

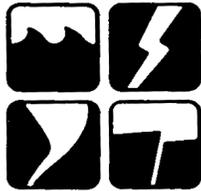
**Surviving the Storm: Sheltering in the May 2003 Tornadoes
in Moore, Oklahoma**

By

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The views expressed in this report are those of the authors and not necessarily those of the Natural Hazards Center or the University of Colorado.

Contents

Abstract
Acknowledgments
Summary
Participants and Procedures
Moore: A Disaster Resilient Community
Survival Stories
Recommendations
References

Abstract

Field surveys and research were conducted during the month after a Central Oklahoma tornado on May 8, 2003. This research focused on Moore, Oklahoma, which sustained tornado damage October 4, 1998; May 3, 1999; and May 8, 2003. Despite widespread damage in a tornado rated as a strong F3, no one was killed in Moore on May 8, and injuries were scattered. This research focuses on how residents took shelter from the storm, how their decisions affected their survival, how their sheltering behavior is changing over recent years, and what lessons they are learning and sharing. Despite National Weather Service and news media warnings that storms were possible, the tornado formed directly over Moore; and most study participants said they had only minutes or seconds to find shelter after they understood and accepted that the tornado was upon them. Neighbors helped neighbors survive the storm and its aftermath. Most of those interviewed who did not own a personal shelter said they hoped to add a home SafeRoom or shelter to provide safer options in the next storm. Planners should consider cooperative neighborhood sheltering options. Future research might involve a cooperative survey by researchers and agencies to compile comprehensive data to validate these findings.

Acknowledgments

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Summary

Moore, Oklahoma, in the buckle of America's tornado belt, is a storm-savvy town. Folks in this Oklahoma City suburb have no choice but to try to out-smart twisters. More than a hundred touchdowns have been recorded in Moore's Central Oklahoma neighborhood in the past hundred years. Monster storms have hit Moore in 1998, 1999, and most recently May 8, 2003.



Figure 1. The May 8, 2003, tornado struck Moore at evening rush hour. [Photo: Donna Hale Hicks. Source: City of Moore.]

When the most recent storm hit Moore at rush hour May 8 – the Thursday before Mother's Day, 2003 – people were ready. After the storm passed, rescuers found heavy damage and scattered injuries throughout the area. But, amazingly, no one was dead.

The people of Moore who knew how to duck and cover have survival skills to teach us all.

What are their secrets? If you stroll up and down the ravaged streets, visit with survivors and listen to their remarkable stories, some clear patterns emerge:

- They believe they are at risk but can survive.
- They built or found safe shelter.
- They were alert and moved to shelter quickly.
- They had a plan and acted on it.
- They learned from experience.
- Neighbors helped neighbors.
- They believe they can recover.

This report summarizes conversations and research conducted in Moore in the weeks after the tornado, seeking answers to several questions:

- How, where, and when did Moore citizens seek tornado shelter May 8?
- How did previous storms and mitigation actions affect their behavior and survival?
- What lessons can we learn from their experiences, to help empower us all to build more disaster-resistant communities?

Participants and Procedures

Research visits to Moore, Oklahoma, relating to this storm extended from May 16 through May 31, 2003.

Before traveling, I collected information from the news media and various websites including the City of Moore, the National Weather Service, and the Federal Emergency Management Agency (FEMA). I also obtained information by phone and email from local, state, federal officials.

This research was complemented by experience and research about previous storm events, including the disastrous May 3, 1999, tornadoes in Oklahoma, and about sheltering options, including SafeRooms.

I faced several challenges in obtaining interviews with victims and other citizens.

I recognized that my interview schedule would not allow a large sample, so I devised ways to collect information from as diverse a sample as possible, including variety in geographic area, age, gender, and storm circumstance.

I divided the Moore damage area into several neighborhoods and categories and obtained sample interviews in each neighborhood and category. The neighborhoods were generally as follows: south of Northwest 12th Street; between 12th and the Nail Parkway; between Nail and Bryant Avenue; and in fringe areas.

I also interviewed citizens of various ages in their homes and businesses including city officials, state and federal workers working with victims, builders, and experts in storm-related construction and emergency management. In addition, a mitigation adviser from FEMA's Moore Disaster Recovery Center, who counseled 400 applicant families, kept informal track of locations where people took shelter, ranging from closets to SafeRooms. This person reported the range of categories and I was able to interview victims in most sheltering categories.

I conducted voluntary interviews with victims who were salvaging possessions, citizens working at their homes or businesses, applicants at the Disaster Recovery Center, and others recommended by officials or friends. I interviewed the Moore city manager, assistant city manager, public works director, and emergency manager, as well as the warning coordination meteorologist for the National Weather Service in Norman. I also gleaned information from media reports, FEMA reports and case studies, and knowledgeable officials. I conducted follow-up telephone calls and electronic communications where they were feasible and useful.

In summary, I interviewed 17 survivors and 14 officials/experts and met with 14 builders from the area. I tape-recorded and transcribed all interviews and summarized them in this report. Interviews ranged from five minutes to 1 hour in length. I also consulted a National Weather Service (NWS) survey of victims conducted after the May 8 storm.

Citizen interviews and research focused on a number of issues:

- How, where, and when did you seek shelter in the May 8 tornado?
- How did your decision affect your survival?
- What did you do differently from previous storms?
- What would you do differently next time?

I reviewed the results to identify common themes and issues and asked experts in diverse disciplines to review these findings and conclusions.

Moore: A Disaster Resilient Community

“The best thing about Moore is the small town feel of quiet neighborhoods, peaceful parks, and friendly people. It just feels like home.”

– www.MooreChamber.com, website of Moore Chamber of Commerce



Figure 2. Moore is a proud, family-oriented town of 41,000 in Central Oklahoma.

Setting

Moore is a quiet edge city on the southern fringe of Oklahoma City in Central Oklahoma. It was born in 1892 along an Indian Territory railroad and mushroomed after Interstate 35 opened a corridor stretching south toward Dallas. After the interstate was built, Moore grew from 1,700 residents in 1960 to an estimated 41,000 today. More than 36,000 of Moore's 41,000 residents are white. Household incomes average \$43,400 a year. More than a million people live within a 30-mile radius of Moore, which is in Cleveland County. Just south of Moore is the college town of Norman, home to the University of Oklahoma and the NOAA Severe Storms Lab.

Residents point with pride to Moore's public school system, network of churches, and family-friendly neighborhoods. They are also proud of its affordable housing: median home cost is under \$70,000, and 75% of the 14,850 homes are owner-occupied.

Hazard history and previous storms

The National Weather Service (NWS) has identified more than 100 tornado touchdowns in Central Oklahoma in the past 100 years. At least four have followed a similar track through Moore.

1893 tornado

The NWS reports that one year after Moore was incorporated, an 1893 tornado traveled northeast from Newcastle through Moore, killing 31 people throughout the area.

1973 tornado

Old timers still recall a Moore tornado on November 19, 1973, rated an F3, which killed 5 and injured 46 in Central Oklahoma. NWS records show that at least 22 tornadoes touched down in the vicinity over the next 25 years, but Moore was largely unscathed.

1998 tornado

On October 4, 1998, an F2 tornado cut through Moore along a 3-mile path around 8:30 pm. According to the NWS website, “the tornado touched down just east of Santa Fe Avenue about ½ mile north of SW 19th Avenue. The tornado traveled north, then north northeast and dissipated just west of interstate 35 about ½ mile north of NW 27th Avenue. The most intense damage was in the area of NW 12th Avenue to the west of Janeway where the F2 damage occurred.” No deaths or injuries were reported in Moore.

