CHAPTER TEN

STUDY FINDINGS AND REGULATORY OPTIONS

10.1 Study Findings

Based on the information collected for this Report to Congress, this chapter presents a summary of the Agency's findings regarding various aspects of the generation and management of cement kiln dust (CKD) waste, as well as our initial regulatory options for this waste. Results of EPA's analysis of the eight Congressionally-mandated study factors (see Chapter 1) are presented as follows: sources and volumes of waste (Study Factor 1) in Section 10.1.1; current and potential uses of CKD (Study Factor 8), and present disposal practices (Study Factor 2) in Section 10.1.2; potential danger to human health and the environment (Study Factor 3) in Sections 10.1.3; documented cases of damage to human health and the environment (Study Factor 4) in Section 10.1.4; and costs and impacts of alternative CKD management scenarios (Study Factors 5, 6, and 7) in Section 10.1.5.

10.1.1 Sources and Volumes of Waste (Study Factor 1)

In 1990, the cement manufacturing industry in the United States consisted of 43 companies operating 115 clinker-producing plants (218 kilns) in 37 states and Puerto Rico. California was the largest clinker producing state in 1990, followed by Texas, Pennsylvania, Missouri, and Michigan. Although all cement is manufactured in inclined rotary kilns using similar raw materials (primarily limestone, clay, and sand), variations in the manufacturing process and kiln design affect energy requirements and production capacity at each facility. The cement industry burns large amounts of high Btu fuels during the manufacturing process, primarily coal and other fossil fuels. In 1990, however, 23 facilities also burned hazardous waste as fuels.

Based on an analysis of existing data, including industry data collected by the Portland Cement Association and EPA survey data collected under RCRA §3007 authority from the operators of cement manufacturing facilities, the Agency has documented that cement plants generate large quantities of cement kiln dust waste. In 1990, the generation of gross CKD (i.e., CKD that is collected by air-pollution control devices) was 12.7 million metric tons; there are, however, wide variations among kilns in total gross CKD generated and gross CKD generated per ton of clinker.

In addition, there are wide variations among kilns in the amount of net CKD that is generated (i.e., CKD that is either disposed or used beneficially off-site). For example, twenty-five percent of facilities produce essentially no net CKD (CKD that is either disposed or sold), while 10 percent of the largest net generators produce almost 50 percent of all net CKD.

Finally, the Agency also found that the burning of hazardous waste appears to affect the volume of dust that is actually disposed of. Kilns that burn hazardous waste remove from the kiln system an average of 75 to 104 percent more dust per ton of clinker than kilns that do not burn hazardous waste. The Agency is interested in receiving additional information regarding how the burning of RCRA hazardous wastes, non-hazardous wastes (such as tires and non-hazardous used oils), and fossil fuels affect the quantity and chemistry of generated CKD, as well as the partitioning of toxic metals, chlorides, and alkalis between stack gases, CKD, and clinker.

10.1.2 Waste Management Practices (Study Factors 2 and 8)

For that portion of CKD that is disposed of, industry practice is to manage it in piles, quarries, and landfills, most of which are unlined and uncovered. (Most of the gross CKD -- 8.2 million metric tons or 64% -- is currently recycled directly back into the kiln or raw feed system.) Some active piles are also managed underwater or adjacent to surface water and/or actively tilled agricultural lands. Although most CKD waste is disposed on-site, some is sold for off-site

use. For example, in 1990, 7% of gross CKD generated (897,000 metric tons) was sold for off-site use, most of it as a waste stabilizer, liming agent, or materials additive.

Opportunities do exist, however, to further reduce the amount of net CKD that is disposed of or sold off-site for use by recycling it back into the kiln. The Agency has identified a number of pollution prevention opportunities, including flue gas desulfurization, fluid-bed dust recovery, and leaching with water, that may, in some instances, represent low cost and potentially profitable alternatives to CKD disposal practices.

