# IEPA Pollution Prevention Internship Program

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# Presentation Objectives

- Provide background information on the internship program
- Describe key components of the program
- Highlight intern projects at private and public sector facilities
- Share “lessons learned”

# Background

- Pollution Prevention (P2) Internship Program launched in1989
- Evolved from discussions between IEPA and State Chamber of Commerce
  - Improve relations between IEPA and business community
  - Provide a non-regulatory approach to help facilities reduce environmental impacts
  - Encourage environmental innovation and leadership-type projects
- Purpose:  help facilities improve environmental performance, while providing practical work experience for college students
- P2 Focus:
  - Avoid generation of waste and emissions
  - Decrease use of toxic substances
  - Use materials, equipment, energy and water more efficiently

# Key Components

- Place student interns at 15-17 facilities each year, primarily in the manufacturing sector
- Recruit students from public and private universities in the state
  - Junior/senior undergrad and graduate level college students
  - Background in engineering, chemistry or environmental management
- Train students on energy efficiency, waste auditing, processing mapping and other quality improvement techniques
- Students work for 12 weeks in the summer (includes 11 weeks in the field and one week of training)
- Provide a salary of $2,700 a month
- Depending on funding availability, IEPA will pay entire student salary or negotiate a cost-sharing agreement with the host facility

# What are the benefits for host facilities?

- Technical resource provided at a relatively modest cost
- Fresh perspective with a focus on process improvement
- Reduced waste, emissions, energy losses and potential environmental liabilities
- Cost savings related to materials, operations, treatment and disposal

# Student Benefits

- Gain “hands-on” experience in manufacturing and other workplace settings
- Opportunity to make a difference in the environmental field
- Acquire project management skills
- Improve communication and presentation skills
- Earn a salary
- Build resume and professional contacts

# Which state universities have provided intern students?

- Illinois Institute of Technology
- University of Illinois at Chicago
- University of Illinois at Urbana-Champaign
- Bradley University
- Southern Illinois University Edwardsville
- Southern Illinois University Carbondale
- Northern Illinois University
- Northwestern University

# IEPA's role in the intern program


- Recruit qualified students
- Review facility project proposals
- Match interns with host facilities
- Establish contracts with students
- Train interns on P2 technologies and practices
- Conduct initial on-site visit with student
- Review intern progress reports and periodically consult with the facility supervisor
- Provide project support (technical advice, resource leads, problem-solving, etc.)
- Publicize the project results

# Intern Responsibilities

- Attend one-week training class in Springfield
- Adhere to a work schedule (typically a 40-hr. work week)
- Follow company policies and regulations (e.g., safety, personal protection, operating procedures and confidentiality)
- Work with management and staff
- Submit bi-weekly progress reports
  - Reports are reviewed by facility supervisor before submittal to IEPA
- Present project results at half-day seminar
- Deliver a final report at end of project

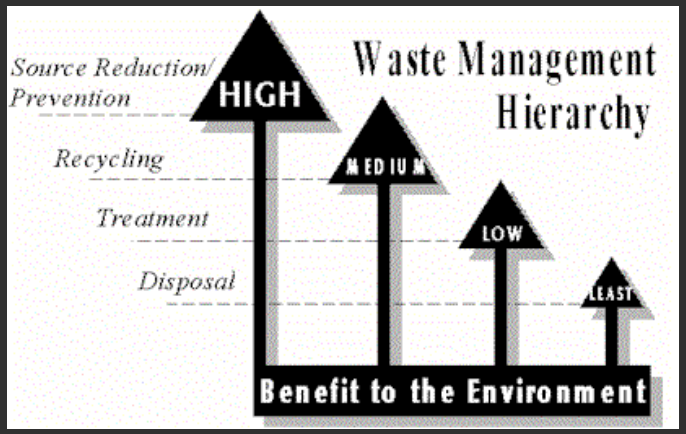
# Facilities Must Provide:

- Well-defined project(s)
- Student supervision
- Work space
- Safety training
- Employee cooperation
- Workers' compensation
- Cost-sharing fee and misc. expenses, where appropriate

