

The Barn is Burning: Analyzing Outbuilding Fire Prevention within the Lane Fire Authority

Service Area

Christopher E. Heppel

Lane Fire Authority, Veneta, Oregon

CERTIFICATION STATEMENT

I hereby certify that this paper constitutes my own product, that where the language of other is set forth, quotation marks so indicate, and that appropriate credit is given where I have used the language, ideas, expressions, or writings of another.

Signed: \_\_\_\_\_

### Abstract

Outbuilding fires have a dramatic impact on the rural residential community. An outbuilding fire means the loss of storage, equipment, animals, food products, a covered workplace and a location for community assembly. The problem is Lane Fire Authority (LFA) does not understand the reason for continued outbuilding fires. The purpose of the research was to identify the reason LFA continues to experience outbuilding fires. A descriptive research method was utilized. The research sought to answer the follow:

1. What are the state regulatory requirements for outbuildings?
2. What value do property owners place on outbuildings?
3. What behaviors contribute to outbuilding fires?
4. How are other agencies providing outbuilding prevention?

The research procedures included: a broad literature review of outbuildings to determine history, use, purpose, construction methods, outbuilding fire incidents, fire cause and current fire prevention efforts. Personal interviews were also completed with insurance agencies, county assessor, county land development and prevention specialists. In addition, a fire prevention survey was completed within the LFA service area by outbuilding owners. The findings from this research identified owners of outbuilding are aware of outbuilding fire risks yet nine percent of outbuilding owners experience fires. The fire causes are similar to national data for similar structures. The fire service has developed limited programs focused toward outbuilding fire prevention. The equine and agriculture community have made steps towards barn fire prevention. The following recommendations were presented: develop distributive outbuilding fire prevention literature, engage with regional fire prevention groups that would support program, establish relationships with organizations that can benefit from an outbuilding fire prevention program,

educate responders on outbuilding response and engage local distributors to offer safe alternative heating equipment.

## Table of Contents

Certification Statement .....	2
Abstract .....	3
Table of Contents .....	5
Introduction .....	6
Background and Significance .....	8
Literature Review .....	12
Procedures .....	22
Results .....	25
Discussion .....	35
Recommendations .....	46
Reference List .....	48
Appendix A.....	53
Appendix B.....	57
Appendix C.....	63
Appendix D.....	64
Appendix E.....	66
Appendix F.....	68

The Barn is Burning: Analyzing Outbuilding Fire Prevention within the Lane Fire Authority  
Service Area

**Introduction**

“The barn in burning” is not an unfamiliar cry for help across our nation. Annually, hundreds of outbuildings are lost due to fire. Since the early settlers barns and outbuildings have made significant impact on our communities. These facilities have provided storage for equipment, tools, animals, food products, a covered workplace and community assembly. Barn fires even live in fire department lore such as the story of Mrs. O’Leary’s cow which started the Chicago fire of 1871. A traditional the folksong tells the beginning of this destructive incident.

Late one night, when we were all in bed,

Mrs. O’Leary lit a lantern in the shed.

Her cow kicked it over, then winked her eye and said,

“There’ll be a hot time in the old town tonight!”

(Abbott, 2012)

The Chicago fire inevitably would burn 2,000 acres of the city finally extinguished with the assistance of rain. After two days there was \$200 million dollars damage, 300 dead and 100,000 people or one third of the city’s population was homeless (Abbott, 2012).

Today the potential of such a catastrophic event has diminished. Building codes for large occupancies within most cities require the installation of monitored detection and suppression systems. However when traveling beyond the city limits large structures such as barns and outbuildings don’t have the same stringent requirements especially on rural residential properties.

Lane Fire Authority (LFA) routinely experiences fires similar to the Boddenham Road fire on June 29, 2014. This was a pole barn with 400 tons of commercial hay valued at 80 thousand dollars. Located in front of the barn were three windrowers each valued at approximately 10 thousand dollars each. The result was a 100 thousand dollar loss plus the structure. The farmer had no insurance on the hay, building or equipment. The fire was caused by spontaneous combustion.



Photo 1: *Bodenhamer Road Fire*. (2014). Retrieved November 21, 2014 from: <http://www.kval.com/news/local/Barn-catches-fire-in-West-Eugene-265126631.html?tab=gallery&c=y&img=1>

Barns and outbuildings of many shapes and sizes remain one of the most common rural residential storage facilities today. Some structures are as simple as a utility shed for garden tools while others are cavernous and house large pieces of agriculturally equipment. Many of these structures may appear to have a limited monetary value yet may have a significant historical, personal, salvage or high contents value. Consider a barn erected at the turn of the 20<sup>th</sup> Century which served as the local grange hall or school and one day it becomes a fire loss. What of the barn which appears to be dilapidated however has a significant salvage value? If the neighbor's horse stable caught fire would the animals survive? Reflect on the residential barn built in the 1950s which the owner still maintains their horse supplies, parks the pick-up truck and stores hay

for cattle. If the barn was lost tonight it would be devastating. Fires like these have become considerable fire losses to the owners, families and community served by LFA.

The problem is the LFA does not understand the reason for continued outbuilding fires. The purpose of this research was to identify the reason LFA continues to experience outbuilding fires.

A descriptive research approach was utilized to answer the following questions: What are the state regulatory requirements for outbuildings? What value do property owners place on outbuildings? What behaviors contribute to outbuilding fires? How are other agencies providing outbuilding fire prevention?

### **Background and Significance**

Lane Fire Authority (LFA) was created using an Oregon Revised Statute (ORS) 190 agreement in July 2012. The agreement formed a functional consolidation of Lane Rural Fire/Rescue (LRF/R) and Lane County Fire District #1 (LCFD#1). Both agencies are classified as special districts per ORS 198 and function as Rural Fire Protection Districts per ORS 478. The consolidation created a 274 square mile district providing fire suppression, rescue, Emergency Medical Services and ambulance transport. As a predominately rural fire district over 90% of the fire district service area is outside incorporated areas. The area, predominately a bedroom community for the City of Eugene, was founded on the timber and agricultural industries. The area has numerous recreational options and the local highway is the only connection to the Oregon coast in Lane County. Located in Veneta, Oregon, Lane Fire Authority responded to 4099 calls for service in fiscal year 2013-2014.

The rural nature of the community lends to the need for storage facilities. Many of the private properties outside the city limits or incorporated areas are a minimum of one acre (Lane

Code, 1978). Commonly these properties of one to ten acres of land are referred to as Hobby Farms and usually do not produce income. Hobby farms provide the space to grow a garden, raise livestock or invest in a small agricultural venture such as a Christmas trees. The opportunity to work the land necessitates the need for storage. The backyard gardener needs a shed to store tools and the hobby farmer needs a chicken coop to raise organic eggs. On a slightly larger scale, the rural residential farmer needs a barn to store the tractor, feed hay and house few head of livestock.

Within the LFA service area there are over 9000 private properties. Because of the rural setting many of these residents have some style of barn or outbuilding. Between 2009 and 2013 LFA responded to 240 structure fires. Of these, 82 (34%) involved barns or outbuildings which the majority were a complete loss. Of those, 76 (92%) were on private property with a estimated property loss of 2.7 million dollars. The leading cause of the fires was heating equipment and faulty wiring. Investigations by LFA indicate heating equipment was the leading cause (31%) and electrical malfunction (18%) of the cases (Lane Fire Authority [LFA], 2014).

Rural residents raise livestock and plants which are susceptible to inclement weather. Heating equipment is utilized inside barns and outbuildings to keep the animals and plumbing from freezing. Unprotected lamps come into contact or project radiate heat to combustible products causing ignition which extend into the structure. Another common fire cause is an electrical malfunction or arcing. Many barns and outbuildings are constructed by individuals not licensed by the Construction Contractor Board or older structures have been modified without regard to proper code. Exposure to the elements and overloading of these electrical circuits leads to arcing and overheating of wiring causing combustion.

The use of heating lamps is not just a rural community problem. With the growing local interest in Urban Agriculture, the practice of cultivating, processing, and distributing food in or around a village, town, or city has moved plants and animals into the backyard. The neighboring City of Eugene has adopted codes to allow for the “increased opportunities for residential urban animal keeping and farming within the city limits” (City of Eugene, 2013, p. 1). This code adoption has increased the number of chicken coops, rabbit pens and goat sheds. The addition of composting of animal and human food waste adds up to potential combustion within a congested urban area.

For some fire departments response to a barn or outbuilding fire is a simple “surround and drown”. On the contraire, barns and outbuildings can be one of the more challenging fires for fire responders. Many are filled with highly flammable products such as petroleum, compressed gasses and plastics. On the morning of March 25, 2011 LRF/R responded to the report of a shed fire on Kokkler Road. On arrival a 4500 square feet outbuilding was 50% involved with flame. There were multiple recreation vehicles stored around the structure with direct flame impingement on two propane bottles. The responding crews were also meet with the sound of detonating ammunition. The investigation reveled the fire was started by a heat lamp in a cardboard box filled with chicks. The fire extended to a wall with shelves of paint products. The owner was also storing his ammunition and classic automobile collection in the structure. The total loss was \$680,000.

Do to the location and occupancy of barns and outbuildings within the LFA service area other dangers exist for fire responders. The rural location creates an extended response time allowing the fire to develop. There is a lack of water supply in the rural setting necessitating heavy water tenders navigate narrow, poorly maintained roads. And because most barn and

outbuilding fires occur at night adds another element of risk (LFA, 2014). In addition, barns are used to house animals. The expectation is fire fighters will make an effort to evacuate these large scared and confused animals which the responders have no training or experience handling (Livestock Welfare, n.d.).

Historically, the fire prevention efforts of LFA have been focused at residential or commercial occupancies and not other structures. These efforts appear to be successful as there hasn't been a structure fire related death in the district in over a decade. The predominate attitude towards barn and outbuilding structure fires has been these structures have little or no value. Subsequently, there has been no formalized barn or outbuilding fire prevention effort.

While each fire department operates differently, the goals are similar: protect and save lives, property and the environment. The best way to achieve this goal is by preventing the incident from occurring. This research is significant to Lane Fire Authority. The vision statement of LFA is:

To have an organization that is highly adaptable to internal and external forces. Maintain an educated and technically competent workforce that provides exceptional public service in conjunction with the district's service partners. Strive to provide quality service above and beyond what is expected and respect the traditions of the United States Fire Service (Lane Rural Fire/Rescue, 2008, p. 6).

LFA has an opportunity to be a Community Risk-Reduction Champion. By working in cooperation with local clubs, associations, groups, schools, farmers, ranchers and the community at large LFA can help residents understand existing and potential risks. Residents who understand the risks are better prepared to partner with emergency services to address challenges.

This partnership will create a safer and healthier community for all (United States Fire Administration, 2011, p. 1)

This research relates to the United States Fire Administration's Goal 1 of "reduce risk at the local level through prevention and mitigation". This research specifically supports the Strategic Initiative "Fire Prevention and Life Safety" and the Operational Initiative to "expand initiatives in public fire and safety education through various avenues to reach all segments of the population, particularly high risk groups" (U.S. Fire Administration, 2009, p. 18).

