



# From Home to School: Tribal Indoor Air Quality Study

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PI: Dr Richard Shaughnessy, Univ of Tulsa,  
9182303908; [rjstulsau@aol.com](mailto:rjstulsau@aol.com)



# Presenters

- David Reisdorph: Research Consultant The University of Tulsa
- Mike King: Sr. Environmental Specialist Navajo Nation EPA



# Presentation Summary

- Tribal Asthma Background & Study Overview—David Reisdorph
- Traditional Ecological Knowledge—Mike King
- Working with Homes & Schools: Data Collection—David Reisdorph
- Home & School Conditions—Mike King
- Preliminary Results—David Reisdorph



# Background & Study Overview

## David Reisdorph

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# Potential Benefits of Research

- **Improved health and attendance of children and staff** in schools because of improved IAQ, and reduction of asthma/allergy reactions and infectious illness due to school and home exposure.
  - Most vulnerable children and staff, such as those with asthma or suppressed immune systems, are expected to benefit most from health improvements.
- **Improved student performance**, coincident with improved health including reduction in low-level symptoms that do not cause absences but do interfere with learning.



# Data Collection

- Three visits over the school year at each home and school (fall, winter, spring)
- IAQ measurements: Carbon dioxide, relative humidity, temperature, carbon monoxide
- Allergens: dust mite, cat, dog, mouse & cockroach
- High-touch points/targeted surfaces: swab to gauge surface residual bio contamination
- Visual inspections: interior & exterior





# Traditional Ecological Knowledge Mike King

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# Traditional Ecological Knowledge

- The evolving knowledge acquired by indigenous and local peoples over hundreds or thousands of years through direct contact with the environment.
  - Holistic that looks at relationships throughout the environment
  - Adaptive to change





# From Home to School TEK



- Study is a more holistic look at asthma triggers.
- Considers how modern homes and school buildings change our indoor environments
  - Changes homes and schools such as bringing water indoors.
  - Concentrates asthma triggers
  - Alters traditional human contact with natural environment





# Restoring Balance

- Careful consideration of materials in indoor environments.
  - For example, highly volatile and irritating cleaning chemicals.
- Remove contaminants through rotation, cleaning and ventilation that exchanges indoor for outdoor air.
- Increase renewal and restoration.
- Reconnecting with the outdoor world.



# TEK Focus

- Balance:
  - Reduce asthma triggers.
  - Focus where triggers concentrate.
- Restoration/renewal:
  - Replace damaged materials.
  - Minimize clutter.
- Purify:
  - Use simple & safe cleaning.
    - Water & soap.
    - Consider cleaning a removal & reduction process not a war on germs.
  - Ventilate-fresh air.



# Working with Homes & Schools

**David Reisdorph—Homes**  
**Mike King—Schools**  
**Nez Perce Tribe**  
**Air Quality Program**



# Home Sampling





# Home & Sleeping Area





## From Home to School Study: Protocol & Data Form



### 10. Record Indoor Living Room Temperature (F), Relative Humidity, CO<sub>2</sub>, & CO.

Temperature

82.5

Relative Humidity

44.9

Time Recorded

13:30

Carbon Dioxide

1349

Carbon Monoxide

0

**Is living room temperature below 60 degrees F?**

Yes

No

**Is living room RH% above 60%?**

Yes

No





# Example Field Data Sheet

Main Living Area	
<b>Current Study Code:</b> 63106923	
Previous Study Code: 63102369	
Study Home: <b>STUDY - ATP Only</b>	
<b>Sample #1</b>	Surface Description: Coffee Table
	Surface Material: wood
	Clean/Dirty: clean
	RLU: 269476
	Time: 1:30 PM
<b>Sample #2</b>	Surface Description: Coffee Table
	Surface Material: wood
	Clean/Dirty: clean
	RLU: 301649
	Time: 1:32 PM
<b>Sample #3</b>	Surface Description: Coffee Table
	Surface Material: wood
	Clean/Dirty: clean
	RLU: 283444
	Time: 1:34 PM
<b>Sample #4</b>	Surface Description: Coffee Table
	Surface Material: wood
	Clean/Dirty: clean
	RLU: 469177
	Time: 1:36 PM