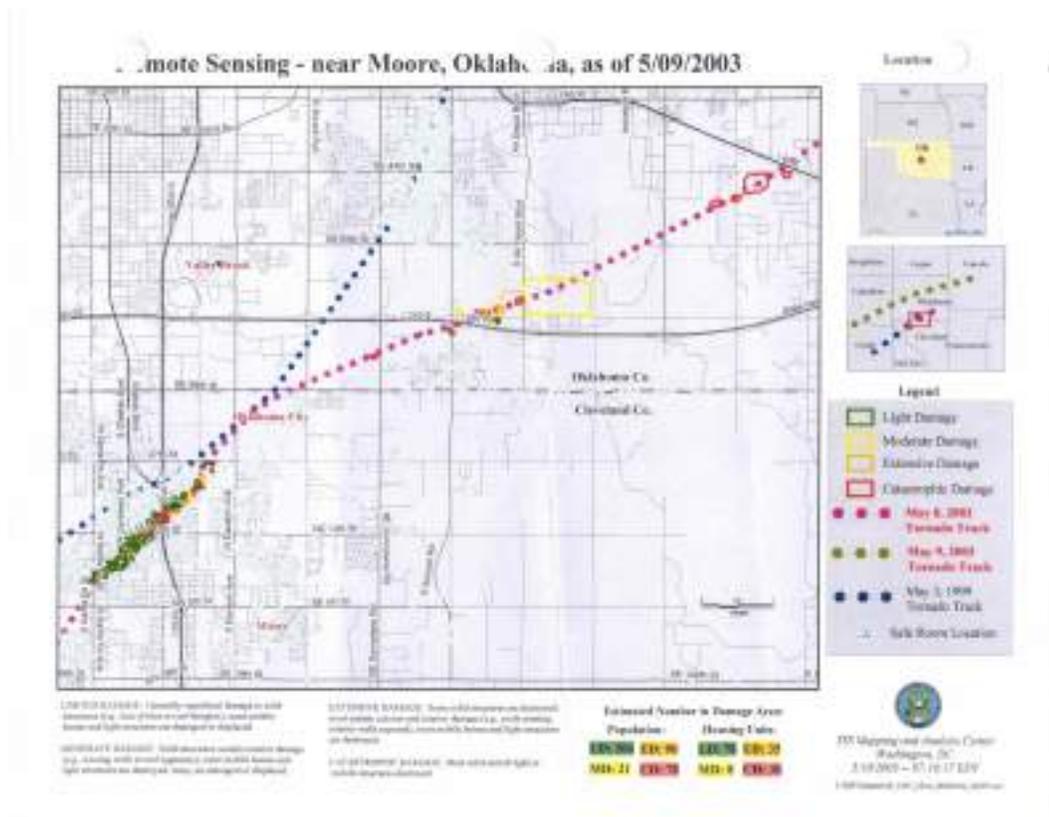


Figure 3. The 1998, 1999, and 2003 storms took similar tracks through Central Oklahoma. [Source: FEMA.]

May 3, 1999, tornadoes

The mother of all Oklahoma tornadoes hit a half year later on May 3, 1999, when an outbreak of more than 70 fierce tornadoes killed 44, injured 800, and caused \$1.2 billion in damages to thousands of buildings (3,000 destroyed, 8,000 damaged) in the state. The worst of the storms, an F5, split Moore in two, killing 5, injuring scores of people, destroying and damaging hundreds of buildings. Wind speeds were measured at a record

318 miles per hour (above ground level). The horrific storm stripped buildings from their foundations and shredded others into toothpicks. Weather forecasters were able to track the storm for an hour and a half before it hit the Oklahoma City area, giving residents unprecedented warning time to seek shelter.

The May 3, 1999, tornado outbreak stretched across 3 states. Before the night was over, the storms left the most expensive tornado damage in U.S. history, nearly \$1.5 billion in losses across Texas, Oklahoma, and Kansas.

The path through Moore was familiar, but the intensity was rare. The NWS reports that the May 3, 1999, tornado was the first and only F5 tornado on record in Central Oklahoma: “the deadliest, costliest, and most violent on record in the immediate OKC area.” For good or ill, it was a benchmark against which future storms would be measured by residents of Moore and elsewhere.

May 8, 2003, tornado - forecasting, warning, storm and loss

On May 8 and 9, 2003, strong tornadoes again devastated areas of Central Oklahoma. May 8 damage was centered most heavily in Moore, along a 3-mile path up to a quarter-mile wide that followed an eerily similar track to the 1893, 1973, 1998, and 1999 storms.

The NWS had forecast several days earlier that the outbreak could occur. Early in the day May 8, Rick Smith, the NWS warning coordinating meteorologist in Norman (south of Moore), “knew it was cooking. Every indication we had from spotters to all the different radar data showed there was an impending tornado.”



Figure 4. Rick Smith issued forecasts and warnings from NWS Norman office.

Since the 1999 tornado, Smith had wondered if people would understand that the ‘99 tornado was unusual. “I had worried – what is it going to take for people to react next time? May 3, 1999, was such an extreme-off-the-wall scale of event, in size and scale and scope and intensity. If they don’t see it on television an hour and a half before, if it isn’t an F5 – will people take it seriously?”

On May 8 at 1:35 p.m., the NWS issued a tornado watch for central Oklahoma. At 2:35 pm, the Norman NWS office issued an unprecedented live briefing about the developing weather pattern. At 4:33 p.m., a tornado was spotted in Grady County (southwest of Moore). At 4:49 p.m., the NWS issued a warning for Cleveland (including Moore), McClain, and southern Oklahoma Counties. Uptown in Moore, Emergency Manager Gayland Kitch punched his new warning sirens.

“Fortunately,” says Smith, “we were able to take some unprecedented steps to let people know it was cooking. We were able to predict the tornado 21 minutes before there WAS a tornado and warn people it was coming. And then the tornado developed in Moore.”

Shortly after 5 p.m., the tornado abruptly dropped from the sky into southwestern Moore, west of I-35 near Highway 37. The NWS says the twister’s damage begins at precisely the intersection of North 5th Street and Santa Fe, near the Church of Latter Day Saints. Churning and chewing up houses, trees, power lines, and everything else in its path, the twister moved swiftly across Moore, traveling generally from southwest to northeast.

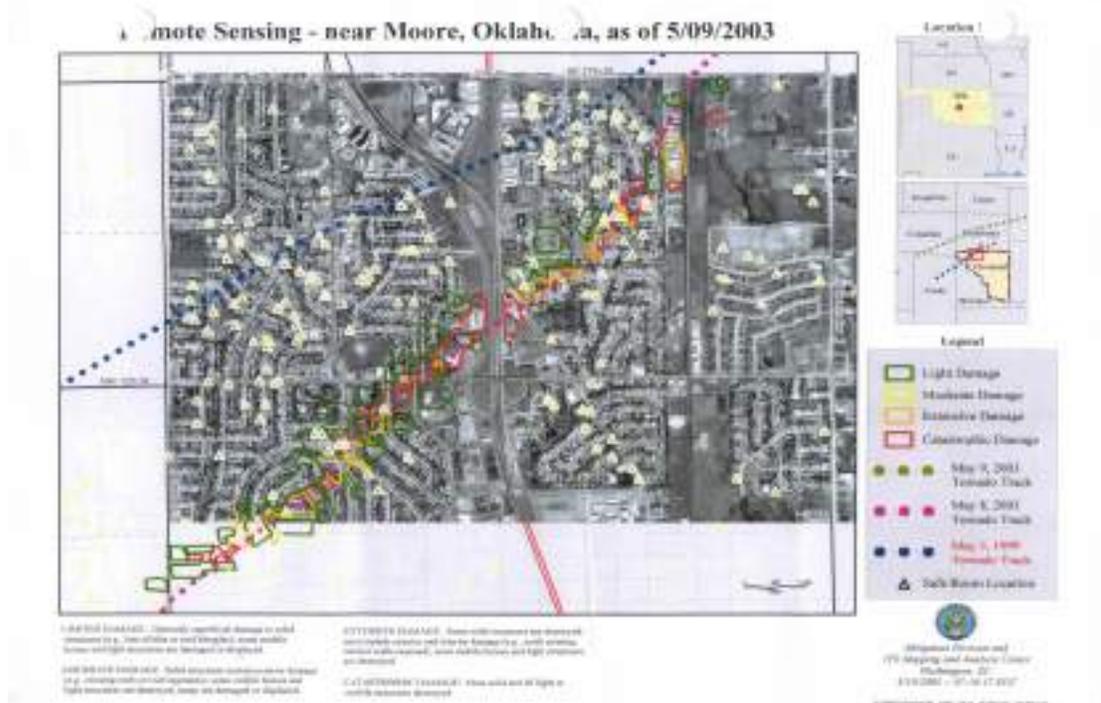


Figure 5. This map shows '99 and '03 Moore damage paths and SafeRooms built with FEMA help. [Source: FEMA.]

