fire
- Aircraft Emergencies
- Domestic Terrorism
- Emergency Medical Services

The assessment of each hazard as listed took into consideration the likelihood of the event, the impact on the city itself, and the impact on our emergency services.

2.4 Development of a Risk Assessment Plan

The 2004 edition of NFPA 1720 says "The Fire Department shall participate in a process that develops a community fire and emergency medical services risk management plan." The standard further requires that "the number and types of units assigned to respond to a reported incident shall be determined by risk analysis or pre-fire planning."

The NFPA and the FEDERAL EMERGENCY MANAGEMENT ASSOCIATION (FEMA) set out the basic definition of a risk assessment, which details the fact that it is "a quantitative and qualitative tool used for measuring the probability of incident occurrence and impact that a given area may experience if certain criteria are met during an incident". These tools can take many forms, from a simple paper survey to a calibrated set of indicators designed to be applied and manipulated for each analyzed area. Information is then prioritized and ranked to assess the importance and degree of preparation needed for each event.

Due to financial restrictions, each event cannot be completely mitigated. By completing a comprehensive risk assessment, agencies may allocate funding and resources towards the most vulnerable aspects in their region.

The main component of risk assessment lies in the construction of a risk rating matrix. The qualitative and quantitative measurements of risk are derived and illustrated by using this tool. Designed in a graphical format, the matrix rates impact on the vertical axis, ranging from minor to catastrophic. Event likelihood is rated on the horizontal axis, ranging from unlikely to highly probable. The graph is further broken down into separate cells which are quantified based on the amount of risk present.

2.5 Risk Rating Matrix

COMMUNITY IMPACT	1 UNLIKELY	2 POSSIBLE	3 PROBABLE	4 HIGHLY PROBABLE
4 CATASTROPHIC				
3 SIGNIFICANT				
2 MODERATE				
1 MINOR				

LIKELIHOOD OF OCCURRENCE

E	**Extreme Risk –** Potential for overwhelming loss of life, enormous damage to local infrastructure or significant impact to the local economy; may completely absorb all available emergency resources for response efforts.
H	**High Risk –** Potential for high loss of life or large impact to local economy or community; may require substantial commitment of emergency resources.
M	**Moderate Risk –** Increased potential for loss of life; impact on local economy or community noticeable but not significant.
L	**Low Risk –** Potential for loss of life limited, with little or no impact on local economy or community. Limited commitment of emergency resources required.

2.6 Likelihood Scoring Scale – Quantitative and Qualitative Measures

Level	Descriptor	Indicative chance of occurrence in a given 5 year period.	Description
1	**Unlikely**	2%-25%	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or no recent incidents in associated organizations, facilities or communities; and/or little opportunity, reason or means to occur; may occur once every one hundred years.
2	**Possible**	26%-50%	Might occur at some time; and/or few, infrequent, random recorded incidents or little anecdotal evidence; and/or very few incidents in associated or comparable organizations, facilities or communities; and/or some opportunity, reason or means to occur; may occur once every twenty years.
3	**Probable**	51%-75%	Likely to or may occur/recur every 1– 5 years; regular recorded incidents and strong anecdotal evidence and will probably occur in many circumstances.
4	**Highly Probable**	76%-100%	Likely to or may occur/recur every year or less; high level of recorded incidents and/or strong anecdotal evidence.

2.7 Impact Scoring Scale – Qualitative Measures

Level	Descriptor	Categories of Impact	Description of Impact
1	**Minor**	*Life Safety*	• Small number of people affected (<10), no fatalities, and small number of minor injuries with first aid treatment. • Minor displacement of people for <6 hours and minor personal support required.
		Economic & Infrastructure	• Minor localized disruption to community services or infrastructure <6 hours.
		Environment	• Minor impact on environment with no lasting effects.
2	**Moderate**	*Life Safety*	• Limited number of people affected (11 - 50), no fatalities, but some hospitalization and medical treatment required. • Localized displacement of small number of people for 6 - 24 hours. Personal support satisfied through local arrangements.
		Economic & Infrastructure	• Localized damage that is rectified by routine arrangements. • Normal community functioning with some inconvenience
		Environment	• Some impact on environment with short-term effects or small impact on environment with long-term effects.
3	**Significant**	*Life Safety*	• Significant number of people (51-100) in affected area impacted with multiple fatalities, multiple serious or extensive injuries, and significant hospitalization. • Large number of people displaced for 6 - 24 hours or possibly beyond. • External resources required for personal support.
		Economic & Infrastructure	• Significant damage that requires external resources. • Community only partially functioning, some services unavailable.
		Environment	• Significant impact on environment with medium to long-term effects.
4	**Catastrophic**	*Life Safety*	• Very large number of people (>100) in affected area(s) impacted with significant numbers of fatalities, large number of people requiring hospitalization with serious injuries with long term effects. • General and widespread displacement for prolonged duration and extensive personal support required.
		Economic & Infrastructure	• Extensive damage to properties in affected area requiring major demolition. • Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. • Community unable to function without significant support.
		Environment	• Significant long-term impact on environment and/or permanent damage.

2.8 Very High Risk Hazards

E	EXTREME RISK | *Likelihood Possible with Catastrophic Community Impact*
	RAILROAD INCIDENT

Definitions

The Federal Railroad Administration lists 11 classifications of accident types, which can be divided into five major groups[5]:

- **Derailment:** occurs when on-track equipment leaves the rail for a reason other than collision, explosion, rail-highway crossing impact, etc.
- **Collision:** occurs when two trains, parts of trains, locomotives or track equipment impact each other; includes head-on, rear-end, side, raking, broken train, and railroad crossing.
- **Rail-highway (R/H Crossing) crossing collision:** an impact at grade between railroad on-track equipment and highway vehicles, farm vehicles, bicycles or pedestrians.
- **Fire/Explosion:** an accident caused by detonation, combustion or violent release of material carried or transported by rail.
- **Other:** any event not otherwise classified; also includes switching collisions when all consists involved are parts of the switching movement.

Chemical train derailment near Brooks, Ky., 2007.
Flames consumed 14 train cars and sent dense black clouds of smoke billowing into the air. Officials ordered the evacuation of all homes and businesses within a mile radius of the fire; shut down more than 20 miles of nearby Interstate 65; and closed airspace over the fire as a precaution

History

- **Wenatchee's Appleyard Blast:** A shipment of MONOMETHYLAMINE NITRATE SOLUTION, a chemical used to make explosives, detonated at the south Wenatchee train switching yard at 12:32 p.m. on August 6, 1974. The explosion killed two people, injured 113, destroyed many buildings and homes within a one-mile radius and shattered windows up to three miles away. East Wenatchee residents recovered large parts of train cars and rail that the explosion force had flung across the Columbia River[6].

  The explosion demolished 71 train cars and four containers, and damaged 101 freight cars. The blast left a 100-foot-wide and 35-foot-deep crater and caused more than $7.5-million in property damage (over $33.4-million in today's economy). The ensuing National Transportation Safety Board investigation did not determine what caused the chemical shipment to explode. The westbound train carrying the shipment had passed through Ephrata only a few hours earlier.

[5] Federal Railroad Administration, 2005
[6] Wenatchee World, August 8, 2004

- **Train versus Vehicle R/H Crossing Collision & Spill, Quincy:** On May 25, 1989, a westbound freight train struck an automobile which had run the crossing at Road P-NW, east of Quincy. The collision caused forty cars and both engines to derail. The car's driver was killed and four train employees were injured. Fortunately, this train did not spill any hazardous materials.

Nationwide, 2,728 highway-rail grade crossing collisions occurred in 2007. In Washington State during 2007, 47 crossing collisions were investigated. Our state's incidents resulted in seven fatalities and 14 injuries[7].

Aftermath of train derailment east of Quincy, 1989

It is the perception of many that significant chemical accidents do not occur anymore. While it is true chemical accidents of catastrophic magnitude happen only rarely, hazardous materials incidents – some of them serious – occur dozen of times a week in the United States. While no comprehensive recent data are available, an analysis of data from multiple Federal databases over a five-year period (1988-1992) indicates that an average of at least 19 known chemical incidents occurred daily. (There were probably more unreported.)[8]

The enactment of the HAZARDOUS MATERIALS TRANSPORTATION UNIFORM STANDARDS ACT OF 1990 placed added emphasis on the need to assess the risks and benefits associated with the transportation of hazardous materials by all modes. Rail transportation is playing an increasing role in the growing movement of hazardous materials. The events of September 11, 2001 and the real possibility of future attacks have raised the concern level for rail transportation of hazardous materials and the safety of people and property in the event of a terrorist rail incident. Add to this the ever present possibility of an unrelated rail accident involving hazardous materials, especially given the growing volume of hazardous materials.

Vast quantities of these hazardous substances are being moved by rail alone. Due to the nature of most chemicals, they can pose hazards of explosion, toxic release, and fire. The transportation of these hazardous materials is an important problem due to their pervasiveness. Hazardous materials, or dangerous goods, include explosives, gases, flammable liquids and solids, oxidizing substances, poisonous and infectious substances, radioactive materials, corrosive substances, and hazardous wastes. The fact that the volume of hazardous materials moving by rail more than doubled since 1980 indicates that rail has become an integral part of the tremendous increase in the transport of hazardous materials. Nearly 155 million tons of chemicals are being transported by rail in North America each year which constitutes 1.75 million rail cars of hazardous materials (D'Amico, 2001).

Hazard Identification and Vulnerability Analysis

Burlington Northern Santa Fe operates the Class One corridor which bisects Ephrata. Approximately 24 freight trains with 7,000 cars and two Amtrak trains pass through each day.

[7] Federal Railroad Administration, *Highway-Rail Incidents, Casualties, and Trespass Casualties by State, 2007*
[8] Special Report: Risk Management Planning for Hazardous Materials: What It Means for Fire Service Planning USFA-TR-124/ January 2003

The freight trains pass through at up to 60 miles per hour; at that speed, a fully loaded freight train would require over one mile to stop after the emergency brakes were applied.

There are two crossings in the city: Nat Washington Way and Division Avenue East. These crossing are only three blocks apart. The SR282 overpass (eight blocks south of the Nat Washington Way crossing) provides the only other means to cross the tracks within the city limits. A train incident which causes damage to the overpass would pose a significant emergency response problem, and could cause subsequent economic loss to downtown businesses since detours would cause a bypass of the downtown business corridor.

The greatest concern is the track's proximity to the downtown business corridor, residential neighborhoods and government infrastructure. The core business district is 1½ blocks west of the tracks. The majority of City of Ephrata infrastructure is 100-200 feet away from the tracks at three separate locations. These critical facilities include City Hall and the Police Station (121 Alder St SW), the Fire Station (800 A St SE), and the Public Works Facility (900 A St SE). A high-speed derailment or other incident could cause the train to physically collide with these facilities. Debris could interfere with the access for emergency personnel. Release of hazardous materials may force the evacuation of citizens. Depending on the hazmat involved, weather, and other associated factors, this evacuation zone (aka Hot Zone) may be up to a mile radius from the incident site.

Ephrata is vulnerable to all types of transportation emergencies. The two major effects of transportation accidents are human injury and hazardous materials releases. Mass casualty incidents can be difficult because of location. Due to the limited amount of emergency medical resources, response times may be extended, and delay treatment of the injured. The worst type of accident would involve mass casualties and a hazardous material release. The presence of hazardous materials slows response to the injured for fear of exposing emergency personnel. Mass casualty events quickly overwhelm local emergency personnel, hospitals, and blood banks.

Conclusion

A rail accident in Ephrata will likely impact the local government infrastructure, and significantly impact the local economy. The source and location of transportation accidents vary but the response is typically the same. Response is focused on determining the presence of hazardous materials and then assisting the injured.

Emphasis should be placed on continued risk evaluation and participating in a leadership capacity role in the Ephrata Local Emergency Planning Committee (LEPC). LEPCs address issues and devise response plans that build on the framework of local, State, and Federal laws and regulations.

At the local level, the LEPC performs the frequent reevaluation that is necessary to ensure that a community's response plan is up to date and appropriate for the hazards that the community may face. In most locations, the LEPC comprises a broad variety of individuals to make sure that response planning takes into account the various issues and concerns that may be raised in an actual emergency. Drawing on their respective expertise and experience, these individuals work to create realistic scenarios and then devise appropriate emergency response plans. By modifying generic high-level State and Federal guidance to meet community-specific needs, LEPCs play an important role in the emergency response and risk management hierarchy.[9]

[9] Environmental Protection Agency. "LEPCs and Deliberate Releases: Addressing Terrorist Activities in the Local Emergency Plan." EPA 550-F-01-005. May 2001

BNSF HAZARDOUS MATERIALS TRAFFIC COUNTS
GRANT COUNTY WASHINGTON - LAST 4 QUARTERS 11/21/08
(Hazardous Materials Which Travelled on Rail through Ephrata)

