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CEMENT AND KILN DUST CONTAIN DIOXINS

During routine preparation of a REPORT TO CONGRESS ON CEMENT KILNS, the U.S. Environmental Protection Agency (EPA) has learned that cement and cement kiln dust contain dioxins and furans (both of which are powerful poisons in animals and humans), according to a briefing document dated October 8, 1992, prepared by EPA staff for EPA's Director of Solid Waste, Sylvia Lowrance. The October briefing document also says 20 percent of the cement kiln dust that EPA tested contains the non-natural radioactive elements plutonium-238, plutonium-239 and cesium-137. Dioxins are the most powerful carcinogens (cancer-causing agents) ever tested in laboratory animals; plutonium is the most potent carcinogen in humans ever discovered.

Cement is a principal component of pipe often used to distribute drinking water in many American cities. Cement kiln dust is a byproduct of cement manufacture and is routinely given or sold to farmers as a soil treatment, or is discarded into pits or is piled on the ground near cement kilns in an uncontrolled fashion. According to Bill Schoenborn, an EPA staff member working on the REPORT TO CONGRESS, about 6 million tons of kiln dust is disposed of each year by cement kilns, 5.1 million tons of it buried on-site, and 900,000 tons of it shipped off-site for use in stabilizing other wastes (such as sewage sludge) or as a soil additive on farms. Cement kiln dust has previously been reported to contaminate groundwater with the toxic metals lead and chromium,[1] but until now no one has reported dioxins, furans, plutonium or cesium-137 in cement or cement kiln dust.

The REPORT TO CONGRESS is required by the federal Resource Conservation and Recovery Act (RCRA), the nation's basic hazardous waste law. Like mine wastes, cement kiln dust was initially exempt from RCRA because it is a high-volume waste presumed to be low in toxicity. Cement clinker (that is to say, cement itself) is exempt from RCRA because it is a product, not a waste. Section 8002(o) of RCRA required EPA to study cement kiln dust and to write a report for Congress on its findings. For several years, EPA dragged its feet preparing the report. Then Environmental Defense Fund (EDF)

brought a lawsuit, and now EPA is under a court order to finish the report by April, 1993.

In the course of preparing the REPORT TO CONGRESS, EPA randomly selected 15 cement manufacturing plants (called kilns) for sampling, out of the 114 such plants presently operating in the U. S. Of the 15 plants sampled, eight burn hazardous waste as fuel and seven do not. In recent years, cement kiln operators have increasingly been using hazardous waste as fuel, to reduce fuel costs and thus increase profitability. The practice has proved controversial. (See RHWN #174 and #243.) Opponents of the practice say they fear cement will become contaminated with industrial poisons. Cement is a key raw material in concrete pipe for water delivery systems, and in concrete block and other concrete materials used in construction of private homes, commercial dwellings, public buildings, bridges and highways. Seventy to 80 million tons of cement are produced in the U.S. each year, depending on market demand.

Sampling Results

EPA took 15 samples of "clinker" (the product of a kiln, from which cement is made), plus 28 samples of dust (the unwanted byproduct of a kiln). All samples were analyzed for metals, chloride, cyanide, fluoride, total sulfate, total organic carbon, moisture content, and radioactive elements.

Samples from six kilns (4 burning hazardous waste, 2 not burning hazardous waste) were tested for dioxins and furans, volatile organic compounds, semivolatile organic compounds, and pesticides. All chemical analyses were completed by EPA's National Air and Radiation Environmental Laboratory (NAREL) in Alabama.

Dioxins and furans were detected in all samples of "clinker" and all samples of kiln dust analyzed for these compounds. The October briefing document says that the dioxin molecule known as 2,3,7,8-TCDD, the most potent poison in the dioxin family, was only identified in samples from kilns burning hazardous waste. Other dioxins were found in samples from kilns not burning hazardous waste, but no 2,3,7,8-TCDD. However, the October briefing document says it is not possible to generalize these differences to the entire 114 operating cement kilns.

Samples of cement kiln "clinker" did not contain pesticides or semivolatile organics. Clinker was not analyzed for volatile organics. On the other hand, cement kiln dust contained amounts of the volatile organics benzene and acetonitrile that exceeded RCRA limits "in a number of the samples of hazardous waste burners" but not in samples from kilns not burning hazardous wastes. The dust from one kiln not burning hazardous waste proved to be high in methylene chloride, according to the October briefing document.

