



# DELAWARE CLIMATE-READY WORKFORCE PILOT PROJECT

Summary Report  
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Four Twenty Seven and MDB, Inc.

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## Acronyms

CalOSHA	California Division of Occupational Safety and Health
DeIDOT	Delaware Department of Transportation
DHSS	Delaware Department of Health and Social Services
DNREC	Delaware Department of Natural Resources and Environmental Control
DSHS	Delaware Department of Safety and Homeland Security
EPA	Environmental Protection Agency
NIEHS	National Institute of Environmental Health Sciences
NIOSH	National Institute for Occupational Safety and Health
OMB	Delaware Office of Management and Budget
OSHA	Occupational Health and Safety Administration
PPE	Personal protective equipment

## Executive Summary

Delaware is already experiencing higher temperatures, increasing rainfall, and rising sea levels, and these changes are expected to continue—and become more serious—in the coming years. Changing climate conditions pose health and safety risks to state employees whose duties require extended periods of outdoor exposure. These risks include increased exposure to high heat days and other extreme weather conditions, including flooding and storm-related hazards, as well as indirect impacts related to air quality, vector-borne diseases, and water-related illnesses.

Delaware has laid a critical policy and planning foundation for addressing climate change through Governor’s Executive Order 41. The State is also taking important steps to identify, characterize and respond to potential climate change impacts in specific sectors through efforts such as the Climate-Ready Workforce Pilot Project. The Pilot Project, under which this report was produced, addresses the health and safety risks faced by state employees who work outdoors or in environments that are vulnerable to extreme weather. The project focused on the risks of exposure to high heat days and other severe weather conditions, including flooding and storm-related hazards, as well as indirect impacts related to air quality, vector-borne disease, and water-related illness.

Climate change effects can be a “risk magnifier” for vulnerable populations, such as outdoor workers who face greater exposure to environmental conditions. The five state agencies participating in the Climate-Ready Workforce Pilot Project similarly identified and defined the at-risk positions that work in six types of climate-exposed environments: indoor unconditioned spaces, indoor confined spaces, outdoor urban spaces, outdoor natural areas, outdoor suburban areas, and in vehicles or with heavy equipment. Rather than focusing simply on “outdoor workers,” participating agencies identified at-risk workers as individuals who spend time in work environments in which they are exposed to weather-related hazards, such as extreme heat, extreme cold, storms, and flooding. The Climate-Ready Workforce Pilot Project sought to identify opportunities to integrate climate considerations into worker health and safety policies in order to safeguard these workers in the face of changing climate conditions.

## Purpose of this Report

This document summarizes key cross-agency<sup>1</sup> findings and recommendations regarding the climate resilience of the worker health and safety policies of the five participating Delaware state agencies<sup>2</sup>—the Department of Transportation (DelDOT), Department of Health and Social Services (DHSS), Department of Natural Resources and Environmental Control (DNREC), Department of Safety and Homeland Security (DSHS), and the Office of Management and Budget (OMB). The pilot project team includes staff representing specific divisions of these agencies, and is not department-wide. (See Figure ES1.) Two consulting firms—Four Twenty

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<sup>1</sup> Agency-specific findings are summarized in the Supplemental Report.

<sup>2</sup> Although we refer more broadly to specific state agencies (e.g., Department of Transportation) throughout the document, the findings and recommendations are based on inputs from participating divisions.

Seven and MDB, Inc.—worked closely with the inter-agency team to review current policies, collect stakeholder input, and provide recommendations.

**Figure ES1. Inter-Agency Pilot Project Team**

Agency	Division
DeIDOT	Maintenance and Operations
	Motor Vehicles
	Transportation Solutions
DNREC	Energy and Climate
	Human Resources
	Parks and Recreation
	Waste and Hazardous Substances
	Water
DSHS	Communications
DHSS	Public Health
OMB	Human Resources

The results of this report will inform next steps to incorporate recommended practices into participating agencies’ policies and procedures. By addressing risks from climate and weather-related impacts, state workers will be better prepared to adapt to a changing climate—improving working conditions for state employees, reducing work-related illnesses and injuries, and supporting worker productivity.

## Key Cross-Agency Findings

The findings below are based on: 1) a thorough review of participating agencies’ existing policy documents relevant to employee health and safety in changing climate conditions, 2) key informant interviews with staff responsible for defining or implementing health and safety policies and procedures, and 3) a survey targeted to obtain feedback from at-risk and other staff across the participating agencies.

### Policy Guidance

- Addressing gaps in safety and health programs related to climate change is built on the foundation of core safety and health policies and procedures.
- In reviewing health and safety policies across the five agencies we discovered a high degree of variation in detail and implementation of the written policies.
  - There is a need to improve clarity and consistency in agency-level policies and incorporate relevant weather and climate factors, including high heat, extreme cold, and vector-borne diseases, into safety and health policies and procedures.

### Roles and Responsibilities

- Supervisory leadership was repeatedly rated highly by survey respondents, and many supervisors play a key role in informing workers about the agency’s safety and health policies and guidance.

- There is a need for clearly defined agency-wide guidance on roles and responsibilities for leadership and staff, detailing specific actions required for safety and health policy development, implementation, training, and review.

### Communications and Training

- Communications and alerts regarding severe weather events varied by agencies, and many surveyed employees reported being unaware of the location of relevant safety and health policy information. However, they also commonly expressed an interest in learning more about existing policies.
  - Across the five agencies there is a need to increase communications and training regarding health and safety policies and procedures.

### Implementation and Enforcement

- Effective implementation of policies requires a specific action plan with personnel assigned to action steps on a detailed timeline.
  - There is a need to develop systems for accountability to ensure policies are implemented, and timelines and responsibility are established for solving problems, and updating policies and procedures.

### Evaluation and Improvement

- Managers are responsible for customizing, writing, and implementing health and safety policies for their staff.
- There appears to be a lack of systems for employee and union involvement across the agencies, and there was no evidence of cross-agency or interagency cooperation in developing policies and sharing good practices.
  - There is a need to establish an appropriate process for reviewing and updating safety and health policies, engaging staff, eliciting feedback and sharing health and safety information, policies and good practices between and within agencies.

### Recommendations

Based on the results of the policy review, key informant interviews and staff surveys, the consultant team developed a set of recommendations to help inform next steps in state agencies' efforts to integrate climate change considerations into worker health and safety policies—these are listed below. Strengthening the fundamentals of current policies and procedures by sharing agency good practices, improving processes for policy development, implementation and enforcement, focusing on gaps specifically related to climate change, and sharing agency good practices are key action steps. Establishing a system of safety and health committees that include front line employees will be an important step in creating an ongoing process of management commitment and employee involvement to achieve continuous improvement of the policies and procedures.

## Policy Guidance

- Develop detailed agency occupational safety and health policies in recognition of the higher occurrence of extreme weather events. These policies should: 1) address thermal stress, working in hot and cold environments; 2) include detailed procedures, and 3) describe the signs and symptoms of health effects, employer-provided equipment and clothing, preventive actions such as hydration and response actions related to first aid procedures, and mandatory training, early warning and communications.
- Use and reference relevant national and industry guidelines and standards in developing the above policies such as the National Institute for Occupational Safety and Health's [Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot Environments](#), the American Conference of Governmental Industrial Hygienists' Threshold Limit Values on Thermal Stress (Cold Stress, Heat Stress and Heat Strain), and the California Division of Occupational Safety and Health's [Heat Illness Prevention Standard](#).
- Require development of Emergency Action Plans that set forth site-specific emergency and disaster plans (preparation for responding to floods, other extreme weather events, air pollution, and the mental health impacts of exposure to traumatic events and fatigue).
- Develop policies, procedures, information, and training on biological exposures certain field employees are likely to encounter such as Lyme Disease. Other biological exposures that may be of concern include Zika, Histoplasmosis, and mold.
- Convene an inter-agency working group to identify shared concerns and opportunities to develop policies, procedures or supporting materials (e.g., factsheets describing hazards) that may be used across agencies. Seek to leverage an existing inter-agency mechanism.

## Roles and Responsibilities

- Ensure that policies clearly state that staff who are assigned safety responsibilities are adequately trained and have access to necessary resources and equipment.

## Communications and Training

- Develop and implement a consistent method and process to provide early warning for at-risk employees to take action in extreme conditions based on established, clearly articulated thresholds as well as reminders of the appropriate protective actions.
- Include training on the impacts of climate change, and designate an individual to integrate the information into decision-making processes.
- Provide additional information and training such as factsheets with photos of potential threats (e.g., ticks) and training on hazard specific safety and health control policies.
- Create a regular schedule to update all staff about health and safety policies and procedures.
- Ensure that safety and health policies, standards and guidelines are posted in a visible and highly trafficked area, and that employees are aware of where they are posted.

## Implementation and Enforcement

- Establish systems for accountability to ensure policies are implemented, and timelines and responsibility are established for solving problems and updating policies and procedures.
- Promote monitoring and accountability by:
  - Tracking incidents, and
  - Ensuring staff are aware of and implement relevant health and safety policies and procedures.

## Evaluation and Improvement

- Create a system of safety and health committees to provide an ongoing process for employee participation and management leadership.
- Create a regular schedule to review and update safety and health policies.
- Create a product evaluation committee and process that is charged with incorporating risk evaluation information provided by relevant staff and selecting protective clothing, personal protective equipment, and other safety equipment.

## Conclusion

The State of Delaware has already taken important steps to characterize changing climate conditions and identify potential opportunities to integrate climate considerations more explicitly into existing policies in order to safeguard the State's communities, resources, and assets. The Climate-Ready Workforce Pilot Project is one example of this. By identifying relevant climate hazards and at-risk populations as well as assessing the effectiveness of existing worker health and safety policies, state agencies have laid an important foundation for better safeguarding their workers. Participating State agencies now have an opportunity to leverage and share their experiences and lessons learned as well as use the results of the Pilot Project to more explicitly incorporate climate considerations into existing health and safety policies and improve relevant processes. In particular, establishing mechanisms that enable continuous, iterative learning and adjustment will position Delaware's agencies to continue to respond effectively to climate change, even as these risks shift over time.

## 1. Introduction

This report summarizes key cross-agency findings from the Delaware Climate-Ready Workforce Pilot Project and provides recommendations to enhance the climate resilience of the five participating state agencies' health and safety policies and procedures. The results will inform next steps to incorporate recommended practices into these policies and procedures. By addressing risks from climate and weather-related impacts, state workers will be better prepared for adapting to a changing climate—improving working conditions for state employees, reducing work-related illnesses and injuries, and supporting worker productivity.

The remainder of Section 1 provides an overview of changing climate conditions in Delaware and the potential impacts on worker health and safety, relevant State adaptation efforts, Delaware's at-risk workers, and the project's framework for analysis. Section 2 presents the methods used to collect and assess the climate resilience of existing policies, procedures and practices. Section 3 focuses on key cross-agency findings, and Section 4 provides recommendations and highlights opportunities for learning across state agencies. Section 5 concludes the report.

### 1.1 Delaware's Changing Climate

Delaware is already experiencing higher temperatures, increasing rainfall, and rising sea levels, and these changes are expected to continue—and become more serious—in the coming years. The *Delaware Climate Change Impact Assessment* (2014) provides a thorough analysis of historic climate trends and future climate projections for temperature and precipitation in Delaware. The findings indicate that:

- Annual and seasonal temperatures have increased by approximately 2°F over the past century.
- Average temperatures are expected to increase by another 2.5 to 4.5°F by 2050, and as much as 8°F by the end of this century.
- The number of very hot days (over 95°F) is expected to increase, and heat waves are projected to become longer and more frequent.
- Heavy rainstorms are expected to become more frequent and more intense, with an increasing number of very wet days with two inches or more of rainfall.
- Sea level rise is already occurring along Delaware's coast, with an increase of 13 inches over the past century.
- Higher sea levels will likely increase coastal flooding as storm surge reaches further inland.

### 1.2 Climate-related Risks to Worker Health and Safety

Changing climate conditions pose health and safety risks to state employees whose duties require extended periods of outdoor exposure. These risks include increased exposure to high

heat days and other extreme weather conditions, including flooding and storm-related hazards, as well as indirect impacts related to air quality, vector-borne diseases, and water-related illnesses. Figure 1 summarizes climate change hazards that may affect workers, occupational health impacts, the work and individual factors that contribute to vulnerabilities, and the types of work environments that are most affected.

Climate change effects can be a “risk magnifier” for vulnerable populations, such as outdoor workers who face greater exposure to environmental conditions. Individual workers may have additional vulnerabilities that increase their risk. For example, people with underlying health conditions, such as asthma or cardiovascular disease, may be more sensitive to extreme heat and worsened air quality. Age, weight, and fitness can all affect an individual worker’s vulnerability to weather-related challenges.

**Figure 1. Climate Change-related Hazards and Impacts on Worker Health and Safety**

Climate Change-related or Induced Hazards	Impacts on Worker Health and Safety	Work-Related Factors	Individual Factors	Locations Most Affected
<b>Air Quality</b>				
<ul style="list-style-type: none"> <li>- Increased particulates and pollutants such as ozone and pollen</li> <li>- Indoor air pollutants including mold</li> </ul>	<ul style="list-style-type: none"> <li>- Respiratory illnesses</li> <li>- Cardiovascular disease</li> <li>- Increased allergies</li> </ul>	<ul style="list-style-type: none"> <li>- Work practices</li> <li>- Work/rest cycles</li> <li>- Protective gear, personal protective equipment (PPE)</li> <li>- Indoor air quality</li> <li>- Hazard exposure</li> <li>- Proper ventilation</li> </ul>	<ul style="list-style-type: none"> <li>- Age</li> <li>- Weight</li> <li>- Metabolism</li> <li>- Degree of physical fitness</li> <li>- Medical conditions</li> <li>- Use of alcohol or drugs</li> <li>- Clothing worn</li> </ul>	<ul style="list-style-type: none"> <li>- Indoor</li> <li>- Outdoor</li> <li>- Rural</li> <li>- Urban</li> </ul>
<b>Extreme Weather</b>				
<ul style="list-style-type: none"> <li>- Hazards associated with clean-up following an extreme event (e.g., flood, storm) such as hazardous debris, mold, sediments, chemicals</li> </ul>	<ul style="list-style-type: none"> <li>- Respiratory illnesses</li> <li>- Cardiovascular disease</li> <li>- Vector-borne infections</li> <li>- Skin irritations, rashes</li> <li>- Allergies</li> <li>- Heat stroke</li> <li>- Cold stress</li> <li>- Traumatic injuries</li> <li>- Mental stress, depression</li> </ul>	<ul style="list-style-type: none"> <li>- Work practices</li> <li>- Work/rest cycles</li> <li>- Access to water</li> <li>- Protective gear, PPE</li> <li>- Location and condition of work place</li> </ul>	<ul style="list-style-type: none"> <li>- Age</li> <li>- Weight</li> <li>- Degree of physical fitness</li> <li>- Medical conditions</li> <li>- Mental health</li> <li>- Previous experience with disasters</li> <li>- Clothing worn</li> </ul>	<ul style="list-style-type: none"> <li>- Indoor</li> <li>- Outdoor</li> <li>- Rural</li> <li>- Urban</li> </ul>
<b>Extreme Temperatures</b>				
<ul style="list-style-type: none"> <li>- Heat stress</li> </ul>	<ul style="list-style-type: none"> <li>- Dehydration</li> <li>- Heat cramps</li> <li>- Heat exhaustion, heat fatigue</li> <li>- Heat rash</li> <li>- Heat stroke</li> <li>- Heat syncope/fainting</li> </ul>	<ul style="list-style-type: none"> <li>- Work practices</li> <li>- Work/rest cycles</li> <li>- Access to water</li> <li>- Access to shade, cooling</li> <li>- Properly worn PPE</li> </ul>	<ul style="list-style-type: none"> <li>- Age</li> <li>- Weight</li> <li>- Metabolism</li> <li>- Degree of physical fitness</li> <li>- Medical conditions</li> </ul>	<ul style="list-style-type: none"> <li>- Outdoor</li> <li>- Rural</li> <li>- Urban</li> </ul>

Climate Change-related or Induced Hazards	Impacts on Worker Health and Safety	Work-Related Factors	Individual Factors	Locations Most Affected
			<ul style="list-style-type: none"> <li>- Degree of acclimatization</li> <li>- Prior heat injury</li> <li>- Use of alcohol or drugs</li> <li>- Clothing worn</li> </ul>	
<ul style="list-style-type: none"> <li>- Cold stress</li> </ul>	<ul style="list-style-type: none"> <li>- Frost bite</li> <li>- Hypothermia</li> <li>- Chilblains</li> </ul>	<ul style="list-style-type: none"> <li>- Work practices</li> <li>- Work/rest cycles</li> <li>- Access to heating</li> <li>- Properly worn PPE</li> </ul>	<ul style="list-style-type: none"> <li>- Age</li> <li>- Weight</li> <li>- Metabolism</li> <li>- Degree of physical fitness</li> <li>- Medical conditions</li> <li>- Degree of acclimatization</li> <li>- Use of alcohol or drugs</li> <li>- Clothing worn</li> </ul>	<ul style="list-style-type: none"> <li>- Outdoor</li> <li>- Rural</li> <li>- Urban</li> </ul>
<b>Infectious and Vector-borne Diseases</b>				
<ul style="list-style-type: none"> <li>- Greater incidence of and changes in pathogens</li> <li>- Greater incidence of and changes in insect distribution</li> <li>- More plant allergens</li> </ul>	<ul style="list-style-type: none"> <li>- Infectious diseases</li> <li>- Vector-borne infections</li> <li>- Allergies, asthma</li> <li>- Dermatitis</li> </ul>	<ul style="list-style-type: none"> <li>- Work practices</li> <li>- Protective equipment, PPE</li> <li>- Properly worn PPE</li> </ul>	<ul style="list-style-type: none"> <li>- Age</li> <li>- Weight</li> <li>- Degree of physical fitness,</li> <li>- Medical conditions</li> <li>- Medications used</li> <li>- Clothing worn</li> <li>- Use of insecticides</li> </ul>	<ul style="list-style-type: none"> <li>- Healthcare facilities</li> <li>- Outdoor</li> <li>- Rural</li> <li>- Urban</li> </ul>

Source: Content modified from Appendix A in National Institute of Environmental Health Sciences (NIEHS). (2015). [Climate Change Vulnerability Assessment: A Report Assessing How Climate Change Will Impact Worker Health and How To Prepare for These Impacts](#). The National Clearinghouse for Worker Safety and Health Training.

