WASHINGTON STATE UNIVERSITY
EXTENSION ENERGY PROGRAM

Indoor Air Quality in Northwest Schools

An electronic newsletter for school Indoor Air Quality (IAQ) exclusively for Northwest schools

Spring 2007

"The students learned that sometimes IAQ problems can be easy to fix. Sometimes it just takes making sure the HVAC system is on and working."

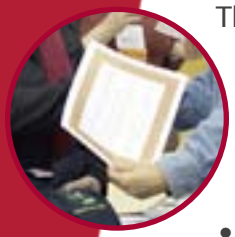
Kaye Martin
Gateways Learning Center
Springfield School District
Oregon

Help Draft Model Indoor Air Quality Management Plan

The following is an example of an indoor air quality management plan. The plan, submitted by a school district, is intended to generate discussion aimed at producing a model program that can be generally adopted. All contributions toward improving this plan are welcomed and encouraged. Send you suggestions and comments – or your district's plan to: Rich Prill of the Washington State University Extension Energy Program at *prillr@energy.wsu.edu*.

Indoor Air Quality Management Plan

The purpose of the IAQ management plan is to recognize, eliminate and otherwise minimize pollutants known or suspected to cause detrimental health effects and/or affect comfort and performance.



This plan was developed by the district to encourage everyone to practice "prudent avoidance" of indoor air pollutants toward protecting the health, safety, achievement, and productivity of all our building occupants.

Reduce Indoor Sources of Air Pollution:

- Ensure adequate ventilation with clean outside air and HVAC maintenance.
- Choose safer construction and finish materials.
- Choose safe and cleanable furnishings.
- Purchase and use safe cleaning supplies, and art and science supplies.
- Provide safe handling and safe storage guidance for all chemicals.
- Ensure proper use of ventilation hoods and exhaust fans where indicated.
- Scented products, deodorizers and personal fragrance should not be used.
- Remove allergens such as mold, old upholstery, wet ceiling tiles.
- Keep building clean and dry.

Keep Pollutants Out:

- Prevent vehicle exhaust and other pollutants from entering the air intakes.
- Avoid pesticide use whenever possible; practice integrated pest management.
- Avoid herbicide use on school grounds.
- Avoid burning when smoke could enter air intakes or pollute playing fields.
- Use walk-off mats at all entry doors.
- Seal air leaks from crawl spaces, storage closets and utility tunnels.

*See **Model IAQ management Plan** on page 2*

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School Indoor Air Quality Newsletter for Northwest Schools

A quarterly electronic newsletter exclusively for Northwest schools.

Please circulate this subscription opportunity throughout the Northwest to those who may be interested.

There are two ways to subscribe:

1) To view the newsletter, click here: *www.energy.wsu.edu/projects/building/iaq_nl.cfm*

The newsletter contains a link for subscription information.

2) Or, send a blank email message to: *subscribe-iaq@listserv.energy.wsu.edu*

You will receive a confirmation message. When you reply to that message you will be subscribed and will receive all future postings. You can easily unsubscribe at any time.

This broadcast email list not only provides automatic delivery of the quarterly School IAQ Newsletter, but includes announcements about news of interest, training events, grant opportunities, and other information useful to school districts, agencies, and stakeholders involved in school IAQ and operations and maintenance.

The newsletter is an opportunity for all interested parties to communicate, and add to the collective wisdom.

WSUEEP-07-006 • May 2007

Model IAQ Management Plan

Continued from page 1

Classroom and Office Management Plan:

- Classrooms and offices shall be kept clean and free of pollutants as described in the _____ School District document, *"Healthy Classrooms/ Healthy Students"* (attached).
- Classrooms and offices will be kept free of clutter, dirt, dust and open food.
- Fragrances, deodorizer sprays or scented products should not be used.
- Furry or feathered pets may visit, but shall not live in the school buildings.
- Chemicals used or stored in school buildings must be obtained through the district, must be stored safely, and out of the reach of children.
- Wet spills will be cleaned up immediately.
- Problems such as water leakage, pest infestation, ventilation unit malfunction or other indicators of an indoor air quality problem shall be reported to custodial and facilities maintenance staff .
- Room CO_2 should be maintained below 1,000 parts per million (ppm), and fresh air ventilation at 15 cubic feet per meter/per person via the HVAC system.
- Ventilation systems will not be turned off or blocked.

