Regulated Research Institutional/Industrial Setting Form (1C)

This form must be completed AFTER experimentation by the adult supervising the student research conducted in a regulated research institution, industrial setting or any work site other than home, school or field.

Student's Name(s) Kyle Pinzon

Title of Project Optimizing the Adsorption Operating Conditions for Dual Functional Materials in Direct Capture of CO2 from Air

To be completed by the Supervising Adult in the Setting (NOT the Student(s)) after experimentation:

(Responses must be on the form as it is required to be displayed at student's project booth; please do not print double-sided.)

The student(s) conducted research at my work site:

1. Did you or your proxy (e.g. graduate student, postdoc, employee) mentor or provide substantial guidance to the student researcher? ☑ Yes ☐ No
   a. If no, describe your and/or your institution's role with the student researcher and his/her project (e.g. supervised use of equipment on site without ongoing mentorship and sign below.

   b. If yes, complete questions 2 –5.

2. Is the student's research project a subset of your ongoing research or work? Use questions 3, 4 and 5 to detail how the student's project was similar and/or different from ongoing research or work at your site. ☑ Yes ☐ No

3. Describe the independence and creativity with which the student:
   a. developed the hypotheses or engineering goals for the research project

      Kyle's main goal in this project was to optimize the conditions for CO2 adsorption in order to maximize methane production. Kyle very quickly came up with the hypothesis, based on independent literature research of previous DFM work, that the adsorption of CO2 should be maximized in order to maximize methane production and worked out the engineering goal of finding the operating conditions that would maximize CO2 adsorption from a very dilute stream (1000 ppm of CO2).

   b. designed the methodology for his/her research project

      Kyle designed the methodology for his research project by referring to previous DFM work that was conducted. After shadowing a Masters student, Kyle was able to apply the methodology used for their study to his own research study. His procedures were clear and Kyle was able to provide good reasoning for his methodology.

   c. analyzed and interpreted data

      Kyle was introduced to a software called Origin in order to conduct data analysis. After a short lesson, Kyle was independently able to analyze the data he collected. He was also able to present and interpret his data in a clear and concise way through the use of graphs and charts, which was included in a final Power Point presentation.

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Regulated Research Institutional/Industrial Setting Form (1C) Continued

Student's Name(s) Kyle Pinzon

4. Detail the student's role in conducting the research (e.g. data collection, specific procedures performed). Differentiate what the student observed and what the student actually did.

Kyle spent the first two weeks observing the operation of the instrument called the Quantachrome ChemBET Pulsar and an Enerac gas analyzer. After the first two weeks, Kyle was able to independently operate the Quantachrome, collect data using the Enerac, and perform data analysis. Kyle also observed the preparation of catalyst material, handling gas cylinders, and operation of a fixed bed reactor. Kyle's work will be used as a baseline for future scale-up work in our lab.

5. Did the student(s) work on the project as part of a group? ☑ Yes ☐ No
If yes, how many individuals were in the group and who were they (e.g. high school students, graduate students, faculty, professional researchers)?

Kyle worked as part of the DFM research group. Though Kyle was independent through most his time in our lab, he was supervised by two Ph.D students and shadowed one Masters student.

I attest that the student has conducted the work as indicated above and that any required review and approval by institutional regulatory board (IRB/IACUC/IBC) has been obtained. Copies are attached if applicable.
I further acknowledge that the student will be presenting this work publicly in competition and I have communicated with the student research regarding any requirements for my review and/or restrictions of what is publicized.

Robert Farrauto	Prof. of Practice
Supervising Adult's Printed Name / Signature	Title
Columbia University, Earth and Environmental Engineering	9/13/19
Institution	Date Signed (must be after experimentation) (mm/dd/yy)
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