### 1.3 Climate Adaptation in Delaware

The impacts on worker health and safety can be reduced through appropriate adaptation policies and programs. Delaware has laid a critical policy and planning foundation through Governor’s Executive Order 41, and is taking important steps to identify, characterize and respond to potential climate change impacts in specific sectors through efforts such as the Climate-Ready Workforce Pilot Project.

**Executive Order 41 and the Climate Framework for Delaware**

In September 2013, Governor Markell signed Executive Order 41: Preparing Delaware for Emerging Climate Impacts and Seizing Economic Opportunities from Reducing Emissions. The Executive Order directed Delaware state government agencies to address both the causes and

consequences of climate change and to develop “agency-specific actionable recommendations for improving Delaware’s preparedness and resilience to climate impacts.”

Through a year-long planning process, state agency representatives worked together to identify climate risks to their departments. Each agency proposed strategies to reduce impacts to their workers and facilities, increase their resilience to climate change, and maintain their ability to provide programs and services to the people of Delaware. The planning work culminated in the publication of the *Climate Framework for Delaware* in December 2014.

Through the adaptation planning process, many agencies identified similar or related vulnerabilities to impacts from increasing temperatures, more frequent extreme heat events, and increased flooding from extreme precipitation and sea level rise. One of the common climate change concerns identified by many state agencies is workforce health and safety, especially for outdoor workers who face increased exposure to heat and extreme weather. Eleven of the 155 recommendations included in that report relate to workforce health and safety concerns. A few examples include:

- Department of Health and Social Services (DHSS) – Provide training and education on climate preparedness and adaptation,
- Department of Safety and Homeland Security (DSHS) – Consider alterations to policies regarding worker safety in an increased temperature environment,
- Department of Transportation (DeIDOT) – Evaluate and adjust worker safety guidelines,
- Office of Management and Budget (OMB) – Offer training for employees on impacts of climate change, and
- Department of Natural Resources and Environmental Control (DNREC) – Educate staff and the public on vector-borne diseases, prevention and treatment of heat-related illnesses, and what to do in extreme weather events.

### ***Inter-Agency Pilot Project***

In 2016, the state of Delaware launched the *Climate-Ready Workforce Pilot* project to address the health and safety risks faced by state employees who work outdoors or in work environments that are vulnerable to extreme weather. The project focused on the risks of exposure to high heat days and other severe weather conditions, including flooding and storm-related hazards, as well as indirect impacts related to air quality, vector-borne disease, and water-related illness. These risks are expected to grow as Delaware experiences the effects of climate change.

Health and safety is a particular concern for agencies with at-risk workers such as transportation maintenance crews, public health workers, natural resources field staff, park rangers, landscape maintenance staff, state police, and communications and emergency personnel.

The project was managed as a coordinated effort among five state agencies representing a diverse range of workers engaged in jobs and activities in a variety of work environments: DeIDOT, DNREC, DSHS, DHSS, and OMB. The pilot project team includes staff representing specific divisions of these agencies, and is not department-wide. (See Figure 2.) Two consulting

firms—Four Twenty Seven and Michael D. Baker—worked closely with the inter-agency team to review current policies, collect stakeholder input, and provide recommendations.

The purpose of this project was to: 1) review and evaluate current state agency policies and practices that guide the safety and health of state at-risk workers; 2) conduct outreach to at-risk state workers to identify opportunities to improve current policies and practices, and 3) recommend good practices for supporting worker health and safety and reducing risks posed by climate change. The assessments conducted in this pilot project were focused on selected departments and divisions (see Figures 2, 5 and 6), and do not represent a comprehensive review of all state agency health and safety policies.

**Figure 2. Inter-Agency Pilot Project Team**

Agency	Division
DeIDOT	Maintenance and Operations
	Motor Vehicles
	Transportation Solutions
DHSS	Public Health
DNREC	Energy and Climate
	Human Resources
	Parks and Recreation
	Waste and Hazardous Substances
	Water
DSHS	Communications
OMB	Human Resources

## 1.4 Delaware’s At-Risk Workers and Their Work Environments

The project team members identified the at-risk positions that work in six types of climate-exposed environments; the participating agencies define these work environments and identify at-risk positions similarly. Rather than focusing simply on “outdoor workers,” participating agencies identified at-risk workers as individuals who spend time in work environments in which they are exposed to weather-related hazards, such as extreme heat, cold, storms, and flooding. Project team members provided the following descriptive examples to characterize these work environments.

### Work Environments

At-risk work environments include both indoor and outdoor settings. They are:

1. **Indoor unconditioned spaces**, which vary in size and include both smaller spaces such as mechanic shops, electrical rooms, and fee booths, and larger spaces such as buildings, homes and warehouses.
2. **Indoor confined spaces**, which include compost rooms, crawl spaces, drainage systems, and building mechanical spaces.
3. **Outdoor urban spaces**, which consist of paved areas such as garages, bridges, and outdoor areas surrounding buildings, as well as unpaved areas such as crawl spaces, roofs, and outdoor open areas.

4. **Outdoor natural areas**, which are commonly identified as wooded forests, meadows, state parks, beaches, and trails. Many of these outdoor work areas are adjacent to or near built infrastructure such as a rest area or a highway.
5. **Outdoor suburban areas**, which can be found in the suburbs or in neighborhoods, include residents' yards, streets, empty lots, and other grassy areas.
6. **Heavy equipment**, which are used by agencies' staff and include loaders, leaf vacuums, wood chippers, and spare tires, and **vehicles**, which include trucks, skid steers, snow plows, street sweepers, tractors, and fork lifts.

## At-Risk Workers

Agencies identified the at-risk workers who spend time in each type of work environment. (Figure 3 presents the types of workers that are at-risk, listed by agency, and the percentage that work in each type of work environment.) An at-risk worker in the climate change context is one who is more exposed to the negative impacts of climate change during her or his workday. The pilot project recognized that at-risk workers will be affected by changing climate conditions related to extreme heat, flooding, and storms, with impacts on air quality, vector-borne diseases, and water-related illnesses. (See Figure 1 for a summary of potential climate change impacts on worker health and safety.) In order to protect these positions from the current and future effects of climate change, it is important to determine who Delaware's at-risk workers are and how they are already being and may be affected.

Different agencies considered a variety of positions to be at-risk but there were commonalities among the five agencies. The positions that were most often classified as being at-risk by at least three of the five agencies include technicians, maintenance workers, engineers, those who provide support services and managers and supervisors. In addition, many agencies indicated that they had seasonal positions which accounted for a large number of employees, as in the case of DNREC, which employs more than 190 seasonal maintenance workers. Pilot project team members identified the types of job positions and work environments that could be considered at-risk, and estimated the numbers of positions in their agency divisions. (See Figure 3.)

Vulnerability of at-risk workers is defined in part by the work environment (exposure) and the type of work being done (e.g., degree of physical exertion, use of tools). Other factors that contribute to risk is a worker's age, health and physical condition, level of safety training, availability of safety equipment or protective gear, and a workplace culture that values and supports health and safety.

**Figure 3. Participating Agencies' At-Risk Workers**

Agency	Division/Section	Type of position	Approximate # employees	Type of work environment						
		<i>Descriptive job category</i>		<i>Percent of workers who spend some portion of time in each work environment</i>						
				Indoor Unconditioned space (shelter, equipment shed, toll both)	Indoor Confined Space	Outdoor Urban (pavement)	Outdoor Natural Areas (natural habitat)	Outdoor Suburban (lawns, parks)	Vehicle or heavy equip.	Other
DeIDOT	Maintenance & Operations	Equipment Operators, Physical Plant Maintenance/Trades Mechanic, Public Works, Utilities, Entrance Permits, Subdivisions, Roadside Control/Outdoor Advert, Maintenance Contracts, Design & Engineering, Design Support, Environmental Scientist, Roadside Environmental Specialist, Mechanic, Electrician, Resource Center, Conservation Tech, Groundskeeper, Laborer, DE, ME, Superintendents, Area/Yard Supervisors	640	13%	0%	87%	4%	11%	98%	0%
	Transportation Solutions	Signs, Signal Techs	38			100%			100%	
	Motor Vehicles	CDL/Private Driving Instructors, Motorcycle Instructors, Toll Booth, Department of Motor Vehicles Lanes	339	73%		27%				
DHSS	Public Health	Visiting Nurse, Field Health Inspectors, Animal Welfare Inspectors, Plumbing Inspectors, Case Workers, Emergency Preparedness Staff	174	100%	3%	100%	9%	20%	100%	0%
DNREC	Waste & Hazardous Substances	Hazmat Emergency Responders, Project mangers who conduct field work, Environmental Compliance Specialists	74	100%	0%	100%	97%	97%	100%	100%
	Parks & Recreation	Park Management, Conservation Tech, Physical Plant Maintenance, Park Ranger, Interpreter (Full-time and Seasonal), Central Office Operational Staff, Construction Project Managers, Central Office Staff, Seasonal Maintenance, Seasonal Park Patrol, Seasonal Fee Booth, Lifeguard, Seasonal Miscellaneous, Seasonal Zoo Keeper, Administrative Specialist, Arborist	887	46%	66%	57%	63%	84%	77%	60%
	Water	Field Inspectors, Sampling crews	35	0%	0%	100%	100%	100%	100%	100%
DSHS	Communications	Systems Technicians, Installers, Bus Support	24	17%	0%	100%	67%	67%	83%	100%
OMB	Facilities Management	Physical Plant Maintenance Superintendent, Physical Plant Maintenance Supervisor, Physical Plant Maintenance Trades Mechanic, Physical Plant Maintenance Trades Technician, Master Electrician, HVAC/Refrigerator Technician, Chief of Maintenance Operations, Conservation Technician (Grounds), Equipment Mechanic, Indoor Air Quality Program Manager, Chief of Engineering and Operations, Building Support Systems Engineer, Construction Project Manager, Construction Project Administrator	70	81%	91%	100%	0%	0%	91%	0%
	Government Support Services	Support Operations Manager, Supply, Storage & Distribution Clerk III, Supply, Storage & Distribution Technician I & II, Supply, Storage & Distribution Coordinator, Fleet Services Field Supervisor, Fleet Services Technician, Surplus Property Program Administrator, Surplus Properties Technician, Surplus Properties Specialist	40	78%	100%	83%	0%	10%	100%	18%
<b>Total At-Risk Employees in participating divisions</b>			<b>3550</b>	<b>1076</b>	<b>693</b>	<b>1595</b>	<b>721</b>	<b>977</b>	<b>1755</b>	<b>671</b>

Note: The percent of workers who spend time in each work environment is calculated for all at-risk staff to which the location applies. Since many state employees work in more than one environment, the percentages will not add up to 100. For example, the majority of at-risk DeIDOT Maintenance and Operations staff (98%) will spend some work hours in a vehicle, but only a small group of staff (4%) would ever be expected to spend a portion of their workday in outdoor natural areas. While an employee may split her or his workday between time in a vehicle and outdoor natural areas, no at-risk DeIDOT Maintenance and Operations staff spend time in indoor confined spaces.

## Examples of At-Risk Worker Profiles

Different types of workers will experience climate hazards differently. Understanding the range of vulnerabilities and potential impacts as well as how specific worker categories are likely to be affected by climate hazards is critical for effectively safeguarding workers from changing climate conditions. The following examples of Worker Profiles help to illustrate how climate hazards may affect the health and safety of a sample of different categories of workers.

### **OMB, Government Support Services - Fleet Service**

OMB Fleet Services staff maintain and operate the statewide vehicle fleet. During an emergency or weather event, staff issue vehicles to support emergency management and relocate vehicles ahead of a storm to avoid damage to the vehicles. Fleet staff spend most of their time in parking lots or inside fleet vehicles.

Climate change impacts to Fleet Services staff may include more frequent high heat events that put staff working in parking lots and vehicles at greater risk of experiencing heat stress, illness and dehydration. Similarly, more severe cold events may put staff working outdoors at greater risk for cold stress, hypothermia and frostbite. More severe storms may also result in severe flooding, and higher temperatures increase the prevalence of and vulnerability to vector-borne diseases. The greatest concern will be the extent to which these events exceed the normal conditions that staff are accustomed to responding to, putting them at greater risk for being underprepared for changing conditions.

### **DHSS, Division of Public Health – Field Health Inspectors**

Field health inspectors spend time in the field inspecting food quality at restaurants and events with food vendors throughout the state. This includes large events, such as festivals, where food vendors must be inspected regardless of the weather conditions. Inspectors are also responsible for verifying food service providers are in compliance with regulations after an event such as a power outage.

Climate change impacts to field health inspectors may include thermal stress in hot or cold field conditions due to more extreme or variable temperatures, and respiratory stress in poor air quality conditions. Increased risk of exposure to vector-borne diseases may also be a challenge at events such as festivals that are hosted outdoors or in parks. In addition, as a result of changing conditions, the impacts to staff may include an increased workload. As temperatures increase, food industry vendors may face greater challenges maintaining food temperature and quality. Power outages, floods and other emergency events that compromise food quality and require inspections may also become more common, increasing the need for site visits and inspections.

### **DeIDOT, Division of Motor Vehicles – Tollbooth Operators**

Tollbooth operators collect tolls from drivers on highways across the state. They work in tollbooths, which are partially protected from the weather and, in most cases, have some climate control functionality. Tollbooth operators work in all weather conditions and, due to their location on highways, are exposed to vehicle exhaust. In addition, workers are responsible for their own transportation to the tollbooth location requiring them to navigate roads even in extreme weather conditions.

Climate change impacts to tollbooth operators may include heat and cold stress due to increasing extreme temperatures. Heat especially may be a problem on concrete infrastructure and near traffic. The impacts of poor air quality on the highway may also become more severe in high heat conditions, leading to increased occurrences of respiratory illness. Personal commutes to the workplace may also become more challenging in certain conditions, as winter storms may become more severe.

### **OMB, Division of Facilities Management – Conservation Technician (Grounds Staff)**

Conservation technicians are part of Facilities Management and are responsible for maintaining state facility grounds. These staff spend the majority of their workday outdoors maintaining landscaping and performing yard work. They also participate in snow removal in the winter, which requires extra-long shifts, and are responsible for securing state buildings and grounds after a storm or other emergency event. Grounds staff typically have the ability to adjust their work schedule and uniform to avoid experiencing heat stress. For example, staff will perform activities that do not require being in direct sunlight for extended periods during extreme heat, and wear shorts and short sleeves.

Climate change impacts for grounds staff may include more intense snow storms, which would create greater strain for staff working long hours in cold conditions during snow removal. More common or intense high heat events and increased exposure to vector-borne diseases may also be a challenge for staff working outdoors. More severe storms could also lead to flooding, which could increase the risk of staff exposure to mold, mildew, and other flood-related hazards at affected state facilities.

## **1.5 Framework for Analysis**

The framework used for this analysis and good practice recommendations are the Occupational Health and Safety Administration's (OSHA) Publication 3885 entitled "[Recommended Practices for Safety and Health Programs](#)" (2016)<sup>3</sup>. Although OSHA's coverage in Delaware extends only to private sector employers and does not include public employers and employees, the federal agency's guidelines are a useful and widely accepted benchmark for assessing the effectiveness of occupational health and safety policies and procedures. The core elements in the OSHA guidelines, outlined below in Figure 4, informed the determination and organization of the key findings in Section 3 as well as the recommendations in Section 4.

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<sup>3</sup> These guidelines are an update from OSHA's Safety and Health Program Management Guidelines, first published in 1989. The supporting OSHA website has links to resources, tools, case studies, and recommended practices.