Federal statutes that potentially affect CKD management include the Clean Air Act (CAA), Clean Water Act (CWA), the Resource Conservation and Recovery Act (RCRA), and the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Provisions of regulations developed under authority of the CAA and CWA impose regulatory controls on releases of CKD to the air (via stack or fugitive dust emissions) and water (from stormwater run-off and point source effluent discharges), respectively. Under both RCRA and CERCLA, the federal government can respond to situations where the release of CKD or its constituents presents an imminent and substantial danger to human health and the environment. CKD that is not directly recycled is also subject to regulation under Subtitle D of RCRA. In addition, CKD generated in kilns that burn RCRA hazardous waste is subject to the RCRA Boiler and Industrial Furnace rule (40 CFR 266.112).

Based on an analysis of state regulations, the Agency has found that cement kiln dust waste is regulated under state and local laws, but the requirements vary significantly from state to state. For example, California regulates CKD as a non-RCRA hazardous waste, but has suspended enforcement of the management requirements for CKD that fails the State's hazardous waste corrosivity test, pending the results of further study of CKD. Pennsylvania regulates CKD as a residual waste, requiring facilities to comply with site-specific disposal requirements and waste reduction strategies, which are both periodically updated by the State. In contrast, Michigan and Texas both consider CKD an industrial non-hazardous waste. Michigan requires permits, ground-water monitoring, and regular reports of ground-water sampling results; whereas Texas issues non-enforceable guidance.

10.1.3 Waste Characteristics and Potential Risks to Human Health and the Environment (Study Factor 3)

EPA's analysis of cement kiln dust chemistry shows that CKD does contain toxic constituents, including metals and organic by-products. Constituents identified in dust solids and leachate include arsenic, thallium, antimony, lead, chromium, total-2,3,7,8-substituted dioxins, and total hexachloro-dibenzodioxin. In addition, water-CKD mixtures are often RCRA corrosive (see 40 CFR 261.22), with pH levels commonly in excess of 12.5 standard units.

In addition, on the basis of our analysis of leachate test results, EPA has found that no significant distinction can be made between CKD generated from kilns that burn hazardous waste from those that do not burn hazardous waste. (This finding was corroborated for metals content in CKD by leachate test results submitted to the Agency by the cement industry.) For example, laboratory analysis of CKD using the Toxicity Characteristic Leaching Procedure (TCLP) shows that trace metal concentrations rarely exceed RCRA toxicity limits whether or not the CKD is generated at kilns that burn hazardous waste. At the same time, certain metals, such as lead, cadmium, and chromium are present in the CKD at a consistently higher mean concentration from those kilns that burn RCRA hazardous waste than those that do not (alternatively, thallium is higher in CKD generated from kilns that burn predominantly non-hazardous fuels).

While it is not possible to establish statistically significant differences between these groups due to small sample sizes, detectable, but low, concentrations of dioxins and dibenzofurans were detected in CKD, (ranging in concentration from a few parts per trillion to 7.7 parts per billion), at both hazardous waste burning facilities and non-hazardous waste burning facilities. However, the highest concentrations that were measured in CKD came from kilns that burn hazardous waste. [Note: The levels of dioxins in dust observed at the River

Cement facility in Festus, Missouri, a facility that burns hazardous waste, are at least 15 times higher than those found at any other facility for which EPA has data. We believe that River Cement is likely atypical of the industry as a whole.] Volatile and semivolatile compounds were generally not found in CKD.

With respect to exposure scenarios associated with on-site CKD management, EPA modeled both direct and indirect exposure pathways, including contaminated surface water and ground water used as a drinking water source, direct inhalation and ingestion of windblown CKD, and the ingestion of foodstuffs (beef, milk, fish, and\or vegetables) originating from agricultural fields or streams that are receiving releases of CKD from nearby piles. The sample of cement plants examined in this analysis appears to be generally representative of typical cement plants in terms of several factors that influence risk. Based on this analysis, cancer risks for individuals living around cement plants under average conditions of transport and exposure (defined as central tendency estimates) were low (below 1×10^{-4}). In addition, noncancer effects were below the threshold effects level, indicating a negligible likelihood of noncancer impact. This analysis also quantified the high end of the distribution of risks around these same cement plants. While the risks were somewhat higher, they are generally considered within an acceptable risk range.

