

INCIDENT HIGHLIGHTS

**DATE:**

August 5, 2019

**TIME:**

11:15 a.m.

**VICTIM:**

52-year old Hispanic farm laborer

**INDUSTRY/NAICS CODE:**

Sugarcane Farming/111930

**EMPLOYER:**

Sugarcane Farm

**SAFETY & TRAINING:**

Some elements existed

**SCENE:**

Farm field

**LOCATION:**

Louisiana

**EVENT TYPE:**

Heat Stroke

REPORT#: LA202401

REPORT DATE: May 15, 2024

Sugarcane Worker Dies from Heat Stroke - Louisiana

SUMMARY

It was the victim's first day working in the sugarcane fields, work began at 8:30 a.m. The victim's job this day was to walk behind a trailer full of seed sugarcane and plant it in straight rows. Workers took their first break after the trailer was planted. While planting the second trailer, a co-worker noticed the victim was struggling, so he was encouraged to take deep breaths during the second break. After work resumed co-workers noticed the victim's sugarcane rows were crooked, he began having difficulty breathing, and his gait was slow and unsteady. The victim appeared to be hallucinating before he lost consciousness. After he lost consciousness, he was transported to a local hospital. He was then transferred to a larger hospital and admitted to the ICU, but he did not recover. [READ THE FULL REPORT>](#) (p.3)

CONTRIBUTING FACTORS

Key contributing factors identified in this investigation include:

- Insufficient worker acclimatization program
- Lack of adequate breaks and shaded areas for workers
- Failure to monitor for symptoms of heat-related illness
- Lack of a written heat-related illness prevention plan

[LEARN MORE>](#) (p.8)

RECOMMENDATIONS

Louisiana FACE investigators concluded that, to help prevent similar occurrences, employers should:

- Develop and implement an acclimatization program for each worker at risk of heat-related illness.
- Provide enough breaks with adequate shaded areas for workers.
- Monitor workers for symptoms of heat-related illness during periods of heat stress.
- Develop a written heat-related illness prevention program.



LOUISIANA

State **FACE** Program

Fatality Assessment & Control Evaluation



Occupational Health and Injury Surveillance Program • Louisiana Department of Health
Office of Public Health • Section of Environmental Epidemiology & Toxicology
1450 Poydras St., Ste 1631 • New Orleans, LA 70112 • 888-293-7020 • fax 504-568-8149



LOUISIANA

State **FACE** Program

Fatality Assessment & Control Evaluation

Occupational Health and Injury Surveillance Program • Louisiana Department of Health
Office of Public Health • Section of Environmental Epidemiology & Toxicology
1450 Poydras St., Ste 1631 • New Orleans, LA 70112
888-293-7020 • fax 504-568-8149



Fatality Assessment and Control Evaluation (FACE) Program

This case report was developed to draw the attention of employers and employees to a serious safety hazard and is based on preliminary data only. This publication does not represent final determinations regarding the nature of the incident, cause of the injury, or fault of employer, employee, or any party involved.

This case report was developed by the Louisiana Fatality Assessment and Control Evaluation (FACE) Program. Louisiana FACE is a NIOSH-funded occupational fatality surveillance program with the goal of preventing fatal work injuries by studying the worker, the work environment, and the role of management, engineering, and behavioral changes in preventing future injuries. The FACE program is located in the, Louisiana Department of Health, Office of Public Health, Section of Environmental Epidemiology and Toxicology, Occupational Health and Injury Surveillance Program.

