TRI CURRICULUM PROJECT FOR UNIVERSITIES AND HIGH SCHOOLS

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May 7, 2014

PRESENTATION OVERVIEW

- Background and Introduction
- The “SHWEC” Experience
- UW – Green Bay and TRI
  - Pollution Control and Pollution Prevention
  - Student and Community Impacts
- TRI at the High School Level
- Conclusions

UW-GREEN BAY MISSION

The University of Wisconsin-Green Bay provides an **interdisciplinary, problem-focused educational experience** that prepares students to think critically and address complex issues in a multicultural and evolving world. The University enriches the quality of life for students and the community by embracing the educational value of diversity, **promoting environmental sustainability**, **encouraging engaged citizenship,** and serving as an intellectual, cultural and economic resource.

REFERRED TO AS ECO-U IN THE EARLY 1970s
NAMED AS AN EPA TRI UNIVERSITY FOR 2013-14

BACKGROUND

- UW-Green Bay (B.S.) – 1991
  - Environmental Science and Business Administration
- UW-Green Bay (M.S.) – 1993
  - Environmental Science and Policy
- Marquette University (Ph.D.) – 1996
  - Civil and Environmental Engineering

CURRENT POSITIONS

- UW – Green Bay
  - Professor and Chair of Natural and Applied Sciences
  - Director, Environmental Management and Business Institute (EMBI)
  - Academic Director, M.S. in Sustainable Management (100% on-line program)
- SEH Inc., Project Design Leader
- Brown County Solid Waste Board, Chair
- Many other contacts with industry

THE “SHWEC” EXPERIENCE

- UW Extension – Solid and Hazardous Waste Education Center

- 1995-1999 (currently hold adjunct status)
  - Industrial Recycling Specialist housed at UW – Green Bay

THE “SHWEC” EXPERIENCE

- **“Dirty Jobs” (Wisconsin style!)**
  - Visited 100s of facilities during this short period of time

SHWEC AND TRI

- SHWEC "Customers"
  - Referrals from the Wisconsin Department of Natural Resources
    - Companies out of compliance
    - Potential difficulties in meeting new regulations
  - Community based issues associated with one or more toxic substances
    - Pre-treatment programs at wastewater treatment plants

SHWEC TECHNICAL ASSISTANCE PROGRAMS

- No cost, non-regulatory assistance
- Pollution prevention project opportunities at individual companies
- Industry sector programs and training
  - Dry Cleaners, Printers

UW-GREEN BAY AND TRI

- Accepted a tenure-track faculty position in 1999

- Course load included:
  - Pollution Control (existing course)
  - Pollution Prevention (new course)
  - Waste Management and Resource Recovery

POLLUTION CONTROL

- Course Format
  - 2 hours of lecture/week
  - 3 hours of laboratory/week
- Laboratory
  - Field trips to local industries
  - Favorite part of the class for the students!
  - I wish we could do more field trips!

FIELD TRIPS

POLLUTION CONTROL

- Course Format
  - 2 hours of lecture/week
  - 3 hours of laboratory/week

HOW CAN THE COURSE BE MADE BETTER?

HOW CAN I USE MY PREVIOUS EXPERIENCE IN THE CLASSROOM?

INDUSTRY RESEARCH PROJECT

- Utilize TRI data as a starting point for a research project, which can also include other environmental impacts

- Project steps
  1. Select a company based on zip code
  2. Research TRI data for that company
  3. Use the data to assess the company's pollution control and pollution prevention efforts

EXAMPLE PROJECTS

EXAMPLE PROJECTS (CONT.)

3M

CEMSTONE
BUILDING THE FUTURE TOGETHER

NEW BELGIUM BREWING

VOLLRATH®

MERCURY

CARVER YACHTS

cei
Converting Ideas Into Innovation

INDUSTRY RESEARCH PROJECT FORMAT

- Final Report
  - Introduction
  - Types/amounts of pollution in the county
  - Types/amounts of pollution by the company
  - Pollution control technologies utilized
  - Pollution prevention opportunities
  - Conclusions

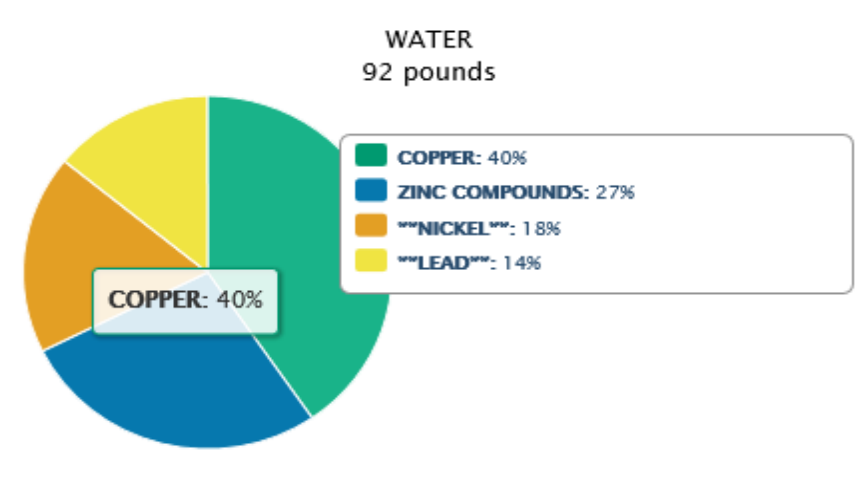
INDUSTRY RESEARCH PROJECT FORMAT (CONT.)

