California/Nevada Section
Bimonthly Update
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Fiftieth Edition

*** 2014 Water Technology Conference on Thursday May 8**
*** California's ¼ Scale Tractor Design Teams**
*** What you know about the most potent global warming gas? – Pramod Pandey, DPHR, VME, UC Davis**
*** The Future's Agricultural Mechanization Engineer – Tyler Niday, Orchard Machinery Corporation**
*** Let the Winds Blow… A Dust Tunnel at CSU Fresno – Balaji Sethuramasamyraja, CSU Fresno**

* 2014 Water Technology Conference on Thursday May 8

California's drought and its impact on water supplies will be the primary focus of the 2014 Water Technology Conference on Thursday May 8 from 8:00 am-4:30 pm at the Clovis Veteran's Memorial Building. This BlueTechValley event, presented by the International Center for Water Technology (ICWT), features an impressive line-up of technical speakers, over 40 exhibitors, poster sessions and networking opportunities. "The drought is on everyone's mind. This year's conference will provide an important opportunity to learn from researchers, industry and water managers about the San Joaquin Valley's water resources and what we can expect in the future," according to ICWT director David Zoldoske. The event kicks off with a morning plenary session featuring two panel discussions. Our lunch speaker is responsible for the water needs at Paramount Farms and should provide valuable insight into the future of irrigated agriculture. Three concurrent afternoon sessions are set to address groundwater, on-farm irrigation technology and urban water use/water treatment. Attendee registration is $125 per person.

* California's ¼ Scale Tractor Design Teams

Where can you find an international design competition that provides students with the unique experience of designing, building, and marketing a product? How about a competition where students gain priceless skills in engineering, marketing, and other areas? Where can students mingle with industry members and students from other universities while competing? At the ASABE Quarter Scale Competition in Peoria, Illinois May 29- June 1! This year 27 teams are signed up to compete and the CA/NV section is proud to have two teams from the section competing. Those two teams are from Cal Poly San Luis Obispo and Modesto Junior College. Students from both teams have been working hard all year to design and build tractors that they will take to Peoria for the competition. The teams have not only built tractors, but they have also written a report and created a presentation to market their unique tractor. Once they arrive in Peoria they will present the marketing presentations and compete in other categories from maneuverability to static design judging, and of course, a tractor pull. The ASABE International Quarter Scale Tractor Design Competition is an exciting time for students, and it is open to the public. For more information on the competition go to:
http://www.asabe.org/membership/preprofessionalsstudents/14-scale-comp.aspx

* What you know about the most potent global warming gas? – Pramod Pandey, DPHR, VME, UC Davis

Sulfur hexafluoride (SF_6) is the most potent global warming gas. Global Warming Potential (GWP) is a ratio/multiplier, which is commonly used for estimating the potential future impacts of various gases on global climate with reference to carbon dioxide (CO_2). The GWP of CO_2 is 1, while the GWP of SF_6 is 23,900 (considering life span of 100 years). Which means the SF_6 is 23,900 times more harmful to

climate than CO_2. Other greenhouse gases such as methane (CH_4) and nitrous oxide (N_2O) are relatively less potent. For instance GWPs of CH_4 and N_2O are 25 and 298, respectively.

The SF_6 is an inert gas, which means it is non-reactive to water, oxygen, acid, and so on. It also does not have any color and odor. It was first trapped in the laboratories of the Faculte de Pharmacie de, Paris. Over the time, this gas has been found to be tremendous useful particularly in electrical industries. In 1934, General Electrical Company discovered that this gas can be extremely useful for insulating electrical power systems. In 1948, Allied Chemical Corporation and Pennsalt began to produce this gas commercially. By 1960, this gas was used in the high power system (voltage greater than 36 kV). In high voltage power system, high levels of arc are produced, and this gas can absorb free electrons, which are produced by arcing between contacts of circuit breakers.

