## ENVIRONMENTAL PROTECTION AGENCY

### 40 CFR Part 261

**[EPA 530–Z95–003; FRL–5149–6]**

**RIN 2050–AD99**

## Regulatory Determination on Cement Kiln Dust

**AGENCY:** Environmental Protection Agency.

**ACTION:** Regulatory determination.

**SUMMARY:** Today's action presents the Environmental Protection Agency's (EPA) regulatory determination on cement kiln dust (CKD) waste. This action is required by the Resource Conservation and Recovery Act (RCRA). EPA has concluded that additional control of CKD is warranted in order to protect the public from human health risks and to prevent environmental damage resulting from current disposal of this waste. The primary environmental concerns to be addressed through additional controls are documented damages to ground water and potable water supplies, and potential human health risks from inhalation of airborne CKD and ingestion via food chain pathways. The Agency has decided to take a common sense approach in imposing such controls. In order to avoid duplication among regulatory programs, the Agency will use, as appropriate, its various authorities under the Clean Air Act, Clean Water Act, and RCRA to address the relevant pathways of potential contaminant releases from CKD.

Under Subtitle C of RCRA, the Agency will develop a tailored set of standards for CKD that controls releases to ground water. The tailored standards will protect human health and the environment, while imposing a minimal burden on the regulated community. Until the tailored regulations are published by the Agency, CKD will retain the Bevill exemption and the status of CKD under RCRA Subtitle C will remain unchanged. Those cement manufacturing facilities that burn RCRA hazardous waste in their kilns will still be required to test their CKD to see that it remains unaffected by the combustion of hazardous waste.

EPA has not included an evaluation of clinker or other products or by-products of cement production in this regulatory determination. In the absence of the CKD regulatory exemption, under certain regulatory scenarios clinker produced from re-introduced CKD could be considered a hazardous waste. However, as part of the regulations that EPA will promulgate as a result of today's determination, EPA intends to exclude clinker from regulation as a derived-from hazardous waste when CKD is re-introduced. At this time, EPA has no indication that such clinker poses an unacceptable threat to human health or the environment.

**ADDRESSES:** Copies of this regulatory determination and the supporting record docket are available for public inspection and copying at the RCRA docket, 401 M Street, SW., Washington, DC, Room M2616, 2nd floor, Waterside Mall. The docket number for this action is F–94–RCKD–FFFFF. The docket is open from 9 to 4 p.m., Monday through Friday, except federal holidays. In order to access the docket, please call (202) 260–9327 to make an appointment. Copies are free up to 100 pages and thereafter cost $0.15/page.

This document and the Response to Public Comments document are also available on the EPA's Clean-up Information Bulletin Board (CLU–IN). To access CLU–IN with a modem of up to 28,800 baud, dial (301) 589–8366. First-time users will be asked to input some initial registration information. Next, select ''D'' (download) from the main menu. Input the file name ''CKD6.ZIP'' to download this notice. Input the file names ''CKD7.ZIP'' and ''CKD8.ZIP'' to download the two files that contain the two response to public comments documents. Follow the on-line instructions to complete the download. More information about the download procedure is located in Bulletin 104; to read this bulletin type ''B 104'' from the main menu. For additional help with these instructions, telephone the CLU–IN help line at (301) 589–8368.

**FOR FURTHER INFORMATION CONTACT:** For general information, contact the RCRA/Superfund Hotline at (800) 424–9346 or (703) 412–9810; for technical information contact Bill Schoenborn, U.S. Environmental Protection Agency (5302W), 401 M Street SW., Washington, DC 20460, at (703) 308–8483.

**SUPPLEMENTARY INFORMATION:**

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## I. Background

### *A. Statutory Authority*

EPA is issuing today's notice under the authority of section 3001(b)(3)(C) of the Resource Conservation and Recovery Act (RCRA), as amended. This section requires that, after completing the Report to Congress (RTC) mandated by section 8002(o) of RCRA, the EPA Administrator must determine whether Subtitle C regulation of CKD waste is warranted. The RTC documents EPA's study of CKD. It was signed by the Administrator on December 30, 1993.

### *B. Public Comment Process*

After submitting the RTC to Congress, EPA provided the public with an opportunity to comment on the report and the appropriateness of regulating CKD under RCRA Subtitle C (59 FR 709, 1/6/94). The public comment period lasted until February 22, 1994 (59 FR 709, 1/6/94). Due to numerous requests to lengthen the comment period, EPA extended the comment period to March 8, 1994 (59 FR 6640, 2/11/94). To ensure that all interested parties had an opportunity to present their views, EPA not only held a public hearing in Washington, DC, but also held a series of public meetings with representatives of the cement industry, the hazardous waste treatment industry, regional and state environmental authorities, and citizen groups.

EPA received approximately 1,100 written comments, 18 videotapes, and a number of photographs prior to the close of the RTC comment period. All individual comments and a transcript from the public hearing are available for public inspection in the RTC docket (Docket No. F–94–RCKA–FFFFF). The docket also contains a summary of all the comments presented at the public

meetings and public hearing, as well as those submitted in writing.

