

<https://wall-street.com/dakota-access-pipeline-fighting-environmental-rights-pipeline-sacred-native-american-land/>



DAPL: Health and Social Perspectives

Dakota Access Pipeline

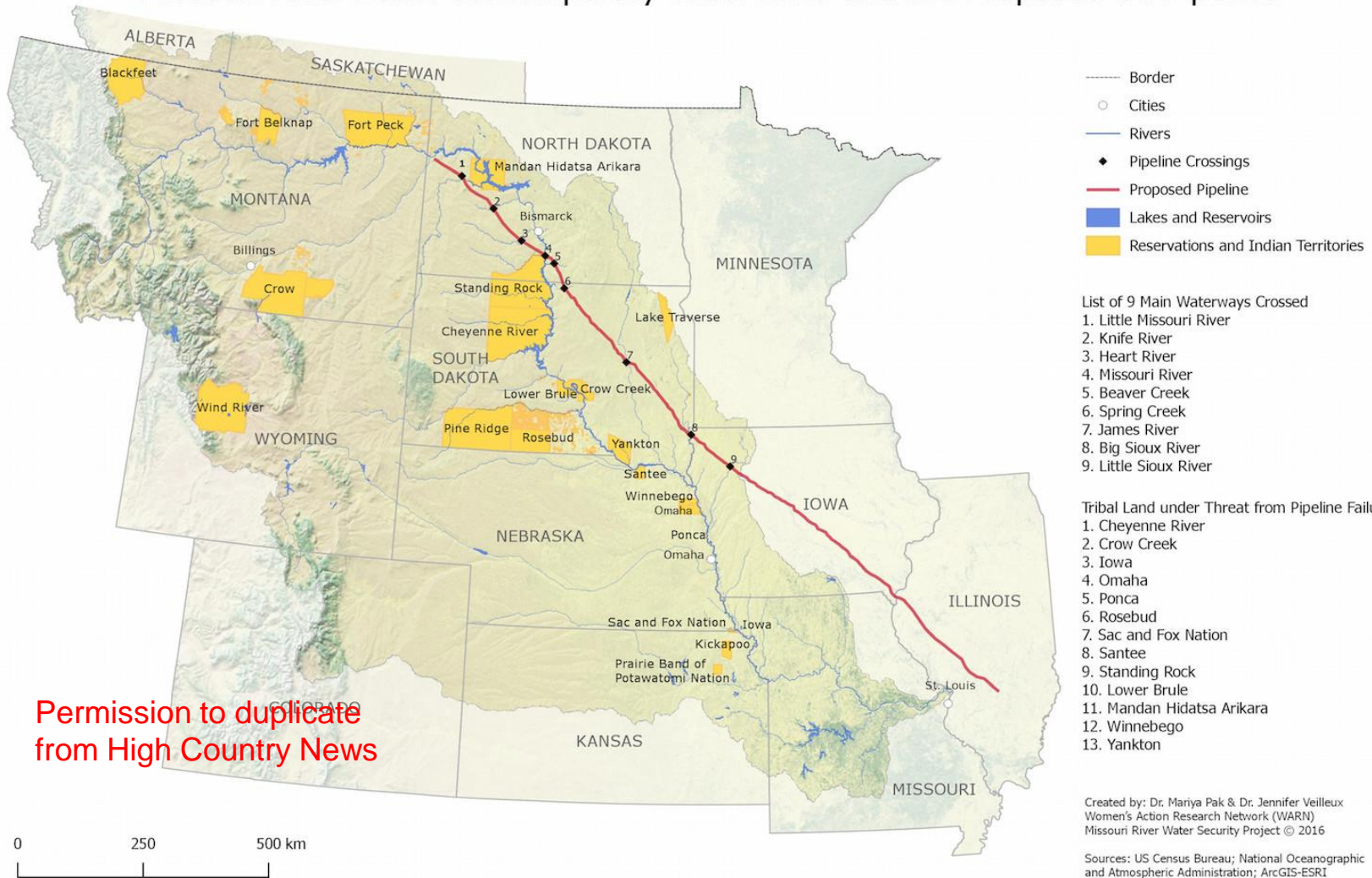
Drs. Lori and Robert Byron

Objectives

1. Discuss the risks of gas/oil pipelines.
2. Increase awareness of health issues related to fracking.
3. Discuss the beliefs and reasons behind the civil protest at Standing Rock.

This is DAPL.

Missouri River Basin Contemporary Tribal Land and the Proposed Oil Pipeline



Permission to duplicate
from High Country News

Created by: Dr. Mariya Pak & Dr. Jennifer Veilleux
Women's Action Research Network (WARN)
Missouri River Water Security Project © 2016

Sources: US Census Bureau; National Oceanographic
and Atmospheric Administration; ArcGIS-ESRI

This is DAPL.



UNCONPROT.MN.IA

This is DAPL.



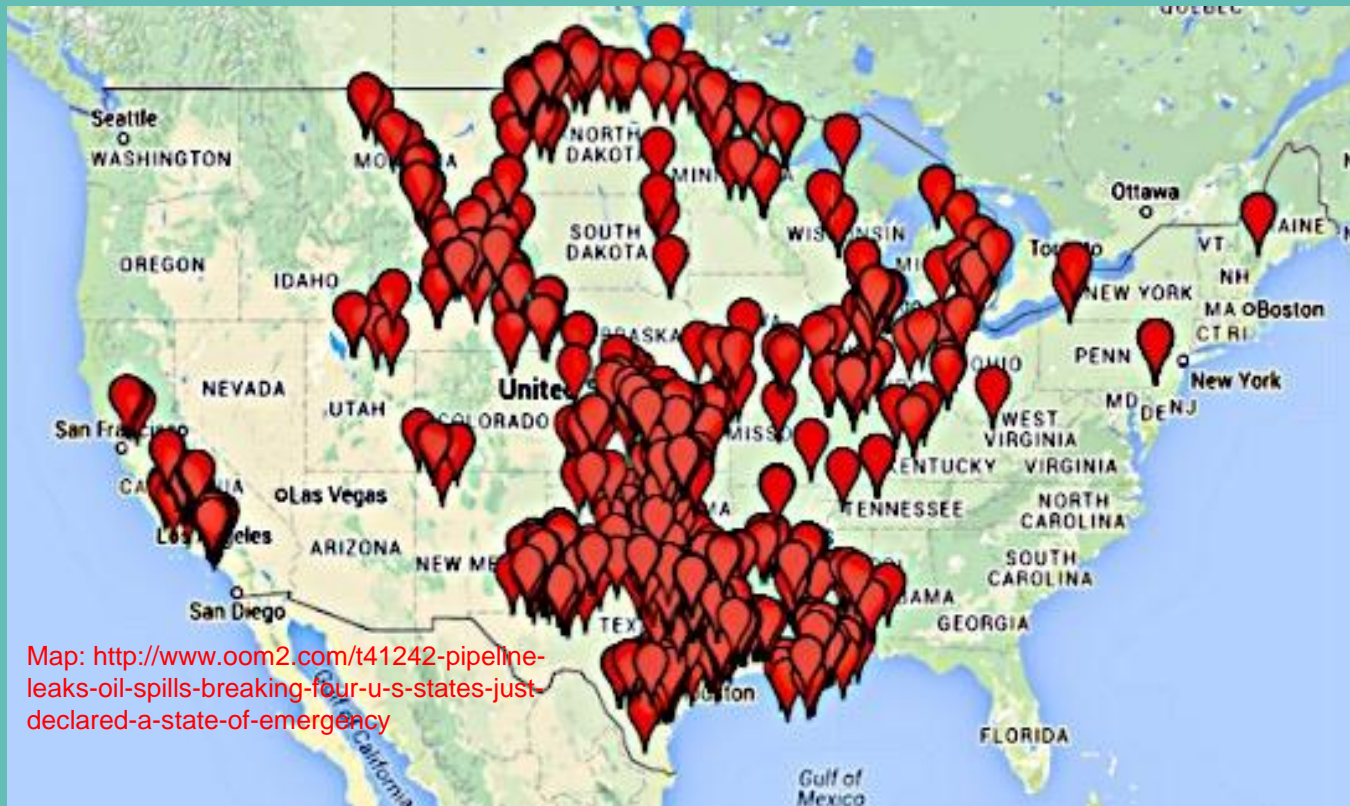
Photo: <http://portside.org/2017-02-21/construction-near-standing-rock-restarts-pipeline-fights-flare-across-us>