The Agency recognizes that the high end results obtained above may not necessarily capture the upper bound of the risks that exist across the whole universe of cement plants, as site-specific factors at some plants may contribute to higher risks. Therefore, in addition to a central tendency analysis, the Agency also conducted a sensitivity analysis of several hypothetical scenarios representing a combination of potentially higher risk transport and exposure situations. This analysis estimated that the potential cancer risks for individuals living around cement plants assuming plausible worst-case conditions (i.e., modeled utilizing the highest measured concentrations of dioxins and arsenic found in CKD and leachate derived from CKD) were in the risk range of 10^{-5} to 10^{-2} (for purposes of this analysis, these individuals are hypothetical individuals highly exposed to CKD intake who were created for purposes of the Agency's risk characterization). The hypothetical scenarios are: (1) subsistence fish consumers ingesting fish caught in nearby waters; or (2) subsistence farmers ingesting elevated amounts of vegetables grown in, or beef and milk derived from animals who ingested grasses originating from agricultural fields receiving releases from nearby CKD piles through air deposition.

The Agency does not have sufficient information to determine whether these plausible worst-case conditions of high transport and high exposure potential exist around cement manufacturing facilities, and if yes, their prevalence. Therefore, the Agency is interested in receiving additional information regarding the extent to which activities such as farming (including recreational gardening), fishing, and swimming occur around these facilities.

10.1.4 Documented Evidence of Damage (Study Factor 4)

Migration of potentially hazardous constituents, including metals, has occurred from cement kiln dust waste sites. EPA has documented seven cases of damage to surface water and ground water, and 21 cases of documented damage to air from cement kiln dust waste. By damage, the Agency means that toxic constituents have contaminated ground water and/or surface water, and/or air above Maximum Concentration Limits or some other standard. Constituents of concern being released to ground and surface waters include arsenic, chromium, and lead, among others. When ground-water and surface water exceedances do occur, the magnitude of the exceedance is generally small, although in certain instances it was as high as two orders of magnitude above the Maximum Concentration Limit for drinking water.

Environmental damage generally affects the area in the immediate vicinity of the waste disposal site. However, in some cases, nearby wetlands and streams that are off-site were also impacted. For example, releases from two facilities in Mason City, Iowa caused severe degradation of the aquatic habitat in nearby Calmus Creek. Observed releases are commonly chronic at sites at which exceedances have been noted.

It should be noted that information on environmental quality, on which this evidence is based, is limited by available data from each of the 127 sites evaluated. For those sites that had data, available files contained information on releases, but little human exposure data. Because there is little evidence of direct human exposure to environmental releases from CKD, it appears that the observed damages are not widespread.

Waste disposal practices at sites where water damages have been documented include management in waste piles, abandoned quarries, or landfills, all of which were unlined. Air damages are primarily due to mechanical failure of dust handling equipment. There is no evidence that any damage has directly affected human health. In particular, drinking water wells are located far enough away, and/or tap aquifers are isolated enough to be very unlikely to access contaminated ground water.

10.1.5 Potential Costs and Impacts of Subtitle C Regulation (Study Factors 5, 6, and 7)

If CKD were required to be managed as a RCRA hazardous waste under the existing regulatory scheme, there would likely be significant compliance costs for these facilities. These costs may potentially be reduced if they could recycle their dust. For these facilities costs would be upwards of 20 percent or more of product sales. In addition, domestic and international competition limits the ability for those facilities to pass costs through to customers.