These findings lend support to the view that burning hazardous waste in a cement kiln increases the amount and potency of toxins in the resulting cement kiln dust and perhaps in the cement itself.

At three kilns (2 burning hazardous waste, one not burning hazardous waste) levels of naturally-

occurring radioactive radium-226 exceeded the cleanup standard for uranium mine and mill wastes (the standard being 5 picoCuries per gram). Cesium-137, a non-natural radioactive element, was present in the dust of 26 percent of the kilns tested (4 out of 15)--one hazardous waste burner and three non-hazardous waste burners. Plutonium-238 and plutonium-239 were detected in kiln dust samples from 3 of the 15 kilns tested. Each of these 3 facilities is "located near a DOE [U.S. Department of Energy] nuclear weapons production/testing facility," according to EPA's October briefing document. Plutonium and cesium-137 do not occur in nature but are created by nuclear bomb explosions and in nuclear power reactors.

A second EPA briefing document dated November 24, 1992, contains additional information about the problem of potent toxins being found in cement and in cement kiln dust. The document is titled "OSW Office Briefing on Cement Kiln Dust Risk Screening" and it contains a summary of a risk assessment that is being conducted by the EPA's Communications and Budget Division within the Regulatory Analysis Branch, Office of Solid Waste.

The November briefing document outlines two risk assessment scenarios: one in which cement dust blows off-site and affects a person living 750 feet from an active waste pile, and a second in which an individual is presumed to be living on top of an abandoned waste pile. No risk assessment was reported for the case of a farmer growing crops in soil to which cement kiln dust has been added.

Furthermore, no risk assessment is reported for the dioxins and furans measured in cement clinker, which it to say, in cement itself.

Based on the two risk assessment scenarios, the November briefing document describes amounts of toxins in cement kiln dust that appear to be acceptable, which is to say will only give cancer to one in 100,000 individuals so exposed. The November document lists 22 instances in which one or more EPA tests of cement kiln dust exceeded the criteria developed in the risk assessments. Criteria that are exceeded by one or more samples include: 2,3,7,8-TCDD, total dioxins, total dioxins and furans, total hexachloro dioxins, arsenic, beryllium, cadmium, chromium, lead, and thallium, plus the following radioactive elements: bismuth-214, cesium-137, potassium-40, lead-212, lead-214, radium-226, radium-228 and thorium-227.

The purpose of the risk assessments reported in the November document is to help EPA decide whether the agency needs to regulate cement kiln dust as a legally hazardous waste or not. Declaring cement kiln dust a legally hazardous waste would greatly increase the cost of waste disposal for some cement kilns, and thus might reduce the profitability of some kilns.

EPA employee Hugh Kaufman has previously charged that the agency has been "accommodating the regulated cement kiln hazardous waste incineration industry with nonexistent, or at best loose, regulation..."[2]

Now that EPA has found dioxins in cement clinker, and dioxins and radioactive elements in cement kiln

dust, the agency will likely come under considerable pressure to regulate all cement kiln wastes as hazardous wastes.

For their part, citizens seem likely to start asking themselves anew whether kilns can be good neighbors. --Peter Montague, Ph.D.

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[1] Jeffrey D. Smith, "Cement Kilns 1991," EI DIGEST (August, [1991),] pgs. 20-32.

[2] Kaufman made his charge in a letter to EPA chief William Reilly dated Dec. 7, 1990; on February 21, 1991, cement kilns burning hazardous waste became regulated under the so-called "BIF" (boiler and industrial furnace) regulations, which can be found in the FEDERAL REGISTER February 21, 1991, pgs. 7134-[7240.] See also FEDERAL REGISTER July 17, 1991, pgs. 32688-[32692;] August 27, 1991, pgs. 42504-42517; September 5, 1991, pgs. 43874-43877; and August 25, 1992, pgs. 38558-38566.

Descriptor terms: cement kiln incineration; hazardous waste incineration; bif rules; sylvia lowrance; cement kiln dust; plutonium; cesium; dioxin; carcinogens; cancer; lead; chromium; metals; rcra; risk assessment; edf; concrete;

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