To supplement the information included in the CKD RTC, the Agency analyzed the public comments and undertook several additional data collection and analysis efforts. The new data generated by EPA were placed into the RCRA docket for public inspection and comment and a Notice of Data Availability (NODA) was published in the September 14, 1994, **Federal Register** (59 FR 47133). The Agency provided a 30-day comment period for review of the new data and analyses. The principal new documents placed in the docket addressed the following issues: Additional CKD damage cases; environmental justice; analysis of CKD generation and characteristics data; costs of CKD management alternatives; and human health and environmental risks posed by CKD management.

Subsequent to issuing the NODA, EPA identified certain errors and, in a supplemental errata document, corrected certain portions of the new data pertinent to additional assessments of potential risk from CKD waste. EPA published a correction Notice on October 11, 1994 (59 FR 51440) that identified the corrections and provided a public comment period on the corrected materials until November 10, 1994.

In preparing both of these Notices, the Agency made a special effort to make the data accessible to the public. In addition to placing this information in the RCRA docket, the Agency posted data files in electronic format on EPA's Superfund electronic bulletin board (CLU–IN) and made these data available on disk upon request.

Today's decision is based on the RTC and the data and analyses that underlie the report, as well as on public comments received during the public hearing and public meetings, or in written form submitted during the comment periods, and EPA analyses of these comments.

### *C. Stakeholder Comments*

The Agency received over 1,100 public comments on the RTC on Cement Kiln Dust and subsequent Technical Background Documents from individual companies and trade organizations representing the cement industry and their affiliated consultants, suppliers, and waste fuel blenders; individual companies and trade groups representing the hazardous waste incineration industry, and their associated consultants; other companies that handle CKD; public interest groups; and private citizens.

Comments were received on a wide variety of topics discussed in the RTC and NODA including cement production and CKD generation and characteristics; current and alternative CKD management practices; documented damage and potential danger to human health and the environment; existing regulatory controls on CKD management; and cost and economic impacts of alternatives to current CKD disposal practices. The following is a brief summary of the major positions presented in the public comments. (A detailed response to all of the comments is included in two background documents that are identified below.)

Companies and groups representing the cement manufacturing industry generally stated that CKD exhibits low inherent toxicity and poses minimal risk to human health and the environment. They argued for continued management of CKD using existing Federal and State authorities, and urged the Agency to work with the cement industry to develop voluntary standards for the management of all CKD.

Commenters from companies that handle CKD stated that CKD has numerous beneficial uses (e.g., as a liming agent or sewage sludge stabilizer) which would be detrimentally affected by regulation of CKD as a hazardous waste.

Companies and groups representing the hazardous waste treatment industry generally argued for an aggressive regulatory determination for CKD. These commenters generally favored removing the exemption and immediately imposing hazardous waste regulations for the management of CKD, especially dust from kilns that burn hazardous waste.

Public interest groups generally stated that current industry management of CKD from kilns that burn hazardous waste causes chronic human health problems and extensive environmental damages, including degraded water and air quality, affecting local residents around cement manufacturing facilities. These commenters generally argued for immediate adoption of hazardous waste regulations for CKD generated from hazardous waste-burning kilns.

Most of the comments from public citizens were from residents living around cement manufacturing facilities, and the commenters were divided in their position on CKD. Some commenters expressed concern over potential loss of jobs at plants in their communities if CKD is regulated as a hazardous waste. Others commenters, generally residents who live around cement plants that burn hazardous waste, stated that releases of CKD from plants in their communities are a visual nuisance, degrade the air and vegetation, and cause health problems for themselves and their neighbors.

EPA has carefully reviewed all comments in arriving at today's final determination. The Agency has prepared a detailed summary of comments received, along with responses, in two background documents that are available for viewing in the RCRA docket. The first document, titled *Summary of and Responses to Comments on the Report to Congress,* presents the public comments and the Agency's response to these comments on the *Report to Congress on Cement Kiln Dust;* the second document, titled *Summary of and Responses to Comments on the Notice of Data Availability,* presents the public comments and the Agency's response to the material announced in the NODA.

## II. Major Findings of the RTC and NODA

In this section, EPA briefly restates some of the basic technical findings presented in the RTC, as well as new insights presented in the technical background documents announced in the NODA. These findings are generally presented in categories that correspond to the study factors listed in RCRA section 8002(o).

### *A. Sources and Volumes of Waste*

Information received by the Agency since publication of the RTC (in comments and from additional research) suggests that, as of 1992, the domestic cement industry consisted of 111 plants operated by 46 companies. The five largest cement clinker producing states are California, Texas, Pennsylvania, Missouri, and Michigan. The cement industry burns large amounts of high Btu fuels, primarily coal and other fossil fuels, during the manufacturing process. In 1990 and in 1992, 23 facilities also burned hazardous waste as fuels.

Based on an analysis of existing data, including data collected by the Portland Cement Association and separately by EPA under RCRA section 3007 authority from operators of cement manufacturing facilities, the Agency has determined that, nationally, cement plants generate large quantities of CKD. In particular, EPA has estimated that 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 and plants in the amount of gross CKD generated per ton of clinker.

In addition, there are also wide variations among kilns and plants in the amount of net CKD (i.e., CKD that is either disposed or used beneficially off-site) that is generated. For example, 25 percent of the facilities produce essentially no net CKD, while 10 plants (about 10 percent of the population) generate 40 percent of all net CKD.