Figure 4. Core Elements of OSHA Guidelines



Additionally, “Advancing the framework for considering the effects of climate change on worker safety and health” (Schulte et al., 2016) provided a climate change specific framework for the policy review. This framework for climate related occupational hazards includes: 1) increased ambient temperature, 2) air pollution, 3) ultra-violet radiation, 4) extreme weather, 5) vector-borne diseases and other biological hazards, 6) industrial transitions and emerging industries, and 7) changes in the built environment.

## 2. Methods

The Climate-Ready Workforce Pilot Project included three methodological components to inform the assessment of the five Delaware agencies’ readiness for climate change. They were: 1) a thorough review of participating agencies’ existing policy documents relevant to employee health and safety in changing climate conditions, 2) key informant interviews with staff responsible for defining or implementing health and safety policies and procedures, and 3) a survey targeted to obtain feedback from at-risk and other staff across the participating agencies.

### 2.1 Policy Review

The participating agencies provided the consultant team with the relevant written policy documents relating to worker health and safety. (See Figure 5 for a full list.) The consultant team reviewed each document to evaluate assurance of employee health and safety and the applicability of those policies to at-risk workers as climate conditions change. Relevant sections of each policy were highlighted as either good practices or gaps in assuring employee health and safety, and recorded in a policy review matrix<sup>4</sup>. The analysis of relevant policy sections encompassed the following steps:

1. Categorize the policy excerpt as either a) a gap which fails to appropriately account for climate hazards or employee health and safety under various climate conditions, or b) a

<sup>4</sup> The matrix detailing the policy review has been provided to agencies separately, and agency-specific findings are summarized in the Supplemental Report.

good practice that demonstrates robust consideration of climate hazards and concerns regarding employee health and safety.

2. Identify the climate hazard(s) of concern for the policy or excerpt.
3. Provide justification for the review and categorization of the policy or excerpt by explaining the strengths or opportunities for improvement.
4. Suggest recommendations for how the policy or excerpt could be improved or better account for worker health and safety under changing climate conditions.
5. Identify the intended workforce to which the policy or excerpt applies.
6. Suggest the additional or alternative workforce(s) to which the policy or excerpt should apply.

Good practices were defined as policies that account for worker health and safety in a variety of climate conditions, including extreme heat, cold and severe storms. These policies identify the risks associated with these conditions, explain how to prepare for them, detail the training needed to prepare for and respond to these conditions, provide information on recognizing hazards and/or climate related illness, and/or instruct staff on how to respond to those hazards. Policies were categorized as gaps if they lacked the type and level of information that could be found in policies labeled as good practices. For example, policies could be defined as gaps because they include instructions limited to the care of equipment, or only provide information on reactive actions such as emergency response functions.

**Figure 5. Policies Reviewed**

Agency	Division	Policies Reviewed
DelDOT	Agency-wide	AFL-CIO Local 879, 1036, 1443-9
	Human Resources	2016 State of Delaware Performance Plan Required Performance Plan Standards
	Maintenance and Operations	Transportation Safety Manual New Employee Orientation – Safety Training Portion Cold Weather Safety Presentation Cold Weather Safety Issue Presentation Worker Over or Near Water Presentation Summer Work Safety – Heat Stress Presentation
DHSS	Public Health	Draft Responder Safety and Health: A Guide for Responder Safety in Public Health Emergencies Personal Protective Equipment and Respiratory Protection Program
DNREC	Agency-wide	Procedures for Employee Safety Administrative Policy D-0910 Standards of Conduct/Communications (D-0915) Procedures for Identification Badges (D-0919) Procedures for Employee Vehicle Use (D-1201) Procedures for Motor Vehicle Accidents (D-1202) Procedures for Parking State and Personal Vehicles (D-1203) Volunteer Management (7-004) Emergency Procedures Reference Guide 2015
	Parks and Recreation	Delaware State Parks Seasonal Interpretive Handbook Day Camper Camp Policy Manual Pontoon Boat Requirements (D-23) All Terrain Vehicle Policy (D-70)

Agency	Division	Policies Reviewed
	Waste and Hazardous Substances	Division of Waste and Hazardous Substances Health and Safety Manual
	Water	Division of Water Resources Safety Procedures Ground Water Discharges Section – Notification of Procedures for Field Visits
DSHS	Communications	Division of Communications, Safety and Injury Reporting Policy
OMB	Agency-wide	Operating Policies and Procedures, Workplace Safety, Contingency Plan: Weather Related Events (C9) Operating Policies and Procedures, Workplace Safety, Contingency Plan: Loss of Electricity (C3) Operating Policies and Procedures, Workplace Safety, Contingency Plan: Bomb Threat Procedure (C2) Operating Policies and Procedures, Workplace Safety, Contingency Plan: Fire, Smoke, Gas Leak (C5) Operating Policies and Procedures, Workplace Safety, Contingency Plan: Radiological Event (C8) Emergency Action Plan Emergency Action Plan – Haslet Armory
	Government Support Services	Messenger Services Safety Procedures Surplus Evacuation Procedure Food Warehouse Evacuation Procedure Food Administration Evacuation Procedure Vehicle Operation – Safety and Accident Prevention (VO-8)
	Office of Pensions	Office of Pensions – Building Evacuations

## 2.2 Key Informant Interviews

The goal of the interviews was to better understand key informant’s thoughts, experiences, and knowledge about the existing safety and health policies and procedures in each agency and the potential impact of climate change on those policies and procedures. The inter-agency pilot project team identified the key informants and provided their contact information to the consultant team. Key informants are agency staff that were identified by participating divisions as being important actors in the development or implementation of agency health and safety policies. The consultant team reached out to these potential interviewees via email and conducted eleven interviews between December 19, 2016 and February 9, 2017. Based on availability, the consultant team was able to conduct interviews with representatives from four of the five agencies<sup>5</sup>.

Each interview was approximately 45 minutes long, and interviewees included director-level, manager-level, supervisor-level, and technical-level staff. The interview questions focused on familiarity with and the perceived effectiveness of agency health and safety policies, procedures and training; the impact of climate conditions on interviewee’s (or their staff’s) work, and opportunities for improvement. (See Appendix B for a summary of key informant interview questions.)

<sup>5</sup> The four agencies are DHSS, DNREC, DSHS, and OMB.

## 2.3 Surveys

An employee survey was also conducted to compile a broad range of feedback on agency health and safety policies and procedures from agency staff. The survey was deployed using SurveyMonkey and distributed to staff either via email or on paper depending on whether those staff had access to a computer. Each participating agency selected the employees to take the survey. While the focus was on employees who were considered “at-risk” to changing climate conditions, the agencies also disseminated the survey to staff who are not considered at-risk (e.g., work in offices) at their discretion.

Survey questions focused on staff familiarity with and perceived effectiveness of agency health and safety policies and procedures. Questions included inquiries into whether staff were informed of agency policies, how and by whom; whether they were notified before extreme weather, how and by whom; what the most significant hazards affecting staff work are; and what the most important improvements to make might be. (See Appendix C for the worker survey questions.)

All electronic and paper survey responses were entered into SurveyMonkey for analysis. (See Figure 6 for a breakdown of the responses.) The analysis of survey responses was conducted using the SurveyMonkey “Analyze Results” feature, in addition to an agency-specific analysis conducted in Microsoft Excel. (See Appendix D for a summary of survey results.)

**Figure 6. Survey Responses**

<b>Total Responses</b>	
792	
<b>Type of Response</b>	
Electronic	391
Paper	401
<b>Department</b>	
DeIDOT	517
DHSS	160
DNREC	54
DSHS	10
OMB	48
Unknown	3
<b>Participating Divisions</b>	
DeIDOT	Maintenance and Operations
	Motor Vehicles
	Transportation Solutions
DHSS	Aging Adults with Physical Disabilities
	Child Support Services
	Management Services
	Public Health
	Social Services
DNREC	Parks and Recreation
	Waste and Hazardous Substances
DSHS	Communications
OMB	Facilities Management
	Government Support Services

### 3. Cross-Agency Findings

Based on the policy review, key informant interviews, and surveys, the consultant team identified:

#### **Cross-Agency –**

- The strengths of the overall set of policies and procedures of all five participating agencies in incorporating climate resilience, and
- Opportunities for improvement in the overall set of policies and procedures of all five agencies.

#### **For Individual agencies –**

- What each of the five agencies is doing well in regard to incorporating climate resilience into its worker health and safety policies and procedures, and
- What each of the five agencies is not addressing and/or could improve.

While insights gained from the agency-specific analyses also informed the cross-agency analysis, the findings for individual agencies are discussed in detail in the Supplemental Report (2017). The cross-agency and agency-specific findings serve as the basis for the recommendations in Section 4. (See below for the summary of findings, and Figure 11 for a summary of the opportunities for improvement and recommendations.)

## Summary of Findings

### Policy Guidance

- Addressing gaps in safety and health programs related to climate change is built on the foundation of core safety and health policies and procedures.
- In reviewing health and safety policies across the five agencies we discovered a high degree of variation in detail and implementation of the written policies.
  - There is a need to improve clarity and consistency in agency-level policies and incorporate relevant weather and climate factors, including high heat, extreme cold, and vector-borne diseases, into safety and health policies and procedures.

### Roles and Responsibilities

- Supervisory leadership was repeatedly rated highly by survey respondents, and many supervisors play a key role in informing workers about the agency's safety and health policies and guidance.
  - There is a need for clearly defined agency-wide guidance on roles and responsibilities for leadership and staff, detailing specific actions required for safety and health policy development, implementation, training, and review.

### Communications and Training

- Communications and alerts regarding severe weather events varied by agencies, and many surveyed employees reported being unaware of the location of relevant safety and health policy information. However, they also commonly expressed an interest in learning more about existing policies.
  - Across the five agencies there is a need to increase communications and training regarding health and safety policies and procedures.

### Implementation and Enforcement

- Effective implementation of policies requires a specific action plan with personnel assigned to action steps on a detailed timeline.
  - There is a need to develop systems for accountability to ensure policies are implemented, and timelines and responsibility are established for solving problems, and updating policies and procedures.

### Evaluation and Improvement

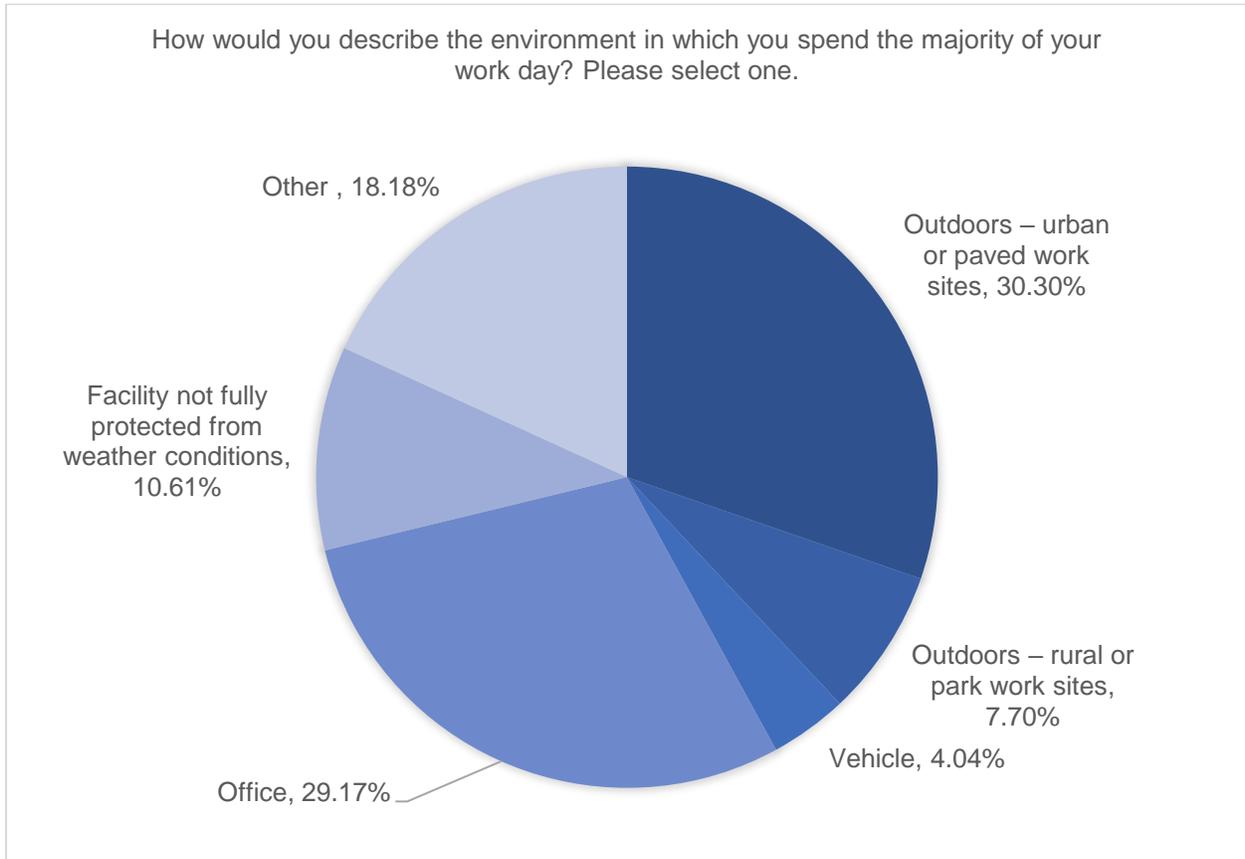
- Managers are responsible for customizing, writing, and implementing health and safety policies for their staff.
- There appears to be a lack of systems for employee and union involvement across the agencies, and there was no evidence of cross-agency or interagency cooperation in developing policies and sharing good practices.
  - There is a need to establish an appropriate process for reviewing and updating safety and health policies, engaging staff, eliciting feedback and sharing health and safety information, policies and good practices between and within agencies.

## 3.1 Background and Key Concerns

The work environments in which agency staff spend the majority of their work day is an important factor in exposure to climate change-related hazards. As noted in Section 1.4, the work environments that are subject to the greatest exposure to these hazards include outdoor urban spaces and natural areas as well as vehicles and facilities that are not fully protected from weather. Thirty percent of survey respondents spend the majority of their work day outdoors in

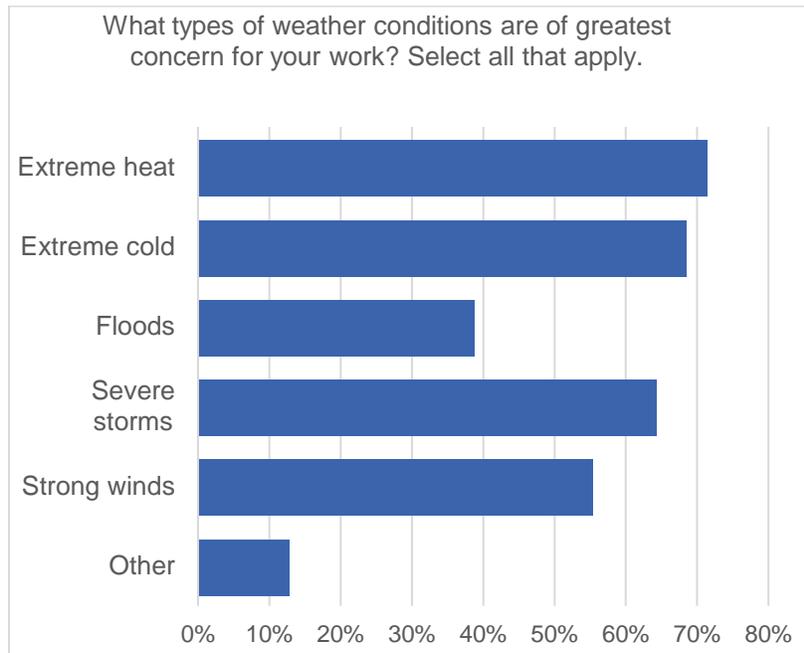
urban or paved work sites, and another 30% spend the greatest part of their work day in an office. The remainder of respondents spend the majority of their work day in a facility that is not fully protected from weather conditions (11%), outdoors in rural or park work sites (8%), or in a vehicle (4%). (See Figure 7.)