Pipeline Oil Spills, U.S. 1986-2016

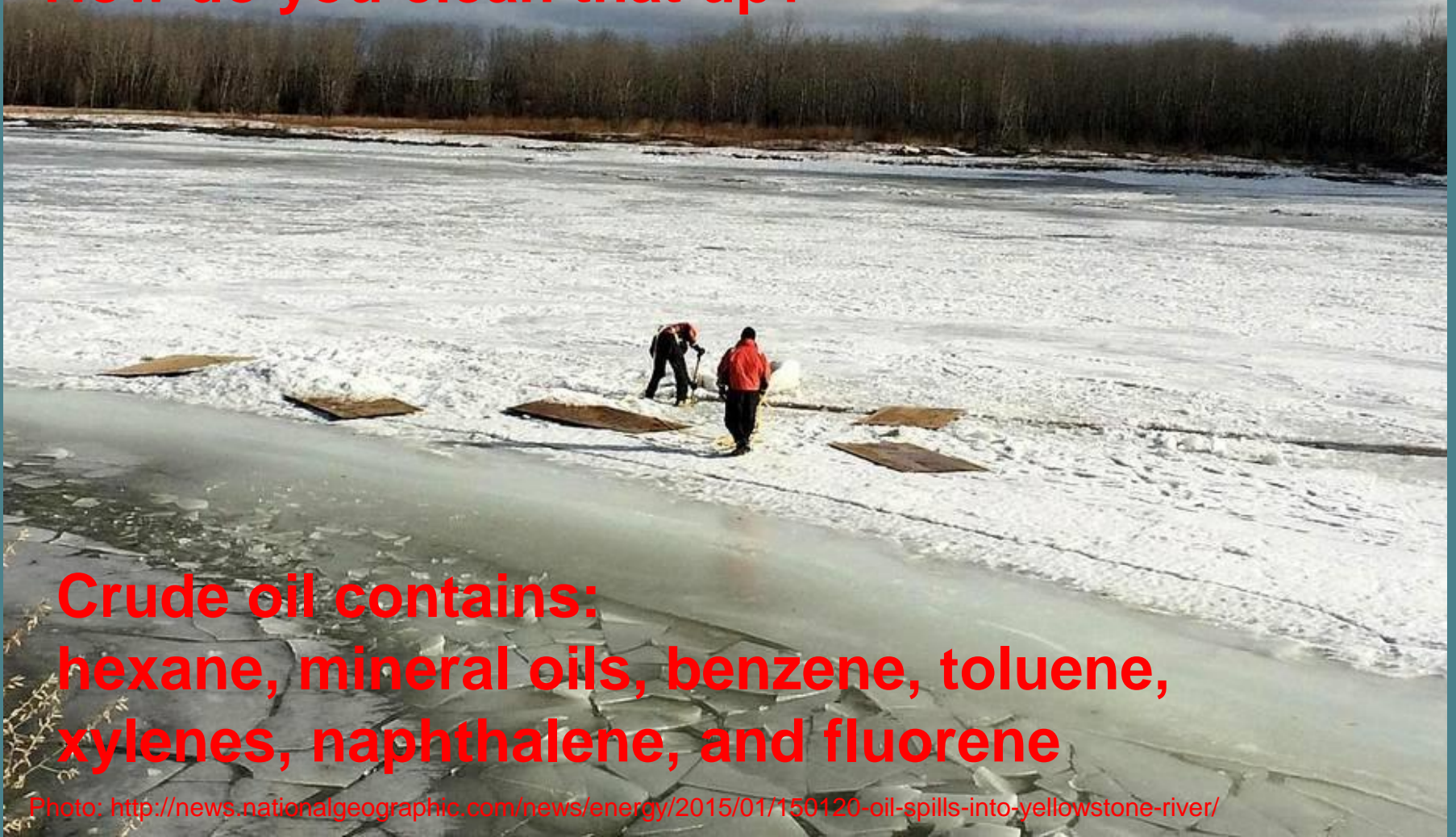
8700 spills/year (almost 1/day)