[Email](#) | [Website](#)



Occupational Health and Injury Surveillance Program • Louisiana Department of Health
Office of Public Health • Section of Environmental Epidemiology & Toxicology
1450 Poydras St., Ste 1631 • New Orleans, LA 70112 • 888-293-7020 • fax 504-568-8149

INTRODUCTION

On August 5, 2019, a 52-year-old male Hispanic farm worker exhibited symptoms of heat-related illness and later fell unconscious after working outside for several hours. Paramedics were called to the scene, and he was transported to a local hospital, after which he was airlifted to a regional medical center and admitted to the ICU. He died several days later from heat stroke on August 11, 2019. The worker's initial heat-related injury and death were reported to Louisiana's Occupational Safety and Health Administration (OSHA) on August 5, 2019 and August 11, 2019, respectively. This death occurred prior to the establishment of Louisiana's FACE Program in 2021, who decided to investigate this incident on or around August 15, 2022 while reviewing the program's work-related fatal injury database for potential cases to investigate. Louisiana's FACE investigator attempted to contact the victim's employer multiple times, but was unsuccessful in establishing contact.

EMPLOYERS

The employer is a sugarcane farm established in 1981. They have approximately 5 full-time workers. The victim was employed through the H2-A visa program. The farm hires additional workers from Mexico on a seasonal basis through the H-2A temporary agriculture visa program (H2-A visa program), which helps American farmers fill employment gaps by hiring workers from other countries. As part of the program, the employer provided the victim with housing and transportation.

WRITTEN SAFETY PROGRAMS and TRAINING

The employer recognized that heat stress is a hazard for farm work during the picking/planting seasons but did not have a written extreme heat and heat-related illness plan. There was a rudimentary worker heat acclimatization program in place at the time of the incident; however, records were not kept, and the program was inadequate. As personal protection equipment (PPE), workers were given hats. A water, rest, shade program was used; when a tractor of seed cane was empty (planted) workers took a 30-minute break where they were provided water and were allowed to rest under the shade of umbrellas.

WORKER INFORMATION

The victim was a 52-year-old male, Hispanic, seasonal farm worker employed as a guest worker through the H2-A visa program who arrived at the farm on August 1, 2019. He was from Mexico City where the average summertime maximum temperature is much lower (75°-80°F) and drier than it is in southeastern Louisiana. He performed some light work on the farm on August 2 and 3, which constituted his heat-acclimatization period, before his first day of planting cane stalks on August 5, 2019, the day of the incident. He mentioned to co-workers that he was worried that he was going to have trouble with the heat before he became ill. This was his first time working for this employer.

EQUIPMENT

A John Deere 7830 tractor was used to pull the trailer of sugarcane.

INCIDENT SCENE

The incident scene was a field on a sugarcane farm in southeastern Louisiana (Exhibits 1 and 2). The workers plant seed cane in fields that are wide open spaces with no natural shade. The tractor pulls a trailer filled with seed cane and the farm workers walk behind the trailer pulling canes from the trailer and planting them in neat rows in the ground. Another truck carries umbrellas, water, and portable toilets that are available for the workers to use. While an umbrella provides more shade than nothing at all, as evidenced in Exhibits 1, 2, and 3, it does not provide sufficient cooling and shade. It is recommended that workers be offered shade where the heat does not defeat the purpose of the shade [Cal/OSHA T8CCR § 3395]. No cooling mechanisms are observed from the materials obtained by the investigators.

