



Wisdom to make a difference.

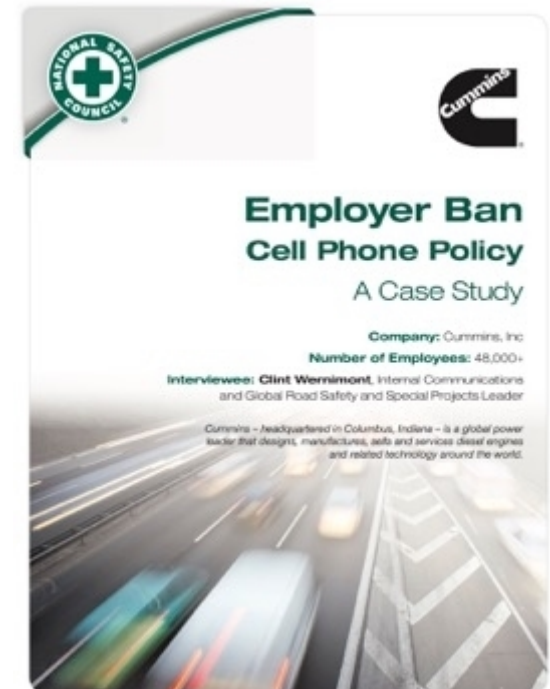
Improving Academic Safety Culture through *Leadership and Empowerment: How to Ask and Answer Safety Questions Well*

Ralph Stuart, CIH, CCHO
Environmental Safety Manager
Chemical Hygiene Officer
Keene State College

Improving Organizational Safety Culture

How did your employees react to the roll out of the policy?

- ❖ The reaction to the policy was split between those who felt they would not be as productive if unable to conference while driving, and ***those who were relieved that conferencing and driving would no longer be acceptable or expected...***
- ❖ Recognizing that driving is the most dangerous activity that most people participate in daily reinforces the idea that our full attention must be placed on that task.



Classification of Organizational Cultures

From *Safe Science*

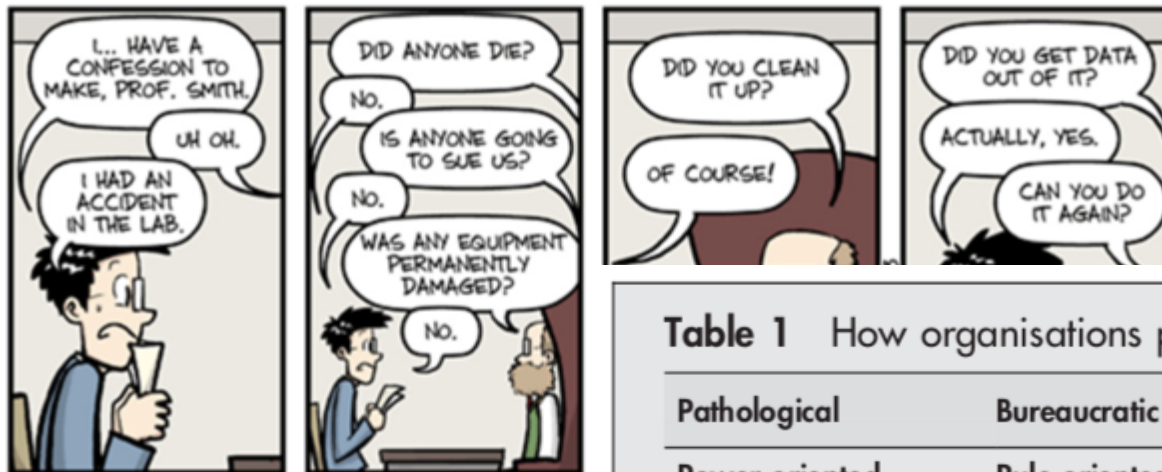


FIGURE 3-1 Complexities of student perception
<http://www.phdcomics.com/comics/archive.php?>
 Used with permission from "Piled Higher and Deeper"