This research coincides with the National Fire Academy Executive Analysis of Community Risk Reduction (R0274) course goal of "to empower the Executive Fire Officer (EFO) with the ability to lead community risk reduction in a strategic manner" (U.S. Fire Administration, 2013, p.1-7). The shift from just providing response to a barn or outbuilding fire to one of preventing the fire through community participative involvement is clearly an adaptive challenge for the fire service.

### **Literature Review**

#### **Outbuildings are a part of history**

Traditionally barns and outbuildings are separate buildings away from the house. According to the Merriam-Webster online dictionary a barn is "a usually large building for the storage of farm products or feed and usually for the housing of farm animals or farm equipment" and an outbuilding is "a building (as a stable or a woodshed) separate from but accessory to a main house" (<http://www.merriam-webster.com/>). Today these structures still serve the same purposes and others. Older barns located on smaller pieces of property are no longer used for agriculture. Some of these structures are being converted into commercial businesses such as

wedding gardens, wine tasting rooms, educational venues and even homes in an effort to sustain their historical and cultural significance.

Since the days of the early settlers barns have been a part of the American landscape. The early forefathers envisioned a nation dependant on citizen farmers to spur the economy and represent freedom. This vision truly came true as the painted landscape of the family farm is an important image of the American lifestyle. As the country grew farmers spread across the land making claims and many times erecting their barns before their main residence. The family barn provides a sense of security, home and closeness to the communities who build the barns (Auer, 1989, p. 1). Many of these barns have been handed down from generation to generation.

The transition of owner ship establishes a sense of pride and ownership. Within the State of Oregon these farms are commonly labeled Century Farms. The Century Farm program is administered through the Oregon Agricultural Education Foundation. The program is a statewide recognition program for families who have worked the same land for at least 100 years. To date there have been 1,117 designated farms and there are currently 55 Century Farms in Lane County (*Century farm and ranch public data export*, 2014).

Barns and outbuilding with a documented historical significance are recognized by the federal government. The National Park Service, a part of the Department of the Interior, manages the National Register of Historic Places. The purpose of the registry:

is the official list of the Nation's historic places worthy of preservation. Authorized by the National Historic Preservation Act of 1966, the National Park Service's National Register of Historic Places is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect America's historic and archeological resources. (National Park Service, 2014, para. 1)

Within the LFA service is the Charles C. Fitch Farmstead, located at 26689 Pickens Rd, is listed on the National Register of Historic Places. The Fitch Farmstead was built in 1914. Over the years six additional structures were added to the seven acre property a barn, fruit house, fuel house, garage/shop, machine shed and chicken coop (National Park Service, 2014, table 89000510).

### **Structure fires in barns**

Structure fires in barns have been decreasing since 1980. According to the National Fire Protection Agency (NFPA) structure fires in barns has decreased by 95% over the past three decades. In 1980 there were a reported 14,190 structure fires in barns and only 740 in 2010 (Evarts, 2012, figure 1). Per NFPA “an estimated 830 structure fires in barns were reported with the associated death of 1 civilian, 10 civilian injuries and \$28 million in property damage annually” (Evarts, 2012, p. iv). The NFPA began tracking these statistics after the establishment of NFPA standard 150. Early data collected from 1980-1998 utilized the National Fire Incident Reporting System (NIFIRS) version 4.1. NFIRS version 4.1 utilized property use code 815: (barn or stable, including facilities associated with farms, zoos, or wild life preserves, weather for providing restraint or protection for animals or for storage of feed, but excluding silos) and code 817: (live stock storage an any point beyond the raising ranch or farm, including rail and truck stockyards and other livestock pens and yards). The transition to NFIRS 5.0 in 1999 added property code 819: (livestock or poultry storage, including barns, stockyards and animal pens). The most recent NFPA analysis uses only property code 819. Much of the decline is associated with these categorizing and labeling property use changes (Evarts, 2012, p. 1).

### **Causes of outbuilding fires**

Overall 61% of the barn structure fires were caused unintentionally. Six percent were set intentionally (Evarts, 2012, p. 3). Fires in outbuildings are caused from many of the same reasons other structure fires occur. According to the National Fire Protection Agency (NFPA) every fire has at least three “causes”. Fire could have been prevented by changing behavior, heat source and ignitability of the first fuel (Evarts, 2012, p. 23).

Typically the first item ignited in a barn or outbuilding fire is a light, flashy, fuel. The most common fuel was agricultural crops (15%), organic materials (10%) and light vegetation such as grass (10%) for a combined total of 35% (Evarts, 2012, figure 3). These highly flammable fuels include but are not limited to livestock bedding, hay, straw, cobwebs, dust, paint and fertilizer. Straw reaches a burning temperature of 300°F within a few minutes with a heat release rate comparable to gasoline. It only takes 2-3 minutes to burn an area 10 feet in diameter (Pennsylvania State University, 2002, p. 5). Additionally the initial stages of combustion are sometimes supported by accelerants. An accelerant is a substance that speeds up a chemical reaction and is characterized by high heat release rate and ignites easily. Typically accelerants are hydrocarbon based such as gasoline, kerosene, aerosol cans, butane and turpentine ("accelerant," 2014, para. 4).

Heat sources are readily available within the barn and outbuilding environment. Smoking continues to be a documented source. Even with the routine posting of signs 2% of the barn fires reported between 2002 and 2005 were caused by smoking materials (Equine Risk Management Group, LLC, 2011, p. 3). Motors from operating equipment, sparks from welders and equipment not well maintained have all contributed to fires in the past. The product of friction is heat as seen by rotating mechanical devices. After use hot equipment is placed into the barn or

outbuilding were easily ignitable fuels come into contact with the equipment. Just lawn mowers caused two million dollars in direct property damage according to the NFPA (Evarts, 2012, table 6). Field debris (loose grass, straw or hay) resting on heated equipment can ignite hours after the operator has secured the apparatus. Because of the presence of easily ignitable fuels even broken glass or a pair of glasses can ignite a fire. If the glass is broken or rounded it can focus and amplify concentrated light onto an ignitable fuel such as hay (ROBwithaB, 2013).

The leading cause of fires, 23% of reported cases, in barns involved heating equipment (Evarts, 2012, figure 2). The NFPA lists the follow as heating equipment for data collection purposes: heat lamp, fixed or portable space heater, water heater, heat tape and other unknown heating equipment (Evarts, 2012, table 6).

Heat lamps are filament type bulbs which are used to heat to high temperature and produce visible light. A single 250Watt, 120Volt, red safety coated heat lamp can generate temperatures over 500 degrees Fahrenheit with continuous use (Bulb Town, 2014). Heat lamps are routinely used in barns and outbuildings for warming of animals and equipment. Heat lamps are regularly associated with brooders. A brooder is a heated device which is used for the raising of chickens.

A brooder typically incorporates a pen to retain the animal and a heating element for warming. Commercially manufactured brooders are available however makeshift brooders are common. Makeshift brooders are constructed of any material but typically are disposable such as cardboard, plastic and wood ("Homemade Brooder," 2013, figure 1). Animals when placed in brooders will move inside the box. A shift in the brooder causes the heating element to contact or have close proximity to the pen or bedding causing a fire. In the horse community some owners will use heat lamps to keep the hair of their animals in prime condition. According to Laurie

Loveman, president of the National Equine Safety Association, this “is a dangerous shortcut. In addition to the high heat generated, unguarded units may be viewed as “playthings” and some horses will rear up and bite the lights” (Loveman & Barnard, 2005, p. 10). Between 2006 and 2010 heat lamps created two million dollars in direct property damage (Evarts, 2012, table 6).

A faulty electric hot water heater caused a fire which spread through a 32,000 square foot horse arena and stable. The 1991 fire in Clarence, New York killed 40 horses and the building was destroyed (Loveman, 2013, para. 11). Electrical distribution or lighting equipment was the second leading cause (16%) of barn fires. Included in the electrical cases seven percent were associated with wiring and six percent were associated with the lamp or bulb. Failure of wiring and arcing was the leading heat source of structure fires in barns (Evarts, 2012, p. 3).

Electric systems especially in older barns are of a concern. Many older electric systems were not installed properly or following code guidance. Wires are not protected in conduits exposing the wires to the elements accelerating deterioration. The deterioration creates cracks for potential arcing especially in a dusty environment. The use of heavy motors, fans and equipment can quickly overload inadequate electrical systems. Plastic used in electrical insulation are a target for rodents to chew on as well as other livestock (Penn State University, 2002, p. 7). Even bare, uncovered, bulbs create enough heat to ignite dust and cobwebs.

Another electrical source not to be overlooked is lightening. According to a recent NFPA study there was an estimated 8400 non-home structure fires caused by lightning (Evarts, 2012, table 2). Non-home structure fires make up an estimated 7% of the annual average of 22,600 fires caused by lightning (Aherns, 2013, figure 1). Lightning is a rapid discharge of electrical energy into the atmosphere which is surrounded by superheated gases. Lightning often strikes the same object repeatedly and activity peaks in the summer months (National Oceanic and

Atmospheric Administration [NOAA], 2014, para. 3). Lightning follows the path of least resistance so barns should have lightning protection systems installed.

Lightning protection usually is in the form of a lightning rod. The metal air terminal (rod) is the highest point on the structure. The terminal intercepts the lightning and a cable provides a route of travel so the electricity is safely dissipated into the ground (Penn State University, 2002, p. 5). Installation should be completed by installers certified by the Lightning Protection Institute. According to a Lightning Protection Institute study “nine out of ten barns struck by lightning burn to the ground---they are totally destroyed” (Loveman & Barnard, 2005, p. 10).

### **Spontaneous combustion**

Probably one of the more fascinating causes of a barn fire is the spontaneous combustion of hay. Tightly baled hay which has moisture content above 15% promotes chemical reactions and microbial growth. This is because freshly cut hay is not dead. Cellular respiration, the burning of plant sugars to produce energy, continues in plant cells and a small amount of heat is released in the bale. The availability of moisture, oxygen and pressure create an environment for microbial development. Normally this is of little consequence however if a higher moisture environment is present growth and multiplication of mesophilic, warm temperature, bacteria found in forage crops will multiply. Mesophilic bacteria release heat within the bale and cause the internal bale temperature to rise between 130°F and 140°F. At this temperature range, bacteria die and bale temperature decreases (Fetzer, 2014, para. 4). However if the temperature of the bale doesn't decrease after this initial cycle the temperature can continue to rise and combustion may occur. The higher the moisture contents the greater potential for fire.

**Barn construction**

Many states do not take into consideration fire codes for agricultural barns in rural settings. The open space, large storage areas and lack of fire breaks all support rapid fire spread. Though some older barns may be constructed of heavy timber but today's outbuildings are not. Barns which lack interior siding expose the raw wood to direct flame and heat supporting the fire spread. This is similar to a residential building catching fire at the framing state of construction.

