

Deconstruction vs. Demolition: Portland, Oregon's Potential for Groundbreaking Health and Safety Studies in Building Demolition

By Sara Badiali

Demolition: deliberate destruction of a building or other structure.¹

Deconstruction: the systematic dismantling of a building in order to recover the maximum amount of materials for reuse and recycling.²

The City of Portland is poised to contribute to the study of health and safety in building removal. The Deconstruction Ordinance will take effect starting October 2016. The ordinance outlines single family homes built before 1916 must be deconstructed for material reuse. Deconstructing buildings will greatly lower greenhouse gas emissions and material disposal in landfills over traditional demolition. Deconstruction not only provides access to unique materials but also viable building materials that would otherwise go to waste. The Deconstruction Ordinance will provide the first ever opportunity for side by side comparisons of demolition versus building deconstruction for environmental health and safety measures.

Portland presents an environment of blistering-fast paced development, houses upwards of one-hundred years old, and established demolition and deconstruction companies. Residential interest in environmental health and safety is at an all-time high due to incidents pertaining to lead and radon, and unprecedented housing demolition. Portland is also home to multiple academic organizations specializing in environmental health issues, health sciences, urban planning, and architecture.

By hosting studies of building removals, new information will lead to a better understanding of hazardous material reductions and ultimately best practices. Consequently research in Portland could be the catalyst for laws regulating more than standards for lead dust fall, but also heavy metals, asbestos, and water contamination in demolition practices.

Hazardous Particulates in Buildings

When a building is demolished, the mechanical action of crushing creates particulates of dust from the building's materials. These particulates enter the air and spread throughout the environment. Machines repeatedly driving over the worksite further circulate these particulates. Atmospheric conditions like wind can exacerbate the spread of dust.

There are currently no U.S. federal regulatory standards for lead dust fall, exterior settled dust, or dust-suppression methods in housing demolition.³ There are also very few demolition dust fall related studies, or inquiries into whether hand dismantling structures (deconstruction) reduces the spread of potentially hazardous air particulates.

Lead and asbestos are by far the most studied and discussed of hazardous materials attributed to buildings. Asbestos is proven to cause the fatal diseases asbestosis, pleural disease, and lung cancer. According to a 2011 survey by U.S. Department of Housing and Urban Development Office of Healthy Homes and Lead Hazard Control, over 37 million homes have lead based paint somewhere in the building.⁴ The majority of hazardous lead is in homes built before 1978.

One study indicates that 37 billion square feet of building components are coated with deteriorated lead-based paint.⁵ A 2008 study of lead exposures in U.S. children found that "Exposure to lead can occur from many pathways and sources, but housing is the main pathway of exposure in the U.S., accounting for approximately 70% of childhood lead poisoning cases."⁶

There are other less well known potential health hazards in buildings. Arsenic and heavy metals like chromium, copper, iron, and manganese are harmful to humans. These heavy metals are thought to be from use of pressure treated wood manufactured before 2003. Mercury is a common toxic waste present in buildings, including gas pressure regulators, boiler heating systems, and thermostats. According to the Massachusetts Water Resource Authority "The amount of

mercury present in one mercury thermometer is enough to pollute 5 million gallons of water.”⁷ That is the capacity to contaminate a 20-acre lake with enough mercury to result in a fish consumption warning, says Wastecap of Massachusetts. Benzene, a chemical related to natural gas, is also found harmful to humans. Environmental dust is especially problematic for people who suffer from asthma.

Portland citizens consistently and effectively raise standards of living in many areas including residential health and well-being. Consequently we are now facing a population increase and housing deficiency. It is uncharacteristic for Portland residents to be passive in the face of opportunities to increase knowledge, and to contribute to the vitality and livability of our community. Studies of demolition vs building deconstruction in the Portland area will provide groundbreaking information in environmental safety. Like many other Portland initiatives, information gained by these studies will go on to improve cities around the world.

Water Use in Dust Suppression

Water safety is a national concern, and a vital interest to Portland citizens. By studying the effects of demolition on ground water, we can continue to be informed of our water safety and best practices in our water usage.

When studied, use of water for dust-suppression shows to reduce particulates in the air. However as one group in Chicago attempting to measure the exact impact found, demolition sites vary greatly in dust-suppression methods or have none at all.

