TNRCC INFORMATION

Waste Tire Recycling Program, Office of Permitting
March 2001

SUBJECT: # Air Emissions Associated with the Burning of Tire-Derived Fuel

Toxicological Review of Air Emissions Associated With the Burning of Tire Derived Fuel (TDF) Background:

More than 240 million scrap tires are generated annually in the United States. Used tire disposal is problematic, as tires are very resistant to degradation and are poorly compatible with landfilling. As a result, an estimated two billion scrap tires are currently stockpiled. In addition to providing breeding grounds for disease-carrying insects, these stockpiles have proven to be susceptible to spontaneous combustion and arson. Tire fires are difficult to extinguish, and their open uncontrolled burning has the potential to result in hazardous air emissions.

Although recycling opportunities are available, the market is currently insufficient to handle the large number of stockpiled tires. However, used tires have qualities which make them excellent alternative fuel sources for certain industries. Whole and shredded tires (known as tire-derived fuel, or TDF) have been used as a fuel source in European and Japanese industries for a number of years. In the United States, more than 30 states have adopted legislation recognizing TDF as an acceptable industrial fuel source. Due to their intensive fuel requirements, cement kilns, electric utilities, and pulp and paper mills have been the primary industrial users of TDF.

TDF Permitting in Texas:

To date, the TNRCC has permitted the combustion of TDF at seventeen facilities, most of them cement kilns, in Texas. Although public concern has been expressed about the use of TDF at these facilities, the TNRCC believes that scientific evidence has demonstrated that tires can be safely burned for fuel provided proper emission control devices are used. The United States Environmental Protection Agency (USEPA) and other state environmental programs have reviewed the available data, and have reached the same conclusion.

Support for the burning of TDF is provided by extensive reviews of data from pilot studies and emission monitoring efforts nationwide. Independent of these studies, the TNRCC has also required smokestack testing for several facilities proposing to use tires as a fuel supplement in Texas. In addition, in order to address the concerns of local citizens, air and soil monitoring has been conducted in Texas communities located near facilities which burn TDF. The following sections summarize these studies and their conclusions with respect to the acceptability of TDF as an alternative fuel source.

USEPA and State of Ohio Reviews of TDF Trial Burns:

The USEPA and the Ohio Air Quality Development Authority have conducted separate reviews of air emissions data from various industries that were seeking permits to use TDF as a fuel source. Both reviews concluded that TDF could be burned in an environmentally sound manner, with overall emissions consistent with the burning of coal. In support of this conclusion, of all the electric utilities surveyed, the Oxford Energy facility in California (which burns 100% TDF) reported the lowest overall air emissions. USEPA was careful to recognize the importance of appropriate emission control devices when burning TDF. The USEPA review found that both electrostatic precipitators (ESPs) and baghouses (fabric filters) were effective in controlling emissions from the combustion of TDF. These types of controls are commonly required by the TNRCC in granting air permits to burn TDF.

USEPA Pilot Studies

The USEPA recently performed a pilot study in which tires were burned in a test incinerator without the aid of any emission control devices. Flue gases were analyzed for the 189 Hazardous Air Pollutants listed in the 1990 Clean Air Act Amendments (including criteria pollutants, metals, volatile/semi-volatile organic compounds, and dioxins/furans). The study concluded that, with the exception of zinc, there were no significant increases in air emissions when tires were substituted for coal. USEPA stated that the zinc emissions would have been effectively eliminated if an appropriate control technology had been used. It should be noted that emissions of certain compounds of concern (e.g., mercury) were significantly lower when burning tires relative to coal combustion.

TNRCC Smokestack Testing Requirements

As part of the air permitting process, the TNRCC has required smokestack testing on several cement kilns which were proposing to supplement with TDF. Analytical testing was performed for those compounds that were most likely to be emitted by the burning of TDF, and compounds of potential health concern (e.g., dioxins/furans). Emissions when burning TDF were consistent with emissions from coal burning, and were below levels of concern from a health standpoint.

TNRCC Ambient Air and Soil Monitoring Efforts

Based on facility design and data from the above mentioned studies, the TNRCC was confident that tires could be burned safely at the Texas Lehigh cement kiln in Buda. However, local citizens and environmental groups were uncomfortable with the use of this data in the TNRCC air permitting process. In order to address these concerns, TNRCC conducted ambient air monitoring downwind of the facility while the cement kiln was burning TDF. Those compounds most likely to be released by the burning of tires/fossil fuels were measured, including criteria pollutants, metals, volatile/semivolatile organics, and dioxins/furans. All compounds were either not detected or were measured at concentrations well below TNRCC health-based screening levels, or relevant state or federal standards. No adverse health effects would be expected to occur in association with exposures to the measured air concentrations.

One point that is often made with respect to air monitoring is that although every effort is made to characterize facility emissions, monitoring results are only reflective of the conditions at the time of sampling. Accordingly, questions have been raised about an inferred lack of knowledge about TDF emissions during non-typical conditions (e.g., upset conditions). Soil sampling efforts in and around the town of Midlothian have provided data that addresses these concerns.

Three cement kilns, including facilities which have burned hazardous wastes and TDF in addition to traditional fossil fuels, have been in operation in Midlothian for a number of years. Once emitted, persistent compounds of concern (e.g., metals, dioxins/furans) would be expected to deposit on local soils, where their stability would allow them to accumulate over time. As these soils are subject to any and all facility releases, contaminant levels will reflect TDF emissions under non-typical conditions, as well as contributions from other local sources and natural background levels. In Midlothian, the measured soil concentrations of all compounds of interest were generally consistent with natural background concentrations, and were below levels of health concern. Based on this data, air emissions associated with the TNRCC-permitted use of TDF do not represent a human health threat.

USEPA Indirect Risk Assessment- Midlothian

USEPA Region VI included considerations for the potential for local impacts associated with the burning of tires in conducting an indirect risk assessment on several facilities in Midlothian. Indirect risk assessments predict the movement of emitted chemicals through the environment, and are used to evaluate risks associated with human exposures to chemicals in local fish, beef, milk, crops, and other environmental media. In considering all of these routes of exposure, the USEPA risk assessment concluded that air emissions in Midlothian would not be expected to pose a health threat to local residents.

Conclusion:

A significant body of scientific data, provided by studies conducted by the TNRCC, USEPA, and other states, support the conclusion that TDF can be burned in an environmentally sound manner, provided proper emission control devices are utilized.