STRUCTURE TRIAGE DURING WILDLAND/URBAN INTERFACE/INTERMIX FIRES

STRATEGIC ANALYSIS OF FIRE DEPARTMENT OPERATIONS

BY: Keith Brown
Lake Dillon Fire Authority
Silverthorne, CO

An applied research project submitted to the National Fire Academy
as part of the Executive Fire Officer Program

February 1994

ABSTRACT

This research project analyzed the factors that influence the survivability of structures located in wildland/urban interface and intermix zones. The purpose of the project was to produce a short, simple checklist fire officers can use to do structure triage during a wildland conflagration.

This research employed both historical and action research (a) to identify attributes of land and buildings that compromise firefighter safety during structure-protection operations, (b) to identify those physical features of a structure and its environs that serve as reliable predictors of structure survivability during wildfire, (c) to assess which survivability predictors are of practical value in performing structure triage, and (d) to develop guidelines that help direct the actions of firefighters undertaking structure protection in scarce-resource situations occasioned by uncontrollable wildland fires.

The principal procedure employed was review of instructional materials and wildfire case studies focusing on structure protection in wildland/urban interface/intermix areas. Data were compiled in table form to facilitate comparison of survivability factors discussed in the literature.

The major finding of this research was that a small number of factors can be utilized to accurately predict structure survivability during wildland fires. Principal among those factors were accessibility, roof construction, defensible space, and slope of adjoining terrain. The research findings were incorporated into a checklist appropriate for field use during structure/ wildland fires.

The recommendations resulting from this research included (a) incorporating use of the checklist into operational procedures, (b) training fire officers in the use and limitations of the checklist, (c) providing periodic updates to the checklist, and (d) utilizing the checklist in preincident planning to better inform the fire department and property owners of risks associated with building in or near wildlands.

INTRODUCTION

The Lake Dillon Fire Authority (LDFA) has long recognized the severe wildland fire hazards that menace structures located on or near the forest and brush lands that comprise the vast majority of its response area. To the extent allowed by available resources, LDFA actively participates in community planning, public education, and hazard-reduction programs aimed at mitigating those hazards. In spite of those efforts, LDFA expects that someday an uncontrollable wildland fire will occur. Such a fire is likely to endanger a large number of structures and force fire officers to pick and choose which structures to defend. A major problem those officers would face today is lack of a standardized, systematic procedure for effecting structure triage.

The purpose of this research project was to develop a short, simple checklist fire officers can use when doing structure triage during a wildland fire. Historical and action research methods were employed to answer the following questions:

1. What attributes of premises (i.e., land and buildings) located in the interface/intermix zone reduce firefighter safety to an unacceptable level?

2. What physical features of a structure and its environs are reliable and accurate predictors of its survivability during a wildland/urban interface/intermix fire?

3. Which of the most significant of those predictors can be quickly evaluated with reasonable accuracy and precision?

4. What evaluation results suggest a structure (a) should be defended, (b) should be written off, or (c) will probably survive without active structure protection?

BACKGROUND AND SIGNIFICANCE

Current demographic changes in Summit County, Colorado, continue the trend of the last decade in at least one way important to the fire service: homes and apartment buildings are being built at an increasing rate in the wildland/urban interface and intermix zones. Those zones comprise the entire remaining undeveloped land in Summit County, a rural, forested, high-country area consisting of narrow river valleys delineated by the 14,000-foot peaks of three major mountain ranges. With existing buildout less than 50 percent of projected development, and with the average annual population increase in the county running at 3.3 percent (2.4 times the Colorado growth rate), the probability for a wildland fire that threatens structures multiplies annually (CACI, 1994).

The Summit County fire chiefs have stated publicly that the question with which the public should concern itself is not *if* major structure losses will occur from wildland fires but *when* such losses will occur. They have admonished residents that "there are never enough resources to protect every threatened structure--hard decisions will be made as to when and where intervention will occur" (Summit County Fire Mitigation Program, n.d., p. 2). The chiefs pointed to owner apathy and unwillingness to practice good structure-protection behaviors (e.g., defensible space) as the principal reasons for their forecast.