The costs of managing CKD as a hazardous waste could be reduced, if RCRA Section 3004(x) authority is used to modify certain Subtitle C requirements (e.g., prohibitions on land disposal, minimum technological requirements for managing CKD). Costs would also be imposed under the Option 5 management standards, although those costs are likely to be much less than under Options 3 and 4. Removing the exemption, but not specifically listing CKD would have less cost impact, as most CKD is not RCRA characteristic hazardous waste. While those cement kilns that burn listed RCRA hazardous waste would be required to handle their CKD as hazardous, they will likely be able to at least partly absorb the costs of Subtitle C compliance with revenue from accepting and burning these wastes. In addition, these facilities are already subject to a number of the more costly RCRA requirements (e.g., requirement to obtain a permit, corrective action).

Pollution prevention opportunities, including, flue gas desulfurization, fluid-bed dust recovery, and alkali leaching show promise as low cost, and potentially profitable alternatives to disposal in piles. Flue gas desulfurization creates new lime for use as raw material, scrubs stack gases of sulfur, and creates pelletized alkali sulfates that may be sold as fertilizer. The alkali leaching process dissolves alkalis from CKD, enabling more CKD to be returned to the kiln. The process creates an alkali solution that may be sold as a fertilizer. The fluid-bed dust recovery process takes CKD and converts it directly into clinker. All three technologies can be used to process old CKD piles. The Agency is interested in receiving additional information regarding how these processes affect the quantity and chemistry of air emissions, as well as the partitioning of toxic metals, chlorides, and alkalis between CKD and clinker.

10.2 Environmental Justice

In addition to the eight study factors specifically identified in the statute, the Agency is interested in determining whether there are environmental justice issues associated with the management of CKD. 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 cement kiln dust.[1] It is not known, however, how prevalent these activities are around existing cement manufacturing facilities. Although the Agency acknowledges that its concern is speculative, the prospect that subsistence farmers and subsistence fish consumers may be of

[1] For purposes of this report, subsistence farmers and subsistence fish consumers are hypothetical individuals highly exposed to CKD intake who were created for purposes of the Agency's risk characterization.

low income or minority status suggests that there might also be environmental justice issues associated with cement manufacturing facilities. The Agency is interested in receiving additional information regarding the extent to which activities such as farming (including the recreational gardening of vegetables) and fishing occur around these facilities, and in particular, whether subsistence farming and subsistence fishing exists. The Agency is also interested in learning of concerns related to environmental justice (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 cement kiln dust.

10.3 Recommendations

10.3.1 Decision Rationale and Options

Based upon the analysis of the eight study factors in RCRA §8002(o), EPA has reached some preliminary findings. Utilizing the three step procedure described in Chapter 1 of this volume (Section 1.2), EPA has arrived at tentative answers to the questions posed in its decision rationale, which are described below. The decision rationale contributed to development of the five proposed options for managing CKD waste (listed in Section 10.3.2), although the Agency has not yet made a final decision. EPA is soliciting comment on how the decision rationale can be used in the Agency's decision-making process.

Step 1: Does management of CKD pose human health and environmental problems? Might current practices cause problems in the future?

After reviewing evidence of damage to human health and the environment, performing a risk assessment, and reviewing the results of laboratory analyses of waste samples, EPA has concluded that risks associated with CKD management are generally low. There is, however, a potential under certain circumstances for CKD to pose a danger to human health and environment, and it may do so in the future.

Data collected from state files and EPA site visits identify common CKD waste management practices, including management in exposed, unlined piles, abandoned quarries, and landfills, that have caused, and may continue to cause, contamination of air and nearby surface water and ground water. Management practices such as disposal in a water-filled quarry and management in piles adjacent to grazing and agricultural fields or surface water bodies also pose a potential danger to human health and the environment. In addition, risk modeling results support the conclusion that CKD can potentially pose risks to human health and the environment under certain hypothetical, yet plausible scenarios.