4.2 million barrels, 176 million gallons, spilled

Over 10% of spills have seeped into water bodies



**Yellowstone River 1/2015:
50,000 barrel spill under the ice
How do you clean that up?**

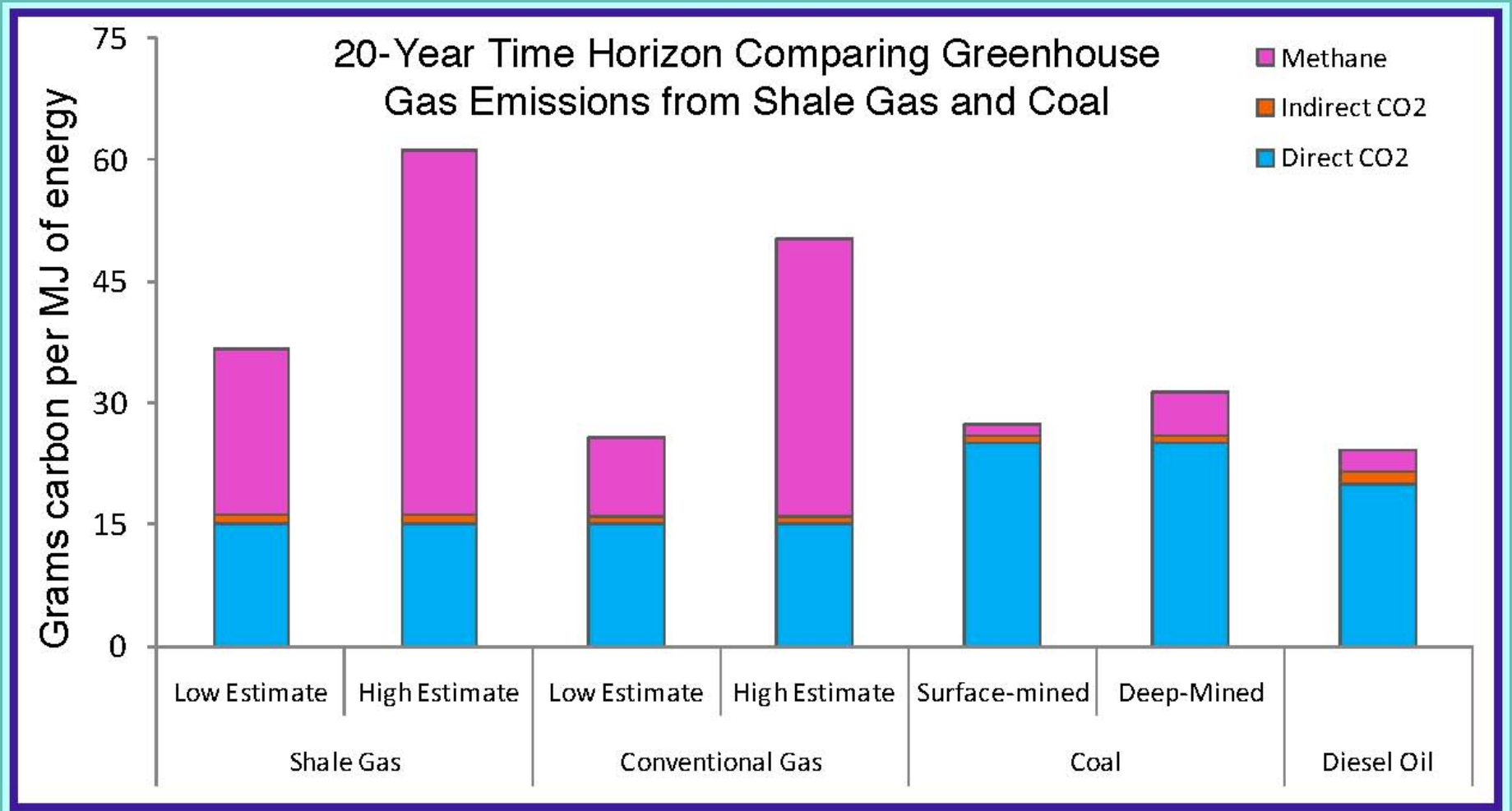


**Crude oil contains:
hexane, mineral oils, benzene, toluene,
xylenes, naphthalene, and fluorene**

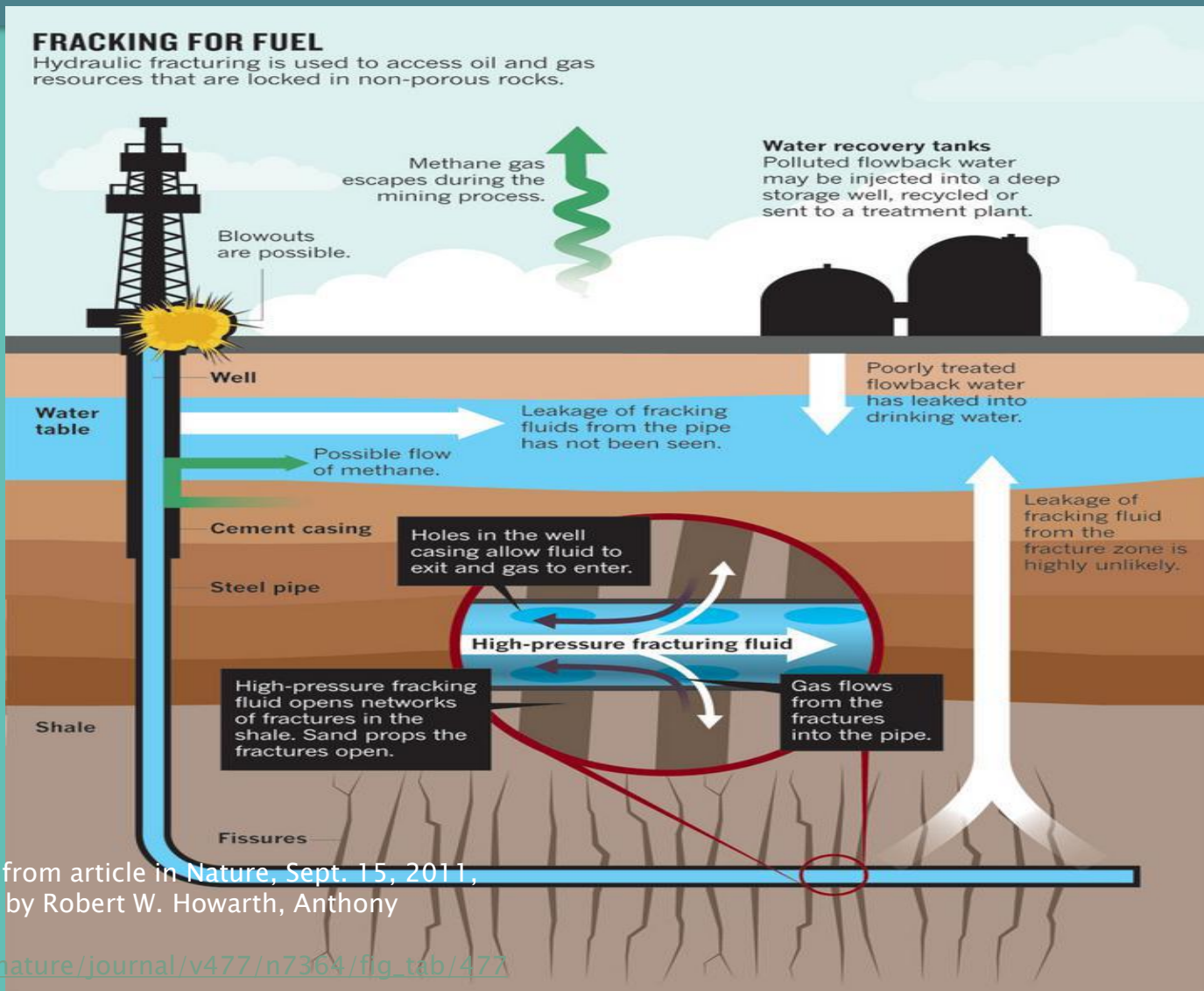
Photo: <http://news.nationalgeographic.com/news/energy/2015/01/150120-oil-spills-into-yellowstone-river/>

Climate Impact Per Unit of Energy

Natural Gas vs. Coal Emissions



Fracking



Fracking infrastructure. Illustration from article in Nature, Sept. 15, 2011, Natural Gas: Should fracking stop?, by Robert W. Howarth, Anthony Ingraffea, & Terry Engelder. http://www.nature.com/nature/journal/v477/n7364/fig_tab/477271a_F1.html

Fracking Issues

- 20-40% of water returns to surface as wastewater with high levels of salts and toxic levels of Ba, As and Ra
- Airborne emissions: VOC, NO_x, BTEX
- ~ 12 % of methane produced by fracking is lost by leaking into the atmosphere across the production chain

Fracking Concerns

- 2300-7000 single truck trips/well¹
- PM from vehicles
- Increased traffic related injuries & deaths (Eagle Ford Shale play in southern Texas, traffic fatalities increased by 48 percent from 2008 to 2013, compared with a statewide decrease of 3 percent)²
- Silica/Silicosis related to fracking sand transport
- As of 2013, more than 15 million people in the U.S. lived within 1 mile of a natural gas well drilled since 2000.³
- Total US Oil & Gas wells:1.7 million, fracking-137,000

1. Stephenson, Mike, What is it like living near a shale gas site? (with a webinar for planners and health professionals), 15 September 2015; [elsevier.com /connect/fracking-what-does-it-mean-for-local-people](http://elsevier.com/connect/fracking-what-does-it-mean-for-local-people).

2. Dianne Rahm, Billy Fields and Jayce L. Farmer, "Transportation Impacts of Fracking in the Eagle Ford Shale Development in Rural South Texas: Perceptions of Local Government Officials," *Journal of Rural & Community Development*, 10(2): 78-99, 2015.

3. Gold & McGinty, Energy Boom Puts Wells in Fracturing Largely Driving Transformation of the Nation's Landscape,, <https://www.wsj.com/articles/energy-boom-puts-wells-in-america8217s-backyards-1382756256> **America's Backyards-Hydraulic**

Cumulative Impacts of Fracking: 2005-2014

State	Wells Fracked	Hydrochloric Acid Used (10 ³ pounds)	Methanol Used (10 ³ pounds)	Wastewater Produced in 2014 (10 ⁶ gallons)	Water Consumed (10 ⁶ gallons)	Methane Released from Well Completed in 2014 (10 ⁶ pounds)	Land Disturbed (acres)
Arkansas	6,496	142,406	2,025	unavailable	11,290	144	22,858
California	3,405	1,034	489	1,057	237	140	15,940
Colorado	22,615	68,663	10,042	3,139	19,142	395	105,866
Louisiana	2,883	15,136	2,045	unavailable	4,880	50	16,010
New Mexico	4,318	70,798	4,403	8,592	3,132	125	35,273
North Dakota	8,224	82,198	88,168	unavailable	14,891	517	33,718
Ohio	1,594	105,447	1,942	313	7,771	136	9,118
Oklahoma	7,421	455,225	17,147	unavailable	19,582	546	41,210
Pennsylvania	9,233	1,806,032	5,396	1,821	24,732	295	52,813
Texas	54,958	2,148,789	302,501	unavailable	120,215	2,521	257,272
Utah	4,949	35,926	1,414	unavailable	916	186	35,478
West Virginia	2,670	64,134	1,174	unavailable	7,651	88	15,272
Wyoming	7,277	18,074	5,870	70	2,528	116	29,836
TOTAL	137,743	5,038,953	444,786	14,993	239,166	5,340	679,148

Elizabeth Ridlington, Kim Norman (Frontier Group), Rachel Richardson (Environment America Research & Policy Center), **Fracking by the Numbers: The Damage to Our Water, Land and Climate from a Decade of Dirty Drilling**, Appendix A, April 2016; <http://www.environmentamerica.org/sites/environment/files/reports/Fracking%20by%20the%20Numbers%20vUS.pdf>

Difficulties with research on UOG (Unconventional Oil and Gas)

- Vast expansion this century
- Emissions (VOCs, PM2.5) are variable in their intensity, frequency, and duration
- Over a thousand different chemicals used in the extraction process, study design difficult
- Exposure varies with proximity to wells w/drilling and hydraulic fracturing, wellpads, compression stations, processors, storage facilities, waste sites, and the transport between these stations
- Chemicals are "trade secrets"
- Oilfield wastes largely unregulated, also radioactive
- Contamination of air, soil, and water possible

Regulatory issues

Fracking is currently largely exempt from:

- Safe Drinking Water Act
- Resource Conservation and Recovery Act
- Clean Water Act
- Clean Air Act
- CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
- TSCA (no rulemaking yet)

Prenatal Complications

“Unconventional Natural Gas Development and Birth Outcomes in Pennsylvania, USA”

Epidemiology: March 2016 - Volume 27 - Issue 2 - p 163–172

Casey, Joan A.; Savitz, David A.;
Rasmussen, Sara G.; Ogburn, Elizabeth L.;
Pollak, Jonathan; Mercer, Dione G.;
Schwartz, Brian S.

Johns Hopkins School of Public Health
National Institute of Environmental Health
Sciences Grant

2009-2013

9,384 mothers and 10,946 neonates

Expectant mothers who live near active natural gas wells in Pennsylvania are at an increased risk of giving birth prematurely (40% more likely) and for having high-risk pregnancies.

(In a posthoc analysis, there was an association with physician-recorded high-risk pregnancy identified from the problem list)

Birth Outcomes and Maternal Residential Proximity to Natural Gas Development in Rural Colorado

Environmental Health Perspectives

April 2014

Colorado School of Public Health

Rural Colorado

1996-2009

125,000 births

Determined well counts within 10 miles of maternal residence

<https://ehp.niehs.nih.gov/1306722/>

Suggests a positive association between greater density and proximity of natural gas wells within a 10-mile radius of maternal residence and greater prevalence of CHDs and possibly NTDs, but not oral clefts, preterm birth, or reduced fetal growth.

Cancer Risks

“Unconventional oil and gas development and risk of childhood leukemia: Assessing the evidence” **(“Yale Public Health Analysis”)**

Science of The Total Environment
Volume 576, 15 January 2017, Pages
138–147

E. Elliott, P. Trinh, X. Ma, B. Leaderer, M. Ward, N. Deziel

The researchers reviewed the evidence of cancer risk for 1117 water contaminants and 143 air pollutants related to fracking.

Found 55 chemicals released into air or water that may cause cancer, 20 of which increase leukemia and lymphoma

More than 80% lacked enough data to classify whether or not they had the potential to cause cancer.

Adult Complications

Unconventional gas and oil drilling is associated with increased hospital utilization rates.

Jemielita T. et al, 2015.

**University of Pennsylvania
School of Medicine**

2007-2011

67 zip codes/3 counties

<http://journals.plos.org/plosone/article/file?id=10.1371/journal.pone.0131093&type=printable>

Fracking in Pennsylvania significantly associated with increased rates of hospitalization for cardiac and neurological issues, and also associated with urological, cancer-related, skin-related problems.

