Healthier Tribal Housing: Combining the Best of Old and New

Nate Seltenrich

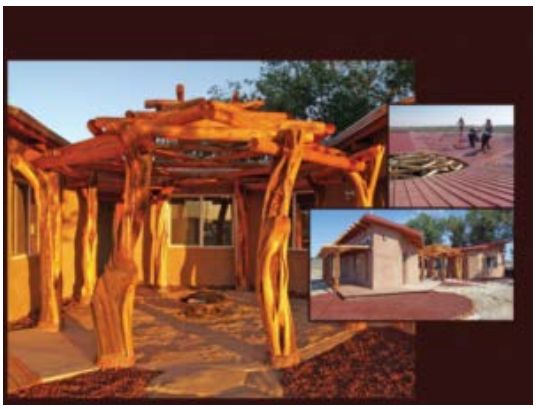
Nate Seltenrich covers science and the environment from Oakland, CA. His work has appeared in *High Country News, Sierra, Earth Island Journal,* the *San Francisco Chronicle,* and other local and national publications.

The American Indian is of the soil, whether it be the region of the forests, plains, pueblos, or mesas. He fits into the landscape, for the hand that fashioned the continent also fashioned the man for his surroundings.

— Luther Standing Bear (1868–1939)
Oglala Lakota Sioux

Comprehensive statistics are hard to come by, but anecdotal evidence suggests mold infestation is an extensive problem in Native American tribal housing. At the Oglala Sioux Pine Ridge Indian Reservation in South Dakota, the Oglala Lakota Housing Authority has reportedly estimated that 75% of homes may be contaminated with mold. A 2010 Montana State University study of 406 homes on reservations throughout the state identified visible mold growing in the bathrooms of more than a third.[1] And the Associated Press reported in 2001 that at least 320 homes in a single housing development on North Dakota's Turtle Mountain Indian Reservation were contaminated with mold, two-thirds of them so severely that they had to be destroyed.[2]

Mold has long been a concern for most of Alaska's 225 federally recognized tribes, notes Ruth Etzel, a pediatrician and professor of epidemiology at the University of Wisconsin, who previously was medical director of research at the Alaska Native Medical Center in Anchorage. "When we talk to tribal leaders, the thing that comes up over and over again in Alaska is mold," she says. Mold is also common, though perhaps less pervasive, in tribal homes in warmer climes including California, Arizona, and New Mexico.



Architect Daniel Glenn and colleagues at Arizona State University built a model sustainable home in Nageezi, New Mexico. The model home incorporates design elements of the traditional Navajo *hooghan*, such as passive solar temperature control and thick walls for added insulation from the desert heat. The corbelled cedar pergola over the central courtyard mirrors the distinctive architecture of the *hooghan*.

Archival photograph shows a Navajo *hooghan*, c. 1906. These structures of wood and packed earth are traditionally situated with the door facing east to receive the sunrise.

Simeon Schwemberger

Exposure to indoor mold has been strongly linked to asthma symptoms and hypersensitivity pneumonitis in sensitive people as well as wheeze, cough, and upper respiratory tract symptoms. There also is evidence exposure may contribute to asthma development, lower respiratory illness, mucous membrane irritation, immune diseases, neurologic and gastrointestinal problems, skin symptoms, shortness of breath, and lung bleeding among infants.[3]

Asthma and other respiratory illnesses are prevalent among Alaska Native and American Indian people. In 2010 the prevalence of asthma in Native adults was 10.5%, compared with 7.8% in white adults and 10.5% in black adults.[4] Among Native children, asthma prevalence in 2004–2005 was 9.9%, compared with 7.9% in whites and 12.9% in blacks (more recent data are unavailable).[5]

A convergence of housing-related factors may be partly to blame for increased disease risks among Native peoples, including poorly designed and constructed homes, poverty, overcrowding, insufficient indoor ventilation, and use of wood-burning stoves. These factors can contribute to increased concentrations of an array of indoor air pollutants, each with its own suite of health effects: mold and mildew, volatile organic compounds,[6] formaldehyde (in furniture and treated wood), radon,[7] particulate matter, asbestos, lead and mercury (in paint dust), and carbon monoxide.[8]

But if housing is a problem, it may also be a solution. Tribes across the country are now working—often independently, but increasingly in a collaborative matter—to build healthier homes that employ sustainable, locally sourced, and often natural materials. These homes operate efficiently and passively, taking advantage of warmth from the sun and cooling from shade and wind, and they respond to local climate. They also promote cultural customs for holistic health and draw on traditional building techniques and designs.