**Figure 7. Work Environments in which Survey Respondents Spend the Majority of their Work Day**



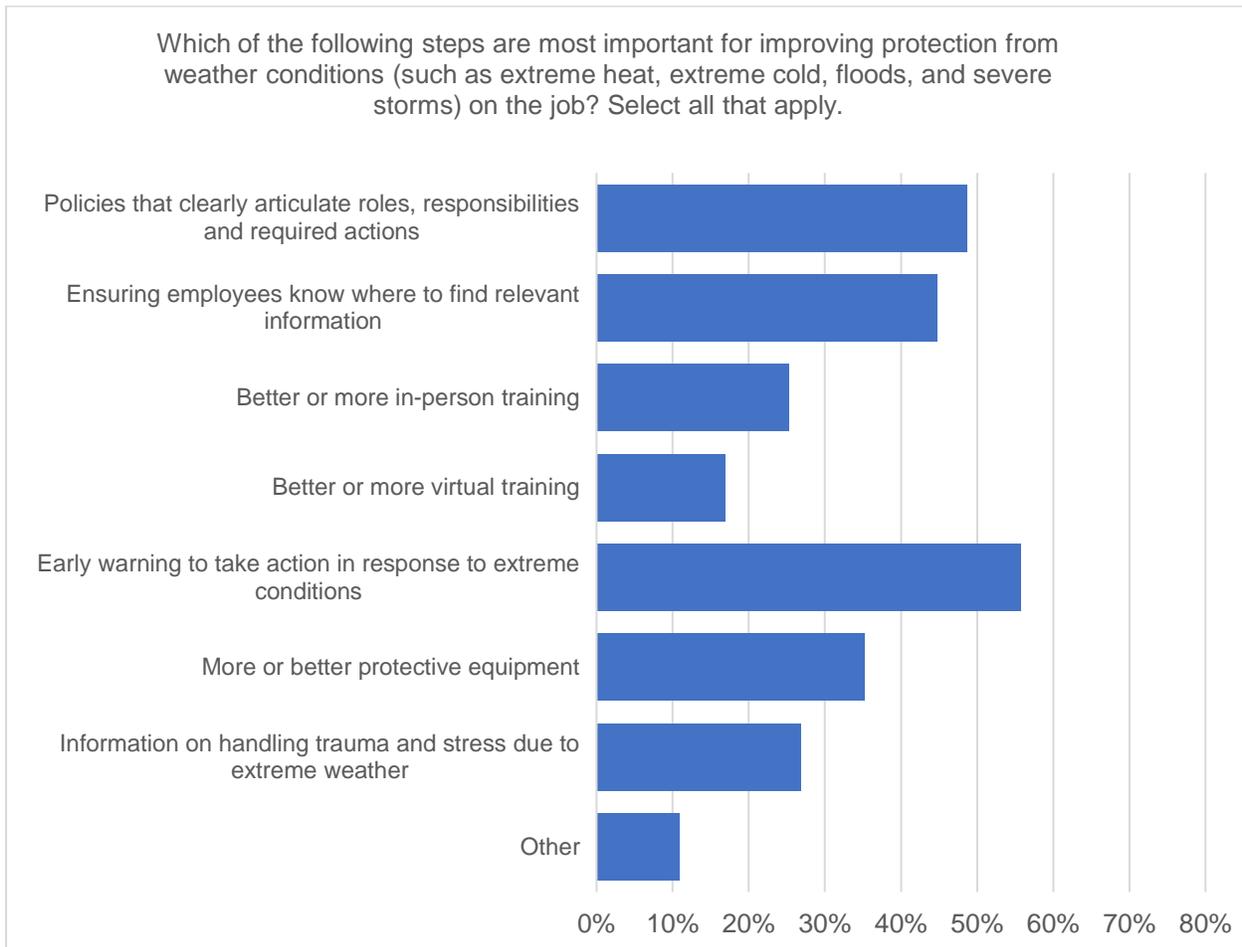
In terms of climate hazards that affect their work, survey respondents indicated that extreme heat is the greatest concern (71%), followed by extreme cold (68%), severe storms (64%), strong winds (55%), and floods (39%). (See Figure 8.)

**Figure 8. Weather Conditions of Greatest Concern in relation to Survey Respondent**



Appropriate adaptation actions can help to reduce the impacts of climate change-related hazards on worker health and safety. While some of these actions may be more explicitly linked to weather and climate hazards (e.g., early warning), in many cases, strengthening the processes related to health and safety policies will enhance worker protection from climate change hazards. The greatest number of respondents (56%) indicated that early warning to take preventive action would be most valuable. A significant number of survey respondents also indicated that the following would be important: policies and procedures that clearly articulate roles, responsibilities and required protective actions, and employees knowing where to find relevant policies, procedures and other information. (See Figure 9.)

**Figure 9. Most Important Actions to Improve Worker Protection from Weather Conditions**



### 3.2 Policy Guidance

Safeguarding workers from the impacts of climate change will require explicitly incorporating consideration of the potential impacts of extreme temperatures, storms, strong winds, and floods into existing health and safety policies. Additionally, in accordance with OSHA recommendations and good practices, a core element in an effective occupational safety and health program is management commitment and employee involvement. Another important feature is written health and safety policies that detail the organizational processes and procedures established to protect workers from exposure to job hazards.

In reviewing health and safety policies across the five agencies we discovered a high degree of variation in the degree to which they address climate hazards as well as the detail and implementation of the written policies. For example, some agencies' policies address specific climate hazards (e.g., DeIDOT's Summer Work Safety-Heat Stress presentation) as well as define roles and responsibilities and detail required protective measures. In contrast, other policies are much more general or focused entirely on actions required by employees. According to the survey conducted, only 66.5% of respondents were aware of agency health and safety policies and most respondents considered policy implementation to be "average."

This awareness is important because addressing gaps in safety and health policies related to climate change is built on a foundation of core safety and health policies and procedures.

Opportunities for improvement include:

- Incorporate relevant weather and climate factors, including high heat, extreme cold, and vector-borne diseases, into safety and health policies and procedures.
- Consider providing detailed guidelines specifying thresholds for early warning and triggering actions to protect workers from heat and cold stress, as well as information on signs of heat and cold illness and how to prevent or respond to the illnesses.
- Strengthen safety and health policies and procedures related to disaster preparedness and response.
- Reference and incorporate relevant national and industry guidelines and standards such as the:
  - National Institute for Occupational Safety and Health's (NIOSH) [Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot Environments](#),
  - American Conference of Governmental Industrial Hygienists' Threshold Limit Values on Thermal Stress (Cold Stress, Heat Stress and Heat Strain), and
  - California Division of Occupational Safety and Health (CalOSHA) [Heat Illness Prevention Standard](#).
- Provide protocols for translating agency-wide policies into job- and site-specific policies and procedures.
- Encourage the development of a process for employee and union involvement in the development and implementation of safety policies.

### 3.3 Roles and Responsibilities

Managers and supervisors play an important part in ensuring the safety and health of all workers. Across the five agencies, supervisory leadership was repeatedly rated highly by survey respondents, and many supervisors play a key role in informing workers about the agency's safety and health policies and guidance. Most agencies also emphasize the important role of division leadership and frontline supervisors in implementing safety and health policies and procedures, which may allow for better site-specific application of policy information. However, many of the policy documents did not detail management and supervisor responsibility in implementing the policies and procedures and lacked guidance on worker and union involvement in their development, implementation, and review. Survey respondents also drew attention to the need for more clearly articulating roles, responsibilities, and required protective actions, with nearly fifty percent of respondents highlighting this as an important action.

Opportunities for improvement include:

- Clearly define guidance on roles and responsibilities for leadership and staff, detailing specific actions required for safety and health policy development, implementation, training and review.
- Develop comprehensive agency-wide safety and health definitions, standards, procedures and policies regarding weather related events, such as high heat, extreme cold, and severe weather events.
- Define how staff who are assigned responsibilities are to be trained and will have access to necessary resources.
- Develop procedures for employee and union involvement in the safety and health policies.
- Engage employees in safety and health committees assigned to solve problems and develop solutions.

### 3.4 Communications and Training

Communications and training are essential for policies to be effective. Managers, supervisors and workers must be aware of policy goals and objectives and fully understand what is required of them to prevent occupational injury or illness. The analysis revealed that across the five agencies there is a need to increase communications and training. Communications and alerts regarding severe weather events varied by agencies. Only about 60% of survey respondents reported having been notified when extreme heat, cold, and other severe weather conditions required precautionary actions. Another example, based on survey responses, is that a significant percentage of employees were not aware of the location of relevant safety and health policy information. Staff expressed an interest in learning more about existing policies, and 71% of respondents indicated that they wanted to be informed of agency safety and health policies and procedures every six months to a year.

Training plays an important role in ensuring workers understand the risks they face and ways to avoid risks. Although some of the policies included training requirements, in general they lacked detail and specificity. For instance, training on the use of personal protective equipment (PPE) and other protective measures related to hot and cold environments should include an outline of the content, how frequently it will be provided, length of the training, and a description of the intended participants.

Opportunities for improvement include:

- Provide additional information and training on climate related hazards, especially site-specific actions required for staff to implement protective measures.
- Strengthen awareness and training of staff on worker health and safety policies and procedures, including:
  - Emphasize processes for employees to engage in reporting unsafe and unhealthy conditions.

- Develop written guidelines that are disseminated to all staff, so they understand how to identify hazards and prevent exposure to risks.
- Ensure all applicable OSHA training requirements are being met in areas such as PPE, Hazard Communication, and Emergency Preparedness.
- Communicate findings through multiple means (e.g., teleconference, email, toolbox talks).
- Develop a consistent approach to training on the use of PPE.
- Include a line in the budget for health and safety training and PPE.

### 3.5 Implementation and Enforcement

Survey respondents called attention to the need to ensure implementation of relevant policies, procedures and training, highlighting the importance of accountability in effective safety and health policies and procedures. Systems should be in place to ensure managers and supervisors are accountable for implementing required policies and procedures. Effective implementation of policies requires a specific action plan with personnel assigned to action steps on a detailed timeline. A system should be in place to ensure that mandatory awareness training is provided to workers to ensure that they know what is required of them.

Opportunities for improvement include:

- Develop systems for accountability to ensure policies and procedures are implemented, and timelines and responsibility are established for solving problems, and updating policies and procedures.
- Review the effectiveness of the current system for agency-level leadership of the health and safety policies and procedures.
- Ensure staff are properly educated and trained about their responsibilities under specific safety and health policies.
- Establish non-punitive policies for correcting employee deviation from safety and health requirements.

### 3.6 Evaluation and Improvement

Effective safety and health policies and procedures are continuously evaluated and improved based on an assessment of their effectiveness as well as an ongoing review of hazards and controls. According to interview responses, managers have the responsibility to customize, write, and implement health and safety policies for their staff as they deem necessary. Respondents generally found upper management to be supportive of these efforts. However, there appears to be a lack of systems for employee and union involvement across the agencies. Furthermore, there was no evidence of cross-agency or interagency cooperation in developing policies and sharing good practices. In general, agencies lacked systems to review and update policies.

Opportunities for improvement include:

- Create a system of safety and health committees to provide an ongoing process for employee participation and management leadership, including a process to receive feedback from staff and engage with frontline employees on how to improve health and safety policies and procedures.
- Develop a process for sharing health and safety information, policies and good practices between and within agencies.
- Establish an appropriate process for reviewing and updating safety and health policies.

## 4. Recommendations

Our review of the impacts of climate change on Delaware state agencies' occupational safety and health policies and procedures reveals important opportunities for improvement. Strengthening the fundamentals of the current policies and procedures by improving processes for policy development, implementation, and enforcement, focusing on gaps specifically related to climate change, and sharing agency good practices are key actions. Establishing a system of safety and health committees that include front line employees will be an important part of creating an ongoing process of management commitment and employee involvement to achieve continuous improvement of policies and procedures. In so doing, Delaware will provide a model of leadership on addressing the occupational safety and health impacts of climate change on employee well-being.

To help inform next steps in state agencies' efforts to take advantage of identified opportunities for improvement and integrate climate change considerations into worker health and safety policies, the consultant team developed a set of recommendations. Figure 10 summarizes the opportunities for improvement, recommendations for addressing them, and relevant examples and resources. Additional information, including pertinent examples of good practices, is detailed in the remainder of Section 4.

**Figure 10. Summary of Opportunities for Improvement, Recommendations and Examples and Resources**

Category of Finding	Opportunity for Improvement	Recommendations	Examples & Resources
<b>Policy Guidance</b>	<ul style="list-style-type: none"> <li>Incorporate relevant weather and climate factors, including high heat, extreme cold, and vector-borne diseases, into safety and health policies and procedures.</li> </ul>	<ul style="list-style-type: none"> <li>Develop detailed agency occupational safety and health policies in recognition of the higher occurrence of extreme weather events. These policies should:               <ul style="list-style-type: none"> <li>Address thermal stress, working in hot and cold environments,</li> <li>Include detailed procedures,</li> <li>Describe                   <ul style="list-style-type: none"> <li>The signs and symptoms of health effects,</li> <li>Employer provided equipment and clothing,</li> <li>Preventive actions such as hydration and response actions related to first aid procedures, and</li> <li>Mandatory training and communications.</li> </ul> </li> </ul> </li> <li>Develop policies, procedures, information, and training on biological exposures certain field employees are likely to encounter such as Lyme Disease. Other biological exposures that may be of concern include Zika, Histoplasmosis, and mold.</li> </ul>	<ul style="list-style-type: none"> <li>Example Heat Stress Prevention Program (See Appendix A.)</li> <li>NIEHS Worker Training Program</li> <li>NIEHS Disaster Resiliency Training Program</li> <li><a href="#">NIEHS Worker Climate Change Vulnerability Report</a></li> <li><a href="#">Schulte, et al. 2016</a></li> <li>Seasonal training such as DeIDOT’s Winter Driving and Heat and Cold Stress Presentations,</li> <li>DSHS’s buddy system for inspections</li> </ul>
	<ul style="list-style-type: none"> <li>Consider providing detailed guidelines specifying thresholds for early warning and triggering actions to protect workers from heat and cold stress, as well as information on signs of heat and cold illness</li> </ul>	<ul style="list-style-type: none"> <li>Develop detailed agency occupational safety and health policies in recognition of the higher occurrence of extreme weather events. These policies should:</li> </ul>	<ul style="list-style-type: none"> <li>Example Heat Stress Prevention Program (See Appendix A.)</li> <li>NIEHS Disaster Resiliency Training Program</li> <li><a href="#">NIEHS Worker Climate Change Vulnerability Report</a></li> <li><a href="#">Schulte, et al. 2016</a></li> </ul>

Category of Finding	Opportunity for Improvement	Recommendations	Examples & Resources
	and how to prevent or respond to the illnesses.	<ul style="list-style-type: none"> <li>○ Address thermal stress, working in hot and cold environments,</li> <li>○ Include detailed procedures,</li> <li>○ Describe <ul style="list-style-type: none"> <li>▪ The signs and symptoms of health effects,</li> <li>▪ Employer provided equipment and clothing,</li> <li>▪ Preventive actions such as hydration and response actions related to first aid procedures, and</li> <li>▪ Mandatory training and communications.</li> </ul> </li> <li>● Convene an inter-agency working group to identify shared concerns and opportunities to develop policies, procedures or supporting materials (e.g., factsheets describing hazards) that may be used across agencies. Seek to leverage an existing inter-agency mechanism.</li> </ul>	<ul style="list-style-type: none"> <li>● Seasonal training such as DeIDOT's Winter Driving and Heat and Cold Stress Presentations</li> <li>● DSHS's buddy system for inspections</li> </ul>
	<ul style="list-style-type: none"> <li>● Strengthen safety and health policies and procedures related to disaster preparedness and response.</li> </ul>	<ul style="list-style-type: none"> <li>● Require development of Emergency Action Plans that set forth site-specific emergency and disaster plans (preparation for responding to floods, other extreme weather events, air pollution, and the mental health impacts of exposure to traumatic events and fatigue).</li> </ul>	<ul style="list-style-type: none"> <li>● NIEHS Disaster Resiliency Training Program</li> </ul>
	<ul style="list-style-type: none"> <li>● Reference and incorporate relevant national and industry guidelines and standards.</li> </ul>	<ul style="list-style-type: none"> <li>● Use and reference relevant national and industry guidelines and standards in developing</li> </ul>	<ul style="list-style-type: none"> <li>● <a href="#">NIOSH Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot Environments</a></li> </ul>

Category of Finding	Opportunity for Improvement	Recommendations	Examples & Resources
		<p>climate-resilient worker health and safety policies.</p>	<ul style="list-style-type: none"> <li>American Conference of Governmental Industrial Hygienists' Threshold Limit Values on Thermal Stress (Cold Stress, Heat Stress and Heat Strain)</li> <li><a href="#">CalOSHA Heat Illness Prevention Standard</a></li> </ul>
	<ul style="list-style-type: none"> <li>Provide protocols for translating agency-wide policies into job and site-specific policies and procedures.</li> </ul>	<ul style="list-style-type: none"> <li>Require development of Emergency Action Plans that set forth site-specific emergency and disaster plans (preparation for responding to floods, other extreme weather events, air pollution, and the mental health impact of exposure to traumatic events and fatigue).</li> <li>See Evaluation and Improvement Recommendation - Create a system of safety and health committees to provide an ongoing process for employee participation and management leadership.</li> </ul>	<ul style="list-style-type: none"> <li>Monthly training program for Delaware OMB Division of Facilities Management staff</li> <li>New York State Department of Transportation Joint Agency Level Health and Safety Committee – Statement of Purpose (See Appendix A.)</li> <li><a href="#">OSHA Recommended Practices for Safety and Health Programs</a></li> </ul>
	<ul style="list-style-type: none"> <li>Encourage the development of a process for employee and union involvement in the development and implementation of safety policies.</li> </ul>	<ul style="list-style-type: none"> <li>Convene an inter-agency working group to identify shared concerns and opportunities to develop policies, procedures or supporting materials (e.g., factsheets describing hazards) that may be used across agencies. Seek to leverage an existing inter-agency mechanism.</li> <li>See Roles and Responsibilities Recommendation - Ensure that policies clearly state that staff who are assigned safety responsibilities are adequately trained and have access to</li> </ul>	<ul style="list-style-type: none"> <li>New York State Department of Transportation Joint Agency Level Health and Safety Committee – Statement of Purpose (See Appendix A.)</li> <li><a href="#">OSHA Recommended Practices for Safety and Health Programs</a></li> </ul>

