

**One-year Post-Fire Survey of Emergency Communications and Public Response
to the Chimney Tops 2 Fire in Sevier County, TN**

**U.S. Department of Commerce
National Institute of Standards and Technology
Generic Clearance for Community Resilience Data Collections
OMB CONTROL NO. 0693-0078
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For each proposed request using this generic clearance, NIST will submit the actual instrument and related documents (letters, emails to respondents, scripts, etc.), as well as proposed statistical methods to be employed to OMB along with responses to the following questions:

1. Explain who will be surveyed and why the group is appropriate to survey.

Households that were affected by the Chimney Tops 2 fire in Sevier County, Tennessee (November 2016) is the population from which the sample will be taken in this collection. Households that will be included in the sampling frame for this study were either located within the perimeter of fire impact and/or within the pre-fire evacuation zones. The survey instrument (i.e., structured questionnaire) is written to obtain information on the types of emergency information that affected households received prior to and during fire impact, their perceptions of this information, and respondents' responses to this information (including evacuation and remaining in place).

Further study of public response to this fire can lead to improvements in emergency communications, pre-fire planning and emergency response. This population will be important to survey because the Chimney Tops 2 fire (which occurred on Monday, November 28, 2016) is linked to 14 deaths and approximately 191 injuries. A major question is why people died as a result of this fire. New reports suggest that Sevier county officials admit that a mobile (Wireless Emergency) alert was not issued for this fire¹. Even if there is doubt in this claim, information on the locations of confirmed deaths suggests that individuals delayed their evacuation or did not evacuate at all before the fires arrived. In each case, the victim may not have been aware of the severity of the fire, the location of the fire (and future predictions of its growth), and/or that an evacuation order was issued. Important lessons can be learned from a focused study of this fire – specifically focusing on emergency communications, situational awareness of the public, and actions/behaviors of residents before and during the fire. In addition, work has been ongoing at NIST to develop a computer model to simulate household decision-making and response to wildfire events. Data from this survey will help to further validate this model for eventual use by officials involved in planning for and response to wildfires.

¹ <https://www.knoxnews.com/story/news/local/tennessee/2016/12/03/sevier-officials-defend-handling-wildfire-evacuation/94886552/>

2. Explain how the survey was developed including consultation with interested parties, pretesting, and responses to suggestions for improvement.

This survey instrument (i.e., questionnaire) was developed by NIST researchers through a series of steps. First, a literature review (Folk et al., in review) of the wildfire and hurricane evacuation literature was carefully reviewed to better understand the types of factors that influence public response during these types of disaster events. Second, NIST researchers collected a total of six previously deployed questionnaires developed by experts in the fields of emergency communication, evacuation, and disasters. In all cases, these six collected questionnaires were disseminated to households after a disaster event had occurred to ask about emergency communication and public response. Of the six surveys collected, three were post-wildfire surveys, one was a post-hurricane survey, one was a post-dam break survey, and one was a questionnaire from the NIST Investigation of the 2001 WTC disaster. These six questionnaires were used to develop a draft version of the 2016 Chimney Tops 2 Fire questionnaire (for this study).

Next, after a draft questionnaire was developed, NIST researchers elicited feedback from content experts in wildfire evacuation and emergency communications from the National Research Council (NRC) Canada and Massey University in New Zealand (collaborators on this project). Additional revisions were made at this time that focused on the content of the questionnaire.

Finally, NIST researchers disseminated the revised survey to survey experts. These included experts here at NIST, NRC Canada, and the University of Akron (working currently as a Guest Researcher at NIST in ITL). A final round of revisions was made at this time that focused on the questionnaire, itself, including issues with clarity, question ordering, and consistency. Before starting the PRA process, the 2016 Chimney Tops 2 Fire questionnaire was reviewed by the Director of the NIST Human Subjects Protection Office. While no IRB issues were found, some minor survey-related issues were addressed.

3. Explain how the survey will be conducted, how customers will be sampled if fewer than all customers will be surveyed, expected response rate, and actions your agency plans to take to improve the response rate.

According to the U.S Census (2010), the area affected by the 2016 Chimney Tops 2 Fire contains a total of 9,100 houses (and a total of 5,500 people). The affected area, for this study, is defined as the U.S. Census blocks that falls within the fire perimeter and the U.S. Census blocks that received an evacuation warning. Sometimes these Census blocks overlap, but not always. One possible reason that the number of houses is so high compared with the number of people, is because many of these houses are seasonal homes and do not have full-time tenants.