The tornado crossed I-35 at 12th Street, shredding a childcare center, the First Christian Church, office buildings, two hotels, several restaurants, apartment buildings, and numerous houses. East of I-35, the tornado weakened slightly and continued northeast, taking aim on the southern part of the Highland Park subdivision. The NWS reported that Highland Park was heavily damaged in 1999; the 2003 storm followed a parallel path about two blocks south of the 1999 tornado. The May 8 storm hit areas along Northeast 27th, Pole Road, Eastern Avenue, and the Lakeside Golf Course.

In only minutes after its touchdown in southeastern Moore, the tornado left town, heading into an Oklahoma City residential area near 89th and Bryant, and then northeast toward other central Oklahoma areas. Before 5:30 p.m., it was well northeast of Moore, wreaking havoc at a General Motors assembly plant and Tinker Air Force Base.

Some Moore neighborhoods were hit in the 1998, 1999, and 2003 storms. Reports the NWS: “It is worth noting that the damage track between Northeast 27th in Moore and

Southeast 89th in Oklahoma City coincides exactly and precisely with the damage track from the May 3, 1999, tornado. In fact, the May 3 tornado also struck the Lakeside Golf Course directly, and the northwest part of the residential area just west of 89th and Bryant.”



Figure 6. The May 8, 2003, tornado damaged or destroyed hundreds of buildings in Moore.

The NWS would later rate the 2003 Moore tornado as a strong F3. As the storm moved along a 19-mile path through southern Oklahoma City and on across Central Oklahoma, it would leave destruction that earned it a rating as high as F4 on the 5-point Fujita scale.

The familiar southwest-to-northeast path cutting catty-cornered through Moore was littered with hundreds of broken homes, roofless businesses, ruined churches, shredded trees, and prized possessions scattered to kingdom come. In its wake, the May 8, 2003 storm left more than 300 buildings destroyed and at least 1,200 damaged in Moore, Oklahoma.

Amazingly, no deaths were recorded in Moore, and injuries were scattered.

Ironically, as cleanup began the next day tornadoes again threatened the area. This time the twisters touched down north and northeast of Moore, zipping through central and northern Oklahoma City areas and into northeastern Oklahoma.

Between May 4 and 11, 2003, the NWS reported 400 tornadoes across the U.S., the largest number of tornadoes ever reported in a single week.

“Flee from a flood, hide from a storm.”

Folk wisdom holds that you should flee from a flood and hide from a storm. But even in Oklahoma, which has one of the highest tornado risks in the world, most people still do not have safe tornado shelter readily available.

On the frontier, country people used to routinely build storm shelters, and the way of life was for neighbors to help neighbors. Later, during the Cold War, underground shelters were briefly quite popular, too. Governments across the land identified and outfitted underground bunkers as fallout shelters, and many homeowners buried little concrete pods in their backyards. A popular image was a man with a rifle guarding the door of his bomb shelter from his neighbors, and the idea took root that sheltering would inevitably set neighbor against neighbor.

In recent generations, city people stopped building shelters, about the time of the Cuban missile crisis. Home and group shelters were discredited as the potential scope of nuclear devastation was more widely understood, and shelters faded from popularity for both nuclear and natural disaster planning.

To make matters worse, Oklahomans generally don't build basements. Various reasons are given, from the high water table to underground rock to plastic soils. For whatever reason, since World War II, Oklahoma buildings have commonly been built flat on the ground on a concrete slab, without even a crawl space that might offer some emergency under-building shelter.

A further complication is that emergency managers and meteorologists in Central Oklahoma generally oppose community shelters because they know people usually have only minutes to find shelter; they do not want to encourage people to leave their homes and go out in the storm to seek shelter.

The result: when the wind comes sweeping down the plains, Oklahomans are sitting ducks in the area often regarded as the tornado capital of the world.



Figure 7. Dr. Ernst Kiesling, Texas Tech University researcher, inspects an above-ground SafeRoom that survived the 2003 tornado in Moore.

SafeRoom capital of the world

Moore, Oklahoma, may well be the current SafeRoom capital of the world. SafeRooms are specially armored and anchored small enclosures that can be built above or below ground in new or existing houses to offer safe shelter from tornadoes. The

engineering design was developed by Texas Tech University after 25 years' research showed small center closets or halls were most likely to remain standing after tornadoes. FEMA has popularized the concept since 1998.

Thousands of SafeRooms have been built in Oklahoma since 1999, when FEMA and the State of Oklahoma sponsored a SafeRoom initiative that offered \$2,000 rebates toward SafeRoom purchases, which generally run between \$2,500 and \$7,500. FEMA reports that 6,016 SafeRooms were built with help from the \$12 million Oklahoma SafeRoom initiative that followed the May '99 storm. Unnumbered others, undoubtedly thousands, have been built or installed with private funds.

As of May 8, 2003, Moore officials had records of about 750 SafeRooms, according to Moore Emergency Manager Gayland Kitch, including about 460 supported by the '99 FEMA initiative. In all, Moore has about 14,000 dwelling units. This may well be one of the highest ratios of SafeRooms per capita in the brief history of the SafeRoom phenomenon. In addition, many Moore homeowners have built cellars and traditional underground shelters.

One school has an above-ground safe room built with a FEMA grant. Moore has no community tornado shelters, by that name, and as far as Gayland Kitch is concerned, it will never have any. He never wants to encourage people to leave a sturdy building and go outside into a storm to find group shelter.



Figure 8. Moore Emergency Manager Gayland Kitch sounded the sirens and took shelter in his Emergency Operations Center.

“We had 15 minutes’ warning this time,” Kitch says. “What more could you ask? That’s enough time to get to your own shelter or, if it comes to that, a local shelter next door or in a mobile home park. But to hear the warning, verify that it’s true, round up your stuff, find your keys, get the kids, go outside and get into the car, drive however long it takes in whatever kind of weather and traffic jams, get out, and get inside a community shelter – there’s just not enough time for all that. The last place you want to be in a tornado is in your car!”

His position is widely shared by emergency managers and meteorologists in Central Oklahoma, making it even more important that SafeRooms and individual or localized neighborhood shelters be built if Oklahoma's 3.5 million people are to have quick access to safe shelter from storms.

Survival Stories

Moore, Oklahoma, is a disaster-resilient community.

Hit by three tornadoes in five years, Moore not only lies in the heart of Tornado Alley but is also on the southern fringe of an Oklahoma City still shadowed by the 1995 Murrah Federal Building bombing. Down but not out, this town of 41,000 survivors has lessons to share.

City Manager Stephen Eddy recalls his despair after the May 3, 1999, tornado stripped much of his town down to bare earth. "After '99, we had no clue what to do, what to expect, or whether we would survive," Eddy says. Surrounded by devastation and anguish, Eddy was drowning in decisions that had to be made instantly, with no future in sight. "Unless you've experienced it, you can't know what to expect. Suddenly they appear, all these agencies you never dreamed of, and reporters from everywhere, and storm chasers that just descend on you like fleas."

He credits the unsinkable human spirit and help from FEMA and many others for the town's recovery from the horrific 1999 tornado. To their surprise, the storm opened up doors of opportunity. Moore rebuilt, only to be hit again.

"This time we knew," says Eddy. "We knew what we had to do. We knew we would survive and that we could rebuild even better than before."

That community confidence made all the difference this time. Within two weeks, some victims had already salvaged what they could of their possessions, bulldozed their houses, cleared the debris and slabs, poured new ones, and moved briskly ahead with rebuilding their lives.