Finally, the Agency also found that the burning of hazardous waste is correlated with the volume of dust that is actually disposed. 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. Regression modeling conducted by EPA for the NODA analyses showed a consistent, statistically significant association between hazardous waste fuel burning in cement kilns and increased CKD generation on a gross, net, and disposed basis. EPA's work does not establish the cause of this statistical relationship between hazardous waste fuel burning and CKD generation. The Agency, however, believes that increased CKD generation is maybe due either to the burning of hazardous waste, or to some other plant-specific operating factors such as the composition of the raw material feed.

*B. Current and Alternative CKD Management Practices*

Most of the gross CKD—8.2 million metric tons, or 64 percent—was recycled directly back into the kiln or raw feed system in 1990. For that portion of CKD that is disposed, standard industry practice is to place it in piles, quarries, or landfills, most of which are unlined and uncovered. Some active piles are also managed underwater or adjacent to surface water and/or agricultural lands. Although most CKD removed from the kiln system is disposed on-site, some is sold for off-site beneficial use. For example, in 1990, about 7 percent of CKD generated (897,000 metric tons) was sold for off-site use, most of it as a waste stabilizer, liming agent, or materials additive.

Cost-effective opportunities may exist, however, to further reduce the amount of CKD that is disposed 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. In addition, the Agency has received some evidence, in comments from cement companies, that raw material substitution may be a highly effective means of increasing CKD recycling rates. This may be done by controlling the input of contaminants (in raw materials and fuels) to the kiln system, thereby reducing or eliminating the need to purge the kiln system of contaminants by removing larger volumes of CKD from the system.

*C. Existing Regulatory Controls*

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). Regulations developed under authority of the CAA and CWA impose controls on releases of CKD to the air (via stack or fugitive dust emissions, 40 CFR Part 50) and water (National Pollution Discharge Elimination System (NPDES), 40 CFR Part 122, point source effluent discharges, and 40 CFR Part 411, effluent guidelines for cement manufacturing facilities), respectively. Under both RCRA and CERCLA, the Federal government can respond where the release of CKD or its constituents may present an imminent and substantial danger to human health or the environment. CKD that is not directly recycled is also subject to regulation under Subtitle D of RCRA as a solid waste. In addition, CKD generating facilities that burn RCRA hazardous waste in kilns are subject to the RCRA Boiler and Industrial Furnace (BIF) rule (40 CFR part 266) and other RCRA requirements if the CKD from that combustion is ''significantly affected'' by the hazardous waste fuel. See 40 CFR 266.112.

For states with the highest cement production capacity (California, Michigan, Pennsylvania, and Texas), the Agency has found that CKD waste is subject to some regulation 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 and other cementitious materials. 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.[1]

*D. Waste Characteristics*

While CKD itself does not exhibit the RCRA Subtitle C hazardous waste characteristic of corrosivity (40 CFR 261.22)[2], EPA's data show that mixtures of CKD and water often exhibit the characteristic of corrosivity. In particular, runoff from precipitation that contacts CKD storage and waste piles generates considerable volumes of wastewater. EPA data show that the pH level in such precipitation runoff typically exceeds 12.5 standard units, the standard for the corrosivity characteristic for hazardous wastes (40 CFR 261.22).

In addition, EPA's analyses of CKD show that CKD does contain certain metals listed in Appendix 8 (''Hazardous Constituents'') part 261 of RCRA. Table 1 presents the range of total concentration levels for a number of other toxic metals EPA has observed in CKD.

TABLE 1.—Measured Metals Levels in CKD[1]

[Mg/kg (parts per million), total basis]

| Metal | No. of samples | Min. | Mean | Max. |
|---|---|---|---|---|
| Antimony | 52 | 0.09 | 11.5 | 102 |
| Arsenic | 60 | 0.26 | 14.1 | 80.7 |
| Barium | 59 | 0.43 | 181 | 900 |
| Beryllium | 53 | 0.1 | 1.03 | 6.2 |

[1] Texas is in the process of developing on-site management standards for cement kiln dust and expects to propose them in 1995.

[2] EPA hazardous waste identification rules do not include a characteristic or definition for solid corrosives.

TABLE 1.—Measured Metals Levels in CKD [1]—Continued

[Mg/kg (parts per million), total basis]

| Metal | No. of samples | Min. | Mean | Max. |
|---|---|---|---|---|
| Cadmium | 61 | 0.065 | 9.7 | 44.9 |
| Chromium | 61 | 3.9 | 31.2 | 105 |
| Lead [2] | 63 | 3.1 | 287 | 2,620 |
| Mercury | 57 | 0.003 | 0.33 | 2.9 |
| Nickel | 45 | 3 | 19.9 | 55 |
| Selenium | 52 | 0.1 | 12.2 | 103 |
| Silver | 56 | 0.25 | 5.9 | 40.7 |
| Thallium | 57 | 0.44 | 33.6 | 450 |

[1] Metals data sources include 1992 APCA survey, EPA sampling data, and public comments on the RTC.
[2] The median value for lead is 113 mg/kg.