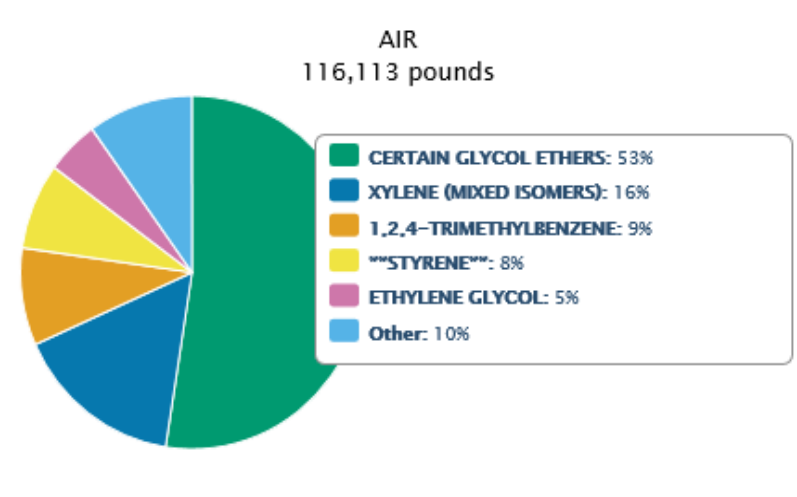
- No other requirements are provided to the students
  - Some intermediate reporting is required
  - A presentation is made to class at the end of the semester
- Inquiry-based learning
  - Every project is different
  - There is no “right” answer
  - Students can approach the project in many different ways, which allows for increased creativity but is also considered to be more challenging by the students

