



ALASKA PACIFIC
OFFICE

WESTERN STATES
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**Climate Change and Occupational
Safety and Health
Fall 2014 NIEHS WTP Workshop
October 7, 2014**

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Program

- NIOSH Overview
- Climate Change and Workers
- Occupational Health and Safety Response
- NIOSH Climate Change Initiative
- Discussion



NIOSH Mission

- To generate new knowledge in the field of occupational safety and health
- To transfer that knowledge into practice





NIOSH Activities - Research

- Surveillance/Epidemiology
- Field Studies
- Laboratory Studies
- Exposure Measurement
- Control Technology
- Protective Equipment
- Emergency Response
- Training
- Information Dissemination



Photo by Aaron Sussell



NIOSH

Web

[Images](#)

[Video](#)

[News](#)

[Maps](#)

[Gmail](#)

[Documents](#)

Google

NIOSH

Web

did you mean: [OSHA](#)?



Regulation/Enforcement

Department of Labor
(DOL)

Mine Safety
and Health
Administration
(MSHA)

Occupational
Safety and Health
Administration
(OSHA)

Research, Training, and Prevention Recommendations

Department of
Health and Human Services
(HHS)

Centers for Disease
Control and Prevention
(CDC)

National Institute for
Occupational Safety
and Health (NIOSH)



NIOSH

Approximately
1,100 staff members



Locations

Anchorage

Atlanta

Cincinnati

Denver

Morgantown

Pittsburgh

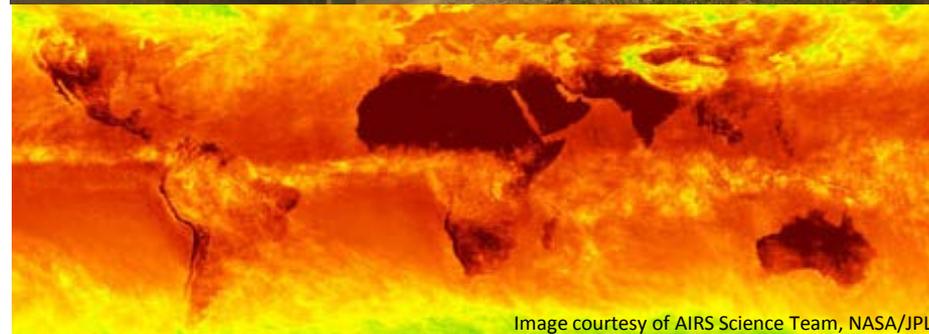
Spokane

Washington, DC



Climate Change and Workers

- Temperature Extremes
- Air Pollution
- UV Radiation
- Extreme Weather
- Wild-land Fire
- Vector-borne and other Infectious Disease
- Changes in Built Environments
- Industrial transitions

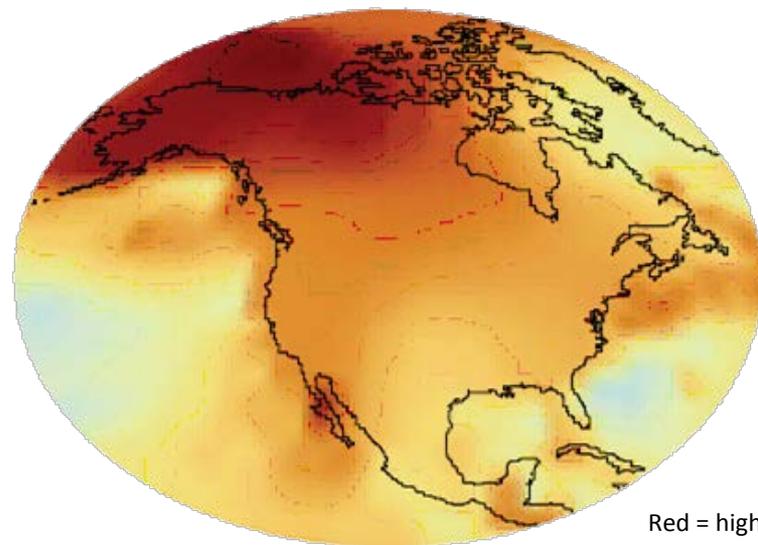




Increased Ambient Temperature

- Heat exhaustion
- stress/stroke
- Decreased chemical tolerance
- Fatigue, Impaired Judgment
- Increased risk of Injury
- Other

Rate of Global Warming



Red = higher rate

Image courtesy of the National Academy of Science and was created with data from the Goddard Institute for Space Studies.