Maintenance and Housekeeping:

- The HVAC maintenance program will ensure that the HVAC system is inspected, cleaned and maintained on a regular basis, at least annually.
- Ducts, vents, coils, intakes and other components will be kept clean and in good working order.
- Filters will be replaced on a regular basis according to manufacturer specifications.
- Air intakes shall remain open, operating and unobstructed.
- Sources of pollutants such as automobile exhaust shall not be located near an air intake.
- Roofing, exterior walls and foundations shall be inspected on a regular basis. Breaches in integrity, leaks and pest invasions will be corrected as soon as possible.
- The housekeeping program will ensure that buildings are clean and dry, using practices that decrease the use of harsh chemicals without compromising cleanliness and reserving antimicrobial cleaners for areas that must be disinfected for health and safety reasons.

Integrated Pest Management:

- Facilities staff will inspect the school for signs of pest inhabitation on a regular basis. Infestations will be remediated using the least toxic method available, as soon as possible, and in compliance with all applicable regulations.

Responding to IAQ Issues: A case study in lessons learned

By Rich Prill, WSU Extension Energy Program

A Northwest school district offered to share its story about the impact of deferred maintenance, which can be expensive and time consuming.

An eight classroom wing was added to the school in 1997. It is stick frame with a stucco exterior and a flat roof.

In 2001 the school district received a letter from the architect saying the exterior stucco on several walls of one building needed patching. The architect had been called back to look at a leak on the wall that received most of the severe weather, both sun in the summer and rain and wind in the winter. This advice was ignored.

In 2003, the architects again recommended the district look at the cracks because they noticed hairline cracks in the elastomeric paint coating the stucco. Larger cracks had also appeared and were evident in the stucco itself. Again, nothing was done to follow up on these recommendations.

In the spring of 2006, teachers complained about mold and leaks and indoor air quality. Risk management was finally notified of these concerns. An industrial hygienist came in to test the air. Although the spore count was not alarmingly high, the hygienist recommended an assessment of the walls where the leaks had occurred because of the condition of the interior walls. Although the spore count was low, the hygienist suggested a closer look.

Core samples were taken initially and then the wall was opened in various places. The building was wood framed with significant wood rot in the walls. The wood framing was so rotten it crumbled at the touch.

There was little live mold, but lots of evidence of past colonies. The testing revealed minimal spores in the air. At one point, there was mold growing on the walls in one classroom, but that was some time ago and some sort of stopgap had been applied to curtail the active growth.

Initially there was concern that the structural stability of the building was jeopardized, but this was later determined not to be the case. The roof was not a problem. The building continued to be used safely from both a structural and environmental point of view, until the end of the year when construction was started.

The subsequent repairs consisted of rebuilding framing walls, re-sheathing the entire exterior, and interior repairs to walls.

The structural integrity of the building was not damaged. Total cost of the remodel was about $700,000. This doesn't include the costs of relocating eight classrooms into portables – which fortunately were available onsite – and then moving the classrooms back.

Lessons learned include the following:

- The need to go beyond IAQ testing. All four air quality tests were negligible for mold spores and indicated no IAQ issues. Each test indicated levels well below the outside air.

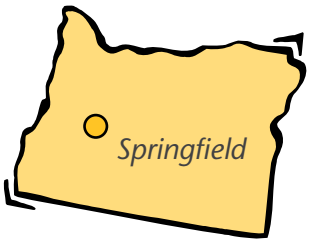
*See **IAQ Issues** on page 9*

Indoor Air Quality Curriculum Results in Real-life Classroom Improvements

By Sue Helback, Oregon State University

Students in Kaye Martin's environmental science classroom at Gateways Learning Center in Oregon's Springfield School District made some real-life discoveries about indoor air quality. After spending four weeks studying the Hydroville Indoor Air Quality curriculum, they used data collection and analysis techniques to investigate their own classroom environment.

The Hydroville Curricula is an integrated environmental health curriculum developed at Oregon State University, which uses teamwork, science inquiry, hands-on activities, and real data to successfully engage students in environmental health issues and problem-solving. The concepts and skills learned will have practical use for the rest of the students' lives.



In the Hydroville IAQ scenario, teachers and students in the fictional town of Hydroville report illnesses and complain of odors in a remodeled school building. The students in Kaye Martin's class took on roles of experts in this hypothetical problem to determine if there really is an indoor air problem in the school.

After learning about the impact air quality had on the health and behavior of the students at Hydroville Middle School, the students at Gateways were curious about their own classroom's air quality. For one full day, they monitored

Two of the student presentations at Gateways Learning Center

and graphed temperature, carbon dioxide, and humidity levels in three of the classrooms in the building. Afterwards, they presented their findings to the staff from the Springfield School District Facilities Department and their IAQ Team.