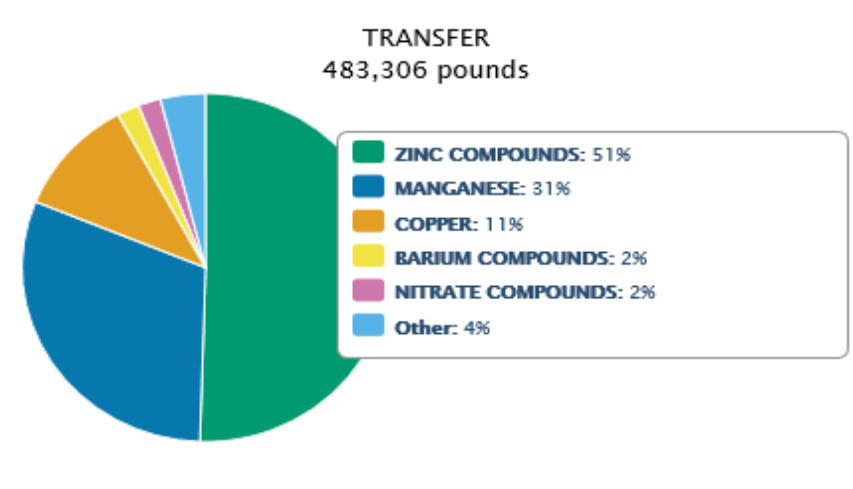
POLLUTION BY COUNTY

- Sauk County

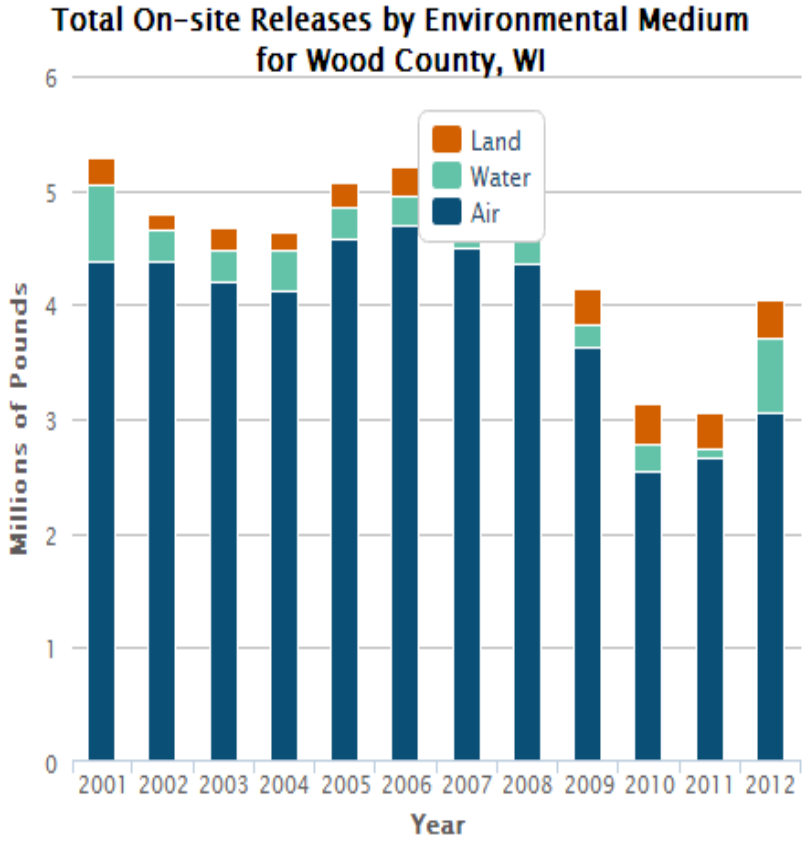
SAUK COUNTY

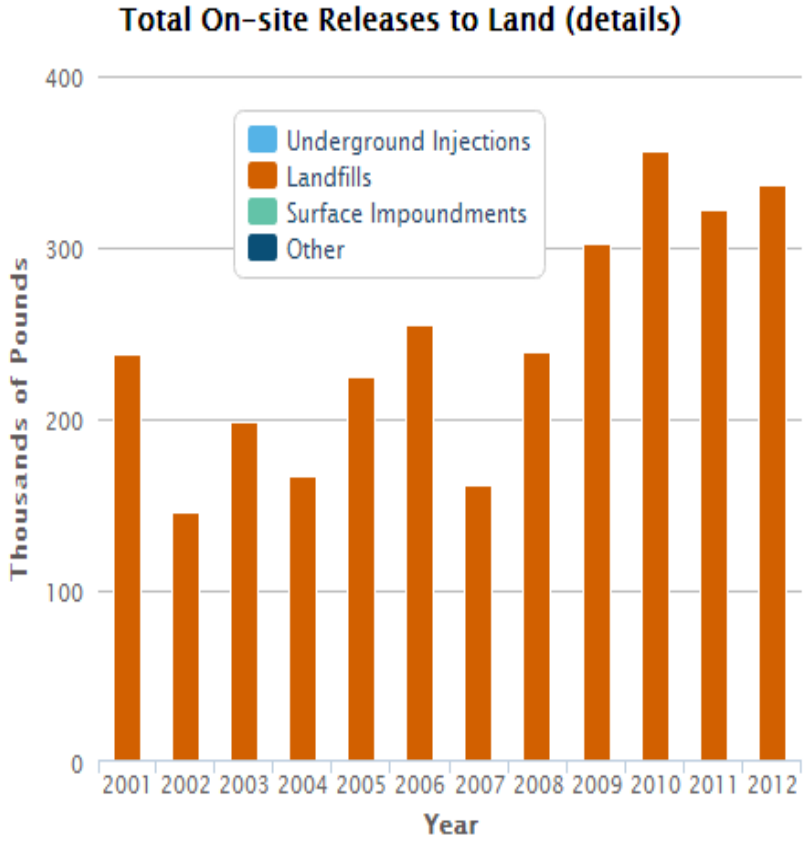

WATER
92 pounds
COPPER: 40%
COPPER: 40%
ZINC COMPOUNDS: 27%
""NICKEL"": 18%
""LEAD"": 14%


AIR
116,113 pounds
CERTAIN GLYCOL ETHERS: 53%
XYLENE (MIXED ISOMERS): 16%
1,2,4-TRIMETHYLBENZENE: 9%
""STYRENE"": 8%
ETHYLENE GLYCOL: 5%
Other: 10%


TRANSFER
483,306 pounds
ZINC COMPOUNDS: 51%
MANGANESE: 31%
COPPER: 11%
BARIUM COMPOUNDS: 2%
NITRATE COMPOUNDS: 2%
Other: 4%

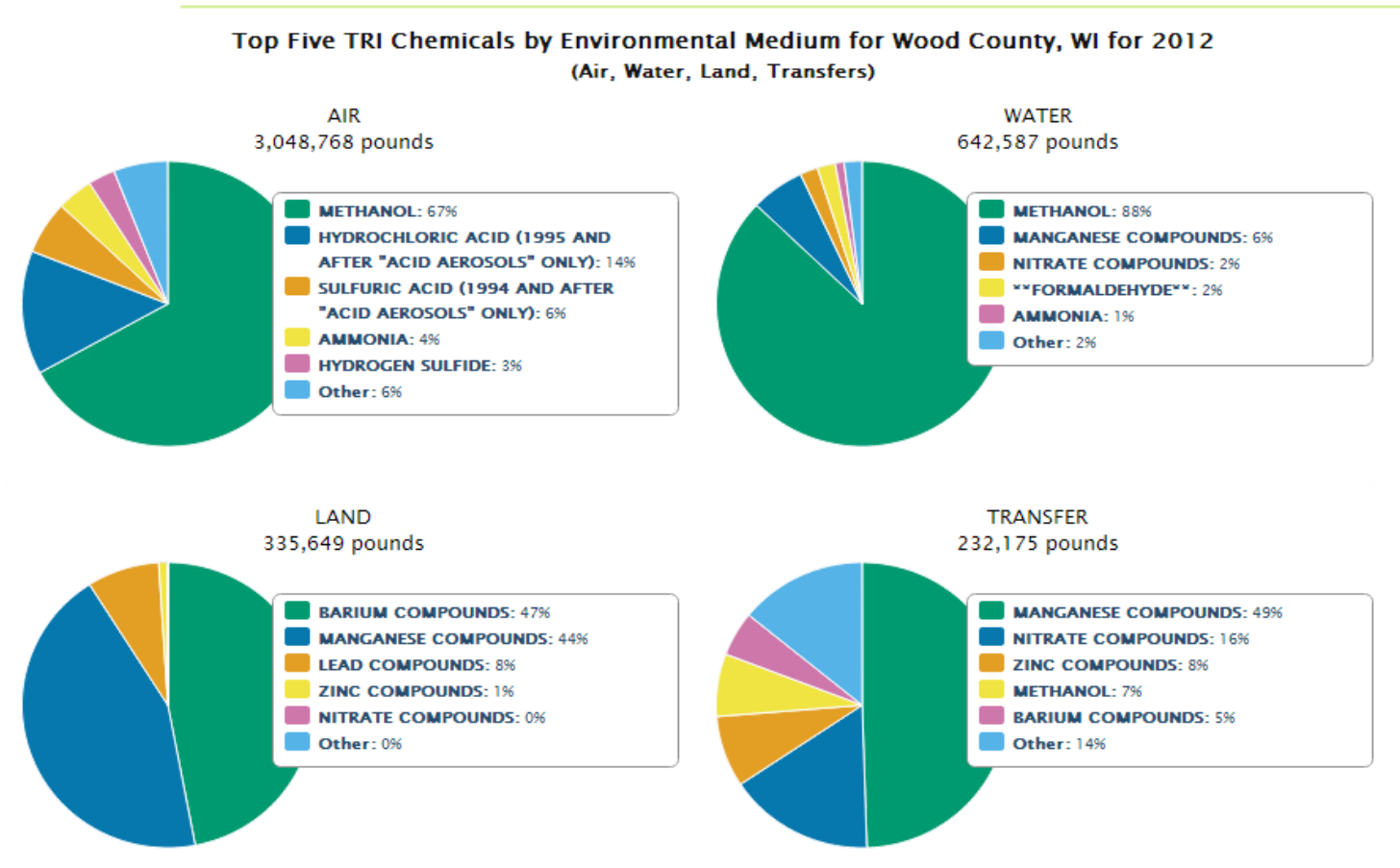
WOOD COUNTY





Total On-site releases by environmental medium for Wood County, WI (EPA, 2013).

WOOD COUNTY



Top five TRI chemicals by environmental medium for Wood County, WI (EPA, 2013).

TRI DATA - NEKOOSA MILL

CONTEXT

County

15% of TRI releases in WOOD County, WI

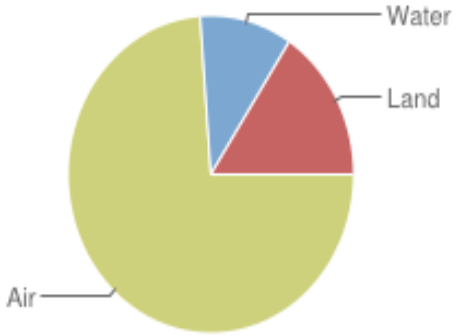
16 TRI facilities in WOOD County, WI

National

Ranks 3 out of 401 TRI facilities in Industry: Wood Products

(Rank 1 = highest releases)

