Editor’s Note, 03/28/2013: The original Winter 2013 issue inadvertently omitted the references which should have been included with Dr. Leslie Walleigh’s feature article, “Unconventional Gas Extraction: Worker Exposures; Part 2 in a series of 3”. The references are now included here in the electronic-only edition. They will be included in the next hardcopy edition as well.

Features:

Unconventional Gas Extraction: Worker Exposures; Part 2 in a series of 3
Dr Leslie Walleigh continues her outstanding series on Unconventional Gas Extraction – often referred to as hydraulic fracturing. In the last issue she discussed the potential environmental impacts. In the current article she details the potential worker exposures.

Pemberton Mills Collapse
Long before the infamous Triangle Shirtwaist fire, the Pemberton Mill collapse and subsequent fire killed and injured hundreds in Lawrence, MA. Kathleen Lawrence personalizes and reminds us of this tragedy in an early industrial era before workers’ compensation and structured state benefit systems.

FMCSA Training
Dr Ron Blum provides background for the upcoming Commercial Driver Medical Examiner training course at Sunday River Ski Resort, Newry, ME on April 13th.

NYOEMA Snapshot
The president of the NECOEM’s sister component in NY, NYOEMA, Dr David D’Souza, describes NYOEMA’s response to Superstorm Sandy and invites NECOEM members to join a speaker’s bureau to address related health concerns.

Wood Biomass for Heat and Power: Addressing Public Health Impacts
Dr David Diamond summarizes the findings of a symposium on the public health implications of using wood biomass for heat and power.

Commentary: Integrating Worker’s Comp into Vermont’s Green Mountain Care
Vermont is exploring options to provide covered workers’ compensation medical services through the state’s Green Mountain Care system. Dr Nelson Haas provides a commentary on the implications of this proposal.

Upcoming Events! Visit NECOEM.org for more information and registration

Mar 7, 2013
“How to Recognize and Treat Heavy Metal Poisoning From Occupational and Non-Occupational Exposures”
NECOEM Dinner Meeting
St Francis Hospital, Hartford, CT
Unconventional Gas Extraction: Worker Exposures

Part 2 in a series of 3
By Leslie A. Walleigh, MD, MPH

Part I of this three part series, “Unconventional Gas Extraction - Part 1 - Threats to the Environment” (Fall 2012 issue of the NECOEM Reporter) discussed the process of unconventional gas extraction (UGE) and its potential environmental impacts. The current article discusses potential exposures to workers. Part 3 will discuss community impacts.

The oil and gas extraction industry annual fatality rate of 27.5 per 100,000 workers is more than seven times higher than the rate for all U.S. workers (3.9). From 2003-2009, the majority of fatalities were caused by motor vehicle accidents (29%) or being struck by tools or equipment (20%). Explosions (8%), being caught or compressed by moving machinery or tools (7%), and falls to lower levels (6%) were other common fatal events (1).

Given the risk for injury and death, it is understandable that, historically, the primary focus of professionals charged with protecting the health and safety of oil and gas extraction workers has been on improving safety. Recently, however, as part of its Oil and Gas Extraction Safety and Health Program, NIOSH launched a “Field Effort to Assess Chemical Exposure Risks to Gas and Oil Workers (2).” Some of the potentially hazardous chemical exposures identified in this field effort include (3):

- Silica
- Diesel particulates
- Volatile organic compounds
- Hydrogen sulfide
- Aldehydes
- Metals

Radiation exposure from naturally occurring radioactive material (NORM) brought to the surface in flowback water (the fluid that flows back to the surface when the pressure from hydraulic fracturing is released) and produced water (wastewater emerging from the well after production begins), as well as noise exposure from drilling and hydraulic fracturing activities, pose potential hazards to workers.
Beyond the exposures discussed in this article, it should be noted that natural gas extraction is a 24 hour, all season industry. As a result, long work shifts, extended work periods, and extreme weather conditions create additional challenges to workers’ health and safety.