# A sampling of facilities that have participated in the program

- Industry
  - Caterpillar
  - Motorola
  - Abbott Laboratories
  - Nalco Company
  - Case New Holland (Goodfield)
  - Woodward Governor (Rockford)
  - Innertech (Nashville)
  - Carlisle SynTec (Greenville)
  - Rhodia Inc. (Blue Island)
  - Illinois & Midland RR (Springfield)
  - Prairie Farms Dairy (Carbondale)
  - Pre Finish Metals (Elk Grove Village)
  - Roe Machining (Johnston City)
- Government
  - Wilmette Water Plant
  - Village of Algonquin Public Works
  - Chicago Transit Authority
  - Rock Island Arsenal
  - Shawnee Correctional Center
- Institutions
  - University of Illinois at Chicago
  - Southern Illinois University – Carbondale
  - Illinois Central College
  - Illinois Green Economy Network
  - St. Mary's Hospital (East St. Louis)
  - Joliet Public Schools District 86

# What type of projects have interns recommended or implemented?




- Lighting/motor upgrades
- Air compressor usage
- Solid waste reduction
- Process efficiency
- Material substitution
- Equipment cleanup
- Waste segregation
- Heat recovery
- Improved inventory control
- Container reuse/recycling
- Laboratory chemicals/solvents
- Training/awareness building
- Environmental management systems

# Sample Intern Projects

- *Project Recommendations*:
  - Continental General Tire (Mt. Vernon) – convert to water-based inks for marking tires
  - Honeywell Microswitch (Galena) – install spill trays and spill guard doors in zinc phosphating process to reduce spillage and drag-out. Recirculate chemicals in phosphate bath to reduce sludge buildup
  - Sundstrand Aerospace (Rockford) – reduce wastewater generation by utilizing ultrafiltration system to recycle aqueous cleaners
  - Abbott Labs (Abbott Park) – expand technical stockroom inventory system to share, order and track new and returned lab chemicals
  - Baxter Healthcare (Round Lake) – eliminate use of isopropanol in filter integrity testing by utilizing a water-based intrusion process
  - McWhorter Technologies (Carpentersville) – reduce wastewater sources by repairing roof leaks; minimizing spills and drips from hoses; and utilizing a less hazardous floor cleaner

# 2012 Project: Shawnee Correctional Center (Vienna)

- *Project Focus*: solid waste, energy efficiency and renewable energy
- *Intern Tasks and Recommendations*:
  - Evaluated opportunities to institute a composting program that would utilize vegetable and fruit waste from dietary, as well as landscaping waste. Identified several options for improving the recycling of paper, plastic, tin, and cardboard materials. Potential benefits: eliminate three waste pickups per week, saving over $44,000 a year and reducing landfill waste by 75 percent.
  - Recommended that lighting fixtures be updated to reduce energy consumption. Potential benefits: save $59,000 a year and reduce CO2 emissions by 520 metric tons.
  - Evaluated feasibility of installing a biodiesel conversion unit to process vegetable oil grease from dietary services. Potential benefits: reduce disposal costs by $35,464 a year and provide fuel for several fleet vehicles.
  - Performed a wind site and solar thermal system assessment. Determined that a solar thermal system would be feasible, given the 4.5 KWh/m2/day solar insolation or amount of available solar radiation energy that would be necessary to offset natural gas consumption.

# 2011 Project: Navistar (Melrose Park)

- *Project Focus*: Energy efficiency
- *Intern Tasks and Recommendations*:
  - Created a leak detection and repair program for compressed air systems. Identified and repaired leaks during the July shutdown, resulting in a savings of $39,000 a year. Potential cost savings: over $92,000 a year if all identified leaks are repaired.
  - Recommended that all incandescent exit signs be updated to LED lighting. Potential cost savings: $1,400 a year.
  - Conducted lighting audit of manufacturing area for all shifts and proposed that ceiling lighting be upgraded to T8 fixtures. Potential benefits: save $648,400 a year, with a reduction of 3,350 metric tons in CO2 emissions.
  - Delamped all T17 lighting fixtures and every third high pressure sodium fixture. Potential cost savings: $92,000 a year.
  - Turned off lighting in vending machines, leading to an immediate savings of $1,700 a year. Proposed that energy controls be installed in all vending and snack machines. Potential cost savings: $2,800 a year.
  - Identified 300 personal ventilation fans in manufacturing area, each of which operates during all shifts. Proposed replacing these fans with 24 industrial high volume, low-speed fans. Potential benefits: save $20,996 a year, with a reduction of 302 metric tons in CO2 emissions.