-for communities with the most wells, the rate of cardiac hospitalizations was 27 % higher than in the control county.

Animal Impacts: Fracking Fluid

Phillips, S. Sept. 27, 2011."Burning Questions: Quarantined Cows Give Birth to Dead Calves." *NPR StateImpact*.
<https://stateimpact.npr.org/pennsylvania/2011/09/27/burning-questions-quarantined-cows-give-birth-to-dead-calves/>

In 2010, 28 cows in Pennsylvania were quarantined after a leaking waste container left a puddle of hydraulic fracking fluid in their field. A year later, the released cows appeared healthy, but gave birth to 11 offspring described as "dead or extremely weak," an outcome that the farm owner called "abominable." Only 3 calves survived.

“Mni Waconi”: “Water is Life” in Lakota



Photo: <https://trofire.com/2017/03/02/fbi-thinks-standing-rock-protesters-might-terrorists/>

Alaina Buffalo Spirit, N Cheyenne



Photo: <http://www.artmobilemontana.org/alaina-buffalo-spirit.html>

“We (indigenous peoples) view earth as a living system. We thank the plant before we pick it. We give thanks for water before we drink it. We bless the air we breathe with burning sweet grass.”



**“You can live without money.
You can live without oil. But
you can’t live without water.”**

Respect Our Water

#NoDAPL



DAPL Timeline

- 9/14 Standing Rock Sioux Chair "not in favor"
- 10/14 Protests begin, petitions for a state E.O. to halt construction
- 3/16 EPA/DOI/etc asks for an formal EIS (not just the EA) from the ACE [ACE then looked at ½ mile radius of the river crossing and not 88 yards beyond (reservation)]
- 7/16 Standing Rock Sioux filed suit against ACE
- 9/16 construction begun
- 12/16 ACE denied easement under river , EIS was to be completed.
- 1/17 E.O. to continue construction/end env. assessment
- 5/17 oil flowing in the DAPL
- 6/17 Court says EA is inadequate – lacking NA issues (fishing and hunting rights, env justice).ACE must reconsider these issues.

Modern-Day Civil Disobedience, Native Style

----Standing Rock was vaster than what [you see on the surface.] At its height it was almost certainly the biggest political gathering of Native North Americans ever seen, said to be the first time all seven bands of the Lakota had come together since they defeated Custer at Little Bighorn in 1876, one that made an often-invisible tribe visible around the world. What unfolded there seemed as though it might not undo one pipeline but write a radical new chapter to a history of more than 500 years of colonial brutality, centuries of loss, dehumanization and dispossession. --- Rebecca Solnik

<https://www.theguardian.com/world/2017/mar/13/protest-persist-hope-trump-activism-anti-nuclear-movement>



Image: <http://bsnorrell.blogspot.ie/2016/08/mohawk-nation-news-standing-like-rock.html>

Lori Byron, MD, FAAP:

lori.byron@gmail.com

Robert Byron, MD, MPH, FACP:

rgbyron@gmail.com

Thanks to

- The hundreds of thousands who stood in support of the Standing Rock Sioux**
- Over 300 tribes who stood together**
- Those who were injured by water cannons, rubber bullets, tear gas and concussion grenades, and attack dogs, and arrests**
- Those who provided assistance, finances and supplies**
- Those who gave their time and prayers**

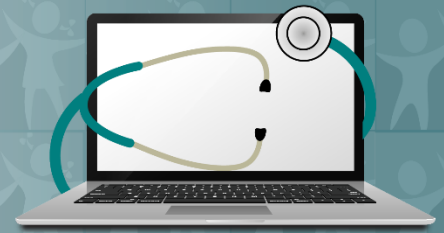
Thanks to

- The scientists and researchers who continue to expose the hazards of fossil fuels, both present and future**
- The AAP for its aggressive advocacy for children.**



PEHSU NATIONAL CLASSROOM

Pediatric Environmental Health Specialty Units



www.pehsu.net/nationalclassroom.html



Webinars

Series of scientific webinars that provide a forum for discourse on scientific issues.

Live and On-Demand

Case Conferences
Journal Clubs
Grand Rounds

CE Available



Online Courses

Evidence-based online courses on a variety of children's environmental health topics.

Interactive and Self-Paced

CE Available



Resource Catalog

Fact sheets, journal publications, reports, and other resources for parents, community members, patients and healthcare professionals

Topics included:
Air Quality, Pesticides, Natural Disasters, BPA, Mold, Lead, Mercury



Wildfire Guide: Disaster Response and Preparedness

Laura Anderko, PhD, RN

Marissa Hauptman, MD, MPH

Katie O'Donnell, Public Information Officer, Larimer County

Learning Objectives

- 1) Identify links between climate change and increased risk for wildfires
- 2) Describe health impacts of wildfires
- 3) Outline resources available to address health and safety concerns
- 4) Discuss risk communication strategies to address health and safety concerns from wildfires

Disclaimers

- This material was supported by the American Academy of Pediatrics (AAP) and funded (in part) by the cooperative agreement **FAIN: 1U61TS000237-03** from the Agency for Toxic Substances and Disease Registry (ATSDR).
- Acknowledgement: The U.S. Environmental Protection Agency (EPA) supports the PEHSU by providing partial funding to ATSDR under Inter-Agency Agreement number **DW-75-95877701**. Neither EPA nor ATSDR endorse the purchase of any commercial products or services mentioned in PEHSU publications



INCREASING MAGNITUDES
OF WARMING INCREASE
THE LIKELIHOOD OF

**SEVERE AND
PERVASIVE IMPACTS**

Climate Connections





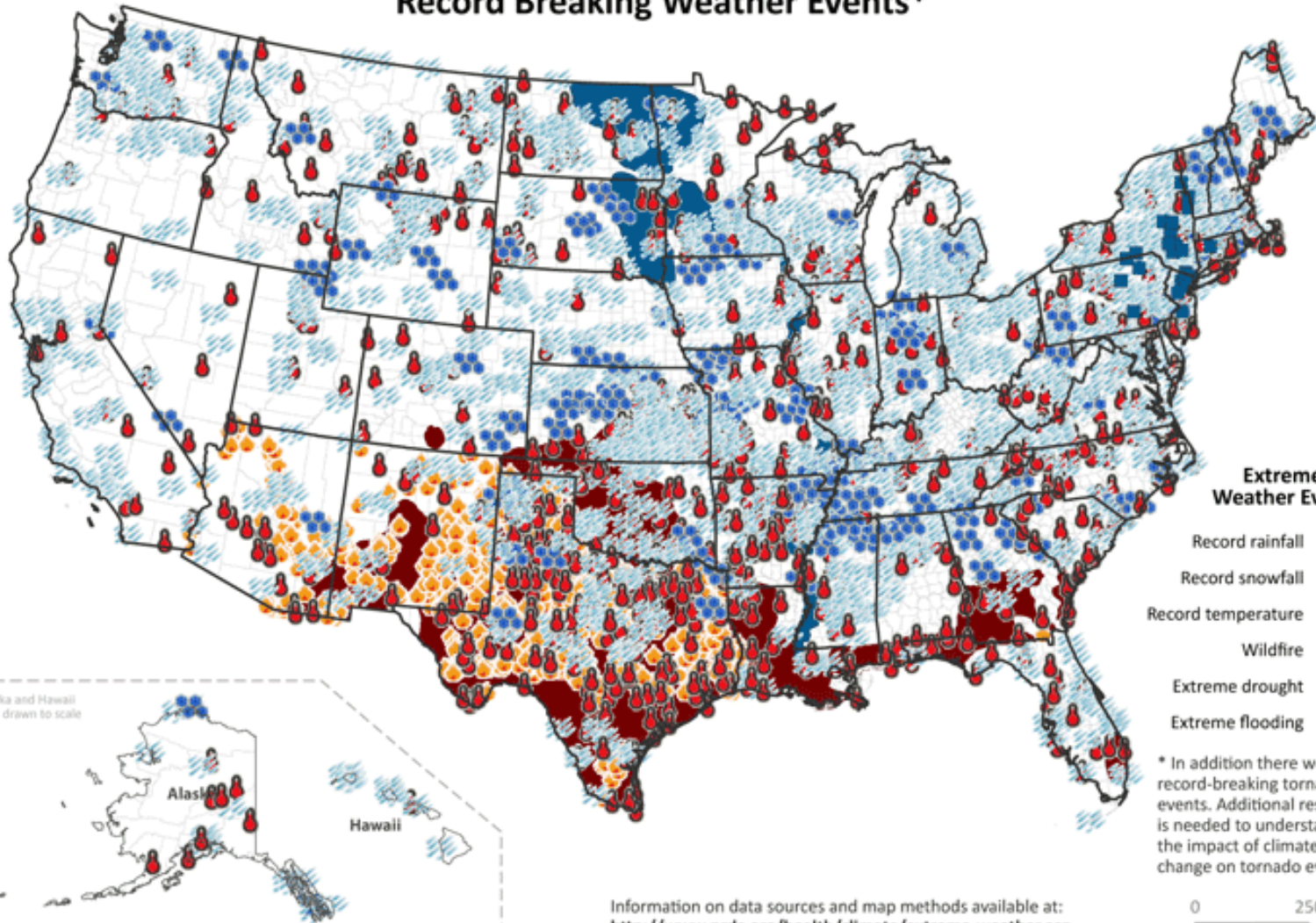
Eric Peter Abramson, U.S. Forest Service

As the world warms, we can expect
more wildfires

Impacts

- Longer fire seasons
- More intense wildfires
- More fuel for forest fires
- Drier conditions
- Wildfires increase carbon dioxide, increasing global warming

Extreme Weather in the US (2011): Record Breaking Weather Events*



Extreme Weather Event

- Record rainfall
- Record snowfall
- Record temperature
- Wildfire
- Extreme drought
- Extreme flooding

* In addition there were 7 record-breaking tornado events. Additional research is needed to understand the impact of climate change on tornado events.