Step 2: Is more stringent regulation necessary or desirable?

EPA has reached no conclusions with respect to the need for more stringent regulation. EPA's preliminary analysis of the effectiveness of state and federal regulations and controls suggests that additional controls should be evaluated; for example, controls for CKD management scenarios which potentially present high risks, if those scenarios exist. While CKD is regulated under state and local laws, the specific requirements for CKD vary from state to state. In many instances, minimal controls are applied to these wastes. Also, recycling technologies could be used as a means to improve waste management practices.

Step 3: What would be the operational and economic consequences of a decision to regulate CKD under Subtitle C?

Operational costs of CKD regulation are largely dependent on the management alternative selected. If CKD is managed as a hazardous waste under RCRA Subtitle C, facilities that manage their CKD through on-site land disposal are estimated to incur significant compliance costs. However, the financial burden of compliance, even for waste dust generated

in kilns that burn RCRA hazardous waste, may be reduced or potentially turned into net income, if facilities are able to adopt pollution prevention technologies that recycle CKD.

The possible economic outcomes of a decision to regulate CKD under RCRA Subtitle C cover a broad spectrum. An economic analysis of innovative pollution prevention technologies (including alkali leaching, flue gas desulfurization, and fluid bed dust recovery), suggests that the potentially high compliance costs of CKD land disposal may drive the industry toward more recycling of their CKD. However, at this early stage of their development, it is uncertain that these recycling technologies can be widely adopted by the industry. Moreover, even if CKD is recycled, some facilities may incur substantial disposal costs.

10.3.2 Regulatory Options

This section presents a series of options the Agency is considering concerning the management of cement kiln dust waste based on the findings of this Report. In accordance with RCRA §3001(b)(3)(C), EPA will make a regulatory determination for cement kiln dust waste after submitting this Report to Congress, holding a public hearing, and accepting and reviewing public comments.

As stated previously, cement kiln dust waste generally presents a low inherent toxicity, is only rarely characteristically hazardous, and, in most cases based on risk modeling, does not present a risk to human health and the environment. However, cement kiln dust waste may pose a potential threat to human health and the environment considering plausible worst-case conditions under certain hypothetical management scenarios (see Chapters 5 and 6). Major factors increasing the potential for human health and environmental damages include proximity to potential exposure points such as agricultural fields and surface water bodies, as well as the concentrations of key constituents of concern.

Based on the findings, and an initial evaluation of regulatory options, the Agency has not decided whether to retain or remove the CKD exemption. The Agency considered a number of options which represent a wide range of scenarios that would subject CKD to different management requirements and enforcement oversight. From these, the Agency has chosen to highlight five, including three in which CKD would be managed under Subtitle C, with the intent to focus public comment from environmental groups, industry, and other interested parties regarding the most appropriate approach to manage CKD.

EPA notes that regulations for the management of CKD waste under Subtitle C may not be warranted or appropriate if other Agency-administered programs are better suited to address the concerns identified in this report. Among the statutes that may have authority to address the indirect foodchain risks associated with CKD are the Clean Water Act (stormwater management regulations), the Clean Air Act (the program defining the National Emissions Standards for Hazardous Air Pollutants), and the Toxic Substances Control Act (which gives the Agency authority to issue appropriate regulations to address the risks from hazardous chemical substances or mixtures). In particular, when fully implemented the Agency's recently implemented stormwater control regulations could substantially mitigate damages related to the surface water pathway. These alternative authorities are being explored and a decision to pursue regulation of CKD under one or more of these statutes may form the basis for a decision that Subtitle C regulation of CKD may be limited or even unwarranted.

Whether or not the Agency lifts the exemption, dust suppression and stormwater management at facilities that burn hazardous waste, as well as on-site CKD management practices at all other facilities would be subject to current and potential future regulation under the Federal Clean Air and Clean Water Acts, and where such provisions exist, all applicable state laws and regulations. Damages at existing CKD disposal sites also could be addressed by RCRA §7003 and CERCLA §104 and §106, if the site posed an imminent and substantial danger to human health and the environment.