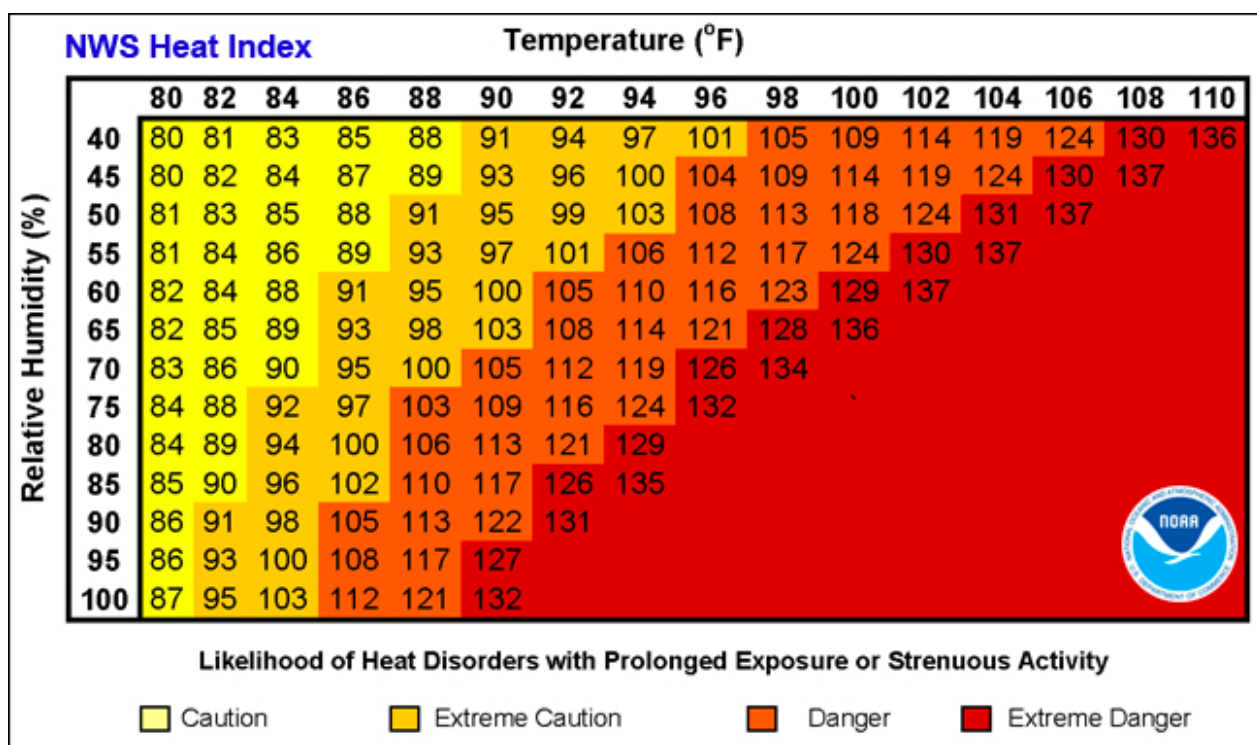
Farm workers were planting for approximately three hours before the victim became unconscious and paramedics were summoned. The victim was initially hospitalized on August 5, 2019, and passed away on August 11, 2019. The OSHA inspection, which was based on the fatality, took place on August 12, 2019; therefore, the site conditions at the scene of the victim's collapse were not the same as when the investigation took place.

WEATHER

Weather data was obtained from the closest weather monitoring site, which was 5.4 miles from the incident site. The wet bulb globe temperature (WBGT) values were calculated by OSHA using the Argonne National Laboratory WBGT calculator as directed by the OSHA manual [NOAA 2022; OSHA 2008]. The temperature, relative humidity, wind speed, WBGT, and heat index during the three hours leading to the time of the incident are displayed in the table below:

Weather Data for August 5, 2019						
Time	Temperature	Humidity	Wind	WBGT	Heat Index	Risk Level
8:53 a.m.	86°F	77%	3 mph	90.4°F	98.3°F	Extreme Caution
9:53 a.m.	86°F	75%	5 mph	88.9°F	97.3°F	Extreme Caution
10:53 a.m.	87°F	70%	5 mph	89.1°F	97.6°F	Extreme Caution

Source: OSHA Investigation Report and Weather Underground 2023d



Source: National Oceanic and Atmospheric Administration (NOAA) 2017

INVESTIGATION

The decedent's first day of work began Friday, August 2, 2019. On this day, the farm workers cleaned up sugarcane from 8:00 a.m. to 4:00 p.m. with an hour lunch break. The task of organizing sugarcane for planting is considered nonstrenuous work. According to co-workers, the decedent appeared fine and showed no signs or symptoms of heat-related illness. The average temperature, humidity, and heat index in the area on August 2 between 8:00 a.m. and 5:00 p.m. was 87°F, 61%, and 94°F [Weather Underground 2023; 2023a]. According to the National Weather Service Heat Index chart (above), a heat index of 94°F corresponds with a risk level of extreme caution [NOAA 2023b].