ON SITE RELEASES TOTALS



Source	Pounds Released
Air	338530
Water	47869
Land	72225

- Most emissions are air releases
- Ranks 3rd highest in Wood Products Industry

State of Wisconsin
DEPARTMENT OF NATURAL RESOURCES
Wisconsin Rapids Service Center
473 Griffith Ave.
Wisconsin Rapids WI 54494

Scott Walker, Governor
Cathy Stepp, Secretary
Telephone 608-266-2621
Toll Free 1-888-936-7463
TTY Access via relay - 711

WISCONSIN DEPT. OF NATURAL RESOURCES

June 21, 2012

File Ref: 4530-1
FID#: 722010690

Domtar A.W. LLC
Attn.: David Ulrich
301 Point Basse Ave.
Nekoosa WI 54457

RECEIVED
JUN 22 2012
ENVIRONMENTAL AFFAIRS

Subject: Full Air Compliance Evaluation (FCE), May 31, 2012

Dear Mr. Ulrich:

I would like to thank you and all of the employees at the Domtar Nekoosa Mill for your time and cooperation during the compliance evaluation that I conducted at your Mosinee facility on May 31, 2012. Information obtained during and subsequent to the records review of your files was used to write up the enclosed Full Compliance Evaluation Summary Report dated June 21, 2010.

Based on our inspection of your facility and your records, your facility is in compliance with your air pollution control operating permit and NR400, Wisc. Adm. Code, series rules.

If you have any questions or comments concerning this report, you may contact me at (715) 421-7840.

Sincerely,

WEST CENTRAL REGION

Donald R. Grasser

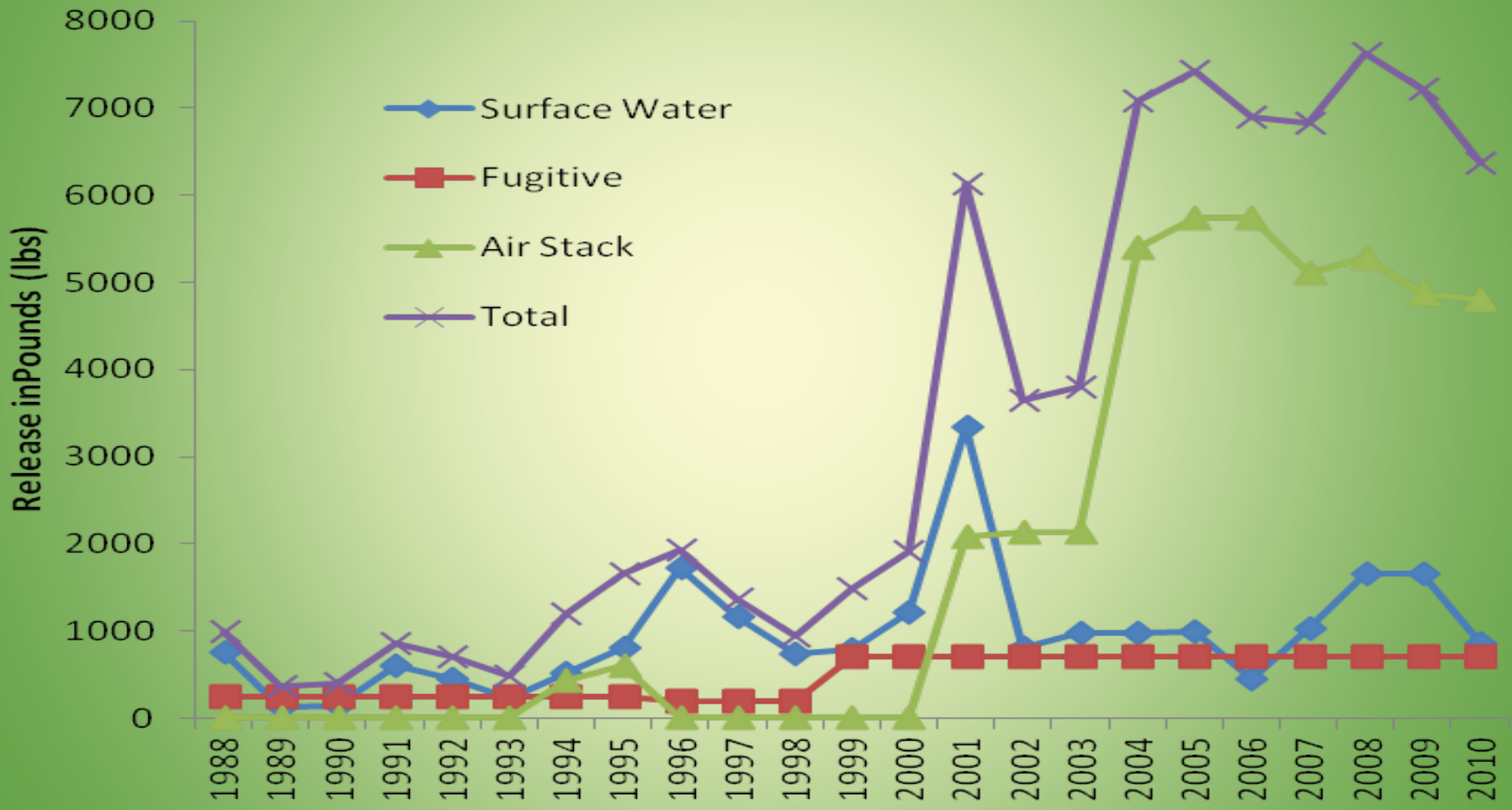
Donald R. Grasser, P.E., P.H.
Air Management Engineer