STCC DESCRIPTION	CLASS CODE	RESIDUE CAR COUNT	LOADED CAR COUNT	RESIDUE INTER-MODAL	LOADED INTER-MODAL	TOTAL LOADED COUNT
BUTANE	2.1	105	12	0	0	12
BUTANE	2.1	16	15	0	0	15
BUTANE	2.1	39	58	0	0	58
ETHYLENE-REFRIGERATED LIQUID	2.1	0	2	0	0	2
ISOBUTANE	2.1	1	70	0	0	70
ISOBUTANE	2.1	8	0	0	0	0
LIQUEFIED PETROLEUM GAS	2.1	1	0	0	0	0
LIQUEFIED PETROLEUM GAS	2.1	78	45	0	0	45
LIQUEFIED PETROLEUM GAS	2.1	2	0	0	0	0
LIQUEFIED PETROLEUM GAS	2.1	24	0	0	0	0
LIQUEFIED PETROLEUM GAS	2.1	1001	588	0	0	588
PETROLEUM GASES- LIQUEFIED	2.1	71	59	0	0	59
PETROLEUM GASES- LIQUEFIED	2.1	1	0	0	0	0
PETROLEUM GASES- LIQUEFIED	2.1	76	8	0	0	8
AMMONIA- ANHYDROUS	2.2	92	4	0	0	4
CARBON DIOXIDE- REFRIGERATED LIQUID	2.2	160	18	0	0	18
PENTAFLUOROETHANE	2.2	0	0	0	1	1
REFRIGERANT GAS R124	2.2	0	0	0	1	1
REFRIGERANT GAS R134A	2.2	0	0	0	1	1
AMMONIA- ANHYDROUS	2.3	5	0	0	0	0
CHLORINE	2.3	3	29	0	0	29
SULFUR DIOXIDE	2.3	1	0	0	0	0
1-HEXENE	3	0	1	0	0	1
ACETONE	3	5	0	0	0	0
ALCOHOLS- N.O.S.	3	5	0	0	0	0
CYCLOPENTANE	3	0	0	0	5	5
DIESEL FUEL	3	0	2	0	0	2
DIESEL FUEL	3	18	4	0	0	4
ELEVATED TEMPERATURE- LIQUID- FLAMMABLE- N.O.S.	3	2	2	0	0	2
ELEVATED TEMPERATURE LIQUID- FLAMMABLE- N.O.S.	3	1	0	0	0	0
ETHYL METHYL KETONE	3	3	0	0	0	0
FLAMMABLE LIQUIDS- N.O.S.	3	111	18	0	0	18
GAS OIL	3	126	68	0	0	68
GASOLINE	3	4	0	0	0	0
METHANOL	3	13	0	0	0	0
METHYL ISOBUTYL KETONE	3	1	0	0	0	0
PENTANES	3	29	0	0	0	0
PETROLEUM DISTILLATES- N.O.S.	3	1	0	0	0	0
PICOLINES	3	0	0	0	11	11
RESIN SOLUTION	3	0	0	2	0	0
RESIN SOLUTION	3	0	0	7	11	11
STYRENE MONOMER- STABILIZED	3	0	10	0	0	10
VINYL ACETATE- STABILIZED	3	14	0	0	0	0
WASTE PETROLEUM DISTALLATES - N.O.S.	3	0	1	0	0	1
SULFUR- MOLTEN	4.1	3	0	0	0	0
ALUMINUM REMELTING BY-PRODUCTS	4.3	3	1	0	0	1
ALUMINUM REMELTING BY-PRODUCTS	4.3	29	16	0	0	16
WASTE ALUMINUM REMELTING BY-PRODUCTS	4.3	0	41	0	0	41
AMMONIUM NITRATE	5.1	5	8	0	0	8
AMMONIUM NITRATE BASED FERTILIZER	5.1	1	1	0	0	1
HYDROGEN PEROXIDE- AQUEOUS SOLUTIONS	5.1	1	0	0	0	0
HYDROGEN PEROXIDE- AQUEOUS SOLUTIONS- STABILIZED	5.1	10	0	0	0	0
TOLUENE DIISOCYANATE	6.1	1	2	0	0	2
VINYLPYRIDINES- STABILIZED	6.1	0	0	0	15	15
AMMONIA SOLUTIONS	8	6	0	0	0	0
CORROSIVE LIQUID- ACIDIC- INORGANIC- N.O.S.	8	3	0	0	0	0
CORROSIVE LIQUIDS- N.O.S.	8	0	3	0	0	3
CORROSIVE LIQUIDS- N.O.S.	8	18	0	0	0	0
CORROSIVE LIQUIDS- TOXIC- N.O.S.	8	58	0	0	0	0
SODIUM HYDROXIDE SOLUTION	8	11	6	0	0	6
SULFURIC ACID	8	0	0	0	1	1
SULFURIC ACID	8	312	0	0	0	0
ELEVATED TEMPERATURE LIQUID- N.O.S.	9	4	3	0	0	3
ELEVATED TEMPERATURE LIQUID- N.O.S.	9	138	181	0	0	181
ELEVATED TEMPERATURE LIQUID- N.O.S.	9	4	0	0	0	0
ELEVATED TEMPERATURE LIQUID- N.O.S.	9	120	127	0	0	127
ENVIRONMENTALLY HAZARDOUS SUBSTANCES- SOLID- N.O.S.	9	2	86	0	0	86

ENVIRONMENTALLY HAZARDOUS SUBSTANCES- SOLID- N.O.S.	9	132	3774	0	0	3774
ENVIRONMENTALLY HAZARDOUS SUBSTANCES- SOLID- N.O.S.	9	2	0	0	0	0
HAZARDOUS WASTE- SOLID- N.O.S.	9	0	2	0	0	2
OTHER REGULATED SUBSTANCES- SOLID- N.O.S.	9	0	55	0	0	55
POLYCHLORINATED BIPHENYLS- SOLID	9	1	0	0	0	0
SULFUR- MOLTEN	9	137	7	0	0	7
COMBUSTIBLE LIQUID-N.O.S.	CL	0	0	0	36	36
COMBUSTIBLE LIQUID-N.O.S.	CL	1	0	0	0	0
COMBUSTIBLE LIQUID-N.O.S.	CL	1	1	0	0	1
DIESEL FUEL	CL	3	0	0	0	0
FUEL OIL	CL	14	14	0	0	14
PETROLEUM DISTILLATES- N.O.S.	CL	5	0	0	0	0
PETROLEUM DISTILLATES- N.O.S.	CL	3	0	0	0	0
HAZARDOUS WASTE - DESCRIPTION NOT AVAILABLE	HW	0	0	68	77	77
FAK-HAZARDOUS MATERIALS	ML	0	2	0	0	2
FAK-HAZARDOUS MATERIALS	ML	0	0	21	15790	15790
	TOTALS	**3045**	**5344**	**98**	**15949**	**21293**

HAZMAT Classification Codes

Red indicates materials which passed through Ephrata based on the list above.

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
- Division 1.6 Extremely insensitive explosive articles

Class 2: Gases

- Division 2.1 Flammable gases
- Division 2.2 Nonflammable gases
- Division 2.3 Poison gas
- Division 2.4 Corrosive gases

Class 3: Flammable liquids.

- Division 3.1 Flashpoint below -18°C (0°F)
- Division 3.2 Flashpoint -18°C and above, but less than 23°C (73°F)
- Division 3.3 Flashpoint 23°C and up to 61°C (141°F)

Class 4: Flammable solids; spontaneously combustible materials; and materials that are dangerous when wet

- Division 4.1 Flammable solids
- Division 4.2 Spontaneously combustible materials
- Division 4.3 Materials that are dangerous when wet

Class 5: Oxidizers and organic peroxides

- Division 5.1 Oxidizers
- Division 5.2 Organic peroxides

Class 6: Poisons and etiologic materials

- Division 6.1 Poisonous materials
- Division 6.2 Etiologic (infectious) materials

Class 7: Radioactive materials

- Any material, or combination of materials, that spontaneously gives off ionizing radiation. It has a specific activity greater than 0.002 microcuries per gram.

Class 8: Corrosives

- A material, liquid or solid, that causes visible destruction or irreversible alteration to human skin or a liquid that has a severe corrosion rate on steel or aluminum.

Class 9: Miscellaneous

- A material which presents a hazard during transport, but which is not included in any other hazard class (such as a hazardous substance or a hazardous waste).

ORM-D: Other regulated material

- A material which, although otherwise subjected to regulations, presents a limited hazard during transportation due to its form, quantity and packaging.

2.9 High Risk Hazards

H HIGH RISK | *Likelihood Possible with Significant Community Impact*

FLOODING

Definition

Flooding is a natural feature of the climate, topography, and hydrology of Washington State and Grant County. Flooding results from bodies of water overflowing their banks; structural failure of dams and levees; accumulation of runoff surface water; and erosion of a shoreline. Eastern Washington is prone to flash flooding. Thunderstorms, steep ravines, alluvial fans, dry or frozen ground, and light vegetation, which tends not to absorb moisture, cause the flooding.

History

Partial failure of irrigation canal: In Ephrata, the West Canal has experienced structural defects leading to the flooding of Lions Park in 2006.

Failure of irrigation canal, Utah: At approximately 4:00 a.m. on January 5, 2008, a portion of the an irrigation canal embankment failed in a portion which passes through the City of Fernley, Nevada, located about 12 miles downstream of Derby Diversion Dam. Approximately 11.7 miles of the Canal passes through Fernley. When the failure occurred, the Canal was conveying 750 cubic-feet-per-second of water. The flow had rapidly increased from approximately 375 cubic-feet-per-second to 750 cubic-feet-per-second over the 18-hour period prior to the breach as a result of an effort to capture storm flows occurring on the Truckee River. This breach resulted in an uncontrolled water release into the middle of recently constructed residential housing development, flooding 590 homes, of which about 138 suffered moderate to severe damage and the remainder suffered minor damage. No fatalities occurred. Operations of the Canal were suspended about nine hours after the breach occurred. The cause of the failure was determined to be burrow holes caused by rodents. President Bush declared the area a national disaster area, making federal relief available to hundreds of people whose homes were damaged or destroyed by the canal failure. Class action lawsuits were filed against the irrigation district, the city, and others.

Fernley, Nev., flooding caused by irrigation canal failure, January 2008

Failure of East Low Canal, Moses Lake: On June 16, 1992, a portion of the East Low Canal failed east of Moses Lake. Interstate 90 and the North Frontage Road were closed and submerged under three feet of water in some places. It took nearly seven hours to empty the canal and stop the flow from the breach.

Flooding, other causes: Severe rainstorms have created localized flooding of downtown Ephrata. In 1997, several businesses and homes in the northwest and southwest

sections of town west of the BNSF railroad tracks suffered minor flood damage when a rainstorm deposited several inches of rain in the city over just a few hours. Storm drains became quickly clogged with debris carried by the runoff, and soil became saturated, leading to minor flooding within basements due to seepage.

Hazard Identification and Vulnerability Analysis

The valley in which most of Ephrata lays poses a special risk for localized flooding as demonstrated historically. Residences within the northwest and southwest sections of town are considered to be within the Special Flood Hazard Areas (aka floodplain).

Two concerns are sudden onset and flood elevation in relation to topography and structures. Other factors contributing to flood damage are water velocity, debris carried by water, duration of flood conditions, and ability of soil to absorb water. Flooding predominates in late winter and early spring due to melting snow, breakaway ice, and rainy weather.

The West Canal of the QUINCY-COLUMBIA BASIN IRRIGATION DISTRICT bisects Ephrata, running north-to-south through the west-central portion of the city. The West Canal was constructed between 1946 and 1955. The canal has an initial capacity of 5,100 cubic feet per second, and is both concrete and earth-lined.[10] This canal passes above the downtown district of government infrastructure, businesses, schools, and residential areas in the northwest and southwest portions of the city. Significant damage, economic loss and interruption of government would occur of a moderate or major failure of this canal was to occur. Access routes for emergency responders may be impeded by floodwaters. This risk is only present during the irrigation season (generally April through October) when the canal is flowing water.

Flood Plain: The city of Ephrata lies near the mouth of the Dry Creek drainage basin at the east end of the Beezley Hills. Dry Creek is the longest of a network of 10 major ravines draining the 27-square-mile basin within the Beezley Hills. In its 9-mile length the creek bed falls 1,400 feet from elevation 2,700 to 1,300 feet. The gradient is fairly uniform, averaging about 150 feet per mile. The Creek bed is about 20 feet wide with steep sides near its mouth at Ephrata.

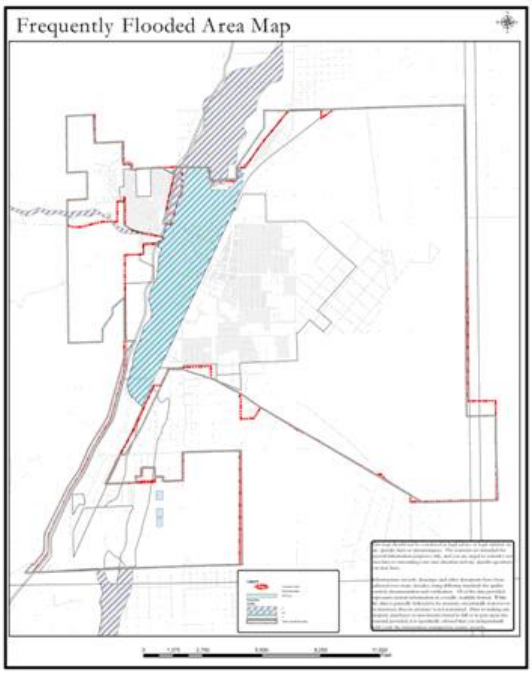
Surface water runoff in the Dry Creek drainage basin takes place intermittently when a thunderstorm or rapid snow melt, combined with rainfall occurs. Often the water is absorbed into the hillside soil or stream beds. However, if the ground is frozen or wet, runoff in substantial quantities reaches the mouth of Dry Creek. Peak flow frequencies are estimated as follows:

Peak Flow (cfs)	Avg. Recurrence Interval (Years)	Peak Flow (cfs)	Avg. Recurrence Interval (Years)
680	5	3,700	50
1,300	10	5,000	100
2,150	20		

The most severe combination of weather and runoff conditions reasonably characteristic of the area, such as an intense thunderstorm centered over the drainage basin, could result in a peak flow of 15,000 cfs.

[10] US Bureau of Reclamation website http://www.usbr.gov/dataweb/projects/washington/columbiabasin/history.html#west accessed 08/29/08

Flood waters are diverted at the mouth of the creek to the north by a corrugated metal arch culvert 10 feet high, 24 feet wide and 100 feet long. A steel sheet pile training wall, 250 feet long, turns the creek in the direction of the culvert. Creek waters are thence carried northward in a channel paralleling the adjacent West Irrigation Canal. About 3,500 feet north of 1st Avenue NW the channel turns eastward, releasing discharges into a ponding area north of Ephrata. The ponding area is 1.5 miles long and nearly one-half mile wide and has a capacity for storing about 1,800 acre-feet. A low embankment is intended to prevent the extension of ponding southward into Ephrata, but has a top elevation three feet below the maximum potential ponding elevation. Because of the fine materials used in construction, the embankment is subject to failure from erosion whenever flow exceeds 560 second-feet, which is approximately a 4-year flow. The Federal Emergency Management Agency has defined areas showing the extent of the 100-year flood boundary in order to establish flood insurance rates and assist communities in efforts to promote sound flood plain management. The following Flood Plain map depicts the area susceptible to flooding. [11]



Frequently Flooded Area Map - Ephrata

Depending on the severity of the flooding, risk may range from inconvenience to immediate life threats and severe structural damage. Localized flooding can also negatively impact the mobility of emergency responders.

According to the city's Department of Community Development, flood plains, or areas at risk of flooding, make up about eight percent (550 acres) of the City's 6,464-acre total land area. The flood hazard areas contain an estimated 780 dwellings. All homes and citizens that live in them are vulnerable to flood damage.

Only about 22 percent of homes in Washington State flood plains are insured against flood losses. Uninsured homeowners face greater financial liability than they realize. During a typical 30-year mortgage period, a home in a mapped floodplain has about a 26 percent chance of being damaged by a 100-year flood event. The same structure only has about a one-percent chance of being damaged by fire. Many homeowners living in floodplains carry fire insurance, yet very few carry flood insurance. The City of Ephrata participates in the NATIONAL FLOOD INSURANCE PROGRAM (NFIP). The NFIP provides subsidized flood insurance to properties within designated within the floodplain.

[11] Report on Survey. Dry Creek Flood Control. Ephrata, Washington. Army Corps of Engineers. May, 1973

Conclusion

A major flooding emergency could pose several response challenges for emergency responders and also cause significant economic impacts for local businesses, as well as interruption of local government infrastructure.

During extreme flooding incidents, access to citizens may only be accomplished via watercraft. The Ephrata Fire Department is not equipped to handle water-related emergencies or rescue. Assistance would be sought from water rescue-equipped agencies such as the Marine Patrol and Search & Rescue Units of the Grant County Sheriff's Office, Moses Lake Fire Department, and Washington State Fish & Wildlife, as well as the use of watercraft by local citizens.

H HIGH RISK | *Likelihood Probable with Moderate Community Impact*

SEVERE WEATHER

Definition

An atmospheric disturbance manifested in strong winds, and may be accompanied by rain, snow, or other precipitation, and often by thunder or lightning.

History

During the 1996-97 winter storms, high snowfall and cold temperatures resulted in significant snow accumulations.

In November 2006 and again in January of 2007, a severe winter storm delivered high winds and damage across most of Washington State, including Grant County. Wind gusts over 100 miles per hours were recorded in the Quincy area, where several thousand dollars of property loss occurred. This damaged property included roofs, windows, fallen trees, and other property struck by flying or falling debris. Public power was interrupted due to damaged power lines, and three new homes being framed in Quincy were collapsed by the high winds.