** Alaska and Hawaii are not drawn to scale



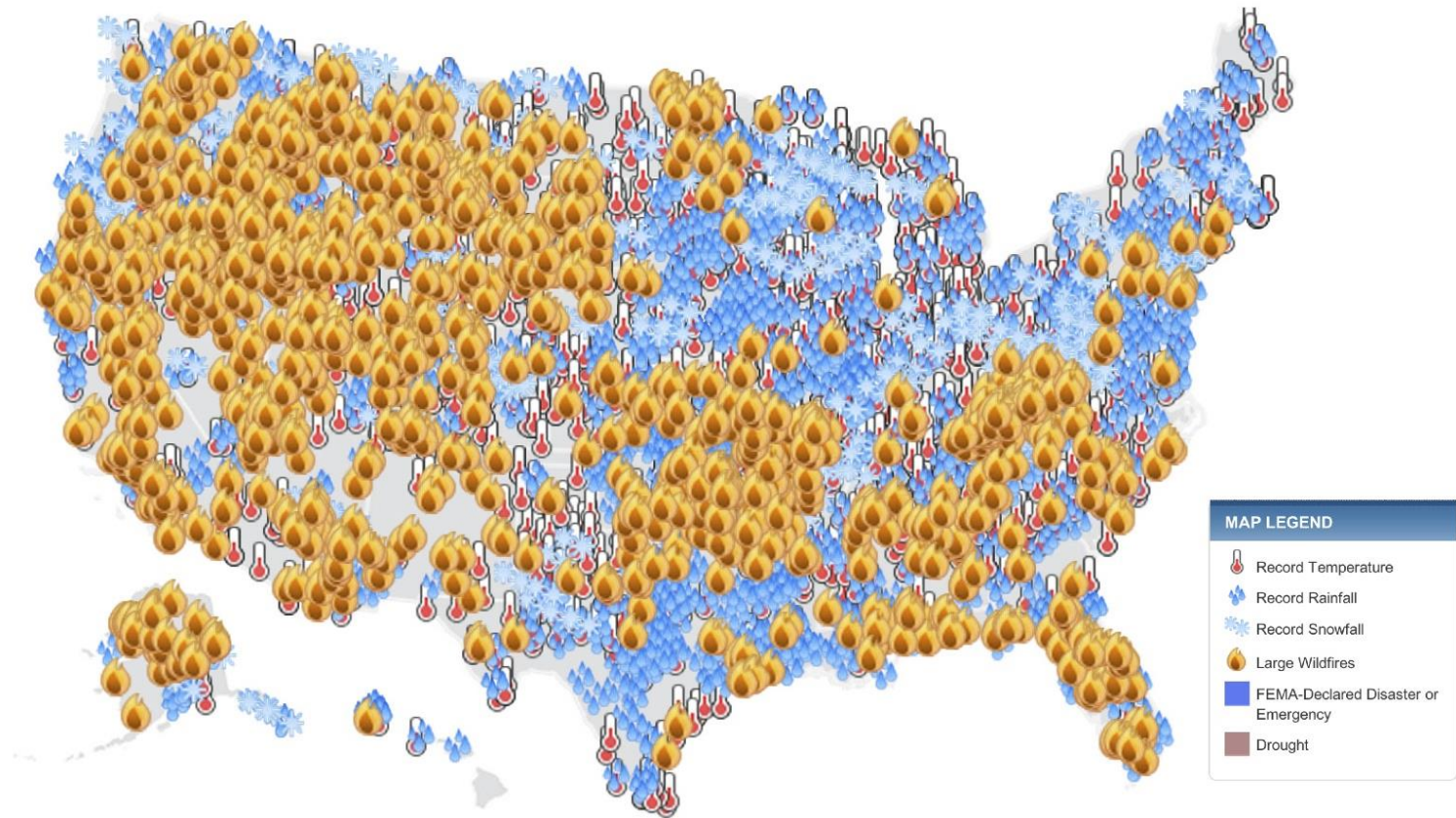
Information on data sources and map methods available at:
<http://www.nrdc.org/health/climate/extreme-weather.asp>