As fire growth accelerates the smoke and heat raise to the ceiling capped by a metal roof. It only takes a few minutes for temperatures at the ceiling to exceed 1800 degrees reaching "flash point". When flash point is reached all the combustible material in the barn or outbuilding is ignited simultaneously (Penn State University, 2002, p. 2). The lack of detection and protection systems caused 70% of barn fires to spread beyond the floor of origin. (Evarts, 2012, table 12). The use of fire-retardant treated wood, masonry and heavy timber should be used whenever possible. In addition NFPA 150, Chapter 7, Construction and Separation requirements offer guidance for design, construction, fire protection and classification of animal housing facilities.

Land use rules can have an effect on the proximity of a barn to other structures. As urban expansion continues land once used for farming and ranching is being subdivided into small parcels. Individuals are purchasing these smaller plots and then constructing barns or stables close to other buildings only adding to the urban interface problem. Barns constructed on smaller acreage with neighboring barns or residences put nearby structures at risk (Loveman & Barnard, 2005, p. 3). The same concern exists with neighborhoods which have been constructed around older barns.

The College of Agricultural Sciences at Pennsylvania State University recommends placing buildings at least 50-100 feet apart. The 50 foot distance allows for fire department

equipment access and 100 foot reduces the chances of fire spread. With building so close either radiate heat or fire brands, a piece of burning material transferred from the source to an ignition source, could start another fire (Pennsylvania State University, 2002).

Construction of roads or access routes around barns should also take into consideration fire response. Many rural addresses are poorly labeled or missing. Driveway width, vertical clearances, maximum grade, turnouts, bridges and elevated surfaces all impact accessibility to an outbuilding fire. Chapter five and Appendix D of the Oregon Fire Code establish fire apparatus access road standards for residential structures (Oregon Fire Code, 2014). The ground should be able to support heavy equipment in a dry and wet environment. The requirement for wet condition is for weather and the potential water runoff created during fire suppression activities. Inclement weather such as heavy snow and flooding can also inhibit access and delay response (Loveman, 2008, p. 3).

### **Housekeeping**

The broom and dust pan are an effective fire prevention tool. The buildup of dust, debris and cobwebs can be a cause and increase fuel load. Dust can build up on uncovered bulbs causing ignition of the cobwebs that float to the floor and ignite the loose hay. Twine from bales of hay looped on a nail in the barn creates a route of travel for fire to spread (University of Kentucky, 2011, p. 2). Tall grass and debris around a barn can cause fire to spread to nearby structures or allow a field fire to burn up to the barn. A lack of general housekeeping is a contributing factor to barn and outbuilding fires.

### **Outbuilding prevention**

The Great Chicago Fire of 1871 is one story of barn fire causing a conflagration. The legend is Mrs. O'Leary's cow kicked over the lantern starting the fire however; other theories are

the fire was start by an arsonist or even a meteor. In the end the true cause of the fire which spread to a mile wide and four miles long was never determined (History Channel, 2014, para. 1).

It was a series of racetrack stable fires in the mid-1970s which gained the nation's attention around stable fires. In response the NFPA established the Committee on Firesafety in Racetrack Stables. The committee established sub-committees which developed standards on constructions, occupancy requirements and fire protection. The first version of NPFA 150, Standard on Firesafety in Racetrack Stables was published in 1979. There were a couple of revisions and then in 2004 the scope of NFPA 150 expanded to include life and safety requirements for both humans and animals in all types of animal housing facilities. This expansion of the standard changed the name to Standard of Fire and Life Safety in Animal Housing Facilities. The 2013 standard is the most recent edition (National Fire Protection Association [NFPA], 2013, p. 150-1).

A barn fire is a horse owner's nightmare. Within minutes smoke and flame can damage or destroy saddles, bridles, hay, grain, equipment and the barn. Thousands of dollars would be lost in such an incident. The National Equine Safety Association (NESA) in cooperation with The Humane Society of the United States (HSUS) produced the document "Making Your Horse Barn Fire Safe" in an effort to educate barn owners.

The federal government promotes barn and outbuilding safety through the United States Department of Agriculture, Cooperative Extension Systems Office. Cooperative Extension System is a nationwide, non-credit educational network. Located in each state the extension system has offices which are "staffed by one or more experts who provide useful, practical, and research-based information to agricultural producers, small business owners, youth, consumers,

and others in rural areas and communities of all sizes” (United States Department of Agricultural, 2014, para. 1). The Oregon State University manages the extension programs within the State of Oregon. One popular club offered through the extension who focuses on farm safety is 4-H. The goal of 4-H is to develop citizenship, leadership, responsibility and life skills of youth through experiential learning programs and a positive youth development approach. The 4-H program has agricultural roots and addresses farm and barn safety as part of their program. The Pennsylvania State University extension program offers a safety checklist and references (<http://animalscience.psu.edu/files/pdf/horsechecklist.pdf>). The University of Minnesota offers the same (<http://www.extension.umn.edu/agriculture/horse/care/barn-fire-safety/>).

The State of Vermont has taken barn safety one step further. The Vermont Rural Fire Protection Task Force established a sub-committee, the Barn Prevention Task Force who is working to identify ways to reduce and prevent future barn fires. The task force is working in cooperation with the University of Vermont Extension and the Vermont Fire Marshalls office. The task force has created a series of videos and informational brochures. These media products address topics such as signage, livestock evacuation, pre-plan, safety, fire extinguishers and hay fire prevention (The Vermont Barn Fire Prevention Task Force, n.d.).

### **Procedures**

This research utilized a descriptive method for the purpose of identifying the reason Lane Fire Authority continues to experience outbuilding fires.

The National Fire Academy Learning Resource Center was used while attending an on campus course in May 2014. Google’s regular and scholar search engines were used extensively for internet searches. Key search words included barn fire, outbuilding fire, stable fire, hay fire,

fire risks to animals, NFPA barn fire, barn safety, outbuilding safety checklist, chicken coop fires, historical barn buildings, barn fire conflagration and humane society.

Many barns and outbuildings have been around for generations and serve multiple purposes. This researcher began by researching the history, use, purpose, construction and significant barn fire events. Research was completed at the Lane County Historical Society and Museum and The Oregon Historical Society on-line research library. Building construction variations were reviewed as purpose can drive barn design and construction. The Lane County, Lane Management Division was contacted to obtain building permit requirements and associated building codes. In addition, a personal interview was completed with the Lane County Tax and Assessment Division to determine the value of barns and outbuildings for tax purposes. Personal interviews with national and local independent insurance agents were accomplished to identify how value is established for both the structure of a barn and the contents.

Next, a literature review was undertaken to understand how barn fire data is collected. Research was completed at the University of Oregon to obtain published data on barn and outbuilding fires. The research was further narrowed to the causes of barn and outbuilding fires in an effort to understand trends over the generations of barn and outbuilding use. Using a postcard mailing and on-line survey data was collected directly from LFA service area residents on fire risk to their barn or outbuilding.

In addition, a literature review and survey focusing on current barn and outbuilding fire prevention efforts was completed. This researcher investigated on-line training, available brochures, videos, the local fire prevention coop and how groups or clubs outside the fire service promote barn safety. Residents of the LFA service area were asked to respond to a survey via postcard notification on the receipt, type and delivery of outbuilding fire prevention.

An on-line survey program, Survey Monkey, was used to collect resident specific information on their outbuilding purpose, structure value, contents value, knowledge of barn prevention awareness and interesting in receiving prevention education. The Outbuilding Fire Prevention Awareness survey is provided in Appendix A. The survey uses predominately dichotomous (yes or no questions) and questions using the Likert response scale. Questions developed using the Likert scale utilized a 1-to-5 bipolar scale (Research methods knowledge base, 2006).

The survey leads in with a letter addressing the purpose of the survey. Next a definition of an outbuilding is provided for the purposes of the survey. Question 1 is an entry question to determine if the respondents have an outbuilding on their residential property. Questions 2-3 were used to address the personal value of the outbuilding and the contents. Question 3 determined the single or multiple purposes of the respondent's outbuilding. Questions 5-7 addressed the respondent's potential fire risk. Questions 8-12 were used to determine the respondent's fire prevention efforts in their outbuilding. Questions 13-15 were used to address the respondent's previous receipt of outbuilding fire prevention education and interest in the future.

A postcard mailer was developed to notify and encourage the residents of the LFA service to respond to the Outbuilding Fire Prevention Awareness survey. This researcher worked in conjunction with Eagle Mailing Service, a distribution and advertising agency, to design and distribute the postcard mailer (Appendix C). The survey was opened on August 18, 2014. The postcard mailers were distributed via U.S. Mail on August 22, 2014 and the survey was closed on October 1, 2014. There were 9956 postcards distributed.

As a cost saving measure the postcard mailer was multi-purpose. The first purpose was to provide outbuilding fire prevention education. Second, was a request for area residents to complete the online survey. And third was to draw attention to the recently developed LFA website. A link to the survey was provided on the website.

Limitations to the postcard mailer and online survey included, accurate addresses, receipt of postcard mailing, access to internet, inability to determine if residents received survey and effectiveness of postcard mailing to draw attention to the survey request versus simply a public education mailer.

## **Results**

### **What are the state regulatory requirements for outbuildings?**

The Oregon State Fire Marshall (OSFM) is the lead agency for fire prevention and code enforcement for those areas within the state that are not under the fire protection of a municipality or special district. According to Kristina Deschaine, Deputy State Fire Marshall, regulation by the OSFM over barns and outbuildings is dependent on the occupancy classification. If the building has routine general public access, is business or commercial structure then the building should be built using the Oregon Specialty Structural Code and the Oregon Fire Code (K. Deschaine, personal communication, October 22, 2014) . Usually, the barn or outbuilding is classified as a Group U, Utility or Miscellaneous. Appendix C of the Oregon Specialty Structural Code addresses allowable height, area and exit requirements. According to Appendix C the size of a single story Group U structure is not limited when the building is surrounded by roads or yards greater than 60 feet wide. The same requirement applies to two or more story structures with the added requirement of sprinklers (Oregon Structural Specialty Code, 2007). The occupancy may be more restrictive based on a structure with

multiple occupancies. However, if a barn or outbuilding is constructed on residential property for private use and does not have a specific regulated occupancy then the OSFM has no regulation authority. There has been no adoption on NFPA 150, Fire and Life Safety in Animal Housing Facilities in the State of Oregon.

Within Lane County the construction of barns and outbuildings on residential property is guided by the size and use of the building. Per Lane County Code 10, the county has adopted the Oregon Specialty Structure Code as defined in ORS 455.010(8) for the construction of barn and outbuildings (Lane Code, 2004). Lane County Land Development is responsible for the issuance of building permits for residential outbuildings. According to Charlie Peterson, Code Enforcement, Lane Management Division, barns and outbuildings are classified into three categories: accessory, pole barn or agricultural.