Members of the Pinoleville Pomo Nation helped build modern, wood-framed homes in Ukiah, California. The breathable wall systems—which consist of straw bales and adobe-like cob, covered with a finish layer of clay-based plaster—prevent the buildup of moisture, a typical cause of mold problems in poorly insulated homes. The rounded walls are reminiscent of traditional Pomo architecture.

The straw bales in the Pinoleville Pomo homes not only provide excellent insulation but also pay homage to the traditional use of tule, from which the Pomo created numerous items including shelters, boats, and household goods. In this archival photograph, a woman cooks acorns in front of a tule shelter, upper Lake Pomo, c. 1924.

Edward R. Curtis, courtesy of Library of Congress

In recent years, the trend has garnered support from federal programs including the Tribal Green Building Initiative[9] of the U.S. Environmental Protection Agency (EPA), which offers technical assistance to tribal leaders, and the Sustainable Construction in Indian Country Program of the Department of Housing and Urban Development (HUD),[10] which offers both guidance and funding opportunities. As it grows, the movement could be a boon for healthy living throughout tribal communities.

Overcoming a Legacy

The intimate link between housing and health on Indian reservations reaches back to the genesis of the reservations themselves, when, beginning in the 1850s and ’60s, the U.S. Government began inducing tribes “to give up their old homes by the promise of assistance in building new ones.”[11] That promise wasn’t always met, and even when it was, the tribes weren’t necessarily better off: By the 1870s, some of the first federally funded homes were recognized as substandard by government Indian agents, who noted some were devoid of furniture, in poor condition, decaying rapidly, and in some cases uninhabitable.

The problem worsened through the early twentieth century and into the 1950s, ’60s, and ’70s, when a housing boom funded by HUD and the Bureau of Indian Affairs (BIA) resulted in the construction of tens of thousands of single-family homes modeled on post-war tract housing.[12] Built to federal rather than local or state codes, these new wood-frame homes were constructed without regard for local climate. “If you go from reservation to reservation, you see this same house,” says Daniel Glenn, a Seattle-based architect who specializes in sustainable and affordable housing on tribal lands. “People would freeze in them in Montana and overheat in them in Arizona.”

They also were built with no regard for deep-rooted tribal customs, which vary widely across the country and bear on living arrangements, food-preparation practices, and heating preferences. Furthermore, the lack of trained inspectors on most reservations meant that builders were rarely scrutinized and thus were prone to cut corners.

Today, these “HUD homes,” along with ill-equipped trailers and other substandard homes, are at the root of many tribes’ mold and indoor air quality issues. And a severe housing shortage—at least 250,000 new housing units are needed on reservations nationwide[13]—amplifies the problem by accelerating wear and tear and contributing to indoor moisture levels as more occupants cook, bathe, and simply breathe in each home. Approximately one-third of Native homes are considered overcrowded, with large extended families often sharing one- and two-bedroom homes.[14]

The era of the undersize, cookie-cutter HUD house is ending, however, thanks to the Native American Housing and Self-Determination Act (NAHASDA) of 1996, which granted tribes authority over the use of HUD funds.[15] “From that point on, American Indian people living on reservations had their own ability to dictate the types of houses that they’d build,” Glenn says. “A big part of the message of HUD now is to say, ‘You’ve got this freedom to build whatever you want to build.’”

Tribes also have the freedom to formalize their new designs by developing codes to replace the less-suitable or ill-adapted codes previously used on their reservations. The outcome, in many cases, has been a hybrid of modern green design elements and indigenous knowledge passed down through the generations. This lineage, partially severed by the onset of the reservation era, is now poised to recover and to merge with the vanguard of contemporary homebuilding.

Straw Bales and Clay

At the 100-acre Pinoleville Pomo Reservation in Ukiah, California, such a transition is under way. In November 2012 a five-year design and construction process culminated in the completion of two prototype homes built with wood frames and highly insulating wall systems consisting of straw bales, cob (an adobe-like mixture of clay, sand, straw, and water), and a finish layer of earthen plaster (a blend of clay, fine aggregate, and fiber).