ENCLOSURE: Full Compliance Air Compliance Evaluation Summary, w/o attachments

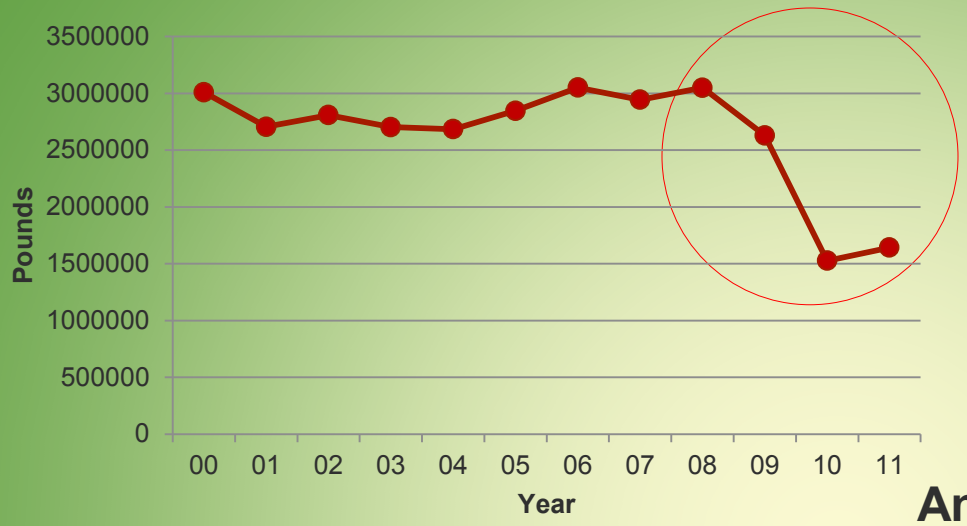
Cc: Rick Wulk, Air Team Supervisor (FCE by email)
AM/7 – INS (FCE by email, hard copy attachments)
Wisconsin Rapids Service Center File

Air Compliance Evaluation Summary

POLLUTION TRENDS



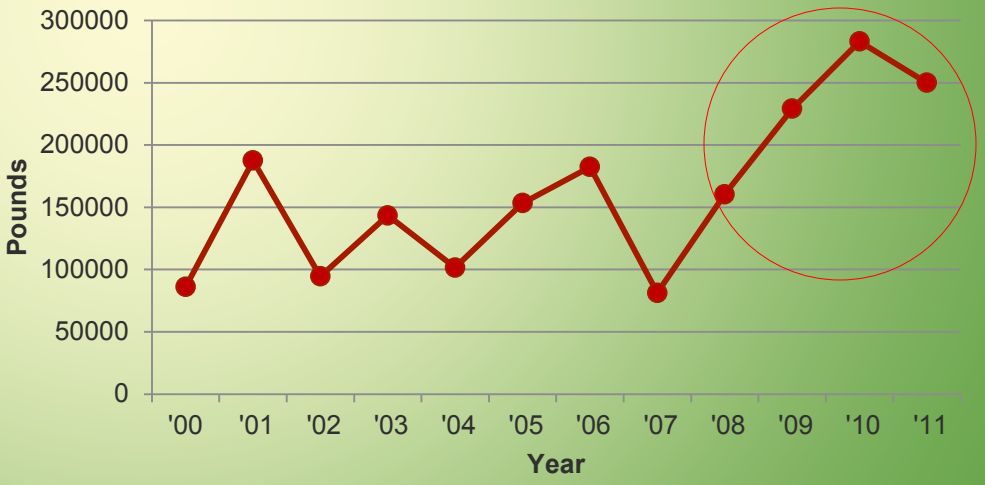
Annual Air Emissions



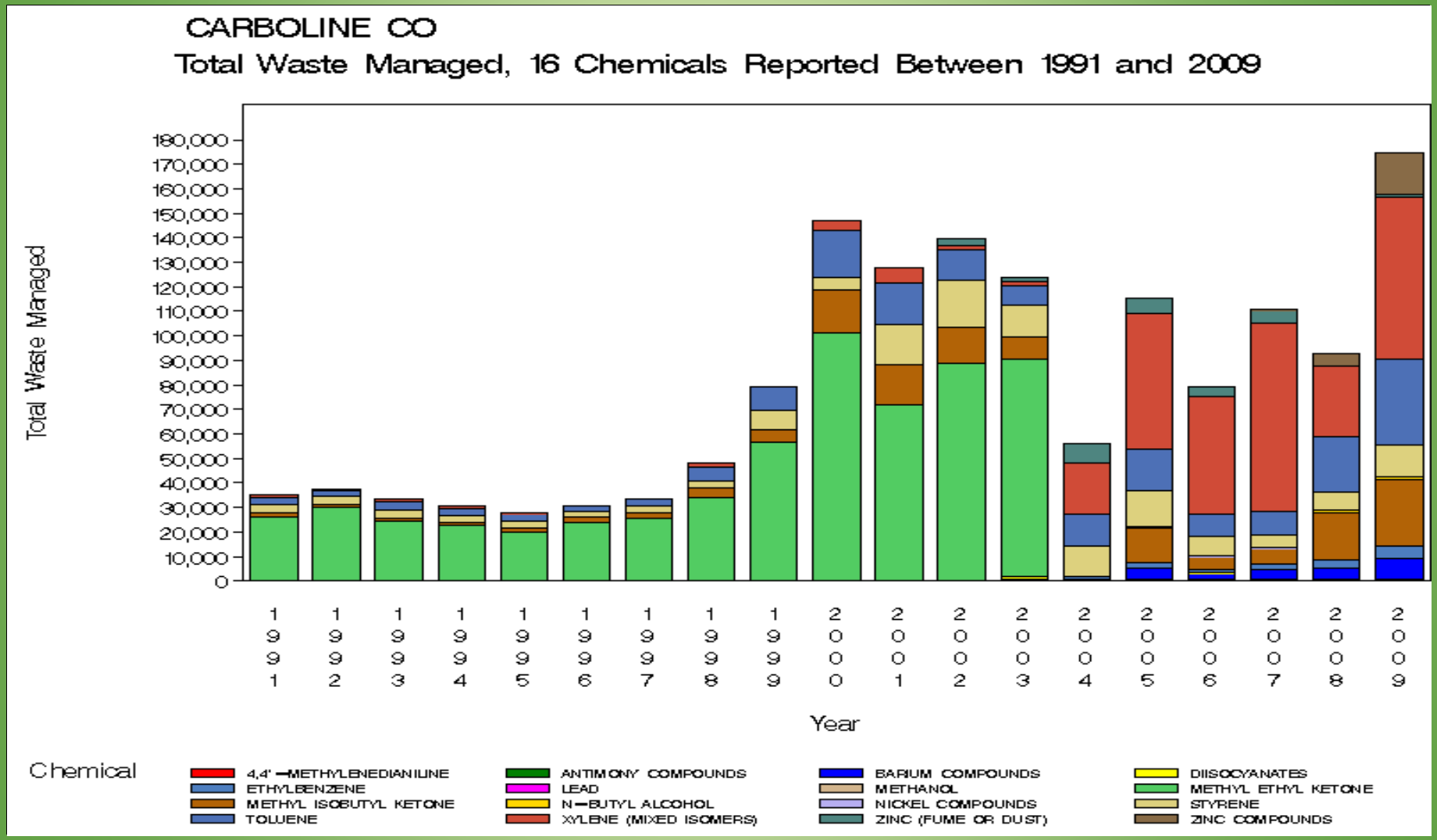
2011:

- 1,640,000 pounds of air emissions
- 250,000 pounds of land releases

Annual Land Releases



POLLUTION TRENDS

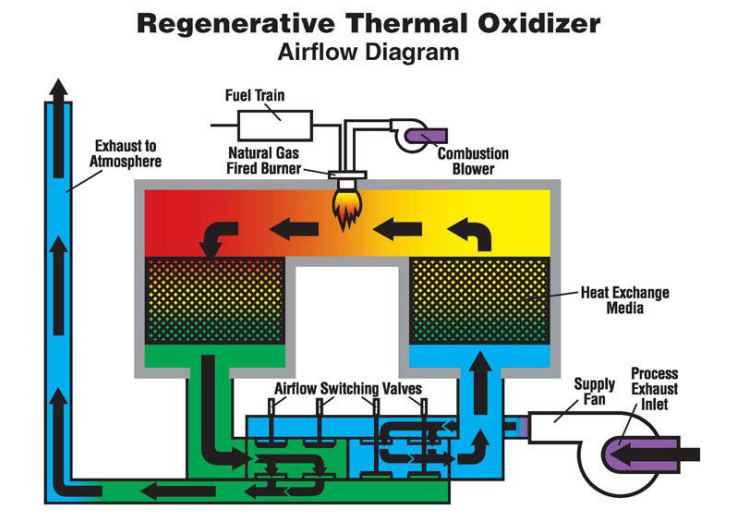


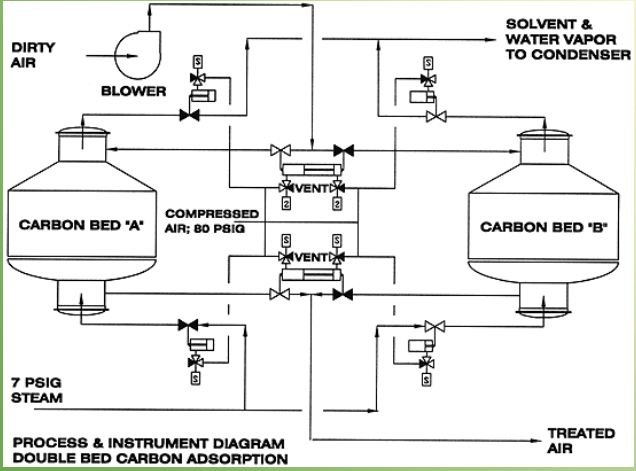
CARBOLINE – 10/21/13

For Immediate Release – Green Bay Police Department

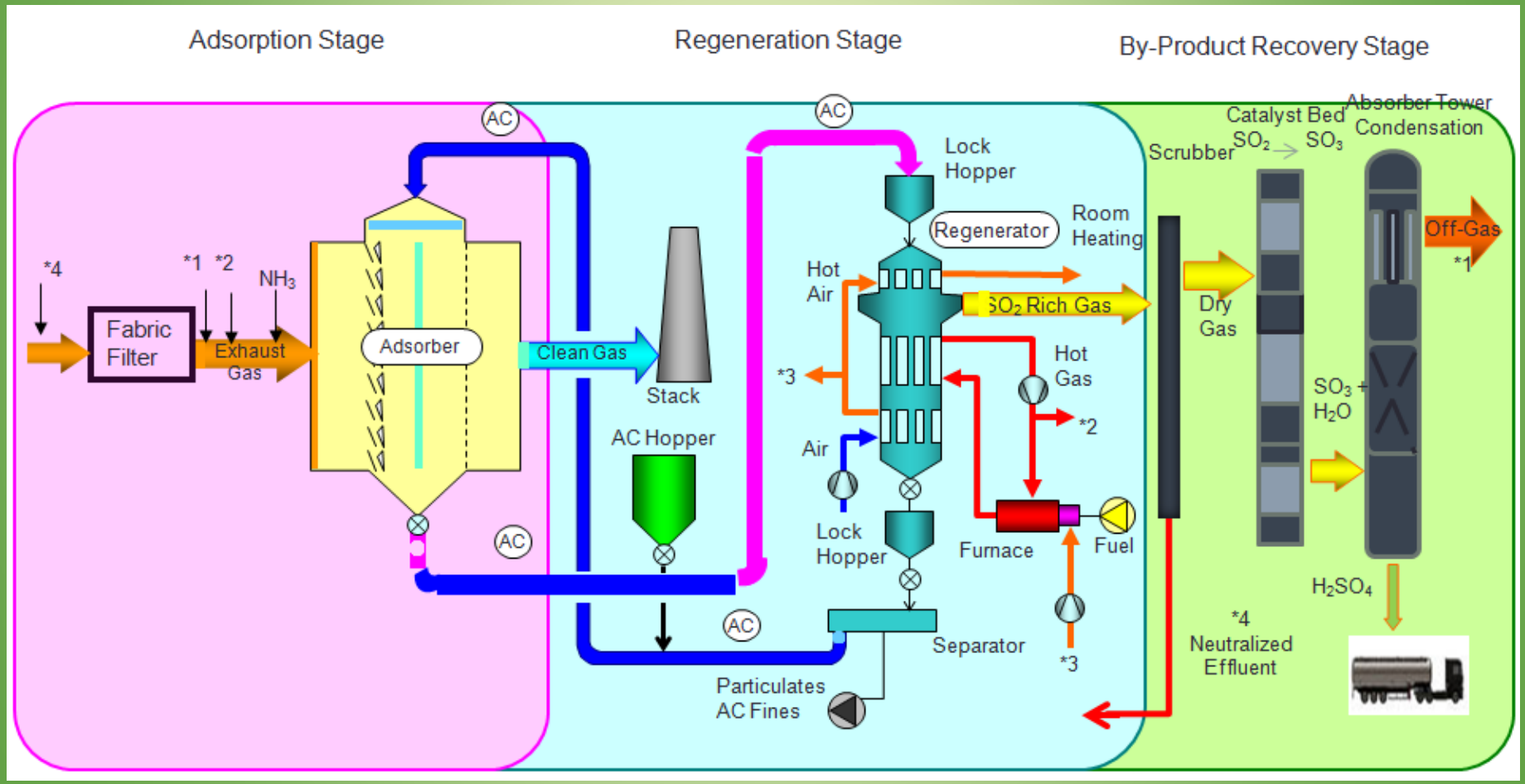
Incident Date: 10/21/2013
Incident Type: Hazardous Material
Incident Time: 8:25 AM
Incident Description: Chemical manufacturing facility
Cause of Incident: A chemical coating mixture was prematurely mixed together causing a chemical reaction
Estimated Dollar Loss: Unknown
Injuries: None
Number of People Displaced: One elementary school and some local businesses temporarily sheltered in place.
Additional Information: Last night workers at Carboline Company mixed parts of a chemical coating together inside the facility. The chemical coating is manufactured at Carboline and is usually mixed by the end-user while spraying it onto various surfaces. Workers put the product into six 55 gallon drums and put them outside in the loading dock. The chemical reaction between the chemicals produced significant amounts of heat and started smoking this morning. Fire crews used water to cool the drums and suppress vapors. The Brown County Hazardous Materials Team was called in to assist and monitored air quality downwind and found no hazardous conditions.