**Accessory.** Accessory buildings are defined as “accessory buildings on the rear half of the building site used as garages, storerooms, wood sheds, workshops, laundries, playhouses, greenhouses, poultry houses, animal shelters, or similar” in suburban residential district areas (Lane code, 2004). The State of Oregon defines accessory building as “any portable, demountable or permanent structure, including but not limited to cabanas, ramadas, storage sheds, garages, awnings, carports, decks, steps, ramps, piers and pilings” (OregonLaws.org, 2013). To promote spacing the square footage of the residence and the accessory buildings cannot exceed 30% of the total property square footage. Accessory buildings are any buildings and uses customarily provided in conjunction with properties zoned as rural residential district areas (Lane Code, 2004). All accessory buildings are required to have full set of plans submitted, a permit issued prior to construction and post construction inspection. The following are exceptions to the permitting requirement, “uninhabitable one-story detached accessory structures

used as tool and storage sheds, playhouses and similar uses, provided the floor area does not exceed 200 square feet and a height of 10 feet and framed-covered accessory buildings not more than 500 square feet in area, one story in height where the structure is composed of a rigid framework that supports a fabric membrane” (Lane County Land Management, 2014, p. 1).

**Pole barn.** A pole barn is a structure built by placing poles, timber or other structural members vertically into the ground. Pole barns do not use a foundation and the flooring is usually a dirt or gravel base. Pole barns may incorporate a concrete slab for flooring however provides no structural support. Metal siding is placed on the exterior and a metal, asphalt composition or fiberglass roof is installed. A pole barn may be free standing with no completed sides or completely enclosed. The purpose of a pole barn is to store large equipment, recreational vehicles or general storage. Pole barns are required to have only engineering plans submitted, a permit issued prior to construction and post construction inspection unless the building is an exception to the building permit requirement.

**Agricultural building.** If the owner of a barn or outbuilding can prove the structure is related to the operational purpose of an agricultural or equine farm then the structure is exempt from the requirements of the state structural specialty code. Agricultural buildings within incorporated cities may be regulated. An agricultural building is defined as:

Storage, maintenance or repair of farm or forestry machinery and equipment; the raising, harvesting and selling of crops or forest products; the feeding, breeding, management and sale of, or the produce of, livestock, poultry, fur-bearing animals or honeybees; dairying and the sale of dairy products; or any other agricultural, forestry or horticultural use or animal husbandry, or any combination thereof, including the preparation and storage of the produce raised on the farm for human use and animal use, the preparation and storage

of forest products and the disposal, by marketing or otherwise, of farm produce or forest products. (Exemption of agricultural buildings, agricultural grading and equine facilities, 2013).

An equine building is for the purposes of stabling, training equines, riding lessons or training clinics. The building may be used by the owner or the public. All agricultural buildings in Lane County are required to have only the plans submitted however there is no permitting or inspection process if the building is exempt per Oregon Revised Statute 455.315.

### **What value do property owners place on outbuildings?**

For the purposes of this survey an outbuilding is defined as a building such as a shed, barn or garage on the same property but separate from the primary structure, such as a house. The first section of the survey focused on the presence of an outbuilding, the structures value, contents value and outbuilding purpose. Question one asked respondents if they had an outbuilding on their residential (own or rent) property. Of the 127 respondents 99(78%) responded yes and continued with the survey. Of the 28(22%) of the respondents who did not have an outbuilding on their property the survey was terminated (Table B1). The purpose of their outbuildings balanced across many functions including recreation 37(38%), livestock 34(35%), gardening/greenhouse 29(30%), pumphouse 37(38%). The use of an outbuilding for storage had the highest response of 90(93%) and commercial use was the lowest response with 6(6%) (Table B4).

Question two asked respondents how important their outbuilding is without consideration for the contents. The responses trended towards owners placing a high value on their outbuilding, very important 37(38%), important 25(26%), 14(14%) somewhat important, somewhat unimportant 10(10%) and very unimportant 11(11%) (Table B2). Question three asked

respondents to value the contents of their outbuildings. Similar to the value of the structure the owners responded very important 39(40%), important 30(31%), 10(10%) somewhat important, somewhat unimportant 8(8%) and very unimportant 10(10%) (Table B3).

The Lane County Assessment and Taxation division establishes values on residential outbuildings for taxation purposes. A phone interview was completed with Isabelle Matthews, Property Appraiser (Appendix F). A Real Market Value (RMV) and Assessed Value (AV) are established for all outbuildings. Property appraisers utilize the Oregon Department of Revenue, Cost Factors for Farms, 2009 edition to assist with establishing value. Measure 50 approved by voters in 1997 established a Maximum Assessed Value (MAV). The MAV is AV plus no more than a 3% increase annually. The lower of RMV or MAV is used for tax purposes. There may be some properties such as farm or forest property which may be subject to a special valuation process (Lane County Assessment and Taxation, 2014, p. 1). Typically, the established RMV is much lower than the replacement or personal value of an outbuilding. The lower value is a benefit to the owner for tax purposes but it is not reflective of the true replacement or building costs.

Insurance agencies establish values on outbuildings for the purpose of issuing a policy. Two agents were contacted, Sally Culbertson, Owner/Agent with Culbertson Insurance, a locally based agency (Appendix D) and Jeff Williams, Agent, with State Farm Insurance, a nationally recognized agency (Appendix E). Both agencies provide coverage for outbuildings on residential property.

The issuance of residential coverage versus a farm policy is dependent on property use. If the property generates income a farm policy can be established. For Culbertson Insurance the

property must generate a minimum income of 10,000 dollars annually. State Farm has no minimum income requirements.

Farm property is considered “ala carte” coverage according to Sally Culbertson. With a farm policy the structure of an outbuilding and contents are listed as separate on the policy. If the item is not listed and there is a loss the insurance agency is not obligated to replace the item. Most items normally found in an outbuilding are insurable to include tools, tractor, hay and animals (S. Culbertson, personal communication, November 22, 2014)

On a residential property, which produces no income, then the outbuilding is covered under a residential policy. Under a residential policy the outbuilding and contents are covered. The limits of coverage are 10% of the value of the residential structure. There are coverage limitations within the policy for contents. Additional coverage can be purchased under a residential policy (J. Williams, personal communication, November 22, 2014).

Valuation for an outbuilding is established using the same process for both State Farm and Culbertson Insurance. The structural value is determined based on size, shape, exterior components, roof, floor type, electrical, plumbing, heating, significant improvements and the number of closed sides. The variables are provided by the owner of visual inspection by an agent. The variables are then entered into a valuation system to establish an actual cash value. Insurance agencies may adjust the actual cash value based on depreciation. The value of contents is specified by the owner. Both agencies then use a validation database to ensure the item is not over insured.

Discounts are not provided by either State Farm or Culbertson Insurance for outbuildings with fire detection and suppression systems installed.

**What behaviors contribute to outbuilding fires?**

Human caused fires are preventable. Behaviors in outbuildings which elevate fire risk in outbuildings include the unsafe use of heat lamps/tape, smoking, lack of housekeeping and defective wiring. (Equine Risk Management Group, LLC, 2011, p. 4). The Outbuilding Fire Prevention Awareness survey also focused on potential fire risks efforts by owners of outbuildings. The survey focused on the top causes of outbuilding fires which are modifiable behaviors. Causes included heating equipment, electrical, general housekeeping and smoking. The survey also asked respondents to list fire detection and/or suppression equipment in their outbuilding for (Appendix A).

Residents within the LFA service area experience routine outbuilding fires. Question five asked if the respondents have experienced a fire in an outbuilding. Of the responses 9(9%) were yes and 87(91%) were no (Table B5).

As for potential causes 28(29%) of the residents stated they operate heat lamps or heat tape within outbuilding while 68(71%) do not (Table B6). Question seven was used to trend if respondents are aware of the risks associated with operating heating elements within an outbuilding. Respondents are aware of the risks associated with heating elements and responded; strongly disagree 1(1%), disagree 1(1%), neither agree or disagree 4(4%), agree 28(29%) and strongly agree 62(65%) (Table B7). About a third of the respondents, 35(37%), stated they utilize unsafe heating elements however 60(63%) stated they are aware of and use safe heating elements in their outbuildings (Table B11). Question eight addressed smoking. Few owners smoke in their outbuildings as only 2(2%) responded yes and 93(98%) responded no to smoking in outbuildings (Table B8).

Outbuildings are primarily used for storage. An outbuilding appears to be a logical storage location for unused parts/equipment, chemicals and pesticides. Depending on the use of the outbuilding they are more susceptible to the accumulation of debris, cobwebs and dust. All of these items create a fire friendly environment (University of Kentucky, 2011, p. 2). Question nine was used to trend the housekeeping behavior of outbuilding owners. There was a positive tendency when asked if they routinely remove debris, unused parts/equipment, pesticides/chemicals and buildup of cobwebs and dust; strongly disagree 3(3%), disagree 25(26%), neither agree or disagree 14(15%), agree 37(39%) and strongly agree 16(17%) (Table B9).

Other than routine housekeeping the lack of maintenance or improper installation of electrical components is a cause of outbuilding fires. Question 10 asked if owners saw frayed wiring, rusted electrical outlets, corroded receptacles and lights lacking caging or other covers; strongly agree 39(41%), disagree 31(33%), neither agree or disagree 19(20%), agree 5(5%) and strongly agree 1(1%). If there was no electrical installed in the outbuilding respondents were asked to answer neither agree or disagree (Table B10).

### **How are other agencies providing outbuilding prevention?**

The fire service has made little effort to develop outbuilding prevention programs. Utilizing an online search engine revealed organizations, groups and special interest groups have made efforts towards the development of prevention programs.

**Federal and state programs.** Each state cooperates with the through the United States Department of Agriculture, Cooperative Extension Systems Office. Cooperative Extension System is a nationwide, non-credit educational network. This network works through their state offices to provide services at the local level (United States Department of Agricultural, 2014, p.

1). The extension system operates through the Oregon State University (OSU). OSU provides barn prevention efforts through the 4-H program (Oregon State University, 2014). The State of Vermont has established the Vermont Rural Fire Protection Task Force established a sub-committee, the Barn Prevention Task Force. The task force has developed informational videos through the University of Vermont extension video program “Across the Fence”. In addition the task force developed prevention brochures in both English and Spanish (The Vermont Barn Fire Prevention Task Force, n.d., p. 1)

**Special interest groups.** Equine groups have a large interest in outbuilding prevention. Organizations such as The Humane Society of the United States, the National Equine Safety Association and the Equine Risk Management Group produce brochures, checklists, websites and blogs addressing outbuilding prevention (Loveman & Barnard, 2005, p. 29) In addition periodicals such as Equestrian magazine routinely have articles on barn safety (Loveman, 2008).

