

SUPPORTING STATEMENT
U.S. Department of Commerce
National Institute of Standards and Technology
Evacuation Movement and Behavior Questionnaire
OMB CONTROL NO. 0693-XXXX

A. JUSTIFICATION

1. Explain the circumstances that make the collection of information necessary.

The Final Report on the collapse of the World Trade Center (WTC) Towers recommended that tall buildings be designed for timely full-building evacuations from both building-specific and large-scale events. Since the WTC study, project efforts were established within the NIST Building and Fire Research Laboratory (BFRL) to better understand occupant egress from buildings. Our goal for this project is to improve occupant safety during building evacuations, and one critical way to achieve this goal is to conduct an information collection using the proposed questionnaires (Evacuation Drills Questionnaire).

The data obtained from these questionnaires will help to better understand the performance of specific egress designs and provide guidance to codes and standards on the types of egress systems that are appropriate for tall buildings in the United States. Current egress systems, such as stairs, exit corridors and exit doors, are designed based on antiquated code requirements with little or no consideration for occupant movement and behavior, needs of emergency responders, or evolving technologies. Aggressive building designs, changing occupant demographics, and consumer demand for more efficient systems have forced egress designs beyond the traditional stairwell-based approaches, with little technical foundation for performance and economic trade-offs. There is a lack of evacuation data available to verify the level of safety provided by existing, as well as newly proposed code requirements for egress and access in buildings.

This data is necessary to improve current egress designs for buildings that will provide a higher level of safety for building occupants.

2. Explain how, by whom, how frequently, and for what purpose the information will be used. If the information collected will be disseminated to the public or used to support information that will be disseminated to the public, then explain how the collection complies with all applicable Information Quality Guidelines.

Data obtained from the questionnaire will be used by NIST/BFRL to improve code requirements and safety assessment models to make buildings safer for occupants. The trends on occupant movement and behavior during building evacuations will be used to support necessary code requirements and new code changes, improve safety assessment models that currently do not account for occupant behavior during an evacuation, and improve training and education for

occupants in buildings. Also, general trends from this data will be provided to egress researchers around the world (via NIST reports and conference presentations) so that this data can be used to improve buildings world-wide.

It will be distributed to all building evacuees from a variety of buildings (e.g., 1-10 stories, 11-20 stories, 21-35 stories, and 35+ stories). The same questionnaire will be used for all buildings – specifically all of the same questions will be asked of all evacuees, and, for *each* specific building (which is unique in building design), the questionnaire will need to be modified slightly to accommodate for minor changes across buildings. However, since the opportunities for surveying building occupants usually become available with little notice, NIST is unlikely to have sufficient time for approval of each individual building questionnaire.

Therefore, the submitted questionnaire has been designed as flexible in that the response categories for three of its questions (shown below) will need to be modified with each building evacuation. Due to the fact that each building design and make-up is unique, it is impossible to predict ahead of time the types of rooms located inside the building (Section 1, Question 1), stair designations (Section 2, Question 12 [a]), and exit designations (Section 2, Question 16). Therefore, the submitted questionnaire is structured so that the three questions below have flexible response categories that can be altered with each building surveyed. Across all buildings, none of the actual *questions* will change and none of the other response categories will change

Question 1: The first question, shown here, asks the occupant at which location he/she was when the evacuation drill began. This question will remain the same for all buildings, however, depending upon the building type, there are several different rooms that can be suggested as response categories. Examples of these are shown here. Rooms in an office building can be very different from rooms located in a residential or dormitory building. This question’s response categories will need to be flexible to account for these changes across different buildings, therefore, response options may change depending upon the type of building.

1) Question 1, in Section 1: Where were you when you first became alerted of an incident in this building (e.g., from an alarm)? (*To be tailored to rooms in involved building*)

- Your own office/room
- Restroom
- Cafeteria
- Stairwell
- Colleague’s office/room
- Elevator
- Basement
- Storage / copy area
- Meeting room
- Corridor
- First floor lobby
- Other, specify _____

Questions 12 (a) and 16, Section 2: These questions ask the occupant which stair did he/she use and which exit did he/she use to evacuate the building. Again, these questions will remain the same for all buildings surveyed; however, depending upon the stair and exit labels used by the building, the response categories will need to reflect each building separately. For example, stairs can be labeled as East/West, North/South, A/B/C, and/or 1/2/3, etc. Response categories in question #12 (a) will need to reflect the stair designations for each stairway inside the building – and there may be more than 2 stairs per building. Similarly in question #16, exits can also be labeled differently in each building, so the questionnaire should be developed as flexible to account for various exit labels.

2) Question 12 (a), Section 2: If you left by stairwell, (a) Did you use... • Stairwell ___

- Stairwell ___ [Designations, e.g., A, 1, north, blue, to be tailored to involved stairwell]

3) Question in Section 16, Section 2: When you exited the building, which exit did you use? [Designations, e.g., A, 1, north, blue, to be tailored to involved building]

- Exit _____
- Exit _____
- Other _____(please specify)
- Exit _____
- Exit _____

Even though statistical sampling methods are not being used, NIST is interested in performing simple statistical analyses on the data to determine inter- and intra-building similarities and differences. NIST may use basic analysis techniques such as simple difference of means tests and basic regression analysis.