Designed to withstand harsh weather conditions on Alaska's North Slope, the Anaktuvuk Pass Prototype Home is modeled on traditional sod igloos of the region and features an earthen roof, spray-foam-insulated exterior walls bermed into the earth, a passive ventilation system called a *qingok*, and solar panels to supplement grid electricity. An unheated cold room stores game, a staple of the local diet.

© 2012 Meyerak/Getty Images

Traditional sod igloos were dug into the earth and framed with wood or whalebone. This archival photograph shows a dwelling on the banks of the Selawik River in Northwest Arctic Borough, Alaska, c. 1929.

Edward R. Curtis, courtesy of Library of Congress

Although the reservation's climate is relatively temperate, Pinoleville Pomo leaders have reported a significant mold problem in existing housing. "We could go into any one of these houses that was built with HUD money, and I'm sure we could find black mold if we looked," says Nathan Rich, a water quality specialist for the tribe. Asthma also affects many tribal members, young and old alike. Self-governance director Lenora Steele estimates that more than three-quarters of the reservation's 50 residents suffer from respiratory ailments—although she points out that emissions from nearby wood-processing facilities also likely add to the problem.

Rich, who will live with his three children in one of the two prototypes, is among those with asthma. "I'm definitely happy that these walls are earthen plaster," he says from inside the new home, which he helped build. Clay-based plaster resists mold due to its breathability, and clay's negative ionization is widely touted as absorbing positively charged toxicants and pathogens, although to date there has been only limited peer-reviewed study of this phenomenon in indoor environments.[16,17] Untreated earthen plaster can slowly release dust of its own as it ages, but this may be prevented with a sealing layer of paint, according to Croft Elsaesser, president of American Clay Enterprises, which sells such plasters.

The Pinoleville Pomo prototypes, funded by HUD under NAHASDA and by the Department of Energy through a grant program tied to clean-energy development,[18] will ultimately cost about $500,000 each, including planning and training expenses—triple the cost of standard HUD homes on the reservation. Tribal chairwoman Leona Williams says the tribe

hopes to reduce costs in future builds and to recoup some of the extra expense through energy, water, and health care savings, but has yet to make any formal projections.

The 2,300-square-foot homes, with three bedrooms and two bathrooms each, are carefully designed to conserve resources, featuring rooftop solar panels, grey water systems, rainwater catchment systems, ground-sourced heat pump systems, and an envelope designed for passive heating and cooling (see glossary). But what they offer health-wise is just as crucial. The entire wall system is mold- and pest-resistant. The heating and cooling system is emission-free. Concrete floors and clay-based paints don't off-gas volatile organic compounds. The use of earthen plaster and untreated wood eliminates the formaldehyde present in manufactured alternatives.

"It's important to keep it earth-friendly," says vice chairperson Angela James. "That's how our people lived a long time ago." Historically, before the arrival of HUD-funded homes, the tribe's shelters were built of oak and redwood. The tribe incorporated untreated redwood into the new homes through four posts in the center of each home. These represent the four directions, an important cultural symbol, and mark the perimeter of a sunken living room floor, above which an elevated skylight draws in natural light—all elements of the traditional Pomo meeting house. Adjacent to the sunken living room, an open kitchen/dining room combination reflects the tribes' interest in communal living.