**Locally.** The Lane County Prevention Co-op works on prevention efforts within the local area. Per Dean Chappell, LFA Code Enforcement Officer, the Co-op focuses on urban interface fire prevention and mitigation efforts. The Co-op encourages residents to establish a defensible space around their outbuildings. This effort is a protective measure for fires which extend towards outbuildings. Traditional fire prevention efforts are the responsibility of individual fire districts and municipalities. He stated there are no local agencies with a specific outbuilding prevention program (D. Chappell, personal communication, October 2, 2014).

**Survey.** The Outbuilding Fire Prevention Awareness survey addressed fire detection and/or suppression efforts, receipt and interest in obtaining of prevention education. Question 12 ask outbuilding owners about the presence of fire detection and/or suppression equipment; 70(74%) answered False (no alarms, sprinklers or extinguisher), 24(25%) had a fire extinguisher,

10(11%) had fire detection installed and 0(0%) had fire suppression (Table B12). Respondents were asked to select all that apply. According to question 13, 32(34%) of the respondents have received outbuilding prevention education however 61(66%) have not (Table B13). Interest is split on receiving outbuilding education, 47(51%) have interest and 46(49%) have no interest (Table B14). Question 15 asked how owners would like outbuilding fire prevention education delivered. Respondents were asked to select all that apply: fire prevention events 40(43%), club or association meetings 12(13%), US mail 49(53%), regularly scheduled school visits 4(4%), fire department website 48(52%) and not interested in receiving outbuilding fire prevention education 25(27%) (Table B15).

This researcher toured a local farm store to observe the type of heating equipment sold to local residents. Photo 3 was taken at Jerry's Home Improvement located at 2600 Highway 99, Eugene, Or, 97402. Jerry's Home Improvement is the largest of this type of store in the LFA service area. The photo is a seasonal display located in the front center aisle of the store. The items on the left are brooder kits however the heating equipment are spring clamp bare bulb lights without safety cages.



Photo 3: Heppel, C. (Photographer). (2014). *Heat lamp sales*. [Photograph].

At the time this photo was taken there were no safe alternative heating elements on this display or available for sale in the store.

## Discussion

### What are the state regulatory requirements for outbuildings?

There are virtually no state fire regulatory requirements for barns and outbuildings. Depending on the occupancy and if the building has routine general public access, is a business or commercial structure then state fire codes apply. State fire code does not apply to structures built on private land for residential and personal use (K. Deschaine, personal communication, October 22, 2014).

However, with the construction of new outbuildings Lane County Code 10 requires accessory buildings and pole barns to be constructed using the Oregon Specialty Structure Code defined in ORS 455.010(8) (Lane Code, 2004). The permitting process ensures the building plans are reviewed and the building inspected upon completion. By building to the code it ensures there are enough exists and utilities such as electrical and plumbing are properly

installed. However there is no guidance on spacing between buildings and after construction the owner can retrofit, change interior design or add utilities to without permitting. This practice is common on existing outbuildings.

Not all outbuildings are required to be permitted. According to Lane County Code 10 uninhabitable one-story detached accessory structures such as tool and storage sheds, playhouses and similar uses are not required to be permitted if the floor area does not exceed 200 square feet and a height of 10 feet (Lane County Land Management, 2014, p. 1). This would also include buildings used as chicken coops, small live stock shelters and equipment storage. There is no regulation on the electrical system or placement of a non-permitted outbuilding. For example a chicken coop built next to the barn or residence which ignites can extend into the next structure.

The above situation is an example of one of the challenges with the infusion “Urban Agriculture”. This is a change in the original intent of the land use rules. The addition of chicken coops, compost piles and larger greenhouses place structures closer together. The small property area reduces the recommended distances of 50-100 feet between buildings (Pennsylvania State University, 2002). Urban farmers use extension cords and make shift wiring to provide electrical power to lighting and heating equipment both the leading causes of barn fires (Evarts, 2012, figure 2).

Another land use change is the partition of land originally zoned farm for farm use and divided into smaller rural residential plots (Lane Code, 1978). Sometimes these smaller plots still have the original large agricultural building on the property. If the new owner has no interest in the outbuilding then it will not be maintained and be a potential fire risk. Smaller plots of land also lead to compression with the construction of new buildings. Because the property is zoned

rural residential but on a larger plot of land the rule of no more than 30% of the total property has no impact (Lane Code, 2004).

Buildings with close proximity to each other exist in rural residential zoning. Photo 2 is an example of an outbuilding within 18 feet of a residential structure. The land is zoned for Christmas tree farming and the outbuilding is classified agricultural. Only the plans were required to be submitted and no permit or post construction inspection are required.



Photo 3: Heppel, C. (Photographer). (2014). *Building compression*. [Photograph].

Within the LFA service area these plots are commonly purchased by hobby farmers. It is not uncommon for two owners to build their outbuildings back to back on the property line to create a sense of more open space and block their view of the neighbors barn. With buildings so close either radiate heat or fire brands, a piece of burning material transferred from the source to an ignition source, could start another fire (Pennsylvania State University, 2002).

Finally, access to a structure in the rural setting can be a challenge. Poorly designed roads, vegetation overgrowth and wash outs are very common and delay response. Chapter five and Appendix D of the Oregon Fire Code establish fire apparatus access road standards (Oregon

Fire Code, 2014). However the purpose of this code is access to a residence. With the construction of an outbuilding there is no requirement for access. Owners of newly constructed outbuildings should be encouraged to follow the same guidelines as for their residence. As a minimum the ground should be able to support heavy equipment in dry and wet weather such as heavy snow and flooding (Loveman, 2008, p. 3).

### **What value do property owners place on outbuildings?**

The value of an outbuilding is variable from owner to owner. The owner of an outbuilding will value the structure based on monetary, importance, usefulness, benefit, utility, and emotion. Newer barns have a higher monetary value while older structures have a high sentimental value. Local farm owner Michael Siewert stated:

“some of our older structures have limited monetary value however still house my tractors and farm implements. If they were lost I couldn’t afford to replace them and would be a loss to my family history. Losing our barn would be like losing family photos and heirlooms in a house fire” (personal communication, October 23, 2014).

Mr. Siewert’s comments tend to echo the respondents to the Outbuilding Fire Prevention Awareness survey (Appendix A). Survey data indicates 64% of the respondents stated their outbuilding was important or very important (Table B2). Outbuilding owners have similarly high value for the contents of the building as 71% reported the contents were important or very important to them (Table B3).

The purpose of an outbuilding can establish the value for the owner. Over 93% of the respondents use their outbuilding for storage. Almost evenly split was were the purposes of recreation (38%), livestock (35%), gardening/greenhouse (30%) and pumphouse (38%) (Table B4). These results are reasonable taking into consideration a typical hobby farm which would

have more than one outbuilding. All rural residential zoned properties are on a well system requiring a pumphouse unless housed in a main structure. One reason hobby farmers purchase small manageable plots of land is to raise one or two heads of cattle or horses is common. The larger property allows for the growing of a garden, orchard or backyard requiring storage for tools and lawn tractors.

Taking into consideration nine percent of the respondents stated they have experienced an outbuilding fire (Table B5) indicates there is a potential for greater fire loss in the future. Nine percent of the entire district is approximate 896 residences considering 9965 addresses are listed. Considering most rural residential properties have multiple outbuildings and many are not permitted or inspected the fire risk is elevated.

Outbuildings with historical or cultural value don't necessarily have a monetary value. The Charles C. Fitch Farmstead is listed on the National Register of Historic places. Rich in cultural value the property and outbuildings have limited monetary value (National Park Service, 2014, table 89000510). The insurance industry views these buildings the same way. According to Culbertson Insurance they avoid barns and outbuildings with cultural and historical value (S. Culberston, personal communication, November 22, 2014). Jeff Williams with State Farm Insurance stated they usually avoid these buildings as well. He also provided an analogy, "if you have an antique chair and you use it, then it's a chair, and not considered a "show piece", however if the chair is on display then the value is higher. Therefore, how do you "rope off" a barn and call it an antique" (J. Williams, personal communication, November 22, 2014)?

Conversely insurance agencies do see a value in outbuildings in general. Agencies use relatively the same method to determine actual cash value of the structure however some coverage's adjust for depreciation. Outbuilding owners must be mindful of the type of coverage

they are purchasing, residential or farm. Coverage on a residential property is limited to 10% of the value of the residence. Unlike the “ala carte” coverage on farm policy, if the item is not specifically listed in the policy the item is not covered (S. Culberston, personal communication, November 22, 2014).

Certainly Lane County places a value on outbuildings for tax purposes. The tax assessment division establishes the RMV and calculates a MAV. The assessors use the Oregon Department of Revenue, Cost Factors for Farms, 2009 edition to assist with establishing the value (I. Matthews, personal communication, December 10, 2014). Most structures have a use and even those not permitted valued for tax purposes. If the building owner disputes the established RMV or MAV there is a property value appeal ([http://www.oregon.gov/dor/PTD/Pages/Appeal\\_P.aspx](http://www.oregon.gov/dor/PTD/Pages/Appeal_P.aspx)). Typically these values are below the true replacement or building costs which is a benefit to the outbuilding owner.

### **What behaviors contribute to outbuilding fires?**

Owners of barns and outbuildings take different approaches to the maintenance and care of their buildings. Some owners have little consideration towards fire prevention. The accumulation of combustible materials, the storage of high quantities of accelerants, lack housekeeping and readily available ignition sources precipitate the potential for combustion within these structures. While 56% of the survey respondents routinely remove debris, dust, cobwebs etc., from their outbuildings 29% do not (Table B9). The purpose of the building might be a consideration in this statistic. If the outbuilding is used for recreation it might therefore be attended to more often than an outbuilding only used for storage.

General housekeeping is a modifiable behavior and extends beyond the interior of an outbuilding. Vegetation, firewood stacked along the wall and loose debris provide flammable

sources for fire from other sources to extend into an outbuilding. An NFPA study identified 8% of the structure fires in barn were caused by exposure to another fire (Evarts, 2012, table 5). The establishment of a defensible space around an outbuilding is just as important as a residence. The Lane County Fire Prevention Co-op is focused on this effort. According to Dean Chappell, Code Enforcement Officer with Lane Fire Authority, the primary goal is residential protection however the same protective concepts can be applied to an outbuilding. Many times the owners are not aware of the risks associated with poor housekeeping (D. Chappell, personal communication, October 2, 2014).

The leading cause of barn fire is heating equipment and is involved in nearly one-quarter (23%) of structure fires in barns (Evarts, 2012, figure 2). Data collected by Lane Fire Authority indicates heating equipment was the cause in 31% of outbuilding fires between 2009 and 2013 (Lane Fire Authority [LFA], 2014). The LFA data is slightly higher than the national statistic however the LFA data is a combination of all outbuilding fires not just barn.

During the survey 94% of respondents replied they were aware of the fire risks associated with operating heating elements within an outbuilding (Table B7). However, 28% of the respondents to the same survey stated they operate heat lamp or heat tape devices within their outbuilding (Table B6). In addition, 63% of the respondents stated the use of safe alternative heating elements within their outbuilding. Nevertheless, even though residents are aware of the risks associated with heat lamp and tape devices use continues and local fires are comparable to national statistics.