# House Conditions





# Interior – Moisture/Mold





# Interior – Flooring



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# Interior - Wood Stoves



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# Interior - Pets



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# Interior - Pests



# Exterior – Roof & Siding



# Exterior – Water Drainage

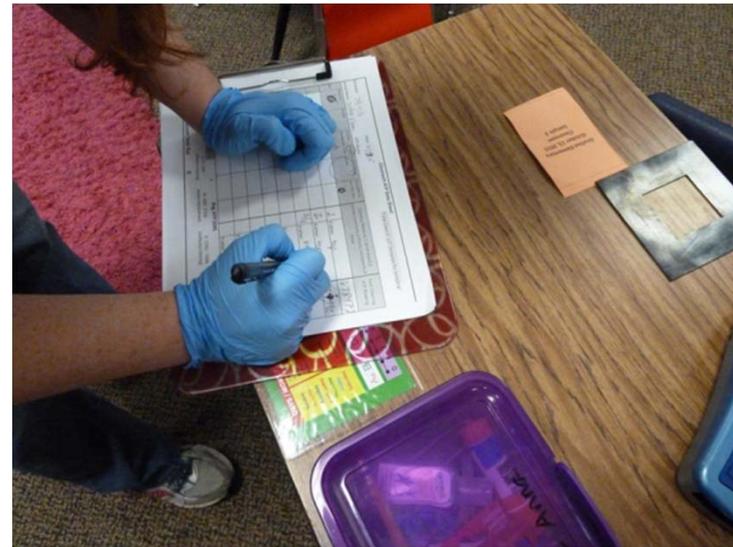
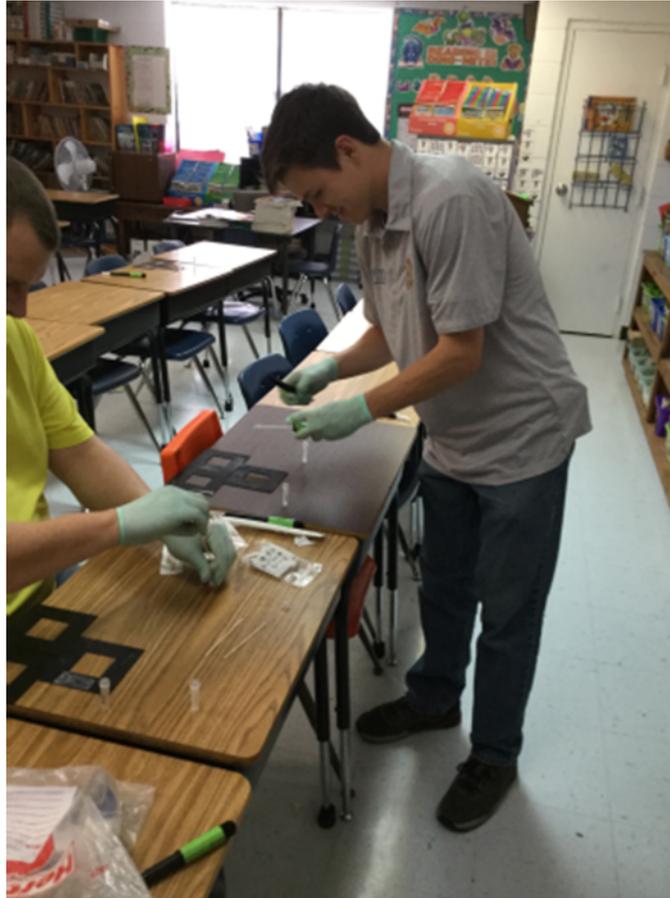




