

GREENPEACE

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To: Environmental Activists

Fm: Greenpeace Toxics Research and Information Unit

Re: [Tire](#) Incineration and Toxic Emissions: New data from the Modesto Incinerator, Westley, CA

In late 1989, the California Air Resources Board conducted tests at the Modesto Energy Company tire incinerator in Westley, California. In a series of trial burns, the facility incinerated an average of 5800 lbs/hour of [tires](#), generating about 14 megawatts of electricity in the process. Trial burns are generally considered a poor indicator of operation on a daily basis: during trial burns when regulatory authorization is at stake and government officials are at the site, variables such as wastefeed, temperature, oxygen flow, and pollution control device efficiency are carefully maintained to optimize performance. On a day-to-day basis, emissions may be considerably higher.

Preliminary results from the trial burn are discussed below [G. Lew, "Preliminary Test Data from the Modesto [Energy](#) Company Evaluation Test", California Air Resources Board, Review Draft, Sacramento, February 1990].

CONVENTIONAL POLLUTANTS

The facility was found to be emitting conventional air pollutants as follows (using mean values of all samples taken and assuming an average operating time of 7000 hours per year):

Particulate matter: 44,100 pounds/year

Hydrogen chloride/ hydrochloric acid (HCl): 1,428 pounds/year

Sulfur dioxide: 11,930 pounds/year

Oxides of nitrogen (NOx): 57,400 pounds/year

Carbon monoxide: 76,256 pounds/year

ORGANIC TOXIC POLLUTANTS

Tires are a diverse and complex mixture of hydrocarbons, metals, and small quantities of chlorine. While an ideal incinerator would convert simple hydrocarbons into nothing other than carbon dioxide and water, the reality of a tire incinerator is not so simple. In any real-world combustion device, small quantities of the original material are not subject to complete combustion; fragments of incompletely burned chemicals recombine to form new chemicals, many of which may be more toxic than the original material. Tires, which contain difficult or impossible to burn substances (such as heavy metals and chlorine) are no exception. Like burning any other type of waste, incinerating tires can be presumed to form hundreds of different combustion products, ranging from simple to complex hydrocarbons and halogenated hydrocarbons (ranging from chlorinated methanes to the ultratoxic dioxins and PCBs).

The Modesto testing program analyzed for only a handful of the many pollutants likely or possibly present. Data presented in the report are discussed below, but it is important to remember that they [offer](#) a profile of only a small portion of total emissions from the incinerator.

Polychlorinated dioxins and furans. The facility was found to be emitting dozens of different dioxin and furan isomers at a mean rate of .16 grams/year (Assuming 7000 hours of operation per year). A toxic equivalency approach (which expresses the toxicity of a mixture of dioxins and furans relative to the toxicity of 2,3,7,8-TCDD, the most toxic dioxin congener) shows mean dioxin emissions of .0236 grams/year.

While these quantities of dioxin may appear small, they can pose a significant risk to public [health](#). To provide perspective, dioxin emissions from the Modesto incinerator can be compared to EPA's "risk specific dose," the dose which EPA estimates will pose a one per million cancer risk to the general population (the maximum dose EPA considers "acceptable"). Daily dioxin/furan emissions from the Modesto tire incinerator are equivalent to a maximum "acceptable" daily dose for 187 million individuals (assuming humans weigh 70 kg). Expressed another way, annual dioxin/furan emissions from the facility are equivalent to a LIFETIME maximum dose for more than 2 million people.

Other halocarbon pollutants. Other chlorinated combustion products released from the Modesto incinerator include extraordinarily toxic, carcinogenic, and teratogenic compounds which may augment the direct toxicity of the dioxins and furans.

Tests at the facility found emissions of PCBs, dichlorobenzene, trichlorobenzene, tetrachlorobenzene, hexachlorobenzene, chlorophenol, and dichlorophenol. All of these compounds are highly toxic and are known or suspected carcinogens, as well. Total emissions of chlorinated benzenes and chlorinated phenols averaged 154 grams/year; PCB emissions averaged 28.6 grams/year.

Non-chlorinated hydrocarbons. No attempt was made to identify or quantify the full range of hydrocarbon pollutants from the facility, which are likely to range from relatively non-toxic compounds like ethane to more toxic pollutants such as benzene and xylene and the highly carcinogenic polynuclear aromatic hydrocarbons (PAHs). Only a handful of PAHs were tested for, and the total quantity of those pollutants detected, many of which are known or suspected carcinogens and all of which are toxic, is shown below:

Polynuclear aromatic hydrocarbons 3,250 grams/year

Naphthalene

Acenaphthylene

Acenaphthene

Fluorene

Fluoranthene

Pyrene

Benzo(k)fluoranthene

Benzo(a)pyrene

HEAVY METALS

Tires are known to contain at least 17 heavy metals. In an incinerator, heavy metals cannot be destroyed, but can only be distributed to air emissions or incinerator residuals. Stack emissions of heavy metals were quantified for aluminum (83 pounds per year), arsenic (.11 lbs/year), and chromium (9.9 lbs/year). Arsenic and chromium are both considered potent carcinogens.

ASH RESIDUES

The Modesto facility generates fly ash from its pollution control devices and bottom ash from the furnace itself. The ash can be presumed to contain the same selection of pollutants present in the air emissions, often in greater quantities. The California report provides no data on toxic pollutants present in the ash from the Modesto facility. However, stack gases leaving the furnace and entering the pollution control device were found to contain the dioxins, furans, PCBs, chlorobenzenes and phenols, and arsenic, aluminum, cadmium, chromium, manganese, nickel, lead, and mercury.

Fly ash from the facility is a legally hazardous waste due to its high zinc content. It is sent to a zinc smelter in Monterey, Mexico, which recovers a portion of the zinc in a smelting furnace. No attempt is made to recover, treat, control, or dispose the other heavy metals or toxic pollutants present in the ash. Greenpeace is opposed to the international trade of hazardous wastes, especially waste exports to nations with weaker environmental standards, scarce provisions for public participation in environmental policies, and limited resources to provide technical and regulatory oversight for environmentally dangerous practices.

ENERGY ISSUES

The incinerator generates about 14 MW of energy. That quantity of energy could be saved by merely replacing about 245,000 standard lightbulbs with compact fluorescent bulbs. Modesto has 108,000 residents -- if each person replaced about two light bulbs in his or her home or office, the energy provided by the tire incinerator would be rendered immediately unnecessary. Other conservation and efficiency measures offer even greater potential to eliminate the perceived need for environmentally unsafe energy sources.

Further, incinerating tires and manufacturing new ones from virgin petroleum feedstocks wastes energy that could be saved by recycling or retreading tires. In the 1940s, 60 percent of the nation's tires were retreaded or recycled; today the total is about 10 percent. Retreading a tire once saves 65 percent of the energy and 60 percent of the petroleum feedstock necessary to make a virgin tire. Because combustion can recover only a portion of the energy contained in a material (the rest is lost as light, heat, unburnt material, friction, etc.), destroying tires which have been used only once is hardly an efficient use for petroleum, a non-renewable, finite, polluting, and politically contentious material.