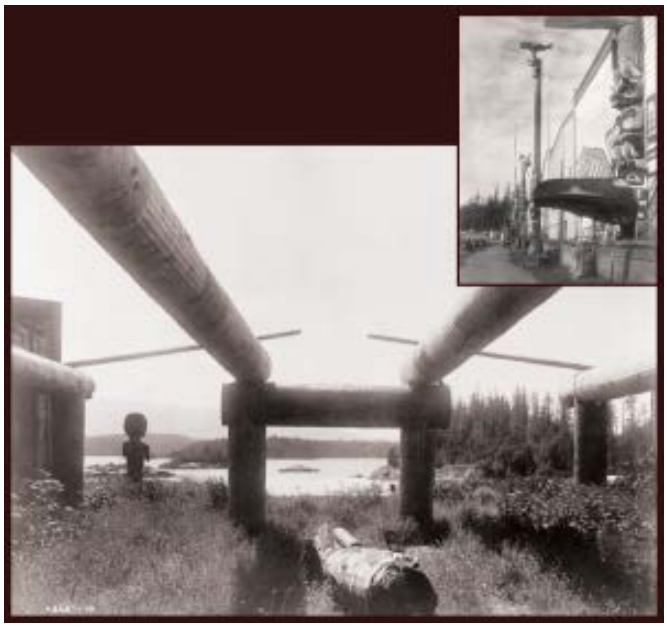
Straw, an agricultural by-product, was not historically used, but its presence in the new homes echoes the Pinoleville Pomo people's traditional use of tule, a sturdy rush-like species native to local freshwater marshes. Bob Gough, secretary of the Intertribal Council On Utility Policy (COUP), says the straw bales allow water vapor to pass through the walls; modern wall systems with vapor barriers prevent this movement, so the moisture concentrates and condenses inside the wall and provides an environment for mold to grow. Gough says this is often the result of well-intended energy-efficiency measures that "tighten" the house by sealing it up from air infiltration and drafts.

Once the prototypes are fully occupied, mechanical engineering researcher Ryan Shelby, who assisted with the design of the homes through an interdisciplinary program at the University of California, Berkeley, called CARES (Community Assessment of Renewable Energy and Sustainability),[19] will lead a monitoring program to assess indoor air quality. For at least one year, sensors will collect real-time data on temperature, humidity, particulate matter, radon, ozone, volatile organic compounds, and carbon monoxide. If the homes meet performance metrics specified by the Pinoleville Pomo and CARES, and if funds allow, the tribe may move forward with the design and construction of 25 to 30 similar homes. Shelby says this information could also be used to guide members of the tribe in retrofitting existing homes to improve indoor air quality and energy and water efficiency.

Unique Tribes, Unique Solutions

In late 2010 and early 2011, 16 years after passage of NAHASDA, COUP conducted the first-ever survey of tribal interest in green homes. The survey was designed to stimulate a national conversation among tribes on building codes.

Glenn also designed the Place of Hidden Waters Community Longhouse in Tacoma, Washington, which was awarded the LEED for Homes Project of the Year Award at the 2012 Greenbuild International Conference and Expo. The project includes elements of the traditional longhouse used by Pacific Northwest peoples, with a communal area lined on both sides by individual living spaces. The units feature structural insulated panels, triple-paned windows, and ground-sourced heat pumps.



Large image: Framing for a longhouse in the Kwakiutl village of Memkumlis, Village Island, British Columbia, c. 1910; inset: Kwakiutl village with longhouses and totem poles, Alert Bay, British Columbia, c. 1914.

Edward R. Curtis, courtesy of Library of Congress

Of the 39 tribes that responded, 34 reported they were aware they can now adopt their own codes when building with federal funds. Twenty-three worried that existing codes do not reflect cultural values. But the response to a question on tribes' hopes for new codes was most telling: Of the eight options offered, "healthy indoor air quality" ranked as the number-two priority, selected by all but 7 of the respondents. Only "reductions in energy consumption" scored higher, with 36 votes.

Gough issued a follow-up survey in November 2012, supported by 5 federal agencies and 45 tribal green-building representatives, which should reach more tribes and deliver more thorough data. Results are projected to be available in early 2013.

In the meantime, case studies are illuminative. Northern Idaho's Nez Perce Tribe is building 18 units of energy- and water-efficient straw bale townhomes designed to resemble lean-tos and oriented around central cul-de-sacs that mirror the layout of teepee encampments.[20] The Navajo Nation of Arizona, Utah, and New Mexico—North America's largest tribal group—is looking to address a massive housing shortage with traditional small-diameter log homes called *hooghans*[21] as well as modern homes featuring lightweight concrete walls finished with earthen plaster. The Ohkay Owingeh Tribe of New Mexico, intent on reviving traditional adobe construction, is in the midst of rebuilding a historic pueblo about 25 miles north of Santa Fe.[22] And the Crow Agency of southeastern Montana, of which architect Glenn is a member, is building more than a dozen homes of compressed earth block.[23]

"We're looking not just at green technologies but indigenous technologies," Gough says. "These designs have been developed over millennia."