# School Research



# School Sampling



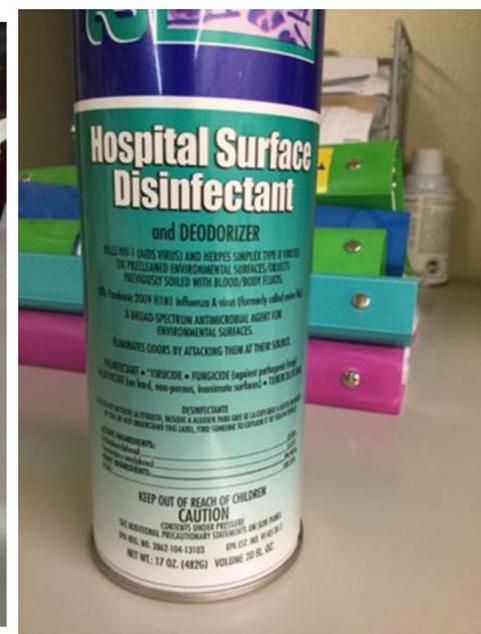


# School Conditions



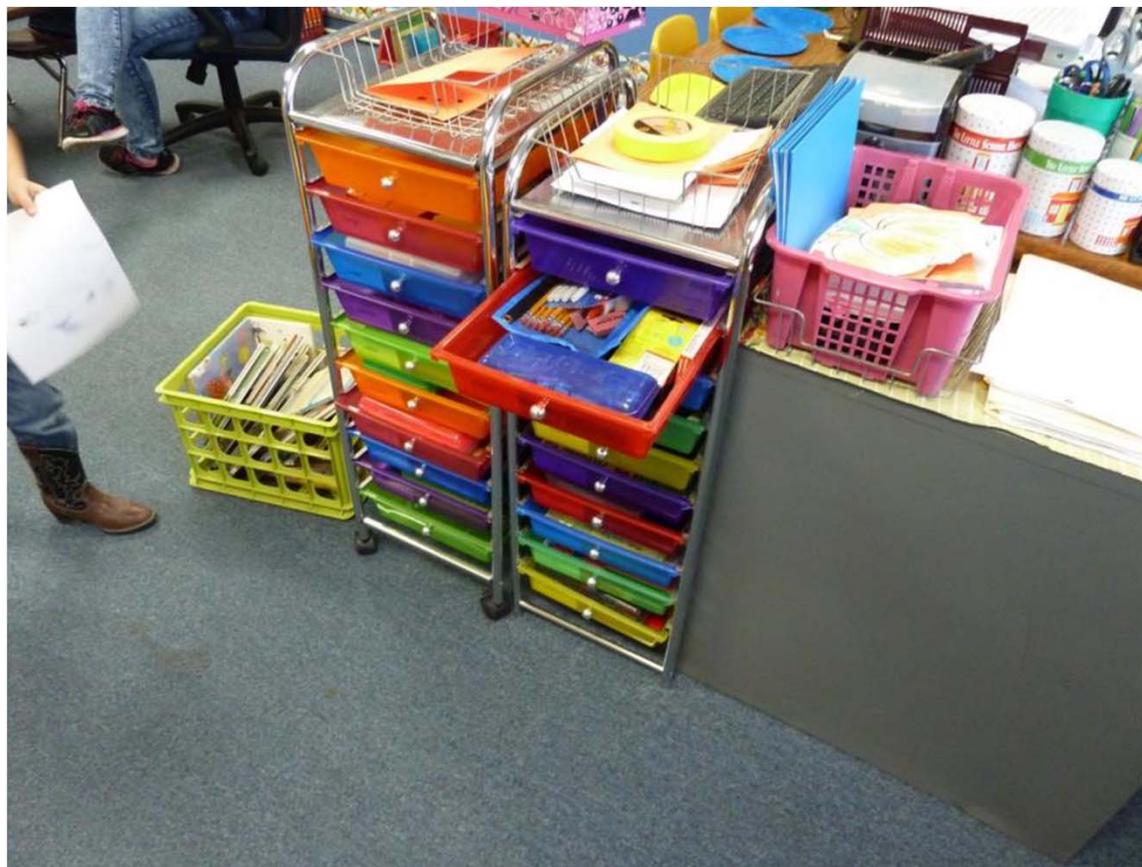


# Interior – VOCs - classroom chemicals





# Interior – Cleanable Surfaces





# Interior – Moisture/Mold



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# Interior – Classroom Pets





# Preliminary Results

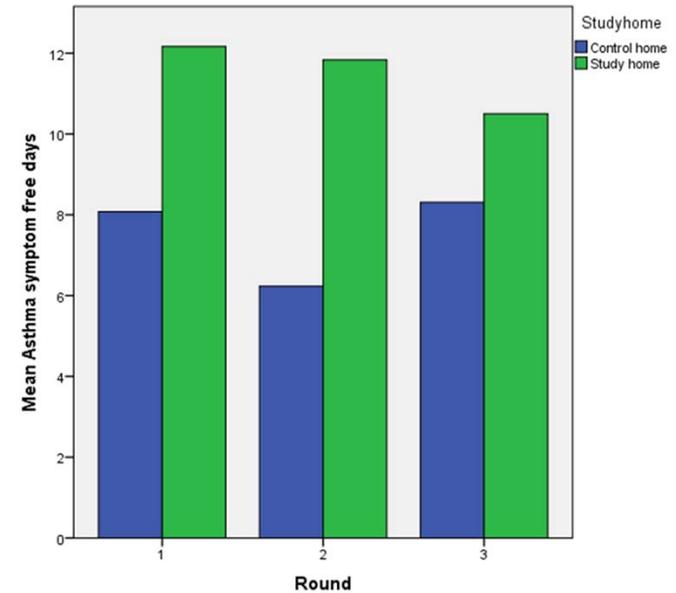