Option 1: Retain the CKD Exemption.

Since CKD exhibits low inherent toxicity and poses minimal risk when evaluating the various exposure pathways using average or best-case conditions, it may be appropriate to retain the exemption for cement kiln dust waste, that is, maintain the status quo. Under this option, CKD management would continue to be regulated by the states, if at all.

Option 2: Retain the CKD Exemption, but enter into discussions with the industry, in which they voluntarily implement dust recycling technologies, reduce waste, and monitor and control certain off-site uses.

Since certain management scenarios may present risks when assuming plausible worst-case conditions and pollution prevention alternatives may be promising in certain instances, the Agency could enter into discussions with the cement manufacturing industry to urge it to implement selected waste minimization/pollution prevention technologies or implement, more environmentally protective management practices, including controlling certain off-site uses.

For example, some of the potential higher risk situations that have been identified in the hypothetical scenarios relate to on-site CKD management and derive from CKD releases from waste piles or other points via wind-blown dust or stormwater run-off or a combination of the two. These contaminant release situations may be controllable (and at some facilities are currently being controlled) at relatively low cost by careful location of the waste pile and active use of conventional dust suppression and stormwater management practices. The Agency would hold discussions with the industry to encourage them to voluntarily agree to implement these practices.

An exception to the above conclusion would appear to be the 15 percent or so of cement plants where CKD waste is managed in areas of karst topography or other areas characterized by flow in fractured or cavernous bedrock, where leachate may directly percolate to ground water with little or no attenuation. For some of these facilities, the ground-water pathway may become of increased concern, depending on other site-specific considerations. Again, EPA would discuss with the industry opportunities to either use appropriate liners or relocate the CKD management unit.

About 20 percent of current net CKD generation is used off-site for a wide variety of purposes, most of which according to the Agency's risk assessment do not pose human health or other risks. However, the use of raw CKD containing higher measured levels of certain metals and/or dioxins as a direct substitute for lime on grazing fields, agricultural fields, and gardens can concentrate toxic constituents in crops and animal products at levels of concern for human health. This use of CKD, though not widely practiced at present, is otherwise not currently controlled, and may warrant further consideration by the Agency.

The Agency, under this option, could also develop guidance for states regarding site management, off-site uses, and pollution prevention and waste minimization technologies. This guidance would assist states in reducing the potential risks posed by mismanagement of CKD and recommend implementation of technologies that would promote recycling of CKD.

Under this option, CKD management would not be controlled by the provisions of RCRA Subtitle C. However, since the exemption for CKD remains in place, CKD generated in kilns that burn hazardous waste would still be subject to the two-part test for residuals under 40 CFR 266.112. If CKD does not pass the two-part test, it would be treated to standards for land disposal (40 CFR 268.43) and disposed in a Subtitle C facility. Damages at existing CKD disposal sites would still be addressed by RCRA §7003 and CERCLA §104 and §106, if the site posed an imminent and substantial danger to human health and the environment.

Option 3: Remove the CKD Exemption but delay implementation for some period of time (e.g., two years), that would allow industry time to employ pollution prevention options.

While CKD may not present risks when evaluating the various exposure pathways using average or best-case conditions, CKD may pose a potential danger to human health and the environment if managed in certain ways under a limited set of exposure pathways assuming plausible worst-case conditions. Also, damages to the environment resulting from poor CKD management practices have been recorded and are continuing to occur at some facilities. For these reasons, removing the Bevill exemption (codified at 40 CFR 261.4(b)(8)) may be appropriate. Accordingly, provisions of the Boiler and Industrial Furnace rule (40 CFR 266.112) would no longer apply to hazardous waste-derived CKD.