"This time," says Eddy, "we know we'll survive, and, overall, our community will be even better because of it."

Lessons to share

What are some of the lessons Moore survivors have to share? Here are some of the trends and stories that surfaced in our interviews of Moore survivors:

- They believe they are at risk but can survive. The Moore survivors understand that they live with a real tornado threat and that they can improve their odds of surviving if they plan ahead, based on what they learned in previous storms.
- They built or found safe shelter. They identified their safest shelter options before the storm and practiced so they could move to cover quickly. Many built cellars, shelters, or SafeRooms.
- They were alert and moved to shelter quickly. They monitored the weather, listened to warnings, and took instant action when needed.
- They had a plan and acted on it.
- They learned from experience. Many are planning to improve their sheltering options before the NEXT storm. The town manager is recommending changes in

building codes, and homebuilders are exploring ways they can improve building practices.

- Neighbors helped neighbors. They warned each other, helped each other, and welcomed neighbors into their shelters. They helped each other survive the aftermath and recovery period. They defined “neighbor” very broadly.
- They believe they can recover. They began working on recovery and rebuilding almost immediately, with remarkable resilience.



Figure 9. The 2003 tornado left Moore survivors daunting challenges in cleanup and recovery.

They believe they are at risk but can survive

Ernest Smith, 505 Northeast 21st Street

After the '99 tornado damaged their home, Ernest Smith and his wife decided to renovate and put in a backyard shelter.

They added \$2,500 of their own money to the \$2000 FEMA subsidy for the shelter. Then they re-bricked their house and added 350 square feet of living space, a new roof, dual-pane windows and a new wrought iron fence, Ernest says ruefully from atop the pile of rubble that was his house. He is hunched over with a bad back, trying to poke through the overwhelming debris-scape for salvage.

The only thing we lacked was painting the trim. That was going to happen Monday, but Thursday the tornado got it,” he says, gesturing to a small mountain of broken trunk and limbs. There’s part of the wrought iron fence up there. They estimated the time was to be 5:21 here, and I had a grandfather clock in the study, and it stopped at 5:21. Of course, all the electricity went off and everything. I was watching, but I couldn’t see it because that tree was so big. Then here come the neighbors and they said, Come on, let’s get in the storm shelter. And we could see it headed this way. Just in time. About 5

minutes after we got in, we could feel something hit. It shook the whole thing. There were three of us in there. When it was over, we tried to pry up the shelter door, but it wouldn't budge. All this was on it. We was lucky, firemen coming down the street was asking where storm shelters are on this street. This is the only one. And when they came down and yelled at us and we answered back, they got 2-3 other guys to help them get these limbs off of this door. Nobody was hurt. This was my storage house that sat next to it. Most of my roof went in the ditch.

Would he do differently next time?

No, I'd get in the storm shelter again. I would probably have a hydraulic jack but the limbs are so thick, I don't know if we could have gotten out. I probably would take me a saw down there, too, a gas saw. We're just grateful to FEMA that we had that shelter this time.

They built or found safe shelter

Shannon Scott and Robert Wallace, 2106 Fox

What does a SafeRoom mean for people like Shannon Scott and Robert Wallace? They believe it was the difference between life and death. They rode out the May 8 storm in a SafeRoom unscathed, although their home at 2106 Fox was totaled.

"I must have had a premonition that my kids would need it," says Shannon's mother, Elona Scott. She built the SafeRoom after the '99 storm, using the FEMA subsidy to help defray the cost.



Figures 10 & 11. Shannon Scott, Robert Wallace, and six others took shelter in their SafeRoom with five dogs and two cats. Right: Shannon's mother Elona Scott salvages personal possessions at the tornado-wrecked house.

The 1999 storm left roof and fence damage to the house she rented to Shannon and Robert. "Five houses up," says Shannon, "that's where the windows started blowing out of cars in '99. And you'll notice straight up this street, the house that's facing ours, it's a

brand new house; the old one took damage and ended up burning down in '99 when the power came back on because of damage to the roof and everything. So it just missed us then.”

This time, from when the first siren went off, Shannon and Robert had about a 15 minute warning. Then the siren stopped. When it went off again, they headed for cover.

“We are lucky,” Robert says, stepping gingerly through the twisted debris of what had been a dining room. “I mean, they built new sirens after May 3, and our siren’s right here and, you know, handy for us. And we have this SafeRoom. When we closed the door of the shelter, we looked around, and it was just in the next block, west of us – the storm, you could see it coming. It was clear. It was translucent, you could see through it. It wasn’t black, like a lot of them you see.”

“They say this was a dry tornado,” says Shannon. “There was no rain. If you just look, on this back half yard, there’s a lot of insulation and stuff, but in the house, there is no mud. We recovered a lot of our stuff, because it didn’t rain.”

Who was in the shelter? “We had 8 adults, 2 children, 5 dogs and 2 cats,” says Shannon. That’s how many we had in there. The only problem was that I was holding the kitten, and it peed on me.”

“We were inside about 5 or 10 minutes, that’s all,” says Robert. “We came out within 60 seconds of it passing.”

“You know how everybody describes May 3 as it sounded like jets?” says Shannon. “This didn’t sound like that. We did not expect to see what we saw when we opened the door. It was just real windy, and the door was rattling. Things were hitting. There were loud pops, but nothing like what you would expect to see when you walked out and saw what you saw.”

“No, we didn’t think it was that bad,” Robert says. “We thought, well, that was nothing, and then we came out. We expected to see maybe just trees down, maybe, and then, when we came out, we saw what had happened, and we said, ‘NO! NO! This has happened!’”

Don Staley, 1313 Sunrise Drive

Don Staley’s roof and most of his house are no longer at 1313 Sunrise Drive, thanks to the May 8 tornado. But his dishes are still neatly stacked in what remains of kitchen cabinets, now open to the sky and street.

And in his backyard, wrapped in sheet metal and other debris, his SafeRoom is virtually unscathed. Staley rode out the tornado in his monolithic-poured concrete SafeRoom. He was particularly happy to be inside, because May 8 was his THIRD tornado in five years. In 1998, his home at 817 Northwest 17th was seriously damaged. In 1999, the house was totaled. “We didn’t have a SafeRoom in ’98 or ’99,” he says. “We rode out the tornadoes twice in the bathroom, and I said, never again.”

Now he not only has one, he also sells SafeRooms for a company called Oz, headquartered in New York. “I have a fear of being buried in debris and being trapped in an underground shelter, so I wanted one above ground. When I found this one – it weighs 21 tons, so it’s not gonna go anywhere. It’s a single pour, solid concrete, matted steel throughout, and we’ve got a slide door that has ¾” plywood on each side and 12-gauge steel in the middle. So if anything hits it, it recoils off, and it’s a slide door that locks into

each side of the structure, so there's no give to the door.... So it's the best in the world, as far as I'm concerned."



Figures 12 & 13. The 2003 storm destroyed Don Staley's home – his third tornado in five years. His earlier houses were damaged in 1998 and destroyed in 1999. This time he took shelter in his backyard SafeRoom.

His wife was at work when the storm hit. "It's a good thing, because she would have beat me to death. She was home on the '98 one, and it scared her so bad, she black and blued my back. She thought we was dead. If she ever goes through another one, I don't think she can handle it."

Staley went to the shelter 30 minutes before the tornado hit.

I had the two cats and a dog in the SafeRoom with me. I was prepared. I had all my documents, all my title papers, all the car titles, all the important information I needed with me in the SafeRoom. The second time, I lost the title to my truck and it took 6 months to get it straightened out. This time, I had all my tax forms in a folder in the house, and I forgot to grab it, and I was in the SafeRoom thinking about it, but it was too late. I wasn't about to go back in the house for IRS papers. I gathered up what I thought I would need like a radio and AC/DC television in the SafeRoom – so I was actually watching the TV while the tornado was hitting me, and tracking it on radar. It sounded like a bulldozer with a jet engine. I felt the vibration, I thought it was moving but it wasn't, it was just vibrating. And the storm shelter didn't move a centimeter.