SF_6 is used in high voltage power system (Photo credit unknown)

Each year more than 10,000 tons of SF_6 is produced, which is equivalent to 239 million tons of CO_2 equivalent (10,000 × 23,900 GWP). Usually one metric ton of CO_2 is released into atmosphere by every 103 gallons of gasoline used. Average American home releases 12 metric tons of CO_2 in a year due to electric use for heating, cooking, lighting, cooling and other energy needs. The U.S., landfills produces more than 132 million metric tons of CO_2 equivalents. In addition, enormous amount of greenhouse gases such as CH_4 is produced from animal waste such as dairy manure and swine manure slurries stored in lagoon system.

In addition to electrical industries, SF_6 is also used in medical industry. It is used as a contrasting agent in ultrasound imaging. It is also used in microfabrication works of semiconductor industry. Due to harmful impacts on climate, reducing SF_6 production and identifying the alternatives are proposed. For example, the California Air Resources Board asks electrical companies to limit and monitor the emissions of SF_6 from high voltage electrical applications. These high voltage systems constitute 80% of the California total SF_6 emissions. Many power utilities are participating in the SF_6 emission reductions plans proposed by the U.S. EPA. We can anticipate that the application of SF_6 will be limited in future because of its unfriendliness to our climate.

Cited references are available upon request. Pramod Pandey is an Assistant Specialist at the Department of Population Health and Reproduction at the Veterinary Medicine Extension office at UC Davis and may be contacted at pkpandey@ucdavis.edu.

*** The Future's Agricultural Mechanization Engineer – Tyler Niday, Orchard Machinery Corporation**

As the world population continues to increase, the demand for food is growing faster than ever. According to World Food Programme, the amount of food required to feed the world must double by the year 2050. To increase the production of food with limited increase in land used for production, there will need to be increased efficiencies in production. Some of these efficient practices have already become the standard; such as using GPS to plant vast acres of land and autonomous machines harvesting through the day and night. As engineers in the agricultural field, it is our job to continue to create innovative ways to become more efficient. What have you designed to increase production efficiency?

*** Let the Winds Blow… A Dust Tunnel at CSU Fresno – Balaji Sethuramasamyraja, CSU Fresno**

Wind Tunnel for EPA certified research on effects of water mist on dust plumes

A new dust tunnel has been added to the Fresno State research infrastructure to enable research in improving air quality in the San Joaquin valley and greater California. The tunnel will be used to measure the effects of water misting as a means of controlling particulate matter (PM) that rise into the air through agricultural field operations. Dust raised by operations such as disking, cultivating and harvesting carries PM (various sizes) that can be harmful to general population. PM control in the agricultural industry has been a focus of both local and state air pollution control agencies for years.

Particulate matter is typically classified by size. For example, PM 10 stands for particulate matter with 10 microns (millionth of a meter) aerodynamic diameter. Similarly, a PM 2.5 stands for even smaller sized particulate that can be more harmful because they are not trapped by our natural filtering systems and end up lodging in the lungs resulting in asthma or respiratory diseases. At Fresno State, researchers are working on understanding the dynamics in particulate matter emission and control by conducting applied engineering research in this area. One of the goals of the research is to prove that the misting process i.e., cooling the microclimate around the area where dust is generated using water mist can effectively reduce the amount of regulated particulate matter emitted. When air containing the dust is cooled, it tends to fall, causing the PM to settle back down to ground.

The wind tunnel is housed in Center for Water Technology on campus boasting a 40 hp 3 phase VFD (variable frequency drive) electric motor with a blower capable of generating wind speeds up to 25 miles per hour in a 3 x 3 foot square tunnel. One end has an injector capable of injecting mist droplets of various sizes and the other contains a vacuum pipe for sucking in air samples, which then pass through a paper filter system (FPS) that can record the amount of PM in samples. Advanced instrumentation including a forward looking infrared camera (FLIR) and optical particle sizer (OPS) are available for simultaneous measurement of PM concentration. Concurrent measurement of PM using three different instruments – FPS, FLIR and OPS offers validated PM suppression results for the research. Dr. Alex Alexandrou, Chair, Department of Industrial Technology is the research leader of this dust tunnel project. For more information, contact balajis@csufresno.edu

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- If you have ideas for Update items or would like to get involved in the leadership team, please let us know.