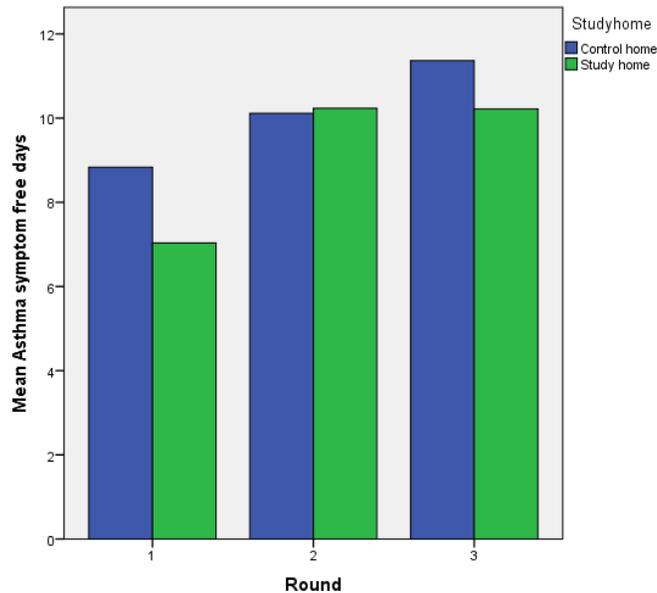
## David Reisdorph

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# Asthma Symptom Free Days

During past 2 weeks, how many asthma symptom free days did your child have?



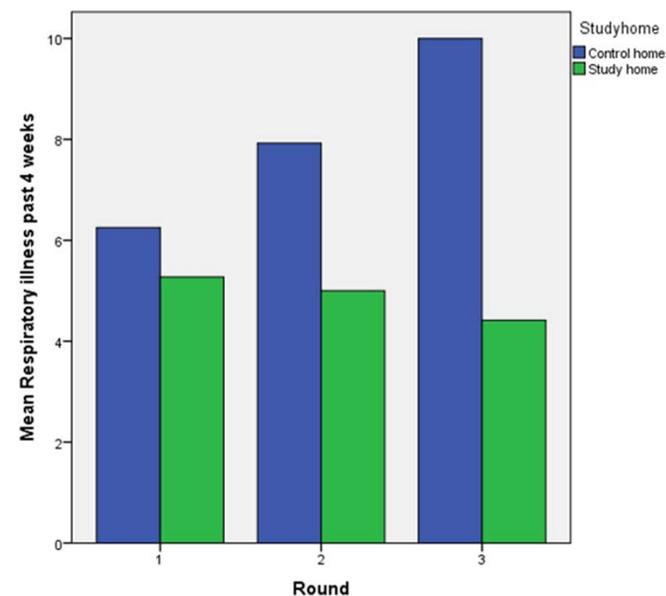
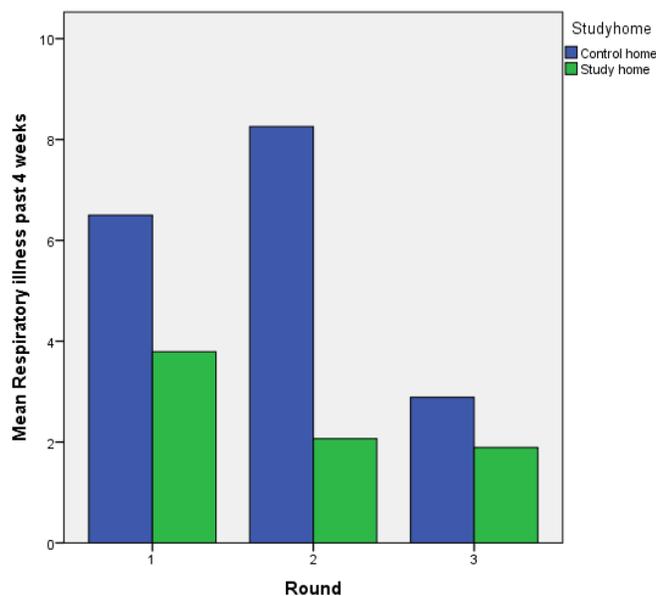
- Cherokee Homes
- Increase in both groups, especially in control homes