As part of the implementation of the Summit County Fire Hazard Mitigation Plan for New Construction (Board of County Commissioners, 1992), LDFA and the Colorado State Forest Service (CSFS) identified wildfire hazard ratings for subdivisions. CSFS determined those ratings primarily through an assessment of fuel types, fuel loading, and topographic characteristics that affect wildfire behavior. Architectural and construction features of structures played no significant role in CSFS's determinations.

Meager resources have not permitted LDFA to accomplish prefire planning of individual structures. Preplans would document the defensibility of each structure. Absent such preplans, LDFA responders will likely be compelled to do structure triage during fires in wildland/urban interface/intermix zones. [Given the rural (rather than urban) character of Summit County (population approximately 12,000) and the topography described above, Winston's (1994) term "structural/wildland interzone" seems more fitting than "wildland/*urban* interface/intermix." Therefore, the term structural/wildland interzone will be used hereinafter and refers to both interface and intermix areas.]

The nature and objectives of structure triage are described in the manual for the National Fire Academy's *Strategic Analysis of Fire Department Operations* course as follows (National Fire Academy, 1990):

> "Triage" originates from a word meaning to divide into three parts. Basically, it amounts to: 1) eliminate the hopeless; 2) ignore the unnecessary; 3) deal with the rest. While we, as firefighters, hesitate to write off any threatened structure, triage is necessary to prevent futile waste of effort. Trying to save more than you realistically can might very well result in the loss of everything, including homes you could have saved. Forget the structures that are impossible or too dangerous to defend; leave those that are too well involved to save. Ignore, for now, the structures needing little or no protection. Concentrate on seriously threatened but savable structures.

> What is or is not feasible depends on the overall situation: what the fire does, and what resources you have (p. 61).

Rowley (1993) asserts that the above guidance lacks the specifics needed to do a real-world triage. What criteria does a fire officer employ to decide that a structure is impossible or too dangerous to defend? What process does a fire officer use to decide a structure needs little or no defending? Rowley also suggests that the answers to these questions depend on more than what the fire does and what resources you have; those answers, to a very large extent, depend on the design and construction of the structure itself and on other features of the threatened property. This study aims to identify specific observations upon which an LDFA officer can base triage decisions.

LITERATURE REVIEW

The Structural/Wildland Interzone Problem

With few exceptions, wildland fires in the United States historically had little impact on society because, though sometimes involving vast areas, the fires typically occurred in wilderness or sparsely populated areas (Kramer & Bahme, 1992, pp. 190-201). During the last 20 years, however, a resurgence in rural living has dramatically increased the number and area of structural/wildland interzones, putting many more high-value properties in juxtaposition with highly combustible vegetation. The result has been an increased exposure to risk, more fires, and striking increases in the loss of lives and structures in interzones (Bailey & Tokle, 1991). For example, in 1990 and 1991, the largest of the large-loss fires in the United States were wildfires in California (Kramer, 1992, p. 190; Taylor & Sullivan, 1991). And civilians are not the only ones to suffer these increased losses; in 1992, 23.1 percent of firefighter deaths resulted from wildland fires (Washburn, Leblanc, & Fahy, 1993). (See Appendix A.)

Structural/Wildland interzone fires account for the greatest fire losses in American history, yet development of standards, codes, and laws to help regulate the interzone has been slow. The fire that overran Peshtigo, WI, and surrounding areas in 1871 remains the worst loss-of-life fire in the United States (Lyons, 1976, p. 230). The Oakland/Berkeley Hills fire that began October 20, 1991, remains the largest dollar-loss fire in American history (Queen, 1991). Both the public and elected officials usually ignore warnings from the fire service that these disasters may be but a foretaste of suffering and loss to come unless compliance with good fire safety practices is achieved. Yet, stricter codes regulating the structural/wildland interzone are usually enacted only immediately after a catastrophic fire, and even then only with difficulty (Staats & Cutler, 1991).