For many of the toxic metals, the concentrations detected in kiln dust were not significantly different whether the dust is generated from kilns that burn or do not burn hazardous waste. However, for lead, cadmium, and chromium, the mean concentration found in CKD generated by kilns that burn hazardous waste is measurably higher than in CKD from those kilns that do not burn hazardous waste; conversely, thallium and barium concentrations are measurably higher in CKD from kilns that do not burn hazardous waste.[3] [4]

With respect to organics, volatile and semi-volatile compounds were generally not found in CKD. However, levels of 2,3,7,8-substituted dioxin, and 2,3,7,8-substituted dibenzofuran were detected, although the concentrations were generally low—ranging from 0.5 to 20 ppt for dioxin and non-detected to 470 ppt for furan. The calculated 2,3,7,8–TCDD TEQ values for the facilities sampled by EPA ranged from non-detected to 9 ppt.

**Note:** EPA sampling data for one cement plant reported a total dioxins concentration in CKD as high as 16 ppb, with a TEQ value for the managed CKD of 195 ppt. The total dioxins level measured for this plant were at least 2½ times higher than those found at any of the other plants sampled by EPA.

In terms of potential constituent solubility and release, leach test results show that no significant distinction can be made between CKD generated from kilns that burn hazardous waste and those that do not burn hazardous waste. (This finding was corroborated for metals 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.[5]

*E. Documented Evidence of Damage*

Migration of potentially hazardous constituents, including metals, has occurred from CKD waste sites. In the RTC and subsequent NODA, EPA identified 14 cases of damage (10 documented and 4 potential) to surface water and ground water and 36 cases of documented damage to air from CKD waste.[6] By damage, the Agency means that metal constituents have contaminated ground water and/or surface water, and/or air above a federal or state standard (e.g., a maximum concentration limit). Constituents of concern that have been 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 variable, going as high as two orders of magnitude above the standard. 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 affected. For example, excessive discharges 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 documented. However, most of the documented surface water damage cases occurred prior to 1991, which was before implementation of NPDES general stormwater permits.

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 for which data were available, files contained information on releases, but little human exposure data. Significantly, releases to ground water were observed at all sites for which EPA has received ground water monitoring data; if there had been additional ground water monitoring data from other sites, further evidence of leaching and contamination would likely have been found. While the Agency has no documented data on contaminant transport off-site, or documented data on human exposure and risk at the point of drinking water use, this is because the drinking water wells at these sites are currently located far enough away, and/or tap aquifers are isolated enough, to be unlikely to intersect contaminated ground water. To the extent that wells would be drilled closer to the sites or the contamination spreads, there is potential that the wells would tap CKD-contaminated ground water. 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 cited as primarily due to mechanical failure of dust handling equipment.

[3] The differences cited are those discernible at a 95 percent confidence level.

[4] While lead, cadmium, and chromium were observed to be higher in CKD from facilities that burn hazardous waste, generally the difference in mean constituent concentrations by themselves are not enough (i.e., do not differ by more than a factor of about 2) to result in discernible risk estimates between facilities that do and do not burn hazardous waste, after considering other site-specific factors affecting exposure (e.g., proximity of exposure points, topography). The concentrations of barium, chromium, and nickel in CKD are within the typical range found in U.S. soils.

[5] A separate issue raised by commenters is whether the TCLP adequately depicts the potential for metals to leach from CKD. See the background document to this Notice entitled *Summary of and Response to Comments on the Report to Congress* in the RCRA docket for a discussion of this issue.

[6] EPA received many comments on the specific damage cases described in both the RTC and subsequent NODA. Based on review of the damage cases, except for only one reassessment, the Agency believes the information received does not contradict the Agency's basic conclusions regarding any of the damage cases.

*F. Potential Risks to Human Health and the Environment*

Based on an extensive data base compiled from industry sources, Agency field visits, RCRA section 3007 information requests, information submitted in comments, literature reviews, and other public sources, the Agency conducted a series of risk screening and site-specific risk modeling studies to evaluate potential risks from on-site management and off-site uses of CKD. Methodologies and results of these studies were documented in Chapter 6 of the RTC and its related technical background document and in two subsequent EPA technical background documents titled Human Health and Environmental Risk Assessment in Support of the Regulatory Determination on Cement Kiln Dust (August 31, 1994) and Supplemental Errata Document for the Technical Background Document for the Notice of Data Availability on Cement Kiln Dust (September 30, 1994). Principal findings from these studies include the following:

- Among a sample of 83 plants for which EPA had sufficient data to conduct a site-specific risk screening evaluation for metals in CKD, the Agency predicted only low or negligible risk potential from on-site management of CKD via conventional direct pathways of constituent transport and exposure (drinking water, incidental direct ingestion, chemical inhalation) via ground water contamination, surface water runoff to streams or lakes, or windblown dust. However, there are three principal and important qualifications to these direct pathway findings:
- As noted above, EPA has found empirical evidence of ground water contamination near the management unit at each cement manufacturing facility where ground water quality data exist; these sites are located in both areas of karst and non-karst terrain.
- According to U.S. Geological Survey maps and other sources, about half of all cement plant sites are underlain by limestone formations in areas of karst landscape. These limestone formations may have fissures caused by rock dissolution along joints or bedding planes with hydraulic characteristics that allow leachate to directly enter ground water aquifers without substantial dilution or attenuation. Available ground water pathway modeling techniques are not applicable under these conditions. This does not necessarily mean that ground water contamination will occur at these cement plants (although that would be consistent with some of the damage cases); however, it should be regarded as a significant qualification to the general findings of low or negligible risk from the ground water pathway risk modeling results.
- In its follow-up work leading to the NODA, EPA did find evidence of possible risk to human health due to the fine particulate nature of inhaled dust. Although the Agency's direct inhalation exposure modeling studies described in the RTC did not indicate significant risk from inhaled chemical constituents in CKD, subsequent screening-level modeling on a small number of plants did indicate that windblown dust from uncontrolled CKD waste management units could exceed EPA's health-based fine particulate (10 micron or less) National Ambient Air Quality Standard (NAAQS) at plant boundaries, and potentially at nearby residences. Results from a more recent extension of this work to a larger sample of 52 cement plants suggest that 28 of the plants could exceed NAAQS standards at plant boundaries, if the plants do not have effective dust control mechanisms.[7] Although quantitative risks presently can not be estimated, these initial modeling results relating to fine particulates suggest cause for concern and argue for further attention to this source of fugitive dust.
- The Agency also modeled health risks via indirect food-chain pathways (i.e., risks from ingestion of crop or livestock products or fish containing CKD-derived chemical contaminants). These contaminants reach the food chain as part of storm water run-off and/or wind erosion from uncontrolled CKD storage or disposal areas to nearby water bodies and farm fields. The Agency's indirect pathway methodology is relatively new, complex, and still under refinement and peer review. Therefore, the reported results must be regarded as preliminary and subject to substantial uncertainties. However, the methodology represents the best available approach for evaluating these potential risk pathways of interest.

EPA's indirect food chain risk modeling estimated that potential individual cancer risks in the $1\times10^{-5}$ (1 in 100,000) to $1\times10^{-3}$ (1 in 1,000) range to highly exposed subsistence farmers and subsistence fishers from CKD metals (principally arsenic) could occur at about 12 percent of the 83 cement plants studied. Similar risk levels due to dioxins are also possible at some additional sites, although the Agency's data base on dioxin concentrations in CKD was not extensive enough to conduct a similar large sample study. In addition, about 18 percent of the plants (mostly the same plants with the higher estimates for cancer risks) were estimated to have potential non-cancer hazard ratios greater than 0.1 for highly exposed potential farmer/fisher individuals. That is, they would contribute enough of a toxic metal such as cadmium, chromium, or thallium through a possible food source (fish, vegetable, or beef and milk source) to equal one-tenth of a subsistence individual's allowable health-based-standard intake from all sources. In a few instances, a toxic metal food chain exposure was estimated to exceed a non-cancer health based standard by more than a factor of 100. Preliminary analysis presented in the September 1994 technical background document also suggested possibilities for elevation of blood lead levels in children living near uncontrolled CKD piles, due to food chain exposures.

These indirect pathway risk estimates are based on current standard Agency methods to account for toxic metals and dioxins to be bio-concentrated in plant and animal components of foods for human consumption. The Agency did not have direct data on local food consumption patterns for backyard gardeners, subsistence farmers, or recreational or subsistence fishermen in areas of potential exposure. In this instance, standard Agency assumptions (as documented in the RTC and background document) regarding consumption rates of home-grown beef, dairy products, vegetables and family-caught fish were used to estimate exposures to these potentially affected consumers.

The particular sites selected for indirect pathway analysis from among the 83 plants in EPA's study were carefully screened with respect to the potential for CKD releases from currently active piles and exposures via land, air, and surface water pathways. Proximity to nearby streams or lakes (for possible risk via fish ingestion) and distance to actual farm fields and rural dwellings likely to have gardens (for potential exposures from home grown vegetables and/or beef and milk) were determined from a variety of sources, including company-provided maps, U.S. Geological Survey maps, and aerial photographs.

[7] Documentation and detailed results of five case study facilities are documented in the technical background document for the NODA on human health and environmental risk assessment (see 59 FR 47133). The documentation and detailed results of the more recent work are presented in the Technical Background Document on Potential Risks from Cement Kiln Dust in support of the Cement Kiln Dust Regulatory Determination, January, 1995. This document is located in the RCRA docket No. F–95–RCKD–FFFFF.

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 $1\times10^{-4}$ (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.[8] 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 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

[8] 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.

require more extensive ground water protection measures.

In addition to these two lower-cost versions of a possible Subtitle C land management option, the cement industry suggested, in public comment, a ''voluntary contingent management practice'' proposal, that was estimated by industry representatives to cost between $5 and $14 per ton of CKD at various plants and to average about $10 per ton. Although EPA has not been able to confirm these estimates, this land disposal technology would, using the industry's cost figures, require an average industry-wide compliance cost of about one percent of gross cement sales.

Though by no means negligible, costs averaging one per cent of sales would not imply the dire consequences for the industry that would be suggested by the full Subtitle C regulatory scenario.