Category of Finding	Opportunity for Improvement	Recommendations	Examples & Resources
		<p>necessary resources and equipment.</p> <ul style="list-style-type: none"> <li>• See Evaluation and Improvement Recommendation - Create a system of safety and health committees to provide an ongoing process for employee participation and management leadership.</li> </ul>	
<b>Roles and Responsibilities</b>	<ul style="list-style-type: none"> <li>• Clearly define guidance on roles and responsibilities for leadership and staff, detailing specific actions required for safety and health policy development, implementation, training and review.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure that policies clearly state that staff who are assigned safety responsibilities are adequately trained and have access to necessary resources and equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">OSHA Recommended Practices for Safety and Health Programs</a></li> <li>• DelDOT's incorporation of health and safety into Performance Management Plans</li> <li>• DNREC Division of Waste and Hazardous Substances Health and Safety Manual</li> <li>• DNREC's hiring of an employee dedicated to safety</li> </ul>
	<ul style="list-style-type: none"> <li>• Develop comprehensive agency-wide safety and health definitions, standards, procedures and policies regarding weather related events, such as high heat, extreme cold, and severe weather events.</li> </ul>	<ul style="list-style-type: none"> <li>• See Policy Guidance Recommendation - Develop detailed agency occupational safety and health policies in recognition of the higher occurrence of extreme weather events.</li> </ul>	<ul style="list-style-type: none"> <li>• Example Heat Stress Prevention Program (See Appendix A.)</li> <li>• <a href="#">NIEHS Worker Climate Change Vulnerability Report</a></li> </ul>
	<ul style="list-style-type: none"> <li>• Define how staff who are assigned responsibilities are to be trained and will have access to necessary resources.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure that policies clearly state that staff who are assigned safety responsibilities are adequately trained and have access to necessary resources and equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">OSHA Recommended Practices for Safety and Health Programs</a></li> <li>• DelDOT's incorporation of health and safety into Performance Management Plans</li> </ul>
	<ul style="list-style-type: none"> <li>• Develop procedures for employee and union involvement in the safety and health policies.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure that policies clearly state that staff who are assigned safety responsibilities are adequately trained and have access to necessary resources and equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• <a href="#">OSHA Recommended Practices for Safety and Health Programs</a></li> <li>• DelDOT's incorporation of health and safety into Performance Management Plans</li> </ul>

Category of Finding	Opportunity for Improvement	Recommendations	Examples & Resources
	<ul style="list-style-type: none"> <li>Engage employees in safety and health committees assigned to solve problems and develop solutions.</li> </ul>	<ul style="list-style-type: none"> <li>See Evaluation and Improvement Recommendation - Create a system of safety and health committees to provide an ongoing process for employee participation and management leadership.</li> </ul>	<ul style="list-style-type: none"> <li>DHSS promotion of Employee Personal Preparedness Plans</li> <li>New York State Department of Transportation Joint Agency Level Health and Safety Committee – Statement of Purpose (See Appendix A.)</li> <li><a href="#">OSHA Recommended Practices for Safety and Health Programs</a></li> </ul>
<b>Communications and Training</b>	<ul style="list-style-type: none"> <li>Provide additional information and training on climate related hazards, especially site-specific actions required for staff to implement protective measures.</li> </ul>	<ul style="list-style-type: none"> <li>Develop and implement a consistent method and process to provide early warning for at-risk employees to take action in extreme conditions based on established, clearly articulated thresholds as well as reminders of the appropriate protective actions.</li> <li>Provide additional information and training such as factsheets with photos of potential threats (e.g., ticks) and training on hazard specific safety and health control policies.</li> </ul>	<ul style="list-style-type: none"> <li>Example Heat Stress Prevention Program (See Appendix A.)</li> <li>NIEHS Worker Training Program</li> <li>New York State Department of Labor, Division of Safety and Health – <a href="#">“Safety Tips” for Complying with the New York State Sun Safety Law</a></li> <li>New York State Department of Environmental Conservation – Sun Safety Memorandum (See Appendix A.)</li> <li>New York State Department of Environmental Conservation – Tick Bites/Lyme Disease Prevention Memorandum (See Appendix A.)</li> <li>Seasonal training such as DelDOT’s Winter Driving and Heat and Cold Stress Presentations</li> <li>DSHS Division of Communications Safety Presentations</li> <li>DNREC air quality forecasting program and <a href="#">EPA Enviroflash program</a></li> <li>DHSS promotion of Employee Personal Preparedness Plans</li> </ul>

Category of Finding	Opportunity for Improvement	Recommendations	Examples & Resources
	<ul style="list-style-type: none"> <li>• Strengthen awareness and training of staff on worker health and safety policies and procedures, including:               <ul style="list-style-type: none"> <li>○ Emphasize processes for employees to engage in reporting unsafe and unhealthy conditions,</li> <li>○ Develop written guidelines that are disseminated to all staff, so they understand how to identify hazards and prevent exposure to risks,</li> <li>○ Ensure all applicable OSHA training requirements are being met in areas such as PPE, Hazard Communication, and Emergency Preparedness, and</li> <li>○ Communicate findings through multiple means (e.g., teleconference, email, toolbox talks).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Develop and implement a consistent method and process to provide early warning for at-risk employees to take action in extreme conditions based on established, clearly articulated thresholds as well as reminders of the appropriate protective actions.</li> <li>• Include training on the impacts of climate change, and designate an individual to integrate the information into decision-making processes.</li> <li>• Ensure that safety and health policies, standards and guidelines are posted in a visible and highly trafficked area, and that employees are aware of where they are posted.</li> </ul>	<ul style="list-style-type: none"> <li>• Example Heat Stress Prevention Program (See Appendix A.)</li> <li>• NIEHS Worker Training Program</li> <li>• NIEHS Disaster Resiliency Training Program</li> <li>• Monthly training program for OMB Division of Facilities Management staff</li> <li>• Seasonal training such as DeIDOT's Winter Driving and Heat and Cold Stress Presentations</li> <li>• DSHS Division of Communications Safety Presentations</li> <li>• DNREC air quality forecasting program and <a href="#">EPA Enviroflash program</a></li> </ul>
	<ul style="list-style-type: none"> <li>• Develop a consistent approach to training on the use of PPE.</li> </ul>	<ul style="list-style-type: none"> <li>• Create a regular schedule to update all staff about health and safety policies and procedures.</li> </ul>	<ul style="list-style-type: none"> <li>• Monthly training program for Delaware OMB Division of Facilities Management staff</li> <li>• <a href="#">OSHA Recommended Practices for Safety and Health Programs</a></li> </ul>
	<ul style="list-style-type: none"> <li>• Include a line in the budget for health and safety training and PPE.</li> </ul>	<ul style="list-style-type: none"> <li>• See Evaluation and Improvement Recommendation - Create a product evaluation committee and process that is charged with incorporating risk evaluation information provided by relevant staff and selecting protective clothing, personal protective equipment, and other safety equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• New York State Department of Transportation Joint Agency Level Health and Safety Committee – Statement of Purpose (See Appendix A.)</li> <li>• DNREC Division of Waste and Hazardous Substances Health and Safety Manual</li> </ul>

Category of Finding	Opportunity for Improvement	Recommendations	Examples & Resources
<b>Implementation and Enforcement</b>	<ul style="list-style-type: none"> <li>Develop systems for accountability to ensure policies and procedures are implemented, and timelines and responsibility are established for solving problems, and updating policies and procedures.</li> </ul>	<ul style="list-style-type: none"> <li>Establish systems for accountability to ensure policies are implemented, and timelines and responsibility are established for solving problems and updating policies and procedures.</li> <li>Promote monitoring and accountability by:               <ul style="list-style-type: none"> <li>Tracking incidents, and</li> <li>Ensuring staff are aware of and implement relevant health and safety policies and procedures.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><a href="#">OSHA Recommended Practices for Safety and Health Programs</a></li> <li>DelDOT's incorporation of health and safety into Performance Management Plans</li> <li>DNREC Procedures for Employee Safety – Signing In and Out</li> </ul>
	<ul style="list-style-type: none"> <li>Review the effectiveness of the current system for agency-level leadership of the health and safety policies and procedures.</li> </ul>	<ul style="list-style-type: none"> <li>Promote monitoring and accountability by:               <ul style="list-style-type: none"> <li>Tracking incidents, and</li> <li>Ensuring staff are aware of and implement relevant health and safety policies and procedures.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><a href="#">OSHA Recommended Practices for Safety and Health Programs</a></li> <li>DNREC Procedures for Employee Safety – Signing In and Out</li> </ul>
	<ul style="list-style-type: none"> <li>Ensure staff are properly educated and trained about their responsibilities under specific safety and health policies.</li> </ul>	<ul style="list-style-type: none"> <li>Promote monitoring and accountability by:               <ul style="list-style-type: none"> <li>Tracking incidents, and</li> <li>Ensuring staff are aware of and implement relevant health and safety policies and procedures.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li><a href="#">OSHA Recommended Practices for Safety and Health Programs</a></li> <li>DNREC Procedures for Employee Safety – Signing In and Out</li> </ul>
	<ul style="list-style-type: none"> <li>Establish non-punitive policies for correcting employee deviation from safety and health requirements.</li> </ul>	<ul style="list-style-type: none"> <li>Establish systems for accountability to ensure policies are implemented, and timelines and responsibility are established for solving problems and updating policies and procedures.</li> </ul>	<ul style="list-style-type: none"> <li><a href="#">OSHA Recommended Practices for Safety and Health Programs</a></li> <li>DelDOT's incorporation of health and safety into Performance Management Plans</li> </ul>
<b>Evaluation and Improvement</b>	<ul style="list-style-type: none"> <li>Create a system of safety and health committees to provide an ongoing process for employee participation and management leadership, including a process to receive feedback from staff and engage with frontline employees on</li> </ul>	<ul style="list-style-type: none"> <li>Create a system of safety and health committees to provide an ongoing process for employee participation and management leadership.</li> <li>Create a product evaluation committee and process that is</li> </ul>	<ul style="list-style-type: none"> <li>New York State Department of Transportation Joint Agency Level Health and Safety Committee – Statement of Purpose (See Appendix A.)</li> <li><a href="#">OSHA Recommended Practices for Safety and Health Programs</a></li> </ul>

Category of Finding	Opportunity for Improvement	Recommendations	Examples & Resources
	<p>how to improve health and safety policies and procedures.</p>	<p>charged with incorporating risk evaluation information provided by relevant staff and selecting protective clothing, personal protective equipment, and other safety equipment.</p>	
	<ul style="list-style-type: none"> <li>• Develop a process for sharing health and safety information, policies and good practices between and within agencies.</li> </ul>	<ul style="list-style-type: none"> <li>• Create a system of safety and health committees to provide an ongoing process for employee participation and management leadership.</li> </ul>	<ul style="list-style-type: none"> <li>• New York State Department of Transportation Joint Agency Level Health and Safety Committee – Statement of Purpose (See Appendix A.)</li> <li>• <a href="#">OSHA Recommended Practices for Safety and Health Programs</a></li> <li>• DelDOT’s cross-agency development of the Transportation Safety Plan</li> <li>• DNREC’s hiring of an employee dedicated to safety</li> </ul>
	<ul style="list-style-type: none"> <li>• Establish an appropriate process for reviewing and updating safety and health policies.</li> </ul>	<ul style="list-style-type: none"> <li>• Create a regular schedule to review and update safety and health policies.</li> <li>• Create a product evaluation committee and process that is charged with incorporating risk evaluation information provided by relevant staff and selecting protective clothing, personal protective equipment, and other safety equipment.</li> </ul>	<ul style="list-style-type: none"> <li>• New York State Department of Transportation Joint Agency Level Health and Safety Committee – Statement of Purpose (See Appendix A.)</li> <li>• <a href="#">OSHA Recommended Practices for Safety and Health Programs</a></li> </ul>

## 4.1 Policy Guidance

Bolstering the climate resilience of worker health and safety policies and procedures starts with ensuring that their content adequately addresses existing threats, and that workers are aware of this content. This requires that leadership ensure policies clearly describe key components such as roles and responsibilities and required protective measures, that these policies are located in an easily accessible place, and that staff are aware of policies' location and content. This will provide a strong foundation for explicitly incorporating climate hazards into policies and procedures through the recommended actions.

- Develop detailed agency occupational safety and health policies in recognition of the higher occurrence of extreme weather events. These policies should:
  - Address thermal stress, working in hot and cold environments,
  - Include detailed procedures,
  - Describe:
    - The signs and symptoms of health effects,
    - Employer provided equipment and clothing,
    - Preventive actions such as hydration and response actions related to first aid procedures, and
    - Mandatory training, early warning and communications.
- Use and reference relevant national and industry guidelines and standards in developing the above policies such as the NIOSH [Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot Environments](#), the American Conference of Governmental Industrial Hygienists' Threshold Limit Values on Thermal Stress (Cold Stress, Heat Stress and Heat Strain), and the CalOSHA [Heat Illness Prevention Standard](#).
- Require development of Emergency Action Plans that set forth site-specific emergency and disaster plans (preparation for responding to floods, other extreme weather events, air pollution, and the mental health impacts of exposure to traumatic events and fatigue).
- Develop policies, procedures, information, and training on biological exposures certain field employees are likely to encounter such as Lyme Disease. Other biological exposures that may be of concern include Zika, Histoplasmosis, and mold.
- Convene an inter-agency working group to identify shared concerns and opportunities to develop policies, procedures or supporting materials (e.g., factsheets describing hazards) that may be used across agencies. Seek to leverage an existing inter-agency mechanism.

### **Policy Guidance: Agency Highlight**

#### **DNREC Division of Waste and Hazardous Substances Health and Safety Manual**

This manual is state of the art, up to date, and follows recommended good practices in defining roles and including budget responsibility for safety and health training and equipment. The manual assigns budgeting for safety and health training and equipment to the Program or Section Manager. Having resources dedicated to existing safety and health programs and funding new initiatives is key to moving forward on climate change initiatives. Although, the manual lacks depth of information on employee involvement, safety and health committees, and disaster preparedness and response, it can serve as a model on which to build climate change safety and health initiatives.

### **Policy Guidance: Example Programmatic Structure**

#### **Sample Heat Stress Prevention Program**

This program outline has been developed to provide workers with the training and equipment necessary to protect them from heat related exposures and illnesses. It includes information on roles and responsibilities, the kinds of training that will be included in program implementation, and the policies and hazard-related content that will be implemented or covered through the program. (See Appendix A for a full copy of this example document.)

## **4.2 Roles and Responsibilities**

Worker health and safety policies and procedures provide guidance for a wide range of positions. For supervisors and workers to carry out their responsibilities and effectively respond to climate hazards, they must have access to appropriate resources, training and support. For instance, the managers who are responsible for developing policies that address climate hazards may need a deeper, more detailed understanding of climate hazards and when they pose a substantial threat to worker health and safety. In contrast, for workers whose role is limited to taking precautionary actions as stated in policy guidance, it may be more important to recognize the symptoms that signify an adverse response to climate hazards.

- Ensure that policies clearly state that staff who are assigned safety responsibilities are adequately trained and have access to necessary resources and equipment.

## **4.3 Communications and Training**

The implementation of policies which address climate risks to worker health and safety hinges on effective communications and training. Managers, supervisors and workers must be aware of the potential impacts of climate change on their work as well as their specific roles and responsibilities in preventing and/or responding to these impacts on health and safety. Nearly three-quarters of survey respondents indicated that they would like to be informed of agency health and safety policies and procedures every six months to a year. Supervisors and workers must also receive training on appropriately implementing required policies and practices, such as those related to PPE. The NIEHS Worker Training Program lists a number of training

resources in Appendices B and C of the document [Climate Change Vulnerability Assessment: A Report Assessing How Climate Change Will Impact Worker Health and How to Prepare for These Impacts](#) (2015).

- Develop and implement a consistent method and process to provide early warning for at-risk employees to take action in extreme conditions based on established, clearly articulated thresholds as well as reminders of the appropriate protective actions.
- Include training on the impacts of climate change, and designate an individual to integrate the information into decision-making processes.
- Provide additional information and training such as factsheets with photos of potential threats (e.g., ticks) and training on hazard specific safety and health control policies.
- Create a regular schedule to update all staff about health and safety policies and procedures.
- Ensure that safety and health policies, standards and guidelines are posted in a visible and highly trafficked area, and that employees are aware of where they are posted.

