Emerging Technology Forum
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Emissions and Residuals/Environmental Health Issues

Summary of presentation by William Welch prepared by presenter.
William Welch is a Principal Development Engineer College of Engineering, Center for Environmental Research and Technology (CE-CERT).

Evaluation of Environmental Impacts of Thermochemical Conversion Technologies Using Municipal Solid Waste Feedstocks

As the potential environmental impacts from thermochemical conversion of waste have become a source of confusion and controversy among some stakeholders, the CIWMB directed the University of California, Riverside researchers to obtain and analyze third-party emissions data from several prototype conversion facilities that have recently performed such testing. In addition, the overall environmental impacts of thermochemical conversion technologies vs. existing practice were expanded and described.
Three case studies were considered where researchers had access to independently-verified emissions test data and/or access to allow direct observation of source testing. The following are brief descriptions of the processes evaluated.

IES – Romoland, CA
International Environmental Solutions (IES) operates an Advanced Pyrolytic Treatment Thermal Conversion System that consists of a retort chamber followed by a thermal oxidizer and air pollution control equipment.

BRI Energy – Fayetteville, AK
The BRI Energy process uses an up-front partial oxidation gasifier, followed by a bioreactor to produce ethanol as the primary product. According to company Principals, the process can produce about 100 gallons of anhydrous (fuel-grade) ethanol per ton of dry feedstock.

IET Technologies – Richland, WA
The Plasma Enhanced Melter (PEMTM) system was developed in the 1990's and patented by its inventors shortly after Integrated Environmental Technologies (IET) was founded in 1995. The PEM system electrically heats waste fed to a refractory-lined processing chamber to gasify organic material and melt inorganic components and metals at high temperatures. The syngas can be oxidized prior to atmospheric release or it can be used to produce electrical power or other forms of energy.

Case Studies – Emissions Results
Currently, there are no regulatory requirements in the United States specific to thermochemical conversion processes. To date, facilities have been evaluated on a case-by-case basis, usually under a research permit. There are, however, European limits for these types of processes. For comparison purposes, emissions results for the (3) three case studies were compared with existing EPA limits for starved-air combustors, German limits thermal conversion, and SCAQMD MSW incinerator permit limits. As the limits in many cases are in different terms, they were all normalized to equivalent units (milligrams pollutant per normal cubic meter, corrected to 7% oxygen). The emissions results and comparison to existing standards were shown in the presentation

There are many indirect impacts to consider in assessing conversion technologies in the overall scheme of waste reduction, energy recovery, and environmental footprint. If conversion technologies are able to process a significant portion of California's waste that is currently landfilled, benefits could be realized in a number of areas. These include reductions in overall greenhouse gas emissions, fugitive landfill gas emissions, and diesel truck emissions. On the energy production side, the avoided costs and impacts in exploration, production, and transportation of traditional fuels could be substantial. While quantification of these indirect impacts was beyond the scope of the current study, an example of potential diesel truck trip reduction was presented.

Summary of presentation by Jay Chen prepared by CIWMB staff.
Jay Chen is a Senior Engineer Manger for the South Coast Air Quality Management District, responsible for overseeing the permitting and field enforcement of the Toxics and Waste Management Section of the Office of Engineering and Compliance.

Mr. Chen's presentation was entitled IES Romoland Emission Tests: Status Update.

He began by stating that International Environmental Systems Romoland had been conducting emissions testing on their pyrolysis facility in Romoland, California under a Southern California Air Quality Management District (SCAQMD) Research Permit obtained in March, 2005.

Mr. Chen indicated that testing was conducted in June/July 2005 for criteria and toxic air pollutants. At 1.25 tons/hour, 30 tons total post-MRF MSW was processed in the pyrolytic converter during the tests. The air pollution control system included thermal oxidizer with low NOx burner, baghouse, wet scrubber, and in-stack carbon filter (and/or carbon injection). The test report was submitted to SCAQMD for review in August 2005. The initial test results were valid only for criteria pollutants with corrections. Supplemental data for toxic pollutants was submitted which resulted SCAQMD validation of test results for criteria pollutants, formaldehyde, dioxin/furans, and toxic VOCs. The test results for multiple metals, however, were ruled invalid.

SCAQMD issued another research permit to IES for a 14-day reliability test with enhanced air pollution control equipment. Several tables were included in his PowerPoint presentation that summarized test data.

Summary of presentation by Peter Cantle and Robin Cobbs provided by presenters
Peter Cantle is the Engineering and Compliance Division Manager for the Santa Barbara County Air Pollution Control District. Robin Cobbs is an air pollution engineer with the Santa Barbara County Air Pollution Control District and the project manager for the district's Conversion Technology Emissions and Safety Testing Program

Waste Conversion Technologies
Emissions Testing and Modeling in Santa Barbara County

Santa Barbara County is considering installing a waste conversion technology to address the limited capacity of the County's Tajiguas Landfill. To further this process and to address a critical lack of toxics emissions information from these technologies, the Santa Barbara County Air Pollution Control District (APCD) will implement and manage a comprehensive emissions testing program. The intent of the testing program is to produce sufficient emissions data from the gasification and acid hydrolysis processes that are being considered to assess if these technologies can operate safely from a public health perspective. The program will use EPA- and ARB-approved methods to test for a full suite of toxic air contaminants, including metals, polycyclic aromatic hydrocarbons, dioxins, furans, PCBs, vinyl chloride, aldehydes and acid gases, and speciated volatile organic compounds. The emissions testing will be performed using municipal solid waste taken from the Tajiguas Landfill waste stream and provided to each technology vendor. The emissions data will then be used with facility siting assumptions to model the expected health risks from a conceptual conversion facility. Each vendor is expected to cover the costs associated with testing (e.g., source test contractor, laboratory work). The Integrated Waste Management Board has provided a $400,000 to cover the APCD's costs in this two-year effort.