Air Pollution

- Elevated temperature can increase levels of air pollution
 - e.g., ground level ozone, particulate matter
- Impact on both outdoor and indoor workers
- Aeroallergens and asthma
- Expanded geographic range



Photo Courtesy of USGS



Ultraviolet Radiation

- Direct effect of climate change
 - Depletion of stratospheric ozone
- Sunburn
- Skin Cancer
- Eye Damage
- Enhanced photo-toxicity
 - Combined exposures to UV and PAHs
- Number of outdoor workers at risk will increase





Extreme Weather Events



Photo courtesy of USGS

- More frequent
- Heavy precipitation, storms, floods
- Droughts
- Emergency response and clean-up workers
 - New and unanticipated hazards
 - More frequent and longer in duration
- Disruption of infrastructure
- Worker risks include traumatic injury, stress, fatigue, exposure to chemical, physical, and biological agents



Wildland Fire

- Climate change will result in increased numbers and expansion of wildland fires
 - Hot, dry and windy conditions persist are factors conducive to fires
 - Increased numbers of fire fighters will be required
- Extended fire season
 - Increased work duration
- Climate change influences fire and fire activity can influence climate.
- Occupational risks include: Heat stress, fatigue, smoke exposure, burns, injury



Satellite Image of California Wildland Fires



Vector-Borne and other Disease Hazards

- ❑ Climatic variables influence pathogen and disease patterns
- ❑ New and expanded vector ranges
 - Longer periods of vector activity
- ❑ Lyme disease, Hantavirus, West Nile Virus, Malaria, Dengue, Chikungunya



Photo Courtesy of the CDC

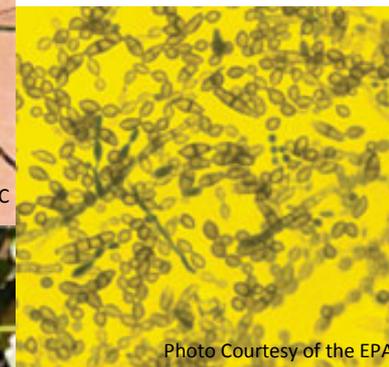


Photo Courtesy of the EPA



Photo Courtesy of USDA



- Outdoor work increases vulnerability
- Wide variety of disciplines potentially affected
- Increased pesticide use
- Valley Fever (Coccidioidomycosis)
 - Associated with dust storms, dry condition

Vector-Borne and other Disease Hazards



Culex tarsalis: Vector for West Nile Virus

Lyme Disease

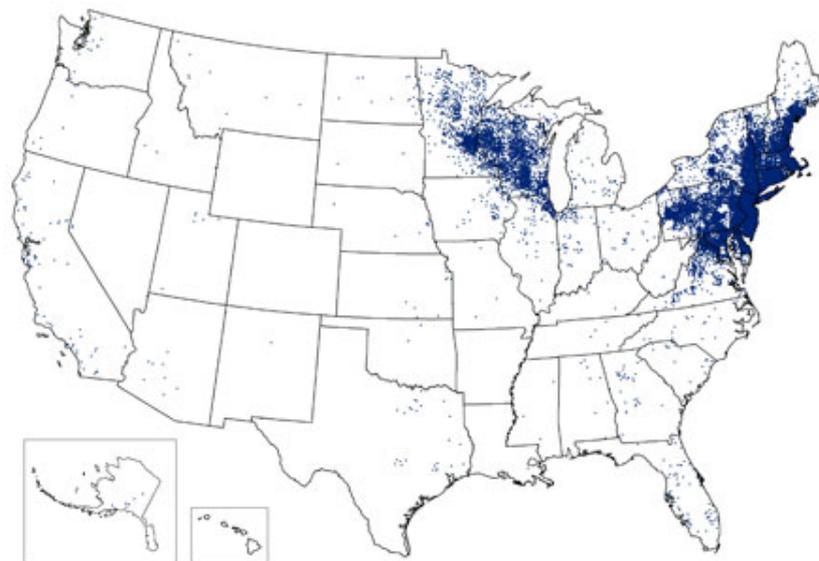
Reported Cases of Lyme Disease -- United States, 2001



