An Overview
RET Site, Expectations & Work

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College of Engineering

University of Cincinnati

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PRESESENTATION OUTLINE

- Introductions
- Project Office & Contact Information
- Other Project Participants
- Research Project Titles & Participants
- Goals of the RET Site Activities
- RET Site Activities
- Laboratory & Office Usage & Safety Issues

RET PROJECT OFFICE and CONTACT INFORMATION

- **Project Offices**
  - 615A Old Chemistry Bldg.
- **Project Director**
  - Dr. Anant R. Kukreti
  - Office: ERC 816
  - Phone: 513-556-4105
  - E-Mail: anant.kukreti@uc.edu
- **General Help Contact**
  - Dr. Andrea Burrows (RET Coord.)
  - Office: 620V Old Chemistry Bldg.
  - Phone: 513-556-1029, 407-963-6818
  - E-Mail: Andrea.burrows@uc.edu

  Mr. Mike Borowczak
  ERC
  513-479-7674 (C)
  borowczak@gmail.com
- **Computer Help**
  - Mr. Ken Maxwell
  - Office: 620U Old Chemistry Bldg.
  - Phone:513-307-3382 (C)
  - E-Mail: maxwelljrj@gmail.com

OTHER RET PROJECT PARTICIPANTS

- **College of Engineering Research & Education Faculty**
  - Dr. George Sorial (CEE-Water)
  - Dr. Mingming Lu (CEE-BioDiesel)
  - Dr. Kelly Cohen (AE-Flight)
  - Dr. Vesselin Shanov (CME-Energy)
  - Dr. Heng Wei (CEE-Traffic)
  - Mr. Eugene Rutz (CEAS-PreEng)
  - Dr. Anastasios P. Angelopoulos (ChemE-NanoMat)
- **College of Education & Evaluation Services Center Faculty**
  - Dr. Jon Breiner (CECH/A&S)
  - Dr. Catherine Maltbie (ESC)
- **Graduate Assistants**
  - Mr. Hafiz Salih (Env-Water)
  - Ms. Jingjing Wang (Env-BioDiesel)
  - Mr. Cody LaFountain (AE-Flight)
  - Mr. Feng Wang (Materials-Energy)
  - Mr. Hao Liu & Mr. Zhuo Yao (CE-Traffic)
  - Mr. Adam Worrall (ChemE-NonoMat)
- **NSF STEP Graduate Fellows**
  - Mr. Brian Ervin
  - Mr. Cody LaFountain
  - Mr. Nick Ernest
  - Ms. Whitney Gaskins
  - Ms. Anna Nagle

RET RESEARCH PROJECT TITLES AND PARTICIPANTS

- **Project # 1: Availability of Safe Drinking Water**
  - **Teacher Participants**
    - Ms. Kathryn M. Nafziger, Science, Oak Hills High School, Cincinnati, OH, kathryn.nafziger@gmail.com, 513-377-1368
    - Ms. Rachel Rice, Biology, Hamilton High School, Cincinnati, OH, rachelkrice@gmail.com, 513-403-9087
  - **Faculty Mentor**
    - Dr. George A. Sorial, Chair and Professor of Environmental Engineering Program, School of Energy, Environmental, Biological and Medical Engineering, George.Sorial@uc.edu , 756F Baldwin Hall, 513-556-2987, 513-515-4473 (C)
  - **Graduate Student Mentor**
    - Mr. Hafiz Salih, Ph.D. Student in Environmental Engineering, salihhh@mail.uc.edu, 709 Rhodes Hall, 513-382-5480 (C)

RET RESEARCH PROJECT TITLES AND PARTICIPANTS

- **Project # 2: Making Biodiesel for Research and Education**
  - **Teacher Participants**
    - **Ms. Phyllis Hutchinson, Science, Goshen Local Schools, hutchinsonp@goshenlocalschools.org, 513-465-5356**
    - **Ms. Lindsey N. Burkhart, University of Cincinnati – Pre-Service Teacher, burkhaln@mail.uc.edu, 513-237-8593**
  - **Faculty Mentor**
    - **Dr. Mingming Lu, Associate Professor of Environmental Engineering Program, School of Environment, Energy and Biological Engineering, Mingming.Lu@uc.edu, 797 Rhodes Hall, 513-556-0996**
  - **Graduate Student Mentor**
    - **Ms. Jingjing Wang, Master Student in Environmental Science, wang2jn@mail.uc.edu, 709 ERC, : 513-250-0609**