Further symptomatic of the general apathy surrounding interzone fire losses is the fact that the **first** National Fire Protection Association (NFPA) standard on protection of life and property from wildfire was issued as recently as 1991 (National Fire Protection Association [NFPA], 1991). The model building and fire codes used in Summit County, the Uniform Building Code and Uniform Fire Code, also pay short shrift to interzone fire safety (International Conference of Building Officials, 1991; International Fire Code Institute, 1991). Perry (1988) attributes this apathy to incorrect public perception of fire management, unrealistic public expectations of fire department capability, and the failure of the fire service to adequately engage in public education regarding the structural/wildland interzone.

The Colorado Structural/Wildland Interzone

Over 3,000,000 acres of wildland subdivisions exist in Colorado, exceeding 4.5 percent of the landmass of a state where almost 18 percent of the population lives in rural areas (Schumacher, 1990). Yet, an uncommon alliance of home owners, developers, and environmentalists has slowed the wildland-fire mitigation efforts initiated by Colorado fire departments (Schumacher, 1990).

In Colorado, efforts to regulate the structural/wildland interzone succeed for the same reason controversial changes to fire and building codes succeed: disastrous fires. For example, the Olde Stage Fire, an arson in Boulder County that charred over 6,000 acres and destroyed 10 houses, was the impetus for the county commissioners to adopt Resolutions 91-163 and 92-42 requiring fire-retardant roof coverings on new or remodeled homes in the mountainous, forested portions of the county (Cornett, Narvaes, & McGrath, 1990). The 1989 Black Tiger Fire, the wildfire claiming the greatest number of Boulder County homes ever, sparked a 16-month fight in Summit County that culminated in adoption of the most stringent regulations in Colorado on **new** construction in the structural/wildland interzone (NFPA, 1991a). However, **existing** structures remain largely unregulated.

Wildfire Preplanning and Structure Triage

Wildfire preplanning is widely relied on throughout the country (Bisbee, 1993; Perry, 1989, pp. 117-120). To varying extents, jurisdictions across the nation rate structures in the interzone for defensibility and survivability as part of their planning process (North Lake Tahoe Fire Protection District, n.d.; Rowley, 1993; Winston, 1992; Wrightson, 1994). In Colorado, the rating process, where employed, ranges from simple survey forms (see Appendix C) to computer-based, three-dimensional color maps showing firefighters which homes they are likely to save and which ones will likely be lost (Lake and Chaffee County Urban/Wildland Interface Wildfire Committees, 1991; Lipsher, 1993).

The importance of the structural/wildland-interzone problem has produced a vast body of literature on the subject of wildfire preplanning. That literature is replete with recommendations for structure design, construction materials, landscaping plans, and other owner practices intended to lessen the fire risk inherent in building structures within the interzone.

To a lesser degree, the direct impact of structure and property characteristics on firefighter safety is addressed in the literature. Those safety-related characteristics are (a) directed to structure survivability without the intervention of suppression forces and (b) tied to the tactics proven most effective when uncontrollable wildland fire threatens interzone structures (e.g., high mobility of apparatus, exclusive use of tank water, etc.).

The literature review of structure-survivability factors is summarized in Appendix B and will not be repeated here. Appendix B includes the yardsticks for structure triage as well as for preincident planning.

Few sources discuss in detail how to do structure triage under the duress of actual fire conditions. Queen (1992b) provides a comprehensive list of considerations to keep in mind when an interzone fire approaches the area to be defended. However, only Cowardin (1992) outlines a decisionmaking process intended to be employed under fireground conditions. Cowardin's system, named WURST for Wildland/Urban/Rural Structure Triage, is an excellent foundation upon which to build a structure-triage approach customized to LDFA's needs. The WURST system incorporates the factors identified most often by other authorities as major factors in the defensibility of interzone structures. (See Appendix B.) WURST also includes setup time factors not described elsewhere in the literature. WURST, however, does not consider accessibility, escape routes, and other firefighter safety factors in its flowchart model.