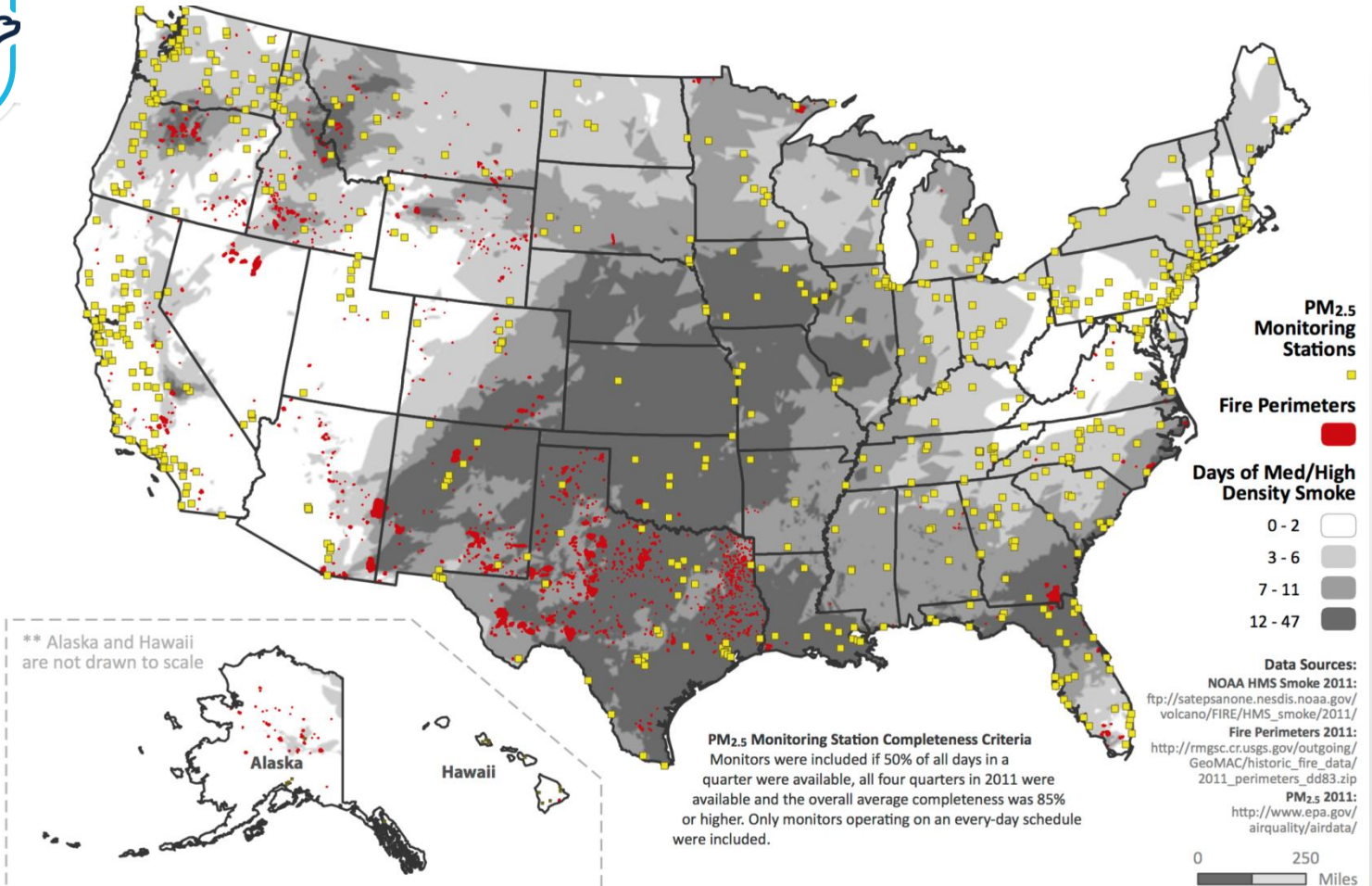


Extreme Weather Map

2012: Thousands of Weather Records Broken in the U.S., Costs Climbing



NRDC

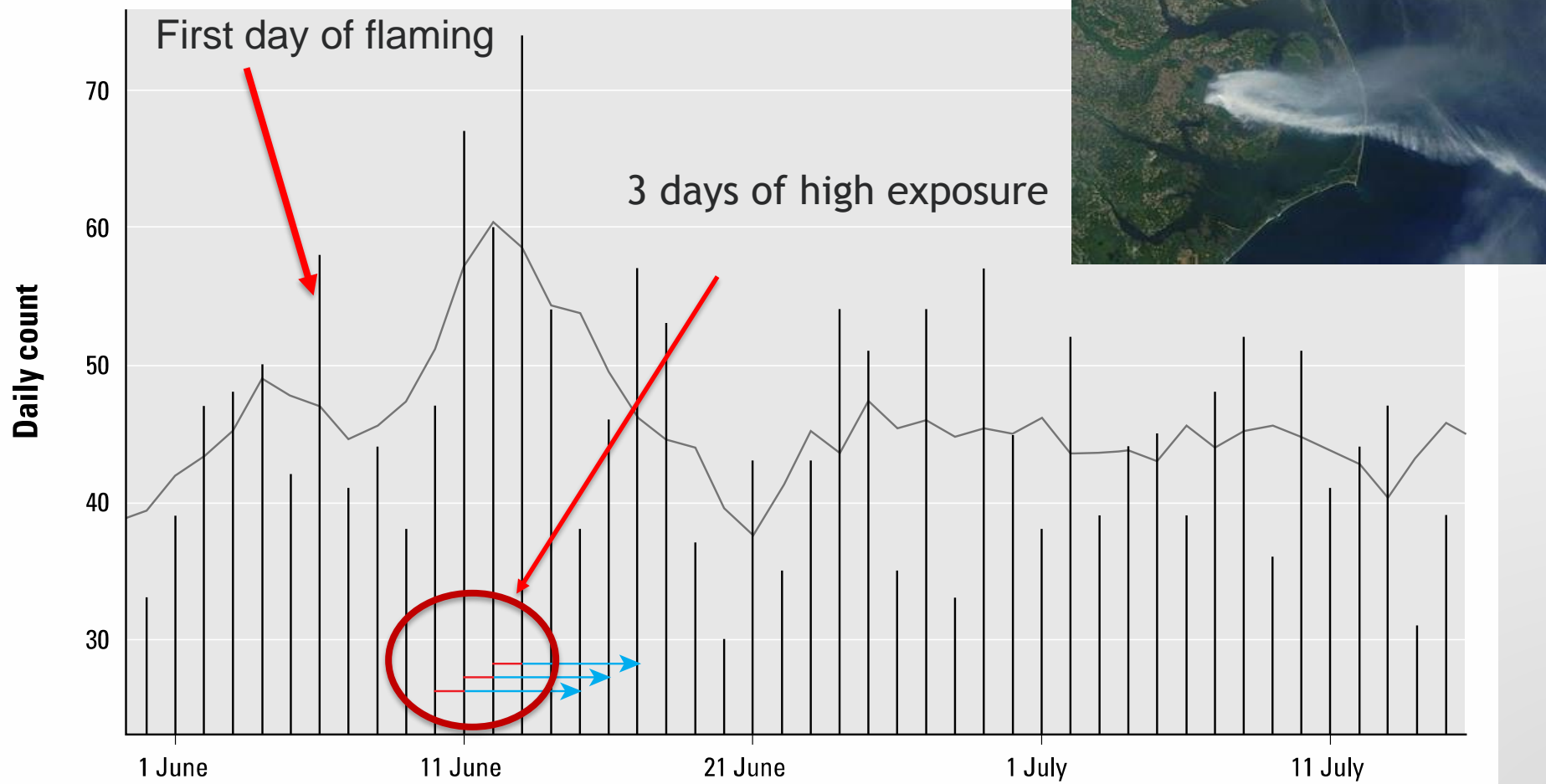




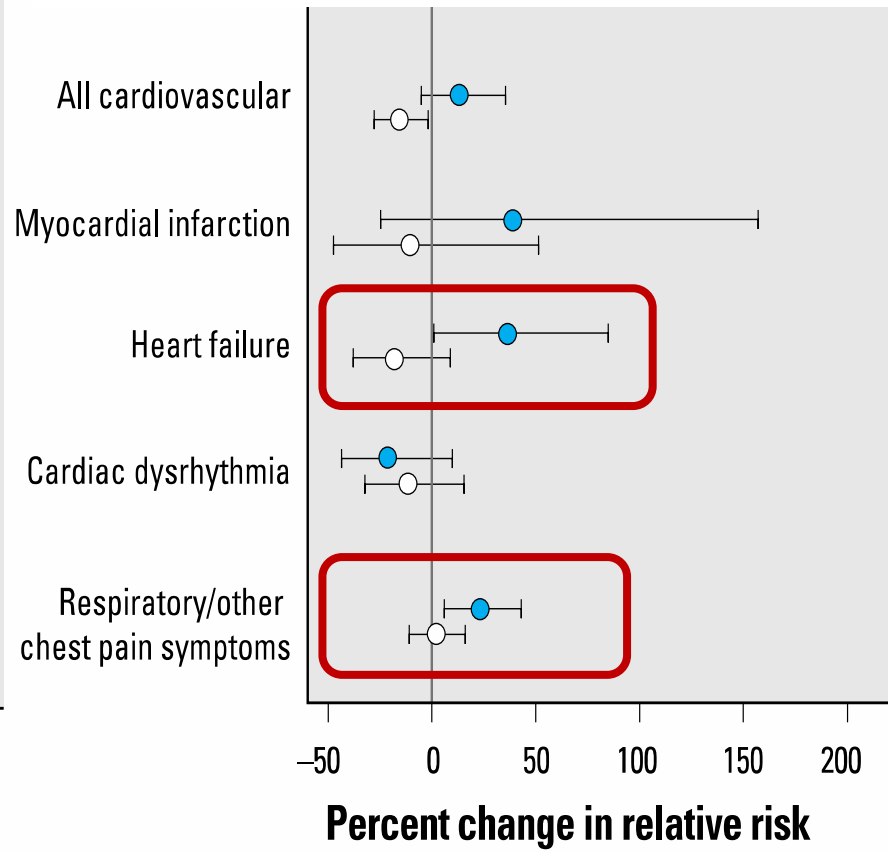
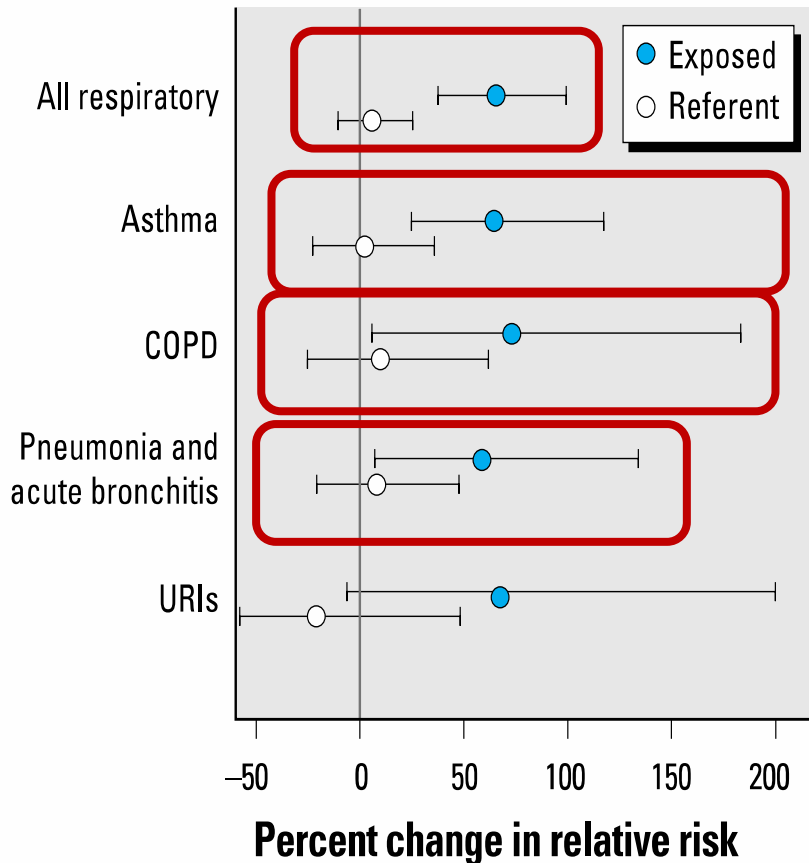
Air Quality Impacts

Health effects of smoke

Daily Counts of Asthma ED Visits; Pocosin Lakes NC 2008



Health Effects of Wildland Fire Smoke



Percent change in cumulative RR by discharge diagnosis category for exposed and referent counties in NC during 3-day period of high exposure compared with the entire 6-week study period.

Rappold AG et al. Environ. Health Perspectives 2011



Wildfire Smoke Resources

Key Resources for Health Professionals

AirNow (www.AirNow.gov)

The screenshot displays the AirNow website interface. At the top left is the AirNow logo. To the right is a search bar for "Local Air Quality Conditions" with fields for "Zip Code" and "State" (set to Alabama) and "Go" buttons. Below this are navigation tabs for "Forecast", "Current AQI", "AQI Loop", and "More Maps".