Under this option, on-site CKD management practices at those facilities with dust that exhibited any of the RCRA hazardous waste characteristics, or CKD derived from the burning of listed hazardous wastes (see 40 CFR 261.3(c)(2)(i)) would be affected by the provisions of RCRA Subtitle C. CKD disposal piles which are inactive on or before the effective date of the Final Rule would be unaffected by the provisions of Subtitle C, unless subsequently managed.

By delaying lifting the exemption for some period of time (e.g., two years after the Regulatory Determination), industry would be provided an opportunity to implement pollution prevention alternatives and thus, manage the hazardous waste management costs they would incur. During this interim period between submittal of the Report to Congress and the effective date of the Final Rule, the CKD exemption would still be in effect. The Agency believes that many of the affected facilities would utilize the time to adopt pollution prevention technologies which would reduce, if not eliminate the amount of hazardous CKD they generate, or stop burning hazardous waste.

Once the exemption is removed, CKD generated from cement manufacturing facilities that burn RCRA hazardous wastes would be RCRA hazardous waste under the derived-from rule (40 CFR 261.3(c)(2)(i)). The goal of avoiding Subtitle C compliance costs would provide an incentive for each facility to look for pollution prevention alternatives to recycle their CKD and reduce the amount of hazardous waste generated. The Agency is requesting additional information on the viability of the CKD recycling options discussed in the RTC and any other available pollution prevention or recycling option not considered in the Report.

Those facilities that do not burn hazardous waste would not generally be affected by removing the exemption unless they generated characteristic RCRA hazardous waste. The Agency expects the number of non-hazardous waste burning facilities affected by this option would be small, since CKD rarely exhibits a characteristic of hazardous waste. These facilities would have an incentive to control their cement manufacturing process to avoid generating characteristic CKD.

Option 4: Remove the CKD Exemption, and rely on existing hazardous waste rules to control cement kiln dust.

This option is similar to Option 3, except the exemption would be removed in accordance with RCRA §3010(b). (Under Subtitle C of RCRA, wastes brought under regulatory control have up to six months from the Regulatory Determination before they become subject to hazardous waste control.) Thus, CKD that is hazardous waste-derived or exhibits a RCRA hazardous characteristic would be made subject to the provisions of RCRA Subtitle C. Otherwise, this option is the same as Option 3.

Option 5: Promulgate Regulatory Standards for the Management of CKD Waste.

As previously stated, the Agency's analysis of the risks associated with cement kiln dust suggest that by merely lifting the exemption at 40 CFR 264.1(b)(8), certain pathways of potential concern under the hypothetical scenarios may not be adequately addressed under Options 3 and 4, should EPA decide that Subtitle C regulation is warranted for CKD in the first instance. Specifically, EPA's risk assessment indicates indirect foodchain risks are of potential concern

from releases of CKD from disposal piles to nearby surface waters and crop lands and from the direct application of CKD to croplands as a soil amendment assuming reasonable worst-case conditions. The Agency acknowledges, as discussed in detail in Chapter 6, that these modelled risks, while plausible, are of probably minimal incidence.

As described above, the likely regulatory result under Options 3 and 4 would be to make CKD generated by a kiln that burns listed hazardous wastes itself a hazardous waste under the derived-from rule (40 CFR 261.3(c)(2)(i)). The indirect foodchain risks potentially identified in this Report, however, are not associated only with CKD generated by hazardous waste burning kilns. As a result, EPA is also considering regulatory mechanisms that would specifically address these risks, including promulgating regulatory standards under Subtitle C for the management of CKD waste that would provide adequate protection against these risks.