Table 1 How organisations process information

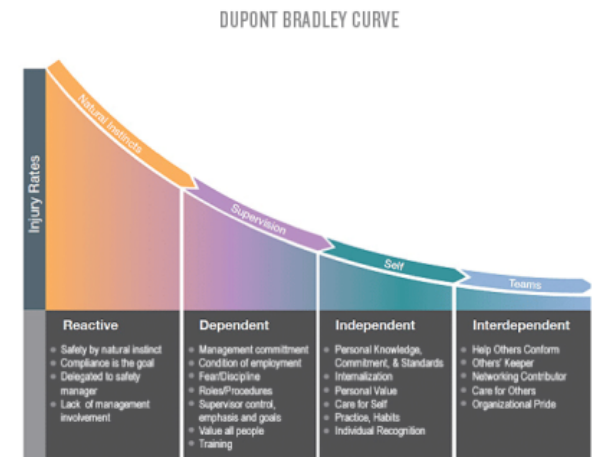
| Pathological | Bureaucratic | Generative |
|--------------------------|-------------------------|-----------------------------|
| Power oriented | Rule oriented | Performance oriented |
| Low cooperation | Modest cooperation | High cooperation |
| Messengers shot | Messengers neglected | Messengers trained |
| Responsibilities shirked | Narrow responsibilities | Risks are shared |
| Bridging discouraged | Bridging tolerated | Bridging encouraged |
| Failure→scapegoating | Failure→justice | Failure→inquiry |
| Novelty crushed | Novelty→ problems | Novelty implemented |

Organizational Responses to Surprises

My Experiences:

- 1) **Bully culture:** deny the event and repress questions
- 2) **Bureaucratic culture:** blame the individual and train everyone else
- 3) **Resilient culture:** *repent and throw (a few) new resources at the problem*
- 4) **Generative culture:** review the event and incorporate changes from Lessons Learned

An organization can house all of these at the same time.



The Challenge to a Generative Culture

T-shirt wisdom: ***“True fear comes from within”***

Some Signs that Fear is Driving Behavior:

- Work happening faster than is reasonable
- Secrets – personal or organizational
- Body language

Organizations can address fear by through **empowerment** and **leadership**



Empowerment = asking questions that get useful answers

Leadership = ability to ask questions that uncover secrets and elicit questions that aren't being asked that should be

When Worlds Collide

Start *Manacled Slim Wrists* at 1:27

A Real Life Lab Safety Example

- During a Teaching Lab last October, students boiled **8 setups of 500 ml of acetic acid to dryness** in 4 hoods
- In each of the 4 classes, the lab filled with a “strong vinegar” smell
- The PhD chemist and the research-experienced lab Teaching Assistant called me the next week to see why the hoods “weren’t working”
- Two different worlds came together - ***lab ventilation*** and ***chemistry education***



Any Ideas of the Pathway of the Odors?



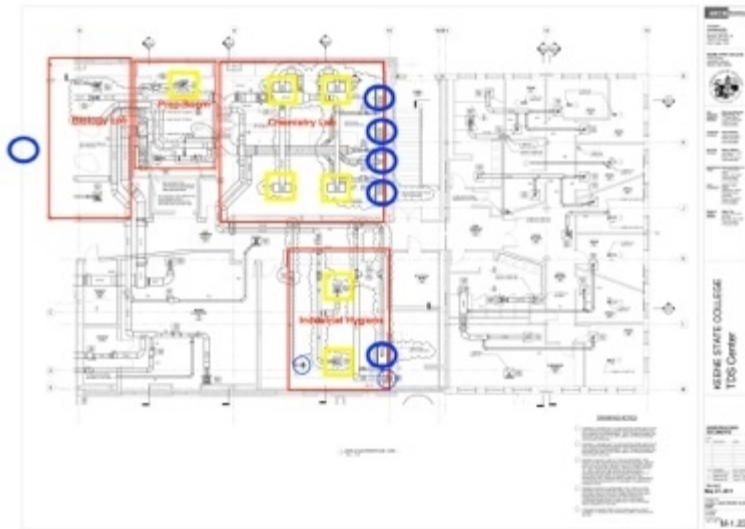
The Lab Vent Assessment Approach:

1) Air Movement Direction

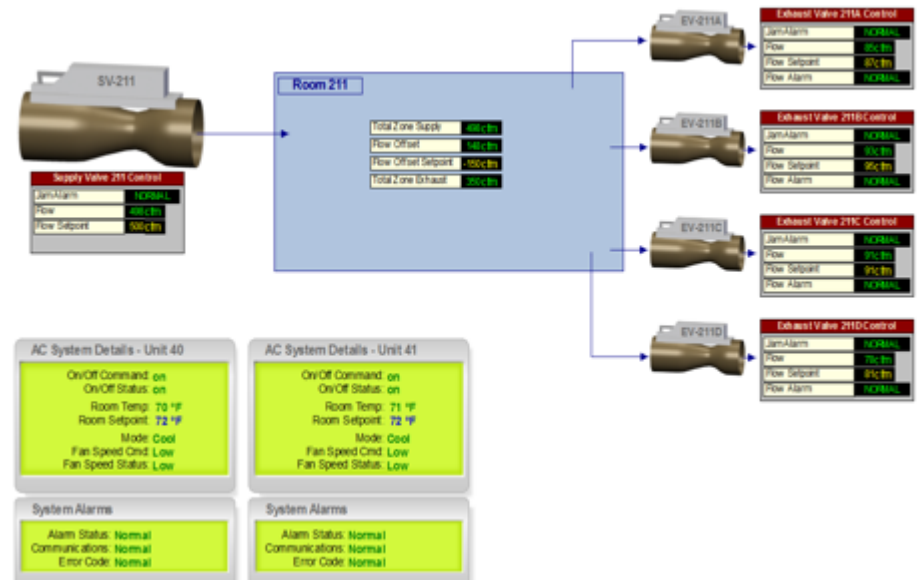
- Capture velocity involves both speed and direction
- First, we check the direction of airflow in the lab



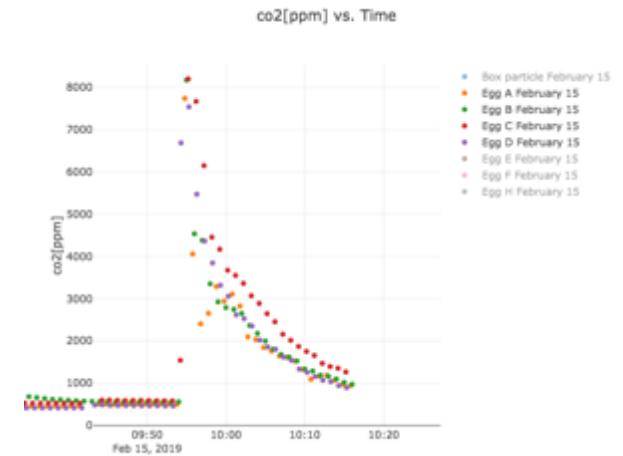
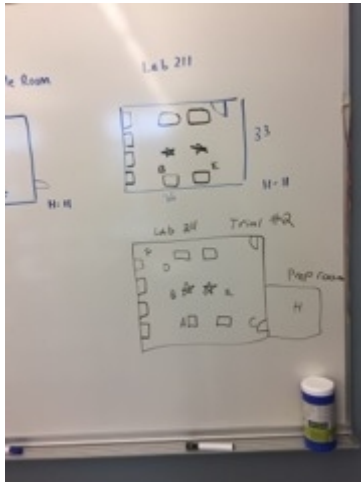
2) Assessing Speed: What Does Building Tell Us?