In summary, the reviewed literature identifies and gives priority (a) to factors significant in doing structure triage (e.g., defensible space), (b) to factors important in assuring firefighter safety during structure protection (e.g., reliable escape routes), and (c) to factors relevant to tactical considerations (e.g., practical limitations on length of handlines). In addition to factors included in the WURST model, other factors identified with interzone conditions and situations commonly found in LDFA's response area were incorporated in the checklist that forms this project's principal result and output.

PROCEDURES

Definition of Terms

Wildland/Urban Interface. An interface zone is an area where development and wildland fuels meet at a well-defined boundary (National Fire Protection Association, 1991b).

Wildland/Urban Intermix. An intermix zone is an area where development and wildland fuels meet with no clearly defined boundary (NFPA, 1991b).

Structural/Wildland Interzone. The interzone is an area consisting of a wildland/urban interface zone and/or a wildland/urban intermix zone. A structural/wildland interzone is particularly descriptive of rural (as opposed to urban) development contiguous with or integral to wildland.

Research Methodology

The desired outcome of this research was to create a checklist for use by fire officers performing structure triage during wildfire in the structural/ wildland interzone. The research was historical research in that a literature review was conducted to understand the relationship of building design, materials, and landscaping to fire behavior and to firefighter safety. The data gathered were based on fire case studies and on the experience and advice of fire officials, foresters, other public officials, builders, and architects.

The research was action research in that the information gathered was applied to the actual, real-world problem of structure triage. Structure triage is likely to become necessary in case of a major, uncontrollable structural/ wildland interzone fire in the Lake Dillon Fire Authority's response area. The compilation of structure-survivability and firefighter safety factors developed from historical research and embodied in Appendix B was analyzed for (a) the number of occurrences of a particular factor in the referenced sources and (b) each factor's weight or importance as attributed by those sources. Subsequently, a checklist was developed for use by LDFA officers and appears as Appendix D.

Assumptions and Limitations

Unlike the WURST triage model (Cowardin, 1992), the development of this checklist assumes that triage would not be undertaken unless a scarce-resource situation already existed. Therefore, resource availability was not directly incorporated into the checklist. WURST also arrives at an absolute conclusion about the action to be taken regarding each structure: Write off, defend, or allow to stand alone. WURST does not provide a means for comparing the probable outcome for one structure with that of another. However, this analysis assumed that checklist evaluations need not result in an **absolute** decision about which structures merit or do not merit being defended. Since triage inherently presumes comparative (in addition to absolute) evaluation of all threatened structures before assignment of resources, a mathematical comparison of checklist results could be used to decide relative defensibility of multiple threatened structures.

Weather, particularly wind speed, during wildland fires is always a major factor in structure survivability and defensibility, largely because high winds cause extensive spot fires (NFPA, 1990a). High or gusty winds result in a low probability of success in defending threatened structures (Perry, 1990). Applicability of the checklist produced by this research is inversely proportional to wind speed; the checklist is not intended to be a reliable tool when winds exceed 30 mph.

Case histories document that even structures which meet defensibility criteria to a high degree cannot be successfully defended in severe fire areas, where fireline intensities exceed 500 Btu/foot/second (NFPA, 1990a). Reliability of the triage checklist would, therefore, be suspect--if not futile--in severe fire areas. There being no convenient technique for field measurement of fireline intensity, responders relying on the checklist for guidance could be led into a dangerous situation where fuel loading may result in high fireline intensities. Therefore, the checklist should be used cautiously in areas designated as high wildfire hazard areas by the Colorado State Forest Service.