Tornadoes in Grant County are infrequent and touchdowns are not consistent or specific to any particular area within the county.

January 2007: 100 mile-per-hour winds damaged property and uprooted trees in Quincy, and caused millions of dollars in damage throughout central Washington

Hazard Identification and Vulnerability Analysis

The City of Ephrata is vulnerable to severe local storms. The affects are generally transportation problems and loss of utilities. Transportation accidents occur, motorists are stranded, and schools, businesses, and industries close. The affects vary with the intensity of the storm, the level of preparation by local jurisdictions and residents, and the equipment and staff available to perform tasks to lessen the effects of severe local storms.

Most storms move into Washington from the ocean with a southwest to northeast airflow. Maritime air reaching the Olympic Mountains rises upwards and cools. As this airflow reaches higher elevations and cools, there is less ability to hold moisture and rain occurs.

- Windstorms with sustained winds of 50 miles per hour are powerful enough to cause significant damage and occur frequently. Affected areas are primarily located at the openings of long passes through the mountains, at the base of the mountains, and at the edges of large expanses of open water.
- Blizzards and snowstorms accompanied by high wind and drifting snow occur occasionally throughout the state.
- Ice storms occur when rain falls from a warm, moist, layer of atmosphere into a below freezing, drier layer near the ground. The rain freezes on contact with the cold ground and exposed surfaces causing damage to trees, utility wires, and structures.
- Hailstorms occur when freezing water in thunderstorm clouds accumulates in layers around an icy core. Hail damages crops, structures, and transportation systems.
- Dust storms occur regularly in Grant County. Wind blows dirt and light debris aloft, at times obscuring visibility and causing temporary road closures.
- Extreme heat temperatures during the summer months occur annually in Eastern Washington. Individuals, pets, livestock, wildlife, and crops are all affected.

Of high concern during severe winter weather events is the stability of structures. Snow loads can exceed the designed or built capacities of roofs, and high winds can challenge the integrity of buildings, leading to structural collapse. Under these circumstances, rescue of citizens would be of primary importance. Although equipped with modern vehicle extrication equipment, the Ephrata Fire Department is not equipped with urban search and rescue equipment to effectively and safely execute rescue operations at the collapse of a commercial building.

Conclusion

The City's plans should reflect warning and notification of the public, prioritization of roads and streets to be cleared, provision of emergency services, mutual aid with other public entities, procedures for requesting state and federal assistance if needed. To prepare for severe local storms, local jurisdictions should provide public information on emergency preparedness and self-help.

Resources

National Oceanic and Atmospheric Administration, Seattle Weather Service, National Weather Service – Spokane Office, Grant County Emergency Management

H HIGH RISK | *Likelihood Probable with Moderate Community Impact*

FIRE IN THE WILDLAND-URBAN INTERFACE

Definition

Wildland urban interface (WUI) is a geographic area where formerly urban structures, primarily homes, are built in immediate proximity to naturally occurring flammable fuels (wildland).

History

The 2008 fire season in Grant County was the most active in several years, requiring the mobilization of state resources on six separate occasions. Evacuations were ordered during two of those fires.

The 2007 fire season yielded several significant wildfires, including a wildfire which burned the Beezley Hills and threatened to burn communications infrastructure on top of the hills, as well as homes just outside of the city limits. Local firefighting resources were able to protect the infrastructure and homes and control the fire, with State mobilized resource assistance after the initial attack.

Ephrata Firefighters battle a wildland fire in sagebrush, 2005

The expansion of Ephrata's WUI in recent decades has significant implications for wildfire management and impact. The WUI creates an environment in which fire can move readily between structural and vegetation fuels. Its expansion has increased the likelihood that wildfires will threaten structures and people.

Hazard Identification and Vulnerability Analysis

Due to its location, Ephrata has a wildland-urban interface on several fronts, and wildland fires of all sizes occur annually. Recent area wildfires near Ephrata include a several hundred acre fire on the north face of Beezley Hills in 2007 and the 3,500 acre Rocky Ford Fire in 2006. Large wildfires requiring the mobilization of State resources occurred six times in 2008 (see table on page 41), the most in Grant County history. These fires burned several thousand acres and destroyed outbuildings.

The fire season runs from mid-May through October. Dry periods can extend the season. Wildland fires responded to by city and county fire departments were largely started by human causes. Included in the list of human causes are cigarettes, fireworks, illegal burn barrels, and outdoor burning. The effects of wildland fires vary with intensity, area, and time of year. Factors affecting the degree of risk include rainfall, type of vegetation, and proximity to firefighting agencies.

Wildland fires pose a serious threat to human life and property when homes are built in fire-prone ecosystems. Several factors influence the intensity of wildfires and their potential to damage or destroy structures. Developing a basic understanding of the factors that determine wildfire movement and intensity (collectively called fire behavior) will allow homeowners and builders to assess fire hazard on their property and determine what they can do to minimize their risk. Research has shown that the most important factors influencing building survival during a wildfire are fire intensity, vegetation characteristics, and building materials (especially roofing). Strategies for protecting homes from wildfires have been developed with these factors in mind.

An important aspect of fire behavior is the manner in which it moves. Fire requires the presence of oxygen, fuel, and heat. Oxygen is abundant from the atmosphere, and therefore it generally does not limit wildfire movement. Plants are the primary fuels during wildfires, and their arrangement greatly influences the transfer of heat. Three basic mechanisms of heat transfer are convection, radiation, and conduction.

- **Convection:** The transfer of heat by the movement of a gas or liquid is called convection. Because hot air rises, heat transfer through convection tends to move upward. During wildfires, burning materials on the ground create convection currents that preheat the leaves and branches of shrubs and trees above the fire. The vertical air currents can also lift burning materials. The floating embers, also called firebrands, can settle in unburned areas ahead of the fire and start small fires. This phenomenon is called spotting and can result in rapid advancement of the fire. Firebrands can also ignite homes directly if they land on flammable roofing or accumulations of leaves or needles in gutters or on roofs.
- **Radiation:** Burning objects release energy in the form of heat. You feel radiant heat when you stand near burning logs in a fireplace. In general, the size of the burning object determines the amount of radiant heat released, with larger fuels burning hotter. In most cases, radiant heat from a wildfire will not ignite materials on homes at distances greater than 30 feet from the house.
- **Conduction:** The last mechanism of heat transfer is from direct contact or conduction; an example is the heat that you feel when you touch a cup of hot water. Conduction carries heat through fuels, such as logs or house walls, and can raise their temperature to ignition points. Heat transfer through conduction can only occur within the same object or between objects that are touching.

With an understanding the fundamentals of heat transfer, one can see how the arrangement of plants can determine the movement of a wildfire. If combustible vegetation is abundant and continuous, all three mechanisms may interact to produce a rapidly advancing fire. Plants near the fire are dried, preheated, and even ignited through the effects of convection and radiation. Conduction preheats and dries larger fuels that are touching each other and may prolong the time those fuels burn by facilitating the internal transfer of heat.

Fuels: The primary fuels in wildland fires are living and dead vegetation. During extended periods of warm and dry conditions, all plants will burn if exposed to enough heat. However, plants differ in how readily they ignite and how hot or long they burn. Combustibility depends on plant size, arrangement of branches and leaves, and chemical properties of leaves, branches and bark. Both the horizontal and vertical arrangement of vegetation influences fire behavior. The arrangement of vegetation across a tract of land is influenced by the frequency of past disturbance. Wildfire is a natural disturbance that reduces the amount of dead plant material and light fuels (see definition below) at a site. A common firefighting technique for slowing or stopping an advancing wildfire involves creating breaks in the fuels by clearing all

vegetation from strategic locations. Fire professionals have a few key terms that they use to describe wildland fuels.

- **Light fuels** include grasses, shrubs, and tree leaves or needles. They are referred to as light and flashy fuels because they ignite easily and burn rapidly. Light fuels affect the rate of spread of an advancing fire. They are the primary fuels that carry fires and ignite homes in many wildfire situations.
- **Heavy fuels**, such as large tree branches, downed logs, and buildings, require more heat energy to ignite, but they burn longer and produce more heat once ignited.
- **Ladder fuels**, such as shrubs or small trees of intermediate height, act as ladders carrying the flames from the ground fuels up into the tops of trees and homes.
- **Fuel breaks** are areas lacking vegetation or other fuels that stop or impede the horizontal movement of an advancing fire. Fuel breaks can be natural, such as rivers or streams, or artificial, such as roads or plowed agricultural fields.
- **Weather:** Precipitation, humidity, wind, and temperature are important weather variables that influence fire behavior. Precipitation and humidity, which is influenced by air temperature, directly influence the flammability of forest fuels by affecting moisture content of living and dead leaves, branches, and grasses. Plant materials dry out quicker and ignite more easily during hot, dry weather. Windy conditions increase the rate of spread of fires and may increase fire intensity.

  Fire fighting professionals have developed classification systems that incorporate current weather conditions into an index to rate fire risk, called a fire danger index. Washington Department of Natural Resources posts fire danger indices on their website, www2.wadnr.gov/burn-risk/.
- **Topography:** Topography significantly affects fire behavior. Fires move faster uphill than downhill. Slope orientation also influences fire behavior. Forests on southern or southwestern slopes generally have lower humidity and higher temperatures than those on north or northeast slopes because of the path of the sun. Consequently, fire hazard is often higher on south and southwest facing hills.

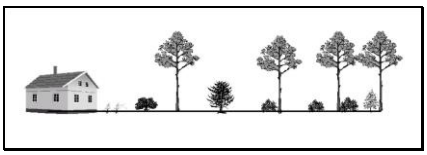
Of the three factors affecting fire behavior, fuels are the easiest to manage by homeowners and land managers to lower fire hazard.

Strategies to Reduce the Risk of High Intensity Fires

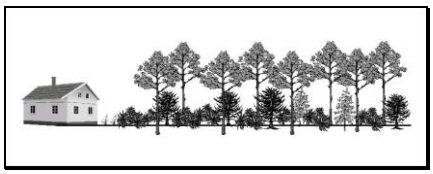
Homeowners: Homeowners in high fire hazard areas can reduce the risk of high intensity fires affecting their property. An important concept for homeowners living in hazardous areas is that of defensible space. Defensible space is defined as an area of modified vegetation between wildland fuels and homes that allows firefighters to protect the home or, in absence of firefighters, allows the home to better survive on its own. The most extensive modification of vegetation should occur within an area extending at least 30 feet outward from the house. Beyond this area, additional modification of wildland vegetation creates a larger buffer from an approaching wildfire and further decreases the risk of damage.

1. Create and maintain a defensible space by removing the lower branches up to 10 feet from the ground on large trees, separating beds of landscape plants, and removing flammable vegetation from within 30 feet from your house. Homeowners living on a steep slope (or hillside) should maintain a larger primary zone of defensible space by clearing flammable vegetation from an area extending up to 100 feet outward from the house.

2. Landscape your yard with fire-safe plants with the following characteristics: slow growth with little accumulation of dead vegetation, high moisture content and low concentrations of oils or other flammable chemicals in the leaves and branches, and open and loose branching pattern.
3. Maintain healthy landscape plants by watering periodically (as needed) and removing dead branches (pruning).
4. If natural areas exist on your lot, reduce the intensity of an approaching fire by removing highly flammable shrubs/trees (contact your local forestry agency for information on plants with high fire hazard), reducing overall tree density by removing small trees (called thinning), and reducing the continuity of ladder fuels. This area can serve as a buffer between unaltered natural areas and a modified area of defensible space.



Landscape A



Landscape B

Landscape A, a natural forest composed of mature pine trees and a dense understory of hardwood shrubs and small trees, is left unmanaged within 15 feet of a woodland home. Fire has been excluded from the forest for more than 10 years. Landscape B also includes a natural pine forest located adjacent to a housing development. However, the owner of the Landscape A has implemented a fuel reduction program that involves the removal of all ladder fuels within a 100-foot buffer of the development and the use of prescribed fire every 3 to 5 years to reduce surface fuels, such as dead pine needles, downed branches, grasses, and shrubs. Note the vertical and horizontal separation of fuels in Landscape B. In addition, the homeowner created a 30-foot area of defensible space.

Conclusion

Building near wildlands increases the risk of loss from fires. Often, structures are built with minimal awareness of the need for fire protection.

Wildland fires occur with regularity in Grant County. There are a number of ways to reduce wildland fires and minimize injury and property loss.

Mitigation activities:

- Educate public and enforce ordinances
- Develop fire detection programs and emergency communications systems
- Exercise warning systems and evacuation plans
- Enact burn bans
- Plan escape routes for personnel living in wildlands
- Close roads during fires

Property owner precautions

- Maintain appropriate defensible space around homes
- Provide access routes and turnarounds for emergency equipment
- Minimize fuel hazards adjacent to homes
- Use fire-resistant roofing materials
- Maintain water supplies
- Ensure that home address is visible to first responders

Resources

Fire Services, National Weather Service, Washington State Patrol, Fire Protection Bureau, Washington State Department of Natural Resources, Resource Protection Division, Washington State Emergency Management Division

Sampling of Major Wildfires in Grant County – 2008[12]

DATE	INCIDENT	SUMMARY
15 JUNE	BAIRD SPRINGS FIRE	• 1,200 ACRE WILDFIRE 5 MILES WEST OF QUINCY • HOMES THREATENED
30 JUNE	SEEP LAKES FIRE	• 3,000 ACRE WILDFIRE 7 MILES WEST OF WARDEN • EVACUATIONS ORDERED
13 JULY	WILLOW LAKES FIRE	• 3,000 ACRE WILDFIRE 8 MILES EAST OF EPHRATA • 3 OUTBUILDINGS DESTROYED • EVACUATIONS ORDERED • STATE MOBILIZATION ORDERED
22 JULY	STUHLMILLER FIRE	• WILDLAND FIRE BURNING ALONG GRANT/DOUGLAS COUNTY BORDER 8 MILES WEST OF QUINCY • EVACUATIONS ORDERED • STATE MOBILIZATION ORDERED • OUTBUILDINGS DESTROYED
27 JULY	WILDFIRE – COLUMBIA NATIONAL WILDLIFE REFUGE – NEAR O'SULLIVAN DAM	• WILDLAND FIRE BURNED 3,000 ACRES ON COLUMBIA NATIONAL WILDLIFE REFUGE 15 MILES SW OF MOSES LAKE • NO STRUCTURES DAMAGED
15 AUGUST	WILDFIRE – WEST OF POTHOLES STATE PARK	• WILDLAND FIRE BURNED 600 ACRES ON STATE FISH & WILDLIFE PROPERTY 15 MILES SW OF MOSES LAKE • NO STRUCTURES DAMAGED

[12] Grant County Department of Emergency Management

H HIGH RISK | *Likelihood Probable with Moderate Community Impact*

STRUCTURE FIRE

History

Fires can strike anywhere—in structures, buildings, automobiles, and the outdoors.

In 2007, Washington fire agencies reported 25,457 fire incidents with associated dollar loss to property and contents of $224 million. Fires claimed the lives of 51 people. This represents a decrease of 11% in number of fire occurrences, but an increase of 5% in the amount of dollar loss. Per capita, there were approximately 3.9 fires per thousand population in 2007 as compared to 4.5 in 2006[13].