“Some site crews used no water; others used a fire hose focusing mostly on demolition equipment, while others consistently used a fire hose and sprayed down debris piles. At all sites, visible dust emissions were observed and often we could smell and taste the gritty air. At some demolition sites, the structure was consistently wetted, before and after an area was demolished. At other sites, the water appeared to be used for little more than to cool off the demolition equipment.”⁸

If water is consistently and accurately used on materials during demolition, dust particulates in the air are sometimes reduced as found in a 2008 study of 3,000 demolished homes in Chicago.⁹ But what happens to those particulates after they are mixed with clean water?

If done correctly the water is stopped from going into the sewer systems by caps, which are then collected to be disposed of as hazardous material. In a 2008 interview Trip Turner from Elder Demolition in Portland, Oregon, explained that the water can pick up benzene, a chemical in natural gas along with other particulates.¹⁰ Elder Demolition uses 1 to 2 inch diameter hoses, for a 5,000 square foot building demolition they typically use 6,000 gallons of water. That is an estimated 1.2 gallons of water per square foot of building. Over a gallon of clean water is used then, for dust-suppression for every square foot of a building that is being demolished.

If a demolition company does not use caps, then the water goes directly into the sewer system. Despite capping or other preventative measures, water used for dust-suppression still directly enters the ground at the demolition site. This water will saturate the soil with whatever hazardous materials the building contained. Eventually these particulates find their way to the water table.

Demolition Notification

Researchers from the National Center for Healthy Housing found that further studies are needed, and more people in greater distances need to be notified of building demolition. Neighbors within a minimum of a 400 foot radius should be notified of an upcoming demolition and the consequential exposure to particulates in air and water.

“Lead dust suppression is feasible and important in single-family housing demolition where distances between houses are smaller and community exposures are higher. Neighbor notification should be expanded to at least 400 feet away from single-family housing demolition,

not just adjacent properties. Further research is needed on effects of distance, potential water contamination, occupational exposures, and water application.”¹¹

It is clear more data is needed in this area and more consistency in the methods employed by demolition companies. It may reduce particulates in the air, but use of water does not significantly reduce health and safety issues related to exposure to demolition dust fall on the ground. If used the cost of water pumping trucks, water-soaked debris, and hazardous materials disposal are all cost prohibitive conditions for demolition companies who choose to perform dust suppression. Until there are Federal regulations and not just guidelines, use of water on demolition sites will be inconsistent.

Portland can provide much needed information on the effects of distance, potential water contamination, occupational exposures, water application, and neighborhood notification by hosting studies of building removals. Contributing current and accurate data will lead to a better understanding of hazardous material reductions and ultimately concise regulations, eliminating potentially dangerous practices.

Building Deconstruction

There is no demolition of building materials in deconstruction because the intent is to salvage materials to be reused. Any materials that cannot be reused are recycled, and only non-recyclable debris is waste. Deconstruction is primarily done by hand. Without crushing materials by mechanical equipment there is little to no dust fall, exterior settled dust, and no need for dust suppression methods.

The majority of buildings have materials that are salvageable, but often the most desirable are those built before the 1980's because the quality of components are often superior to newer builds. Therefore health hazards like lead paint are a deconstructionist's normal work environment. Asbestos abatement, worker safety measures, and structure evaluation are standard operating procedures before a deconstruction is performed.

Portland has an established deconstruction trade, with companies specializing in deconstruction both as the primary and secondary businesses. There are organizations that train workers in deconstruction, including strict health and safety details of dismantling buildings. The City of Portland has adopted the Building Material Reuse Association's Deconstruction Certification which was created by over a dozen national deconstruction experts. One of those experts with over 25 years of experience is Dave Bennink, who is currently overseeing the certification process of new and existing deconstruction companies in Portland. By October 2016, this certification is the standard for all deconstruction companies in Portland.

Deconstruction Notification

While deconstruction typically takes longer than demolition, the advantage is that neighbors are notified by the presence of workers in the area. Just like in construction, responsible companies notify the neighbors of crew's schedules, noise expectations, and supervisors contact information. In demolition, if neighbors are not notified they can be surprised that a building is there one day and is completely gone the next. With such fast turnover, there is no recourse if hazardous materials were missed in the primary building assessment.

According to Stephen Reichard, the Executive Director of the ReBuilding Center in Portland, their Deconstruction Services dismantled 51 houses from 2012 to 2015. Following standard procedures, all buildings were tested prior to deconstruction and declared asbestos free. During the process of deconstruction, hidden asbestos was uncovered by workers in 26 of the buildings. If deconstruction techniques are potentially finding that 50% of asbestos is being missed in standard building assessments, what happens to missed asbestos in traditional mechanical demolition?