In addition, cost effective dust reduction and reclamation options remain a possibility under any of the regulatory scenarios discussed. Industry representatives in public comment have challenged the efficacy and cost effectiveness of these waste reduction and recovery options. Nevertheless, operational prototypes do exist and technologies such as the Passamaquoddy flue-gas scrubber and alkali leaching (both described in Chapter 8 of the RTC) do show benefits in stack gas pollution control and/or by-product sales to help offset capital and operating costs, as well as reducing basic raw material requirements. Further examination of the economics of the Passamaquoddy recovery scrubber, as reported in the September NODA document, indicated that prospective unit costs for plants with lower CKD quantities would be higher than originally estimated in the RTC. However, otherwise, the Agency continues to believe that this and other alternatives can potentially serve as technically and economically viable options to land disposal of CKD, at least for some plants.

*I. Regulatory Options*

Based on the findings of the RTC, the Agency considered a number of options for the management of CKD. These options represent a range of requirements for management of CKD waste. From these, the Agency chose to highlight five specific options, including three in which CKD would be managed under RCRA Subtitle C. (For more detail on the options, see 59 FR 709, 1/6/94.) The specific options are:

Option 1: Retain the CKD exemption.

Option 2: Retain the CKD exemption, but the Agency would enter into voluntary agreements with the industry whereby they would implement dust recycling technologies, reduce waste, and monitor and control CKD management and use.

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 measures.

Option 4: Remove the CKD exemption, and implement the compliance measures within six months.

Option 5: Promulgate tailored regulatory standards for the management of CKD waste under Subtitle C of RCRA.

In presenting this list of options, the Agency noted that control of CKD under Subtitle C may not be warranted or appropriate if other statutes administered by EPA (such as the Clean Water Act, Clean Air Act, or Toxic Substances Control Act) are better suited to address the concerns identified in the RTC. The Agency indicated that these statutes were also being considered in the Agency's decision to either retain or remove the CKD exemption.

## III. Applying the Decision Rationale in Making the Regulatory Determination

In its decision making process, the Agency's approach was the same as for previous special waste determinations [9]. As explained in the RTC, the study factors were evaluated in a step-wise sequence to arrive at a decision. This approach allows EPA to make a systematic evaluation of the information presented in the RTC, the notices, and in all public comments. The Agency has carefully evaluated all comments received in making its decision. (All of the comments received on the RTC, the NODA, and the correction notice are addressed in the background documents titled *Analysis of and Responses to Comments on the Report to Congress on Cement Kiln Dust and Analysis of and Consolidated Responses to Comments on the Notice of Data Availability*, which are available in the RCRA docket.)

The Agency considers its step-wise methodology to be consistent with Congressional intent that EPA consider all the study factors listed in RCRA section 8002(o). In addition, EPA received no substantive comments on the RTC that disagreed with any aspect of its decision methodology. Therefore, no changes have been made in the approach.

The step-wise process that the Agency applied to the available information is presented below.

*A. Step 1: Does Management of CKD Pose Human Health and Environmental Problems? Might Current Practices Cause Problems in the Future?*

The initial component of the Agency's decision making process is to determine whether CKD either has or may adversely impact human health or the environment. To resolve these issues, EPA has posed the following key questions:

Substep 1. Has CKD as Currently Managed, Caused Documented Human Health Impacts or Environmental Damage?

The Agency has determined that CKD has caused documented impacts (and may continue to cause impacts) at levels of concern. As explained in the RTC, danger to human health and the environment is defined to include various effects associated with the management of CKD, including acute and chronic human health effects, significant impairment of natural resources (e.g., contamination of a source of drinking water), degradation of natural ecosystems and habitats, and detrimental impacts to terrestrial or aquatic fauna. A case is considered proven if damages are documented as part of a scientific investigation, administrative ruling, or court decision. In its examination of cases of damage to human health and the environment, the Agency identified fourteen cases of ground water and/or surface water contamination (10 documented and 4 potential), including two sites that are listed on the CERCLA (Superfund) National Priorities List (NPL). In each case, there is information available to indicate that on-site surface water and/or ground water has been affected by CKD management units. Typical impacts include elevated pH, total dissolved solids, and sulfate above secondary federal or state concentration limits as well as elevated levels of certain potentially toxic metals such as arsenic, cadmium, chromium, and lead that are above primary drinking water MCLs.

One of the NPL sites with ground water damage is in an area of karst terrain. The RTC described a release at this site of contaminants to ground and surface water through a ''blowout'' (i.e., sudden discharge) into a nearby creek that resulted in increased turbidity and an abrupt decline in stream biota

[9] For a discussion of EPA's approach in combining the RCRA study factors, see the discussion of the Agency's approach in the Final Regulatory Determination and Final Rule for Special Wastes From Mineral Processing (56 FR 27300, June 13, 1991).

downstream of the release. An investigation by the facility showed waste kiln dust to be the original source of contamination. Since the site is in an area of karst terrain, it is both logical and reasonable to believe that the waste dust rapidly migrated through discrete channels in the bedrock, with minimal attenuation, to the point of the blowout. The fact that this occurred at the site suggests EPA's MMSOILS ground water model is not suitable for karst type terrain, since the model assumes ground water migration through bedrock that is uniformly porous, and lacks discrete channels.

Of particular concern to the Agency is the extent of documented contamination of ground water. Even though limited information exists on ground water contamination due to a lack of monitoring programs at most sites, each case with available information on ground water shows contamination at levels of concern. Only 17% of all cement manufacturing facilities have ground water monitoring systems around their dust management units. These plants are considered to be representative of the industry. Thus, the Agency considers it likely that more damages exist, even though it did not conduct a detailed investigation of ground water beneath all CKD waste management units.