Another modifiable behavior is the installation and maintenance of an outbuilding electrical system. Outbuildings are susceptible to the elements and are not as tightly sealed when compared to a conventional residence. Large doors allow the wind and rain to enter and lack of

environmental control equipment allows for exposure to extreme temperature ranges (University of Kentucky, 2011, p. 2). According to the NFPA electrical distribution or lighting equipment was involved in 16% of structure fires in barns (Evarts, 2012, figure 2). Data collected by LFA indicates electrical malfunction was the second leading cause in 18% of the outbuilding fires from 2009-2013 (LFA, 2014). Within the survey respondents were asked if they see frayed wiring, rusted electrical outlets, corroded receptacles and lights lacking caging within their outbuilding. Surprisingly, 74% stated they don't observe electrical hazards within their outbuilding (Table B10). Respondents were asked to select neither agree nor disagree if there was no electrical power to their outbuilding. Of the respondents 20% stated they had no electrical power to their outbuilding. However, 6% stated they have identified electrical hazards within their outbuilding.

Farmers should not store hay with the moisture content above 15%. The combination of moisture, oxygen and pressure create an environment for microbial growth (Fetzer, 2014, para. 4). There are a couple of recommendations to remedy this hazard. First is to not bale moist hay. However if the hay is baled under less than ideal conditions the moisture of the hay must be monitored. Hay moisture can be monitored using a moisture probes are readily available at local farm stores. If the hay moisture is above 15% then monitoring the internal temperature of the bales twice a day is recommended. If the temperature rises above 150 degrees remove the bales from the storage area and allow air to circulate and cool the bale. If the temperature exceeds 175 degrees call the fire department (Fetzer, 2014, table 1). The monitoring of the hay can prevent the loss of the product and the storage facility.

Spontaneous combustion of hay is another modifiable behavior. The bacteria breaking down and creating heat is a natural process. The NFPA lists spontaneous combustion or chemical

reaction as a cause in 3% of barn fires (Evarts, 2012, figure 2). Between 2009 and 2013 Lane Fire Authority data indicates two fires were caused by spontaneous combustion. However there are fires with an “undetermined” cause which spontaneous combustion could have been a cause (LFA, 2014).

While smoking remains a potential cause of outbuilding fires LFA data indicates smoking has not been the cause of an outbuilding fire since 2009. However, 2% of the respondents stated they smoke in outbuildings (Table B8). When Jeff Thompson, outbuilding owner, was asked why he smokes in the outbuilding he responded “because I can’t smoke in the house” (J. Thompson, personal communication, November 16, 2014). Similarly, hazardous items are bulk stored in outbuildings because residents recognized the life safety threat of the products in stored in their homes.

### **How are other agencies providing outbuilding prevention?**

The rural community LFA serves leans towards a sense of independence. The exchange of rural living for the conveniences of city services tends to drive citizens to be more independent. The distance from convenience necessitates the hobby farmer have a lawn tractor, hay storage, a generator for power outages, flammable fuels, oils and other accelerants all stored in outbuildings. But when fire strikes the rural resident quickly forgets that in exchange independence is the acceptance of a lower level of service from the fire department such as staffing, response times and equipment capability. Living in the rural setting should drive a greater sense of pride toward fire prevention efforts.

LFA community prevention efforts have been primarily focused on fire detection and response actions such as call 911, stop-drop-roll, smoke detectors and family escape plans. According to Tressa Miller, Fire Prevention Specialist with Lane Fire Authority, efforts are also

directed at mitigating fire damage through fire apparatus access requirements, fire extinguishers, sprinklers and defensible spaces around buildings. Also, the focus has been on the residence and not necessarily other buildings. When asked why residences versus other buildings she responded “the fire district has no authority over a residential property, however if an occupancy is addressed in the adopted fire code then enforcement has a greater impact” (T. Miller, personal communication, October 15, 2014).

Locally, neither the Lane Fire Prevention Co-op nor local fire departments have a specific outbuilding prevention program. Nonetheless current fire prevention efforts do carry over into general fire prevention efforts. For example, not smoking, the use of smoke detectors and availability of fire extinguishers. According to survey results 74% of outbuilding owners had no alarm, sprinklers or fire extinguisher installed in their outbuilding. However 11% stated they have fire detection but no respondent has sprinklers installed (Table B12). Nationally, only 2% of the structure fires in barns had a detector present (Evarts, 2012, table 13).

The difficulty can be with the type detection device available and utilized. Traditional residential smoke detectors are typically not heard because of the distance to the residence, especially if the owner locates the outbuilding a minimum of 50 feet from other structures. Residential devices are also susceptible to dust, humidity and temperature. Thermal detectors are a better option with flame detectors being the best however expensive to install (Pennsylvania State University, 2002, p. 10).

It is concerning only 25% of the respondents to the survey had a fire extinguisher within their outbuilding (Table B12). Traditional fire prevention education encourages the presence of a fire extinguisher however when considering the placement of an extinguisher in an outbuilding there are other considerations. In larger barns fire extinguishers should be placed every 30-40

feet because of the limited size a portable fire extinguisher it could be ineffective if the fire spreads too quickly. It only takes 2-3 minutes to burn a 10 foot diameter area of hay access to a fire extinguisher could quickly the fire growth (Pennsylvania State University, 2002, p. 5). In addition, an exterior water supply with a 5/8 inch rubber or vinyl hose the length of the barn is preferred (Loveman & Barnard, 2005, p. 21).

Clearly, education plays a significant role in fire prevention. The Outbuilding Fire Prevention survey asked respondents if they have received outbuilding fire prevention education. The result was 34% have received education and 66% have not. Since local agencies do not provided this education it is reasonable the knowledge was obtained by other organizations. This could be attributed to the agricultural nature of the fire district. The United States Department of Agriculture, Cooperative Extension Systems Office, Cooperative Extension System provides education on prevention through its association with the Oregon State University (United States Department of Agricultural, 2014, p. 1). These programs focus on education and economic impact of barn fires. However education provided outside the fire service by special interest groups such as the The Humane Society of the United States, the National Equine Safety Association and the Equine Risk Management Group provide education focused on equestrian barn fire prevention (Loveman & Barnard, 2005, p. 29). Nevertheless these prevention recommendations presented by these organizations apply to outbuilding fire prevention.

Given that 66% of the survey respondents stated they have not received outbuilding prevention education there is an education short fall (Table B13). Nonetheless there is a split interest in receiving education as 51% of the respondents are interested and 49% are not (Table 14). Those interested in receiving education their preference was via US Mail (53%), fire department website (52%), and during fire department prevention events (43%) (Table B15). The

preferred delivery of education may indicate the generational differences within the district. Preference by US Mail could be an older generation versus preference towards electronic media a younger generation.

The availability of safe alternative heating elements may contribute to the use of unsafe heat lamps and heat tape. During the survey 94% of respondents replied they were aware of the fire risks associated with operating heating elements within an outbuilding (Table B7). However, 28% of the respondents to the same survey stated they operate heat lamp or heat tape devices within their outbuilding (Table B6). Photo two demonstrates readily available spring clamp unprotected bulb heat lamp from a local distributor. The display location and ease of use make this device attractive. However these lamps are used in conjunction with make shift brooder brings a heat source to close to combustibles ("Homemade Brooder," 2013, p. 1). In addition, lack of alternate safe heating element options leaves the consumer without choices.

### **Recommendations**

Lane Fire Authority should consider implementing an outbuilding fire prevention program with the goal of reducing the number of outbuilding fires. By adding outbuilding education to the current prevention program the awareness can be raised with current owners and in schools with children who a future owners. Future efforts toward outbuilding fire prevention efforts should follow the U.S. Fire Administration's recommended mitigation strategies. The recommended strategies are to integrate risk-reduction prevention interventions through education, engineering, enforcement, economic incentives and emergency response (U.S. Fire Administration [USFA], 2012, p. 1-11). The following are recommendations for Lane Fire Authority to proceed with the next step to implement an outbuilding fire prevention program.

1) Develop distributable outbuilding fire prevention literature. Literature should be deliverable via multiple venues, internet, US mail, brochures and email. Literature should focus on heat elements, electrical and modifiable behaviors.

2) Engage with the Lane Prevention Fire Prevention Coop to obtain countywide support and facilitate information distribution.

3) Establish relations with organizations that can benefit from such a program. Consideration should be Oregon State University extension program, 4-H, Future Farmers of America, Equine clubs or clubs and horse arena owners.

4) Educate responders on behaviors leading to barn fire indicators, risks and animal evacuation.

5) Engage with local distributors of heat element equipment to make available safe alternative heating equipment and distribute prevention material.

Outbuilding fire prevention efforts are virtually nonexistent in the State of Oregon. This is an opportunity for Lane Fire Authority to take the lead in spearheading a notable effort. Engagement with other fire prevention partners, special interest groups, farmers and equine facility owners could lead to a decrease in outbuilding fire loss. The development of this program directly supports the Lane Fire Authority organization values of service to the community and pro-activity (LRF/R, 2008, p. 2).

## References

- Abbott, K. (2012). What (or Who) Caused the Great Chicago Fire? Retrieved from <http://www.smithsonianmag.com/history/what-or-who-caused-the-great-chicago-fire-61481977/?no-ist>
- Aherns, M. (2013). *Lightning fires and lightning strikes*. Retrieved from National Fire Protection Association: <http://www.nfpa.org/~media/Files/Research/NFPA%20reports/Major%20Causes/oslightning.pdf>
- Auer, M. J. (1989). *The preservation of historic barns*. Retrieved from National Park Service, Department of the Interior: <http://www.nps.gov/tps/how-to-preserve/briefs/20-barns.htm>
- Bulb Town. (2014). [http://www.bulbtown.com/250R40\\_10\\_120V\\_250\\_WATT\\_RED\\_SAFETY\\_COATED\\_HEAT\\_p/03510.htm](http://www.bulbtown.com/250R40_10_120V_250_WATT_RED_SAFETY_COATED_HEAT_p/03510.htm)
- City of Eugene. (2013). *Urban animal keeping*. Retrieved from <http://www.eugene-or.gov/DocumentCenter/View/10967>
- Equine Risk Management Group, LLC. (2011). *Barn fire safety*. Retrieved from [http://www.horse-safety.com/pdfs/DISASTERS\\_2011\\_ERMG\\_BARN\\_FIRE\\_SAFETY.pdf](http://www.horse-safety.com/pdfs/DISASTERS_2011_ERMG_BARN_FIRE_SAFETY.pdf)
- Evarts, B. (2012). *Home and non-home structure fires caused by lightning fires reported to local fire departments*. Retrieved from National Fire Protection Association: <https://www.nfpa.org/~media/Files/Research/NFPA%20reports/Major%20Causes/OSHomeFiresFromLightning.pdf>

Evarts, B. (2012). *Structure fires in barns*. Retrieved from National Fire Protection Association:

<http://www.nfpa.org/research/reports-and-statistics/fires-by-property-type/storage/barns>

Exemption of agricultural buildings, agricultural grading and equine facilities, 455 Oregon

Revised Statute § 315(2) (2013).