Staley believes he would have become a human pincushion if he had tried to ride out the storm in his house. "In the bathtub, I would have been pelted by debris, by the glass because I have a window there. The safest place in this house would have been a small closet, but I noticed there was 2x4s sticking out of the closet."

Some people argue that the only safe place in a strong tornado is underground. Staley disagrees. "I recommend the above-ground SafeRoom because you don't have to worry about being trapped. All the gas meters in the area were blown out. And people

don't realize that gas is heavier than air, so it is going to travel to a lower form, which is an underground shelter, so people need to realize – do not light candles, do not have any kind of flame, don't smoke down in your shelter. Because natural gas in its raw form, you can't smell it. Gas companies put the raw egg smell in there so you will know there is gas there. So people get the false sense of being safe, and then they light a cigarette or a candle, and it blows the door off. They might survive the storm, but then they get injured because of the gas.”

He talked one neighbor into buying a SafeRoom, so a clone of his concrete box stands in the back yard next door, similarly wrapped in sheet metal and debris and unscathed. No one was home during the storm. The neighbor's house was totaled, too.

Staley recalls another neighbor who considered buying a SafeRoom but decided to put the money into an above-ground pool instead. The pool is filled with debris. “Now they're talking about getting a SafeRoom,” he said.

“It's a miracle no one got killed this time,” Staley says. “People are wising up and realizing that, if you live in Oklahoma and you don't have a shelter, you better get one, because this is Tornado Alley. So I recommend everybody get a SafeRoom of some kind. The people just got to realize, you can replace all your material possessions, you just can't replace your life.”

They were alert and moved to shelter quickly

Lola Floyd, 1309 Sunrise

Next door, Lola Floyd was absent-mindedly picking at debris in her yard, waiting for the insurance adjuster. It was 9 days since the May 8 tornado. “I can talk about it now,” she says. “I couldn't earlier.



Figure 14. Lola Floyd hid in a closet to survive the tornado that destroyed her home.

“Well, John was over and we had dinner,” Lola recalls, “and about that time the TV went BOOM! and he looked out the patio door and said, ‘It's maybe two blocks away.’ So we just jumped in the closet.”

It turned out to be the best of their choices. The back half of the house was mostly blown away. The kitchen floor is covered in glass shards of her china and crystal. The bathroom is also bathed in glass fragments. Most of the roof is gone from the entire house, including the living room. The hall and hall closets have gaping holes in the roof.

One of the few remaining roof pieces is over the central bedroom closet where Lola and her guest hid from the storm.

Right here in the hall could have been ok, except the doors would have blown open. In these hall closets, the blankets and everything was just untouched. I

think it lasted maybe a minute. It sounded like there was a shake when the roof went off, and then it sounded like somebody with a sledge hammer trying to beat their way in. Things were hitting the house so hard that we thought, Oh, my gosh. We thought this was it. Because it came right this way, right through here. My neighbor Don Staley is the one who sells the OZ SafeRooms. That's why he has one and his neighbor has one. And he's been after me to get one, but they were \$5500 and now they are \$7500, and I thought that was too much. But I know that OZ one has to be one of the best. So when they say, closets, go in the closets if you don't have another thing – I sure would have liked to be under ground, but if this is the best you've got, the closet, you need to get there quick, and it is sure better than nothing.

Carol Battaglia, McDonald's, 630 Northwest 12th

When they heard storms were possible on the afternoon of May 8, the McDonald's employees at 12th and I-35 got together and talked out a plan, recalls Carol Battaglia, swing manager who was on duty that day.

“We talked, made sure we talked – where we all would go, and we all kind of gathered, before, because we weren't that busy, so we had time. We said, if something happened, we would go to the men's bathroom, because it has an inside wall. We didn't want to go to the freezer, because it's only made of fiberglass. But if we had been busy, everybody in the back, trying to get all those people together – but we were all right.”



Figures 15 & 16. Carol Battaglia rounded up her McDonald's crew and sheltered them in the men's room. The staff evacuated the all-glass children's Play Place moments before the tornado struck.

Battaglia speaks slowly about the storm, and she does not smile. When clouds became ominous, the play lady (manager of the McDonald's Play Place) sent home the two families of children playing there and closed down the glass-enclosed play area.

We did not hear the sirens at all, if they were even going off. We would never have known if it wasn't for one customer, because we weren't looking that way. The one customer was facing that way, toward the southwest. And he said, there it is on the ground. And it was right by the apartment (about two blocks away). So he ran to the men's room, and I come around to check and see what it was, and I went back and got all my crew and told them to head for the bathroom. And I went to the back to see if anybody was in the storage room or into the

drive-through. And as I come back around, and the play lady came out of the Play Place, we grabbed hands, we got right there to the garbage pails there, and it was tearing up the church (a block away). It was tearing up the church, and we could see the debris and everything. And her and I hustled to the men's bathroom. There were 13 people in there. We heard the glass go, and we were just hoping that bathroom would hold up. It was scary.

When the twister hit dead-on, it shattered all the glass that surrounded McDonald's on three sides, lifted the roof, wrecked the Play Place and cars on the parking lot, and passed quickly in a roar of swirling debris.

All that glass. If somebody had stayed here, behind the counter or in the dining area, all that glass – somebody could have been hurt. If we had been down this way, we would've still been behind the counter. If the children had still been in the play area, it would have been a terrible tragedy. The play lady sent them home about 15 minutes before the tornado hit, because she thought a storm was coming. The only thing I got was glass in my eye, and I had to go to the emergency room Saturday, but it's healed up a little better now.

Within two weeks, McDonald's was largely repaired and open for business, looking as if nothing had happened, except for the black plastic and duct tape encasing the Play Place like a giant sore thumb.

"I was in the '99 storm, a couple of three blocks over there. Just debris, I didn't lose anything. This time I just lost my car on the parking lot here."

What would she do differently if there is a next time?

"Probably try to go to cover a lot earlier, if we had a little bit more warning. We didn't have no warning at all...but we are all right."

Clara and Walter Smith, 2118 Bellaire Drive

Clara Smith is raking the last dregs of debris from her front yard. "We've been in this house since 1976," Clara says. "The neighborhood was built in the early 1970s. This area was hit in 1999 and again this year, but we missed the brunt of the damage both times. In '99 it was just north of here, and this time it just was south of here." Around their home, other houses suffered roof damage May 8, but the Smiths' yellow composition roof looks almost new.



Figure 17. Walter and Clara Smith think careful building helped their roof survive the '99 and '03 tornadoes that hit north and south of their home.

“This roof has survived two tornadoes now – of course we were on the fringe of the storms – but we think it’s because it was put on so well,” her husband Walter says. “The roofer was very conscientious and put at least three nails in every shingle. We had a little warning this time because the Weather Bureau warned the city and they turned the siren on.”

Where did they seek shelter?

“Next door has a storm cellar, and we are on good terms with her, and we go there. And she wasn’t even home yet. She’s a teacher and she didn’t know there was a storm. She was driving this way. When she came to her house about that time, she was scared to death because the fences were down, buildings were down, roofs were gone, and all this kind of stuff.”

Are they changing anything about their sheltering plans?

“No, not really,” says Clara. “I’m not sure whether I want a SafeRoom or not. I haven’t been convinced. I really want to be underground, that’s all.”

They had a plan and acted on it

Bob and Carolyn Morehead, 977 West 6th Street

When the first siren went off, Bob Morehead went out to his driveway, southwest of his house, and began to survey the sky. But it was hazy, and he couldn’t really see anything out of the ordinary. His wife Carolyn wasn’t home. “We had talked about it before,” Bob says.



Figure 18. Bob Morehead survived in a washroom. Now he and his wife Carolyn are building a sturdy new “ICF” house with a SafeRoom.