#### **Communications and Training: Agency Highlights**

##### **Monthly training program for OMB Division of Facilities Management staff**

The Division of Facilities Management, Building Maintenance, Custodial and Grounds team established a partnership with the Delaware Department of Insurance to provide health and safety training to all Maintenance employees. Training topics are chosen by the Chief of Maintenance Operations and the relevant supervisors based on the seasonal and technical needs of the staff. They are complemented by a regularly scheduled staff meeting that gives staff the opportunity to provide feedback on program effectiveness and propose ideas for future trainings.

##### **DeIDOT cold weather and heat stress presentations**

DeIDOT has prepared presentations on seasonal weather hazards to help prepare employees for cold weather and high heat. These presentations include information on the cause of heat and cold illness in addition to prevention, symptoms of illness and appropriate treatment. These presentations are good examples of clear, concise and actionable communications with staff. It is recommended that these presentations or related materials be made available both during trainings and on an ongoing basis, such as via an agency intranet.

## Communications: Examples

### **New York State Department of Environmental Conservation – Tick Bites/Lyme Disease Prevention Memorandum**

New York's Department of Environmental Conservation provided a memo to all department employees that notifies staff of the ongoing threat of vector-borne diseases and summarizes effective responses with practical, clear instructions. The document includes a table explaining the appropriate use of insect repellants containing DEET based on time outdoors, and specific instructions on correct apparel. The memo also includes links to additional information and contact information for the Department health and safety unit. (See Appendix A.)

### **New York State Department of Labor, Division of Safety and Health – [“Safety Tips” for Complying with the New York State Sun Safety Law](#)**

This guideline document explains the New York Sun Safety Law, who is at risk from sun exposure, how to reduce risk, and what supervisors should do to protect their workers. In addition to heat stress, the memo also includes information about cold injury as well. It is helpful to cover both temperature-related hazards in the same document since they affect similar types of workers.

### **New York State Department of Environmental Conservation – Sun Safety Memorandum**

New York's Department of Environmental Conservation issued an agency-specific email communication that notifies staff of upcoming seasonal temperature changes and directs them to available guidance and web resources on the hazards associated with sun exposure and recommended protective measures for employees. (See Appendix A.)

## Training: Examples

The NIEHS Worker Training Program has developed two four-hour interactive worker training programs on 1) Resiliency for Disaster Workers and 2) a Pathogen Safety Data Guide Training Module.

### **The Disaster Resiliency Training Program**

This program addresses the impacts of stress and trauma experienced by disaster workers. This interactive training has been pilot tested in the Gulf of Mexico region and New York City. Instructor Manuals, Participant Manuals, a presentation and an abbreviated training Podcast are now available on the NIEHS [Resilience Website](#).

The program uses activities and interaction to engage participants in open discussion and begin building long term capacity for mental health and resilience. This unique pre-disaster training is intended to build coping skills, knowledge of mental health symptoms, organizational capability to intervention, and resources available in communities. It emphasizes the importance of developing organizational capacity to address the impacts of stress and trauma on workers. This course is intended for workers involved in all phases of disaster work. Delivery of the course may be tailored to participants, address site-specific conditions, and share local resources.

The program's overall objectives are to prepare participants to:

- Recognize signs and symptoms of disaster work-related stress,
- Obtain support through employer/organization and community resources, and
- Build resilience by demonstrating stress reduction and coping strategies.

### **The NIEHS Worker Training Program**

This program has produced a Pathogen Safety Data Guide and Training Module to clarify the use of pathogen safety data resources currently available for development of infectious disease occupational exposure control plans in a broad spectrum of industries. During the Ebola crisis, the NIEHS Worker Training Program conducted a gap analysis that led to development of the Pathogen Safety Data Guide and Training Module.

The Guide reviews existing pathogen safety data resources, their strengths, and limitations, and explains how to access them. Key resources include the Public Health Agency of Canada's Pathogen Safety Data website and app, Centers for Disease Control and Prevention's infectious disease websites, OSHA information, and the Wireless Information System for Emergency Responders' website and app.

The training module was developed to train workers with potential exposure to infectious pathogens on how to use the Pathogen Safety Data Guide and resources. The pathogen safety data module may be integrated into existing infectious disease training programs or used as a standalone module. The curriculum uses interactive training techniques to teach workers how to research the characteristics of infectious pathogens that they may be exposed to on-the-job and how that information may be used to develop site-specific risk assessment and worker protection programs.

### **Training Objectives**

Upon taking this module, participants will be able to:

1. Access and use existing resources for pathogen safety data,
2. Look up key terminology used in pathogen safety data resources, and
3. Explain the use of pathogen safety data.

## 4.4 Implementation and Enforcement

Promoting accountability for implementation and enforcement of health and safety policies and procedures requires systems underpinned by action plans that clearly describe required actions, timelines for implementation, responsible individuals, and available support and resources such as training. As extreme climate conditions occur more frequently and/or become more severe, it will become increasingly critical for workers to take precautionary actions and be able to respond to adverse impacts on health and safety. State agencies may leverage existing supervisory leadership, rated highly across agencies by survey respondents, to promote greater accountability for implementing and enforcing relevant policies.

- Establish systems for accountability to ensure policies are implemented, and timelines and responsibility are established for solving problems and updating policies and procedures.
- Promote monitoring and accountability by:
  - Tracking incidents, and
  - Ensuring staff are aware of and implement relevant health and safety policies and procedures.

## 4.5 Evaluation and Improvement

Climate conditions will continue to change, creating shifting implications for the work environments of at-risk workers. Health and safety policies must be regularly reviewed and updated to reflect these changing conditions and incorporate good practices and lessons learned based on experiences in Delaware and other states. Establishing systems for regularly obtaining and incorporating the perspectives of at-risk and other relevant workers, who are on the front lines of climate impacts, to inform policy updates will help to ensure that policies and procedures are responsive to these workers' evolving needs.

- Create a system of safety and health committees to provide an ongoing process for employee participation and management leadership.
- Create a regular schedule to review and update safety and health policies.
- Create a product evaluation committee and process that is charged with incorporating risk evaluation information provided by relevant staff and selecting protective clothing, PPE, and other safety equipment.

## Evaluation and Improvement: Example Committee Operating Agreement

### **New York State Department of Transportation, Joint Agency Level Health and Safety Committee – Statement of Purpose**

The operating agreement for the New York Department of Transportation Joint Agency Level Health and Safety Committee articulates the committee's objectives, composition and standard meeting procedures. The Committee was established to enhance the health and safety of Department employees. The document was agreed to and signed in collaboration with the Department's employee labor unions, which are cofounders of the joint committee. (See Appendix A for a full copy of this example document.)

## 5. Conclusion

The State of Delaware has already taken important steps to characterize changing climate conditions and identify potential opportunities to integrate climate considerations more explicitly into existing policies in order to safeguard the State's communities, resources, and assets. The Climate-Ready Workforce Pilot Project is one example of this. By identifying relevant climate hazards and at-risk populations as well as assessing the effectiveness of existing worker health and safety policies, state agencies have laid an important foundation for better safeguarding their workers. Participating State agencies now have an opportunity to leverage and share their experiences and lessons learned as well as use the results of the Pilot Project to more explicitly incorporate climate considerations into existing health and safety policies and improve relevant processes. In particular, establishing mechanisms that enable continuous, iterative learning and adjustment will position Delaware's agencies to continue to respond effectively to climate change, even as these risks shift over time.

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## Appendix A: Good Examples

### Example Heat Stress Prevention Program

#### 1.0 Purpose

This Heat Stress Prevention Program has been developed to provide workers with the training and equipment necessary to protect them from heat related exposures and illnesses.

#### 2.0 Training

All employees who are or may be exposed to potential heat related illnesses will receive training on the following:

- The environmental and personal risk factors that cause heat related illnesses;
- The employer's procedures for identifying, evaluating and controlling exposures to the environmental and personal risk factors for heat illness;
- The importance of frequent consumption of small quantities of water, up to 4 cups per hour under extreme conditions of work and heat;
- The importance of acclimatization;
- The different types of heat illness and the common signs and symptoms of heat illness;
- The importance of immediately reporting to the employer, directly or through the employee's supervisor, symptoms or signs of heat illness in themselves, or in co-workers.
- The employer's procedures for responding to symptoms of possible heat illness, including how emergency medical services will be provided should they become necessary;
- Procedures for contacting emergency medical services, and if necessary, for transporting employees to a point where they can be reached by an emergency medical service provider;
- How to provide clear and precise directions to the worksite.

#### 3.0 Supervisor Responsibilities

- All supervisors will be provided a copy of this program and training documents prior to assignment of employees working in environments where heat exposures may occur.
- Supervisors will be provided the procedures to follow to implement the applicable provisions of this program.
- Supervisors will be provided the procedures to follow when an employee exhibits symptoms consistent with possible heat illness, including emergency response procedures.

#### 4.0 Provision of Water

Employees shall have access to potable water. Water shall be provided in sufficient quantity at the beginning of the work shift to provide one quart per employee per hour for drinking the entire shift for a total of 2 gallons per employee per 8-hour shift. Employees may begin the shift with smaller quantities of water if effective procedures for replenishment of water during the shift have been implemented to provide employees one quart or more per hour.

## 5.0 Access to Shade

Employees suffering from heat illness or believing a preventative recovery period is needed shall be provided access to an area with shade that is either open to the air or provided with ventilation or cooling for a period of no less than five minutes. Such access to shade shall be permitted at all times. Shade areas can include trees, buildings, canopies, lean-tos, or other partial and/or temporary structures that are either ventilated or open to air movement. The interior of cars or trucks are not considered shade unless the vehicles are air conditioned or kept from heating up in the sun in some other way.

## 6.0 Heat Stress Disorders

### 6.1 Heat Rash (Prickly Heat)

Symptoms:

- Red blotches and extreme itchiness in areas persistently damp with sweat.
- Prickling sensation on the skin when sweating occurs.

Treatment:

- Cool environment.
- Cool shower.
- Thorough drying.

Heat rashes typically disappear in a few days after exposure. If the skin is not cleaned frequently enough the rash may become infected.

### 6.2 Heat Cramps

Symptoms:

- Loss of salt through excessive sweating.
- Cramping in back, legs and arms.

Treatment:

- Stretch and massage muscles.
- Replace salt by drinking commercially available carbohydrate/electrolyte replacement fluids.

### 6.3 Heat Exhaustion

Heat exhaustion occurs when the body can no longer keep blood flowing to supply vital organs and at the same time send blood to the skin to reduce body temperature.

Symptoms:

- Weakness.
- Difficulty continuing work.
- Headache.
- Breathlessness.
- Nausea or vomiting.
- Feeling faint or actually fainting.

Treatment:

- Call 911.

Help the victim to cool off by:

- Resting in a cool place.
- Drinking cool water.
- Removing unnecessary clothing.
- Loosening clothing.
- Showering or sponging with cool water.

It takes 30 minutes to cool the body down once a worker becomes overheated and suffers heat exhaustion.

## 6.4 Heat Stroke

Heat stroke occurs when the body can no longer cool itself and body temperature rises to critical levels.

Symptoms:

- Confusion.
- Irrational behavior.
- Loss of consciousness.
- Convulsions.
- Lack of sweating.
- Hot, dry skin.
- Abnormally high body temperature.

Treatment:

- Call 911.

Provide immediate, aggressive, general cooling.

- Immerse victim in tub of cool water or;
- Place in cool shower; or
- Spray with cool water from a hose; or
- Wrap victim in cool, wet sheets and fan rapidly.
- Transport victim to hospital.

Do not give anything by mouth to an unconscious victim.

## 7.0 Safe Work Procedures

### 7.1 Supervisors Responsibilities

Supervisors are responsible for performing the following:

- Give workers frequent breaks in a cool area away from heat.
- Adjust work practices as necessary when workers complain of heat stress.
- Oversee heat stress training and acclimatization for new workers and for workers who have been off the job for a period of time.
- Monitor the workplace to determine when hot conditions arise.
- Increase air movement by using fans where possible.
- Provide potable water in required quantities.

- Determine whether workers are drinking enough water.
- Make allowances for workers who must wear personal protective clothing (welders, etc.) and equipment that retains heat and restricts the evaporation of sweat.
- Schedule hot jobs for the cooler part of the day; schedule routine maintenance and repair work in hot areas for the cooler times of the day.
- Make available to all workers, cooling devices (hard hat liners/bibs/neck bands) to help rid bodies of excessive heat.

## 7.2 Workers

Workers are responsible for performing the following:

- Follow instructions and training for controlling heat stress.
- Be alert to symptoms in yourself and others.
- Determine if any prescription medications you're required to take can increase heat stress.
- Wear light, loose-fitting clothing that permits the evaporation of sweat.
- Wear light colored garments that absorb less heat from the sun.
- Drink small amounts of water – approximately 1 cup every 15 minutes.
- Avoid beverages such as tea or coffee.
- Avoid eating hot, heavy meals.
- Do not take salt tablets unless prescribed by a physician.
- Review Attachment 1 for additional information.

## 8.0 Program Review

The Safety Director will periodically review this program for compliance with all applicable regulatory standards. Updates will be provided to all employees.

### Attachment 1 to Example Heat Stress Prevention Program – Heat Illness Prevention Guidance for Workers

Awareness of heat illness symptoms can save your like or the life of a co-worker. The following provides valuable information concerning heat-related illnesses and preventative measures.

- If you are coming back to work from an illness or an extended break or you are just starting a job working in the heat, it is important to be aware that you are more vulnerable to heat stress until your body has time to adjust. Let your employer know you are not used to the heat. It takes about 5-7 days for your body to adjust.
- Drinking plenty of water frequently is vital for workers exposed to the heat. An individual may produce as much as 2 to 3 gallons of sweat per day. In order to replenish that fluid, you should drink 3 to 4 cups of water every hour starting at the beginning of your shift.
- Taking your breaks in a cool shaded area and allowing time for recovery from the heat during the day are effective ways to avoid a heat-related illness.
- Avoid or limit the use of alcohol and caffeine during periods of extreme heat. Both dehydrate the body.

- If you or a co-worker start to feel symptoms such as nausea, dizziness, weakness or unusual fatigue, let your supervisor know and rest in a cool shaded area. If symptoms persist or worsen seek immediate medical attention.
- Whenever possible, wear clothing that provides protection from the sun but allows airflow to the body. Protect your head and shade your eyes if working outdoors.
- When working in the heat pay extra attention to your co-workers and be sure you know how to call for medical attention.

# New York State Department of Environmental Conservation Memo – Tick Bites/Lyme Disease Prevention

**New York State Department of Environmental Conservation**  
**Office of Employee Relations**  
Employee Health & Safety Unit, 10<sup>th</sup> Floor  
625 Broadway, Albany, New York 12233-5062  
Phone: (518) 402-9381 • Fax: (518) 486-9957  
Website: [www.dec.ny.gov](http://www.dec.ny.gov)



## MEMORANDUM

**TO:** All DEC Employees  
**FROM:** Mark Cadrette, Director, Office of Employee Relations  
**DATE:** May 2, 2011  
**SUBJECT:** Tick Bites/Lyme Disease Prevention

The Health and Safety Unit's on-going review of the Department's Supervisor Accident and Injury Investigation Reports and Accident Reporting System (ARS) data indicates that there continues to be a significant number of reported tick bites to DEC employees. This raises appropriate concern for these employees to be at an increased risk of contracting Lyme disease.

As a reminder, the DEC Health & Safety Unit is recommending that employees working in outdoor areas where infected deer ticks might be present follow these basic safety recommendations:

- Use an insect repellent containing DEET. Select a suitable concentration for the time you will be outdoors.

Concentration	Protection Time (Hours)
4.75%	1.5
6.65%	2
20%	4
23.8%	5

- Permethrin is another type of tick repellent. It kills ticks on contact. Permethrin should not be applied directly to the skin. Apply it outdoors and only to your clothing. Follow all label directions carefully.
- Wear light colored clothing, long sleeve shirts, long pants and a hat.
- Tuck your pant legs into your socks/boots and your shirt into your pants.
- Stay on open, well-traveled trails and avoid contact with vegetation – e.g., overgrown grass, brush and leaf litter—whenever possible.
- Examine your body and clothing for ticks at the end of the work day, paying close attention to shoes/boots, socks and lower pant legs.

Additional information may be found on the following websites:

[NYS DEC Lyme Disease web page](http://www.dec.ny.gov/acidet/dvbid/lyme/)  
<http://www.cdc.gov/ncidod/dvbid/lyme/>

If you have any questions, please feel free to contact the DEC Health & Safety Unit at (518) 402-9381 or e-mail the Health and Safety mailbox.

/s/

# New York State Department of Environmental Conservation Memo – Sun Safety

**New York State Department of Environmental Conservation**  
**Office of Employee Relations**  
Employee Health & Safety Unit, 10<sup>th</sup> Floor  
625 Broadway, Albany, New York 12233-5062  
Phone: (518) 402-9381 • Fax: (518) 486-9957  
Website: [www.dec.ny.gov](http://www.dec.ny.gov)



Transmittal Via E-Mail

## MEMORANDUM

June 1, 2011

**TO:** All DEC Employees  
**FROM:** Mark Cadrette  
**SUBJECT:** Sun Safety

With the onset of warmer weather, many employees will be returning to outdoor field duties increasing their risk of exposure to harmful ultraviolet radiation to sunlight. To ensure worker safety, the New York State Department of Labor introduced the NYS Public Employee Sun Safety Law, effective November 2006. This law requires State employers to provide sun safety information to all State employees who spend more than 5 hours per week outdoors as part of their job function.