Environmental damages can also be attributed to particulate emissions of CKD from quarries, haul roads, and CKD handling equipment (screws, conveyors, and trucks), and are traceable to kilns that do and do not burn hazardous waste. Several commenters on the RTC indicated that air dispersion of CKD was a significant source of pollution to local residents living around cement manufacturing facilities. In addition, the RTC identified numerous citizen complaints of excessive particulate matter from cement plant operations collecting on cars, lawns, gardens, chairs, and other personal property of area residents. While developing the RTC, the Agency reviewed numerous letters in state files from residents living near cement kilns who complained of fugitive dust emissions (which may be due to release of CKD from plant operations and/or dust disposal piles). Although the Agency recognizes that dust from mining and quarry operations could contribute to the particulate emissions from a cement plant, other evidence (i.e., damage cases) indicates that fugitive CKD emissions are a substantial contributor to environmental damages in the form of air quality degradation.

Substep 2. Does EPA's Analysis Indicate That CKD Could Pose Significant Risk to Human Health or the Environment At Any of the Sites that Generate It (or In Off-Site Use), Under Either Current Management Practices or Plausible Management Scenarios?

The Agency's analysis indicates that there are potential risks warranting concern, from both current on-site management practices and certain off-site beneficial uses. In the RTC and NODA documents, the Agency reported on plant-specific risk screening and quantitative risk modeling conducted to evaluate potential risks from current and plausible future management of CKD. As summarized in the findings above, current on-site land management practices appear generally to pose relatively low risks to human health via direct pathways of contaminant transport and exposure.

However, with respect to possible ground water contamination, a large percentage of cement plants (and CKD management units at those cement plants) are located in areas of karst terrain, many of which may be underlain by bedrock with hydrological characteristics conducive to relatively direct leachate transport to off-site locations. In karst aquifers, contaminants can potentially migrate long distances through open conduits with little of the filtration, adsorption, and dispersion that are typical of contaminant dispersal in porous bedrock.

In addition, modeling of windblown dust from CKD management areas suggests that dust piles, when uncontrolled (i.e., uncovered and dry), may typically release sufficient quantities of fine particulates to exceed health-based National Ambient Air Quality Standards (NAAQS) at plant boundaries, and sometimes as far away as nearby residences.

The Agency's quantitative modeling of ''indirect'' food chain pathways, both aquatic and agricultural, indicates potential human health effects, both cancer and non-cancer. A wide range of chemical constituents, including arsenic, cadmium, chromium, barium, thallium, lead, and dioxins, were indicated as constituents of concern at various plants. Because some CKD disposal units are located near, and in some instances immediately adjacent to, farm fields, rural residences with gardens, or surface waters containing fish, there is potential for indirect risk from the consumption of CKD-contaminated beef, vegetables and fish, as well as ingestion of CKD-contaminated water during recreational swimming.

Although limited by available data and assessment methodology, the Agency's risk assessment studies also indicated potentials for adverse aquatic ecological effects due to possible chemical releases to streams and lakes adjacent to some cement plants. Aquatic ecological damages due to siltation and sedimentation were not specifically studied in the risk assessment, but were observed in field visits and reported as a problem in damage case documents and in public comments.

The Agency's risk assessment for off-site beneficial uses of CKD indicated that, except for direct application as a lime/fertilizer substitute, most off-site uses do not pose significant risks. Direct cropland application, however, occurs at a number of locations in the country and is essentially unregulated at the state and federal levels. Analysis suggests that, at plausible application rates, CKD that contain sufficiently high concentrations of arsenic or other metals or dioxins (as documented in the Agency's CKD constituent data base), could cause food chain risks of concern that may warrant some type of regulation for these off-site uses.

Substep 3. Does CKD Exhibit Any of the Characteristics of Hazardous Waste?

Although all of the toxicity characteristic (TC) metals (arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver) were detected in CKD, CKD exhibits the toxicity characteristic infrequently, and only for certain metals. This is based analysis of the CKD analytical data available to the Agency. Although CKD itself is not corrosive under EPA's rules because it is a solid, water-CKD mixtures are highly alkaline. Data presented in the RTC indicate that the pH of CKD leachates (using standard EPA leach test procedures) are typically between 11 and 13 standard units. In addition, the elevated pH of a CKD-water mixture is a prominent factor in 10 out of 14 cases of damage (documented and potential) to surface water and/or ground water. In six of these cases, including the ground water damages described for the two plants listed on the NPL, CKD-water mixtures are reported to have a pH exceeding the EPA standard of 12.5 for corrosive hazardous waste (40 CFR 261.22).

The results of Step 1 of the decision process indicate that CKD has posed and may continue to pose risks to human health and the environment under plausible management scenarios. Releases have occurred and may continue to occur as a result of current

management practices (e.g., management of CKD in unlined, uncovered piles near shallow ground water and surface water bodies), posing risk to human health and the environment.