3. Describe whether, and to what extent, the collection of information involves the use of automated, electronic, mechanical, or other technological techniques or other forms of information technology.

The collection of this information does not use automated, electronic, or mechanical techniques.

4. Describe efforts to identify duplication.

For the most part, there will be no duplication. It is possible that NIST will collect evacuation data more than once from the same building (e.g., many buildings run evacuation drills annually and may ask NIST to return to collect a second round of questionnaire data from the occupants). Duplication is important in order to understand uncertainty in our data collection as well as to understand improvements in evacuation procedure as a result of building-wide training and education. The questionnaire is always voluntary and if an occupant does not want to participate, he/she is not forced to do so.

5. If the collection of information involves small businesses or other small entities, describe the methods used to minimize burden.

Not Applicable.

6. Describe the consequences to the Federal program or policy activities if the collection is not conducted or is conducted less frequently.

If NIST did not conduct this research, building owners, code officials, engineers, and the American public still would not understand the appropriate and necessary egress designs to install in current buildings, especially taller buildings. This may result in egress designs that

overestimate the needs of the population and building (resulting in higher costs of the building) or underestimate the needs the population and building (resulting in a lower level of safety for building occupants evacuating in fires).

7. Explain any special circumstances that require the collection to be conducted in a manner inconsistent with OMB guidelines.

There are no special circumstances that require the collection to be conducted in a manner inconsistent with OMB guidelines.

8. Provide a copy of the PRA Federal Register notice that solicited public comments on the information collection prior to this submission. Summarize the public comments received in response to that notice and describe the actions taken by the agency in response to those comments. Describe the efforts to consult with persons outside the agency to obtain their views on the availability of data, frequency of collection, the clarity of instructions and recordkeeping, disclosure, or reporting format (if any), and on the data elements to be recorded, disclosed, or reported.

A Federal Register Notice soliciting public comments was published on March 4, 2008 (Vol. 73, pg. 11618). No comments were received.

In an effort to improve the wording and flow of the questions to be used on the Questionnaire on Emergency Procedures, NIST forwarded the questionnaire to the U.S. Census Bureau, Cognitive Laboratory with a description of the goals/objectives to be used in capturing this information.

Census provided some excellent feedback and suggestions on how to improve the instrument, as well as an assessment of the goals for each individual question. Another major improvement made to the instrument was the restructuring of questions contained in the “Sections” to follow the order of events that would occur for the respondents and/or occupants of the buildings, such as:

- (1) specific information regarding the time period between being alerted of an incident in the building and entering the stairwell/elevator/exits.
- (2) specific information about the time period between entering the stairwell/elevator/exit and leaving the building.
- (3) important background information about the respondent and their particular experience with building evacuations.

Once the instrument was analyzed for content and flow of events and restructured, NIST met with experts in the field of human behavior in fires and compared it with other evacuation questionnaire currently used by experts and agencies in the evacuation field.

The Building and Fire Research Laboratory (BFRL) feels confident that the instrument is a more effective tool to gather the information needed to improve occupant safety for building occupants during evacuations.

Below are examples of “restructuring” -

EXAMPLE 1

Previous Version:

(12a) Did you hear the fire alarm? • Yes • No;

(12b) If unable, did you see the strobe lights flashing? • Yes • No

(12c) If not, how were you alerted to the drill? _____

(13) If you heard the alarm, was the alarm:

- too loud
- loud enough
- too quiet

(14) If you heard the alarm, please answer the following:

(14a) Did you hear the alarm tone? • Yes • No;

(14b) If yes, what did it sound like? _____

(14c) Did you receive instructions through the speakers? • Yes • No

(14d) If yes, what were the instructions? _____

(15) When the alarm started to sound, what did you think it was?

- a fire alarm • a car alarm • a security alarm • other, specify _____
- you didn't know what the alarm was

(16) What did you think was going on?

- a real fire emergency • a false alarm • a test of equipment • don't know
- a fire drill • a weather emergency • a security situation • other, describe _____

Current Version:

(3) How did you become alerted of an incident? Mark all that apply.

- Alarm tone
- Voice alarm message to evacuate
- Flashing strobe light
- Member of building staff (management or fire safety)
- Evacuation coordinator/fire warden
- Colleague/resident
- **Other _____ (please specify)**

- (4) What did you think was going on?
- Real fire emergency
 - False alarm (the alarm is sounding by mistake)
 - Test of equipment
 - Regularly scheduled fire drill
 - Security situation
 - Weather emergency
 - I didn't know what was going on
- Other, describe _____

EXAMPLE 2

Previous Version

(28a) Did you evacuate? • Yes • No; If no, please use additional comments to explain why

(28b) If yes, how did you evacuate?

- Stairwell
- Moved to another floor
- Went to an area of refuge inside building
- Elevator
- Walked directly outside
- Other

(29) If you left by a stairwell, did you use... • Stair __ • Stair __ **[Designations, e.g., A, 1, north, blue, to be tailored to involved stairwells.]**

(30) If you left by a stairwell, how often do you use this stairwell?