The main content area is split into two columns. The left column features a map titled "Today's AQI Forecast Monday, April 25, 2016" showing the United States with color-coded regions. Below the map is a legend with categories: Good (green), Moderate (yellow), USC (orange), Unhealthy (red), Very Unhealthy (dark red), and Hazardous (purple), followed by an "Action Day" icon. Underneath is a section for "Highest 5:" with a link "About the Highest 5". A table lists "Today's Forecasts" with columns for "Tomorrow's Forecasts" and "Current AQI".

The right column features a map titled "Fires: Current Conditions" showing the United States with numerous green dots representing air quality monitors and red fire icons. A yellow box highlights a red banner at the top of this section that reads "Fires: Current Conditions" with a link "Click to see map" and a sub-section for "U.S. Embassies and Consulates" with a link and text: "Data from air quality monitors at select U.S. embassies and consulates around the world".

Today's Forecasts	Tomorrow's Forecasts	Current AQI
Yuma, AZ		130
Imperial Valley, CA		123
Coachella Vly, CA		101
Nipomo, CA		98
Cincinnati, OH		95

EPA developed CE Modules

Particle Pollution and Your Patients' Health

[Contact Us](#) [Share](#)

- Course Home
- About this course
- What is Particle Pollution?**
- Particle Pollution Exposure
- Cardiovascular Effects
- Respiratory Effects
- Patient Exposure and the Air Quality Index
- Patient Exposure and High Particle Pollution Events
- Clinical Scenarios
- Frequent Questions
- Course Outline/Key Points
- Review Questions
- Patient Education Tools
- Course Evaluation
- References
- Glossary

What is Particle Pollution?

On this page:

- [What is particle pollution and what types of particles are a health concern?](#)
- [Where does particle pollution come from?](#)
- [Where and when is particle pollution a problem?](#)

What is particle pollution and what types of particles are a health concern?

Particle pollution, also known as particulate matter, consists of solid and liquid droplets suspended in the air. It can be made up of a number of different compounds (such as ammonium sulfate, nitrate, organic carbon, elemental carbon, metals, soil or dust, and spores).

The air we breathe indoors and outdoors contains dust, dirt, soot, or smoke, are large particles that they can only be detected using an eye.

Your patients who are at risk for the health effects of particle pollution exposure are those who are concerned about particles that are 10 micrometers (μm) in diameter or smaller. This is because these are the particles that can pass through the nose and throat into the lungs and might even translocate into the bloodstream and the central nervous system. Once inhaled, these particles can affect the heart and lungs.



<https://airnow.gov/index.cfm?action=airbasics.particle>

Image courtesy of the U.S. EPA

EPA Air Pollution Factsheets



ASTHMA AND OUTDOOR AIR POLLUTION



Heart Disease, Stroke, and Outdoor Air Pollution

1 Did you know that air pollution can trigger heart attacks, stroke, and other health effects?

Medical studies show that air pollution can trigger heart attacks, stroke, and irregular heart rhythms—especially in people who are already at risk for these conditions. Also, for people with a medical condition called heart failure, air pollution can further reduce the ability of the heart to pump blood the way that it should. Very small particles are the pollutants of greatest concern for triggering these effects. Particulate pollution is found in haze, smoke, and dust—and sometimes in air that looks clean. This fact sheet tells you how you can:

- Get up-to-date information about your local air quality.
- Protect your health when particle pollution is at unhealthy levels.

2 Are you at higher risk?

Older adults and people with risk factors for heart disease or stroke may be at greater risk. You are at greater risk if you:

- Have had a heart attack, angina, bypass surgery, angioplasty with or without a stent, a stroke, blockages in the neck or leg arteries, heart failure, heart rhythm problems, diabetes, or chronic obstructive lung disease.
- You may be at greater risk of heart disease or stroke (and therefore at greater risk from particle pollution) if any of these apply:
 - You are a man 45 years or older, or a woman 55 years or older.
 - You have a family history of stroke or early heart disease (father or brother diagnosed before age 55; mother or sister diagnosed before age 65).
 - You have high blood pressure or high blood cholesterol.



3 How can you protect your health?

Regular exercise is important for staying healthy, especially if you have heart disease. By adjusting when and where you exercise, you can lead a healthier lifestyle and help reduce your risk of heart problems or stroke triggered by air pollution. In addition:

- If you have heart disease or have experienced a stroke, check with your health care provider about the best ways to protect your health when the air quality is unhealthy.
- If you're at risk of heart disease or stroke and plan to exercise more than usual, discuss this with your health care provider.

Know when and where particle pollution levels may be unhealthy.

Particle pollution levels can be high any time of year. Particle levels can also be high:

- Near busy roads, in urban areas (especially during rush hour), and in industrial areas.
- When there is smoke in the air from wood stoves, fireplaces, burning vegetation, or

1 Air pollution can make asthma symptoms worse and trigger attacks.

If you or your child has asthma, have you ever noticed symptoms get worse when the air is polluted? Air pollution can make it harder to breathe. It can also cause other symptoms, like coughing, wheezing, chest discomfort, and a burning feeling in the lungs.

Two key air pollutants can affect asthma. One is ozone (found in smog). The other is particulate pollution (found in haze, smoke, and dust). When ozone and particulate pollution are in the air, adults and children with asthma are more likely to have symptoms.

2 You can take steps to help protect your health from air pollution.

► **Get to know how sensitive you are to air pollution.**

- Notice your asthma symptoms when you are physically active. Do they happen more often when the air is more polluted? If so, you may be sensitive to air pollution.

Effects of Common Air Pollutants

RESPIRATORY EFFECTS



Symptoms:

- Cough
- Phlegm
- Chest tightness

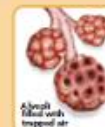
Increased sickness and premature death from:

- Asthma
- Bronchitis (acute or chronic)
- Emphysema
- Pneumonia

Development of new disease

- Chronic bronchitis
- Premature aging of the lungs

How Pollutants Cause Symptoms



Effects on Lung Function

- Narrowing of airways (bronchoconstriction)
- Decreased air flow

Always Inflammation

- Influx of white blood cells
- Abnormal mucus production
- Fluid accumulation and swelling (edema)
- Death and shedding of cells that line airways



Increased Susceptibility to Respiratory Infection



Normal

Lung with respiratory infection

How Pollutants May Cause Symptoms



Symptoms:

- Chest tightness
- Chest pain (angina)
- Palpitations
- Shortness of breath
- Unusual fatigue

Increased sickness and premature death from:

- Coronary artery disease
- Abnormal heart rhythms
- Congestive heart failure

Development of new disease

- Chronic bronchitis
- Premature aging of the lungs



Effects on Cardiovascular Function

- Low oxygenation of red blood cells
- Abnormal heart rhythms
- Altered autonomic nervous system control of the heart



Vascular Inflammation

- Increased risk of blood clot formation
- Narrowing of blood vessels (vasoconstriction)
- Increased risk of atherosclerosis, plaque rupture



Reduce your risk by using the Air Quality Index (AQI) to plan outdoor activities – www.airnow.gov

AQI Levels of Health Concern	AQI Values	What Action Should People Take?
Good	0-50	Enjoy Activities
Moderate	51-100	People unusually sensitive to air pollution: Plan strenuous outdoor activities when air quality is better
Unhealthy for Sensitive Groups	101-150	Sensitive Groups: Cut back or reschedule strenuous outside activities. Particulate Pollution: People with heart or lung disease including children, older adults, and children. Ozone: Active children and adults and pregnant women should avoid prolonged outdoor activities. Carbon Monoxide: People with heart disease and possibly older adults.
Unhealthy	151-200	Everyone: Cut back or reschedule strenuous outside activities. Sensitive groups: Avoid strenuous outside activities.
Very Unhealthy	201-300	Everyone: Significantly cut back on outside physical activities. Sensitive groups: Avoid all outside physical activities.

www3.epa.gov/airnow/asthma-flyer.pdf (English)

www3.epa.gov/airnow/health-prof/EPA-poster-Spanish-2008.pdf (Spanish)

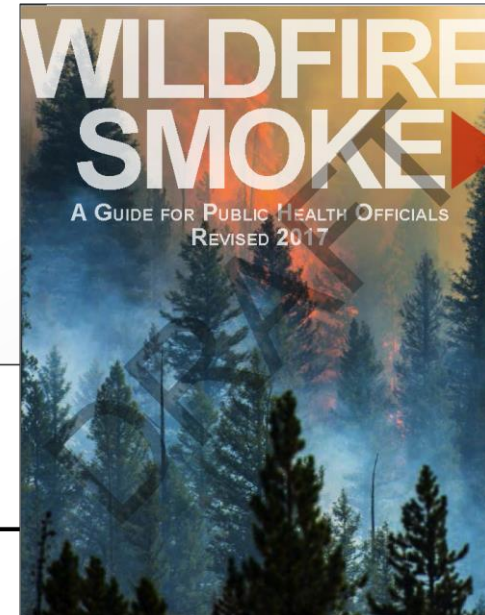
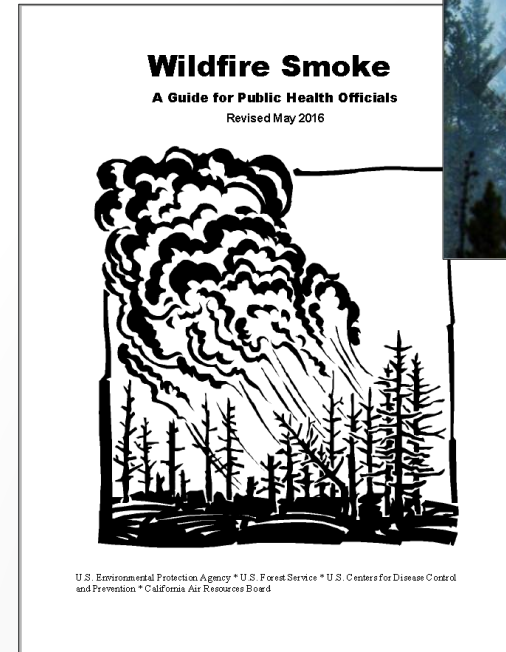
www3.epa.gov/airnow/heartflyer.pdf (English)

www3.epa.gov/airnow/heartflyer-sp.pdf (Spanish)