Analysis of Washington's fire report statistics reveals:

- One fire department response approximately every 1 minute.
- One fire incident reported every 21 minutes.
- One structure fire is reported every 1.1 hours.
- One EMS/Rescue Incident reported every 1.3 minutes.
- One intentionally set fire is reported every 4.1 hours.
- Dollar loss reported as a result of fire: $613,717 per day; $25,572 per hour; $426 per minute.

EFD volunteers battle a fully-developed, post-flashover fire in a residence

Fires that affect homes are often the most tragic and the most preventable. While the loss of possessions can be upsetting, the physical and psychological injuries fires inflict are often far more devastating. Fires at residential properties are a significant problem in terms of their impact on lives and property. Over the past five years 73% of the fire fatalities in Washington State occurred in residential properties to include places such as one- and two-family dwellings, multi-family dwellings, board and care, hotels/motels, college housing, barracks, and dormitories. In 2007, 76.5% of all Washington fire fatalities occurred as a result of fires in residential buildings—our homes. Nationwide, there were 3,430 civilians that lost their lives as the result of fire, representing 84% of all fire deaths.[14]

On average, nonresidential structure fires were less injurious and deadly than structure fires generally, but the monetary property loss was higher. A fire in a nonresidential structure can impact a business, the economy of a city, an entire industry—not to mention the deaths and

[13] 2007 Fire in Washington, Washington State Fire Marshal's Office
[14] The Overall Fire Picture – 2007, US Fire Administration

injuries that can result from such incidents. The leading cause of non-residential fires was incendiary/suspicious (arson) fires.

According to the US Fire Administration, in 2007:

- Approximately 39% of civilian fire injuries resulted from trying to control a fire.
- The leading area for fire injuries in residential buildings was the bedroom.
- The three leading causes for civilian fire injuries are exposure to fire products (82%), exposure to hazardous materials or toxic fumes (6%), and other cause of injury (4%).
- December had the highest incidence of civilian fire injuries.
- In 2007, fire killed more Americans than all natural disasters combined.

Dynamics of Fire: Fire suppression forces meet a variety of conditions at each fire. If the arriving suppression force is to save lives and limit property damage, they must arrive within a short period of time, with sufficient resources to control the growth of the fire. Regardless of the speed of fire growth or length of burn time, fires go through the same stages of growth. A particular stage emerges as very significant because it makes a critical change in conditions. This particular stage is referred to as flashover. The following is the industry accepted phasing of fire development, which consists of four stages for a fully developed fire.

Firefighters from seven agencies battled this fully-developed fire at Renaissance Technology on Basin St SW, September 2006

Stages of Fire Development:

- **Ignition –** Ignition describes the period when a heat source is applied to a combustible fuel package, in the presence of oxygen, and a continuous chemical chain reaction known as combustion begins. At this point the fire is small and generally confined to the material (fuel) first ignited.

- **Growth –** Shortly after ignition, a fire plume begins to form above the burning fuel. For example, a cigarette left smoldering in a chair causes ignition of the chair. A column of smoke, flame, and heated gasses forms. As the hot gasses rise, they begin to spread outward when they hit the ceiling. The gasses continue to spread until they reach the walls of the compartment. The depth of the gas layer then begins to increase. The growth stage will continue if enough fuel and oxygen are available, known as *free burning*. Fires in the growth stage, when within compartments (buildings or enclosed portions of buildings), are generally fuel controlled. As the fire grows, the overall temperature in the compartment increases, as does the temperature of the gas layer at the ceiling level.

- **Flashover –** Flashover is the transition between the growth and the fully developed fire stages, and is not a specific event, such as ignition. During flashover, the

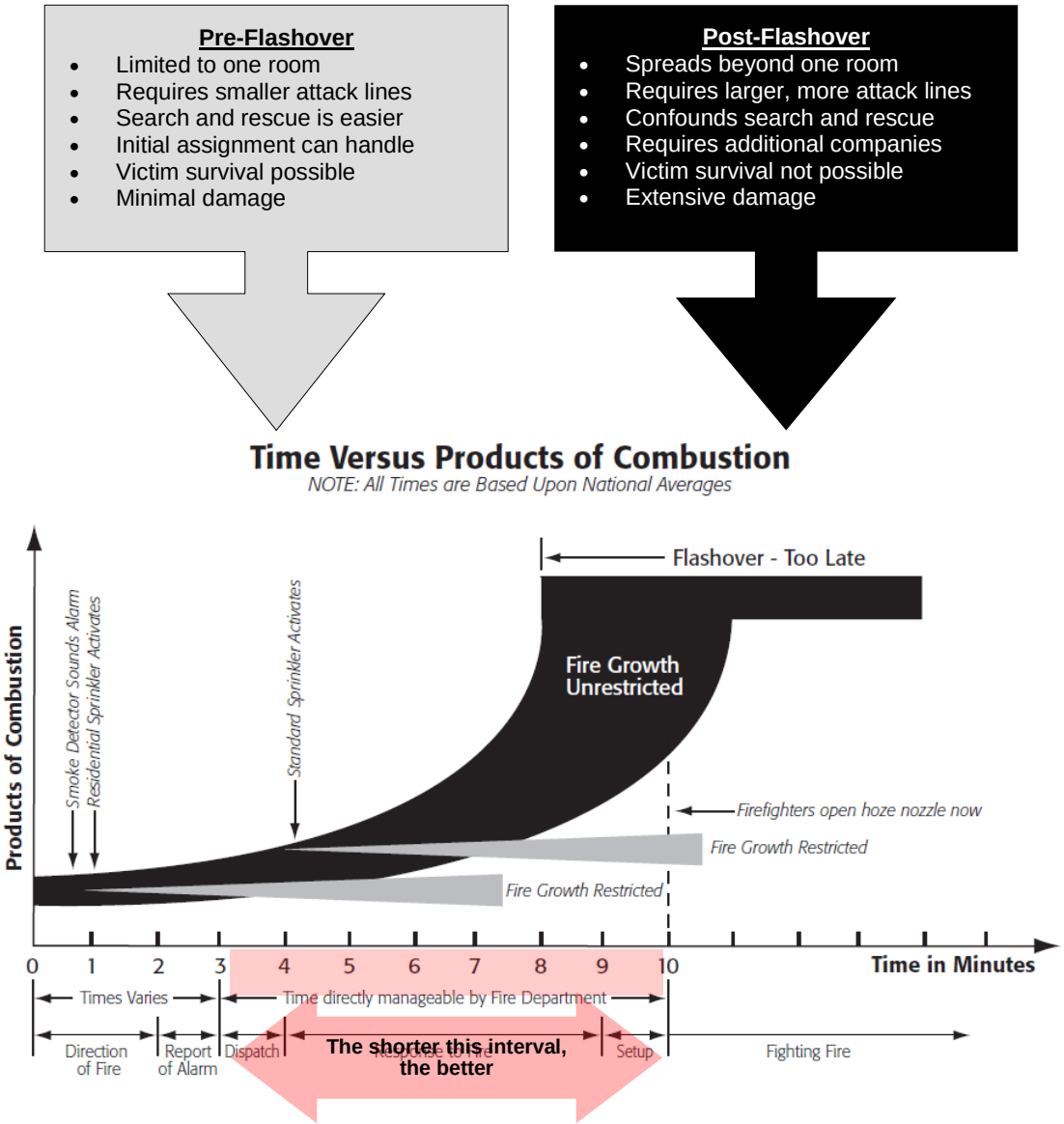
conditions in the compartment change very rapidly, and the fire changes from one that is dominated by the burning material first ignited, to one that involves all of the exposed combustible surfaces within the compartment. The hot gas layer that develops at the ceiling level during the growth stage causes radiant heating of combustible materials remote from the origin of the fire. These materials are eventually heated to their ignition temperature. At this point, flashover can suddenly occur. The smoke-filled room can burst into flames, and a rapid escalation occurs, resulting in a full-room fire involvement.

Flashover has killed many firefighters. The most dangerous phase of a fire's development is when it goes from its growth stage to the fully developed stage. Flashover signals this change.

- **Fully Developed –** The fully developed fire stage occurs when all combustible materials in a compartment are involved in fire. During this period of time, the burning fuels in the compartment are releasing the maximum amount of heat possible for the available materials, and producing large volumes of fire gasses. A fire at this stage requires significantly more resources (water, hoses, and personnel) to control, due to the massive amount of heat energy involved. Also, during this stage, hot unburned fire gasses are likely to begin flowing from the compartment of origin into adjacent spaces or compartments. These gasses ignite as they enter a space where air is more abundant, causing the fire to spread further.

To summarize, the stage of a fire affects staffing and equipment needs. Both can be predicted for different risk levels and fire stages. This ability to correlate staffing and equipment needs with a fire's stage of growth is the basis for a standard of response coverage analysis by a fire department. Nevertheless, it is unreasonable to expect a fire department to reach all fires before flashover, even in the most heavily staffed and best-equipped department.

The graphic on the next page shows the relationship of time and fire growth. Depending on the amount and combustibility of a room's contents, it will reach the flashover point anywhere from six to ten minutes after free burning starts. This is important to remember, for even if the fire is reported at the beginning of the free burning stage, it is highly likely that the room will be at flashover prior to the fire department's arrival. And it takes a fire company a few minutes to set up hoses and actually start flowing water onto the fire. By this time, the fire can be very serious.



Hazard Identification and Vulnerability Analysis

The community's expectation may be that the fire department will arrive at all fires prior to flashover. Because the fire department depends on the availability of volunteers, the reality is that some fires will reach flashover before the arrival of the fire department.

While the probability of a major urban conflagration is low, major residential and non-residential fires are possible in older buildings within older (pre-1970s) neighborhoods and the downtown business district. Fire hazards in the older buildings are high due to the construction materials which were used at the time (sawdust insulation, etc.), the original electrical wiring, and minimum spaces between buildings.

Although residential smoke alarms are provided through many programs offered by the EFD, there is still an uncertain amount of homes which will not have a working smoke alarm. The absence of a working smoke alarm in a residence is the single greatest threat to citizen health and safety.

In addition, one multi-family structure in Ephrata has been identified by the EFD as one of Ephrata's **TARGET HAZARDS** (a property designated to present a specific challenge to the fire department, or which poses a high-level life safety risk to building occupants if a significant fire event occurs). That facility is the BASIN RETIREMENT HOME. At 109 C St SW, this three story, 63 unit apartment complex is home to many elderly and disabled people, with some disabled occupants living on the top floor. Made of wood frame construction and lacking a built-in fire sprinkler system, this facility has been the site of multiple small fires over the past many years. These fires are usually caused by food left unattended on a stove or in an oven, or from combustibles left near a heat source. The building is protected by a fire alarm system monitored by a private company. However, residents have become complacent in evacuating the building due to the frequency of alarms. These two factors could contribute to a large quantity of casualties should this facility experience a significant fire incident. An **extreme** response of resources from our county as well as surrounding counties will be required to handle this type of incident. (See Annex 2 for additional information).

The US Fire Administration has documented a report on the KONA VILLAGE APARTMENT fire, a fire in a building of similar risk in Bremerton, Washington on November 13, 1997. The Kona Village fire caused the deaths of four elderly residents and forced the evacuation of an additional 150 residents. Estimated property damage was in excess of $7.5 million. The fire, determined to be accidental, spread rapidly, trapping many residents. At least 21 people had to be rescued by firefighters using ground ladders. The construction features of the non-sprinkled building contributed to the fire spread.

Mitigation

Techniques which help protect against fires include:

For homes

- Installing and maintaining residential smoke alarms
- Developing and practicing home fire escape plans
- Installing and training on the use of fire extinguishers
- Installing residential sprinkler systems
- Increasing the use of fireproofing and/or fire-resistant materials
- Ensuring compliance with codes and standards
- Using candles in a safe manner
- Deterring arson by removing combustible materials from near homes or structures

For businesses

- Ensuring compliance with codes and standards
- During new construction or utility improvements, installing fire hydrant and water supply connections near sprinkler/standpipe connections
- Installing commercial sprinkler systems
- Providing keybox (KNOX BOX®) near critical entrances for secure fire department access
- Locating hazardous materials storage, use, and handling away from other activities
- Implementing smoke control systems
- Installing and training on the use of fire extinguishers
- Maintaining access to fire hydrants
- Maintaining fire wall and fire door integrity
- Developing and maintaining comprehensive pre-incident and recovery plans
- Implementing guard and employee training
- Conducting regular evacuation and security drills
- Deterring arson by removing combustible materials from near structures
- Regularly evaluating fire protection equipment readiness/adequacy

H HIGH RISK | *Likelihood Possible with Significant Community Impact*

DOMESTIC TERRORISM

Definitions

Domestic terrorism involves acts dangerous to human life that are a violation of the criminal laws of the United States or of any State, and appear to be intended: to intimidate or coerce a civilian population; to influence the policy of a government by intimidation or coercion; or to affect the conduct of a government by mass destruction, assassination, or kidnapping; and occur primarily within the territorial jurisdiction of the United States.[15]

An Improvised Explosive Device (IED) is defined as a homemade explosive or an adapted munitions. Perpetrators can build IEDs using a variety of weapons, including vehicles, missiles or rockets, explosives, potatoes, letters, etc.[16]

Detonated Pipe Bomb

History

The potential for a domestic terrorism within the city of Ephrata was made real after the destruction seen on September 11, 2001. All locations within the United States are vulnerable to a terrorism strike.

The improvised explosive device (IED) is the contemporary terrorist's weapon of choice. IEDs can be inexpensive to produce and, because of the various detonation techniques available, may be a low risk to the perpetrator. Other advantages include their attention getting capacity and the ability to control casualties through time of detonation and placement of the device. It is also easily deniable should the action produce undesirable results.

Typically, citizens associate the terms "terrorist" and "terrorism" with persons from, or incidents related to, a foreign country. The reality is domestic terrorism occurs regularly in the U.S. The 1995 Oklahoma City bombing was perpetrated by U.S. citizen Timothy McVeigh. McVeigh's motivation was retaliation against the U.S. Government for the 1993 attack by federal agents on the Branch Davidian compound near Waco, Tex., which pushed him toward thought of violent action against the United States government. He scheduled the bombing of the Murrah Federal Building for the date of the second anniversary of the government's assault near Waco.

Although the Oklahoma City bombing is the largest domestic terrorism incident to ever occur on U.S. soil, similar actions may be employed by persons upset with local government, businesses of citizens for other perceived wrongs.

In the case of water supplies, we can look to recent history for examples of the danger of water contamination. In the spring of 1993, Milwaukee was staggered by the nation's largest outbreak of waterborne disease. Cryptosporidium, a protozoan, passed undetected through two

[15] U.S. Patriot Act of 2001, H.R. 3162, October 24, 2001
[16] National Counterterrorism Center website http://www.nctc.gov/

water treatment plants and, once it reached customers' taps, caused more than 400,000 illnesses (mostly diarrhea) and between 50 and 100 deaths out of some 800,000 customers who drank the contaminated water. Cryptosporidium often is present in mammal feces, and officials considered the possibility the contamination came from a nearby sewage plant. However, authorities never figured out the cause. But a principle was established: pathogens in water supplies can kill.

Hazard Identification and Vulnerability Analysis

Improvised Explosive Devices: As discovered in Iraq and on the Internet, various terrorist references and training manuals describe in great detail the process by which a person can convert common chemicals into explosives. In addition, these references demonstrate the ease by which explosives can be manufactured by the average person with a limited knowledge of chemistry.