The decedent's second day of work was Saturday, August 3, 2019. The sugarcane fields were too wet to plant on this day. Instead, the farm workers cut grass and cleaned up branches along the tree line. The average temperature, humidity, and heat index in the area on August 3 were 87°F, 60%, and 93°F [Weather Underground 2023b]. A heat index of 93°F corresponds with a risk level of extreme caution [NOAA 2017; 2023]. These two workdays were the only opportunities for the victim to acclimatize to working in this environment.

The workers were off work on Sunday, August 4, 2019.

The employer recognized the importance of acclimating workers to the hot environment; however, their approach was insufficient. Workers can only become fully acclimated if they perform work at full intensity during the acclimatization process [ACGIH 2022]. In this case, the employer had the victim only perform light work for two days followed by a day

off before his first full day planting sugarcane. In addition, the minimum recommended acclimatization program runs five days, and the decedent was only acclimated over two workdays [ACGIH 2022].

Monday, August 5, 2019, was the first day the decedent worked as a sugarcane planter. At this farm sugarcane planting crews work in groups of four including a tractor driver and three planters. One worker drives the tractor pulling a trailer full of seed cane. The other three workers walk behind the trailer, pull stalks of sugarcane off the trailer, and lay the sugarcane by hand in rows that have been previously plowed.



Exhibit 1. Tractor pulling trailer of seed cane for planting with several workers huddled for shade under single umbrella (photo courtesy of Louisiana OSHA)

The farm workers reported for work around 8:00 a.m., and they began their shift planting sugarcane at about 8:30 a.m. The decedent was wearing blue jeans and a short-sleeved shirt, and his co-workers reported that he looked fine at the start of the workday. They took a break after the first trailer of sugarcane was planted. During the break, co-workers stated that the decedent still looked fine; however, he told them it was going to be difficult because of the heat. While planting the second trailer of sugarcane, one of the farm supervisors noticed that the decedent was working slowly, and his sugarcane rows were crooked. He spoke to the crew about this issue a couple of times before 9:30 a.m. In response, the work crew moved the decedent to the middle row hoping to ease his workload.



Exhibit 2. Sugarcane field with worker rest area (photo courtesy of Louisiana OSHA)

After they finished the second trailer of sugarcane, they took another break where they rested under an umbrella. During the break, one of his co-workers noticed that the decedent was having difficulty breathing. He was breathing fast, not speaking at all, and he was very sweaty. After the break, the crew resumed planting and had been working for just a few minutes when they noticed that the decedent was balancing himself on the trailer with labored breathing again. They stopped the tractor and told him to get some water, and as he was going to get water, he began to lose his balance. They guided him to a seated position to keep him from falling. Shortly after he sat down, he appeared to be hallucinating, after which he lost consciousness.

Occupational Health and Injury Surveillance Program • Louisiana Department of Health
Office of Public Health • Section of Environmental Epidemiology & Toxicology
1450 Poydras St., Ste 1631 • New Orleans, LA 70112 • 888-293-7020 • fax 504-568-8149



Exhibit 3. Sugarcane field with worker rest area (photo courtesy of Louisiana OSHA)

CAUSE OF DEATH

The coroner listed the cause of death as hyperthermia-exertional heat stroke. This death was originally included in the program's work-related database because of the fatality report summary posted on OSHA's website. At the onset of investigation, the death certificate was not marked as work-related, and heatstroke was not listed as a cause of death. The Program staff was able to get the victim's death certificate updated to work-related and heat-related by contacting and discussing the case with the parish (county) of death's coroner's office.