- Nez Perce Homes
- Only small changes in the study group (Note: small sample size)



# Preliminary Results

During the past 4 weeks, how many days, if any, did your child have a respiratory illness such as a cold, allergies or sinus infection?

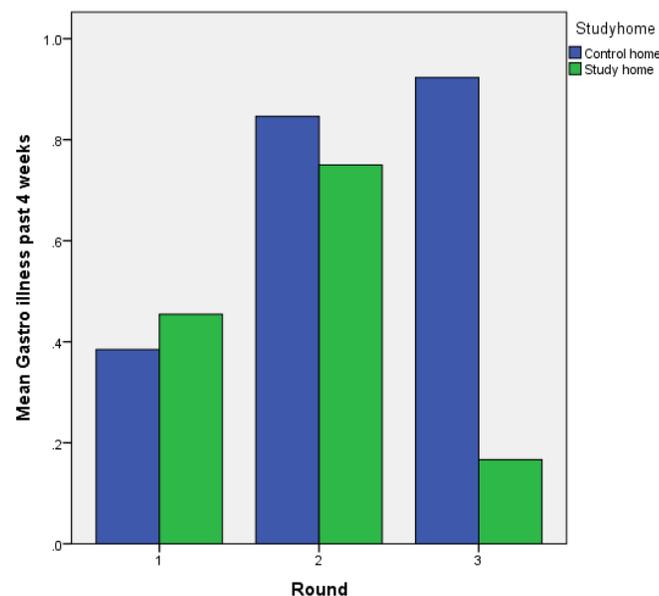
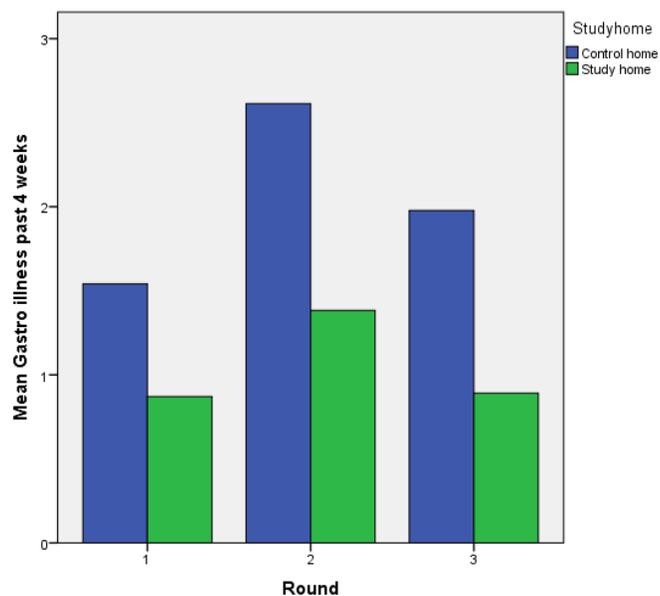


- Decrease in study homes
- Increase in control homes, decrease in study homes



# Preliminary Results

During the past 4 weeks, how many days, if any, did your child have a gastro-intestinal illness such as stomachache, vomiting, or diarrhea?



