

IAQ Efforts on the Nez Perce Reservation



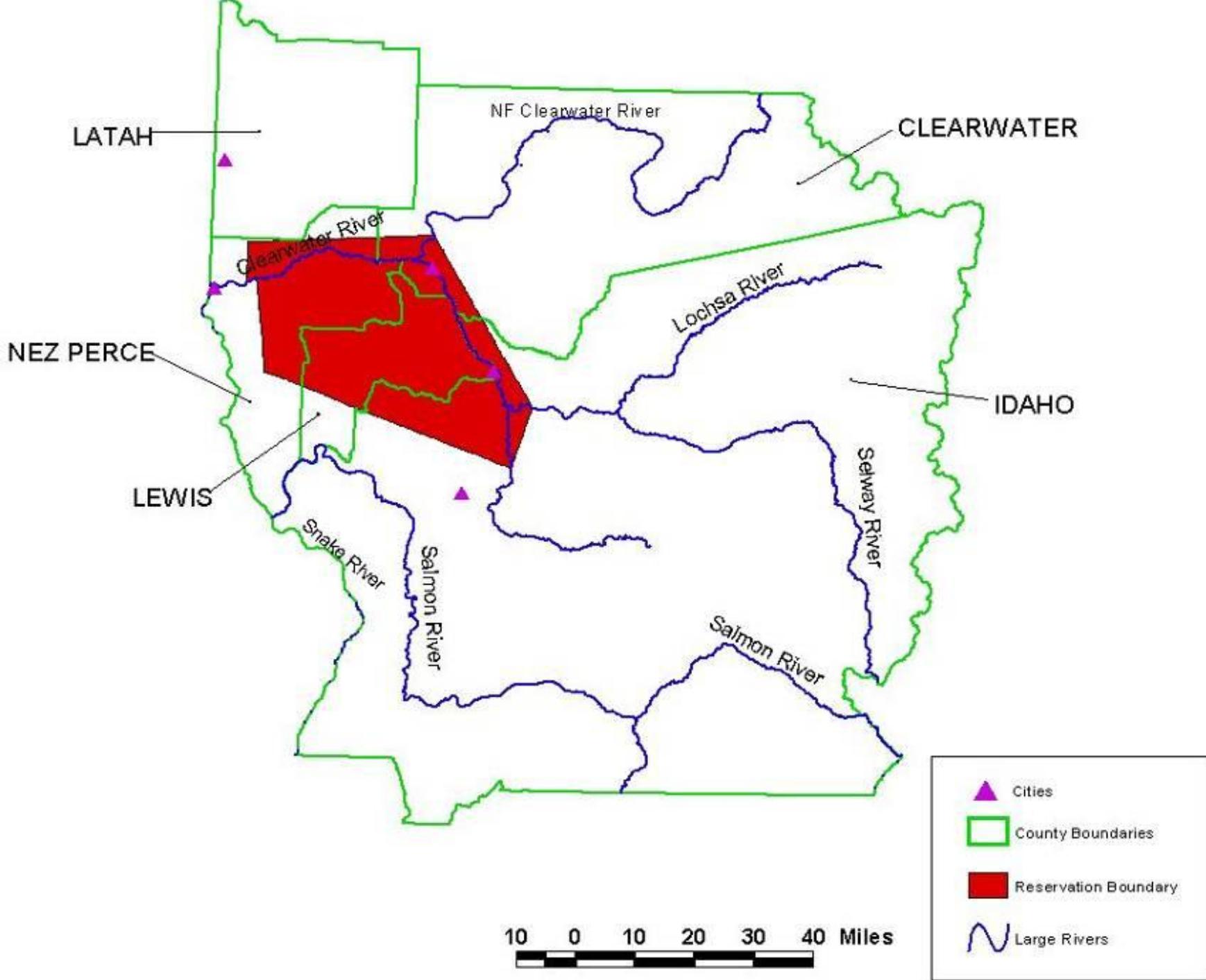
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Overview

- Nez Perce Reservation
- General IAQ Outreach and Education
- IAQ Assessments of Nez Perce Tribal Administrative Buildings
- Woodstove Study and Changeout
- Air Toxics and Health on the Nez Perce Reservation

ENTERING
NEZ PERCE
INDIAN RESERVATION







General IAQ Outreach and Education

- Community events
- Presentations
- Newspaper articles



IAQ Assessments

- 49 assessments (including reassessments)
 - 37 buildings (29 in 2005, 5 in 2006, 3 in 2008)
- Sampled for CO₂ and PM
 - Some buildings for temperature, RH, moisture levels, and pressure
- Building Considerations
 - Type/Design, Age, and Condition
- Common Problem Areas
 - HVAC/thermostats, gutters, crawlspace
 - Older buildings: carpet, lead, asbestos, water leaks, attics