CONTROL TECHNOLOGIES





CONTROL TECHNOLOGIES REACT™ SYSTEM FLOW



POLLUTION PREVENTION

- There are many technologies that can applied to multiple industries
  - Painting and coating
  - Cleaning processes
  - Etc.

- Some technologies are industry specific and proprietary

PROJECT BENEFITS

- Students get to experience as many as 20-24 “virtual field trips” at the end of the semester
- Students learn more about their own communities and other communities they would otherwise not get to visit
- Instructor now has a library of presentations on well over 200 companies
- Increased awareness by industry of the data transparency
  - Not every industry cooperates with the students!
  - This requires them to be better “detectives”

PROJECT BENEFITS (CONT.)

- Students Internships
  - Initiated by meeting the environmental professionals at the selected facilities
- Permanent Jobs
  - More than half of the industry tours for the class are now lead by my former students
- Exposure for the University
  - "360° of Learning"
  - "Connecting Learning to Life"

NEXT STOP - CHILE

Ingeniero que logró limpiar la bahía más contaminada de EE.UU. aconseja:

"Ventanas puede salvarse, pero hay que asumir la contaminación industrial"

Los desechos como una oportunidad

UDD VISIT TO UW-GREEN BAY
APRIL 20-MAY 2, 2014

OTHER OPPORTUNITIES

- If this project is successful for college students at UW-Green Bay, could it work for high school students?

- Benefits
  - Make them more aware of the educational and job opportunities in environmentally related fields
  - Increased understanding of the local community

TRI UNIVERSITY
HIGH SCHOOL CURRICULUM PROJECT

Goals

- Introduce students to toxic pollutants
- Use the TRI website to investigate their community
- Identify top polluters in their counties
- Investigate pollution control/prevention

HIGH SCHOOL SESSIONS

- Three sessions held in April, 2014
  - De Pere, Denmark, and Seymour
- Number of Participants: 68
- Pre-test / Post-test
- Project Worksheet

INDUSTRY PROJECT

- Limitation
  - Project was initiated late in the school year
  - Regardless of the time of year, teachers have little flexibility in terms of doing large projects
  - Some teachers/students were not prepared for the necessary level of commitment
- Opportunity
  - Complete the project outside the classroom with student environmental clubs/organizations

PROJECT WORKSHEET

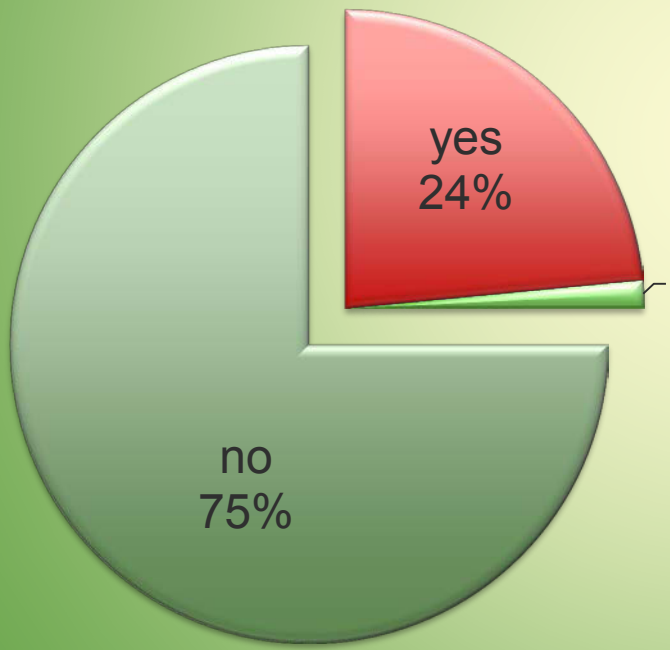
- Benefits
  - Shorter time commitment for teachers
  - Still provides opportunities for student learning
  - Motivated students will become more interested in this topic, which is one that they did not know about previously

STUDENT WORKSHEET

- Students select a facility in their county
- Identify the top pollutants and polluters
- Research the chosen facility
  - What do they produce
  - What toxic chemicals are released
  - Has the facility improved or gotten worse in total toxic releases