RET RESEARCH PROJECT TITLES AND PARTICIPANTS

- **Project # 3: Bio-Inspired Flight**
  - **Teacher Participants**
    - Ms. Veronica Dean, Math/Science, Mt. Healthy Junior/Senior High School, rdeanmann@gmail.com, (301)412 - 1850
    - Sherry Kembre, Science/Physical, St. James the Greater School, Cincinnati, OH, slkembre@aol.com, 513-739-7235
  - **Faculty Mentor**
    - Dr. Kelly Cohen, Associate Professor of Aerospace Engineering & Engineering Mechanics, School of Aerospace Systems, Kelly.Cohen@uc.edu, 732 Rhodes Hall, 513-556-3523
  - **Graduate Student Mentor**
    - Mr. Cody Lafountain, M.S. Student in Aerospace Engineering, lafouncj@mail.uc.edu, 518 Old Chem, 419-722-1753 (C)

RET RESEARCH PROJECT TITLES AND PARTICIPANTS

- **Project # 4: Renewable Energy System**
  - **Teacher Participants**
    - Ms. Charlynn J. Sanford, Math/Engineering, Western Hills Engineering High School, sanforc@cpsboe.k12.oh.us, 513-310-7112
    - Mr. Wesley Taylor Tootle, Science, University of Cincinnati – Pre-Service Teacher, taylortootle@gmail.com, 503-551-6509
  - **Faculty Mentor**
    - Dr. Vesselin Shanov, Associate Professor of Energy and Materials Engineering Program, School of Energy, Environmental, Biological and Medical Engineering, vesselin.shanov@uc.edu. 578 ERC, 513-556-2461
  - **Graduate Student Mentor**
    - Mr. Feng Wang, Ph. D. student in Materials Engineering, wangf4@mail.uc.edu, 602 Rhodes Hall, 513-373-2271

RET RESEARCH PROJECT TITLES AND PARTICIPANTS

- **Project # 5: Simulation Analysis of Traffic-Operation-Related Emission**
  - **Teacher Participants**
    - Mr. Norbert J. Martini, Math, Princeton High School, Cincinnati, OH, njmartini@gmail.com,
    - 513-706-7852
    - Ms. Gabrea Bender, Math/Geometry, Batavia High School, Batavia, OH, gabreabender@hotmail.com, 513-732-2120
  - **Faculty Mentor**
    - Dr. Heng Wei, Associate Professor of Transportation Engineering Program, School of Advanced Structures, heng.wei@uc.edu, 792 Rhodes Hall, 513-556-3781
  - **Graduate Student Mentors**
    - Mr. Hao Liu, Ph.D. Student in Transportation Engineering, liuh5@mail.uc.edu, 735 ERC, 513-828-4738 (Cell)
    - Mr. Zhuo Yao, Ph.D. Candidate in Transportation Engineering, yaozo@mail.uc.edu, 735 ERC, 513-382-6110