Challenges

- Communication & Information Sharing
- Staff and Funding
- NPT Maintenance concerns

Outcomes / Successes

- Capacity building
- IAQ awareness in the workplace
- Building assessments
- Reference resource of IAQ reports
- Remediation loan in 2005
- Overall maintenance changes
- Building improvements



Building Improvements



Building 1



Building 2

Woodstove Study & Changeout

- 16 participating households
 - Used old woodstove as primary source of heat
 - Non-smoking, tribal member homes in Kamiah and Lapwai
 - Asthmatic child between ages of 6 and 17
- Sampling before/after changeout
 - Ambient $PM_{2.5}$ mass
 - Indoor $PM_{2.5}$ levels and chemical markers of woodsmoke
- Woodstove changeout
- Outreach and education



Ambient Monitoring

- Utilized existing network
 - PM_{2.5} TEOM
 - Met Site: temperature, RH, precipitation, wind speed
- EPA PM_{2.5} standards
 - 24/hr is 35 $\mu\text{g}/\text{m}^3$
 - Annual is 15 $\mu\text{g}/\text{m}^3$



Indoor Sampling

- Equipment
 - DustTrak (Model 8520)
 - Leland Sampler / Personal Environmental Monitor (PEM) with a quartz filter
- Sampled for 24-hour period, 1 to 5 sample days
- Intern sampling duties
- Participant responsibilities





PEM

Leland (inside)

DustTrak

Indoor Sampling Equipment





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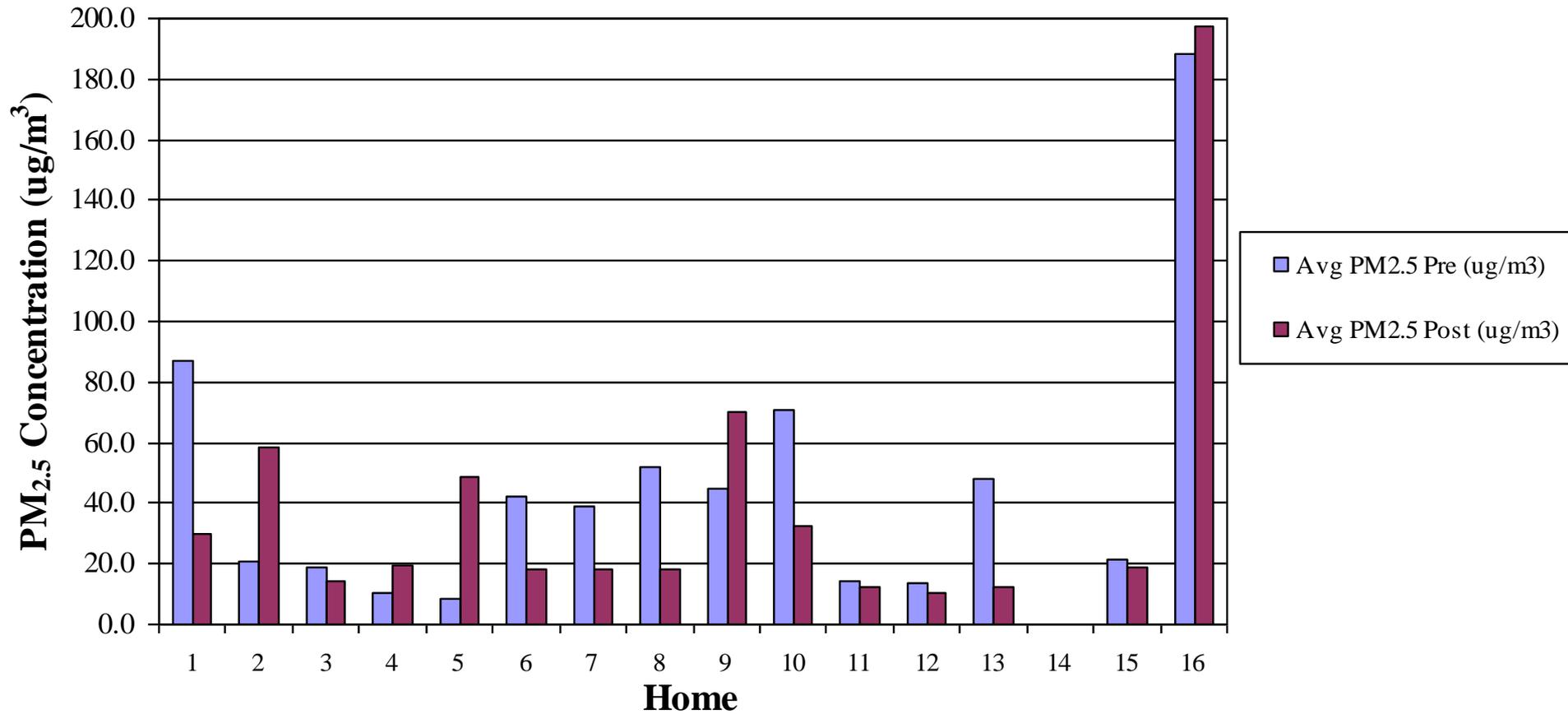
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From Old to New