With data to support their findings, the students explained that the temperature, relative humidity and carbon dioxide levels in these classrooms were above standard guidelines. "Carbon dioxide and dust are probably two of the biggest problems in schools," reported a member of the IAQ Team. The facilities staff took the students' presentation seriously. Upon further investigation, they discovered that no air was coming out of one of the ventilators on top of the building.

"The students learned that sometimes IAQ problems can be easy to fix. Sometimes it just takes making sure the HVAC system is on and working," explained Kaye Martin. The students were able to present their findings and take action to improve the IAQ of their classroom. The district personnel were appreciative and impressed with the students' presentations and their understanding of IAQ issues.

Poor indoor air quality can impact the comfort and health of students and staff, which, in turn, can affect student concentration, attendance and performance. In addition, if schools fail to respond promptly to poor IAQ, students and staff are at an increased risk of short-term health problems, such as fatigue and nausea, as well as long-term problems like asthma, according to the U.S. Environmental Protection Agency's Tools for Schools Program (www.epa.gov/iaq/schools/index.htm).

Through the use of curricula such as the Hydroville Indoor Air Quality Scenario, high school students

See Real-life on page 9

Oregon Releases Asthma DVD

An outstanding DVD detailing the Oregon Department of Education's approach to asthma education and awareness in Oregon schools is now available. Only 17 minutes in length, *"Asthma Friendly Schools: A Coordinated School Health Approach,"* is a remarkably well-done DVD offering a model for any state to follow. To get a free copy, contact tamara.kuenzi@state.or.us.

The DVD is not copyrighted. Feel free to burn your own and pass them around. This DVD is presented in a top-quality professional video format and consists largely of poignant interviews with students, teachers, nurses, administrators, and parents from several Oregon schools. Get a copy! Help spread the word on this wonderful tool.

School Districts Interested in Displacement Ventilation

Displacement ventilation (DV), common in Europe since the 1970s, is coming into its own in the United States. School districts have been taking an interest in converting existing schools to DV and in designing and building new schools to include it. DV is credited with improving indoor air quality and general comfort, lowering energy costs, and reducing the spread of communicable viruses among school children. See "*The Right Place for Displacement*," by John J. Arent, Morton H. Blatt, and Bradley Meister, *Engineered Systems* (ES), April 2006, at: www.esmagazine.com/CDA/Articles/Feature_Article/96fd16fba223a010VgnVCM100000f932a8c0____ .

Idaho Promotes Radon Testing in Schools

By Jim Faust

Idaho's radon program encourages schools to test for radon by getting teachers interested and involved while conducting indoor air quality school walk-throughs with Rich Prill, a building scientist with the Washington State University Extension Energy Program. As we are doing the IAQ school walk-throughs, we discuss radon and hand out free radon tests with a fast-facts sheet. I handed out 100 radon tests to school personnel in 10 schools during the last IAQ school walk-through, and scheduled several radon class presentations.

The radon program works on the premise that radon is the number one cause of lung cancer among nonsmokers and the number two cause of lung cancer among the general population. Every school, classroom and house we get tested and mitigated can save lives. The U.S. Environmental Protection Agency recommends that homes with radon levels at or above 4 picocuries per liter (pCi/L) should be fixed. Thirty-seven percent of houses tested in Idaho were above the recommended limit, and more than half of the counties' test results averaged above 4 pCi/L.

To get the word out in schools we send free radon school supplies (pencils, rulers, tape measures and notepads that we get free from EPA) to science and health teachers along with a "Fast Facts on Radon" fact sheet. We offer free radon tests to all teachers and staff. The tests can also be used for classroom projects.

When we send out the free school supplies we ask teachers and administrative staff if they would like a free IAQ school walk-through. We get excellent responses! Try these simple and easy-to-use techniques and you will get tremendous results!

Jim Faust is the Indoor Environment Program manager for the Idaho Department of Health and Welfare's Environmental Health section in Boise. For more information contact him at faustj@dhw.idaho.gov, or (208) 334-5717.

High School Student Wins Environmental Award

By Dave Blake

The Washington Education Association's Healthy Schools Caucus presented the first Environmentally Healthy Schools Youth Activism Award to Megan Sarver, a junior at South Whidbey High School, in Langley, Washington.

Sarver received the award during a ceremony at the WEA's Representative Assembly on March 30 in Tacoma, Washington. She also received a scholarship to help with college tuition. Sarver was honored for her indoor air quality research at the high school, part of a statewide project funded by the Centers for Disease Control through the Washington State Department of Health.