The risk probability should be considered moderate due to the existence of the following:

- The Grant County Public Utility District Control Center is located in Ephrata. This facility controls the dispatch of power generated by the Wannapum and Priest Rapids dams. Over 64 percent of the electricity generated by these dams is sent to major cities up and down the western US coast. Although not the primary target, a disruption in the operations of the GCPUD control center would enable terrorists to cripple their primary targets elsewhere.
- Lessons learned indicate when traditional explosives become difficult to obtain, bomb makers turn to common chemicals as precursors to manufacture explosives. Only the imagination and the availability of certain chemicals limits the number explosives which can be manufactured with relative ease utilizing common chemicals readily available in our communities.
- Grant County has experienced an increase in the criminal manufacture and detonation of pipe bombs, which are considered IEDs. IEDs were responsible in August 2008 for two separate fatalities in Moses Lake and, in another incident, the destruction of a vehicle in Lakeview.
- Throughout Grant County, there is ready access to the key ingredients of ANFO (ammonium nitrate fertilizer and diesel fuel), the same type of bombs used in the attacks on Oklahoma City, Bali, London and the Jakarta Marriott Hotel. It would not be difficult to steal a necessary quantity of either of these commodities from an unsecured farm storage location. Other precursors and IED-making materials are easily purchased at any hardware or home improvement store.

Depending on the location, time, and presence of citizens, the result of an IED detonation will vary:

- Mass casualty/fatality incident which would require control and management by the fire department. Injuries to citizens may include blast/concussion injuries, burns, shrapnel injuries, and injuries caused from other debris such as glass from broken windows
- Property damage due to the blast
- Subsequent fires which would require control by the fire department.

Water Supply: As drinking water is essential to human life, denying it for any period could cause panic and disrupt society. Supply interruptions include the destruction of, or interference with, reservoir dams, water towers or storage facilities, pumping stations, intakes, valves, treatment plants, the distribution system, or fire hydrants, denying the population

drinking water or firefighting protection. Supply interruptions can be caused by any number of acts, including physical destruction, interruption of the supervisory control and data acquisition system, or acts that could reduce the water pressure in a system. Supply interruptions can also occur as an indirect result of contamination.

In most cases, contamination with biological or chemical agents would cause the most concern for a drinking water system. Given the size of most water supply systems, it would be difficult to effectively contaminate a water system with these agents due to the sheer volume of contaminants needed to cause harm to people. Attacks may potentially occur in three areas of a water system:

- Source water
- Treatment plant
- Distribution system

The distribution system would be the most likely point of attack because it is more readily accessible and is a direct link to consumers. Attacking a water system with the intent to cause major damage or harm to people may be somewhat difficult, but the possibility should not be taken lightly.

In June 2002, the President signed PL 107-188, THE PUBLIC HEALTH, SECURITY, AND BIOTERRORISM PREPAREDNESS AND RESPONSE ACT ("BIOTERRORISM ACT"). Title IV of the act pertains to drinking water security and safety. For a community of Ephrata's size, the bill requires community water systems serving more than 3,300 people to assess their vulnerability to terrorist attack. Systems serving 3,300 to 49,999 must complete the assessment by June 30, 2004. In addition, community water systems must prepare or revise emergency response plans that incorporate the results of the vulnerability assessment. Water systems must certify to the Administrator of the Environmental Protection Agency (EPA) within six months of the completion of the vulnerability assessment that they have completed an emergency response plan.

Introduction of a contaminant to the drinking water system may present subtly, with citizens experiencing symptoms and calling 911 for help, taxing the response capabilities of emergency crews. The full extent and cause of the illnesses may not be identified for many hours.

Mitigation strategies include:

- Reporting any suspicious person or activity to law enforcement
- Private property owners installing security measures at agricultural hazardous materials storage facilities
- Hardening product storage and handling facilities
- Installing security measures at the city water treatment plant
- Securing all remote pump facilities
- Monitoring for radiological, biological, and chemical contaminants

Citizens should always be aware of **threat indicators**. A threat indicator is an observed behavior, activity and/or items construed as terrorist planning effort or impending attack. The following are examples of activities/actions which should be reported to local law enforcement:

Suspicious Persons

- Gathering target intelligence
- Conducting surveillance
- Acquiring necessary materials
- Preparing weapons
- In vehicles at odd times
- Exiting secured locations
- Located in non-public areas
- Wearing odd clothing
- Exhibiting odd or suspicious behavior

Suspicious Vehicles

- Abandoned vehicles
- Possible mobile surveillance activity
- Unusual decals or altered signage
- Auto frame modifications (to accommodate carrying the addition weight/volume of devices)

Suspicious Actions/Objects

- Unattended packages/luggage
- Chemical fires, odors or unusual test explosions
- Illicit access to blueprints/plans
- Heavy packages mailed with excessive postage
- Questioning of personnel, especially regarding security or response measures
- Increase in anonymous phone traffic, threats
- Photographing/videotaping facilities or equipment

If a suspicious package or possible unexploded IED is discovered, law enforcement should be notified immediately. Responders and citizens should never handle suspicious packages or IEDs, and always allow Explosive Ordinance Disposal (EOD) personnel to render suspicious packages safe.

Responders should always be cognizant of the potential for secondary devices, which are intended to injure and kill emergency workers responding to an initial incident.

Conclusion

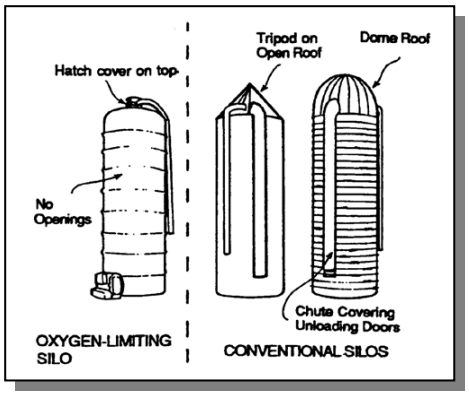
The impact to the city as a whole would be felt on many levels. The potential for destruction and the aftermath of recovery would impact economically.

The impact to the Ephrata Fire Department would also be on the larger scale. While training and considerations of such a strike continue, the ability to train for all scenarios is not practical. The EFD would conduct a response to a domestic terrorism or weapons of mass destruction (WMD) event much as any other event. The response to such an event would require the workings of the National Incident Management System (NIMS) as well as a multi-jurisdictional approach (local, State and possibly Federal) to said incident. Primary tactics would be towards treating the injured or sickened. Depending on the device used, decontamination procedures would need to be enacted.

H HIGH RISK | *Likelihood Possible with Significant Community Impact*

SILO/GRAIN ELEVATOR EXPLOSION

Definitions



Conventional silo: Most common type of silo. The most common conventional silo is one constructed of concrete staves. Staves are curved rectangular-shaped concrete blocks each weighing 70 pounds or more which are held in place by reinforcing bands made of high strength steel. Conventional silos may also be constructed of wood, poured concrete, tile blocks, or steel.

Oxygen-limiting silo: aka "controlled atmosphere" silo. While the conventional silo is constructed to minimize the free flow of air into the storage area, the oxygen-limiting silo is designed as solid construction to be nearly air-tight. They are commonly constructed of steel shells with an inner layer of glass bonded to the steel to protect it and augment the insulation properties. The outer covering may be a finish of a ceramic and enamel coating. Poured concrete and fiberglass silos also are in operation today. The primary characteristics will be no silo openings, no unloading chute, and a fill pipe extending into the top of the dome. Conversion will also be identified by the bottom-unloading configuration.

Combustible dust: Dusts which may cause a deflagration, other fires, or an explosion. There are many types, but for the purpose of this risk assessment, we are addressing grain dust.

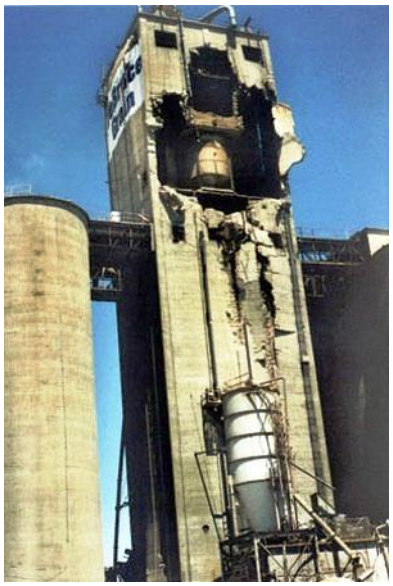
History

On September 25, 1963 an explosion ripped through the Utah-Idaho Sugar Co. factory in Moses Lake, killing seven workers and injuring seven more. Parts of the factory were reduced to rubble. The factory was built in 1953 and was the largest sugar-beet processing factory in the U.S. The explosion took place in one of six storage silos and was apparently caused by the ignition of combustible dust ("sugar dust"). [17]

- The DeBruce Grain elevator near Wichita, Kan., exploded on June 8, 1998, killing seven elevator employees and severely injuring 10. The most probable ignition source was created when a concentrator roller bearing, which had seized due to no lubrication, caused the roller to lock into a static position as the conveyor belt continued to roll over it. This "razor strap" effect on the roller raised its temperature to 500°F, well beyond the 428°F required to ignite layered grain dust which was plentiful inside the roller.[18]
- At least 12 workers were killed and more than 60 seriously injured in a catastrophic combustible dust explosion at Imperial Sugar in Savannah, Georgia, on February 7, 2008.

[17] Washington State Department of Archeology and Historic Preservation
[18] Executive Summary, Explosion of DeBruce Grain Elevator, US Department of Labor, Occupational Safety and Health Administration

- Following three catastrophic dust explosions that killed 14 workers in 2003, the Chemical Safety and Hazard Investigation Board (CSB) issued a report in November 2006 which identified 281 combustible dust incidents between 1980 and 2005 that killed 119 workers and injured 718. A quarter of the explosions occurred at food industry facilities, including sugar plants.



DeBruce Grain Elevator, Wichita, Kan., after explosion in 1998

Hazard Identification and Vulnerability Analysis

No grain elevator explosion has a singular cause. There are five components of every such explosion, often described as the Explosion Pentagon:

- **fuel** (powdered grain),
- **oxidizer** (air),
- fuel-and-oxidizer **containment** within a closed volume (elevator),
- **dispersion** of fuel-and-oxidizer mixture within the limits of explosivity, and
- **ignition.**

Odessa Union Warehouse Elevators in Ephrata

The largest risk of this type of emergency is the grain elevators located on A Street SE between Division Avenue and Nat Washington Way. These conventional elevators owned and operated by the Odessa Union Warehouse are active during the grain harvest season, the first harvest occurring in May, and the last in early October.

The risks associated with a grain dust explosion in a silo includes large pieces of debris (concrete) displaced by the explosion and falling to the ground below; structural collapse of the silo; and casualties caused by the blast and debris. Humans may become entrapped beneath debris.

Conclusion

Since the Ephrata Fire Department is not trained in Urban Search and Rescue (USAR), and there is no certified USAR team in central Washington, rescuing entrapped victims may be beyond the capabilities of local responders. Heavy equipment from local government or private contractors may be needed. The REGION 9 USAR TEAM is based in Spokane, and WASHINGTON USAR TASK FORCE 1 is based in Seattle. It is reasonable to expect a delay of up to eight hours before a USAR team could arrive in Ephrata to assist with rescue efforts in a structural collapse incident.

2.10 Moderate Risk Hazards

M MODERATE RISK | *Likelihood Probable with Minor Community Impact*

AIRCRAFT CRASH

History

Since 1984, 19 aircraft incidents in or near Ephrata have been investigated by the NTSB. The majority of these incidents involved gliders or an aircraft towing a glider. The minority were passenger aircraft and cropdusters. Most occurred at or near the Ephrata Municipal Airport. The remainder occurred off airport. No incidents involved aircraft collisions with structures, and no aircraft incidents affected persons on the ground. A total of three fatalities occurred as a result of these incidents.

Bird's eye view of
Ephrata Municipal Airport

Hazard Identification and Vulnerability Analysis

Eastern Washington has outstanding glider soaring conditions from March through September. Very consistent and predictable thermals make Ephrata a perfect take-off point for gliders.

The Ephrata Municipal Airport is east of downtown at an altitude of 1,272 feet with Beezley Hills to the west of town rising an additional 1,000 feet.

The majority of airplane accidents occur during or shortly after takeoff, or in the process of landing. A loss of power and off-airport crash by an aircraft could damage several homes in the urban or suburban housing.

Ephrata is geographically within the flight pattern of Seattle Tacoma International Airport, and is also home to Ephrata Municipal Airport. While the potential exists for an aircraft to go down, historical data indicates less than 20 local occurrences over the past 24 years, all being small aircraft or gliders. A response by the EFD to an aircraft emergency would be handled with a full response of resources, as well as a possible request for resources from neighboring agencies. The impact of such an incident would depend on the type of aircraft, incident location, damage caused, and potential for life loss. Since Ephrata is mostly a residential community, the potential for a mass casualty incident as a result of a downed aircraft is a possibility.

Listing of aircraft incidents in Ephrata area, July 1984-May 2008 (per NTSB records)

DATE	LOCATION	AIRCRAFT	CASUALTIES	CAUSE
04 May 2008	Ephrata Municipal Airport	Schempp-Hirth Nimbus-4M Glider	1 serious	CRASH The pilot's inadequate preflight inspection and his failure to connect the left aileron control rod during assembly.
26 April 2003	Ephrata Municipal Airport	Schempp-Hirth Cirrus Glider	1 minor	CRASH The pilot's failure to maintain aircraft control while on final approach for landing. Low airspeed was a factor.
25 June 2000	Ephrata Municipal Airport	Piper PA-18A-150	2 uninjured	CRASH The pilot-in-command's failure to maintain directional control during landing roll.
29 May 2000	4 nautical miles northwest of Ephrata	AS+ (RUSSIA) AS-4 Glider	1 uninjured	CRASH The pilot's improper in-flight decision by not immediately seeking a safe landing site upon encountering the sink. A factor was the high vegetation (sagebrush).
20 May 2000	Ephrata Municipal Airport	Avions Mudry et Cie CAP 231	1 uninjured	CRASH The pilot's failure to maintain aircraft control subsequent to the aircraft's canopy opening in flight. Factors include the pilot's failure confirm that the aircraft's canopy was secured prior to takeoff and impaired vision.
04 May 2000	2 miles northwest of Ephrata	Gulfstream-Schweizer G-164B	1 uninjured	CRASH Loss of engine power due to failure of the number three cylinder exhaust valve push rod. Soft terrain encountered during the landing roll-out was a factor.
03 June 1999	Ephrata Municipal Airport	Piper PA-18-150	1 fatality	CRASH & FIRE The glider pilot's failure to maintain control of his aircraft during spoiler retraction, which led to the Piper pilot's inability to recover safe flying airspeed within the altitude constraints at the time of the event. Contributing factors were the failure of the glider pilot to ensure that the spoilers were locked prior to takeoff, and the binding of the tow aircraft's tow hook release latch.
02 Aug 1998	Ephrata Municipal Airport	Schweizer SGS 2-33	1 minor	CRASH The student pilot-in-command's failure to maintain control of the aircraft during the landing. Contributing factors were panic and inadequate initial training.
13 Aug 1996	Driveway near Ephrata	Piper PA-18	1 uninjured	CRASH Failure of the pilot to maintain proper alignment with the landing area (driveway) during the landing.
09 Sept 1995	Three miles west of Ephrata	EIRIAVION OY PIK 20B Glider	1 serious	CRASH Pilot attempted a landing on a hillside and struck a fencepost. Cause was failure to maintain clearance from the fencepost. Sun glare was a factor.
28 July 1995	Ephrata Municipal Airport	GRUMMAN G-164B	1 uninjured	CRASH Pilot's inadequate compensation for winds
01 Aug 1993	Ephrata Municipal Airport	Cessna A150L and Grumman 164B	2 serious	MID-AIR COLLISION Inadequate visual lookout by both pilots.
01 Aug 1994	Ephrata Municipal Airport	Piper PA-28R-180	2 serious, 2 minor	CRASH & FIRE On takeoff, undetermined loss of power and unsuitable landing terrain
31 July 1992	Ephrata Municipal Airport	Schweizer SGU 2-22CK Glider	1 minor	CRASH On landing, glider bounced back into the air and crashed into the dirt alongside runway.
12 July 1992	South of Ephrata Municipal Airport	Berkshire Mfg. Concept 70 Glider	1 minor	CRASH Forced landing in open field. Inadequate in-flight planning/decision. Factors included insufficient thermal lift and rough uneven terrain.
20 Apr 1991	Near Ephrata	Schwartz Bushby MM-1	1 fatality	CRASH Pilot loss of control after initiating a maneuver at low altitude
22 July 1988	Ephrata Municipal Airport	Aeronca 65-LB	1 uninjured	ON GROUND COLLISION Pilot hand-propped aircraft. Aircraft then traveled on runway and collided with a parked aircraft
20 June 1988	South of Ephrata Municipal Airport	Peterson J4 Glider	1 serious	CRASH Inadequate altitude to reach airport. Forced landing short of runway.
12 July 1984	Near Ephrata	Schempp-Hirth VENTUS A Glider	1 fatal, 1 uninjured	IN AIR COLLISION Glider attempted to join a group of other gliders and collided.