Water supplies affect the probability of success or failure in structure defense in a threatened area. (See Appendix B.) In this context, water supply refers to the speed with which onboard tanks can be refilled from public or private water systems or static sources. Water supply and availability are not part of the checklist because tactical considerations (a) demand high mobility of apparatus, (b) call for water to be applied only from onboard tanks of pumping apparatus, and (c) limit hydrant use to refilling tanks (Bisbee, 1993, p. 52; Cowardin, 1992; NFPA, 1989; Queen, 1992b, p. 36). Therefore, the successful defense of any structure depends essentially on making the decision to defend that structure and on the effective use of water from the tank(s) of the apparatus committed to that structure. Water supply may determine how many structures are defended in an area within a given period but does not determine the outcome of protective operations at any one specific structure.

RESULTS

The checklist produced for assisting with structure triage is furnished in Appendix D.

Answers to Research Questions

Research Question 1. The principal factor jeopardizing firefighter safety while attempting to defend structures in wildland fires is impeded or obstructed egress. Standard wildland firefighting orders require that firefighters have at least one, and preferably two, reliable escape routes at all times (Queen, 1992a). Perry's (1990) warning applies to driveways as well as roads:

> Be very cautious about access roads where a good fuel ladder runs from grass to heavy fuel types as well as situations where large "jackpots" of down-dead fuels parallel the road. Flame lengths and thermal outputs in the above examples may exceed survivability and block your egress. (p. 286)

The narrower the driveway, the greater is the threat from fuel-canopy overhangs. Therefore, NFPA 299 (NFPA, 1991b) requires driveways to be 12 feet wide in the clear with a minimum vertical unobstructed clearance of 15 feet. Zeleny (1988, pp. 4-5) recommends even greater clearances.

Firefighter safety must always be the first consideration (NFPA, 1989, p. 18). Therefore, narrow driveways with fuel-canopy overhangs or proximate accumulations of heavy or down-dead fuels contraindicate attack or active defensive efforts by emergency responders.

Research Question 2. The foremost predictor of structure survivability is the composition of the roof (NFPA, 1990a, pp. 31-32). The NFPA (c. 1992) states that "the roof is the most vulnerable part of the house in a fire" and that "noncombustible roof coverings are a must" (p. 17). Experience also argues that if a roof is starting to burn, the structure is probably not salvageable (Perry, 1990, p. 288). However, experience with the Panorama and Paint fires in California suggests that structures already on fire may be saved if the fire is limited to isolated rooms, decks, eaves, or siding and attack lines are quickly deployed (Perry, 1990, p. 284).

The second most important predictor of structure survivability is the presence or absence of adequate defensible space (Coulter, 1980; Cowardin, 1992; Lipsher, 1993; NFPA, 1990a, p. 35; Perry, 1990, p. 276; et al.). The purpose of defensible space is twofold: to protect structures from approaching wildfire and to reduce the potential for a structure fire spreading to the wildland

(NFPA, 1991b). Structure triage is only concerned with the former purpose. Almost all sources referenced in Appendix B discuss, at length, requirements for defensible space; those sources differ only in minor ways from each other in their recommendations. Those sources agree that the minimum radius of defensible space should be 30 feet. Coulter (1980) and CSFS (1991) provide quantitative recommendations for expanding defensible space to compensate for steeper slopes.

The third most significant structure-survivability predictor is a combination of slope and terrain. The NFPA (1991b) defines steep slopes as those exceeding 20 percent (ratio of rise to run) and extreme slopes as those exceeding 40 percent. NFPA statistics, based on case studies, predict an unsuccessful outcome for structure defense when slopes surrounding the structure exceed 20 percent (NFPA, 1990a). Queen (1992) and other authorities cited in Appendix B, Items 2 and 17, also discuss the increased hazard from fire to which structures located in saddles, at the top of steep slopes, on ridges, and at the top of ravines are exposed. Cowardin (1992) also recommends considering the difficulties the given terrain will cause firefighters in stretching and maneuvering hoselines.