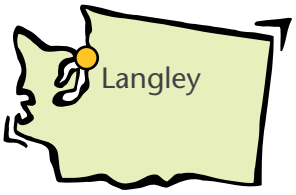
Megan Sarver

When the department announced that six IAQ monitoring stations, set up as rolling carts, were available to schools, Sarver jumped at the chance to get one for her school. She designed a communication and sampling strategy that successfully collected the data the Health Department wanted from her school, as well as increasing awareness of students and staff about the importance of IAQ in our everyday lives. When the state-mandated testing was completed, Sarver took the initiative to continue her project independently, and will compare results from her school to those from other schools using the carts statewide for her senior project next year.

Sarver is also beginning work with Russ Crutcher of Microlab Northwest, an expert in particle microscopy. Crutcher heard about her project and wants to volunteer his time to compare microscopic analysis of settled dust to her airborne particle count data in classrooms.

Sarver has demonstrated wonderful creativity by designing interesting testing scenarios, such as particle counts before and after cleaning, and before and after air filter changes. Sarver's energy, enthusiasm and initiative are making the most of the opportunity to borrow the IAQ monitoring station for her school. She sets a fine example for other students seeking projects that, in addition to being educational, also serve the public by providing valuable information that can make a real difference in people's lives.

Megan Sarver receives her award from Jeanne Bartlett (right), secretary of the National Healthy Schools Caucus, and chair of the Washington State Healthy Schools Caucus.



Congratulations, Megan! Keep up the good work.

Dave Blake is an Environmental Specialist with the Northwest Clean Air Agency. He can be reached at dave@nwair.org or by calling (360) 428-1617, ext. 212.

"Prudent Avoidance:" Should We Remove Fragrances, Whiteout, Glue, and Markers from Our Schools?

By Jim Terhune

Dr. Joyce Young, naturopathic physician and student of environmental medicine, recently gave a brief presentation to members of the Oregon Indoor Air Quality Partnership, and spent two to three hours with me. She's an advocate for replacing or removing volatile organic compounds (VOCs) found in school indoor air. Since there are no U.S. Environmental Protection Agency standards, or laws against the use of many VOC chemicals, and since there are different opinions in the scientific community about the risks to children, governmental organizations have not regulated many of these products in schools. Young believes there is sufficient science-based and peer-reviewed literature to support taking precautionary steps to protect our children.

Young said the only white board markers that are safe are those that are water based (e.g., Crayola® water-based and Vis-á-Vis® fine line markers) and that a paper towel and water can remove water-based marks. If you look on the tray and floor below a school white board that has been printed with VOC white board markers (i.e., either those with a strong odor or those that say non-toxic), you will see tiny dark particles that have been rubbed off by a towel or eraser. However, some of the particles can't be seen and are so small that they go immediately into the air and then into the respiratory system.

White board cleaner, rubber cement, white out, highlighter pens, and Sharpie® pens also give off VOCs. Young warns that it is the accumulative effect and the synergy of chemicals working together that puts children at risk. She points out that one part per million of a chemical can become significant if you have synergy occurring between chemicals. The situation also becomes worse in school classrooms if there isn't sufficient ventilation and air movement through the HVAC system.

Some students with high sensitivity can have allergy, asthma and immune system reactions to the chemicals in our schools. Young's own child continued to be sick in a school for months. She finally had permission to move her child to another school, and once he changed schools, he got well.

Young believes the research indicates that many VOCs and VOC breakdown byproducts are stored in the fat and thus accumulate over time. At some point, a person will suddenly get sick (e.g., cancer, asthma, hormone disruption, high blood pressure) and no one can explain why.

Young shared several articles including:

- *"Why is Chemical Brain Injury Ignored;"*
- *"Association of Domestic Exposure to Volatile Organic Compounds with Asthma in Young Children;"*
- *"One Part Per Million Formaldehyde – Is it Really Trivial?"*
- *"Endocrine Disruption Overview: Are Males at Risk?"*
- *"Endocrine Disruption and Hypospadias;"*
- *"Acute Toxic Effects of Fragrance Products;"* and,
- *"Respiratory Toxicity of Fabric Softener Emissions."*

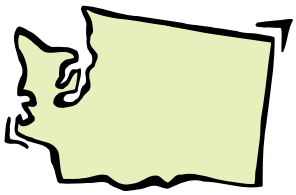
If you would like a summary of these articles please contact me at jim.terhune@state.or.us.

Finally, Young emphasizes, "Low levels of chemicals have high stakes." When there is reasonable suspicion something causes harm, there is a duty to do something.

Jim Terhune is a health specialist with the Oregon Department of Education. He is involved in the Asthma Friendly Schools project, which is part of the Healthy Kids Learn Better initiative between the Oregon Department of Education and the Oregon Department of Human Services.