1 dot placed randomly within county of residence for each reported case

Confirmed Cases in 2001 = 17,029

Reported Cases of Lyme Disease -- United States, 2011

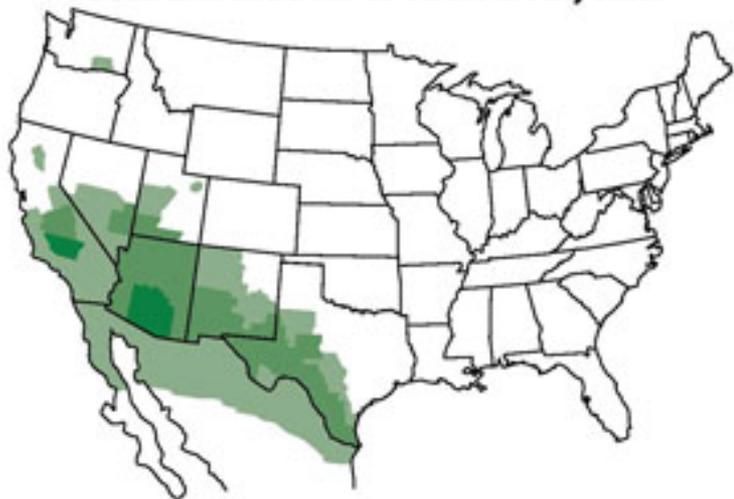


1 dot placed randomly within county of residence for each confirmed case

Confirmed Cases in 2011 = 24,364

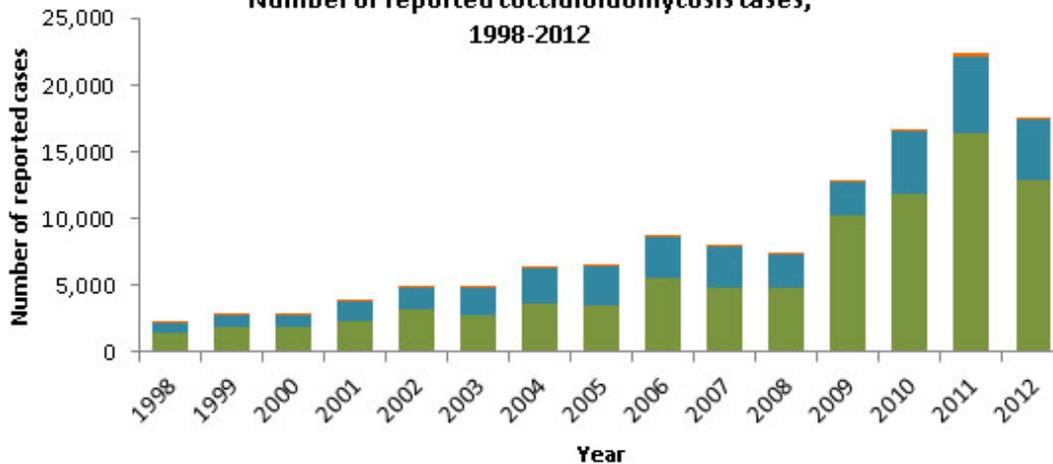
Valley Fever

Areas Endemic for Coccidioidomycosis



Highly endemic
 Established endemic
 Suspected endemic

Number of reported coccidioidomycosis cases, 1998-2012

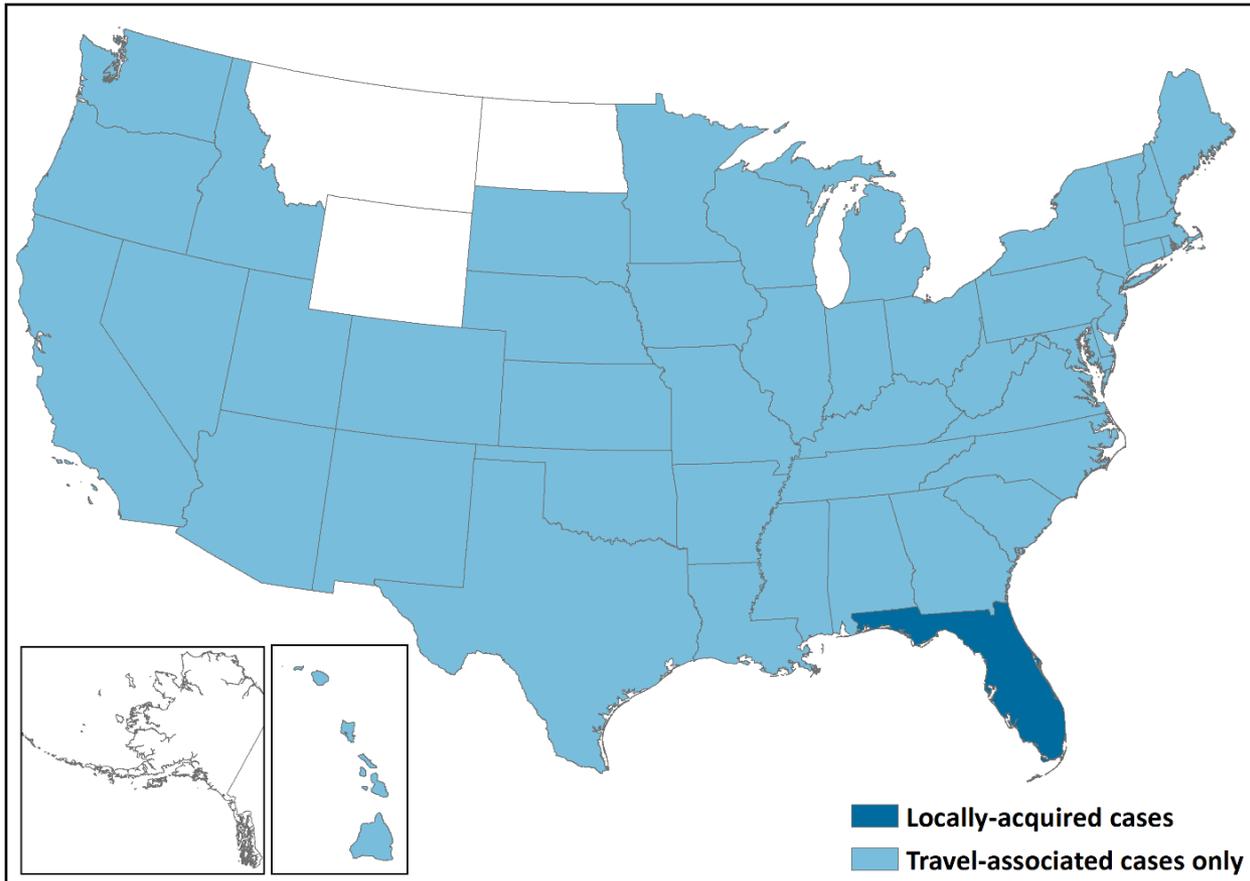


Arizona
 California
 Nevada, New Mexico, and Utah

Source: CDC, <http://www.cdc.gov/fungal/diseases/coccidioidomycosis/causes.html>



Chikungunya virus disease cases reported by state – United States, as of September 30, 2014





The New York Times

September 11, 2009

A Shortcut Across The Top of the World

The Northeast Passage, across the Arctic Ocean, provides a shorter alternative for cargo vessels travelling between Europe and Asia than using the Suez Canal. It is shorter than the Panama Canal route for some voyages between the North American west coast and Europe.

LENGTH OF A VOYAGE TO ROTTERDAM FROM:

YOKOHAMA, JAPAN
12,894 miles via Suez Canal,
8,452 miles via Northeast Passage

SHANGHAI, CHINA
12,107 miles via Suez Canal,
9,297 miles via Northeast Passage

VANCOUVER, CANADA
10,262 miles via Panama Canal,
8,038 miles via Northeast Passage