Perhaps one of the most intriguing projects, in one of the nation's most unforgiving climates, is a prototype home built in 2009 in Anaktuvuk Pass, 100 miles north of the Arctic Circle on Alaska's North Slope.[24] Modeled after a traditional sod igloo, the home was constructed of modern materials—steel frame, plywood walls, soy-based spray-foam insulation—then capped with a sod roof and bermed into a man-made hillside to retain heat and block wind.

Poor ventilation due to concerns over lost heat have contributed to significant mold growth and high levels of indoor pollutants in Anaktuvuk Pass and throughout the North Slope region, says Daryl Kooley, executive director of the Tagiugmiullu Nunamiullu Housing Authority in Barrow, Alaska. HUD-funded homes are among those with problems. Kooley says six remote communities in the region, including Anaktuvuk Pass, also suffer from a housing shortage of some 183 units beyond the existing 547 households.

Anaktuvuk Pass residents boil most of their food, including hunted caribou, moose, and bear, so elevated interior moisture is unavoidable. But the prototype home was designed to handle this. "The whole construction of the house has been done with the issues of mold and humidity in mind," Kooley says. "Virtually everything that goes in is either mold-resistant or mold-proof."

Native technologies incorporated into the home include a passive ventilation system known as a *qingok*, which uses vents in the ceiling to draw out warm, moist air, and a cold-air trap called a *qanitchaq*, or "Arctic entryway" in the local Inupiaq language, a sort of foyer that seals off cold air from the main living space.

Since a local family took occupancy in January 2010, the home's indoor air quality has been monitored with an array of sensors for temperature, humidity, and carbon monoxide levels.[25] Preliminary results suggested the *qingok* was not bringing enough fresh air into the home, so the system was modified with forced air intake between June 2010 and December 2011 until ventilation—and all air quality measures assessed—improved to acceptable levels.

Lessons about ventilation learned from the home have since been integrated into a series of subsequent construction projects throughout the North Slope. Five similar sod homes have been constructed in the region to date, and funding is being sought for 24 more. "We're constantly adjusting the design based on what we've learned, based on what we like," Kooley says. "I think it's a wonderful opportunity to offer housing for the long term that will be healthier, all across the North Slope region."

Advancing Slowly

Curtis Munoz, environmental director for the Kiowa Tribe in Oklahoma, began researching the link between mold and health in tribal homes in the mid-2000s, when he served as a member of the National EPA–Tribal Science Council. "No matter where I called, they had problems with mold and indoor air quality," he says. "Mold is causing a lot of problems in the health of our people."

But the science he needed to confirm the connection was at best incomplete and often contentious.[26] Despite the prevalence of mold and other toxicants in substandard or poorly maintained tribal homes, neither the Native American Indian Housing Council, a tribal-housing advocacy group based in Washington, DC, nor the Indian Health Service, a division of the U.S. Department of Health and Human Services, has prioritized study of the relationship between indoor air quality and human health. Munoz addressed this disparity in a June 2010 presentation to the National EPA–Tribal Science Council, where he called for new clinical research to complement existing case studies on indoor air quality and health effects in tribal homes.[2]

Meanwhile, increased awareness has paved the way for incremental improvements. The Alaska Native Tribal Health Consortium recently launched a four-year plan to visit 60 existing Alaska Native homes and measure a host of indoor air pollutants before and after improving ventilation and replacing outdated stoves with cleaner-burning models.[27]Unpublished preliminary results show that "after work in the first fifteen homes, we did see reductions in carbon dioxide, [particulate matter], and volatile organic compounds," says program manager Aaron Salkoski. "In addition, the caregivers have reported better respiratory health for the children in our study."

Etzel, now working on prevention of health problems from household air pollution in Milwaukee homes, joins Munoz in calling for more research and systematic surveys on indoor air quality in general, but particularly on tribal lands and in Native villages. "There are huge gaps in our knowledge about a variety of serious diseases among people that may be linked to poor air quality in their homes, and these health consequences are potentially preventable," she says.

