Let's cut through the hype!!

Dioxins and the Jasper Clean Energy Center – TRUE or FALSE?

Dioxins, while occurring naturally in small quantities, are produced when carbon based fuels (coal, natural gas, heating oil, diesel fuel and gasoline, wood and biomass - including the perennial grass miscanthus giganteus) are poorly burned in a combustion process and the unburned fuel is permitted to "incubate" under the proper conditions (temperature, time and presence of chlorine) required for its formation.

Dioxins in even small quantities are bad for the public health. The US EPA and the IDEM for the past several decades have been reducing the level of dioxins in the air by requiring facilities which have the potential to emit dioxins to use the Best Available Control Technologies to optimize the combustion processes and to continuously monitor combustion emissions.

During 2009, approximately 6 ½ pounds of dioxin was created in Dubois County from all sources (estimate using latest US EPA data), the Jasper Clean Energy Center expects to produce less than 1/1000th of 1% of this amount (if operated at 100% capacity during every hour of the year).

How are dioxins formed - Just as fuel, oxygen and temperature are required to create fire, dioxin production requires; i) carbon or organic fuel; ii) the right temperature range (400^{o}F to 750^{o}F); iii) a minimum reaction time (longer than 2 seconds); and iv) the presence of chlorine. Miscanthus, woody biomass and most fossil fuels contain both carbon and trace amounts of chlorine. The key to preventing dioxin is to have a clean burning combustion process to minimize both the presence of carbon in the emissions and prevent the conditions under which dioxins can form.

In other words, dioxin formation is not fuel dependent but combustion condition dependent. The Jasper Clean Energy Center will be operated just like any other power plant that combusts a fuel - under conditions which prevent/minimize the formation of dioxins or other potentially toxic compounds.

How are dioxins controlled – A common way to control/prevent fire is to eliminate or control one of the 3 requirements (oxygen, temperature or fuel) by either smothering with a blanket or fire extinguisher (remove oxygen) or cool temperature (put water on it).

Likewise, the way to control/prevent dioxins is to eliminate one or more of the requirements for dioxin formation (carbon, temperature or time). This is accomplished in the boiler and its emissions control equipment by:

i) Eliminating unburned carbon by monitoring the combustion process to ensure complete combustion of all fuel (easily monitored by the amount of carbon monoxide produced); or

ii) Preventing formation by maintaining the temperature in the boiler at temperatures outside the incubation temperature range:
   a. Maintain boiler combustion temperature greater than 800 ^{o}F (boiler operates at greater than 2,000 ^{o}F), and
   b. Limit boiler exhaust temperatures to below 375 ^{o}F (exhaust gas will exit the converted boiler at below ~350 ^{o}F and exit the stack at below 340^{o}F); or

iii) Limiting the incubation time necessary for dioxin formation to less than 2 seconds (exhaust gas in the boiler will pass through the incubation temperature zone 750^{o}F to 400^{o}F in less than 1/2 of a second).

Will Project Operations be Monitored – The Indiana Department of Environmental Management will require the Jasper Clean Energy Center to monitor carbon monoxide and nitrous oxide emissions on a continuous basis to insure the combustion of the biomass is operating efficiently and cleanly. Emission levels and boiler temperatures will be monitored continuously and operators will be notified to take corrective action should emission levels or boiler temperatures vary beyond a safe level.