The DEC Health & Safety Unit has compiled guidance information entitled "Sun Safety: What Outdoor-Based Employees Should Know" to assure compliance with the requirements of the Sun Safety Law. This guidance document along with other helpful sun safety information can be found on their Sun Safety webpage. Please take a moment to review the hazards associated with sun exposure and the precautions you can take to protect yourself while working outdoors.

If you have any questions, please feel free to contact the DEC Health & Safety Unit at (518) 402-9381.

/s/  
Director of Employee Relations

# New York State Department of Transportation Joint Agency Level Health and Safety Committee Statement of Purpose

## STATEMENT OF PURPOSE JOINT AGENCY LEVEL HEALTH AND SAFETY COMMITTEE NYSDOT/CSEA/PEF

### PREAMBLE

It is the policy of the Department of Transportation that all employees should have the right to work in an environment that is free from recognized hazards. DOT is committed to working with its employee labor unions to provide a safe and healthy workplace for all employees. To this end, DOT has established an agency level health and safety committee (the Committee) as detailed in the agreement.

The results of committee meetings shall not contravene any term or provision of the Collective Bargaining Agreements and cannot exceed the authority of any of the parties.

The specific activities of the committee shall be governed by Article 18 (PEF) and Article 15 (CSEA) between the aforementioned unions and the State of New York.

Accordingly, DOT, CSEA, and PEF have reached the following agreements with respect to the agency-level Health & Safety Committee process.

### COMMITTEE COMPOSITION

The joint health and safety committee shall consist of representatives selected by DOT, CSEA, and PEF. Each party shall designate one representative from each party to serve as its chair. The Co-Chairs, may invite organizational staff to attend meetings. However, outside experts may only attend upon the mutual agreement of the parties.

### COMMITTEE OBJECTIVES

The Committee's objectives include:

- Discussing issues of mutual concern and developing strategies to enhance the health and safety of employees;
- Providing support and cooperation to ensure the proper implementation of all health and safety goals and objectives, including programs, guidelines, policies and other rules and regulations.
- Recommend changes and improvements in the work environment, when necessary, to protect the health and safety of the Agency's employees.
- To promote a safe and healthy environment in all DOT work locations throughout the state.
- To reduce or eliminate whenever possible the potential for occupational injuries or illnesses through hazard identification and control measures.

- Educating employees in the recognizing and eliminating of potential hazards in the workplace and in the means of protecting their health and safety;
- To promote education efforts to increase knowledge base and skill enhancement of staff in dealing with health and safety issues and to communicate with and provide advice to local committees.
- Promote the development and enrichment of local health and safety activities.
- Function as a communication link and clearinghouse for local committees of the agency. Local issues and concerns are reviewed and evaluated as to agency-wide impact. Agency impact issues are communicated to local committees.
- To review matters referred by local committees that they are not able to resolve.

COMMITTEE MEETINGS

There will be a minimum of four quarterly meeting of the committee annually. Either party may request that additional meetings be held which shall be mutually agreed upon by the parties. Meetings will follow the after an agenda has been developed in advance.

MINUTES

Minutes will be taken at each meeting and disseminated to other committee members within thirty (30) days. Co- chairs will review, approve and sign the minutes.

SUB-COMMITTEES

The parties may jointly agree to establish other permanent or temporary health and safety committees as necessary to carry on effective and efficient discussions.

TERMS OF THIS AGREEMENT

This Agreement shall be effective upon signature and shall remain in effect until and unless it is one of the parties requests a renewal or revision.

  
 \_\_\_\_\_  
 Management Chair

2/16/11  
 \_\_\_\_\_  
 Date

Cam Panama  
 \_\_\_\_\_  
 CSEA Chair

2/16/11  
 \_\_\_\_\_  
 Date

Paul R Gendron  
 \_\_\_\_\_  
 PEF Chair

2/16/11  
 \_\_\_\_\_  
 Date

## Appendix B: Key Informant Interview Form

Date: \_\_\_\_\_

Person(s) interviewed: \_\_\_\_\_

Title and role of interviewee: \_\_\_\_\_

Interview completed by: \_\_\_\_\_

The State of Delaware's Climate-Ready Workforce pilot project aims to identify and minimize the health and safety risks faced by state employees whose duties require extended periods of outdoor exposure. These risks are expected to increase with changing climate conditions. The project will focus on the risks of exposure to high heat days and other extreme weather conditions, including flooding and storm-related hazards, as well as indirect impacts related to air quality, vector-borne disease, and water-related illness.

Our purpose in meeting with you today is to learn your thoughts, experiences, and knowledge about the existing safety and health policies and programs in your agency and the potential impact of climate change on them. Your insights will provide information that will be used to develop recommendations for improvements.

Anything you tell us is confidential. Nothing you say will be personally attributed to you in any reports that result from this interview. All reports will be written in a manner that no individual comment can be attributed to a particular person.

Your participation in this key informant interview is totally voluntary. Are you willing to answer our questions?

Do you have any questions before we begin?

1. Please tell us what you do for the agency.
2. How long have you worked for the agency?
3. What is your role in the agency safety and health policies and programs?
4. Please talk briefly about your experience with the agency safety and health policies and programs.
5. How would you rate the effectiveness of the safety and health policies and programs? Please explain.
6. How would you describe the agency management's commitment to the safety and health of agency workers?
7. How would you describe union and employee participation in the safety and health policies and programs?
8. What are some ways in which the safety and health policies and programs could be improved?
9. Has your agency briefed you on how climate change may impact the work you do? If yes, please describe.
10. What is your understanding about the impact of climate change on the work done in your agency and your specific operation?
11. What job tasks are done by agency workers that cause them to work outdoors, with potential exposure to hot or cold environments?
12. How effective are the existing policies and programs to protect agency staff who work outdoors from hot and cold environments?
13. What improvements would you recommend to the agency policies and programs to protect workers from heat stress and heat strain?

14. What improvements would you recommend to the agency policies and programs to protect workers from cold stress?
15. What types of disaster work tasks does your agency engage in that may be impacted by climate change?
16. Have you been involved in disaster response work in the past? If yes, please describe.
17. Has the agency developed and implemented training that addresses safety and health needs related to the potential work tasks of agency employees? Yes  No 
  - a. Training on donning and doffing PPE? Yes  No  N/A
  - b. Respiratory protection including fit testing, donning and doffing? Yes  No  N/A
  - c. Hazard recognition and avoidance? Yes  No  NA
  - d. Health hazards from hazardous materials such as mold, asbestos, lead, carbon monoxide, raw sewage, poisonous plants, and others that may be encountered during floods, forest fires, or other natural disasters? Yes  No  N/A
  - e. Assessment of buildings for structural integrity? Yes  No  N/A
  - f. Incident Command System? Yes  No  N/A
  - g. Ladder safety? Yes  No  N/A
  - h. Electrical hazards? Yes  No  N/A
  - i. Confined space entry? Yes  No  N/A
  - j. Debris removal? Yes  No  N/A
  - k. Traffic safety? Yes  No  N/A
  - l. Slips, trips, and falls? Yes  No  N/A
  - m. Working at heights? Yes  No  N/A
  - n. Chain saw safety? Yes  No  N/A
  - o. Heavy equipment such as forklifts, bobcats, loaders, backhoes, ATVs?  
Yes  No  N/A
  - p. Noise? Yes  No  N/A
  - q. Bloodborne pathogens? Yes  No  N/A
  - r. Vector borne diseases such as Lyme, West Nile virus, histoplasmosis?  
Yes  No  N/A
  - s. Resiliency from stress and exposure to trauma? Yes  No  N/A
  - t. Self-care such as hydration, healthy eating, sleeping, social interaction, and rest?  
Yes  No  N/A

## Appendix C: Worker Survey Form

The State of Delaware's Climate-Ready Workforce pilot project aims to identify and minimize the occupational health and safety risks faced by state employees whose job duties require extended periods of outdoor exposure. Delaware is vulnerable to extreme weather events and the risks that they pose. The project will focus on the risks of exposure to high heat days and other extreme weather conditions, including flooding and storm-related hazards, as well as indirect impacts related to air quality, vector-borne diseases, and water-related illnesses.

The purpose of this survey is to get your input on your agency's existing health and safety policies and procedures, especially those that relate specifically to extreme weather conditions. Your insights will provide information that will be used to develop recommendations for improvements. The survey is intended to take about 10-15 minutes to complete, and all answers will remain anonymous. Thank you for your participation.

- 1) What agency do you work for? \_\_\_\_\_
- 2) What is your division? (optional) \_\_\_\_\_
- 3) How would you describe the environment in which you spend the majority of your work day? Please select one.
  - a. Outdoors – urban or paved work sites
  - b. Outdoors – rural or park work sites
  - c. Vehicle
  - d. Facility that is not fully protected from weather conditions (such as toll booth, storage building or garage)
  - e. Office
  - f. Other:\_\_\_\_\_ (respondent required to fill out if chooses this option)
- 4) Health and safety policies and procedures include actions taken to protect staff working outdoors from the effects of heat, cold, and extreme weather conditions. Overall, how would you rate your agency's health and safety policies and procedures on a scale of 1 to 4? 4 = excellent, 3 = average, 2 = poor, 1 = nonexistent
- 5) How would you rate each of the following components of your agency's health and safety policies and procedures on a scale of 1 to 4? 4 = excellent, 3 = average, 2 = poor, 1 = nonexistent, N/A = Not Applicable
  - Agency management leadership
  - Supervisor's leadership
  - Employee involvement (e.g., in goal setting, hazard identification and reporting, incident investigation, progress tracking)
  - Hazard identification and assessment within the agency
  - Hazard prevention and control
  - Education and training
  - Evaluation of policies and procedures (i.e., ensuring policies and procedures are being used and evaluated for improvements needed)
  - Communication and coordination for employers, contractors, and staffing agencies (e.g., employers, contractors, and staffing agencies communicate hazards and provide the same level of safety/health protection to employees)

- 6) Have you been informed about your agency's health and safety policies and procedures? Yes or No
- 7) Have you been informed about your agency's health and safety policies and procedures in relation to extreme heat? Yes or No
- 8) Have you been informed about your agency's health and safety policies and procedures in relation to extreme cold? Yes or No
- 9) Have you been informed about your agency's health and safety policies and procedures in relation to other extreme weather conditions? Yes or No
- 10) Who informed you about your agency's health and safety policies and procedures? Please select all that apply.
- a. Agency management
  - b. Direct supervisor
  - c. Union official
  - d. Training personnel
  - e. Coworker
  - f. Other:\_\_\_\_\_ (respondent required to fill out if chooses this option)
- 11) How were you informed about your agency's health and safety policies and procedures? Please select all that apply.
- a. In person
  - b. Email
  - c. Written document
  - d. Other:\_\_\_\_\_ (respondent required to fill out if chooses this option)
- 12) How frequently would you like to be informed about your agency's health and safety policies and procedures? Please select one.
- a. Once every 6 months
  - b. Once every year
  - c. Once every 2 years
  - d. Other:\_\_\_\_\_ (respondent required to fill out if chooses this option)
- 13) Are you notified when weather conditions require precautionary actions in relation to extreme heat? (e.g., under extreme heat conditions, drinking water, wearing a hat to protect oneself from the sun, guidelines regarding work and rest intervals to prevent overheating)? Yes or No
- 14) Are you notified when weather conditions require precautionary actions in relation to extreme cold? Yes or No
- 15) Are you notified when weather conditions require precautionary actions in relation to other extreme weather conditions? Yes or No
- 16) Who informs you when weather conditions require precautionary actions? Please select all that apply.
- a. Agency management
  - b. Direct supervisor
  - c. Union official
  - d. Coworker
  - e. Training
  - f. Other:\_\_\_\_\_ (respondent required to fill out if chooses this option)

- 17) How are you informed when weather conditions require precautionary actions? Please select all that apply.
- a. In person
  - b. Email
  - c. Written document
  - d. Other:\_\_\_\_\_ (respondent required to fill out if chooses this option)
- 18) What types of weather conditions are of greatest concern for your work? Select all that apply.
- a. Extreme heat
  - b. Extreme cold
  - c. Floods
  - d. Severe storms
  - e. Strong winds
  - f. Other:\_\_\_\_\_ (respondent required to fill out if chooses this option)
- 19) Which of the following steps are most important for improving protection from weather conditions (such as extreme heat, extreme cold, floods, and severe storms) on the job? Select all that apply.
- a. Policies and procedures that clearly articulate roles, responsibilities and required protective actions
  - b. Ensuring that employees know where to find relevant policies, procedures and other information
  - c. Better or more in-person training
  - d. Better or more virtual training
  - e. Early warning to take action in response to extreme conditions
  - f. More or better protective equipment
  - g. More information about handling trauma and stress from work in extreme weather conditions, and advice on ways to reduce these impacts
  - h. Other suggestions on how to improve worker protection from climate related hazards in your agency:
- \_\_\_\_\_ (respondent required to fill out if chooses this option)
- 20) Do you have any other suggestions on how to improve worker protection from extreme weather conditions in your agency? (optional)
- 21) If you have additional comments regarding your agency's health and safety policies and procedures, please share them here. (optional)

Thank you for completing this survey.

## Appendix D: All Agency Responses to Survey Questions

Total Responses: 792

Date Created: February 8, 2017

Completed Responses 692

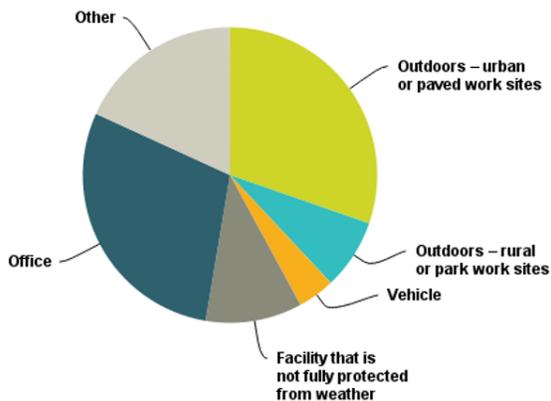
Q1: What agency do you work for? (Answered: 792, Skipped: 0)

Answer Choices	Responses	
DelDOT	<b>65.20%</b>	517
DHSS	<b>20.18%</b>	160
DNREC	<b>6.81%</b>	54
DSHS	<b>1.26%</b>	10
OMB	<b>6.05%</b>	48
Other	<b>0.5%</b>	4
<b>Total</b>		<b>793</b>

Q2: What is your Division? (Answered: 739, Skipped: 53)

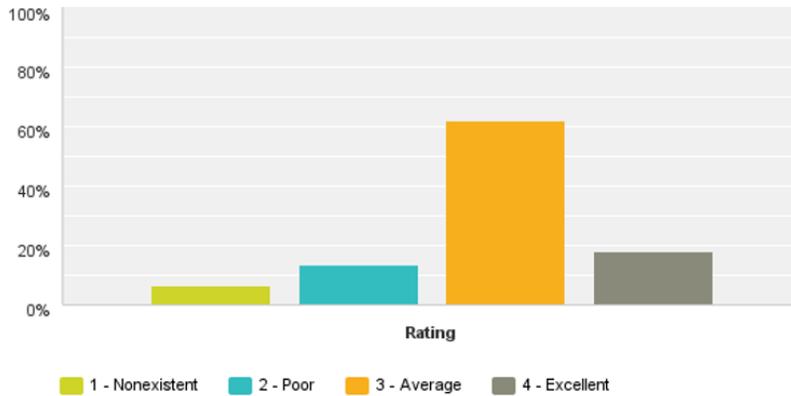
Open Answer

Q3: How would you describe the environment in which you spend the majority of your work day? Please select one. (Answered: 792, Skipped: 0)



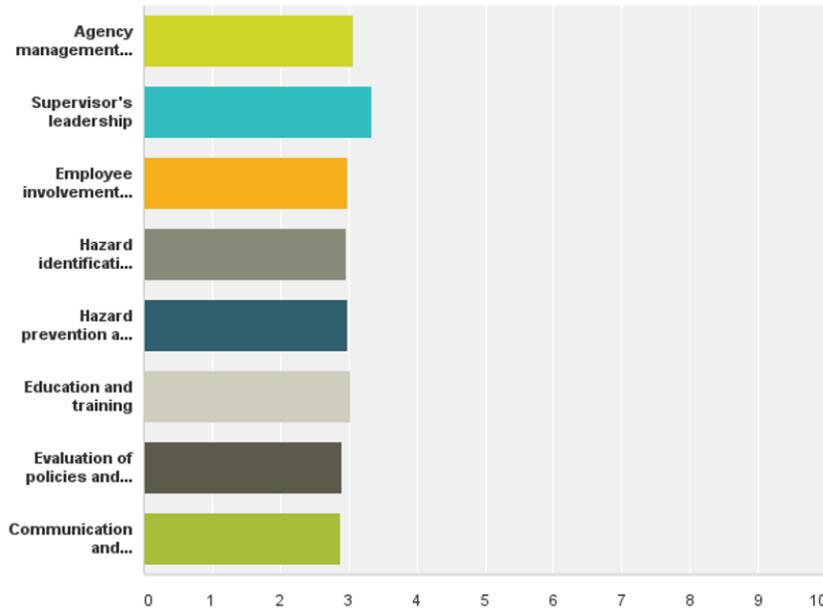
Answer Choices	Responses	
Outdoors – urban or paved work sites	<b>30.30%</b>	240
Outdoors – rural or park work sites	<b>7.70%</b>	61
Vehicle	<b>4.04%</b>	32
Facility that is not fully protected from weather conditions	<b>10.61%</b>	84
Office	<b>29.17%</b>	231
Other	<b>18.18%</b>	144
<b>Total</b>		<b>792</b>