Native peoples face many environmental health challenges resulting from a variety of factors.[28] Although some risk factors for diseases—such as genetic predisposition—cannot be changed, others can, and Etzel says it is within our power to do something about exposures to contaminants in indoor air. "I feel quite strongly that we should take preventive action to improve household air quality," she says, "because we know that this will improve the health of children and families."

Glossary

building envelope: the outer shell of a building that physically separates interior and exterior environments.

grey water: water generated from domestic activities such as laundry, dishwashing, and bathing that is used onsite for landscape irrigation and constructed wetlands.

ground-sourced heat pump: a central heating system that relies on underground boreholes to store and extract heat.

passive heating and cooling: the process of using natural sunlight, shade, and wind to heat and cool a home through building orientation, materials, and other design features.

rainwater catchment: the collection and storage of rainwater, usually from a building's roof, for use both outdoors and, when properly treated, inside the home.

rooftop solar panels: used to supplement or replace grid electricity during the daytime.

References and Notes

1. Tribal Healthy Homes Center. Report of Activities and Outcomes: 2009–2012. Bozeman, MT:Montana State University Extension (May 2012). Note—this report is not currently available online.

2. Witte B. Mold Infestation Threatens Homes. Associated Press, via Emergingworlds.com (19 Aug 2001). Available:http://www.emergingworlds.com/ch_article.cfm?link=Mold_Infestation_Threatens_Homes.htm [accessed 6 Nov 2012].

3. Committee on Damp Indoor Spaces and Health, Institute of Medicine. Damp Indoor Spaces and Health. Washington, DC:National Academies Press (2004). Available: http://www.nap.edu/openbook.php?record_id=11011&page=R7[accessed 6 Nov 2012].

4. Schiller JS, et al. Summary Health Statistics for U.S. Adults: National Health Interview Survey, 2010. Table 4. Hyattsville, MD:National Center for Health Statistics, U.S. Centers for Disease Control and Prevention (Jan 2012). Available:http://www.cdc.gov/nchs/data/series/sr_10/sr10_252.pdf [accessed 6 Nov 2012].

5. Akinbami LJ. The State of Childhood Asthma, United States, 1980–2005. Table B. Advance Data from Vital and Health Statistics, No. 381. Hyattsville, MD:Office of Analysis and Epidemiology, National Center for Health Statistics (revised 29 Dec 2006). Available: http://www.cdc.gov/nchs/data/ad/ad381.pdf [accessed 6 Nov 2012].

6. EPA. Volatile Organic Compounds (VOCs) [website]. Washington, DC:Environmental Protection Agency (updated 9 Jul 2012). Available: http://www.epa.gov/iaq/voc.html [accessed 6 Nov 2012].

7. EPA. Radon: Health Risks [website]. Washington, DC:Office of Radiation and Indoor Air, U.S. Environmental Protection Agency (updated 26 Jun 2012). Available: http://www.epa.gov/radon/healthrisks.html [accessed 6 Nov 2012].

8. Vajani M, et al. Unintentional non-fire-related carbon monoxide exposures in the United States, 2001–2003. MMWR 54(2):36–39 (2005); http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5402a2.htm.

9. EPA. Tribal Green Building Codes: Development Guidance [website]. San Francisco, CA:U.S. Environmental Protection Agency, Region 9 (updated 29 Oct 2012). Available: http://www.epa.gov/region9/greenbuilding/codes/index.html[accessed 6 Nov 2012].

10. HUD. Akwesasne Housing Authority Site Visit [website]. Washington, DC:U.S. Department of Housing and Urban Development (updated 6 Nov 2012).
Available:http://www.huduser.org/portal/native_american/sustainable_construction.html [accessed 6 Nov 2012].

11. Office of Indian Affairs. Annual Report of the Commissioner of Indian Affairs, for the Year 1877. Washington, DC:Government Printing Office (1877). Available: http://digital.library.wisc.edu/1711.dl/History.AnnRep77 [accessed 6 Nov 2012].

12. Davis V. A discovery of sorts: reexamining the origins of the federal Indian housing obligation. Harvard BlackLetter Law J 18:211–239 (2002). Available: http://www.law.harvard.edu/students/orgs/blj/vol18/davis.pdf [accessed 6 Nov 2012].