### Potential Exposures

#### Silica

Inhalation of respirable crystalline silica is responsible for the development of the pulmonary disease, silicosis, conventionally classified as chronic, accelerated, or acute based on the intensity and duration of the preceding exposure. Yearly, an average of 160 to 200 U.S. residents and thousands of individuals worldwide are identified as having died from silicosis. Silica is a recognized lung carcinogen. Silica exposure also contributes to the development of chronic obstructive pulmonary disease, kidney disease and autoimmune diseases. Individuals with silicosis are at increased risk for developing tuberculosis.

As described in Part I, unconventional gas extraction (UGE) uses large volumes of fluid (typically two to five million gallons per hydraulic fracturing event) injected under high pressure into wells in shale or other tight formations to create and prop open fractures in order to increase gas flow. Typically, 90% of the injected fluid is water and 9.5% is the sand which is used to prop open the fractures. The remaining .5% includes a variety of chemical additives.

The large volumes of sand required in UGE are trucked to the well sites, where they are loaded into sand movers, transferred to conveyer belts and then blended into the hydraulic fracturing fluid. The transport and movement of sand produces large visible clouds of silica containing dust. In extensive monitoring of worker silica exposure, NIOSH determined that 79% of the samples exceeded the NIOSH Time Weighted Average (TWA) Recommended Exposure Limit (REL) of 0.05 mg per cubic meter for respirable dust containing silica, with 31% of samples demonstrating a respirable crystalline silica exposure of greater than ten times the REL, a level at which a half-face respirator would not provide adequate protection (4). Both NIOSH and OSHA recommend that worker exposure be kept below the NIOSH REL, which is lower than the outdated OSHA Permissible Exposure Limit (PEL)(5). In response to these findings, in June, 2012, OSHA and NIOSH issued a joint Hazard Alert on “Worker Exposure to Silica during Hydraulic Fracturing”(6). The alert details the NIOSH findings and outlines recommendations to industry to reduce worker exposures which include:

- Air monitoring to determine worker exposure.
- Controlling dust exposures through NIOSH identified work practices and equipment changes detailed in the alert.
- Providing appropriate respiratory protection when needed
- Providing worker training and information about the hazards of silica.

The alert also suggests consideration of medical monitoring for workers exposed to silica as recommended in the OSHA National Emphasis Program (7). These non-mandatory recommendations include:

- Baseline pre-placement medical examination for employees potentially exposed to crystalline silica at one-half the permissible exposure limit (PEL) or more, including:
  - A medical examination emphasizing the respiratory system, as well as an occupational and medical history; and
  - A PA chest x-ray classified according to the 1980 ILO International Classification of Radiographs of Pneumoconiosis (ILO, 1981), and read by a board-certified radiologist or certified class "B" reader

- Frequency of repeat medical exams and chest x-rays:
  - Every three years if the employee has less than 15 years of crystalline silica exposure
  - Every two years if the employee has 15 to 20 years of exposure
  - Annually if the employee has 20 or more years of exposure.
  - Chest x-ray at termination of employment

Beyond NIOSH’s findings regarding excessive silica exposure at UGE well sites, concerns have also been raised regarding the silica exposures of both workers and communities as the result of the dramatic increase in sand mining, processing and transport spurred by the growth of UGE.
Diesel Exhaust/Diesel Particulates

Diesel exhaust is a recognized lung carcinogen (8). In addition, exposure to diesel exhaust contributes to the development of pulmonary disease and exacerbates the symptoms of those with pre-existing cardiovascular and pulmonary disease (9). Diesel exhaust exposure is suspected of contributing to a variety of other adverse health effects (10).

There are many sources of diesel exhaust at UGE well sites, including the drilling rig, air compressors, pump engines and numerous diesel fueled vehicles. Although neither OSHA nor NIOSH currently have diesel particulate exposure limits, California does have a worker exposure limit of 20 µg/m³ time-weighted averages (TWA), which is based on the risk of developing lung cancer. At a 2012 Institute of Medicine (IOM) conference, “The Health Impact Assessment of New Energy Sources: Shale Gas Extraction,”(11) NIOSH presented results from limited initial assessments of worker exposures to diesel particulates at UGE sites. NIOSH determined that 25% of personal breathing zone (PBZ) samples exceeded 20 µg/m³ TWA. Two PBZ and two area samples exceeded 40 µg/m³ TWA. These results suggest that diesel exhaust may represent a health hazard to UGE workers.