<https://www3.epa.gov/airnow/health-prof/common-air-pollutants-2011-high.pdf>

Wildfire Guide 2016


- Primarily a federal/California document; housed on AirNow website
- Updated air quality and health information
- Evidenced-based exposure reduction measures
- Entirely new section on communicating air quality
 - Uses “Current PM” levels from AirNow
 - Uses satellite information on Fires: Current Conditions page
 - Visual range information updated
- PEHSU fact sheets about children’s health, 2011
- Information about new interagency Wildland Fire Air Quality Response Program



Anticipated Sept 2017

https://www3.epa.gov/airnow/wildfire_may2016.pdf

Wildfire Guide 2017 – Example Draft Fact Sheets

 **WILDFIRE SMOKE FACTSHEET**

Prepare for Fire Season


If you live in an area that is regularly affected by smoke or where the wildfire risk is high, you should prepare for fire season. Know how to get ready before a wildfire. Know how to protect yourself and your family from smoke exposure during a wildfire.

Being prepared for fire season is especially important for the health of children, older adults, and people with heart or lung disease.

Prepare Before a Wildfire

- **Stock up** so you don't have to go out when it's smoky. Have several days of medications on hand. Buy groceries that do not need to be refrigerated or cooked, because cooking can add to indoor air pollution.
- **Create a "clean room"** in your home. Choose a room with as few windows and doors as possible, such as a bedroom. Use a portable air cleaner and avoid indoor sources of pollution.
- **Buy a portable air cleaner** before there is a smoke event. High-efficiency particulate air (HEPA) filter air cleaners, and electrostatic precipitators that do not produce ozone, can help reduce indoor air pollution.
- **Understand** how you will receive alerts and health warnings, including air quality reports and public service announcements, from local officials.

- **If you have heart or lung disease**, check with your doctor about what you should do during smoke events.
- **If you have asthma or other lung disease**, update your respiratory management plan.
- **Have a supply of N95 respirators** if you have them. They are available at many home improvement stores and online.
- **Organize your important items** ahead of time and know where to go in case you have to evacuate.

 **WILDFIRE SMOKE FACTSHEET:**
Indoor Air Filtration

Exposure to Particle Pollutants

Indoor sources of particulate matter (PM) come from combustion events such as smoking, candle burning, cooking and wood-burning. During a wildfire event, outdoor PM can increase indoor PM levels well above the levels normally found. As outlined in the Guide, reducing indoor sources of pollution is a major step to lower the concentrations of PM indoors. Further reductions in indoor PM can be achieved using one of the filtration options discussed below.

Filtration Options

There are two effective options for improving air filtration in the home: upgrading the central system filter, or using high efficiency portable air cleaning appliances. Before discussing filtration options, it is important to understand the basics of filter efficiency.

Filter Efficiency

The most common industry standard for filter efficiency is known as the Minimum Efficiency Reporting Value, or MERV rating. The MERV scale for residential filters ranges from 1-20. The higher the MERV rating the greater the percentage of particles captured as the air passes through the filter media. Higher MERV (higher efficiency) filters are especially effective at capturing very small particles that can most affect health.

Central Air System Filter



The filter used in the central heating/cooling system of the home can effectively reduce indoor PM. A home typically will have a low MERV (1-4)

Portable Air Cleaners

Portable air cleaners are devices that can be used to enhance central filtration. Their efficiency depends on several factors. If you have a portable air cleaner, the filter unit is turned on and cleaners fitted with high efficiency filters. Most air cleaners are mechanical and electrical.

Types of Air Cleaners

Most air cleaners are mechanical and electrical. They use a fan to pull air through a fibreglass filter that is replaced periodically. Higher efficiency filters (MERV 11-16) in the central system can significantly improve indoor air quality. You may wish to consult a technician or the manufacturer to confirm the efficiency of your filter. If you have a more efficient filter, you may wish to use it continuously by switching it to "Auto" or "On" has concentrations by as high as 100 times.

 **WILDFIRE SMOKE FACTSHEET**


Children

Background

- **Wildfires** expose children to fire, smoke, the byproducts of burning, and other chemicals released from burning structures and furnishings in addition to the psychological stress associated with these events.
- **During the acute phase** of wildfire activity, the major problems are fire and smoke. Smoke can travel many miles downwind from a burning fire.
- **Children**, individuals with pre-existing lung or cardiovascular diseases (e.g. asthma) are especially vulnerable during wildfires.
- **Children are in a critical period of development** when toxic exposures can have profound negative effects, and their exploratory behavior often places them in direct contact with materials that adults would avoid.

Health Effects from Smoke

- **Wildfire smoke** has very small particles, liquid droplets, and gases such as carbon monoxide (CO), carbon dioxide (CO₂) and other volatile organic compounds (VOCs).
- **Symptoms** from smoke inhalation can include chest tightness, shortness of breath, wheezing, coughing, respiratory tract and eye irritation and burning, chest pain, dizziness, or lightheadedness and other symptoms.
- **Children with allergies and asthma** may have more symptoms than usual.
- **The risk of developing cancer** from short-term exposures to smoke is vanishingly small.


Recommendations

Planning Ahead

- **Stock up** so you don't have to go out when it's smoky. Have several days of medications on hand.
- **Buy groceries** that do not need to be refrigerated or cooked, because cooking can add to indoor air pollution.
- **Create a "clean room"** in your home. Choose a room with as few windows and doors as possible. Use a portable air cleaner and avoid indoor sources of pollution.
- **Buy a portable air cleaner** before there is a smoke event.
 - High-efficiency particulate air (HEPA) filter air cleaners and electrostatic precipitators that do not produce ozone can help reduce indoor air pollution.
- **Organize** and plan ahead of time and know where to go in case you have to evacuate.

During Wildfires – Around Your Home & Car

- **Stay indoors** with the doors and windows closed. If you have an air conditioner, run it with the fresh-air intake closed (recirculate mode) to keep outdoor smoke from getting indoors.
- **Do not add to indoor air pollution.**



Wildfire Factsheets Under Development.

Original PEHSU Wildfire Factsheet available at: <http://www.pehsu.net/cgi/page.cgi/resources.html>



Risk Communication Strategies

Regional and National Examples

National

Air Quality Flag

PROGRAM

Know Your Air Quality
to Protect Your Health



AQI and Air Quality Flag Program

Air Quality Index (AQI) Values	Levels of Health Concern	Colors
<i>When the AQI is in this range:</i>	<i>...air quality conditions are:</i>	<i>...as symbolized by this color:</i>
0 - 50	Good	Green
51 - 100	Moderate	Yellow
101 - 150	Unhealthy for Sensitive Groups	Orange
151 - 200	Unhealthy	Red
201 - 300	Very Unhealthy	Purple
301 - 500	Hazardous	Maroon



GOOD
It's a great day to be active outside.



MODERATE
It's a good day to be active outside. Take it easier if you are unusually sensitive to air pollution.



UNHEALTHY FOR SENSITIVE GROUPS
Older adults, children and teens, people with certain health conditions, and people who are active outdoors should take it easier.



UNHEALTHY
Everyone should take it easier.



VERY UNHEALTHY
Sensitive groups, avoid outdoor exertion. Everyone else, avoid long or intense outdoor exertion.

Check the Air Quality Forecast

Get Your Air Quality By:



Email



Widget



Apps

- Subscribe to **ENVIROFLASH**:
The air quality forecast will be sent to your email.

- Free and easy to subscribe
- www.airnow.gov/enviroflash

- Download the free AirNow APP available at www.airnow.gov

- You can install a **WIDGET** to show local air quality on your website.

- EPA SmokeReady App (undergoing beta testing!)



Regional

Key Resources

- [AirNow](#)
 - [Air Quality Flag Program](#)
 - [Current Conditions](#)
 - [Health Providers Page](#)
 - [Wildfire Smoke and Health](#)
 - [Wildfire Smoke: Guide for Public Health Officials](#)
 - [Wildfire Trends](#)
- [California Air Resources Board Resources](#)
- [CDC Wildfire Factsheets](#)
- [PEHSU Wildfire Fact Sheet](#)
- [Wildland Fire Air Quality Response Program](#)

Thank you!