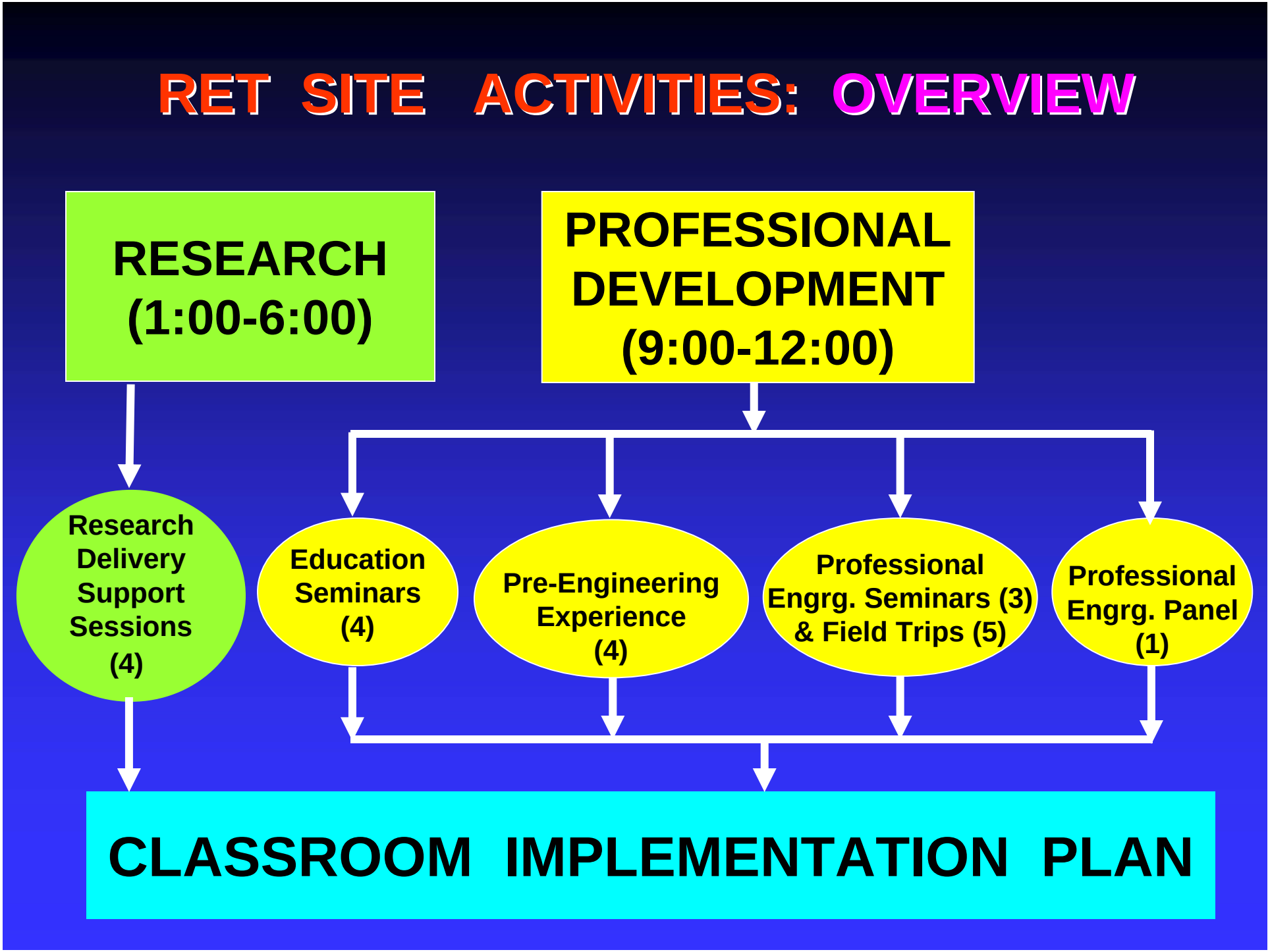
RET RESEARCH PROJECT TITLES AND PARTICIPANTS

- **Project # 6: Nanostructured Catalytic Membranes as Optical Sensors**
  - **Teacher Participants**
    - Ms. Margaret (Peggy) Dunn, Math, Newport High School, Newport, KY, peggydunn@insightbb.com, 859-360-2919
    - Ms. Jean Becker, Science/Biology Newport High School, Newport, KY, jean.becker@newport.kyschools.us, 859-468-1233
  - **Faculty Mentor**
    - Dr. Anastasios P. Angelopoulos, Assistant Professor of Chemical Engineering Program, School of Energy, Environmental, Biological and Medical Engineering, anastasios.angelopoulos@uc.edu, 693 Rhodes Hall, 513-556-2777
  - **Graduate Student Mentor**
    - Mr. Adam Worrall, Ph.D. Student in in Chemical Engineering, worrall.adam@gmail.com, 600 Rhodes Hall, 615-714-2346