CONTRIBUTING FACTORS

Occupational injuries and fatalities are often the result of one or more contributing factors or key events in a larger sequence of events that ultimately result in the injury or fatality. Louisiana FACE investigators identified the following unrecognized hazards as key contributing factors in this incident:

- Insufficient worker acclimatization program
- Lack of adequate breaks and shaded areas for workers
- Failure to monitor for symptoms of heat-related illness
- Lack of a written heat-related illness prevention program

RECOMMENDATIONS/DISCUSSION

Recommendation #1: Employers should develop and implement an acclimatization program for each worker at risk of heat-related illness.

In this incident the employer recognized that workers should be acclimatized; however, the informal process they implemented was deficient in two main ways:

1. The decedent was only acclimated for two days.
2. The decedent did not work at full intensity during acclimatization.

Workers can only become fully acclimated if they perform work at full intensity during the acclimatization process [ACGIH 2022; NIOSH 2016]. In this case, the employer had the victim only perform light work for two days followed by a day off before his first full day planting sugarcane. In addition, the minimum recommended acclimatization program runs five days, and the decedent was only acclimated over two workdays [ACGIH 2022; NIOSH 2016].

It is not safe for unacclimatized workers at risk of heat-related illness to work full workdays in hot environments. Through an acclimatization program, workers gradually build up tolerance to safely work in hazardous environments. During acclimatization, workers undergo physiological changes including more efficient sweating and increased blood flow to the skin. Acclimatized workers can more easily maintain a safe core body temperature while working in hot environments [NIOSH 2016].

The usual recommendation to build workers' tolerance is to slowly ramp up heavy work from 20% to 100% over a minimum of five days increasing by 20% each day. By this point, most workers will be able to tolerate a full workday; however, it takes approximately two weeks for most workers to become fully acclimatized. Employers should closely supervise new workers during the first two weeks of work or until workers are fully acclimatized [ACGIH 2022; NIOSH 2016].

In addition, it is critically important that the work rate during the acclimatization program matches the work rate the job requires. That is, on the first day the worker should work at full intensity for 20% of the time, not perform light work. Work at full intensity should be gradually ramped up by 20% per day until the final day of the program. It is not safe to start workers at full intensity without effective acclimatization [NIOSH 2016].

Minimum NIOSH Heat Acclimatization Recommendations for New Workers	
Day 1	20% full-intensity work duration
Day 2	40% full-intensity work duration
Day 3	60% full-intensity work duration
Day 4	80% full-intensity work duration
Day 5	100% full-intensity work duration

Source: NIOSH 2016

Recommendation #2: Employers should provide enough breaks with adequate shaded areas for workers.

Discussion: Workers took breaks based on when the trailer of sugarcane was emptied and planted. Workers took breaks based on the completion of a task rather than a prescribed time schedule. Workers should take structured breaks based on time, and not only based on the completion of a task NOAA [2017]. For example, workers should take a 15-minute break for every 45 minutes of moderate work or a 30-minute break for every 30 minutes of heavy work for an adjusted temperature of 100°F [NIOSH 2016].

In addition, workers should be provided with adequate shade to allow their bodies to cool down during their breaks. Shade by definition is the direct blockage of sun rays. In this incident, the shade provided by the employer was less than adequate [Cal/OSHA [T8CCR § 3395](#)]. While an umbrella provides more shade than nothing, as evidenced in Exhibits 1, 2, and 3, it does not provide sufficient cooling and shade. Personal communication with a Grainger safety specialist confirmed a 7 5/8 foot industrial umbrella is designed for use by one person. Workers should be able to comfortably sit in the shade without touching one another. It is recommended that workers be offered shade where the heat does not defeat the purpose of the shade [Cal/OSHA [T8CCR § 3395](#)]. No cooling mechanisms are observed from the materials obtained by the investigators. It is also recommended that workers not be expected to make contact with bare soil as the ground can serve as a conductive heat source. Exhibits 1, 2, and 3 indicate that most workers pictured are in contact with bare soil. Employers need to provide effective shade to workers. Shade provided by employers should not produce additional heat exposure as its purpose is to expedite cooling. Effective shade should not involve workers sitting on the ground, leaning against each other, or any other unintended source of radiative heat.