A Contractor (yet to be determined) will be procured to aid with the development of the sampling frame for this survey, as well as conducting the actual survey. The Contractor will conduct the survey at the household level, therefore, the sampling frame for this study will include the entire population of 9,100 houses (reaching out to heads of households in each case). The Contractor will create this sampling frame by performing an address and telephone lookup for all homes within the affected U.S. Census blocks (provided to the Contractor by NIST).

The survey will be conducted by the Contractor using a mixed-methods approach – i.e., dissemination of the survey via web and telephone (using computer-aided telephone interviewing). For recruitment, the Contractor will first send mail correspondence to all 9,100 heads of households (i.e., since the sampling frame is so small in number, all houses on the sampling frame will be included in the sample). This first correspondence will serve as a notification letter inviting participants to the survey with a web link. Then, for those who have not taken the web survey, and whose address could be linked to a telephone number (likely ~50% of the original 9,100 houses), the Contractor will initiate phone call invitations to the survey. For any heads of household the Contractor contacts (via phone) and who comply with the survey requirements (e.g., “Were you at home or in the area when the Chimney Tops 2 fire occurred in Sevier County in November, 2016?”), the Contractor will conduct the survey on that phone call (or schedule another time to conduct the survey). A maximum of three phone calls/reminders will be made to each phone number, offering to conduct the survey (via phone) each time. [Note: any household that is contacted and who 1) does not wish to participate and/or 2) does not comply with the survey requirements will not be contacted again.]

Given that many of the homes in the affected area are seasonal/vacation homes, the response rate is likely to be complicated. The aim is to reach out to 9,100 houses, with the goal of obtaining 380 completes from this survey. Once 380 surveys are completed (either via web or via phone), the data collection effort will stop (e.g., access to the web survey will be closed and no additional phone calls will be made to households). Therefore, the total burden hours from this study would be a maximum of 127 hours (380 heads of household X 20 minutes survey time/household). All survey responses will be weighted accordingly based on heterogeneity in three main areas: 1) areas negatively affected by the fire (e.g., households within the fire perimeter vs. households within the evacuation zones, but not within the fire perimeter), 2) socio-economic characteristics (including income, education, and number of people in household); and 3) geographic location (e.g., rural vs. suburban areas).

Several actions can be taken to improve the outcomes of the data collection. The team will take the following actions to ensure a higher response rate:

- Training for maximum efficiency in the field,
- Concentrating surveying on weekends and evenings,
- Making repeat phone calls to households,
- And, arranging scheduled follow up times for households not available for surveying during initial call (if willing to participate).

Additionally, in order to improve response rates, ahead of the Contractors’ initial recruitment letter, NIST researchers plan to reach out to local officials, including fire and police department personnel, to describe this research effort. The hope is that local officials may be willing to disseminate information about NIST’s research project and encourage participation. In this way, the on-the-ground research time will be better spent and less time will be taken from the households.

4. Describe how the results of the survey will be analyzed and used to generalize the results to the entire customer population.

It is expected that the findings of this survey will inform the understanding of household decision-making and response to emergency communications disseminated before and during wildfire events.

The data will be analyzed as a case study in the specific context of Sevier County, TN (and surrounding areas). However, the researchers will use descriptive statistics to identify the sample demographic profile to verify which population the sample can refer to (the optimum will be the US population). Statistical analysis will be used to determine trends and correlations in the data, as well as relationships between factors that contributed to public response prior to experiencing the impacts from the wildfire. This data will be used to investigate two specific decisions: the decision to start responding to a wildfire emergency and the type of responses taken by the respondents (e.g. evacuate, stay, etc.). Such an analysis will allow the identification of the factors having significant impact on those decisions as well as the development of a decision-making models that can be used for future WUI simulation studies.

There is not a great deal of research conducted to date with primary research concerning public response to wildfires. Work has been ongoing at NIST to develop a computer model to simulate household decision-making and response to wildfire events. However, this model is in the very early stages of development and requires additional data for further calibration and verification/validation studies. This project can provide much needed data to further calibrate and validate the model. Such tools could be used (after sufficient validation) by urban and emergency planners to assess the impact of new construction and mitigate against such impacts in order to enable more resilient communities living near/among the wildlands.