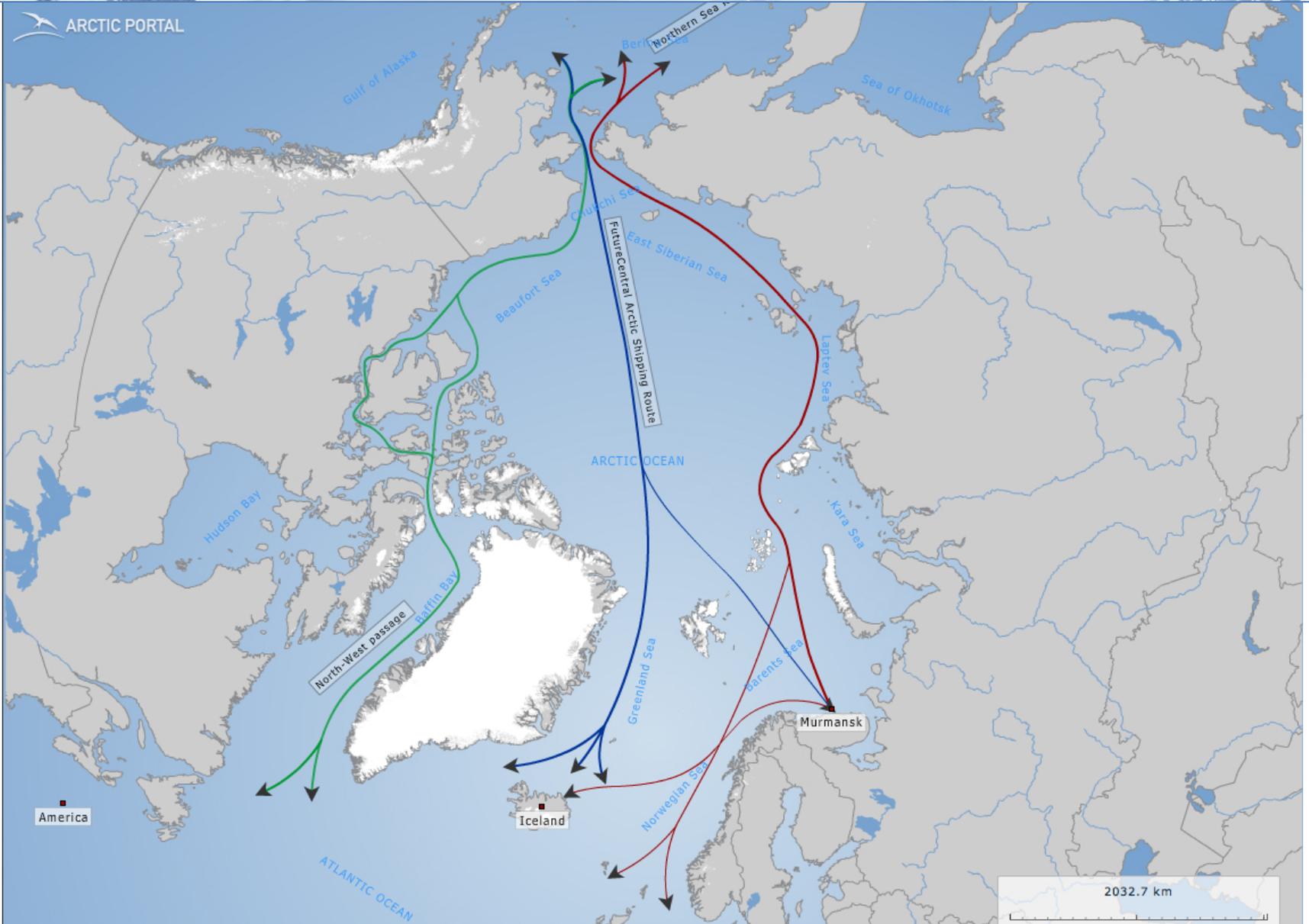
Source: The Russian Ministry of Transport

THE NEW YORK TIMES
 SIGN IN TO RECOMMEND



NIOSH

ARCTIC PORTAL





Developments in Arctic Region

- Oil & Gas Exploration
- Mining
- Shipping
- Commercial Fishing
- Tourism
- Support services – (associated)
- Emergency Response



Industrial Transitions and Emerging Industries

- Shift in industrial investments
 - New capacities and skills will be needed
- Geographical shifts
 - Agriculture
- Recycling
- Emerging industries
 - Biodiesel
 - Nuclear
 - Solar
 - Wind
 - Carbon Capture and Sequestration