M	MODERATE RISK | *Likelihood Highly Probable with Minor Community Impact*
	EMERGENCY MEDICAL SERVICES

Definition

Emergency medical service means "medical treatment and care which may be rendered at the scene of any medical emergency or while transporting any patient in an ambulance to an appropriate medical facility, including ambulance transportation between medical facilities."[19]

History

Up until 2005, Ephrata was protected by the Ephrata Ambulance Service, with four ambulances stationed in Ephrata for immediate response.

In 2005, the Ephrata City Council voted unanimously to abolish the Ephrata Ambulance Service after severe budget shortfalls negatively impacted the EAS's ability to continue operation. EAS assets and vehicles were declared surplus and sold. Twelve career firefighters who staffed those EAS units were terminated.

EFD volunteers and GCFD 5 ambulance crew members treat the victim of a motorcycle crash

Since then, the Ephrata Fire Department has maintained a basic life support rescue unit staffed by volunteers which can respond to assist at emergency medical calls. The rescue unit is not licensed by the State of Washington to transport customers to the hospital. Ambulance transportation and advanced cardiac life support-level care is provided by contract with Grant County Fire District 5.

At present, the GCFD 5 ambulance station (Station 14) is located within Ephrata, but the lone staffed ambulance assigned to Station 14 is regularly not available. The next closest GCFD 5 ambulance responds from Moses Lake, delaying by up to 20 minutes the advanced treatment of heart attack victims or other severely ill or injured customers, and delaying transportation to a hospital.

Hazard Identification and Vulnerability Analysis

Calls for Emergency Medical Services (EMS) continue to be the dominant service request type within the city. Medical responses continue to account for nearly 60 percent of all annual emergency responses managed by the EFD.

The Ephrata Fire Department responds to all critical medical emergency calls, and also responds to the non-urgent medical calls in advance of GCFD 5 to provide initial care while the GCFD 5 ambulance is enroute from Moses Lake. EFD personnel are limited to providing basic

[19] Chapter 18.73.030, Revised Code of Washington

life support care on the scene, and, since the city does not hold an ambulance transport license from the State, EFD cannot transport patients to the hospital.

The ability to adequately care for more than one critically ill or injured customer is also of great concern. Since only one ambulance is assigned to Ephrata, an incident with greater than two seriously ill or injured patients would typically overwhelm the capabilities of a two-person GCFD 5 ambulance crew, as well as the EFD volunteers. Travel time for additional resources to respond from Moses Lake or Quincy (15-20 minutes) would extend the time until the highest level of care could be provided, as well as delay transportation to a hospital.

Conclusion

With over 16 percent of Ephrata's population greater than age 65; 1,358 persons (22.3%) classified as disabled; and 839 (12.9%) of the citizens living below poverty level[20], it is reasonable to forecast the need for pre-hospital emergency medical care and ambulance transportation services will continue to be in high demand.

[20] 2000 US Census

2.11 Response Assignments

These response assignments reflect the deployment to incidents within the city limits of Ephrata.

- **Structural Fire:** First alarm fire assignment is variable and includes resources from the Ephrata Fire Department and Grant County Fire District 13. Optimally, this assignment would include three engines, one ladder truck, one rescue, one command officer, and one incident safety unit, for a minimum of 17 volunteers. *However, this quantity of staffing is not reliable and affected by the availability of the volunteer firefighters.*
- **Emergency Medical:** One rescue unit with a minimum of three volunteers, and a FD5 ambulance, and may include a command officer based upon the severity of the call. *This quantity of staffing is not reliable and affected by the availability of the volunteer firefighters.*
- **Vehicle/machinery rescue:** One rescue unit, one engine, one command officer, and a FD5 ambulance for a total of nine volunteers. *This quantity of staffing is not reliable and affected by the availability of the volunteer firefighters.*
- **Hazardous Materials:** two engines, one rescue, one command officer, with a total of at least 10 volunteers. *This quantity of staffing is not reliable and affected by the availability of the volunteer firefighters.*

These assignments may change with information based on the incident. EMS responses are based on critical care guidelines, which are published in the EMD guidelines.

2.12 Reliability of Other Resources

The Ephrata Fire Department participates in a multi-agency, joint-response mutual and automatic aid agreement. Regularly, units other than those from Ephrata Fire are included in the initial response assignment. The inclusion of additional units is handled automatically and recommended by the Computer Aided Dispatching (CAD) program.

To maintain an adequate level of team effectiveness the EFD regularly participates in joint training with these outside units.

Obviously, Ephrata is not in direct control of these units; we are not able to neither determine nor control individual skill levels or training. However, the Ephrata Fire Department is familiar with their capabilities and limitations, and through the use of the Incident Command System, can utilize these resources appropriately without compromising the safety of responders. Units included in the current joint-response agreement generally meet our own units' capabilities to perform similar basic tasks.

Factors which affect reliability:

1. The mutual aid agencies immediately surrounding Ephrata are either exclusively volunteer or combination/majority volunteer with minimum career staff. Therefore, the quantity of staffing is not reliable and affected by the availability of the volunteer firefighters.
2. Since Grant County Fire District 5 staffs only three ambulance to provide services to Ephrata, Warden and their own district, the capability of providing a sufficient and timely quantity of ambulances able to handle two or more critical patients, or a variety of critical and non-critical patients in any one location, is not reliable.

Agencies in Grant County, our region and Washington State operate under the Incident Command System as required by the National Incident Management System (NIMS). The *Grant County Incident Management Guideline* manual serves as the basis of operations for all

disciplines and is designed to function for all hazards. This system places all responders on the same operational plan and under the same functional system.

Locally, all of our response partners utilize similar incident management systems and most are NIMS compliant. Agencies within Grant County utilize shared radio frequencies (150 MHz) and most utilize personal accountability systems (Passport®). Routine training operations take place to continually evaluate the interoperability of these responders.

"The most beautiful sound in the world is that of a fire siren
coming your way when your house is on fire,"
an Ephrata citizen once shakily remarked
a few minutes after fast action by local firemen
had saved him from a serious loss.

Wenatchee Daily World, May 2, 1955

Section 3 Standard of Coverage

In order to perform a complete assessment of a community's ability to respond to specific emergencies that community must establish standards for itself. These standards must be made based on an educated understanding of the risk faced both from the source and from the community.

In order for a community's emergency resources to make a positive impact on the event they must arrive in time to affect change. Calls for assistance must be processed and dispatched quickly. In this section we will assess and establish a total response time measurement for the service taking into consideration the factors involved in creating effective change in both structural fires and life threatening emergency medical calls.

3.1 Total Response Time Measurement

The concept of a response time continuum has evolved from the standards set by the National Fire Protection Association (NFPA) and the Commission on Fire Accreditation International. This theory of a total time assessment and standard was foreign to the fire service prior to the mid 1980s.

Currently, the response time standards for EFD has not been evaluated or analyzed. As a part of improving future SOCs, EFD must work to determine acceptable levels of service based on the NFPA fire curve models, ALS/BLS criteria, and other related factors of response.

Given these response objectives, how does a community evaluate and measure the Fire Department's progress or efficiency? The elected officials annually adopt a fiscal budget which helps to dictate the city's standard of coverage. The community, in essence, buys a level of protection for itself. The purpose of defining the factors that determine the standards of coverage allows the community to be informed about the decisions they make for the provision of emergency services.

Before making a decision or establishing a standard of coverage, the following information needs to be examined:

- **Detection of an Emergency:** Detection is the time it takes for someone to discover that an emergency exists. The Ephrata Fire Department enhances the detection of alarms through the use and requirements of automatic notification. As of this date, all buildings required to have fire alarm systems in the city meet or exceed current fire codes. In addition, over the past decade the community has experienced a decrease in the reporting time on most alarms do to the proliferation of cellular phones. Previously, detecting and reporting of an emergency may have been delayed because of a lack of communications options. The impact of personal phones/communications can be compared to the initiation of the 9-1-1 calling number decades ago. These issues have served to significantly decrease the time of emergency notification within the City of Ephrata.

- **Call Processing Time** is a component of the dispatch system. Computer Aided Dispatch (CAD) is utilized by the Multi Agency Communications Center in Moses Lake, the entity responsible for receiving and dispatching 911 calls for the City of Ephrata. Utilizing a system known as "Fire Priority Dispatching" and "Medical Priority Dispatching", 911 dispatchers use a set of pre-printed diagrams with a series of yes or no questions that will direct them to the next step of the questioning process depending on the answers that the caller is giving them. The dispatcher is directed to either proceed with the *Key Questions* or, in acute emergency situations, to dispatch help immediately. For instance, if a dispatcher receives information that the patient is unconscious and not breathing (for any reason), before continuing with any further interrogation or instructions, the dispatcher immediately sends a maximal response. Questioning sequences have been designed to assist first responders and to gather the initial picture of what is occurring at the incident site. Key Questions automatically determines the appropriate dispatch determinant code, classified as ALPHA, BRAVO, CHARLIE, DELTA, and ECHO. Generally speaking, ALPHA represents the least severe of an emergency (such as a cut to the finger) and may only require a limited response. ECHO represents a high-level emergency (such as a person not breathing) and usually requires the maximum response.

  The Call Processing Time is not within EFD's control. However, on critical incidents, MACC strives to process calls in less than 180 seconds.

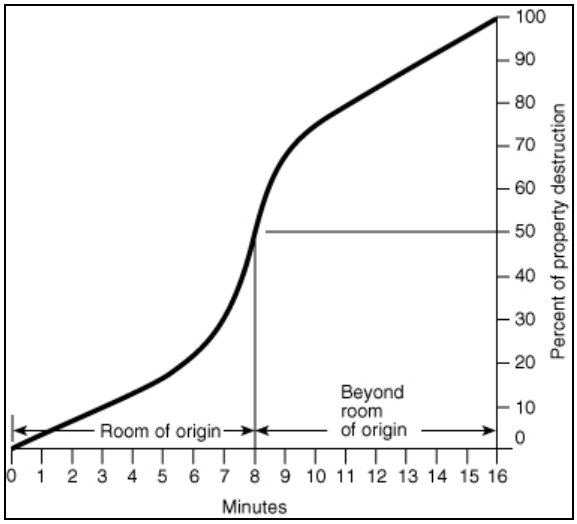
- **Turnout Time** is measured from the time of first alerting by MACC until the time the vehicles leave the station. [This includes the time volunteers need to travel to the station and until a sufficient quantity of firefighters has assembled, donned their personal protective equipment, and boarded the apparatus].

- **Travel Time:** Travel time is the time it takes for dispatched response units to arrive on-scene at the emergency. Ephrata Fire Station #21 is within a driving distance of less than two miles to any emergency within the city limits.

- **Total Reflex Time:** The EFD defines the Total Reflex Time to be that time which totally encompasses the response event, from the time the call for services is initially received to the time dispatched units arrive on location. The Fire Department receives response time data from the MACC which should be utilized for the purpose of determining Total Reflex Time standard compliance. For the purposes of the SOC, this number is considered the Total Reflex Time versus that time used to monitor loss stopped or patient contact in the case of an EMS alarm.

3.2 The Science of Fire and the need for Rapid Response to Affect Positive Change

According to the NFPA, the leading cause of fires in homes and garages is cooking equipment, followed by heating equipment. Smoking materials is the leading cause of civilian fire deaths, accounting for nearly 25 percent. Most smoking-related deaths occur with the ignition of upholstered furniture, mattresses, or bedding. Cooking equipment is the leading cause of home fires and home fire injuries. Unattended cooking is the principal behavior factor. Heating equipment is the second leading cause of home fire incidents, most involving portable or space heaters. Nearly half of all people arrested for arson are juveniles. Child fire play, typically with matches or lighters accounts for one of every ten fire deaths, and accounts for the leading cause of preschooler fire deaths." [21]



Time Temperature Curve
Source: NFPA 1710, Annex A.5.2.1.2.1

A fire within a structure has been classified into three defined growth stages. The first is the incipient phase and occurs from ignition to open flame. The second phase of fire is the free burning stage and is characterized by rapid growth and heat production. During this phase of fire growth the fire can reach the point of flashover.

Flashover is the point when the fire dramatically grows from burning the initial contents to all of the contents in the space. The final phase of the fire growth is the smoldering phase, which occurs when the available oxygen is consumed by the fire. At this stage, a rapid introduction of oxygen into the room can lead to a back draft.[22] Flashover is likely to occur if the temperature of the upper gas layer in an enclosure reaches approximately 1,100 degrees Fahrenheit.

It has long been known that the real killer in structure fires is smoke, not the flame or heat. Smoke contains many toxic gases released as by products of the combustion process. Carbon monoxide is one of these gases. Test fires in furnished residential structures have demonstrated the production of carbon monoxide in measurable amounts after three and one half minutes from the ignition of the fire.

The time-temperature curve standard is based on data from the NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) and the INSURANCE SERVICES OFFICE (ISO), which have established that a typical point source of ignition in a residential house will flash over at some time between 3 and 30 minutes after ignition, turning a typical room and contents fire into a structural fire of some magnitude.

The utility of the time-temperature curve is limited by a number of factors.