GOALS OF THE RET SITE ACTIVITIES

- **Goal 1: Explore the scientific method of inquiry and the critical research skills that engineers use to solve open-ended real-world problems**
- **Goal 2: Become role models by applying research experiences in classrooms and with colleagues**
- **Goal 3: Link education to events and issues occurring within the community and encourage students to become effective citizens in a technology-driven society**

RET SITE ACTIVITIES: OVERVIEW



RET SITE ACTIVITIES: RESEARCH

RESEARCH
(1:00 to 6: pm)

Week 1: Identify Goals, Tasks, Schedule, Conduct Literature Search, and Learn Research Tools

Weeks 2-5: Complete Literature Search, Test, Synthesize, Analyze, and Generalize Results

Week 6: Wrap-Up for Final Deliverables

Project Deliverables (per project):

1. Team Report
2. Team PowerPoint Presentation
3. Team Movie
4. Team Journal Paper
5. Individual Teacher Poster
6. x

RET SITE ACTIVITIES:
PROFESSIONAL DEVELOPMENT SEMINARS

PROFESSIONAL DEVELOPMENT (9:00 to 12:00 pm)

Professional Engineering Seminars (3)
Engineering Research & Education; Ethics in Research, and Panel Session with Professional Engineers

Research Skills Workshops (3)
Technical Writing; Poster Making; and Online Library Literature Search

Pre-Engineering Experience (4)
Engrg. Design Process; Civil Engr. Project; Aerospace Engr. Project; and Materials Sci, & Engr. Project and Technology & Society

Education Seminar Series (4)
Lesson Preparation & Movie Sessions; Nature of Sci. (NOS) Sessions; Report Writing; Paper Publication; and Funding & Proposal Writing

Engineering Delivery Support Sessions (4)
Support for: Movie, Research Section of Report, and Poster

Meeting with Professional Engineers/Scientists (1)
Panel Session with Professional Engineers/Scientists

5 Field Trips to Engineering Sites

RET SITE ACTIVITIES:
Summery of Report Deliverable

1. **Team Project Report** documenting
   - Abstract
   - Goal/Objectives of the Project
   - Literature Review
   - Research Tasks
   - Methodology Used
   - Training Received
   - Research Findings
   - Classroom Implementation Plan
   - Bibliography
   - Appendix containing
     - Project Pictures (minimum 4) – action pictures with captions
     - Writings of assigned seminars/workshops/field-trips (see handout)
     - Lesson Plan of each teacher (using the template provided)

Teacher RET Lesson Web Template

Select Goals & Objectives	Teacher Guide	Student Guide	
3. Goals (learn/understand) **And** **Objectives** (measurable) (Specify skills/information that will be learned.)	• **Goals** SWBAT learn or understand… • **Objectives** SWBAT describe, list, etc… (2-3 levels of Bloom's taxonomy)	• **4. Misconceptions** about this topic:	**5. Materials Needed** • Paper • Pencil • Others
6. Select Instructional Strategies – (Give and/or demonstrate necessary information)	*Pick as many as needed - add your own:* • Direct instruction • Inquiry lesson • Hands on lesson • Activity	*Pick as many as needed – add your own* • Pair/Share • Peer critique • Student presentation	
7. Utilize Technology	• Computer • Document camera • Other	• Computer • Other	**Other Resources** (e.g. Web addresses, books, etc.)
8. Require Learner Participation **Activity** (Describe the procedure and/or independent activity to reinforce this lesson)	• The **procedure** for the class is outlined here in detail • Time for each step is stated (e.g., 10 min.) • **Teacher pieces** are highlighted here	• The **procedure** for the class is outlined again here (copied from box on the left) • Time for each step is stated (copied from left box) • **Student pieces** are highlighted here	
9. Evaluate (Assessment) (Steps to check for student understanding; Evaluate goals and Assess objectives)	• **10. Essential/Review questions** are outlined (at least 5 from different levels of Bloom's taxonomy)	• **Pre and Post assessment** is explained • What will the students do? • How will they do it?	**11. Pre/Post Test Questions**:

Former RET Teacher Lesson Template

Project STEP
www.eng.uc.edu/STEP

University of Cincinnati

Viva Las Vegas – An Energy Project

Hughes Center High School- Paideia Program — Spring 2003

Lesson Information

Grade Level

9

Subject areas

Physical Science

Duration

Six to eleven 50-minute class periods

Setting

- Standard classroom
- Computer laboratory

Materials

- Approximately 50 books from library
- Poster materials
- Computer, w/ LCD projector

Background Knowledge

Students will need some experience with: watts, joules, energy, work, and energy transformations.

Additional Resources

- http://users.rcn.com/agnews/EnergyEfficiency.htm
- http://www.bls.gov/oco/ocos227.htm#outlook
- www.howstuffworks.com
- www.doe.gov
- Many other websites

Developed by Fellows:

Matthew Barber
Nicholas Harth

Summary

Students act as representatives from competing energy production concerns attempting to sell the Las Vegas City Council a new power plant. The students research their own power generation technology, the technologies of other groups, and the Las Vegas area, in order to write and present a detailed report describing how their power plant will best fit the Las Vegas community. Students are required to learn not only the mechanical facts of how power is generated, but also to evaluate the costs and benefits of such generation.

A student presents her research on wind power to the class.

Objectives

Students will be able to:

- Evaluate a power plant technology and its effects on a community.
- Demonstrate their ability to research, analyze, and evaluate a topic in a written report and a presentation.

Ohio Standards

From the Ohio Science Benchmarks:

Earth and Space Sciences

1) Describe how Earth is made up of a series of interconnected systems and how a change in one system affects other systems.
2) Explain that humans are an integral part of the Earth's system and the choices humans make today impact natural systems in the future.

Physical Sciences

1) Demonstrate that energy can be considered to be either kinetic (motion) or potential (stored).
2) Explain how energy may change form or be redistributed but the total quantity of energy is conserved.

Science and Technology

1) Explain the ways in which the processes of technological design respond to the needs of society.
2) Explain that science and technology are interdependent; each drives the other.
3) Predict how human choices today will determine the quality and quantity of life on Earth.
4) Design a solution or product taking into account needs and constraints (e.g., cost, time, trade-offs, properties of materials, safety, aesthetics).

Scientific Ways of Knowing

1) Explain how societal issues and considerations affect the progress of science and technology.

RET SITE ACTIVITIES:
Summary of PowerPoint & Poster Deliverables

2. **Team PowerPoint Presentation** which shows the work in the Team Project Report
   - Research Completed
   - Classroom Implementation Plan
3. **Individual Teacher Poster** which illustrates, for the students, the exciting and interesting parts from the teacher's research

RET SITE ACTIVITIES:
Summer of Movie & Journal Deliverables

4. **Team Movie:** Each RET team will prepare a 5-minute Movie showcasing:
   - Research conducted in the engineering lab - what was done, what was found, what it meant, and what **ACS** (real-world **Applications**, **Career** possibilities, and **Societal** impacts) was highlighted.
   - The movie is intended to introduce the K-12 audiences of the teachers to engineering research labs, problems, successes, equipment, and the overall scientific process.
5. **Team Journal Paper**, co-authored by RET participants and select project team members.