Photo courtesy of USGS



Photo courtesy of USGS



Photo courtesy of USGS



Wind Towers with In-Situ Recovery Uranium wells - Wyoming





From Wyoming wind farm to Los Angeles homes

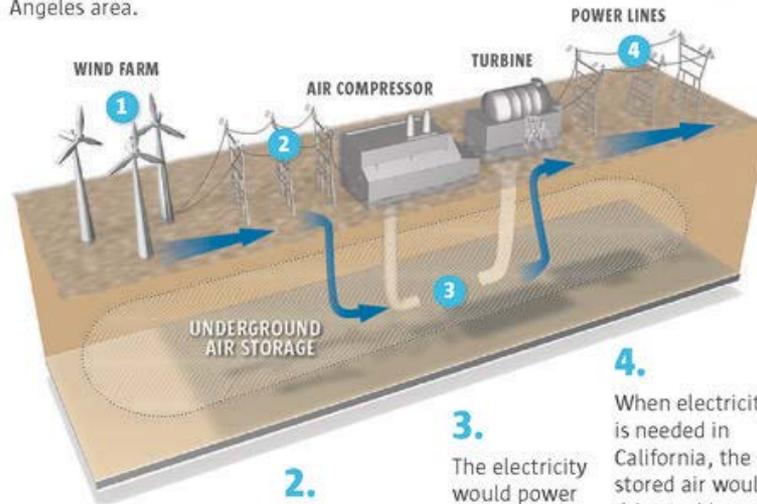
To help meet California's energy demand, four companies have jointly proposed to execute a multibillion-dollar plan for storing wind-generated energy in underground salt caverns. The energy later would be reconverted to electricity and delivered to customers in the Los Angeles area.

ENERGY STORAGE FACILITY

Delta, Utah

WIND FARM
Chugwater,
Wyo.

Customers in
Los Angeles



1.

A huge wind farm in Wyoming would generate enough electricity to power 1.2 million homes.

2.

A 525-mile electric transmission line would transport wind farm electricity to a massive energy storage facility in Utah.

3.

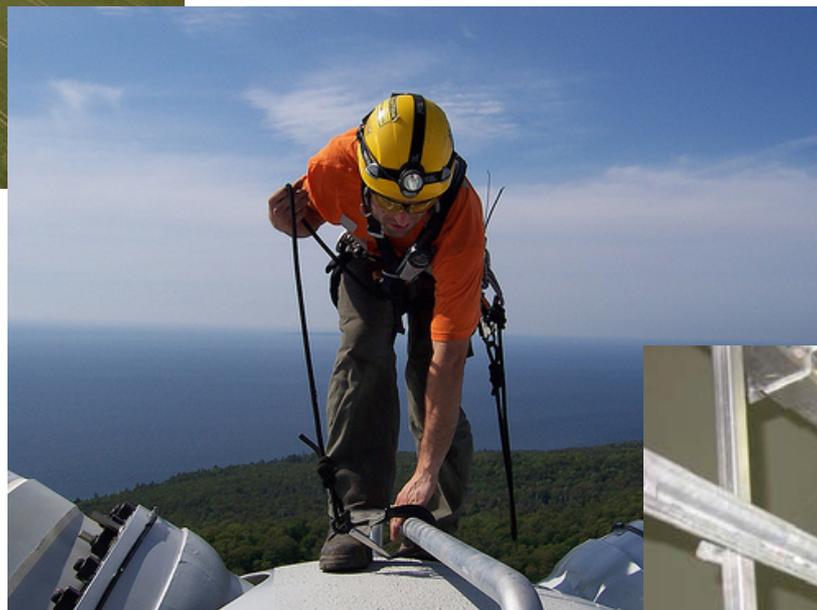
The electricity would power compressors, creating high-pressure air that would be pumped into underground salt caverns for storage.

4.

When electricity is needed in California, the stored air would drive turbines and generators, producing electricity for transport over an existing transmission line.



NIOSH





How do we eliminate hazards and minimize risks in emerging industries and technologies?





NIOSH



How do we transfer existing successful practices to these new jobs?

- Fall protection
- Crane safety
- Control of hazardous energy
- Permit-required confined space



Changes in the Built Environment – Indoor Air Quality

- Tight buildings
 - Radon
 - Mold
- Unconditioned Factories
 - Heat
- Unanticipated impacts of new building designs



ThyssenKrupp Steel USA factory in Calvert, Alabama. Photo courtesy of Reuters



NIOSH





Possible Solutions:

- Integrate sustainable construction safety and health within green design and construction practices
- Incorporate worker safety and health into LEED or alternate rating system
 - Construction, maintenance and use
- Involve energy and environmental professionals and students in design and planning (Prevention by Design; chapters in engineering books)





NIOSH Climate Change Workgroup Formation

Ensure current, emerging, and anticipated worker safety and health issues associated with climate change are appropriately identified and prioritized, and to determine the most important actions that are appropriate to address.



