

# WERC Environmental Design Contest

## Planning and What to Expect

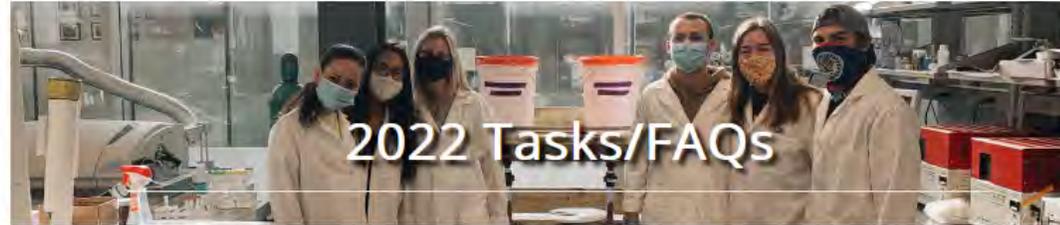
Tips from a professor who brought teams  
from Ohio University for 11 years.

# The Contest—what it is and what it isn't

- ▶ This is an environmental engineering contest, NOT a science fair project
- ▶ The Design Contest focus is to mimic the engineering project process.
- ▶ The Design Contest follows a normal Request-for-Proposal (RFP) engineering challenge solicitation format.
  - ▶ A task statement is published soliciting engineering services to solve a problem.
  - ▶ An RFP often requests a paper submittal discussing a proposed solution, expected performance, test data to show efficacy of the solution, and data on expected costs, environmental and waste issues, public acceptance of solution, and schedule.
  - ▶ Selected applicants are often asked to present their proposed solution benefits to a technical review committee from the company soliciting the engineering services to address any questions arising from review of the paper.
  - ▶ To reduce risks, the technical review committee often wants and pays for a pilot-scale system to operate and conduct a treatability study on actual material to show that the system works.
  - ▶ If all of the above is successful, you win the contract based on cost, performance, schedule, waste minimization, public acceptance, etc.

# September

- ▶ Task statements released in August.
- ▶ Students examine and choose tasks.
- ▶ Teams study Team Manual as a group (manual released in September)



Real-world tasks proposed, designed, and sponsored by industry and government agencies

## Task 1 – Monitoring Virus Removal in MBRs



Task 1 – Monitoring Virus Removal from MBRs  
Click to download task problem statement.

**Task Sponsor:** CDM Smith

**Task Overview:** Teams are challenged to determine a log removal value for viruses from membrane bioreactors, and then develop a way to monitor virus removal in near-real time during wastewater treatment.

**Task 1 FAQs**

No questions have been asked yet.

## Task 2 – Carbon Conversion for the Energy Transition



Task 2 – Carbon Conversion for the Energy Transition  
Click to download task problem statement.

**Task Sponsor:** El Paso Electric Company

**Task Overview:** Why just capture and store CO<sub>2</sub> from a power plant? This task challenges teams to make something useful from the CO<sub>2</sub> emissions.

**Task 2 FAQs**

No questions have been asked yet.

## Task 3 – Value-added Use of Copper Mining Smelter Slag



Task 3 – Value-added Use for Copper Smelting Slag  
Click to download task problem statement.

**Task Sponsor:** Freeport-McMoRan

**Task Overview:**

Task will ask teams to use copper smelter slag for economically viable applications that make use of the slag's advantageous properties, such as its high iron silicate content, electromagnetic interference shielding properties, and its potential as a pozzolanic material (when specially processed). Pozzolans are particularly important in the concrete industry.

**Task 3 FAQs**

No questions have been asked yet.

# October

- ▶ Research possible solutions to the task problem.
- ▶ Investigate alternative approaches.
- ▶ Seek advice from relevant sources (other faculty, institutes and research centers, etc.) on your campus.
- ▶ Investigate practicality of pursuing the most promising approaches.
- ▶ Settle on the approach that will be the focus of your effort on what you will be presenting in Las Cruces.
- ▶ Begin writing the paper.



# November

- ▶ Continue tasks from October (time flies).
- ▶ Identify supplies and equipment needed for testing and demonstration of the chosen technology.
- ▶ Place orders for needed items so that they can arrive by the start of the spring semester in January.
- ▶ Pay attention to contest registration deadlines.
- ▶ Keep an eye on air fares if planning to travel by air to Las Cruces. (We have purchased plane tickets as early as October).



# December

- ▶ Students are usually not around after early December, but if any are, they can continue whatever work can be done while waiting for equipment to arrive.
- ▶ (Some might volunteer to work at home over the break, but we found that this rarely actually happens).
- ▶ Continue working on paper, and it is not too soon to be thinking about the poster as well.
- ▶ Attend Environmental Health and Safety Short Course (optional)



Short Courses

# January

- ▶ The real work begins.
- ▶ Begin assembly and testing of technology, obtain results for use in the paper.
- ▶ Paper writing continues in earnest.
- ▶ Faculty advisor lines up people to serve as auditors for:
  - ▶ legal and regulatory audit
  - ▶ business and economic audit
  - ▶ health and safety audit.
- ▶ Attend EH & S short course (optional)
- ▶ Attend Techno-economic Analysis short course (optional)



# February

- ▶ The paper is due in mid-March, but it should be substantially completed by mid-February so that there is time for the auditors to read and react to it and for the students to revise the paper, if needed, based on the auditor's comments before it is submitted to WERC.
- ▶ Submit Preliminary Report to WERC.  
Make course corrections, based on feedback.
- ▶ Submit Safety Plan to WERC.
- ▶ Complete poster and have it printed.
- ▶ Conclude any last-minute bench-scale testing, then pack for shipment anything that will be going to Las Cruces.
- ▶ Be prepared to purchase what you can locally and later leave behind. Don't ship small, cheap items (buckets, for example), that cost only a few dollars here but take up space in packaging.
- ▶ There's a reason the local Home Depot and Lowes love the design contest.