Indoor PM_{2.5} Mass Comparisons



PM2.5 and OC/EC/TC

(Homes with Complete Datasets)

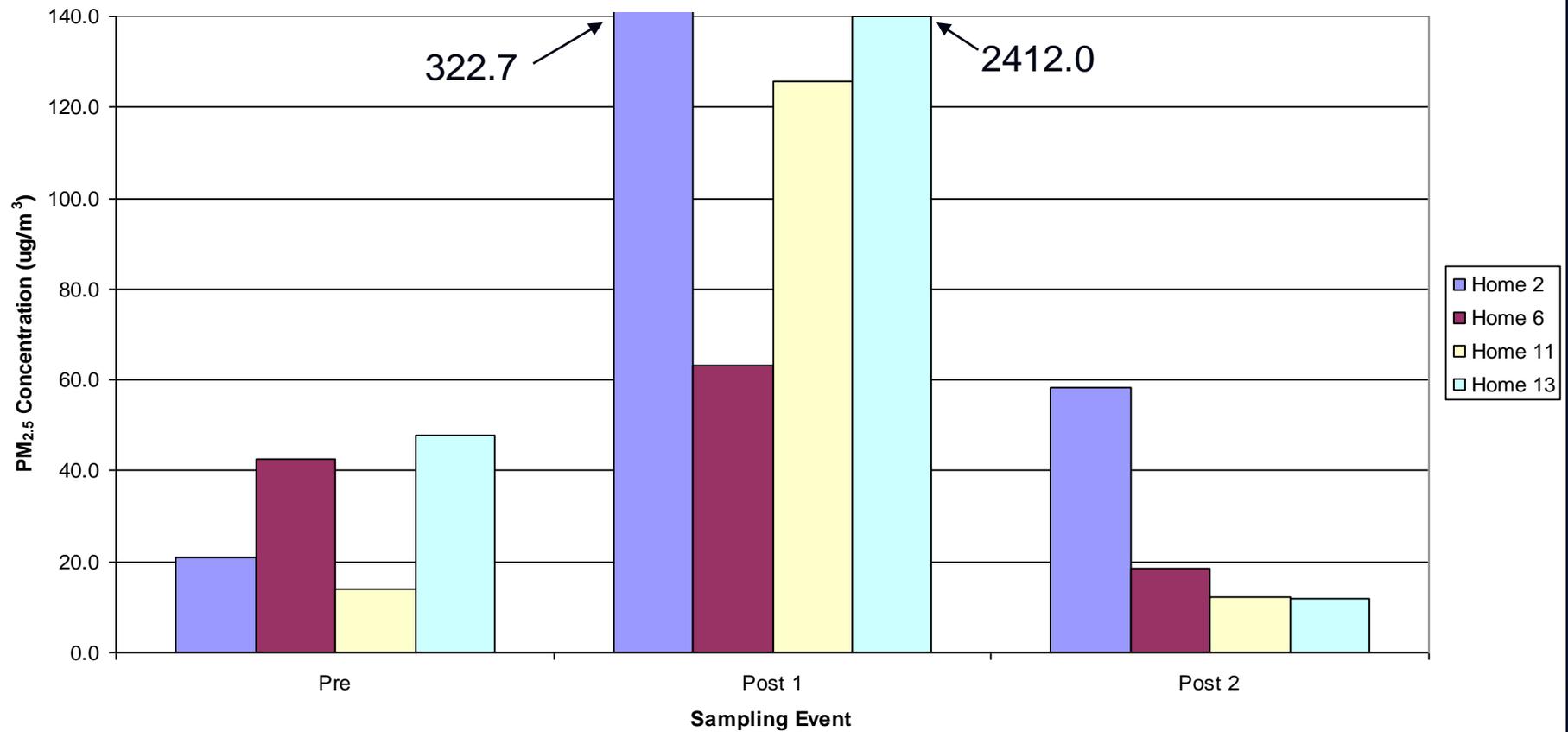
	Median PM _{2.5} ($\mu\text{g}/\text{m}^3$)	Minimum PM _{2.5} ($\mu\text{g}/\text{m}^3$)	Maximum PM _{2.5} ($\mu\text{g}/\text{m}^3$)	OC ($\mu\text{g}/\text{m}^3$)	EC ($\mu\text{g}/\text{m}^3$)	TC ($\mu\text{g}/\text{m}^3$)
Pre Changeout	21.6±57.5	5.0±6.6	254.0±731.1	16.9±15.3	0.3±0.4	17.2±15.5
Post Changeout	18.4±54.1	4.0±13.4	145.0±278.3	13.4±11.0	0.7±0.4	14.0±11.3
Difference	-15%	-20%	-43%	-21%	+120%	-19%