[21] Arthur E. Cote, PE, "Section 1, "Fire Protection Handbook, Eighteenth Edition, (Quincy, MA: NFPA, 1997 1-3.)
[22] Arthur E. Cote, PE, "Section 1, "Fire Protection Handbook, Eighteenth Edition, (Quincy, MA: NFPA, 1997 1-3.)

1. It does not account for the time required for the existence of a fire to be discovered and reported to the fire department via the 9-1-1 system.
2. The time from ignition to flashover varies widely (3-30 minutes depending on building characteristics); thus it can not provide a valid basis for the allocation of resources.
3. The curve is constantly shifting, given the numerous changes in building construction, built-in suppression systems, the increase use of fire-resistive materials for furniture and other items typically found in the interior of occupied buildings.

The City of Ephrata is comprised of approximately 10 square miles. The Ephrata Fire Department provides service to the city as well as mutual aid assistance to neighboring areas of rural Grant County.

During the last five years (2000-2004) the City of Ephrata averaged 4 working structure fires annually. The total dollar loss of these fires has been estimated at $1-million. Due to the only recent implementation of data collection software, complete data for 2000-2004 is only partially available. However, the average dollar loss per fire event during the five-year period is estimated to be $15,000.

The NFPA identifies the national structure fire loss average as $13,700 per structure fire.[23] The City of Ephrata has averaged $15,000 during the five-year time-period which is just slightly greater than the NFPA national average. This fact demonstrates the impact of our training and structural firefighting capabilities. Our crews train and operate with precision to aggressively advance into active fire areas and control the loss of property. This trend also is a direct reflection on our current fire inspection and prevention efforts.

The relationship of fire loss to the number of fires is deceiving. Typically one to two structure fires account for 90–95 percent of the City of Ephrata's annual fire loss. The majority of structure fires in the City of Ephrata occur in single-family residential structures, followed by the multifamily residential structures, and then commercial structures.

The number of structure fires and the dollar loss associated from those fires are only a part of the impact from fire. Loss of life has a much greater impact. Each year since 2002, the Ephrata Fire Department has received the Life Safety Achievement Award from the Residential Fire Safety Institute. This award is presented to those communities who have, through their efforts, experienced no fire related fatalities. According to the NFPA, 3,900 civilians died in the United States in all types fires in 2004. Of these, 3,300 individuals died in residential dwelling fires. Nationwide, there was a fire death every 130 minutes. The NFPA identifies the obvious: the best way to survive a fire is to prevent it from starting in the first place. The NFPA said, "Early detection and alarm are vital in keeping small fires from becoming big fires, as well as reducing the risk of dying in home fires." The NFPA continues by stating, "Sprinkler systems could easily have controlled most of the catastrophic fires in the incipient stage."[24]

As an urban area with nearly 1,500 single family/residential units and a few million square feet of commercial property, the city experiences a low structure fire loss. What has worked in Ephrata has been a balanced approach to fire protection through public education and early detection. With the proven advantage of fire sprinklers, it has been proven that this technology can have a positive impact on the number of fire deaths and injuries in this country.

[23] Michael J. Karter, Jr.,"1996 US Fire Loss, Annual Report," NFPA Journal 91/5 (September/October 1997): 76-83
[24] Kenneth J. Tremblay, "1996 Catastrophic Fire." NFPA Journal 91/5 (September/October 1997): 46-56.

3.3 Fire Prevention's Effect on Fire in Ephrata

Two factors appear to be credited with the reduced fire losses in Ephrata:

1. The City of Ephrata enforces the International Fire Code (IFC) for all structures within its corporate limits.
2. Fire and life safety education provided to the public by the EFD has played a significant role. Since instituting an aggressive public education program in 2001, the city has experienced a significant reduction in structural fires, fire related injuries and the losses due to those fires. There have been no fire-related fatalities in Ephrata since 1999.
3. Fires caused by juveniles have also experienced a decline since the FIRESTOPPERS juvenile firesetter intervention program was established in 2007. (EFD conducted ten interventions in 2007 and eight interventions in 2008).

This combination of technology, enforcement, and education has served the fire prevention effort in Ephrata extremely well. The citizenry have responded by creating safer environments at home and work which has continued to reduce the loss from fire.

3.4 The Human Factor and Medical Response Time

Emergency Medical Service-related incidents have benchmarks in time in which critically ill or injured patients need to be stabilized and enroute to a medical facility. A key component must be in place for this stabilization to take place. Spontaneous circulation can cease in almost every type of medical emergency whether it is an injury or illness related problem. Physiologically, brain death begins four (4) to six (6) minutes after the cessation of circulation. After ten (10) minutes, based on research, the survivability outcome of a patient who suffers from the loss of spontaneous circulation is considered unlikely.

Relation of Survival Rates from Cardiac Arrest to Promptness of Cardiopulmonary Resuscitation and Advanced Cardiac Life Support

Time to CPR (minutes)	Time to ACLS (minutes)	Survival Rate %
0-4	0-8	43
0-4	16+	10
8-12	8-16	6
8-12	16+	0
12+	12+	0

Source: American Heart Association

There are other time-sensitive medical incidents such as trauma, acute myocardial infarction, and stroke that require treatment at a medical facility as rapidly as possible.

The following are significant emergency medical services that have an impact on the quality of life in our community:

Victim of a car crash requiring extrication.
Courtesy Grant County Journal

- Aggressive cardiopulmonary resuscitation (CPR) training in the community and local businesses. This longstanding endeavor the EFD provides many CPR-trained individuals throughout the community, neighbors, etc.
- Automatic External Defibrillators (AEDs) on two EFD apparatus with Basic Life Support equipment and personnel improves treatment initiation times.
- Use of AED technology by the Ephrata Fire Department shortens the time even

further for cardiac arrest patients receiving advanced treatment before arrival of a GCFD 5 ambulance.

3.5 Critical Task Capabilities

In order to affect positive change, EFD personnel must be properly assigned, resources must be properly placed and equipped, and each individual must be assigned a critical task to complete. Consequently, those individuals must arrive within a time frame which allows them a chance to use their skills to stop the loss or convert a potentially fatal medical condition.

Not only is it necessary to assess and establish the task assignments for fire and EMS responses for the EFD, critical task assignments are also necessary for non-fire risks. This section will establish critical task assignments for fire, non-fire and EMS responses and duties.

Emergency Medical Services Critical Tasking & Effective Response Force

The standard EFD response for the majority of EMS calls, including Motor Vehicle FCrashes (MVC) without entrapment, is one rescue unit, thus providing at least three people on the scene with at least one of them being an EMT-BASIC. This is in addition to the ambulance contracted from Grant County Fire District 5, which is staffed with one EMT-BASIC and one EMT-PARAMEDIC. The tasking involved with this response includes diagnosis and treatment of the patient, information collection, and patient transport to a medical facility.

Critical Task	Qty	Fulfilled by
Patient Treatment	3 2	EFD Rescue FD 5 Ambulance
EFFECTIVE RESPONSE FORCE	**5**	

Since critical patients require the manpower beyond a routine medical incident, additional call types such as attempted suicides, cardiac or respiratory arrests, drowning, shootings/ stabbings/assaults, and traumatic injuries (non-MVC) add the Duty Officer and a Chaplain or additional officer to the response for support purposes, with the minimum desired number of on-scene personnel totaling seven, aka MINIMUM EMERGENCY DEPLOYMENT OF 7 (MED 7) RESPONSE. Additional resources are requested based on reported hazards or number of patients.

Critical Task	Qty	Fulfilled by
Incident Command	1	EFD Duty Officer
Patient Treatment	3 2	EFD Rescue FD 5 Ambulance
Customer/Family Support	1	EFD Chaplain or Other Officer
EFFECTIVE RESPONSE FORCE	**7**	

While MVCs without entrapment receive the standard response, MVCs with entrapment or rollover get a minimum of 9 (nine) personnel. Additional resources are requested based on reported hazards or number of patients.

Critical Task	Qty	Fulfilled by
Incident Command	1	EFD Duty Officer
Safety	1	EFD Safety Officer
Extrication/Patient Treatment	3 2	EFD Rescue FD 5 Ambulance
Hazard Suppression	3	EFD Engine Company
EFFECTIVE RESPONSE FORCE	**9**	

Considering the high percentage of total emergency responses is EMS related, the consideration of the EMS risk potential within the city is significant. While locations and call types are varied, the EMS demand on the EFD continues to be the highest.

Structural Fire Fighting Critical Tasking & Effective Response Force

Effective Response Force: An Effective Response Force is defined as the minimum amount of staffing and equipment that must reach a specific emergency zone location within a maximum prescribed travel or driving time. An effective response force should be able to handle fires that are reported shortly after they start and are within the maximum prescribed travel time for the full assignment of fire companies according to the risk level of the structure. In any staffing and response study, the staffing, equipment and travel times that accompany each of the risk categories should be based upon that premise.

Considering that the fire department cannot hold fire risk to zero, this study's objective should be to find a balance between distribution, concentration and reliability that will keep fire risk at a reasonable level, and at the same time yield the maximum savings of life and property at the least cost.

Thus, the next step in the planning process is to understand what crews are capable of and to deploy them in time to become an effective response force to mitigate the emergency. For firefighting the standard convention is to measure the "fire flow" (gallons per minute from firefighting streams calculated from building fire loads) potential of a building and from that calculate the number of hose lines, apparatus and personnel necessary to mitigate a major fire in that building.

The variables of fire growth dynamics and property and life risk combine to determine the fire ground tasks that must be accomplished to mitigate loss. These tasks are interrelated but can be separated into two basic types, fire flow and life safety. Fire flow tasks are those related to getting water on the fire. Life safety tasks are those related to finding trapped victims and safely removing them from the building.

Fire flow tasks can be accomplished with hand held hoses or master streams (i.e., nozzles usually attached to the engine or ladder). Master streams take relatively fewer firefighters to operate because they are most often fixed to the apparatus.

The decision to use hand lines or master streams depends upon the stage of the fire, water supply, personnel available, and the threat to life safety. If the fire is in a *pre-flashover* stage, firefighters can make an offensive fire attack into the building by using hand lines to attack the fire and shield trapped victims until they can be removed from the building. If the fire is in its *post-flashover* stage and has extended beyond the capacity or mobility of hand held hoses, or if structural damage is a threat to firefighters' safety, the structure is declared lost and master streams are deployed to extinguish a fire and to keep it from advancing to surrounding exposures.

First arriving firefighters may use a transitional *"defensive to offensive"* strategy (discussed below) to limit or remove an IDLH (immediate danger to life or health) threat while awaiting the arrival of additional resources.

Life safety tasks are based upon the number of occupants, their location, their status (e.g. awake versus sleeping), and their ability to take self-preserving action. For example, ambulatory adults need less assistance than non-ambulatory adults require. The elderly and small children always require more assistance. Before on-scene procedures can be established, the initial Incident Commander (IC) must select an appropriate initial strategy: offensive, defensive, or transitional.

Offensive Strategy	An offensive strategy is an aggressive interior fire attack. The top priority is rescue of trapped victims. Because the EFD desires to limit the number of fires that spread beyond the room of origin and to limit fire related deaths and injuries, the aggressive offensive attack is utilized wherever possible given safety and other relevant concerns. ➡ Time sensitive ➡ Most effective when fire is limited to room and contents ➡ Most effective for limiting loss and saving the lives of trapped victims
Transitional Strategy	A transitional strategy is utilized in the face of changing resource levels or changing fire conditions. A transitional (defensive to offensive) attack may be utilized while awaiting the arrival of sufficient resources to safely mount an offensive attack, to temporarily reduce the IMMEDIATELY DANGEROUS TO LIFE AND HEALTH (IDLH) conditions, or until a large fire can be "knocked down" sufficiently to permit interior attack. Conversely, a transitional offensive to defensive strategy may be employed when fire progress renders a building unsafe for continued interior operations. ➡ May occur pre- or post-flashover ➡ Moderate property loss is experienced ➡ Rescue and survival of trapped victims is much less likely
Defensive Strategy	A defensive strategy is one that allows for no interior fire attack except as may be necessary to rescue trapped firefighters. No attempts are made to rescue civilian victims because in circumstances where defensive tactics are warranted, victims are presumed to be beyond rescue. Nearly all firefighting is performed from outside the structure with the goal of containing the fire to the initial structure involved. ➡ Post-flashover, free burning (the building itself is burning, not just the contents) ➡ Substantial to complete property loss will be experienced ➡ Victim rescue is not attempted, and trapped victims do not survive

The EFD responds to structure fires with one Engine, one Ladder Truck, and one Duty Officer. In addition, at least one Fire District 13 engine is dispatched on the first alarm. Large structure fires can present a much greater workload than the identified initial level of response. The assigned Incident Commander may, at their discretion, call for any additional units needed to bring more personnel and resources to the scene.

The response assignments are loaded into the computer-aided dispatch (CAD) system, which is designed to deliver a response recommendation for each emergency based upon the information entered. A particular call type demands a particular assignment of resources.

Operations at emergency scenes are accomplished systematically. The success of each response is gauged on the resolution of the emergency and the safe return of each firefighter to

ready status. Tasks are assigned to both individuals and crews and are based on the knowledge, skills, abilities, and resources of that particular unit.

EFD staff, using risk assessment, existing staffing, apparatus capacities and mutual aid agreements, have concluded the following table represents what the time and performance expectations are in this community. In addition, some functions are mandated by state or federal law, as well as accepted national industry standards and must be fulfilled:

Task List *Typical Structure Fire in a Single Family Dwelling*	
Incident Commander	1. Establish Incident Command [WAC 296-305, NIMS, NFPA] 2. Coordinate initial operations 3. Request additional resources 4. Assign Safety Officer/Sector [NFPA/OSHA] 5. Secure utilities 6. Develop the Incident Action Plan 7. Deploy resources
First Due Engine Company	1. Primary search for victims, Initial fire attack 2. Provide for 2 in - 2 out crew for interior attack [OSHA] 3. Stretch 200' of 1¾" preconnect hoseline to point of access 4. Operate the pump to supply water and hook up a 5" hose hydrant supply line
Second Due Engine Company	1. If necessary, lay in a hydrant supply line to the first engine company 2. Provide a Rapid Intervention Team (RIT) [OSHA] 3. Assist first engine company with their Task #2, fire attack and primary search 4. Stretch a second 200' preconnect hoseline for safety functions and exposures
Third Due Ladder Truck Company	1. Assist second engine company with RIT/back-up task 2. Assist with primary search and fire attack 3. Using appropriate tools, provide vertical or positive pressure ventilation
Fourth Due Engine Company	1. If necessary, stretch additional line 2. Assist with search and rescue or vertical or positive ventilation 3. Assist with establishing Rehab Sector [WAC 296-305 & 296-62-095, NFPA 1581]

Assigning personnel to each of these tasks allows the EFD to deploy the proper amount of personnel within a period of time to effect change. With the assigned personnel to structural fires the EFD offers the following guideline to assign these personnel by these critical tasks.

Critical Task	Firefighters
Attack Hose Line	2
Back-Up Hose Line	2
Water Supply Support	2
Search and Rescue / Inside Truck Company Operations	2
Ventilation / Outside Truck Company Operations	2
RIT Team	2
Pump Operator	1
Firefighter Rehabilitation / Patient / Customer Care	2
Safety Officer	1
Incident Commander	1
EFFECTIVE RESPONSE FORCE	**17**

This level of resources can set up the equipment and simultaneously handle the tasks of fire attack, search & rescue, ventilation, backup lines, pump operation, water supply and command, all within a few minutes at a moderate risk fire. If fewer firefighters and equipment are available or if they have longer travel distances to cover, then the EFD will not be successful with the mission of saving life and property.