- Same trends in both groups (seasonal?)
- Some differences between groups, esp. round 3



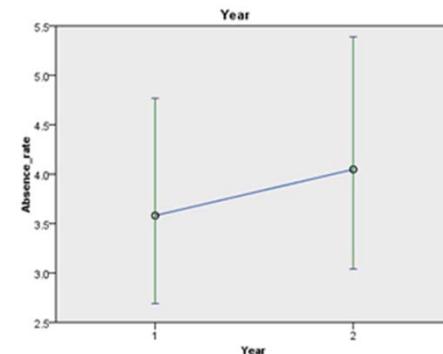
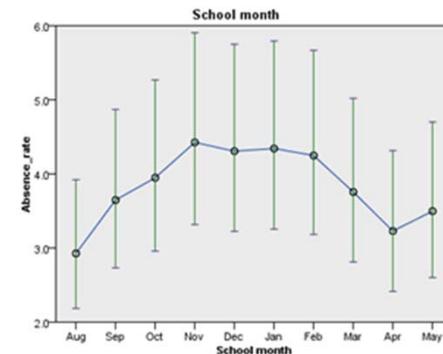
# Preliminary results, All Cherokee schools: Absence rate (% students absent)

- Daily absence rates studied across two school years (14-15 & 15-15)
- Significant variation observed through school year and between school years
- School composition also significantly associated with absence rates (inc. gender ratio and eligibility for free lunch)

Estimated Means: Significant Effects

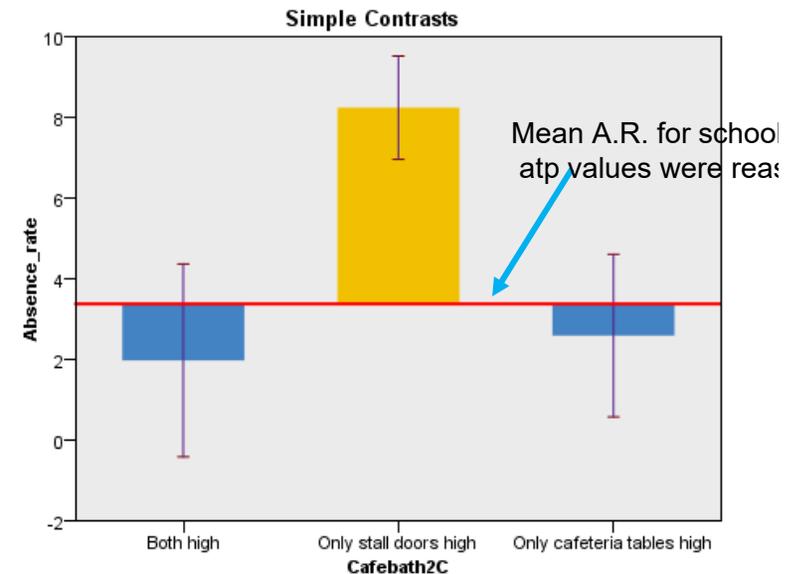
Target: Absence\_rate

Estimated means charts for significant effects ( $p < .05$ ) are displayed. Up to ten effects are displayed, beginning with the top three-way effects. Effects shown contain categorical predictors only.



# Preliminary results: Absence vs. ATP (interactions)

- Data from winter months (flu season) used to study if high ATP levels representing different locations could have cumulative effects
- Absence rates were found to be
  - Significantly higher for schools that graded 1 (reasonable) for cafeteria tables but 2 (higher) for stall doors
  - Lower but NS for schools that graded 1 for both classroom desks and stall doors
  - Higher but NS for schools that graded 1 for both classroom desks and cafeteria tables
- **(ATP levels measured from cafeteria tables appeared to have opposite trends as compared to other surface types)**



The horizontal line is the Absence\_rate estimated mean at Cafebath2C=Both reasonable. The vertical bars are the simple contrasts (Absence\_rate at each level of Cafebath2C minus Absence\_rate at Cafebath2C=Both reasonable).

Significant contrasts are shaded gold. The least significant difference adjusted significance level is .05.

Lets work together to  
preserve the health of  
generations of Native people.





# What's Next? Outreach & Education

- Research Publication
  - Conferences
  - Journal articles
- ITEP Intern
  - Webinars
  - Guidance Materials
- Outreach Cherokee Nation, Navajo Nation & Nez Perce Tribe



# Acknowledgements

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- HL Turner Group
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# Contact Information

Richard Shaughnessy, PhD

The University of Tulsa

918-230-3908

[rjstulsau@aol.com](mailto:rjstulsau@aol.com)



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