RCRA §3001(b)(3)(C) provides that EPA shall within six months of the RTC "determine to promulgate regulations under this subchapter ... or determine that such regulations are unwarranted." The statute does not describe the type of regulation that EPA should consider promulgating (if any), other than that such regulation be under Subtitle C of RCRA. For example, RCRA does not expressly direct EPA to determine whether to list CKD as hazardous, as required for other wastes under the mandates in RCRA §3001(c). Furthermore, RCRA §2002(a) gives the Administrator the broad authority to "prescribe ... such regulations as are necessary to carry out his functions under this chapter." The Agency believes it has the authority where appropriate to promulgate federally-enforceable regulatory standards under Subtitle C for the management of CKD. EPA could explore mechanisms for imposing regulatory standards for CKD, e.g., under grant of rulemaking authority under 3001(b)(3)(C). Alternatively, EPA could consider conditioning the CKD exemption from the definition of hazardous waste (40 CFR 261.4(b)(8)) on compliance with appropriate management standards.

EPA could promulgate minimally burdensome management standards for cement kiln dust that would adequately control the indirect foodchain risks, such as: (1) requiring that dust piles be kept covered to control fugitive emissions and institute surface water run-off and erosion controls; (2) maintaining ground-water protection, perhaps by requiring that CKD piles be maintained on a non-earthen base or by requiring a liner; and (3) establishing risk-based concentration thresholds for all constituents of concern (including 2,3,7,8-TCDD, arsenic, cadmium, and lead) for CKD used as a direct soil amendment. Additional or alternative standards may be appropriate, and EPA welcomes comments and suggestions on this aspect of its options.

Of the five options being considered by the Agency, Options 3, 4, and 5 would provide more control through implementation of the provisions of Subtitle C. The principal difference between Options 3 and 4 is the timing of the implementation of the regulatory controls. Option 3 provides industry additional time to implement waste minimization/pollution prevention options and more protective CKD management standards. Option 4 would bring CKD under Subtitle C regulatory control more quickly. Removing the exemption also would impose regulatory equity between CKD generated from kilns that burn RCRA hazardous waste and residues from other incinerators that burn RCRA hazardous waste that do not have such an exemption. Option 5 would provide management standards to control all CKD, and would be targeted to specifically address only those risks of potential concern.

The Agency did not evaluate the risk from the land application of agricultural lime, so it cannot determine whether there is an increase in incremental risk when CKD is substituted. In any event, CKD-sewage sludge derived fertilizers and soil amendments are considered safe for such uses as fertilizer and pose minimal risk because these final products are required to be tested to assure they comply with all provisions of 40 CFR 503, which are fully protective of human health and the environment. It should be noted that if the exemption is removed, fertilizer that is derived from CKD generated from a kiln that burns listed hazardous waste is itself a hazardous waste under the derived-from rule (40 CFR 261.3(c)(2)(i)); the extent of regulation, however, is limited (see 40 CFR 266.20(b)).

In addition, it should also be noted that under current rules, if CKD is recycled, the resulting clinker is not automatically subject to the provisions of Subtitle C. By removing the exemption, however, clinker may be affected by the derived-from rule (40 CFR 261.3(c)(2)(i)) if the kiln burns listed hazardous waste, thereby becoming a hazardous waste. The Agency has not yet fully analyzed available data on trace constituents in clinker. Based on our understanding of current data, however, the Agency does not believe that clinker produced from kilns that burn listed hazardous waste generally poses a hazard to human health and the environment. The Agency is, therefore, considering crafting appropriate regulatory language for clinker. The Agency, however, is interested in receiving comment on this issue.

10.3.3 Next Steps

After an evaluation of public comments on this RTC, the Agency will, in accordance with RCRA §3001(b)(3)(C), reach a final Regulatory Determination on the management status of CKD within six months of submission of this Report. The Regulatory Determination requires the Agency only to determine to promulgate regulations under Subtitle C, or determine that Subtitle C is unwarranted. Thus, if RCRA §3004(x) or Option 5 is chosen, EPA would have time beyond six months to promulgate a Final Rule.

CHAPTER TEN

STUDY FINDINGS AND REGULATORY OPTIONS