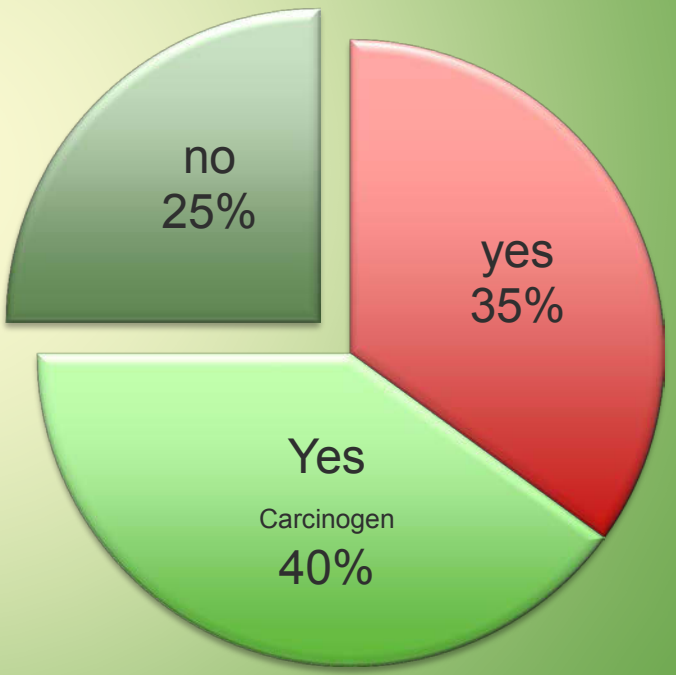
HIGH SCHOOL RESULTS

Able to Define “Toxic” Pre-test

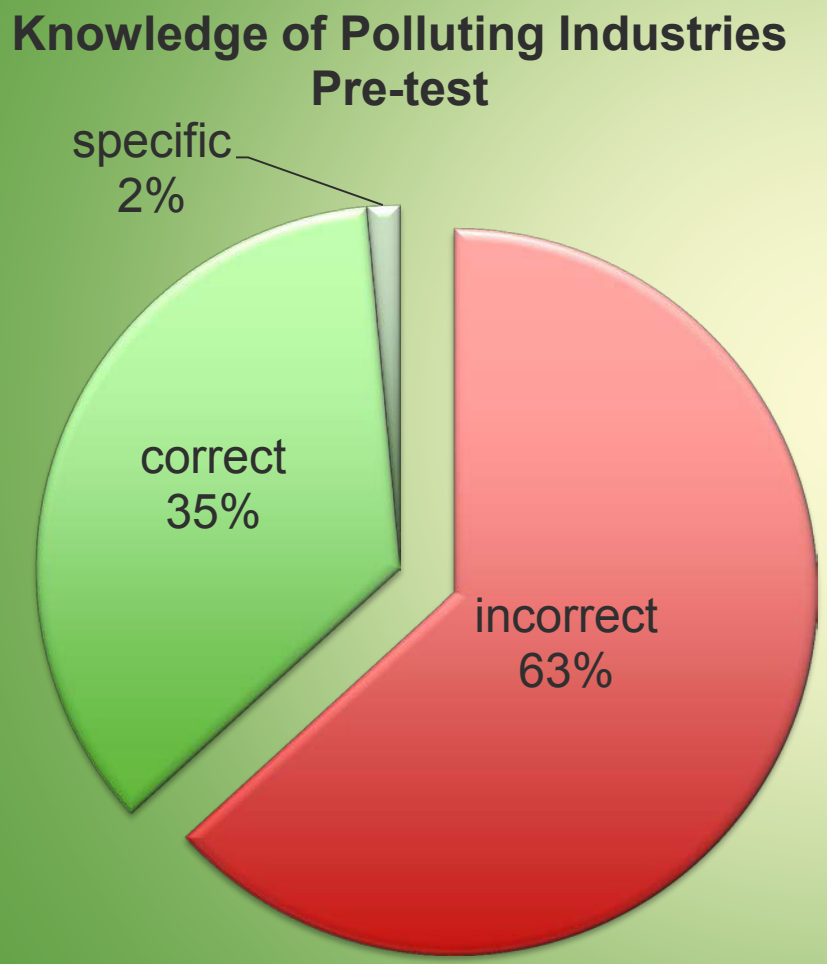


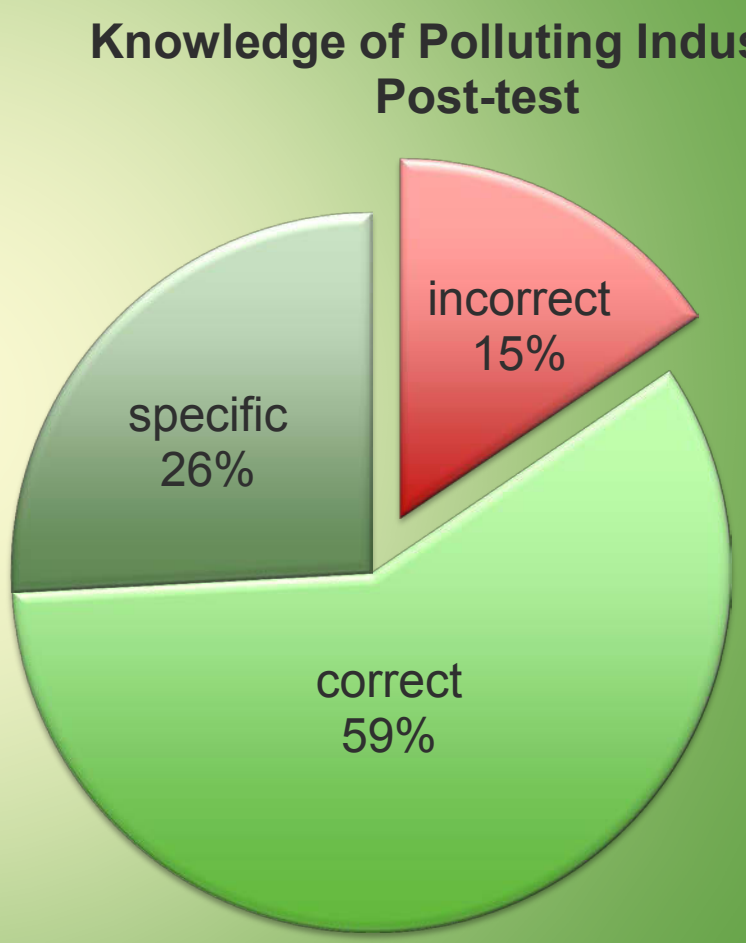
Yes
(Carcinogen)
1%

Able to Define "Toxic" Post-test



HIGH SCHOOL RESULTS





CONCLUSIONS

- This project could be easily duplicated by other universities, with minor adjustments to meet their specific needs
  - Universities could then work with their local high schools
  - Could the student presentations be shared?
- High Schools have limited time available
  - Assigning a full scale project is difficult because of current constraints in K-12 education
  - Substituting a worksheet was more acceptable to the teachers

QUESTIONS?

Thank You