Other physical features of structures and land frequently cited by authorities as having great influence on the probability of success (or failure) in structure-protection operations include the following (see Appendix B):

- Access roads and driveways (dead-ends, length, width, slope, grade, surface, turnarounds).
- Exterior construction (noncombustible, fire resistive, or combustible).
- Projections, overhangs, and stilt construction (decks, eaves, etc.).
- Windows and other glazed openings (size, thickness, and protection).
- Vents and other openings into attics or foundations (presence or absence of screens).
- Fuel loading on land adjoining defensible space (type and amount of vegetation).
- Fuel stored within the defensible space (firewood, LPG, etc.).
- Aboveground power lines crossing over structures or defensible space.

Research Question 3. Fire officers doing triage may have to do so from access roads, in smoke conditions, and sometimes even in darkness. Therefore, evaluation criteria must be carefully limited to those that may be assessed quickly and easily under adverse conditions and from a distance. Roof composition may be difficult to identify under such circumstances, but must be assessed, nevertheless, because of its major import to defensibility. Qualitative assessment of defensible space is usually done more easily than roof assessment. Whether the slope does or does not exceed 20 percent around the structure may be judged with little or no training. The position of a structure in an unfavorable location, such as at the top of steep slopes, is usually obvious. Projections, such as balconies and decks, are normally readily observable, as is stilt construction. Also, the presence of major power lines or even service drops is usually known or readily observable if adequate defensible space has been provided.

Factors more difficult to assess by observation from a distance include windows, attic vents, fuel loading adjacent to defensible space, and onsite fuel storage. The size of windows is often apparent, but window composition and protection are not so apparent. LPG tanks, firewood, and the like may or may not be visible from the one or two observation points from which a fire officer is likely to be performing triage. Three-hundred-sixty-degree reconnaissance will probably be infeasible due to time and distance limitations and due to the number of structures to be evaluated. Lacking information gathered from such reconnaissance, detailed information about debris on roofs, attic vents, and exterior construction materials will, in all likelihood, be unavailable for triage purposes.

Research Question 4. The checklist includes guidelines for triage decisionmaking based on the number of compromising characteristics found at the property. Low scores suggest the structure will probably survive without intervention. Mid-range scores suggest the structure should be defended. High scores suggest the structure is probably not salvageable even with intervention. The decisionmaking guidelines are approximate and based on outcomes reported for structures having similar characteristics in a number of major interzone fires (Birr, 1990, 1992; Cornett, McGrath, & McAllister, 1990; Cornett, Narvaes, & McGrath, 1990; Cullom, 1990; Hoffman, 1991; Hutchinson, 1990; Hutchinson and Narvaes, 1990 Lipsher, 1993; Michaels, 1991; NFPA, 1990a, c. 1992; Staats & Cutler, 1991; Sunderland, 1992).

Checklist Rationale

The checklist is organized into three sections based on order of use. The first section, the safety section, identifies those features judged to be prohibitions to further triage or structure protection. The characteristics assessed involve access to and existing fire condition of the structure.

The second section assesses ten of the most important safety, survivability, and defensibility factors using a yes-or-no format. (See Appendix D.) The DRIVEWAY assessment is both a safety consideration and a predictor of survivability (NFPA, 1990a, p. 31). Weighting in favor of the more important elements of triage (e.g., roof composition, defensible space) is accomplished by using multiple observations of the same triage factor or element. This approach is exemplified by using not one but two ROOF questions for this most important triage element. Similarly, the checklist includes a TREES question (that overlaps roof and separation triage elements) and two additional questions about defensible space (TREES AND BRUSH and VEHICLES). SLOPE also has two observations, both combining the triage factor of terrain slope with the factor of site location; structures on ridges, hilltops, etc., typically have steep terrain nearby. The SLOPE questions also address ruggedness of terrain that would impede firefighting operations. Even structures located at the bottom of a hill (i.e., toe of a slope) are difficult to defend if firefighters have to climb steep embankments. Finally, two questions regarding ancillary triage elements are included. These two elements, DECKS OR STILT CONSTRUCTION and POWER LINES, were chosen because they are usually easy to observe even from some distance.