RET SITE ACTIVITIES:
Reflective Reporting on RET Experience

- Submit a ***Reflective Feedback Report*** each week
- Bring a hard copy to the session
- And E-mail to:
  - Grant coordinator (Burrows and Borowczak) at
    stepgrantcoor@gmail.com
    borowczak@gmail.com
  - Evaluation Coordinator (Maltbie) at
    cathy.maltbie@uc.edu
  - Project Director (Kukreti)
    anant.kukreti@uc.edu
  - Research Faculty Mentor for your project
    (E-mail address given earlier)

RET SITE ACTIVITIES:
Interim Reports

- **Bi-monthly Progress Reports & Presentations:**
  - **Team Project Progress Report** (one per project): submit research and classroom implementation report
  - **Team PowerPoint Presentation** (one per project): present research and classroom implementation at meeting
  - **Team Movie** (one per project): present at bi-monthly meeting
  - **Individual Poster:** present at bi-monthly meeting
- **Submit hard & electronic copy to:**
  - Dr. Kukreti, Dr. Breiner, Dr. Burrows, & Mike Borowczak
  - Research Faculty Mentor (for your project)

RET SITE ACTIVITIES: Field Trips

- Greater Cincinnati Water Works, June 30
- Air Pollution HCDoES Labs, July 7
- Metropolitan Sewer District, July 14
- Mound Technical Solutions, July 21
- National Museum of the USAF, July 25

RET Site Activities:
Workshop, Seminar & Field Trip Reports

- A designated project group will prepare a write-up on the experience) (see handout)
- Describe the topics covered and lessons learned (must have sufficient details)
- The report must be submitted within two days after the delivery of the workshop or seminar or field trip
- E-mail the report to:
  - Anant Kukreti at anant.kukreti@uc.edu
  - Andrea Burrows at Andrea.burrows@uc.edu
  - Mike Borowczak at borowczak@gmail.com
  - Ken Maxwell at maxwelljrj@gmail.com

RET SITE ACTIVITIES:
Stipends & Awards

- **Stipend:**
  $6,000 for in-service teachers
  $3,000 for pre-service teachers
  (Note: 2 payments; ~August and ~June)
- **Laptop, Case, and Flash Drive**
  (on loan until Post-RET completion)
- **Four CEU credits awarded for RET experience**
  - **Please request a letter if needed for your district**
- **Parking at UC for 6 weeks ($112.50/teacher)**
- **Certificate awarded to each participant**
- **$200 for supplies (receipts/orders go to Burrows)**
- **$200 to support a RET presentation at a conference**

RET SITE ACTIVITIES: Post RET Activities

- At least one lesson from RET experience presented by December 2010, but no later than **February 1, 2011**
  [Note - Needs to be observed! (teacher arranges it)]
- Students fill out **Student Activity Feedback Forms** after lesson
- Material for web display of lesson: **Lesson Plan** for the lesson sent to Mike Borowczak and Ken Maxwell by email
  [Note – Send no later than **February 15, 2012**]
- **2 Focus group on-campus** meetings with Dr. Maltbie:
  ~ January & ~ April
- **One-page progress report** submitted at ~January meeting
- Submit **final reflective report** by **March 15, 2012**
  This includes two tables (will be shared later)
- Payments will be tied to 6 deliverables, progress report, final report (with tables), and SAFFs (Student Activity Feedback Forms)

REU Site Activities: Awards

- Certificate for each participant
- “Best Project” selected by Judges in each category:
  - Written Report
  - PowerPoint
  - Movie
  - Poster
  - Journal Article
  - Supporting Documentation (e.g. field trip and seminar reports)

Laboratory and Office Usage and Safety

- **Attire**
  - Closed toe shoes
  - Full length pants
  - Safety glasses, lab coats, and masks when needed
  - Hard hats when needed
- **Equipment training and usage**
  - Provided by laboratory technician and/or Graduate Research Assistant prior to usage
  - No equipment should be used without receiving training
  - All tools borrowed should be returned before the end of the day

Laboratory and Office Usage and Safety Issues (Continued)

- Never work alone when testing
- Use of Project Office
  - Project Office should be kept clean on a daily basis - no exceptions
  - Lock the room after leaving – no exceptions
- Copy Machine Usage
  - Limited printing (few pages only) must be done using RET Office printer
  - For larger jobs use GK-12 Project Office Xerox machine in 620 X Old Chemistry Building
  - RET Office laptop is configured for this printing

Thank you! ☺

QUESTIONS?