Photo courtesy of USGS

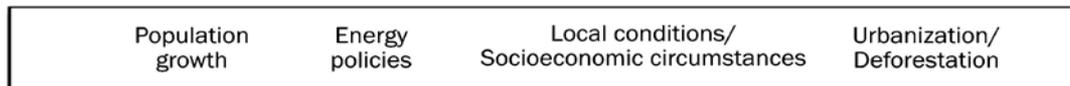


Photo courtesy of USGS



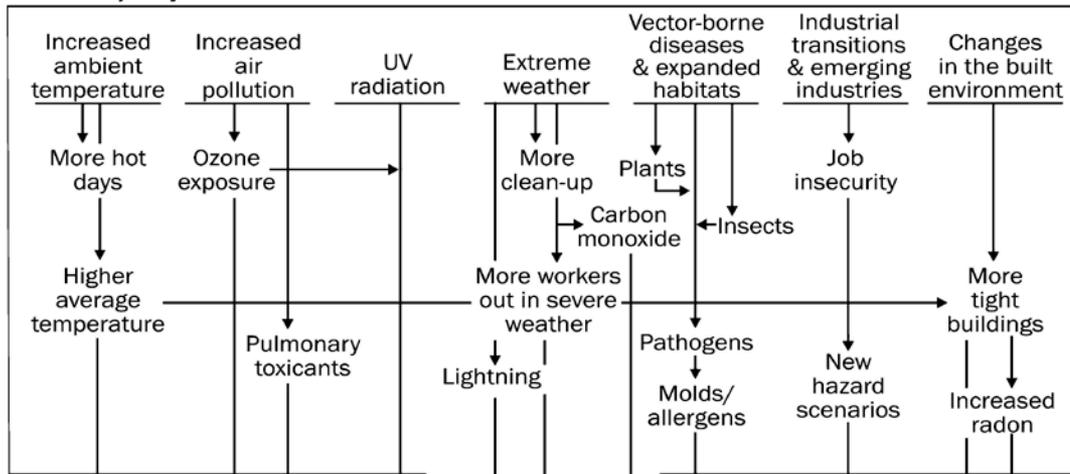
Photo courtesy of USGS

Contexts

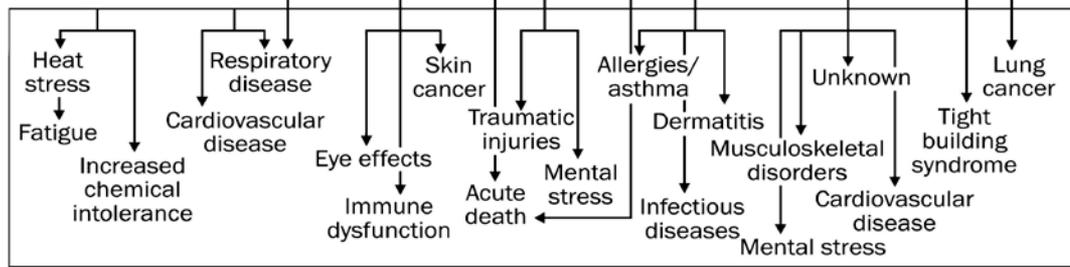


Global Climate Change

Hazards/Exposures



Occupational Health Effects



Impact on Occupational Safety and Health Research and Practice

- Conduct new research linking climate and occupational diseases
- Identify numbers of workers exposed
- Develop:
 - New hazard controls/guidance
 - Occupational Exposure Limits
 - Risk communication
 - Expanded surveillance
- Collaborate with environmental scientists/“green movement”
- Modify risk assessment methods
- Develop leading indicators of climate-potentiated health effects

FIGURE 1. Conceptual framework of the relationship between climate change and occupational safety and health



NIOSH Activities

- Climate change designated as a NIOSH Emphasis area
- Formation of NIOSH Climate Change Occupational Safety and Health (CCOSH) Work Group
 - Interdisciplinary
 - Determine occupational safety and health issues
 - Identify gaps in worker protection
 - **Develop a research agenda**



NIOSH Activities, cont.