Non-Fire Critical Tasking & Effective Response Force

Critical tasking for non-fire risks are much like those related to fire risks. Because the same resources are used to respond to many of the non-fire risks, the response and the apparatus and personnel are the same. The EMS risk is certainly a perfect example of this response.

The EFD also does an excellent job monitoring the other non-fire risks that occur throughout the community. For example, each special event activity is scheduled through the city and is passed to the fire department for approval where decisions are made to provide special detailed personnel. Staffing for these special events is based not only on the amount of people expected to participate.

In addition, the EFD is responsible for emergency management operations for the entire city. This allows the EFD to monitor and implement the concepts related to NIMS and the National Response Framework.

3.6 Service Level Objectives

A community expects a certain level of service from their emergency service organizations. A responsible agency will first examine the level of risk in the community then they will determine what services can be provided in the areas of fire, EMS, and special non-fire risk responses and at what level of quality these services are expected to be maintained with the existing level of support. A standard of coverage policy is the final statement and the foundation of this service. A community accepts a standard of coverage and then works along with their professional staff to maintain that level of service.

The standard of coverage is based on several very basic principles. Once the service commitment is determined by policy, the resources must be distributed in a way that maximizes the efficiency of each unit. The distribution of resources includes both equipment and personnel. In the fire service distribution of resources has been very traditional. Units are normally placed in fixed locations (fire stations). These facilities are usually determined on community acceptance more often than need. Once “fixed”, these locations are hard to move when a community expands and develops. Thus, the fire service professionals must continuously monitor and focus on the efficient distribution of all its resources, both equipment and personnel.

Because most of the resources are delivered from fixed locations, the concentration of resources is equally important to maintaining a community standard of coverage. An agency must deploy resources in a manner which provides depth and redundancy normally referred to as *concentration*. This additional depth and concentration of resources allows a community to manage busy periods of service, or areas of increased activity, when needed.

3.7 Distribution Criteria

Distribution of response resources defines the specific geographical location for each resource. These estimates are based upon what is considered first due or closest resources under normal response situations. This allows emergency response personnel to arrive in the pre-flashover phase of a fire and to affect positive change in emergency medical calls for service.

Fire station location is driven by a number of factors the least of which is delivery of quality service. Stations are usually located where they are most tolerated by the residents and

where the city owns land. It takes extraordinary requirements for an agency to locate a service facility exactly where it is needed. In the case of Ephrata, the city currently operates one response facility (Station 21) from which both municipal fire and emergency medical services are delivered. Station 21 is primarily centrally located to provide a comparable *Travel Time* to the peripheral areas of the City.

3.8 Standard of Coverage Goals

Based on the assessed risk the City of Ephrata has adopted a community standard for the delivery of fire and EMS services. These services are based on many factors and have served to develop what is considered as an acceptable level of risk.

As a result of this review of our procedures, levels of risk, deployment criteria and critical tasking, the recommended community–based Total Reflex Time response goal for the City of Ephrata Fire Department are:

Ephrata Fire Department Response Goals	
Emergency Medical Services	For all CHARLIE, DELTA, or ECHO-level [critical conditions] EMS alarms within the city limits, EFD's goal is for the first EFD unit to arrive within 6 minutes 30 seconds total reflex time, 85 percent of the time.
Fires	For all CHARLIE, DELTA, or ECHO-level [critical conditions] alarms of fire within the city limits, EFD's goal is for the first-due fire unit to arrive within 8 minutes 45 seconds total reflex time, 85 percent of the time. In the case of assignments where multiple units are responding to an emergency, EFD's goal is for the balance of the structural fire assignment to arrive within 12 minutes total reflex time, 90 percent of the time.

3.9 Staffing Levels and the Impact on Standards of Response Coverage

EFD guidelines determine the staffing level of each particular type of response unit. It is the intent of this guideline to place a workforce in the field able to accomplish the goals and objectives of the organization on scene of an emergency, stopping loss or damage, and beginning corrective measures or therapy within the times indicated in the policy.

Staffing levels are driven by the need to place an adequate number of trained personnel on the scene within the standard time limit. Ultimately, those fiscal resources made available by the elected officials drive the EFD's ability to staff positions. Risk Management is used to analyze the city's problems using real world factors. These risk factors are derived from previous response history coupled with future trends, which are based upon those issues facing the community.

Although minimum staffing levels are established, the quantity of staffing is not reliable and is affected by the availability of the volunteer firefighters.

3.10 Evaluation of Reliability of Fire Companies

A goal of the Ephrata Fire Department remains to maintain or otherwise reduce the community's risk from peril to the lowest possible level. This is achieved by balancing the distribution, concentration, and reliability of our resources, both personnel and apparatus. In order to accomplish this goal, an understanding as to what duties and assignments emergency response crews are responsible for and how they should be deployed was developed.

For firefighting, the standard factor is to measure the fire flow potential of a specific building and from that figure, the number of hose lines, apparatus, and personnel necessary to mitigate a fire within the building. For Emergency Medical Services, the standard factor is to provide the medical care before permanent brain death begins (4-6 minutes after circulation ceases).

In this section we will discuss the availability of resources, both apparatus and personnel available to respond when needed to incidents within the EFD's jurisdiction. Discussed in this section will be drawdown, exhaustion and the historical performance of those resources.

3.11 Exhaustion of Resources

In the event that the initial emergency response proves to be inadequate, Ephrata has the capability to request additional resources as part of a countywide Interlocal Mutual Aid Response Agreement. These additional units are available upon a request through the normal communications channels.

With the existing systems in place, it is possible to deplete all of the available Grant County fire resources to respond in a timely manner to an incident within the City of Ephrata. Requests for additional resources from other counties would be made, and a mobilization would respond to assist. This mobilization could take several hours to arrive at the scene.

3.12 Policy Discussion

A review of the EFD's status shows two key facts:

1. The response capabilities of the department are completely dependent on volunteers. The availability of volunteers is extremely reduced during weekday business hours. Many volunteers are either employed outside of Ephrata, or are unable to leave their place of employment during work hours. This poses an extreme risk of inadequate staffing for emergency response. Critical task analysis shows that for the average single-family dwelling fire, a minimum of four fire companies is recommended in order to achieve an effective response force[25]. At present, we may be able to staff one during weekday business hours.

   The City does maintain mutual aid agreements with Fire Districts 7 and 13. However, the City cannot rely on these resources to always be available. FD 13 is all-volunteer, and FD 7 has a single career chief, so they, too, are completely dependent on volunteers to provide an adequate basic response. Both agencies experience the same daytime staffing shortages which EFD does.

2. The Fire Department has averaged 394 calls per year since 2005. The EFD's Command Staff is concerned that the volunteers are approaching the overwork point. In addition to answering alarms, volunteers provide coverage for community events, fire prevention activities, and other social functions where the community or civic groups ask for our help. In the past, a call volume of 180 calls per year was manageable. With the nearly three-fold increase in calls since 2003, it is clearly very difficult for our volunteers to contribute to our department and balance the demands of family and work.

   In an attempt to reduce the workload, EFD administration removed EFD from the response plan for non-emergent medical alarms, leaving these categories of calls to be handled by FD 5 ambulance crews only. However, this only provides occasional

[25] *ITAC - Incident Command, Tactical Accountability, Action Planning and Communication Solutions,* BC Mark Emery

relief. In many cases, non-emergent medical calls end up requiring EFD response since FD 5 ambulances regularly respond from Moses Lake, prompting FD 5 to request EFD to respond and provide care pending the ambulance arrival.

3.13 Policy Recommendations

1. A high level of emphasis, planning and funding should be given towards recruiting, training, and retaining volunteer fire department members. This strategy is aligned with achieving the City Council's Goal of "Safe City".
2. Monthly review of the response data so that trends in response patterns can be monitored and used for not only minor adjustments but in planning for future change.
3. Continue to measure estimated structural dollar loss and saved data to determine effectiveness of loss prevention and fire suppression activities. Comprehensive data collection and reporting is essential to providing accurate and complete data.

Annex 1: Volunteer Firefighter Retention and Recruitment Root Causes[26]

Sources Of Challenge	Contributing Factors
Time Demands	• the two-income family and working multiple jobs • increased training time demands • higher emergency call volume • additional demands within department
Training Requirements	• higher training standards and new federal requirements • more time demands • greater public expectation of fire department's response capabilities (broader range of services such as EMS)
Increasing Call Volume	• fire department assuming wider response roles (EMS)
Changes In The "Nature Of The Business"	• abuse of emergency services by the public • less of an emphasis on social aspects of volunteering
Changes in Sociological Conditions (In Urban And Suburban Areas)	• transience • loss of community feeling • less community pride • less of an interest or time for volunteering • two-income family and time demands • "me" generation
Changes in Sociological Conditions (In Rural Areas)	• employers less willing to let employees off to run calls • time demand • "me" generation
Leadership Problems	• poor leadership and lack of coordination • authoritative management style • failure to manage change
Federal Legislation and Regulations	• Fair Labor Standards Act interpretation • "2 in/2 out"
Increasing Use of Combination Departments	• disagreements among chiefs or other department leaders • friction between volunteer and career members
Higher Cost of Housing (In Affluent Communities)	• volunteers cannot afford to live in the community they serve
Aging Communities	• greater number of older people today • lack of economic growth and jobs in some towns
Internal Conflict	• disagreements among departmental leaders • friction between volunteer and career members

[26] *Retention & Recruitment for the Volunteer Emergency Serves: Challenges & Solutions*. National Volunteer Fire Council and United States Fire Administration (FA-310), May 2007.

Annex 2: Target Hazard List

BASIN RETIREMENT HOME

109 C ST SW

TARGET HAZARD

BRIEF: A major fire in this occupancy will require a massive response from multiple fire agencies, and will easily exceed the capabilities of EFD's initial response strength, even when combined with the response strength of all local mutual aid. Efforts will first be focused on rescuing occupants, and then fighting the fire. EFD cannot assure positive results.

HAZARDS, VULNERABILITIES AND RISKS:

- Extreme life safety risk
- Extreme fire travel/intensity risk
- Elderly and limited mobility occupants
- Wood frame construction
- No sprinkler system to stop fire spread

The building does have a central alarm system. However, during previous incidents, many occupants do not evacuate building when alarm sounds. Comments from residents lead us to believe they have developed a false sense of security that EFD's ladder truck can rescue each and every occupant who chooses to evacuate to their exterior deck rather than to exit the building.

The truth is it will be nearly impossible to accomplish such a task: once the ladder truck is placed into operation, the ladder is limited to accessing unobstructed decks on one side of the building and within the safe reach of the truck itself. Ground ladders will need to be established to conduct rescues and each ladder will require at least two firefighters committed to the task.

Again, the quantity of available volunteer firefighters will dictate how successful rescues can be achieved. However, it is unlikely there will be adequate volunteer firefighters on-hand, even under the best of conditions.

- A fire sprinkler system in this occupancy would greatly reduce fire spread, and may even extinguish the fire prior to or in concert with EFD efforts.

HISTORICAL REFERENCE/COMPARISON:

November 13, 1997: Kona Village Apartment fire, Bremerton, Wash.

Similar building construction, no fire sprinklers, no central alarm system, high concentration of limited mobility occupants, rapid fire spread. Four occupant fatalities. Just to conduct rescue and firefighting efforts, this fire required the response from 13 separate paid-staff fire agencies from three counties. At least 21 occupants were rescued by firefighters via exterior ladders on the outside wall. All people escaped with only the clothes on their backs.

The Kona Village apartment building was constructed in 1971 without sprinkler and central alarm systems. (A retrofit ordinance requiring sprinklers was not in effect at the time of the fire). City fire officials had written the building owners at least twice requesting that they install improvements in built-in fire protection, including fire sprinklers.

This fire provided the impetus for the city to initiate an amendment to its building code to require sprinkler protection for such occupancies.

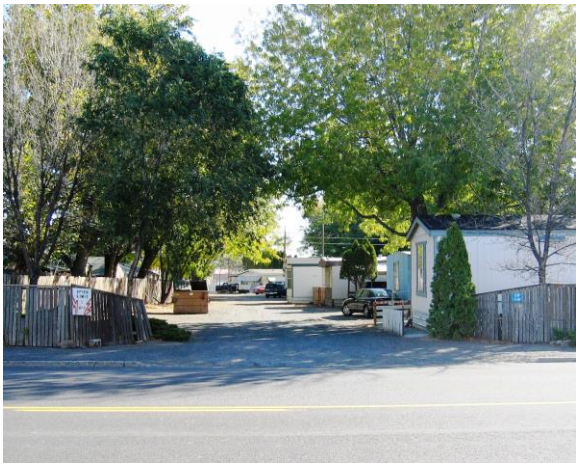
A Bremerton Firefighter rescues an elderly man from the top story of the Kona Village Apartments. Flames in background illustrate conditions *on arrival* of the fire department.

The aftermath of the Kona Village Fire: $7.5M loss.

EASY LIVIN' TRAILER PARK

630 BASIN ST SW

TARGET HAZARD



BRIEF: A fully involved structure fire in this park will likely pose a significant risk to occupants and responders. It is probable that fire will affect other exposed structures as well as overhanging tree canopies. The narrow dead-end roads into this park limit firefighter escape routes.

HAZARDS, VULNERABILITIES AND RISKS:

- Older (pre-1976) manufactured homes; old travel trailers; high fire loads in many; modified structures; some with inadequate or obstructed occupant exits
- Concentration of fire risk
- High life safety risk
- Extreme fire intensity risk
- High probability of fire traveling outside of original fire building
- Some limited mobility occupants
- Inadequate distances between each exposed dwelling
- Once fire is free burning, tree canopies in the park may contribute to fire spread/intensity
- Driveways are narrow, cars park on sides of driveways, and each driveway dead ends, posing high risk for apparatus and firefighters

HISTORICAL REFERENCE/COMPARISON: According to the US Fire Administration, fires in manufactured homes claim the lives of 345 Americans each year and injure 765 more. Many of these fires are caused by heating and electrical system malfunctions and improper storage of combustibles.

- During a typical year, manufactured homes account for 17,700 fires, hundreds of deaths and $155 million in property losses.

- Manufactured homes have a fire death rate per 100,000 housing units 32-50 percent higher than the rate for other dwellings.
- Young children account for more than one-fifth of all fire deaths in manufactured homes.
- A recent study of rural fires showed that smoke alarms were less likely to be present or operating in manufactured homes.
- Electrical system malfunctions and heating fires are the leading causes of fire in manufactured homes. Together, they account for one-third of manufactured housing fires. Electrical distribution fires occur nearly twice as often in manufactured homes as in one- and two-family dwellings.
- Manufactured homes built after the introduction of the HUD manufactured home safety standards in 1976 have lower rates of civilian deaths per reported fire than those built before the HUD standards were introduced. The death rate was 54% lower in 1994-1998.
- Fires in manufactured homes frequently cause damage or ignite neighboring manufactured homes because of inadequate separation between structures, resulting in multiple fires at one location.

Manufactured homes, especially those built prior to 1976 like the one above, burn quickly due to very lightweight wood components and wood paneled walls. The aluminum exteriors usually melt due to the extreme heat.