Chemical Markers of Woodsmoke

(Homes with Complete Datasets)

	Levoglucosan (ng/m ³)	Dehydroabietic acid (ng/m ³)	Abietic acid (ng/m ³)	Vanillin (ng/m ³)	Acetovanillone (ng/m ³)	Guaiacol (ng/ m ³)	4- Ethylgua iacol (ng/m ³)
Pre Changeout	645.1±1315. 3	113.0±147.7	11.3±118.7	0.5±2.3	0.3±9.2	0.9±256. 0	0.8±0.8
Post Changeout	238.1±310.1	0.3±37.1	41.5±40.3	0.5±4.4	0.3±0.0	0.3±0.4	0.1±0.4
Difference	-63%	-100%	+267.0%	No Change	No Change	-62%	-92%

PM2.5 Mass Following Outreach/Education



Challenges

- Sampling equipment malfunctions
- Distance to Kamiah from Lapwai
- Homeowner
 - Learning curve with new stove
 - Paperwork, no shows
 - Selecting 4 new homes mid-study
- Woodstove business & installer
 - Distance (~200 miles away)
 - 2nd round of installations delayed two months due to snow
 - Attitude/not vested in the community

Outcomes / Successes

- Partnerships & intern participation
- Reduced indoor levels
 - PM_{2.5} levels by 52%
 - Levoglucosan by 63%
- Reduced ambient PM_{2.5} in each community
- 16 tribal homes with EPA certified stoves
 - New stoves “burned off” before change out
 - Old stoves recycled
 - Installation inspection and training
- Outreach and Education

Acknowledgements

- EPA
- University of Montana
- Northwest Indian College, Nez Perce Tribe Distance Learning Centers
- Institute for Tribal Environmental Professionals
- Washington State University Extension Energy Program
- Swinomish Tribe
- Nimiipuu Health
- Nez Perce Tribe Housing Authority
- Nez Perce Tribe Forestry & Fire Division
- Nez Perce Tribe Safety Program

Air Toxics & Health on the Nez Perce Reservation

- Participants
 - Lapwai and Kamiah High Schools
 - NPT Distance Learning Centers, Northwest Indian College
- Sampled for Volatile Organic Compounds (VOCs) indoor/outdoor
- Outreach and Education



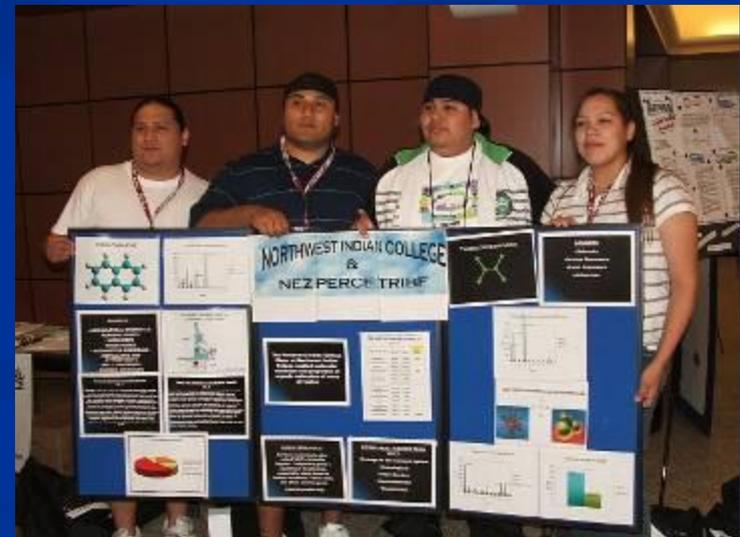
VOC Sampling

- Students conducted sampling
- 21 air toxics/EPA Hazardous Air Pollutants
- Sampled for 12 hour period, up to 2 days inside and outside of student homes
- Equipment
 - SKC low-flow pumps
 - Sorbent tubes
- Results
 - Higher concentrations inside
 - Toluene most abundant compound inside and outside in both communities



Outreach and Education

- Presentations
 - University of Montana, Northern Arizona University, NPT Air Quality staff
 - Groups developed research projects
- Articles and info packets
- Projects and Competitions
 - 46th InterMountain Junior Science and Humanities Symposium; Salt Lake City, UT
 - N. Idaho SkillsUSA; Lewiston
 - Air Toxics Symposium; Missoula, MT



Successes & Challenges

■ Challenges

- Communication with teachers
- VOC sampling
- Student knowledge base

■ Successes

- Collaboration and partnerships
- Interaction with university researchers and air quality professionals
- Gaining hands-on science skills
- Projects and science competition experience