Volatile Organic Chemicals

Volatile organic chemicals (VOC’s), including naphthalene, benzene, toluene, ethylbenzene and xylene (NBTEX) contribute to numerous adverse health effects. Benzene is a recognized carcinogen. Ethylbenzene and naphthalene are considered possible carcinogens. In addition to their carcinogenic potential, the NBTEX compounds can adversely affect most organ systems, with prominent neurologic, respiratory and hematologic effects.

Workers are potentially exposed to VOC’s from the handling and on-site storage of flowback and produced water that returns to the surface following hydraulic fracturing and during subsequent gas production. Millions of gallons of this wastewater, containing varying concentrations of VOC’s including NBTEX compounds, are often stored onsite in large impoundments (12). VOC’s off gas from these storage sites, potentially exposing workers. An additional source of VOC exposure on well sites is fugitive emissions from natural gas production and on-site processing. At the time of writing this article, there are no published results of assessments of worker exposure to VOC’s at UGE well sites.

Hydrogen Sulfide (H₂S)

The potential for exposure to hazardous levels of H₂S is a well-recognized risk in conventional oil and gas extraction, and not new to UGE. As a result, warning systems and protective measures are in place at UGE well sites. At low concentrations, H₂S is an eye, mucous membrane and respiratory irritant. Brief exposures to high levels of H₂S can result in loss of consciousness and death.

Aldehydes

Glutaraldehyde is one of several agents that maybe used as biocides in hydraulic fracturing. Glutaraldehyde is a respiratory, mucous membrane and eye irritant. Exposure can cause or exacerbate asthma. Dermal exposure may result in irritant or allergic dermatitis.

At the previously mentioned IOM conference (13), NIOSH presented some initial area measurements of total aldehydes in and around “frac” tanks where fluids are stored in preparation for being pumped down the well bore. The NIOSH ceiling (not to be exceeded at any time) REL for glutaraldehyde is 0.2ppm (0.8mg/m³). Measurements of total aldehydes at ground level outside the “frac” tank were <0.2ppm, at the top “frac” tank opening 0.21ppm, and within the head space of the “frac” tank 0.44ppm. These second two area readings for total aldehydes were above the NIOSH ceiling REL for glutaraldehyde, suggesting that further evaluation of worker personal breathing zone exposure to glutaraldehyde may be appropriate.

Metals

In a 2011 article “Take home lead exposure in children of oil field workers”(14), Fahad Khan brought attention to the hazards of using lead containing “pipe dope” in well drilling. As Khan notes, “pipe dope” is a specially formulated blend of lubricating grease and fine metallic particles that prevents metal-to-metal damage and seals the pipe threads.” Pipe dope may contain up to 60% lead. The use of lead containing pipe dope by these oil field workers was associated not only with elevated blood lead levels in the workers, but also elevated blood lead levels in their children as a result of take home lead.

There are alternative lead-free pipe dope formulations available. The extent to which UGE workers are exposed to lead pipe dope or other hazardous metals is not yet well characterized.

Naturally Occurring Radioactive Material

The millions of gallons of wastewater (including flowback and produced waters) bring naturally occurring radioactive material, such as radium, uranium, and thorium, to the surface. Although the content of radioactive material varies greatly, analysis of this wastewater has demonstrated up to 18,000 pCi/L of gross alpha and 7400 pCi/L of gross beta emissions (15). Wastewater is either stored on site or transported offsite for treatment or recycling. NIOSH has not yet assessed the potential exposure of well site, transport or processing workers to radiation from these wastewaters.

Noise
UGE well sites are noisy work environments. For example, estimated sound pressure levels are 105 decibels (dBA) adjacent to a drill rig and 110-115 decibels (dBA) adjacent to a pumper truck (16). Implementing engineering controls, providing adequate hearing protection, and monitoring exposed workers in a mobile industry, are all challenges to employers.