13. Prepared Statement of Cheryl A. Causley, Chairwoman of the National American Indian Housing Council. Testimony before the U.S. Senate, Committee on Banking, Housing, and Urban Affairs. 24 Jul 2012. Washington, DC. Available:http://goo.gl/gwkVp [accessed 6 Nov 2012].

14. U.S. Commission on Civil Rights. A Quiet Crisis: Federal Funding and Unmet Needs in Indian Country. Washington, DC:U.S. Commission on Civil Rights (Jul 2003). Available: http://www.usccr.gov/pubs/na0703/na0204.pdf [accessed 6 Nov 2012].

15. HUD. NAHASDA (Native American Housing Assistance and Self-Determination Act of 1996) [website]. Washington, DC:U.S. Department of Housing and Urban Development (updated 6 Nov 2012). Available: http://goo.gl/csWJc [accessed 6 Nov 2012].

16. Haydel SE, et al. Broad-spectrum *in vitro* antibacterial activities of clay minerals against antibiotic-susceptible and antibiotic-resistant bacterial pathogens. J Antimicrob Chemother 6(2):353–361 (2008);http://jac.oxfordjournals.org/content/61/2/353.short.

17. Gedikoglu Y, et al. Employing volcanic tuff minerals in interior architecture design to reduce microbial contaminants and airborne fungal carcinogens of indoor environments. Toxicol Ind Health 28(8):708–719 (2012);http://tih.sagepub.com/content/28/8/708.abstract.

18. DOE. Pinoleville Pomo Nation—2010 Project [website]. Washington, DC:Office of Energy Efficiency and Renewable Energy, U.S. Department of Energy (updated 20 Aug 2012). Available:http://apps1.eere.energy.gov/tribalenergy/projects_detail.cfm/project_id=159 [accessed 6 Nov 2012].

19. CARES. Pinoleville Pomo Nation—UC Berkeley Coalition [website]. Berkeley, CA:Community Assessment of Renewable Energy and Sustainability (CARES), University of California, Berkeley/Pinoleville Pomo Nation (2012). Available:http://ppn.airjaldi.org/drupal/node/7 [accessed 6 Nov 2012].

20. HUD. Nez Perce Housing Authority Site Visit and Design Workshop [website]. Washington, DC:U.S. Department of Housing and Urban Development (updated 6 Nov 2012). Available: http://goo.gl/r6Pr2 [accessed 6 Nov 2012].

21. SouthWest Tradition Log Homes, Inc. [website]. Cameron, AZ:SouthWest Tradition Log Homes, Inc. Available:http://www.swtloghomes.com [accessed 6 Nov 2012].

22. Quick B. For Ohkay Owingeh, Project Means Housing Plus Preservation. The Santa Fe New Mexican, online edition (5 Jul 2010). Available: http://goo.gl/7dBBA [accessed 6 Nov 2012].

23. Olp S. Crow Agency Homes: Crow-Made Homes a Reality for Reservation's Residents. The Billings Gazette, Montana News section, online edition (25 Oct 2011). Available: http://goo.gl/IlwoJ [accessed 6 Nov 2012].

24. CCHRC. Anaktuvuk Pass Prototype Home [website]. Fairbanks, AK:Cold Climate Housing Research Center (2010). Available: http://www.cchrc.org/anaktuvuk-pass-prototype-home [accessed 6 Nov 2012].

25. CCHRC. Monitoring and Verification of Sustainable Northern Shelter Building Performance: Anaktuvuk Pass Prototype House Final Report. Fairbanks, AK:Cold Climate Housing Research Center (31 Dec 2011). Available:http://www.cchrc.org/docs/reports/NREL_DEC2011_AnaktuvukPass.pdf [accessed 6 Nov 2012].

26. Weinhold B. A spreading concern: inhalational health effects of indoor mold. Environ Health Perspect 115(6):A300–A305 (2007); http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1892134.

27. ANTHC. Healthy Homes [website]. Anchorage, AK:Alaska Native Tribal Health Consortium (2012). Available:http://www.anthc.org/cs/dehe/envhlth/ehc/healthyhomes.cfm [accessed 6 Nov 2012].

28. Hoover E, et al. Indigenous peoples of North America: environmental exposures and reproductive justice. Environ Health Perspect 120(12):1645–1649 (2012); http://dx.doi.org/10.1289/ehp.1205422.