Q4: Health and safety policies and procedures include actions taken to protect staff working outdoors from the effects of heat, cold, and extreme weather conditions. Overall, how would you rate your agency's health and safety policies and procedures on a scale of 1 to 4? (Answered: 740, Skipped: 52)



	1 - Nonexistent	2 - Poor	3 - Average	4 - Excellent	Total	Weighted Average
Rating	6.35%	13.65%	61.76%	18.24%	740	2.92
	47	101	457	135		

Q5: How would you rate each of the following components of your agency's health and safety policies and procedures on a scale of 1 to 4? (Answered: 740, Skipped: 52)



	<b>1 Nonexistent</b>	<b>2 Poor</b>	<b>3 Average</b>	<b>4 Excellent</b>	<b>N/A</b>	<b>Total</b>	<b>Weighted Average</b>
Agency management leadership	<b>4.36%</b> 32	<b>10.49%</b> 77	<b>56.27%</b> 413	<b>25.75%</b> 189	<b>3.13%</b> 23	734	3.07
Supervisor's leadership	<b>3.41%</b> 25	<b>6.81%</b> 50	<b>41.55%</b> 305	<b>45.64%</b> 335	<b>2.59%</b> 19	734	3.33
Employee involvement (e.g., in goal setting, hazard identification and reporting, incident investigation, progress tracking)	<b>6.39%</b> 47	<b>11.16%</b> 82	<b>56.87%</b> 418	<b>22.45%</b> 165	<b>3.13%</b> 23	735	2.98
Hazard identification and assessment within the agency	<b>6.22%</b> 46	<b>12.31%</b> 91	<b>56.16%</b> 415	<b>21.92%</b> 162	<b>3.38%</b> 25	739	2.97
Hazard prevention and control	<b>5.16%</b> 38	<b>13.16%</b> 97	<b>54.95%</b> 405	<b>22.93%</b> 169	<b>3.80%</b> 28	737	2.99
Education and training	<b>5.71%</b> 42	<b>12.52%</b> 92	<b>52.52%</b> 386	<b>26.67%</b> 196	<b>2.59%</b> 19	735	3.03
Evaluation of policies and procedures (i.e., ensuring policies and procedures are being used and evaluated for improvements needed)	<b>6.11%</b> 45	<b>15.76%</b> 116	<b>55.16%</b> 406	<b>19.29%</b> 142	<b>3.67%</b> 27	736	2.91
Communication and coordination for employers, contractors, and staffing agencies (e.g., employers, contractors, and staffing agencies communicate hazards and provide the same level of safety/health protection to employees)	<b>6.38%</b> 47	<b>18.05%</b> 133	<b>50.20%</b> 370	<b>20.62%</b> 152	<b>4.75%</b> 35	737	2.89

Q6: Have you been informed about your agency's health and safety policies and procedures? (Answered: 714, Skipped: 78)

<b>Answer Choices</b>	<b>Responses</b>	
Yes	<b>73.81%</b>	527
No	<b>26.19%</b>	187
<b>Total</b>		<b>714</b>

Q7: Have you been informed about your agency's health and safety policies and procedures in relation to extreme heat? (Answered: 714, Skipped: 78)

Answer Choices	Responses
Yes	58.12% 415
No	41.88% 299
<b>Total</b>	<b>714</b>

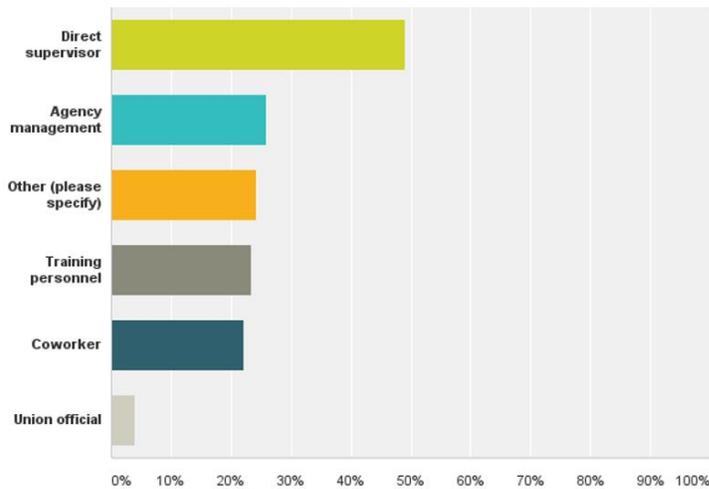
Q8: Have you been informed about your agency's health and safety policies and procedures in relation to extreme cold? (Answered: 714, Skipped: 78)

Answer Choices	Responses
Yes	58.96% 421
No	41.04% 293
<b>Total</b>	<b>714</b>

Q9: Have you been informed about your agency's health and safety policies and procedures in relation to other extreme weather conditions? (Answered: 714, Skipped: 78)

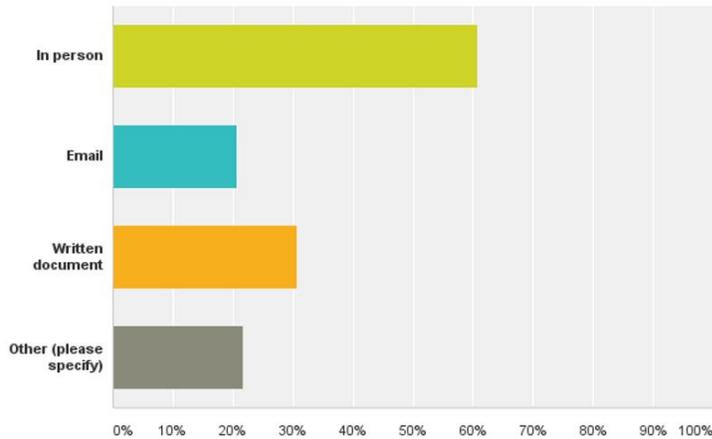
Answer Choices	Responses
Yes	61.06% 436
No	38.94% 278
<b>Total</b>	<b>714</b>

Q10: Who informed you about your agency's health and safety policies and procedures? Please select all that apply. (Answered: 714, Skipped: 78)



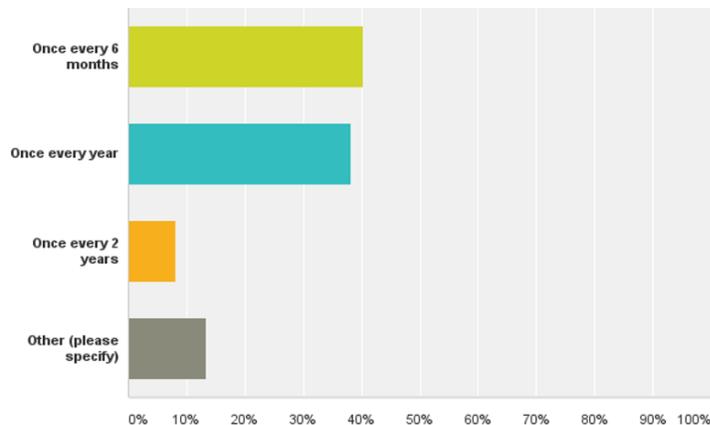
Answer Choices	Responses
Direct supervisor	49.02% 350
Agency management	25.91% 185
Other (please specify)	24.23% 173
Training personnel	23.39% 167
Coworker	22.13% 158
Union official	4.06% 29
<b>Total Respondents: 714</b>	

Q11: How were you informed about your agency's health and safety policies and procedures? Please select all that apply. (Answered 714, Skipped: 78)



Answer Choices	Responses
In person	60.78% 434
Email	20.73% 148
Written document	30.67% 219
Other (please specify)	21.71% 155
<b>Total Respondents: 714</b>	

Q12: How frequently would you like to be informed about your agency's health and safety policies and procedures? Please select one. (Answered: 714, Skipped: 78)



Answer Choices	Responses
Once every 6 months	40.34% 288
Once every year	38.24% 273
Once every 2 years	8.12% 58
Other (please specify)	13.31% 95
<b>Total</b>	<b>714</b>

Q13: Are you notified when weather conditions require precautionary actions in relation to extreme heat (e.g., under extreme heat conditions, drinking water, wearing a hat to protect oneself from the sun, guidelines regarding work and rest intervals to prevent overheating)? (Answered: 706, Skipped: 86)

Answer Choices	Responses
Yes	66.86% 472
No	33.14% 234
<b>Total</b>	<b>706</b>

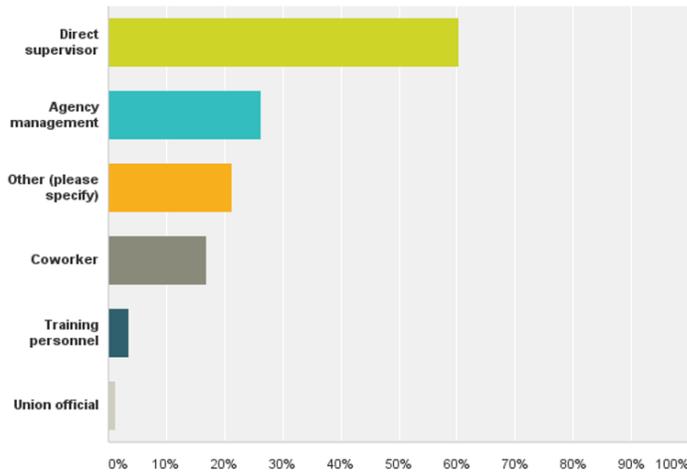
Q14: Are you notified when weather conditions require precautionary actions in relation to extreme cold? (Answered 706, Skipped: 86)

Answer Choices	Responses
Yes	65.58% 463
No	34.42% 243
<b>Total</b>	<b>706</b>

Q15: Are you notified when weather conditions require precautionary actions in relation to other extreme weather conditions? (Answered 706, Skipped: 86)

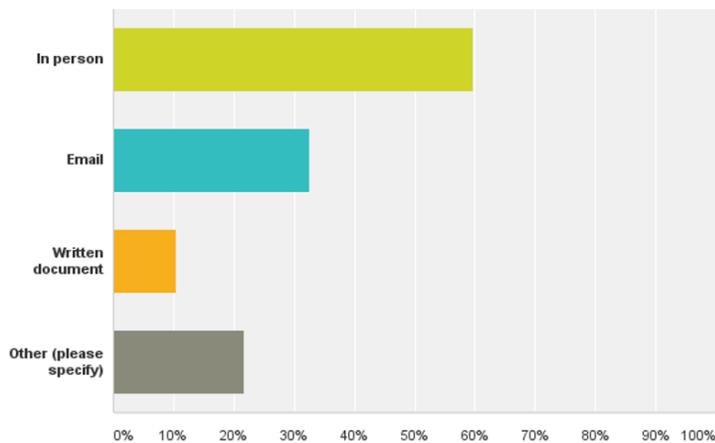
Answer Choices	Responses	
Yes	70.68%	499
No	29.32%	207
<b>Total</b>		<b>706</b>

Q16: Who informs you when weather conditions require precautionary actions? Please select all that apply. (Answered: 706, Skipped: 86)



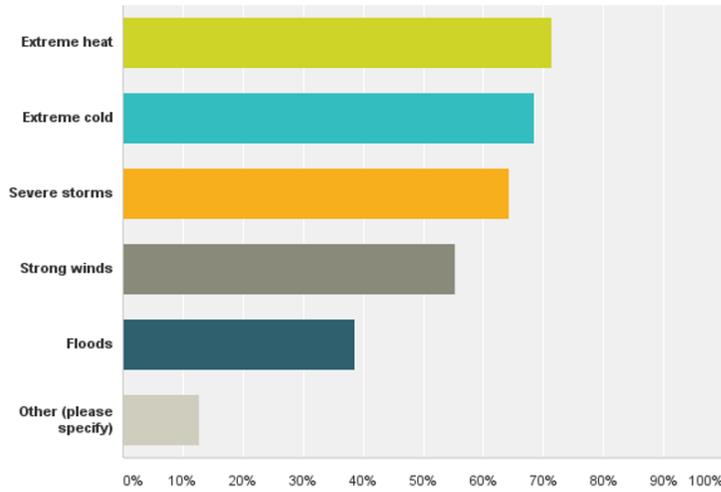
Answer Choices	Responses	
Direct supervisor	60.34%	426
Agency management	26.35%	186
Other (please specify)	21.25%	150
Coworker	17.00%	120
Training personnel	3.54%	25
Union official	1.27%	9
<b>Total Respondents: 706</b>		

Q17: How are you informed when weather conditions require precautionary actions? Please select all that apply. (Answered: 706, Skipped: 86)



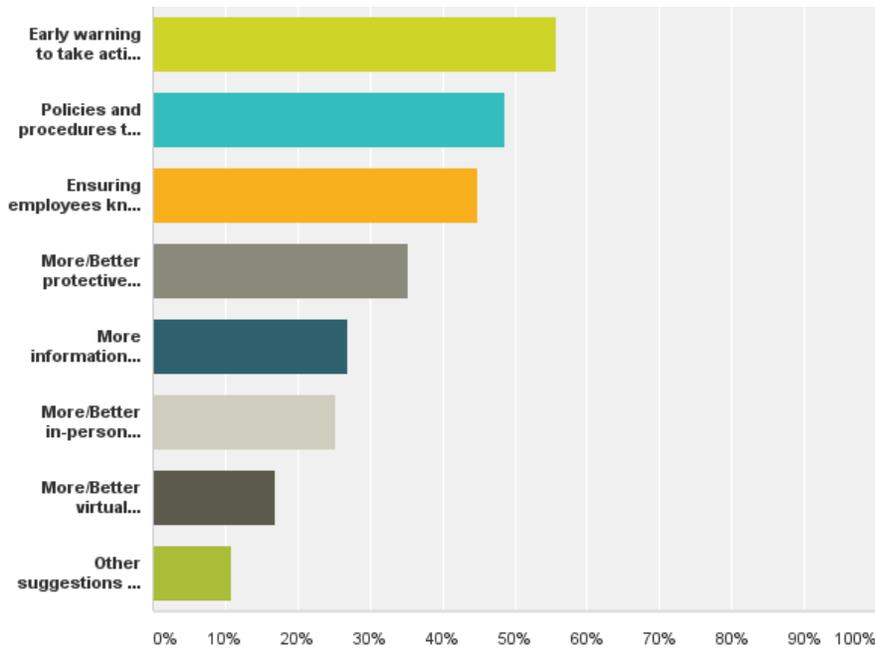
Answer Choices	Responses	
In person	59.63%	421
Email	32.58%	230
Written document	10.34%	73
Other (please specify)	21.67%	153
<b>Total Respondents: 706</b>		

Q18: What types of weather conditions are of greatest concern for your work? Select all that apply.  
 (Answered: 698, Skipped: 94)



Answer Choices	Responses
Extreme heat	71.35% 498
Extreme cold	68.48% 478
Severe storms	64.33% 449
Strong winds	55.30% 386
Floods	38.68% 270
Other (please specify)	12.75% 89
<b>Total Respondents: 698</b>	

Q19: Which of the following steps are most important for improving protection from weather conditions (such as extreme heat, extreme cold, floods, and severe storms) on the job? Select all that apply.  
 (Answered: 698, Skipped: 94)



<b>Answer Choices</b>	<b>Responses</b>
Early warning to take action in response to extreme conditions	<b>55.73%</b> 389
Policies and procedures that clearly articulate roles, responsibilities and required protective actions	<b>48.71%</b> 340
Ensuring employees know where to find relevant policies, procedures and other information	<b>44.84%</b> 313
More/Better protective equipment	<b>35.24%</b> 246
More information about handling trauma and stress from work in extreme weather conditions, and advice on ways to reduce these impacts	<b>26.93%</b> 188
More/Better in-person training	<b>25.36%</b> 177
More/Better virtual training	<b>16.91%</b> 118
Other suggestions on how to improve worker protection from climate related hazards in your agency (please specify)	<b>10.89%</b> 76

Q20: Do you have any other suggestions on how to improve worker protection from extreme weather conditions climate related hazards in your agency? (optional) (Answered: 181, Skipped: 611)

Open Answer

Q21: If you have additional comments regarding your agency's health and safety policies and procedures, please share them here. (optional) (Answered: 112, Skipped: 680)

Open Answer