TDS Center Room 211 Units 41 & 42 Keene State College



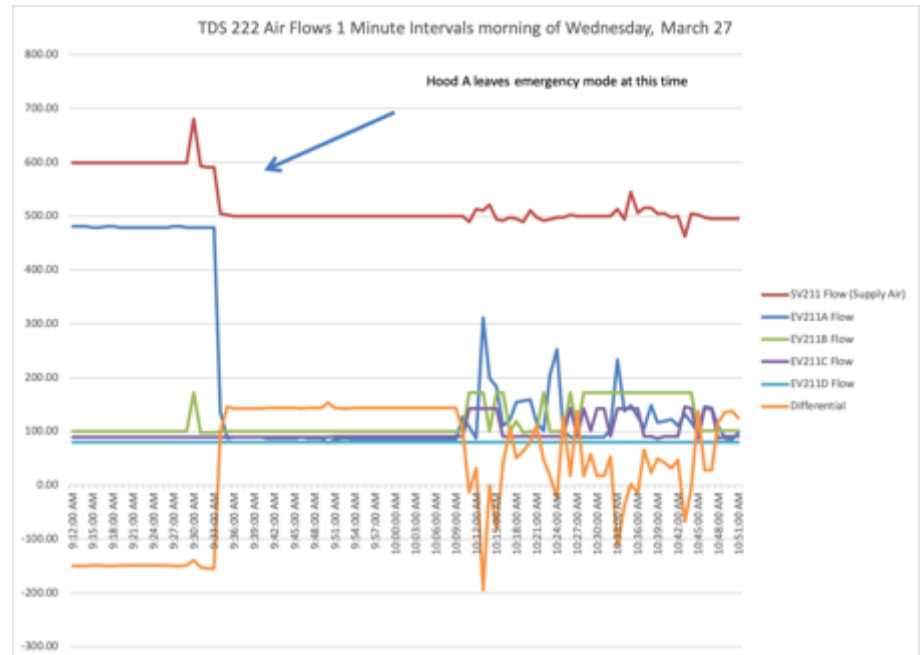
3) Assessing Speed: The Field Approach



| Device Name | Start Time | End Time | # Data Points | Observed ACH [per hour] | R ² | Concentration Half Life [minutes] |
|-------------------|---------------------|---------------------|---------------|----------------------------|----------------|---|
| Egg A February 15 | 2019-02-15 09:55:47 | 2019-02-15 10:04:47 | 10 | 3.58 | 0.55 | 11.62 |
| Egg B February 15 | 2019-02-15 09:56:00 | 2019-02-15 10:05:00 | 10 | 5.21 | 0.93 | 7.99 |
| Egg C February 15 | 2019-02-15 09:56:13 | 2019-02-15 10:09:13 | 14 | 5.69 | 0.95 | 7.30 |
| Egg D February 15 | 2019-02-15 09:56:18 | 2019-02-15 10:05:18 | 10 | 6.74 | 0.98 | 6.17 |
| | | | Average: | 5.31 | 0.85 | 8.27 |
| | | | Std Dev P: | 1.14 | 0.18 | 2.04 |
| | | | Rel Std Dev: | 22% | 21% | 25% |

Any new theories?

My Current Working Theory (#4)



So are the Odors a Problem?

Explaining the Toxicology of Acetic Acid

Acetic acid is a clear, colorless, flammable liquid with a pungent odor. ***At lower concentrations the odor of acetic acid is sour, vinegar-like and can be detected at concentrations from 0.48 to 1.0 ppm.***