# March

- ▶ Submit paper by the deadline. Don't be even one day late as the point penalty is enough to take you out of the running.
- ▶ Submit equipment transportation form.
- ▶ Ship needed items in plenty of time for them to arrive BEFORE the contest starts (the stories I could tell!)



MARCH 2022						
SUN	MON	TUE	WED	THU	FRI	SAT
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28 Paper due	29	30	31		

Printable Calendars From [123Calendars.Com](https://www.123calendars.com)

# Two Weeks Before the On-site Contest: The Technical Report

- ▶ The most important piece of the effort.
- ▶ You will make or break your contest based on the quality of the paper.
- ▶ The judges see the paper before the contest, so they will have already formed some opinions about the teams they'll be judging, and you want that opinion about your team to be a good one.
- ▶ Pay attention to the audits and incorporate what they recommend into the final paper.
- ▶ Tread the fine line between letting the students write the paper with faculty input vs faculty writing the paper.

*Pilot Study of Water  
Desalination Using  
Forward Osmosis and a  
Polymer Draw Agent*

*WERC Task 6, Open Task  
March 25, 2019*

# Issues to Consider

# Team Composition

- ▶ Teams of all compositions (all one major, all engineering majors, mix of engineering and non-engineering) have been successful. Don't believe that your team will suffer if it is only, say, chemical engineers or only civil engineers. Students are smart. They can learn what they don't know.
- ▶ You do NOT need to have a student from this area and another from that area to handle the various aspects of the project (poster preparation, business plan, etc.).
- ▶ In our experience, we often let the students recruit each other as they are more likely to work well together with those they know.



# Cost

- ▶ Money for equipment and supplies.
- ▶ Money for travel. We flew into Phoenix, toured the Grand Canyon, and drove to Las Cruces.
- ▶ The closest major airport is El Paso, TX.
- ▶ Money for shipping anything you can't put on the plane/vehicles.
- ▶ At Ohio University, we spent anywhere from \$8,000 to \$12,000 per year depending on how many tasks were entered (we did four once, but it was mostly one or two) and how many students in total were involved.
- ▶ Find money:
  - ▶ Look for corporate sponsors (sometimes students will know someone).
  - ▶ Pots of money from campus sources.



# Time Commitment

- ▶ For the students, a great deal if they want to succeed.
- ▶ We've seen this handled three ways.
  - ▶ as extra-curricular activity—students do this in addition to their regular course load
  - ▶ as technical elective credit—students do this as part of their regular course load
  - ▶ as senior design course project—students do this as part of their required course load
- ▶ For the faculty advisor, we suggest guiding the students but not telling them what to do all the time.
  - ▶ keep them on track
  - ▶ require regular meetings and reporting to you
  - ▶ be prepared to weed out non-performing students (student earn the right to travel to the contest)
  - ▶ make sure deadlines are met
  - ▶ plan to attend the contest (student teams here without their advisor tend to look like lost sheep)



# At the Contest

# Sunday: Registration, Setup, & Opening Events

- ▶ Arrive at contest site by mid-afternoon on Sunday, especially if you are new to the contest, so you can see how things are set up.
- ▶ Unpack your shipment, checking for any damage or breakage (see Home Depot, etc. earlier).
- ▶ Begin to set up bench-scale demonstration.
- ▶ Attend opening dinner, welcoming meeting, and safety briefing.
- ▶ Remember to have fun this week!



# Monday: Oral Presentations & Bench-scale Oversight

- ▶ Oral presentation day.
- ▶ Treat your sample day (turn it in if you can).
- ▶ Judges do not visit the bench-scale area this day in any formal capacity.



# Monday: The Oral Presentation

- ▶ Practice it and polish it, of course, but don't overdo it.
  - ▶ as faculty, we would watch them do it maybe three or four times, although they'd often practice it on their own many more times
  - ▶ especially practice to get the timing right
- ▶ Don't read from cue cards.
- ▶ Spread the talk among several students (whatever the guidelines allow).
- ▶ Pay attention to the time and don't run long (but don't finish too soon, either).
- ▶ If the faculty advisor attends (and I personally recommend against this even if contest rules allow it), sit quietly in the corner and don't talk no matter how much you feel the urge to do so (points will be deducted). Just smile at your team and support them.
  - ▶ Only the students should answer judges' questions.
  - ▶ You will harm their cause (and embarrass them) if you keep chiming in.
  - ▶ The students are adults—let them be adults.



# Tuesday: The Bench-Scale Demonstration and Poster Presentation

- ▶ Bench-scale demonstration day (posters, too).
- ▶ Finish treating sample and turn in by deadline.
- ▶ Your technology needs to work, but you don't have to actually demonstrate it in front of the judges for various reasons (takes longer than a half hour to work, sample has already been treated, etc.).
- ▶ Keep bench area neat and observe safety requirements.
- ▶ Divide the presentation among several students.
- ▶ Incorporate the poster into the presentation.



# Wednesday: Wrap-up

- ▶ Bench-scale teardown and clean-up.
- ▶ Consider some local touring.
- ▶ Enjoy the banquet and Awards Ceremony



at White Sands National Monument

# The Bottom Line

- ▶ It is rare for a team to win any award their first time out.
- ▶ LEARN from the experience, carry it back with you, and use it when you prepare for your second and future years of participation.
- ▶ It might be a cliché, but there is as much learning and as much reward in the doing as there is in the winning.
- ▶ As contest founder Abbas Ghassemi always said, “you’re already all winners just by being here.” It really is true!