We’ve lived here 40 years one month, same as our neighbor across the street, Sonny and Thelma Holt. We had one in October ’98. We went to the hall and covered with a blanket. I heard that one. It was like a train noise. Our neighbor lost his patio back there and the back part of his house. We had a tree out of the

back yard and a little damage to our roof, a little damage to the camper. What happened was, our neighbors over there, the Holts, they lost the back end of their house. They lost the whole den. It landed on our roof. 1999 didn't hit here, but it was real close. We always said, get in the closet, get in the hallway. They have a storm cellar across the street, but they have got too much family, their whole family comes, and we don't interfere with that. They've barely got room for their whole family. Well, we was remodeling the northeast bedroom, and she was buying paint and had it all ready to paint, and I was getting ready to paint, you know, and waiting for her to get back, and we decided, though, that this little wash room was more protected because it had two roofs overhead. And no windows. And walls were closer together. So we decided that about a week before, that was where we would go, if we had to go, to that little wash room, what we call our junk room.

The May 8 tornado apparently formed overhead.

The second siren went off, and I came out and it started to sprinkle, and I looked overhead, and what I saw – I couldn't explain what I saw – clouds moving around, you know, and it was sprinkling, so I thought I better get back in. Maybe it was my imagination, what I saw. I walked through the door there, and I went to the wash room, and it was over with by then. From the time I left here (the driveway) to the time I got there (the wash room), it was over – 3 to 5 seconds. I couldn't tell you what I heard. Just debris flying by the kitchen that way. I seen stuff passing by the kitchen door that way, running through the bedroom, passing through the kitchen, you know, and I thought, well, I left the front door open, you know, probably might have blew it open. It took off our roof, all the east side of the house, you know.

Fortunately, he was on the southwest side.

I was in that little room, that little wash room. And it wasn't even touched. The hall was all pierced with 2 x 4s. Even our closet on the east side, it was all gone, too, and the roof was gone. And she has salt and pepper shakers in the kitchen overhead that way, on a shelf, none of them was moved, more than 300 of them. Not one of them was moved. The living room, bedroom, bathroom, all totally gone.

The Moreheads had a travel trailer in the drive that was also totaled. Their carport ended up in a yard blocks away. They are concerned about their neighbors, the Holts. "This is their second whack at it. In '98, Sonny Holt was in his storm cellar, and he had to go to the bathroom and then coming back he opened his back den door, there goes his patio and the whole back end of his house. So he did an about face, don't know where he went. Now this time, everything is gone," Bob says.

Two weeks after the May 8 storm, the Holts have cleared their house and slab, poured another, and are beginning to rebuild – although they and the Moreheads and others are frustrated at what they believe is slow response from insurance adjusters.

"We all stick together, we all help each other, because there's a little girl next door who has a baby, and we've tried to help her a little bit, and each other, they come to our rescue, too. And the most impressive thing is the Red Cross, though. Every day they

brought us two meals a day, hot cooked, and the Salvation Army, and water, and drinks, and cokes and snacks. We sure want to give them thanks,” Bob says.



Figure 19. The Holt family survived underground in their back yard storm cellar. They started rebuilding less than two weeks after their house was destroyed in the '03 storm.

“And we had a couple stop by, a boy and a girl, they are in the Air Force, and they wanted to help somebody, and they chose us,” says Carolyn. “And they helped us clean a path in case we have to put our camper over here. The man next door, he’s our contractor too, that’s bought that house to remodel, and we get to live over there, and he’s going to let us go live in the little house until he sells it.”

What would they do differently in the future?

“Well,” Bob says, “this house will all come down this week, and we’re going to build an ICF (insulating concrete form) home. Our son-in-law, he’s a builder, you see, they build Sonics and stuff, you see, and that’s what they build them with. With metal studs inside. We’ve heard they hold up better in storms. We went to see them, and we’ve seen three processes, one starting, one finishing, and one finished.

“Oh, and the most important thing,” Carolyn says, “we’re gonna build a Safe Room in a closet in our new, strong house.”

They learn from experience

Donna Eustice, director, Apple Jack’s Learning Center, 316 Northeast 27th Street

Outside Apple Jack’s Learning Center in northeast Moore, there’s a big blue-and-white sign: SAFE ROOM.

Donna Eustice, the director, wasn’t here in 1999, but she knows all about what happened. It was early evening, 7:14 pm, so the children were gone when the tornado hit.

“The building is a metal-framed structure, brick faced, so the building itself was fine. The windows blew in and of course there was a lot of debris inside. Parts of the roof came off, the air conditioner kind of pulled the northwest corner up. Our outside playground and our vehicles were all destroyed. They were out of the building for a full year afterwards, from May 99 to June 2000, getting it rebuilt.



Figures 20 and 21. Apple Jack's Child Care Center proudly advertises its SafeRoom built after the '99 tornado destroyed the building. Director Donna Eustice shows where the children took cover in a SafeRoom May 8, 2003.

“The owner went through FEMA and got a small business loan to get her business rebuilt, and she put in a FEMA SafeRoom.”

This time, the tornado hit south and east of the center, pretty much parallel to the '99 storm but not as strong, Donna says.

It was about 5 o'clock in the afternoon. It was Thursday night, and a lot of parents had already picked up their children. Some parents came in trying to pick up their children. So we had about 30 altogether here then, about 25 children, all ages from one to twelve, some one-year-olds, and six staff people and two parents. I wasn't here, my assistant was on site. They had the radios on, and they were watching the weather on the television, so they knew what was going on and they were prepared. And of course the sirens went off, so they knew immediately where they needed to go.

The SafeRoom is a big storage closet in the center of the building, without windows. Donna says it was built to hold capacity for the center, 120 people. The staff had 10-15 minutes after the sirens went off to herd the children into the SafeRoom before the storm hit the neighborhood. The center and children survived without damage or physical injury in the 2003 storm.

Sure they were scared, but they handled it pretty well. We do tornado drills at least twice a year, and we talk to the children about it. We live in Oklahoma, they understand, it's an everyday thing. And when we're in the SafeRoom, we have flashlights there. Yes, there is a bit of panic, but we talk to them and try to prepare them as best we can. And tell them what is going on and that they will be safe in there. I think they did real well.

We talked more about it afterwards, too. A few that were here, parents were trying to get back to them but traffic was horrendous. We were here until 8:30 that night trying to be sure everybody got home safely. A few of our families had damage to their homes, but not as bad as '99.

We see some kids that worry when there is a thunderstorm. We reassure them that it's just rain and they know they have a safe place to go.

Neighbors helped neighbors

Ethel Norton, 912 Northwest 6th Street

From the front of Ethel Norton's home, you really don't see any damage to speak of. But the back half is gone. The afternoon of May 8, Ethel was home reading a book in the home where she has lived for 35 years.

I never paid any attention. The electricity went off at 5, but before that, my son had come home and said, why aren't you watching the weather? I didn't notice, if you are reading a book you don't notice how the weather is. So we turned it on, and those people across the street can tell you as good as I, we all started across thataway (to the next door neighbor's cellar). My youngest granddaughters started in the cellar also, and him and his wife and the other neighbor's wife was down there with their two grandkids, and then there was a man and woman and little kid lived right there and others that was visiting, and they all went down there, too. It was a fairly big deal. And then the sirens sounded, and we started down and the men was standing outside the door looking, you know, and they shut it down and it hit. Yes. And nobody was hurt. It must have been 30 minutes or so we was there, or longer, because we couldn't get the door open. Because the two-story shed he built by the shelter ended up on top. And pretty soon we heard somebody say, we're going to get you out, and we said, ok.

Did she know they would get out? "Oh, yeah."

What did she do differently this time than in previous storms, and what would she do differently next time?

"Just head for the cellar. Same thing. Mrs. Johns that used to live there years ago, when my son was real young – and he is 41 now – and I worked nights in a restaurant, and she had two sons and a daughter, and every time she saw a dark cloud, she would grab my son and head for the cellar. Good neighbors. Uh-huh. Yes!"

Lou and Leroy Stahlman, 913 North Lawton

In 1972, when Lou and Leroy Stahlman moved into their one-story brick home at 913 North Lawton, they built an underground storm cellar in the back yard.