Conclusion

The recent introduction and expansive growth of unconventional gas extraction has ignited widespread concern in the public health community regarding the potential, not fully characterized, risks of environmental contamination and adverse community health impacts. Worker exposures and resulting health risks from this technology had also not been fully characterized prior to its widespread recent deployment. Through its Field Effort to Assess Chemical Exposure Risks to Gas and Oil Workers, NIOSH has identified silica as a definite exposure hazard and diesel exhaust as a possible exposure hazard. With regards to silica exposure, implementation of the resulting joint NIOSH/OSHA recommendations on engineering controls, respiratory protection, and employee monitoring carries the potential to save thousands of workers from the devastating health effects of silica exposure. As the NIOSH systematic and targeted assessment process moves forward, the characterization of worker exposures is likely to precede that of potential community exposures.

(1) http://www.cdc.gov/niosh/programs/oilgas/risks.html
(2) http://www.cdc.gov/niosh/docs/2010-130/pdfs/2010-130.pdf
(3) http://www.iom.edu/~media/Files/Activity%20Files/Environment/EnvironmentalHealthRT/2012-04-30/Esswein.pdf
(4) http://blogs.cdc.gov/niosh-science-blog/2012/05/silica-fracking/
(5) http://www.osha.gov/dts/hazardalerts/hydraulic_frac_hazard_alert.html
(6) http://www.osha.gov/dts/hazardalerts/hydraulic_frac_hazard_alert.html
(7) http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=DIRECTIVES&p_id=3790#g
(9) http://cfpub.epa.gov/ncea/CFM/recordisplay.cfm?deid=29060
(11) http://www.iom.edu/Activities/Environment/EnvironmentalHealthRT/2012-APR-30.aspx
(13) http://www.iom.edu/Activities/Environment/EnvironmentalHealthRT/2012-APR-30.aspx
(16) http://www.dec.ny.gov/docs/materials_minerals_pdf/rdsgeisch6b0911.pdf


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“Horrible Calamity: Falling of the Pemberton Mills at Lawrence Massachusetts”

By Kathleen C. Lawrence, RN, COHN

So read the headlines of the New York Times, January 11, 1860. The collapse of the Pemberton Mill was the worst industrial accident of its time. In comparison to the most notable of all industrial accidents, the Triangle Shirtwaist Fire of 1911 in New York, the similarities are disturbing. The Triangle Shirtwaist fire claimed the lives of 146 employees; most were immigrants, most were women, and most were young women. It is difficult to imagine that another tragedy of that magnitude occurred right here in New England some 51 years earlier. The Pemberton Mill was responsible for the death of more than 120 people, although estimates vary from 98 to 145. It was also responsible for 300 injured workers in the devastating collapse and subsequent fire.

The massive Pemberton Mill was one of many mills constructed in the Lawrence, Massachusetts area in the 1800’s. The Pemberton Mill stood six stories high in an area the size of a football field. It was 280 feet long by 84 feet wide. The mill was part of an intentionally planned city whose focus was to harness the power of the Merrimack River for the textile industry. Separated from the city by the north canal, construction of the Pemberton Mill began in 1853 and factory production was underway a year later. After a financial panic in 1857, the mill was sold to George Howe and David Nevins, Sr. They turned it into a profitable business. The Pemberton mill housed 650 looms and 2900 spindles. It used 60,000 pounds of cotton every week to generate 115,000 yards of fabric. Seeking to meet demand, the owners agreed to add production in the attic, the sixth floor of the building.

The Pemberton employed 1003 people at the time of the collapse. Sixty-two percent of the workforce was female. It employed two
distinct types of workers. The first type consisted of workers from small New England farms. These workers left their familiar, rural surroundings in search of steady employment from the mill. The second type were European immigrants, mostly Irish. In fact, seventy-eight percent of the workforce was foreign born.

January 10, 1860 began as just another day at work for so many in the mill. At 4:47 p.m., just before the whistle to announce the end of the shift, workers had just finished moving heavy machinery on the fourth floor. Suddenly, the mighty Pemberton Mill crumbled. Dust and debris filled the air as heavy machinery, yards of fabric, bricks, and mortar, flooring planks, and iron columns crashed down layer upon layer. Hundreds of workers were trapped in the rubble. People in nearby mills reportedly heard the rumble and saw the aftereffects. Their descriptions were consistent with what would appear to be a modern day, planned, building implosion.