Fetzer, L. M. (2014). *Preventing fires in baled hay and straw*. Retrieved from Extension:

<http://www.extension.org/pages/66577/preventing-fires-in-baled-hay-and-straw#.VJjBZ8Cec>

Fire accelerant. (2014). In *Wikipedia*. Retrieved December 1, 2014, from

[http://en.wikipedia.org/wiki/Fire\\_accelerant](http://en.wikipedia.org/wiki/Fire_accelerant)

History Channel. (2014). Chicago fire of 1871. Retrieved from

<http://www.history.com/topics/great-chicago-fire>

Homemade chicken brooder designs & pictures [Online forum comment]. (2013, June 7).

Retrieved from <http://www.backyardchickens.com/a/homemade-chicken-brooder-designs-pictures>

Lane Code, 10 Lane County Code § 10.130-10(7) (2004).

Lane Code, 10 Lane County Code § 10.130-42(1) (1978).

Lane Code, 11 Lane County Code § 11.010 (2004).

Lane County Assessment and Taxation. (2014). *Valuation*. Retrieved from

<http://www.lanecounty.org/Departments/AssessmentandTaxation/Pages/Valuations.aspx>

Lane County Land Management. (2014). *Residential work exempt from building permits*.

Retrieved from

<http://www.lanecounty.org/Departments/PW/LMD/Build/Documents/WorkExemptFromPermit.pdf>

Lane Fire Authority. (2014). *Fire cause* [Data file]. Veneta, Or: Lane Fire Authority.

Lane Rural Fire/Rescue. (2008). *Lane Rural Fire Rescue Master Plan 2008-2011*. Eugene, OR: Author.

Lane code, 10 Lane County Code § 10.135-10(3) (2004).

Livestock Welfare. (n.d.). *Barn fires involving livestock*. Retrieved from

<http://www.livestockwelfare.com/wp-content/uploads/barn-fires-first-responders-national-09.pdf>

Loveman, L. (2008). Fire safety: making every moment count [Magazine]. *Equestrian*. Retrieved from

[https://www.usef.org/\\_staffIframes/pressbox/images/magazine/pdf/04082008044028.pdf](https://www.usef.org/_staffIframes/pressbox/images/magazine/pdf/04082008044028.pdf)

Loveman, L. (2013). Holiday issue [Special issue]. *Equine Wellness*, 8(6). Retrieved from

<http://www.equinewellnessmagazine.com/articles/winter-fire-safety/>

Loveman, L., & Barnard, R. (2005). *Making your horse barn fire safe*. Retrieved from The

Humane Society of the United States: <http://www.humanesociety.org/assets/pdfs/Horse-Barn-Fire-Publication.pdf>

National Fire Protection Association. (2013). *NFPA 150*. Retrieved from

<http://www.nfpa.org/codes-and-standards/document-information-pages?mode=code&code=150>

National Oceanic and Atmospheric Administration. (2014). *NOAA knows...lightning*. Retrieved

from [http://www.lightningsafety.noaa.gov/resources/lightning3\\_050714.pdf](http://www.lightningsafety.noaa.gov/resources/lightning3_050714.pdf)

National Park Service. (2014). National register of historic places. Retrieved from

<http://www.nps.gov/nr/>

- National Park Service. (2014). *Spreadsheet of NRHP list* [Data file]. Retrieved from [http://www.nps.gov/nr/research/data\\_downloads/nrhp\\_links.xlsx](http://www.nps.gov/nr/research/data_downloads/nrhp_links.xlsx)
- Oregon Fire Code, 503 Fire Service Features § 503.1 (2014).
- Oregon State University. (2014). <http://oregon.4h.oregonstate.edu/>
- Oregon Structural Specialty Code, Appendix C Oregon Building Code § C102 (2007).
- Oregon century farm and ranch viewer* [Database record]. (2014). <http://ocfrp.library.oregonstate.edu/public/farms>
- OregonLaws.org. (2013). [http://www.oregonlaws.org/glossary/definition/accessory\\_building\\_or\\_structure](http://www.oregonlaws.org/glossary/definition/accessory_building_or_structure)
- Pennsylvania State University. (2002). *Fire safety in horse stables*. Retrieved from <http://pubs.cas.psu.edu/freepubs/pdfs/ub034.pdf>
- ROBwithaB. (2013, July 22). *How to make fire with reading glasses. 101 ways to make fire #20* [Video file]. Retrieved from <https://www.youtube.com/watch?v=ddHZNbAD2EE>
- Research methods knowledge base. (2006). <http://www.socialresearchmethods.net/kb/questype.php>
- The Vermont Barn Fire Prevention Task Force. (n.d.). <http://www.nvtrcd.org/bfptf.html>
- U.S. Fire Administration. (2009). *Strategic plan fiscal years 2010-2014*. Retrieved from [https://www.usfa.fema.gov/downloads/pdf/strategic\\_plan.pdf](https://www.usfa.fema.gov/downloads/pdf/strategic_plan.pdf)
- U.S. Fire Administration. (2013). *Executive analysis of community risk reduction* [Student manual]. Emmitsburg, MD: Author.
- United States Department of Agricultural. (2014). <http://www.csrees.usda.gov/Extension/>

United States Fire Administration. (2011). *Becoming a community risk-reduction champion* [Coffee break training]. Retrieved from

[https://www.usfa.fema.gov/downloads/pdf/coffee-break/fm/fm\\_2011\\_1.pdf](https://www.usfa.fema.gov/downloads/pdf/coffee-break/fm/fm_2011_1.pdf)

United States Fire Administration. (2011). *Becoming a community risk-reduction champion*.

Retrieved from [https://www.usfa.fema.gov/downloads/pdf/coffee-break/fm/fm\\_2011\\_1.pdf](https://www.usfa.fema.gov/downloads/pdf/coffee-break/fm/fm_2011_1.pdf)

University of Kentucky. (2011). *Preventing barn fire; tips for horse owners*. Retrieved from

<http://www2.ca.uky.edu/agc/pubs/asc/asc184/asc184.pdf>

**APPENDIX A**

## Lane Fire Authority Barn and Outbuilding Fire Prevention Survey

Greetings,

My name is Chris Heppel, and I am the Division Chief with Lane Fire Authority in Veneta, Oregon. I am currently enrolled in the National Fire Academy Executive Fire Officer Program, and I am completing data collection for my Applied Research Project. This paper is focused on barn and outbuilding fire prevention within the Lane Fire Authority service area and neighboring fire districts.

I am requesting your assistance in the completion of a questionnaire regarding the existence of barns and outbuildings on residential property, how owners value outbuildings, fire risk behaviors and prevention education. There are 15 questions. It should take no more than five-to-seven minutes to complete the questionnaire.

Please complete the questionnaire by October 15<sup>th</sup>. The link below is specific to this project and your answers will remain anonymous.

Thank you in advance for your time and assistance in this project.

[https://www.surveymonkey.com/s/outbuilding\\_fire\\_survey](https://www.surveymonkey.com/s/outbuilding_fire_survey)

Chris Heppel

Assistant Chief

Lane Fire Authority

541-688-1770

## Outbuilding Fire Prevention Awareness

### What is an outbuilding?

For the purposes of this survey an outbuilding is defined as a building, such as a shed, barn, or garage, on the same property but separate from the primary structure, such as a house.

#### 1. I have an outbuilding on my residential (own or rent) property.

- True  
 False

### Outbuilding Value

For the purposes of this survey, importance is the state or fact of being of great significance or value.

#### 2. How important is your outbuilding? Do not consider the contents of the outbuilding.

Very Unimportant	Somewhat Unimportant	Somewhat Important	Important	Very Important
------------------	----------------------	--------------------	-----------	----------------

#### 3. How important are the contents of your outbuilding? Do not consider the physical outbuilding.

Very Unimportant	Somewhat Unimportant	Somewhat Important	Important	Very Important
------------------	----------------------	--------------------	-----------	----------------

#### 4. What is the purpose of the outbuilding? Choose all that apply.

- Recreation  
 Storage/Garage  
 Commercial  
 Livestock  
 Gardening/Greenhouse  
 Pumphouse



**12. My outbuilding is equipped with fire detection (alarm) and/or suppression (sprinklers) systems. Select all that apply.**

- False (no alarms, sprinklers or extinguisher)
- Fire Extinguisher
- Fire Detection
- Fire Suppression

**Prevention Education**

**13. I have received outbuilding fire prevention education.**

- True
- False

**14. I am interested in receiving outbuilding fire prevention education.**

- True
- False

**15. How would you like outbuilding fire prevention education delivered? Please select all that apply.**

- Fire Department prevention events (fire safety week, station tours, etc)
- Club or Association meetings (VFW, 4-H, FFA, Grange, Rotary, etc)
- US Mail (semi-annual fire district newsletter or informational card)
- During regularly scheduled fire department school visits
- Fire Department Website
- I'm not interested in receiving outbuilding fire prevention education

**APPENDIX B**

## Outbuilding Fire Prevention Awareness Survey Results

Surveys Sent:

Total 9965  
 Surveys Received: 127  
 Percent Returned: 1.2%

Response percent rounded to nearest whole number.

Question 1: I have an outbuilding on my residential (own or rent) property.

If the respondent answered “false” the survey was ended.

Table B1

*Presence of an outbuilding*

	Responses Count	Response Percent
True	99	78%
False	28	22%

Question 2: How important is your outbuilding? Do not consider the contents of the outbuilding.

Table B2

*Value of outbuilding structure*

	Responses Count	Response Percent
Very Unimportant	11	11%
Somewhat Unimportant	10	10%
Somewhat Important	14	14%
Important	25	26%
Very Important	37	38%

Question 3: How important are the contents of your outbuilding? Do not consider the physical outbuilding.

Table B3

*Value of outbuilding contents*

	Responses Count	Response Percent
Very Unimportant	10	10%
Somewhat Unimportant	8	8%
Somewhat Important	10	10%
Important	30	31%
Very Important	39	40%

Question 4: What is the purpose of the outbuilding? Choose all that apply.

Table B4

*Purpose of outbuilding*

	Responses Count	Response Percent
Recreation	37	38%
Storage/Garage	90	93%
Commercial	6	6%
Livestock	34	35%
Gardening/ Greenhouse	29	30%
Pumphouse	37	38%

Question 5: I have experienced a fire in an outbuilding.

Table B5

*Outbuilding fire experience*

	Responses Count	Response Percent
True	9	9%
False	87	91%

Question 6: I operate heat lamp or heat tape devices within my outbuilding.

Table B6

*Heat lamp or heat tape use*

	Responses Count	Response Percent
True	28	29%
False	68	71%

Question 7: I am aware of the fire risks associated with operating heating elements within outbuildings.