Recommendation #3: Employers should monitor workers for symptoms of heat-related illness during periods of heat stress.

Discussion: In this incident, the decedent exhibited clear signs of heat exhaustion and heat stroke well over an hour before he fell unconscious. His symptoms included labored breathing, excessive sweating, and the inability to stand steadily. He described heat-related symptoms to his co-workers, his co-workers independently noticed these symptoms, and at least one supervisor noticed symptoms of heat stroke. Even so, medical assistance was not sought until after he fell unconscious when it was too late.

Therefore, the decedent, co-workers, and supervisors did not collectively grasp the seriousness of these symptoms in time to intervene to protect the health of the decedent, or possibly the workers were not empowered to respond. This highlights the importance of training workers to recognize the signs, symptoms, and seriousness of heat-related illness in themselves and their co-workers. Some symptoms of heat-related illness appear innocuous to some, and this leads to a lack of urgency in response.

The decedent had risk factors putting him at a greater risk for falling victim to heat-related illness. Risk factors that can make an individual more sensitive to heat illnesses can include but are not limited to taking certain medications such as ADHD medication, antidepressants, or diuretics; obesity; caffeine consumption; dehydration; low level of physical activity; and lack of acclimatization [NIOSH 2011; 2020]. Both the employer and workers should be aware of risk factors putting an individual at a higher risk of heat illness.

It is also important for workers and supervisors to include periodic, routine check-ins to monitor for signs of heat-related illness, and to encourage workers to self-report when they experience symptoms of heat-related illness [NIOSH 2011]. The OSHA-NIOSH Heat Safety Tool App can be useful to help remind individuals of risk levels associated with various heat indices, recognizing signs and symptoms of heat illness, and first aid procedures [NIOSH 2022]. In addition to signs, symptoms, and first aid for heat-related illnesses, the OSHA-NIOSH Heat Safety Tool App also provides location-based heat index information, recommendations for specific heat indices, in addition to an interactive hourly forecast of heat indices with corresponding recommendations for outdoor work [NIOSH 2022].

Recommendation #4: Employers should develop a written heat-related illness prevention program.

Discussion: The decedent's supervisor noted that the victim planted rows of sugarcane crooked to the point that the decedent was moved to plant in the middle row to ease his workload. Planting sugarcane in a crooked manner and working slowly should have been recognizable signs of an individual suffering from heat stress.

Employers should ensure that supervisors/managers monitor workers during periods of extreme heat and when temperatures exceed 80°F and educate and train them to recognize signs and symptoms that workers may show during heat stress. With regular adequate training, supervisors and managers should have the ability to identify signs of heat-related illness in employees, especially heat stroke. Symptoms of heat stroke can include confusion, slurred speech, and excessive sweating [NIOSH 2016].

Training and education represent an important portion of an effective written heat-related illness prevention plan. In addition to training and education, heat-related illness prevention plans should also include the importance of acclimatization; appropriate engineering controls, administrative controls, and personal protective equipment; how to determine and understand risk levels; and what circumstances suggest a heat hazard evaluation.

Education and training should include the following components at a minimum:

1. Hazards of heat-related illnesses
2. How to avoid heat-related illnesses by recognizing and avoiding situations that can lead to heat-related illnesses
3. Recognition of risk factors, including personal risk factors, placing an individual at an increased risk for heat-related illness
4. Recognition of signs and symptoms of heat-related illnesses
5. First aid procedures

If an effective heat-related illness prevention plan had been followed, it could have prevented this worker's death. A proper plan would have required the employer to ensure the worker complete an adequate acclimatization period. An adequate acclimatization period would have allowed his body to adapt to working in the Southeast Louisiana summer heat. Proper education and training would have made it more likely that his co-workers and supervisor would have recognized his signs and symptoms of heat-related illness and provided him the aid that he needed before his illness progressed to the life-threatening/ fatal stage.