Volunteers raced to the mill area to aid in the rescue efforts. Two narrow bridges spanned the canal that separated the rescuers from the mill. As the rescue efforts continued, the shortened daylight hours of a cold New England winter began to fade into evening. Lanterns were lit to assist the rescuers in their mission to free the wounded. At approximately 10 p.m., five hours after the mill collapse, an oil lantern being used to aid the rescue efforts was knocked into the debris, igniting a fire. The fire spread rapidly, fueled by mounds of cotton and fabric in the rubble. The flooring, rich with machine oil, added yet more fuel to the raging fire.

Firefighters, police, doctors, and common citizens came from around New England to offer assistance. Lawrence City Hall was transformed into a hospital and morgue. The morgue was called simply, “the dead room”. There, family members came to claim their loved ones.

This tragedy made headlines across the nation. The cause of the collapse was primarily attributed to inconsistencies in the quality of the cast iron support columns. The walls of the Pemberton Mill were thin and described as being only two bricks deep instead of three. Architect-engineer Charles Bigelow was responsible for the catastrophe, but neither he nor any the owners ever faced criminal charges.

In his books The Pemberton Casualties and Disaster in Lawrence: The Fall of the Pemberton Mill, Alvin Oikle describes in detail the horrific events of that day and the days that followed. He also manages to capture the personal and human side of its workforce. Young Margaret Hamilton, for example, began work at the Pemberton Mill on January 10, 1860. She was one of three children of Mary Ann Hamilton, a widow. Margaret’s earnings of forty-two cents per day were essential to her family’s survival. Sadly, Margaret did not live to collect her first and only day’s pay. She was only 14 years old.

Many of the victims were buried in the Mary Immaculate Cemetery. One such victim was Ann Sullivan. Ann was an 18-year-old immigrant from County Kerry, Ireland. Her gravestone is engraved with the image of a gentle female hand pointing up to heaven. Many of the victim’s gravestones are engraved with the phrase “killed at the Pemberton Mill” rather than simply “died”. This statement implied that the mill collapse was a result of greed and neglect. Ironically, many of the graves are located in an area of the cemetery that overlooks the city and the mill.

This tragedy took place before a structured state benefit system or workers’ compensation was established. The families of those killed and injured as well as those now unemployed relied on charitable assistance. Then Lawrence Mayor, Daniel Saunders Jr. summed up the tragedy with this statement: “There are many cases which call for speedy aid and sympathy. Nine hundred people upon whom 3,000 were dependent for support are out of employment. Young children have lost their parents; brothers and sisters, dependent upon each other, are separated; aged and infirm parents, dependent upon their children are now childless.”

Resources:

Pemberton Mill (Continued from page 6)

Lawrence Heritage State Park: http://www.mass.gov/dcr/parks/northeast/lwp.htm


(Kathleen Lawrence is Nurse Supervisor, Dept of Occupational and Environmental Medicine, Dartmouth-Hitchcock Nashua)
NECOEM Launches FMCSA Training

By Ron Blum, MD, FACOEM

The new Federal Rule mandates that by May 2014 all examiners of DOT certified drivers, e.g. commercial truck and school bus drivers, will need to be entered on the National Registry of Certified Medical Examiners. You must first complete a mandated training course in order to sit for the qualifying examination. NECOEM is designated as a certified Federal Motor Carrier Safety Administration (FMCSA) training organization. On December 1, as an add-on to our 2012 NECOEM Annual Conference in Newton, we presented our first complete full-day course. While anticipating up to fifty students, we faced an eager audience of seventy-two physicians, PAs and NPs. All responses confirm that the program was well received. Attendees who have subsequently taken the certifying examination report the course and accompanying materials were particularly helpful.

The potential for a shortage of certified examiners when the Rule goes into effect next year is a valid public health concern. This could severely hamper truck and school bus transportation. While Occupational physicians alone could not fulfill the need nationally, we should lead the way in promoting certification and assuring quality. The alternative is to leave the responsibility to chiropractors and mid-level providers, who are eager to expand their scope of practice.

NECOEM hopes to fill a need in provider’s education by offering this program throughout New England. Alternatives to our course include a program sponsored by ACOEM and various on-line presentations. We will be offering our eight hour presentation on **Saturday, April 13, at the Sunday River Ski Resort, in Newry, Maine**, where discounted lodging and ski passes are available. **A repeat program in Massachusetts will be held in Springfield on Saturday, September 21.** Additional venues are under consideration. If your institution, practice or organization is interested in offering the course to a recommended minimum of twenty students, please contact NECOEM.