Lift up a metal door in the backyard, and you see maybe 8 concrete steps leading down in the concrete bunker under the lawn. They store canned food there and – during tornado alerts – family and neighbors. It's been used as a "fraidy hole" dozens of times by scores of people, but their house never had a direct hit – until May 8, 2003.

"The cellar's never been locked," says Lou Stahlman, "and all our neighbors know it. They know they can come any time, whether we're home or not. We had 28 people in there in '99, and 5 animals."

On May 8, Leroy was at work. Lou went shopping in mid-afternoon and heard there might be a tornado down at Chickasha, south of Moore. She went home and turned on the TV and heard that the storm could get to Moore before 5:30 p.m. She began hurriedly stocking her cellar – medicine, important papers – all the while trying to reach and round up her family by phone.



Figure 22. Neighbors found safe shelter in Leroy and Lou Stahlman's storm cellar while their homes were blasted by the tornado and then, after an explosion, burned to the ground.

"Usually I get water down there, and wash cloths, and sometimes crackers and peanut butter. Just in case. But we have an ax down there, we can get out with it if we need to. Sometimes I take a fan and some folding chairs. I can't leave them all the time because they will rust. I get prepared and if we don't have to have it, ok."

Lou said when she finally gave up on reaching her daughter and granddaughter by phone, she had only seconds to get to the cellar herself.

"Leroy told me they were saying on TV it would hit at 5:27, so I better get in. But it hit before then. Then phones was out and then my daughter got here. When we got to the cellar, our neighbors was in there already, the ones from across the street. And the ones from next door (on the north), these that caught fire later, they was already in there, and they had their grandbaby. But Larry next door to us (on the south) was asleep, and I didn't know it, I was too panicky about my daughter and granddaughter. He came at the second siren, but he waited too late, and the tornado just literally picked him up and threw him. And he had a knot on his head, and it was bleeding down the side of his face, his arms and legs were bleeding, and I thought at one time we had lost him."

Somehow they got their neighbor Larry into the cellar until the tornado passed. All told, there were 20 people there. But the danger was not yet over.

"Well, I guess it was an explosion from a gas deal, I don't know," Lou said. "But he (neighbor on the north) opened the cellar door and seen his house was on fire, and he took off, and he ran to his house to pick up something, and another explosion hit and threw him outside."

Fortunately for the Stahlmans, wind was blowing from the south, away from their home and cellar. The blast and subsequent fires destroyed three houses to the Stahlmans' north.

In the midst of the chaos, they worked feverishly to help their injured neighbor, Larry. He was too injured to stand and walk. Eventually they got him safely away from the fires. He was taken by ambulance to a hospital and later released.

"Our cars was trapped in there (near the fire)," says Lou. "We couldn't get them out and was afraid they might explode with the fire. So we just took off." Lou hitched a ride with a passerby, still looking for the rest of her family. After a frantic search, the family

was reunited, only to discover they could not get back to the Stahlmans' home because the roads were blocked with debris.

Their home was heavily damaged and many homes on their street were destroyed, but they and their neighbors survived in the Stahlmans' underground storm cellar.

They believe they can recover

Patricia and James Robinson, Jr., 841 Northwest 7th Street

In the 1999 tornado, Patricia and James Robinson had about 40 minutes' advanced warning. They heard television weathermen warning they should either abandon the area or go underground, "or we would die." The Robinsons gathered up their 2 grown daughters and 4 grandchildren and drove to a shopping center 20 minutes away to seek shelter from the storm.

"We made it just fine," Patricia recalls, as she and James pause for an interview at FEMA's Moore Disaster Recovery Center.



Figure 23. Patricia and James Robinson are learning and planning to rebuild a stronger new house with a SafeRoom.

They returned home after the '99 tornado to find what they called "minimal – to the eye – minimal" damage on their street.

"Now THIS time, we didn't have any warning, but when they said a cell was coming over Moore, so we got in the cars and left immediately and went to Norman (about 30 minutes away), to get out of the area."

"This time, there was only warning of a cell, not of a tornado," James says. "Because we got these children into the house, and he (meteorologist) said it is due in your area, in Moore, at 11 minutes after the hour. Well, it's 10 minutes of 5 o'clock, so that gives us 21 minutes. It took us 7-8 minutes to leave, had to get the children together, and she (Patricia) was waiting on a phone call from one of the mothers. We had to leave, we couldn't wait any longer. We looked to the west where the trouble was, and we didn't see a thing. We drove at right angles to what we thought was the storm path. Of course, we kept going until everything was over."

What would they have done if they stayed in their home?

“We would have gone into the bathroom,” James says, “covered ourselves up with blankets and a mattress if we could find it that quick. But it happened so quick, that I don’t know if we would have had time to do all that. It was a strange, strange storm. There was almost no warning. There was clouds coming over, and he (meteorologist) said there were storm cells coming, possible tornadoes in the cells, but they didn’t say there was a tornado. It formed right over Moore and bounced around.”

“And in 20 seconds,” Patricia says, “it was total devastation over Moore, as this 20-second storm was moving. And you are guessing where you are going to go. Told to go into the center of your house in the lowest place, but you forget where you are supposed to go, and you are taking a chance on your life – the chances that you will survive are slim, depending on the level (of the tornado) . You don’t know what the levels are, so everything is up in the air in those seconds, your life is at stake, and worry just fills you.”

“We were worried about the children,” James says, “because the children were the major factor. The dog was a factor, but the children were the major factor. Wanted to get to safety.”

“So we took the two grandchildren and the dog with us,” Patricia says. “But if it had been night when it happened, we would have been in serious trouble, because we don’t have a place to go. That’s the bottom line. If we had had a place to go, where we would have been underground, or in the SafeRoom in the house, we could have had our supplies there, like a flashlight, certain things, and we would have been--”

“Safe,” says James.

“Less stressed,” says Patricia. “And we would have known exactly where to go and what to do. And the cost? It doesn’t matter what the cost, because in that case, your whole lives are depending on it. I’m sorry,” she said, beginning to tear up.

The storm hit their street with fury, hopping and bouncing.

“When we came back,” says Patricia, “we didn’t recognize our own street. It was all smashed up. It was buried in trees and telephone poles, and houses were down. But no one was killed.”

“People were walking around, dazed,” says James.

“But no one was killed, so that was a blessing,” says Patricia. “We had one injury in this area, far as I know.”

“Lady was sucked out of her car,” says James. “Right on our street. She had broken bones, lacerations. Right on our street.”

At their own home they had what they called moderate damage, by comparison to others. “We had minimal – to the eye – to the eye – minimal damage,” said James. “The back of our house, the windows, and the trees we loved in front and in back are gone.” They share pictures of the lost trees, quietly, as one would share photos of a beloved family pet.

It all brought back to them the nightmare scenes after the 1999 tornado.

“Even after the May 3 (1999) storm, I couldn’t walk down that area without starting to cry,” Patricia remembers. “And now it is like you are still suffering from that, you never get over it. It’s like – the horror of that one. You saw fire, and things bursting. It was a war zone, and we had been underground at the shopping center, and when we came and got out, this whole area was shut off, police and fire, closed off, so here you are dealing with you don’t know what but it’s awful what you are seeing, and lives were lost in that storm. And it flattened. It took the foundations off houses, that storm. Peeled

linoleum off kitchen floors. There was no kitchen floor left, just a little piece left in the corners.”

“Took off the slabs on some,” says James.

“Cause on May 3 (1999), people died, and they didn’t even know they were going to die,” says Patricia. “They were eating dinner, people were doing a variety of things, and all of a sudden, within a short span of time, people are dead, or maimed, and the hospitals are full of bodies with boards through them and horrible, hideous things that was happening.”



Figure 24. Three disastrous tornadoes in five years have left many Moore survivors with psychic scars that are hard to heal.

“My wife’s twin brother lives 4 doors from us, and another brother lives in that same house,” James says. “They were standing there (May 8) looking at the storm, and they didn’t see anything. It just came out of the sky. They ran into the house. One ran in to a tub, and glass shattered all over him. The other was standing in the hallway holding on to a doorknob. And they looked up, and the roof was gone.”