# 2010 Project: University of Illinois at Chicago

- *Project Focus*: Lab chemicals, regulated medical and pharmaceutical waste streams
- *Intern Tasks and Recommendations*:
  - Identified the major chemical waste streams on campus, including acetone and hexane solvents from the organic chemistry labs, and xylene from hospital pathology. Recommended the university install an on-site fractional distillation unit to recycle solvents and xylene. Potential benefits: reduce waste disposal costs by $14,000 a year.
  - Recommended improvements in waste segregation practices to reduce hazardous waste generation. Determined that a large percentage of this waste was not inherently hazardous (e.g., plastic containers for the hospital waste) or can be eliminated through source reduction, or in-house recycling.
  - Developed a reusable container program for sharps disposal that will be introduced in early 2011. Change sharps disposal classification from hazardous to medical waste. Potential benefits: reduce plastic waste by 1 ton a year, eliminate need for 600 boxes and save over $485,000 a year in disposal costs.
  - Studied opportunities to reduce pharmaceutical waste through better inventory methods and redistributing expired, unused flush medications (e.g., saline and dextrose) to the university laboratories for use in research projects. Potential benefits: reduce disposal costs by $10,000 to $15,000 a year.

# 2008 Project: City of Olney Wastewater Treatment Facility

- *Project Focus*: Energy efficiency and biogas utilization
- *Intern Recommendations*:
  - Retrofit aeration tanks with fine bubble diffusers to increase oxygen transfer efficiency. Potential benefits: save $58,000 a year, with a payback period of 1.9 years. CO2 emissions would be reduced by 596 metric tons a year.
  - Collect excess biogas from the anaerobic digester to supplement a portion of natural gas utilized to power the facility boiler and heaters. Potential benefits: reduce energy costs by approximately $6,600 a year and decrease CO2 emissions by 40 metric tons a year.
  - Install variable speed drives on two motors in pump house (100 hp and 150 hp units). Potential benefits: save over $26,000 a year, with a payback period of less than 6 months. CO2 emissions would be reduced by 280 metric tons a year.

# 2001 Project: Morton Metalcraft (Morton)

- *Project focus:* wastewater, materials use and water consumption
- *Intern Tasks and Recommendations:*
  - Recommended that the facility implement counter-current rinsing in 5-step parts washing process and install conductivity meters. Potential benefits: reduce wastewater by 14 million gallons and save over $40,000 a year in disposal costs.
  - Purchase and install an ultrafiltration system on the alkaline cleaning bath to remove oils and suspended solids in the bath. Potential benefits: reduce use of alkaline cleaner by 65 percent a year, extend the life of the cleaning bath from three months to one year and save $14,000 a year.
  - Install a reverse osmosis system on the final rinse tank. Potential benefits: reduce water consumption by over 7 million gallons and save over $25,000 a year.

# 1999 Project: John A. Logan College (Carterville)

- *Project Focus*: On-site technical assistance to small businesses in the region
- *Intern Tasks and Recommendations*:
  - Conducted waste reduction assessments and follow-up consultation at six facilities, including a screen-printer, sandblaster, metal welder, fiberglass fabricator, manufacturer of connectors and drill manufacturer
  - Identified several projects for the screen printer, including a screen reclamation system using high-pressure washers without volatile solvents, cleaner bath reuse, silver recovery and prolonged ink shelf-life practices
  - Recommended that the sandblasting facility use a solidification/vitrification process to convert waste bottom ash into a marketable product. This process is expensive and would require a large investment
  - Proposed that the fiberglass fabricator consider an industrial chopper or grinding machine to reuse waste fiberglass and also convert to an alternative cleaning solvent. A list of possible contacts for the industrial grinders and potential solvent alternatives were given to the facility

# Program Results

| Outcome Measures | 2009 | 2010 | 2011 |
|---|---|---|---|
| Number of host facilities reporting | 8 | 10 | 6 |
| Number of student recommendations implemented | 25 | 30 | 12 |
| Gallons of water reduced | N/A | 20,950,000 | N/A |
| Tons of hazardous material reduced | N/A | 35 | N/A |
| Metric tons of CO2 reduced | 2,301 | 1,167 | 16,872 |
| Kilowatt hours of energy reduced | 2,667,550 | 121,888 | 18,012,000 |
| Dollars saved (capital costs, operating costs, one-time savings) | $1,379,035 | $781,986 | $1,316,200 |

# Current Trends

- Reduced operating costs is the primary driving force for implementing P2 opportunities
- Energy use has been the major focus of the intern program over the last several years
- With the down economy, facilities are seeking shorter payback periods in selecting P2 projects for implementation (e.g., less than 1 year in some cases)
- Plenty of “low-hanging fruit” is still available for improving environmental performance (e.g., lighting upgrades, waste heat reuse and tag/repair leaks in compressed air systems)
- Growing interest in having interns calculate CO2 emission reductions from energy efficiency recommendations
- Facilities that have multiple departments/staff involved in the intern project tend to produce the greatest results

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# Questions