Our course faculty consists of Ron Blum, MD of Maine, Jay Poliner, MD of Connecticut, and Bernard Bettencourt, DO and Robert Swotinsky, MD of Massachusetts.

(Use Blum is a member of NECOEM Board of Directors)

Register and find more information at NECOEM.org.

New York Snapshot: A Word from the President of NYOEMA

By David D'Souza, MD, MPH

President, New York Occupational and Environmental Medical Association (NYOEMA)

Hi from NYOEMA! Thank you for the opportunity to feature the New York component and its activities in your newsletter. I, along with a few others from my component, attended NECOEM’s Annual Conference last fall and was impressed by the clinical relevance of the educational sessions as well as the number of attendees. Since I became president last November I have been reaching out to other northeast area components, including NECOEM, looking at ways to enhance educational opportunities for our component, and expanding it to include other occupational health practitioners in the state.

As you know, Superstorm Sandy caused tremendous damage in the NY/NJ area last October. My hospital in downtown Manhattan was the only functioning hospital below 34th Street during and for several weeks after the storm passed. In fact, 3 months later, we are still running at surge capacity levels, though with the reopening of Bellevue and NYU hospitals in recent days, we expect levels to decrease shortly to pre-Sandy levels. This is, however, a mild inconvenience when compared to the devastation from flooding to homes and businesses along the waterfront in NY, NJ and CT. Over the next few months and through the summer, we expect to see an increase in health complaints from residents and workers in the affected area. To that end, ACOEM convened a conference call between northeast and mid-Atlantic components to develop a plan to obtain resources for treatment, education and research on the perceived and anticipated health effects post-Sandy. New York component members have taken the lead, working on a concept paper and eventually a proposal to be circulated to entities responsible for distribution of disaster relief. We are developing a speakers’ bureau to give lectures to primary care physicians and residents from affected areas, to address their health concerns. I would like to invite NECOEM members with an interest in mold, remediation, and respiratory protection to join our roster of speakers.

With members of the NECOEM board, we have been discussing topics for mini-conferences to be sponsored by both components and to promote one another’s programs. Some suggestions were: an academic forum for medical school students and administrators, to promote occupational medicine, or possibly a conference related to Sandy and the safety of workers involved in cleanup and
construction. The NY component also plans to host dinner meetings in NYC and with the Pennsylvania component, in Philadelphia, and will invite you to our component’s programs.

Should you need to reach me, my email address is: ddsouza@chpnet.org. I look forward to an exciting year and to meeting many of you at our joint conferences and at the AOHC in Orlando.

(Dr D’Souza is Medical Director, Occupational Medicine, Beth Israel Medical Center, New York, NY)

Wood Biomass for Heat and Power: Addressing Public Health Impacts
By David V. Diamond, MD, FACOEM

In November 2011, the Lowell Center for Sustainable Production hosted a science policy symposium on the public health implications of using wood biomass to provide heat and power for industries, commercial enterprises, institutions, and the electricity grid. The participants included senior staff and officials from state and federal health, environment, education, forestry, and energy agencies across the Northeast, as well as scientists, health professionals and representatives of advocacy organizations and the biomass industry. NECOEM was one of the sponsors; Dr. David V. Diamond, NECOEM Treasurer/Secretary was in attendance.

Key Conclusions
- Burning wood produces hazardous compounds.
- Increasing use of wood combustion as a source of heat and power poses risks to human health. Potential health impacts on children from the use of wood boilers in schools are of particular concern.
- Existing state-of-the-art technologies can dramatically reduce emissions.
- Emissions from non-residential wood combustion vary widely, depending on a range of factors that are difficult to control. However, state-of-the-art boiler design and emission controls can substantially reduce levels of pollutants.
- Public policies do not promote the cleanest technologies.
- Public policy incentivizes the burning of wood biomass as an alternative energy strategy, but does not distinguish between state-of-the-art boilers that can meet the strictest global standards versus higher emission technologies that are more widely available.
- Gaps in regulation of wood biomass combustion should be filled.
- Wood biomass boilers are not scrutinized sufficiently or consistently in many states to ensure protection of public health. Neither federal nor state regulations consider risks of peak exposures of fine particulates when high levels are released over short periods of time, nor do they routinely take into account the susceptibility of local populations during air permit processes.
- Collaborative action is needed.