- Other CCOSH work group goals:
 - Make recommendations for worker safety and health improvements
 - Topic Page and Blog
 - Establish and maintain a reference database
 - Develop and disseminate communication products
 - Participate on interagency initiatives to ensure occupational safety and health is included as a core component of public health



Elements of a Research Agenda

- Determine the links between climate change and occupational hazards
 - Identify, evaluate, and characterize these links
- Identify the number of workers and subpopulations affected by the direct and indirect effects of climate change
- Identify, evaluate and categorize control methods and adaptive responses to reduce or eliminate the impact of climate change on worker safety and health
 - Develop recommendations and guidance
- Develop new and risk assessment methods



Elements of a Research Agenda, cont.

- Develop and assess risk communication mechanisms and strategies
- Develop leading indicators of climate-potentiated health effects
 - Sentinel event/early warning systems
- Determine mechanisms for establishing a surveillance system
 - identify climate change safety and health injuries and illness,
 - track workers,
 - maintain records of exposure/impacts related to climate change



Identifying Workers and Facilities Likely to be Impacted by Severe Weather Events Stemming from Climate Change: a Geospatial Approach



Photo courtesy of USGS



Key Domestic Partners

- National Center for Environmental Health
- National Institute of Environmental Health Sciences
- National Oceanic and Atmospheric Administration
- Environmental Protection Agency



National Institutes
of Health





Special Report on Climate & Health



An Assessment of Observed and Projected Climate Change Impacts on Human Health in the United States

As part of the President's Climate Action Plan and ongoing efforts within the US [Global Change](#) Research Program (USGCRP), the Interagency Crosscutting Group on Climate Change and Human Health (CCHHG) and a subset of the Interagency National Climate Assessment Task Force (INCA) have initiated an interagency Special Report on the impacts of observed and projected [climate change](#) on human health in the United States. This data-driven technical synthesis and assessment will be an interagency product of the USGCRP organized by the CCHHG. The report supports the interagency efforts outlined in the USGCRP's strategic plan and will ultimately be used to inform public health authorities, other planning and policy entities, and the general public.

Report Information

The Special Report will be an evidence-based, quantitative assessment of observed and projected climate change impacts on human health in the United States. Development of the report will leverage existing activities of the CCHHG and INCA members, aggregate and assess current quantitative research on human health impacts of climate change, and summarize the current state of the science. As a technical scientific assessment, the Special Report will extend the work begun under the 2008 Synthesis and Assessment Product 4.6 (SAP 4.6) [Analyses of the Effects of Global Change on Human Health and Welfare and Human Systems](#) and the forthcoming third National Climate Assessment (NCA) by using modeling and analysis tools to quantify, where possible, projected national-scale impacts of climate change to human health. Such analyses will attempt to identify and bound impact uncertainties, as well as better define changes in attributable epidemiological risks, particularly for vulnerable populations, with the goal of informing public health authorities and other public planning and resource management entities.

Opportunities for Engagement

The period to respond to the Federal Register Notice, [Request for Public Engagement on the Interagency Special Report on the Impacts of Climate Change on Human Health in the United States](#), has closed. Thank you to all those who helped inform the Special Report by nominating contributing authors and submitting comments and scientific literature.

For general questions regarding the Special Report, please contact healthreport@usgcrp.gov. To learn about future opportunities to engage with the Special Report and to stay informed about its progress, please monitor this page, follow USGCRP on [Facebook](#) and [Twitter](#), or sign up for the USGCRP [newsletter](#).

OSH inclusion in the Interagency Climate Change and Human Health Report





Summary

- There is strong evidence that climate change is and will present OSH hazards
 - Amplification of existing hazards (prevalence, distribution, and severity)
 - Unanticipated hazards
 - interactions of known hazards and new conditions leading to new hazards and risks

- Research is needed to better characterize and understand how OSH may be associated with climate change events
 - Specific hazards, populations at risk, surveillance, sentinel events, risk assessment and management, indicators and preventive actions and options, communication

- There is much we can do using established tools and strategies

- Integrating climate change and OSH into a comprehensive adaptation planning process will yield the largest health improvements and savings



Some Questions to Consider

- What are the most important climate change and worker safety and health research questions?
- How do we ensure that climate change and worker safety and health is included as a core component of a National and State climate change action plan?
- How do we train and prepare workers to anticipate, recognize, and respond to climate change related hazards?



Discussion





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