Deconstructionists have intimate knowledge of every board and brick of a building they are working on. The process is slower, and there is opportunity to discover hidden hazardous materials. Even if asbestos is found in components as small as pipe wrappings, workers are not allowed to resume the deconstruction process until it is abated. By law, any

material containing lead must be labeled on the jobsite by the workers before being sold for reuse. Health and safety training, effective communication, and hazardous material identification are standard procedures for deconstruction contractors.

Portland deconstruction businesses will triple their capacity after the Deconstruction Law begins in October. There will be approximately 100 single family houses available as potential case studies. Opportunities for researching dust fall, airborne particulates, hazardous material handling, neighborhood notification, and best practices in building deconstruction will be accessible. Along with no shortage of demolition sites, these are prime conditions for collecting much needed data for groundbreaking health and safety studies.

Portland's Potential

Protection from hazardous materials in our air and water is a basic right. Housing demolition creates conditions which potentially compromise human health, especially children's health. There are no official studies comparing air particulates and dust fall in demolition verses deconstruction of buildings. However there is a national interest in this information. Brad Guy, Director of the Masters of Science in Sustainable Design program at The Catholic University of America in Washington, DC, collected dust fall data in Detroit, Michigan while conducting deconstruction trainings. He says there is academic interest and funding resources available for deconstruction studies. Since the passing of the City of Portland's Deconstruction Ordinance there are now great opportunities to provide resources in the form of buildings for comprehensive studies to take place. Portland presents a consistent environment of development, age of houses pre-dating 1978, both demolition and deconstruction companies, residential interest in health and safety, and multiple academic organizations specializing in environmental health issues.

The City of Portland is poised to contribute an unprecedented standard of health and safety in building removal. By providing a law to deconstruct buildings over 100 years old, Portland has already greatly contributed to decreasing landfill waste and emissions. By hosting studies of building removals, new information will lead to a better understanding of hazardous material reductions and ultimately best practices. Consequently research in Portland could be the catalyst for laws regulating more than standards for lead dust fall, but also heavy metals, asbestos, and water contamination in demolition practices. These studies can inform the development of more sustainable build removal practices that serve environmental and human health, while increasing green economy of reuse and recycling.

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Sara has a Master's degree in Public Administration from Portland State University. She created the website Reclamation Administration.Com, a building material reuse news website in 2011. Sara began her carrier in building material reuse in 2005 coordinating projects for Deconstruction Services at the ReBuilding Center in Portland, Oregon. She served as the board chair for the national nonprofit Building Material Reuse Association in 2014. She is currently serving her second year on the City of Portland's Deconstruction Advisory Group. Sara is the author of five articles on building material reuse and deconstruction practices which you can find on ReclamationAdministration.com.

¹ Merriam-Webster Dictionary – Merriam-Webster.com

² Introduction to Deconstruction: A Comprehensive Training – Building Materials Reuse Association

³ Metals in Dust Fall from Single Family Housing Demolition. Public Health Reports / November–December 2013 / Volume 128 p.455.

⁴ U.S Department of Housing and Urban Development – Portal.Hud.Gov

⁵ The Prevalence of Lead-Based Paint Hazards in U.S. Housing. Environ Health Perspect 2002;110:A599-606. Jacobs DE, Clickner RL, Zhou JY, Viet SM, Marker DA, Rogers JW, et al.

⁶ Lead Exposures in U.S. Children, 2008: Implications for Prevention. Environ Health Perspect 2008;116:1285-93. Levin R, Brown MJ, Kashtock ME, Jacobs DE, Whelan EA, Rodman J, et al.

⁷ "A Healthy Environment Starts at Home" booklet – Massachusetts Water Resources Authority

⁸ Lead Dustfall from Demolition of Scattered Site Family Housing: Developing a Sampling Methodology. Environmental Research 109 (2009) 143–148 Amy Pelka Mucha, Nicole Stites, Anne Evens, Patrick M. MacRoy, Victoria W. Persky, David E. Jacobs

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¹⁰ Drowning In Demolition. Sara Badiali. ReclamationAdministration.com March 2014

¹¹ Metals in Dust Fall from Single Family Housing Demolition. Public Health Reports / November–December 2013 / Volume 128 p.455.