- daily
- often
- occasionally
- never

(31a) When you were evacuating via the stair, were you

- alone
- with friends/colleagues
- in the presence of strangers

(31b) How many people were with you? _____

(32) If you left by a stairwell, please check any of the conditions you encountered:

- furniture or other object(s) obstructed entry to stairwell
- crowding in the stairs – too many people
- difficulty opening stair or exit doors (which doors? _____)
- uncomfortable handrails
- poor lighting
- emergency responders were coming up stairs
- people in front of you were moving too slowly
- people were standing / resting on the landing
- confusion with which way to proceed
- shoes were uncomfortable for the required distance
- other, please specify _____

Current Version

11a) How did you evacuate the building?

- Stairwell
- Elevator
- Walked directly outside to exit
- Other _____ (please specify)

(11b) If you used an elevator, what was your primary reason for not using a stairwell?

- I have a condition which requires me to use an elevator
- Elevators are more convenient
- I could not find a stairwell
- Other _____

(11c) How did you find the stairwell/elevator/exit that you used to evacuate?

- I followed others
- I followed EXIT sign
- I knew the exit
- I used the way I came in
- I was instructed to use this exit
- Other _____

(12) If you left by a stairwell,

(a) Did you use... • Stairwell __ • Stairwell __ [*Designations, e.g., A, 1, north, blue, to be tailored to involved stairwell*]

(b) Please check any of the conditions you encountered during the evacuation:

Furniture or other object(s) obstructed entry to stairwell

Crowding in the stairwell

Difficulty opening stairwell or exit doors (which doors? _____)

Uncomfortable handrails

Poor lighting

Emergency responders were coming up stairwell

People in front of you were moving too slowly

People were standing /resting on the landing

Confusion with which way to proceed

Shoes were uncomfortable for the required distance

Other, please specify _____

(13a) During your evacuation, could you see others around you (e.g., in the stairwell)?

- Yes
- No

(13b) If yes, were they the same people from your floor?

- Yes
- No

9. Explain any decisions to provide payments or gifts to respondents, other than remuneration of contractors or grantees.

There are no payments or gifts to respondents.

10. Describe any assurance of confidentiality provided to respondents and the basis for assurance in statute, regulation, or agency policy.

The assurance of confidentiality is not given to respondents because these are anonymous surveys. Also, the questionnaire does not contain any questions that would reveal the identity of the respondents.

11. Provide additional justification for any questions of a sensitive nature, such as sexual behavior and attitudes, religious beliefs, and other matters that are commonly considered private.

Not Applicable.

12. Provide an estimate in hours of the burden of the collection of information.

It is estimated that 6,666 respondents will complete the questionnaire annually and it is estimated it will take 10 minutes. The estimated total annual burden hours will be **1,111**.

13. Provide an estimate of the total annual cost burden to the respondents or record-keepers resulting from the collection (excluding the value of the burden hours in #12 above).

Not Applicable.

14. Provide estimates of annualized cost to the Federal government.

Each questionnaire is 5-pages in length and will be accompanied with a NIST-addressed stamped envelope so that questionnaires can be mailed back to NIST without cost to the respondent. The costs associated with this include the cost of copying each questionnaire (5 pages each) and the cost of envelopes and stamps for 6,666 respondents. The costs associated with copying the questionnaire and envelopes are estimated to be \$0.30 per respondent (\$ 0.05 for each page of a five page questionnaire, including labor and stapling, and \$ 0.05 for each envelope). Also, as of May 12, 2008, the cost of a First-Class Mail stamp will be \$0.42. Therefore, the data collection annual cost to the Federal government is the cost of stamps, envelopes, and copying the questionnaire (\$ 0.42 + \$ 0.30 per person) for 6,666 respondents each year. The total data collection cost equals **\$4,800** per year. In addition, once the data is collected, NIST will analyze the data. This will include entering all of the data into an internal database and then running basic analysis calculations, which is expected to cost approximately **\$30,000** per year to the Federal government. Therefore, the total annual cost to the Federal government for this questionnaire is approximately **\$34,800**.

15. Explain the reasons for any program changes or adjustments reported in Items 13 or 14 of the OMB 83-I.

This is a new collection thus no program change or adjustment.

16. For collections whose results will be published, outline the plans for tabulation and publication.

The results of the questionnaires will be analyzed in order to identify trends in common behaviors and actions, analyze the performance of the egress system, and other relevant conclusions. More specifically, we are interested in the impact of occupant demographics, previous education and training, previous experience in fire evacuations, and awareness of the event on the *reported* decisions made and the actions performed by occupants 1) on his/her floor during the building evacuation and 2) while in the stairwell and/or the elevator during evacuation. The results will be published as NIST technical reports. No specific quotes or individual responses from this information collection will be included in these reports.

17. If seeking approval to not display the expiration date for OMB approval of the information collection, explain the reasons why display would be inappropriate.

Not Applicable.

18. Explain each exception to the certification statement identified in Item 19 of the OMB 83-I.

None.

B. COLLECTIONS OF INFORMATION EMPLOYING STATISTICAL METHODS

This collection of information does not employ statistical methods.