An Update from the Washington Education Association

By Jeanne Bartlett



The Washington Education Association passed the following new business item with a large majority at the Representatives Assembly in Tacoma in March.

Title
Health and Safety Program

Source
Indoor Environmental Quality Work Team
Jill Van Glubt, Chair

Background
Many new business items related to indoor environmental quality have passed. This makes safety and health, including IEQ, a significant component of WEA's program structure.

WEA Goals and Objectives

- Increase WEA members' professional status and job satisfaction.
- Improve the quality of and access to public education for all students.
- Forge partnerships with parents, businesses, other unions and community groups.

Recommendations
That WEA create, develop and maintain a strong program that provides knowledge, materials and expertise necessary to protect the health and safety of students and members in public schools.

More Assembly News

The Washington State Healthy Schools Caucus gave Megan Sarver the first ever IEQ Youth Activism Award. Sarver is a student at South Whidbey High School in Langley, Washington. She also received $250 in college scholarship funds (see related story about Megan Sarver on page 6).

Carolyn Smith-Evans was honored for her outstanding work with the National Healthy Schools Caucus, of which she is chair and co-founder through the National Healthy Schools Coalition. The coalition flew her back to Washington, D.C., to receive her award the first week of May. Chip Halverson, a long time Pacific Northwest IEQ advocate, also attended the ceremony.

The Washington State Healthy Schools Caucus again ran an IEQ informational booth at the WEA Representatives Assembly.

The secretary of the Washington State Healthy Schools Caucus, Debbie Stalder, and the chair of the National Healthy Schools Caucus, Carolyn Smith-Evans from Oregon, will be attending a new National Education Association-Health Information Network offering: a one day IEQ intensive workshop to be held in Philadelphia June 29, right before the NEA Representative Assembly.

Jeanne Bartlett is secretary of the National Healthy Schools Caucus, and chairs the Washington State Healthy Schools Caucus. Email her at JBar1209@aol.com.

Model IAQ Management Plan

Continued from page 1

- Pesticides shall not be applied during times when students are present and must be applied by or under the direction of a certified or licensed applicator.
- Infestations will be prevented by proper food storage and disposal and by efforts to maintain integrity of exterior walls and roofing.

Renovation and Construction:

- Whenever possible, renovation and construction will not take place when buildings are occupied.
- All renovation or construction will comply with Occupational Safety and Health Administration (OSHA) guidelines and will use the least toxic and most environmentally sound methods and materials possible and practical.

Hazardous Materials:

- All chemical supplies, including cleaning products and science lab materials will be supplied through the district. No such materials will be brought from home or individually supplied by staff or students.
- Material Data Safety Sheets shall be kept on file in each building. Least toxic alternatives will be chosen whenever possible and practical.
- Chemicals will be stored safely, out of the reach of children, and accessible only to adults or supervised mature students who are trained in safe use.
- Chemicals will be disposed of according to all regulations and under the direction of facilities staff.

Safety Committee Oversight:

- It is the responsibility of all building staff and occupants to report unsafe conditions to the appropriate employee. The district safety committee will consider environmental hazards as part of their normal safety inspections.
- Emergency response plan is included in the district emergency response manual.

Please contact me with your suggestions, concerns, or for more information:

_____

District IAQ Coordinator

Phone: _____

Email: _____

IAQ Issues

Continued from page 3

- Maintenance should have responded to the leaks with a more comprehensive investigation of the source and the cracks in the stucco should have been looked at more closely for repair.
- Another lesson learned is to make quality, science-based, websites available to everyone who is determined to Google the word "mold." The first hits always seem to be the Chicken Little variety, "The sky is falling." Everyone's blood pressure goes up, suspicion is piqued, and calls go out for expert testing.

Rich Prill is a building science specialist at the Washington State University Extension Energy Program in Spokane.

Real-life

Continued from page 4

can learn about the impact of indoor air quality on human health, ways to measure and evaluate IAQ, and actions to take to improve the IAQ in their schools and homes. For more information about the Hydroville Curriculum Project, visit the web site at www.hydroville.org.

May is Asthma Awareness Month

Asthma ranks among the most common chronic conditions in the United States, affecting an estimated 14.9 million persons in 1995 and causing over 1.5 million emergency department visits, about 500,000 hospitalizations, and over 5,500 deaths, according to the National Heart, Lung, and Blood Institute. To learn more about asthma in Oregon, visit the state Department of Health Services at *www.oregon.gov/DHS/ph/asthma/index.shtml*. The EPA has an excellent publication: *"Managing Asthma in the School Environment"* available at www.epa.gov or by calling the EPA IAQ Hotline at 1-800-438-4318.