Table B7

*Heating elements fire awareness*

	Responses Count	Response Percent
Strongly Disagree	1	1%
Disagree	1	1%
Neither Agree or Disagree	4	4%
Agree	28	29%
Strongly Agree	62	65%

Question 8: I smoke in outbuildings

Table B8

*Smoking in outbuildings*

	Responses Count	Response Percent
True	2	2%
False	93	98%

Question 9: I routinely remove any piles of debris, unused parts/equipment, pesticides/chemicals, buildup of cobwebs and dust in the ceiling from my outbuilding.

Table B9  
*Housekeeping behavior*

	Responses Count	Response Percent
Strongly Disagree	3	3%
Disagree	25	26%
Neither Agree or Disagree	14	15%
Agree	37	39%
Strongly Agree	16	17%

Question 10: I routinely see frayed wiring, rusted electrical outlets, corroded receptacles and lights lacking caging or other covers in my outbuilding. If you have no electrical power to your outbuilding select neither agree or disagree.

Table B10  
*Electrical hazards*

	Responses Count	Response Percent
Strongly Disagree	39	41%
Disagree	31	33%
Neither Agree or Disagree	19	20%
Agree	5	5%
Strongly Agree	1	1%

Question 11: I use safe alternative heating elements within my outbuilding.

Table B11  
*Use of safe alternative heating elements*

	Responses Count	Response Percent
True	60	63%
False	35	37%

Question 12: My outbuilding is equipped with fire detection (alarm) and/or suppression (sprinklers) system. Select all that apply.

Table B12

*Use of detection and suppression systems*

	Responses Count	Response Percent
False (no alarms, sprinklers, or extinguisher)	70	74%
Fire Extinguisher	24	25%
Fire Detection	10	11%
Fire Suppression	0	0%

Question 13: I have received outbuilding fire prevention education.

Table B13

*Prevention education*

	Responses Count	Response Percent
True	32	34%
False	61	66%

Question 14: I am interested in receiving outbuilding prevention education.

Table B14

*Interest in receiving prevention education*

	Responses Count	Response Percent
True	47	51%
False	46	49%

Question 15: How would you like outbuilding fire prevention education delivered? Please select all that apply.

Table B15

	Responses Count	Response Percent
Fire Department prevention events (fire safety week, station tours, etc)	40	43%
Club or Association meetings (VFW, 4-H, FFA, Grange, Rotary, etc)	12	13%
US Mail (semi-annual fire district newsletter or informational card)	49	53%
During regularly scheduled fire department school visits	4	4%
Fire Department Website	48	52%
I'm not interested in receiving outbuilding fire prevention education	25	27%

APPENDIX C

Outbuilding Fire Prevention Awareness Survey Postcard

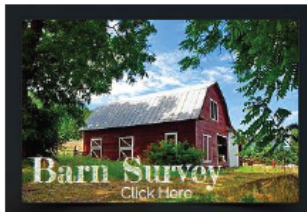


Outbuilding Fire Prevention Tips



- Avoid the use of heating elements, heat lamps, heating tape etc.
- Practice good housekeeping; cobwebs, dust and loose hay are combustibles!
- Clean stalls & pens regularly
- NO SMOKING! Strictly enforced in & around buildings
- Maintain **Warning/Protection Systems**:
  - Heat Detectors  Sprinklers  Fire Extinguishers
- Remove combustible materials from around your buildings:
  - Brush Weeds  Tall Grass  Debris  Building Materials  Fire Wood
- Ensure Fire Department access to all areas of your property in case of emergency
- Have an Evacuation Plan and PRACTICE IT!!

PRSRST STD  
 U.S. POSTAGE PAID  
 SALEM, OR  
 PERMIT NO. 178



T1 P1 \*\*\*\*\*AUTO\*\*3-DIGIT 974  
 LRF/R PATRON  
 91116 POODLE CREEK RD  
 NOTI OR 97461-9735



Take Our Survey At [www.lanefire.org](http://www.lanefire.org)

**APPENDIX D**

Interview Questions for Culbertson Insurance, Sally Culbertson, Owner/Agent

November 22, 2014

1. *Do you insure barns, outbuilding, sheds etc on residential properties?*

Yes. Owners have a choice of coverage either on their residential policy or establishing a farm policy. We establish a farm policy if the farm generates income more than \$10,000 annually. If not covered by a farm policy then the barn or outbuilding is covered under a residential property policy. The barn or outbuilding is covered for up to 10% of the value of the residence. Additional coverage can be purchased under a residential policy if needed.

2. *Are the contents and structure insured differently?*

Yes. Under a residential policy there are established limits of coverage for the contents of a barn or outbuilding. If the owner has a farm policy then it's what I commonly call "ala carte" coverage. The owner must specify what contents they want covered. For example, tractor, tools, livestock, hay etc.

3. *How do you determine the value of the structure?*

The use or occupancy of the building is determined first. Examples of types of occupancies would be horse arenas, stables, dairy, storage, machine shop and feed/agricultural storage. Value is determine based on size, shape, building materials, flooring, number of closed sides, electrical, plumbing and types of doors. The variables are supplied either by the owner, through agent inspection or county tax information. The variables are then entered into a valuation database to determine the actual cash value of the barn or outbuilding then adjusted for depreciation. Our agency uses a valuation database developed by Marshall and Swift.

4. *How do you determine the value of contents?*

The owner specifies those contents they wish to have coverage. The owner must specify the value of each item to be covered. The value is then verified using a valuation database or other means. The verification is to ensure a \$2000 tractor is not insured for replacement coverage of \$10,000.

5. *Are there clients who don't insure their outbuildings? If so, what percentage?*

Yes, however it's difficult to determine how many owners don't insure their outbuildings. If the owner doesn't declare the existence or request for coverage then we don't issue a policy. Some owners wouldn't replace the building if it was a loss because they have no

use for the structure. For example, if they purchased land which were a subdivided large farm and their property has a barn they may not have a use for the structure. However, I have one client who turned the barn into a rental facility for family gatherings, company picnics and weddings. This created a commercial use which changed the type of policy. Overall, from an insurance agency perspective most barns and outbuildings are of low value in the big picture, unless they are used for commercial purposes.

6. *Do you provide discounts for clients who have detection and suppression devices installed in their outbuildings?*

No. We don't provide a discount for detection and suppression devices installed in barn or outbuildings, only for the residence.

7. *Do you provide coverage for barns and outbuildings of historical or cultural value?*

No, and most agents will avoid them.

**APPENDIX E**

Interview Questions for Jeff Williams, State Farm Insurance Agent

November 22, 2014

1. *Do you insure barns, outbuilding, sheds etc on residential properties?*

Yes. Owners have a choice of coverage either on their residential policy or establishing a farm policy. The difference is based on usage of the property. Is the property used for profit or residential only? State Farm doesn't have a minimum income to establish a farm policy. This minimum varies between insurance agencies. If the barn or outbuilding is covered under a residential property policy the barn or outbuilding is covered up to 10% of the value of the residence. This is standard within State of Oregon insurance laws. Additional coverage can be purchased individually if desired.

2. *Are the contents and structure insured differently?*

Yes. Usually under a single farm policy the contents and structure are listed as separate coverage's on the policy. Under a residential policy there are established limits of coverage for the contents of a barn or outbuilding.

3. *How do you determine the value of the structure?*

Value is determine based on size, shape, exterior components, roof, flooring type, number of closed sides, electrical, plumbing, heating and significant improvements. The variables are then entered into a valuation database to determine the actual cash value of the barn or outbuilding. The actual cash value is not adjusted for depreciation. The reason is to provide for full replacement cost. State Farm uses an internal valuation database.

4. *How do you determine the value of contents?*

The owner has two options. For high value items we can issue specific coverage on the policy. For other items coverage is limited to replacement costs. After the loss the owner must purchase the replacement item then submit the receipt for reimbursement. The specifies those contents they wish to have coverage. The owner must specify the value of each item to be covered. The value is then verified using a valuation database. The verification is to ensure a \$2000 tractor is not insured for replacement coverage of \$10,000.

5. *Are there clients who don't insure their outbuildings? If so, what percentage?*

Yes, however it's difficult to determine how many owners don't insure their outbuildings. What I've experienced is the older the building the less likely the owner is to insure the building. If the building is newer, they usually have some level of coverage. Also, when

I've seen older buildings burn down the owners usually replace it with a different type of building. For example, the old barn burns down the owner replace it with a shop or greenhouse.

6. *Do you provide discounts for clients who have detection and suppression devices installed in their outbuildings?*

No. We don't provide a discount for detection and suppression devices installed in barn or outbuildings, only for the residence.

7. *Do you provide coverage for barns and outbuildings of historical or cultural value?*

Not usually because they are difficult to place a value on. It's similar to placing a value on antiques. If you use an antique chair and there is a loss, we replace the chair, not an antique chair. If the chair is considered a "show piece" and is on display then the value is much higher. Hence most antique collectors are self-insured. This would be an even more difficult process for a barn or outbuilding

**APPENDIX F**

## Interview Questions for Isabelle Matthews, Lane County Assessment and Taxation

December 10, 2014

*1. Does Lane County tax barns, outbuilding, sheds etc on residential properties?*

Yes. In 1997, voters approved Measure 50, which separated Real Market Values (RMV) from Assessed Values (AV). Measure 50 also created a new value called Maximum Assessed Value (MAV) and capped its growth at 3%. Once values are established annually, the three percent is added to the value of the property for taxation purposes.

RMV is typically the price your property would sell for in a transaction between a willing buyer and a willing seller on January 1, the assessment date for the tax year. RMV can increase either by 3% annually or more if there are changes to the property.

AV is the lower of its real market value or its maximum assessed value.

Each year, the county assessor determines the property's real market value and calculates its maximum assessed value. Property owners are taxed on the lesser of the two, which is called the assessed value.

The concern is the MAV could exceed the RMV. To alleviate this concern Senate Bill 126 was introduced and approved so the MAV cannot exceed the RMV. This situation was realized when the market depressed from 2008-2012.

*2. How is Real Market Value determined?*

I was directed to reference the Lane County Assessment and Taxation website. According to the county website, "To estimate the initial RMV for your property, your county assessor appraises your property using a physical inspection and a comparison of market data from similar properties. For ensuing tax years, your county assessor may study trends of similar properties to update the RMV for your property. Some property, such as farm or forest property, may be subject to special valuation processes"(Lane County Assessment and Taxation, 2014, para. 1).

Typically, the RMV created for barns and outbuildings is much lower than the replacement value or personal value of the structure. This is a benefit to the property owner as their taxes will be lower however is not reflective of true replacement or building costs.

*3. Are special valuation process for barns and outbuildings?*

Yes, assessors utilize the Oregon Department of Revenue, Cost Factors for Farms, 2009 Edition. Available at: <http://www.oregon.gov/dor/PTD/docs/303-417.pdf>