“The whole thing was gone,” says Patricia.

“And they didn’t know what to do. They had no safe place to go,” says James.

“And that’s why we’ve come to the Disaster Recovery Center,” says Patricia.

“We’ve come to learn about SafeRooms, and we’re going to leave here and talk to our builder, and we’re going to do something about it.”

So if there is a next time, they’ll want a place to go, already outfitted, and know what to do so they could do it automatically, without indecision?

“Yes,” says James. “And a plan... Anybody, anybody that has a loved one, or for their own safety, I would suggest they get a SafeRoom or a safe place to go.”

“So now we don’t have to worry about the furniture,” says Patricia, “even if it’s gone. It doesn’t matter any more. We just have to worry about our safety.”

“So we are having a house built now, and we’re going to move into it, and it’s going to have two main things. We’re going to do the little things that tie the house together, like the roof clips.”

“And a SafeRoom would be number one, with all our supplies in there, our radio, our supplies that we would need in an emergency, that’s going to be there, always. So if we are home, we just go into our SafeRoom.”

“The rest can be bought or replaced, but our safety can’t. The rest is not important.”



Figure 25. Within days after the 2003 storm, many resilient Moore residents had salvaged what they could, cleared the lots, and moved ahead with rebuilding their homes and lives.

Recommendations

Some apparent patterns and trends emerge from the interviews conducted in Moore, Oklahoma, following the May 8, 2003, tornadoes. Those trends should be verified with more detailed research. Tentative recommendations arising from this research include the following.

Research

Additional research on sheltering behavior could be routinely conducted through questionnaires administered at FEMA Disaster Recovery Centers. This research could be conducted in conjunction with the research community and enhanced through expanded interagency cooperation.

Warning and evacuation

Other researchers have often reported that people will linger and seek face-to-face verification of a hazard before taking shelter. The challenge for emergency managers is to either change human nature or change their messages.

As the Moore emergency manager pointed out, redundant warning systems are needed to reiterate warning messages and to compensate for gaps in coverage.

Family and business preparedness

Families and individuals should consider the following:

- As much as possible, develop a pre-disaster plan detailing what you will do during an emergency, so the actions can occur almost automatically and help avert panic.
- Identify your safest shelter and best evacuation options. Practice your plan, too.
- Develop a family contact plan before the disaster, so you don't waste precious minutes trying to figure out how to find each other.

- Assemble survival kits before the emergency strikes. Don't take time to gather the items after a tornado warning is issued. Websites for the Red Cross and others list potential kit items, which should be simplified and customized to individual needs. A simple kit would include emergency water, food, contact information, copies of important papers such as birth certificates, and basic essentials such as battery radio and flashlight. Ideally, one "shelter" kit would be stashed inside a home shelter and another "go" kit could be carried out quickly if evacuation is necessary.
- Schools, businesses, and institutions should also develop and practice emergency plans, identify their safest place or build sturdy shelters, and stock appropriate emergency supplies.
- Expand your personal warning options with a NOAA weather radio, which sounds an alarm when a warning is issued. They are particularly useful during nighttime hours. Special units and vibrating pagers are also available for the hearing impaired.
- "Register" your SafeRoom or shelter with emergency authorities, so they can find and extract you if it becomes necessary after a storm.

Recovery and resilience

Moore city government and citizens have learned to move quickly into recovery and rebuilding after disaster – but this remarkably courageous resilience also has a cost. The more rapid the recovery and rebuilding, the quicker the window of opportunity for change slams shut. Mitigation must be preplanned and accepted before the disaster, so it can be implemented in the first short hours and days after a disaster.



Figure 26. Stronger building techniques and SafeRooms can save lives and reduce losses in tornadoes and other disasters.

Buildings and shelters

Changes in building practices are needed to reduce damages, injuries, and losses in future storms.

Researchers, such as those at Texas Tech, are conducting expert analyses of building failures and successes in the Moore May 8 storm. Preliminary data indicate that roof clips, reinforced garage doors, and laminated glass would have prevented some building damage and injuries.

SafeRooms and shelters are of primary concern to increase personal safety.

The three Moore SafeRooms observed in this research appeared to hold up quite well in the rated F3 tornado; but in the larger picture, quality control over SafeRooms and

safer building remains a nagging concern. One answer may be a permissive code providing building standards for people who choose to build or buy SafeRooms or to harden buildings beyond existing codes.

More education programs are needed for builders and consumers, including attention to developing informed consumers and healthy markets for mitigation.

Some respondents raised issues relating to dangers from gases and pollutants in underground shelters; if those fears are founded, accurate facts should be publicized, especially with government agencies who are encouraging shelters under garage floors.

Overall, tornadoes are low probability / high consequence events. Even in Oklahoma, the chances of an individual building or person being destroyed by a tornado are not very high and are difficult to estimate. But the average Oklahoman spends a good portion of his or her life under various levels of alert, and it is debilitating to have no option for safe shelter.

A state plan is needed to explore, choose, fund, and build options for providing safe shelter in Oklahoma, including sheltering for the traveling public. The plan may need to examine issues and priorities relating to geographic probabilities. Individual communities need to develop sheltering plans, also, to resolve how and whether they want to meet safe sheltering needs for their residents.

If the state plans to meet provide tornado shelters on an individual basis (rather than with larger community shelters), Oklahomans will need to build thousands and thousands of individual shelters for its 3.5 million people. Are there more feasible options? Perhaps localized, shared shelters are feasible on a block-to-block basis.

Neighbors helping neighbors

One lesson from Moore is that neighbors who help neighbors can improve safety and facilitate recovery. Perhaps we can learn from Moore that it is possible to discard that old Cold War image of the man guarding his shelter door with a rifle to keep out his neighbors. Perhaps we can replace that image with a new one of Lou Stahlman welcoming neighbors into her shelter.

Perhaps neighborhoods, apartments, business co-ops, and homeowners associations can cooperatively build and maintain neighborhood shelters.



Figure 27. Leroy & Lou Stahlman welcomed 20 neighbors into their cellar in the 2003 storm. They sheltered 28 in '99.

If such a concept became reality, safe shelters could be offered more quickly for more people at less cost. Such a common-interest project could also help create a stronger culture of mutual aid amongst neighbors.

Perhaps a disaster-resilient Moore, Oklahoma, can teach us fresh that the best defense against disaster is a well-knit community of informed and empowered neighbors who care about and for each other.

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 - Stan Drake, Moore Assistant City Manager
 - Diane Earl, FEMA
 - Stephen Eddy, Moore City Manager
 - Sheila Haworth, Moore City Councilor
 - Richard Standefur, Moore Public Works Director
 - Dr. Ernst Kiesling, National Storm Shelter Association and Texas Tech University
 - Gayland Kitch, Moore Emergency Manager
 - Nitja McGrane, FEMA
 - Bob Patton, FEMA

- Steve Piltz, Chief Meteorologist in Charge, NWS Tulsa office
- Bill Rhees, BMI Construction, Tulsa
- Rex Rudy, Oklahoma Department of Civil Emergency Management
- Rick Smith, Warning Coordination Meteorologist, NWS Norman office
- Moore and Central Oklahoma builders and officials:
- Tadd Bliss, Bliss Electric
- Leo Cravens, Oklahoma State Home Builders Association
- Charles Thompson, Moore HBA
- Frankie Loyd
- L. O.Harrington
- Marvin Haworth
- Tom French
- Steve Wood
- Tom Pollard
- Perry Rice
- Mark Dale, COHBA
- Darren Faires
- Daryl Campbell
- Frank Randall, pres Moore HBA

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- Shannon Scott, Robert Wallace, & Elona Scott
- Don Staley
- Lola Floyd
- Carol Battaglia, McDonald's
- Clara and Walter Smith
- Bob & Carolyn Morehead
- Donna Eustice, Apple Jack's Learning Center
- Ethel Norton
- Lou & Leroy Stahlman
- Patricia & James Robinson