The last section of the form provides a place for the triage officer to score the structure and provides decisionmaking guidance based on that score. Four categories of guidance were used so marginal situations requiring special attention to escape routes could be distinguished from less threatening circumstances.

DISCUSSION

The checklist, which represents the results of this research, reflects Cowardin's (1992) structure-triage model but also embodies the consensus recommendations of the authorities referenced in Appendix B. Those authorities note a variety of factors important to the survivability and defensibility of a structure during a wildland fire, including several factors not cited by Cowardin. However, brevity and simplicity demand practical limitations on the number of items evaluated during structure triage. Triage officers using the checklist should not necessarily limit their considerations only to those found on the form. Triage officers should possess knowledge of wildland fire structure protection encompassing at least all factors listed in Appendix B.

The checklist (Appendix D) should be of considerable value to fire officers performing triage during structural/wildland interzone fires. However, fire officers using the proposed triage checklist should temper their decision to defend or not defend a structure with judgment founded on experience. Unfortunately, most Summit County fire officers will not possess experience sufficient to have good judgment about structure triage. The value of such a checklist increases under those circumstances.

Because the checklist guidelines are merely untested recommendations based on a synthesis of information gathered in this research, triage officers need beware that the true probability of successfully defending a structure from wildfire is a matter of infinite complexity and uncertainty. Queen (1992b) discusses the shortcomings of practical fire protection methods; even the best methods have limited applicability to structure protection during wildland fires. Overly optimistic predictions too often have resulted in unsuccessful attempts to save a few structures when write-offs would have given suppression forces time to gather in strength further in advance of the fire where firefighting efforts would have more likely stemmed the wildland fire's advance and, therefore, eliminated the need to defend individual structures.

The proposed checklist is the first of its kind customized for use by the Lake Dillon Fire Authority. Selection of evaluation criteria was much influenced by typical Summit County conditions. As is true of other resources prepared for use during disasters, the checklist hopefully will never need to be used under actual wildfire conditions. Nevertheless, the checklist adds another weapon to LDFA's arsenal. It is hoped that this study has produced an instrument comparable to the worksheets used by Incident Commanders as an aid in managing structure fires and hazardous materials incidents. If nothing else, the checklist will serve to jog the minds of fire officers burdened with the responsibility of making critical decisions in compressed timeframes and without full and complete fireground data.

RECOMMENDATIONS

Department procedures for managing wildland fires in the structural/ wildland interzones should incorporate use of the structure-triage checklist. LDFA should integrate use of the checklist in its training and assure that the form is readily available for instant use in the event subdivisions are endangered. Training in checklist use should include clear instruction as to the limitations and dangers in trying to apply a single set of structure-triage criteria in any and all wildfire situations Written instructions explaining the use of the form should be developed to facilitate training.

Periodic review and revision of the form should be undertaken to keep the checklist up to date. New ideas based on local circumstances may drive alterations to the form. Additionally, the form should reflect future changes to

NFPA 299 as well as changes to the Summit County Fire Hazard Mitigation Program.

As the form matures and evolves through training, review, and revision, the Summit County fire chiefs should consider adopting the checklist or its successor countywide. Benefits from such standardization already have been realized in such diverse areas as fire prevention and life safety, pump operation, and procurement. Structure triage should be added to that list.

Finally, the factors listed in Appendices B and D are recommended for inclusion in a checklist that should be developed for structure prefire planning in the interzone. LDFA would benefit from that preplanning effort by gaining a more accurate assessment of the latent service demands, assumed risks, and tactics needed. Property owners would benefit from such evaluations by gaining knowledge about methods to improve the survivability of their buildings and for reducing the probability that a fire in their building will extend to the surrounding wildlands and bring them the concomitant liability. A property owner also could be put on notice that his/her home will be a write-off during a widespread, uncontrollable wildland fire unless the owner takes corrective action. That information should lead to citizens having more realistic expectations of LDFA's capabilities to provide protection in the structural/wildland interzone.

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