

EPA's risk assessment work did not explicitly consider the potential for changes in population around CKD management units, which would alter future direct and indirect exposure potentials. Proximity to the source is one of the more important determinants of risk, and many cement plants are experiencing encroachment by human populations.

- The Agency also studied several off-site beneficial uses of waste dust. Most current off-site uses, such as for waste stabilization or general construction, are either currently regulated (under RCRA for hazardous waste stabilization, or under the Clean Water Act in the case of municipal sewage sludge) or appear to present low risk due to low exposure potential. However, one current use—as a lime/fertilizer substitute on agricultural fields—was found to present some potential for indirect food chain risk under plausible exposure modeling assumptions for highly exposed farmers.

As reported in the RTC and the December 1993 technical background document, median industry-wide CKD constituent concentration values for metals and dioxins did not yield cancer or non-cancer human health risks of concern when modeled using current Agency indirect food chain modeling procedures and a normal land application rate of two tons of CKD per acre every three to five years. However, cancer risks for subsistence farming in excess of  $1 \times 10^{-4}$  (1 in 10,000) were estimated when high-end (upper 95th percentile) reported constituent concentration levels for metals and dioxins were used.

Again, these indirect exposure results should be reviewed with caution due to the substantial uncertainties involved in this risk modeling methodology, which is still under refinement and peer review. The Agency believes, the results do suggest the need for further study regarding possible human health implications from this current off-site use of CKD.

#### G. Environmental Justice

As part of its analysis of risks to human health posed by CKD, the Agency investigated whether there are environmental justice issues associated with the management of CKD. Executive Order 12989, dated February 11, 1994, and titled "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," directs federal agencies to consider environmental justice issues. The Agency's risk modeling results indicate that subsistence farmers and subsistence fish consumers would be

most susceptible to the risks posed by the management of CKD.<sup>8</sup> In the RTC, EPA solicited comment on the prevalence of these activities around existing cement manufacturing facilities. The Agency also requested comment on environmental justice issues (i.e., the fair treatment of people of all cultures, incomes, and educational levels with respect to protection from environmental hazards) associated with the management of CKD.

As part of the NODA, EPA announced the availability of a report titled Race, Ethnicity, and Poverty Status of Populations Living Near Cement Kilns in the United States. The report includes numerous analyses and summaries of the demographics data, and is available in the RCRA docket. One analysis indicated that, of the facilities studied, approximately three-fourths of the sites have a minority population at or below the national average of 24 percent living within one mile of the facility while the remaining sites had minority populations higher than the national average living within a mile of the site. With regard to poverty level, approximately 54 percent of the facilities had less than 13 percent of the population (national average) living below the poverty level within one mile of the facility while 46 percent of the facilities had more than 13 percent of the population living below the poverty level within one mile of the facility.

#### H. Potential Costs and Impacts of Subtitle C Regulation

The analysis presented in the RTC indicates that if CKD were managed as a RCRA hazardous waste under the full Subtitle C regulatory scheme, including minimum technology (RCRA section 3004(o)) and land disposal restriction requirements (RCRA section 3004(d-g)), there would most likely be significant compliance costs for a substantial number of cement plants. Costs would, however, vary considerably, depending on individual plant efficiencies in converting raw materials into finished cement. For the 25 percent or so of U.S. cement plants that presently generate little or no wasted dust for on-site disposal, compliance costs for CKD would be negligible. For the remaining 75 percent, the Agency estimates the annualized incremental compliance costs at between \$2 million and \$14

<sup>8</sup>For purposes of this report, subsistence farmers and subsistence fish consumers are those whose diets are very heavily dependent on home-grown foods or locally caught fish. Particularly high exposures to contaminants can result from bioaccumulation of toxic constituents in the locally-grown farm products or fish, compounded by a high proportion of these foods in the diet.

million per year per plant (not including corrective action), depending on an individual plant's current CKD quantity and local landfill construction conditions. This range for typical annual plant costs translates into \$3 to \$28 per ton of cement, or 6 to 56 percent of a plant's annual gross value of sales (at a nominal selling price of \$50 per ton of cement).

Such high costs are a result of the relatively high waste-to-product ratios among plants in this industry and the high unit compliance costs for the full Subtitle C technology. Costs at individual plants might be reduced if facility operators could decrease net waste generation rates by improving basic plant efficiencies, substituting lower alkali raw materials, or implementing dust reclamation and recycling technologies, as discussed in Chapters 8 and 9 of the RTC. The extent to which these pollution prevention options can be implemented economically, however, is uncertain.

For those facilities with high CKD generation rates that cannot reduce their waste-to-product ratios economically, costs for the full Subtitle C scenario would be prohibitively high, and a substantial portion of the industry could become noncompetitive. Projected impacts under this regulatory scenario suggest a substantial curtailment of domestic cement capacity and production, a shift in market share towards the more efficient domestic producers, higher prices for cement in most regions of the country, and substantially increased imports. Important secondary impacts on regional construction industries and on small communities affected by cement industry employment losses also would be projected.

The costs of managing CKD as a hazardous waste would be reduced if certain Subtitle C requirements (e.g., land disposal restrictions, minimum technology requirements for managing CKD) were modified. In the RTC, the Agency speculated that plant-level costs under this scenario might amount to one-third to one-half the cost of full Subtitle C for typical plants with median to high CKD generation rates. Alternative, more tailored standards were estimated to require even lower compliance costs, particularly for favorably located plants or plants already employing available containment measures. Depending upon specific requirements, the costs for these types of controls generally were less than one percent of the industry cement sales value, although they could be higher for some facilities located in areas of karst terrain, which might