ACETIC ACID

CAS: 64-19-7

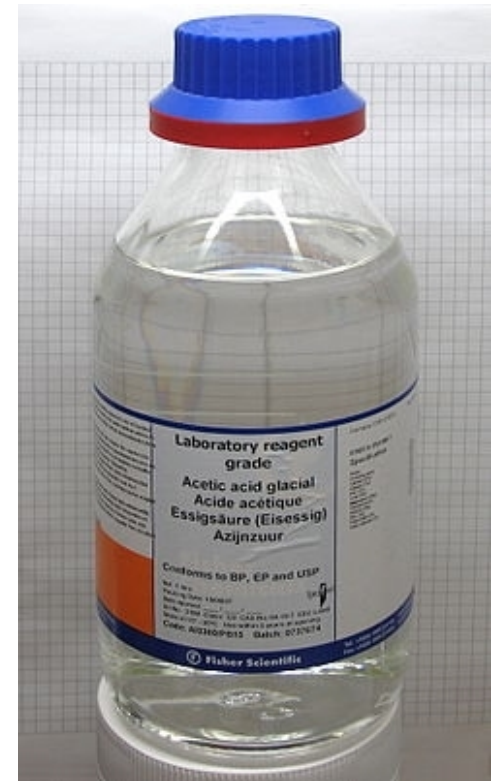
Synonyms: Acetic acid, glacial; Ethanoic acid; Ethylic acid; Glacial acetic acid; Methanecarboxylic acid; Vinegar acid

Molecular formula: $C_2H_4O_2$

Structural formula: $H_3C-COOH$

TLV-TWA, 10 ppm (25 mg/m³)

TLV-STEL, 15 ppm (37 mg/m³)



Does this Information Answer the Question?

Questions Yet to Be Addressed

- Does the odor (really) travel among the labs?
- What are the acetic acid levels being reached in the lab?
- How do we provide better control of fugitive odors in this lab?



Attributes of Good Questions

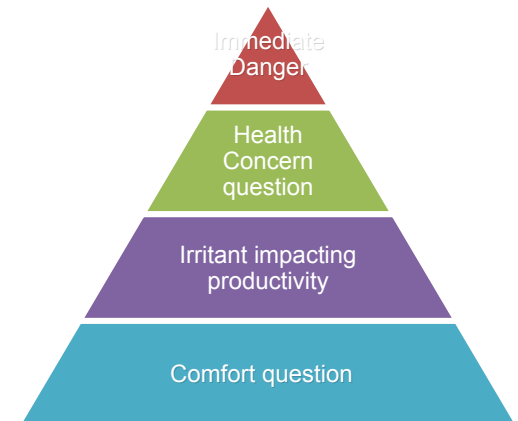
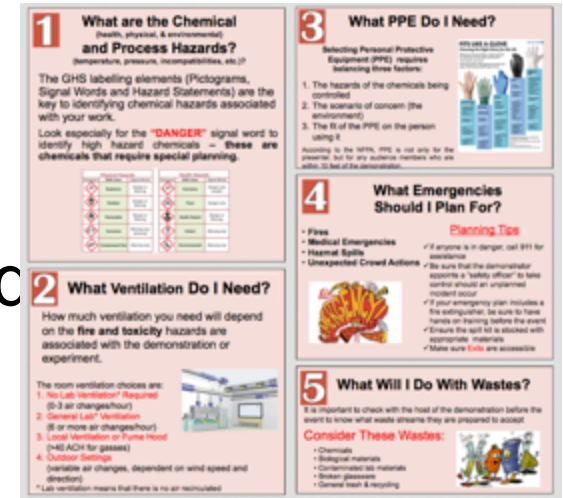
Finding the right expert

- Availability of expert
- Language of the question needs to be negotiated

Timing

- Establishing urgency
- Observability of concern

Framing the Level of Concern



Tips to Getting Useful Answers

1. Ask questions **early and often**
 - *Asking questions takes experience and an emergency is not the time to practice*
 - Think of your questions as an empowerment opportunity
2. Find the person with **the right skills** to answer the question
3. Expect to **take time** to develop a common language in order to frame the question correctly
4. Be **patient** and **persistent**



Follow up from Sunday's talk: Answering Questions Partners Training and Education

Education



"Ivory Tower" Intellectuals

- Correct, but often not useful, answers
- *"That guy again"*

Empowered Leadership

- Actionable answers

The Public

- Confused and confusing answers

"Siloed" Bureaucrats

- Possible but often irrelevant answers
- *"Administrative issues"*

Training



Remember We're All in This Together