Sectors, government agencies, and states in the Northeast can collaborate to protect public health as wood biomass burning proliferates. Leadership by public and private parties should:
- Engage the public and prioritize public health in energy decision-making.
- Advance understanding of risks and better protect susceptible populations.
- Incentivize only the cleanest-burning wood boilers available.
- Establish consistent and health-protective regulations for boilers across the Northeast states.

Priority action steps to implement these recommendations are described in “Wood Biomass for Heat and Power: Addressing Public Health Impacts”, available at the following link:

In 2011, the Vermont General Assembly passed Act 48 with the intent to contain health care costs and provide health care coverage for all Vermonters through Green Mountain Care (GMC). Currently, Vermont government officials are exploring options to provide covered workers’ compensation (WC) medical services through GMC.

An integrated system may mean better access and lower costs; however, as WC insurance covers medical care and indemnity, handling medical care under GMC may mean loss of: (1) focus of WC medical care, which is meant to restore the claimant to their pre-injury/illness state; and (2) control of factors that contain indemnity costs. Additionally, inclusion of WC medical care under GMC may mean having employers forego responsibility for medical care for occupational injuries and illnesses, which could compromise workplace safety.

Vermont has one of the highest occupational injury and illness rates (OII), and probably has one of the higher rates of WC claims rates, in the United States. This is not likely due to the industry mix in Vermont, but is likely due to a relatively permissive WC system that may result in:

(1) inappropriate acceptance of non-work related problems as OII and WC claims in Vermont when they would appropriately not be accepted as such in jurisdictions with lower claims rates;

(2) appropriate acceptance of work related health problems as OII and WC claims in Vermont when they would inappropriately be denied in other jurisdictions with lower claims rates;

(3) a combination of (1) and (2).

There are arguments for both under- and over-reporting in WC. What is certain is that there is misreporting in WC. Addressing misreporting requires better data and application of scientific principles.

Establishing causation in occupational illness requires an accurate diagnosis, quantification of exposure, and support from population studies of a link between diagnosis and exposure. Unfortunately, Vermont has no standards for WC documentation, and establishment of causation rests on legal precedents set before 1900. Causation determinations rely on assertions and opinions that are often unsupported by what is now considered high-quality medical evidence. Standards of medical evidence, such as Hill’s criteria and the National Institute of Occupational Health and Safety approach of Kusntiz and Hutchinson, have little standing. When disputes about causation exist, resolution often rests on an adjudicator finding witnesses persuasive rather than on good quality scientific information.

Relationships between (1) personal and occupational factors and (2) illness may be detected through the collection and analysis of accurate data about personal characteristics, habits, and occupational exposures. Good data could be used for prevention and early detection of health problems, and to support or refute claims that workplace factors cause illness.

Care of WC claimants is based on health care providers’ personal decisions. When needed care is not offered, or when ineffective or unnecessary care is offered, an effective means of recognizing the shortfall should be available. There are treatment guidelines formulated using the tenets of Evidence-Based Medicine that provide a good default basis for WC medical management.

Ending a WC claim depends on full recovery of the claimant, or partial recovery with a plateau in the condition after which no significant improvement is likely regardless of medical care. There is no guidance in Vermont for determination of the end point or what supports disability.

To make its WC system fairer, and more efficient and effective, Vermont should consider:

• setting standards for documentation

• modernizing its evidentiary standard

• promoting the collection of occupational data in the health record
• adopting evidence-based guidelines for default medical management
• specifying standards for determination of disability
• adopting guidelines for default determination of an end point.

If inclusion of WC medical management in GMC means better access, better data, quicker and more reliable detection of occupational problems, fairer determinations of causation, and better medical management guided by modern standards of medical evidence, a fairer, more efficient WC system would be a more likely result of Vermont’s reform efforts.

(Dr Nelson Haas is on the NECOEM Board of Directors. He is medical director at North Country Hospital in Newport, Vermont)

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