DISCLAIMER

Mention of any company or product does not constitute endorsement by Louisiana FACE and the National Institute for Occupational Safety and Health (NIOSH). In addition, citations to websites external to Louisiana FACE and NIOSH do not constitute Louisiana FACE and NIOSH endorsement of the sponsoring organizations or their programs or products. Furthermore, Louisiana FACE and NIOSH are not responsible for the content of these websites. All web addresses referenced in this document were accessible as of the publication date.

REFERENCES

ACGIH® [2022]. [Action Limit \(AL\) for un-acclimatized workers and a Threshold Limit Value \(TLV®\) for acclimatized workers, see Heat Stress and Strain: TLV® Physical Agents 2022 or latest edition](#). Cincinnati, OH: American Conference of Governmental Industrial Hygienists.

Cal/OSHA [T8CCR § 3395: Heat Illness Prevention in Outdoor Places of Employment](#). Oakland, California.
Cal/OSHA/Division of Occupational Safety and Health.

NIOSH [2011]. [OSHA-NIOSH InfoSheet: Protecting Workers from Heat Illness](#). Washington, DC: Centers for Disease Control and Prevention (CDC).

NIOSH [2016]. [NIOSH Criteria Document: Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot Environments](#). Washington, DC: Centers for Disease Control and Prevention (CDC).



Occupational Health and Injury Surveillance Program • Louisiana Department of Health
Office of Public Health • Section of Environmental Epidemiology & Toxicology
1450 Poydras St., Ste 1631 • New Orleans, LA 70112 • 888-293-7020 • fax 504-568-8149

NIOSH [2020]. [CDC Workplace Safety and Health Topics: Heat Stress](#). Washington, DC: Centers for Disease Control and Prevention (CDC).

NIOSH [2022]. OSHA-NIOSH Heat Safety Tool App <https://www.cdc.gov/niosh/topics/heatstress/heatapp.html>

NOAA [2017]. <https://www.weather.gov/safety/heat-index>. Silver Spring, MD: National Weather Service (NWS) Heat Forecast Tools.

NOAA [2022]. [The Heat Index Equation](#). College Park, MD: National Weather Service.

NOAA [2023]. <https://www.noaa.gov/jetstream/synoptic/heat-index>. Silver Spring, MD: National Weather

OSHA [2008]. [OSHA Outdoor WBGT Calculator](#). Washington, DC: U.S. Department of Labor, Occupational Safety and Health Administration.

Weather Underground [2023]. [Weather history for White Castle](#). Atlanta, GA: The Weather Channel Interactive, Inc.

Weather Underground [2023a]. [Weather history for White Castle August 2, 2019](#). Atlanta, GA: The Weather Channel Interactive, Inc.

Weather Underground [2023b]. [Weather history for White Castle August 3, 2019](#). Atlanta, GA: The Weather Channel Interactive, Inc.

Weather Underground [2023c]. [Weather history for White Castle August 4, 2019](#). Atlanta, GA: The Weather Channel Interactive, Inc.

Weather Underground [2023d]. [Weather history for White Castle August 5, 2019](#). Atlanta, GA: The Weather Channel Interactive, Inc.

INVESTIGATOR INFORMATION

This investigation was conducted by Daniel J. Harrington, ScD, CIH, former Fatality Investigator, and Marcia Oursler, MPH, CSP, current Fatality Investigator, Louisiana Fatality Assessment and Control Evaluation Program.

ACKNOWLEDGEMENT

All site photographs in this report were obtained from the Louisiana Occupational Safety and Health Administration's (LA-OSHA) fatality investigation report; therefore, the Louisiana FACE Program would like to acknowledge LA-OSHA for their assistance with the completion of this report.

PROGRAM FUNDING

The Louisiana Fatality Assessment and Control Evaluation Program is funded by grant 5U60OH010915 from the National Institute for Occupational Safety and Health.