*B. Step 2: Is More Stringent Regulation Necessary and Desirable?*

EPA evaluated State and Federal regulations pertaining to CKD waste. The Agency has determined that the answer to this question is yes, more stringent regulation of CKD is necessary and desirable.

Substep 1. Are Current Practices Adequate to Limit Contaminant Release and Associated Risk?

The Agency has determined that current practices are inadequate to limit contaminant releases and associated risks. CKD is now managed primarily on-site in non-engineered landfills, piles, and ponds. Many piles and landfills lack liners, leachate controls, or run-on/run-off collection systems. In addition, while dust suppression measures exist at many facilities, it appears that they are generally ineffective at controlling airborne releases of CKD.

Substep 2. Are Current Federal and State Regulatory Controls Adequate to Address the Management of CKD?

The Agency has determined that Federal and State regulatory controls need to be improved for the proper management of CKD. Some existing regulations do apply to CKD piles, but are rarely tailored to the cement industry. In addition, problems with repeated releases of CKD to the environment suggest that implementation of existing regulations is uneven.

The Agency has analyzed the application of regulations and standards under the Clean Air Act (CAA) for cement manufacturing facilities. Implementation of the CAA requirements varies from State to State. In addition to the baseline Federal requirements,[10] each of the four States studied in the RTC selectively implements more stringent standards on a case-by-case basis. For example, California regulates two more pollutants than required under the NAAQS. Pennsylvania has fugitive dust controls as a permit condition and discourages the open storage of CKD.

The Agency believes that there are adequate existing authorities in the Clean Air Act to address risks via the air pathway posed by the management of CKD. However, there appears to be a need for increased regulation and implementation under the Clean Air Act. The Agency has information that indicates releases of particulate emissions at cement plants are common, persistent, and continuing. The RTC documents 21 incidents of CKD releases at 13 facilities. With the exception of one case that involved fugitive dust emissions from a CKD pile, all cases involved visible emissions violations (opacity) related to equipment malfunctions associated with CKD handling equipment (kilns, baghouses, screw conveyors)[11]. In addition, persistent releases of CKD are documented in the Agency's NODA for one facility in Pennsylvania. This facility was cited for 16 air emissions violations between March 1983 and June 1989. Also, significant releases of airborne particulates at other facilities were frequently observed first-hand by Agency staff during the course of this study[12].

Numeric standards for point source discharges of wastewater from cement facilities have been established under the Clean Water Act, and are administered through the NPDES permit program (40 CFR part 122) along with industry-tailored effluent limitations for runoff from materials storage piles (40 CFR part 411). Indirect discharges via publicly owned treatment works (POTWs) are subject to general pretreatment standards under 40 CFR part 403. Wastewater discharges from individual facilities may also be subject to state water quality standards and state or local effluent discharge standards.

In addition, EPA proposed a multi-sector stormwater general permit under the NPDES program on November 19, 1993 (58 FR 61146). The proposed permit contains limits to control effluent discharges specific to the cement industry (among other industries) and requires each plant to develop facility-specific pollution prevention plans and demonstrate best management practices (BMP) to minimize the contact between stormwater runoff and CKD or other pollutant sources, or else remove CKD (or other constituents) before the stormwater is discharged. This permit will be in addition to previously issued and effective storm water baseline general permits that were issued in 1992 by EPA and between 1991 and 1993 by the 40 states with authorized NPDES programs. The final multi-sector storm water general permit is expected to be issued by EPA in early 1995.

With respect to ground water, there are no Federal standards that are adequate to address the risks posed by CKD via the ground water pathway. The Safe Drinking Water Act (42 U.S.C. 300 f–j) protects drinking water by setting maximum contaminant levels (MCLs) for toxic contaminants, including metals. However, drinking water standards are only protective at the point of consumption. Public water supply wells are protected through the wellhead protection program under the SDWA (41 U.S.C. 300h–7(e)).

Of the states studied in the RTC, three (California, Michigan, and Pennsylvania) have primacy for implementing the NPDES program. The program in Texas is administered by EPA but incorporates more stringent Texas water quality requirements. These four states have ground water protection programs that set non-degradation of ground water quality as a goal. In addition, Texas implements an EPA-approved wellhead protection program.

Water quality regulations vary from state to state. California's water quality program includes long range resource planning, annual inspection of all facilities, and compliance with stringent surface water and ground water quality standards. The California program also grants broad enforcement authority to its State Water Resources Control Boards. Pennsylvania and Michigan inspect major industrial dischargers (including some cement plants) annually, and enforce permit requirements. In addition, Michigan requires compliance with ground water quality standards. Pennsylvania approaches ground water protection through permit requirements for wastewater and stormwater discharges, but has no separate ground water quality standards. In Texas, cement plants are considered ''minor'' facilities and are not inspected annually like all facilities that have major discharges, unless the facility burns hazardous waste, has a past record of environmental violations, or has a complaint filed against it. However, Texas is considering requiring

[10] The Clean Air Act is implemented through the State implementation plan (SIP). As explained in the RTC, the Clean Air Act as amended (see section 110(a)(2)) requires an acceptable SIP to contain detailed provisions to address: Emission limitations and control measures; monitoring requirements, review of new and modified sources for compliance with new source performance standards, prevention of significant deterioration, and non-attainment review; adequate legal authority; and a permit program.

[11] One plant has submitted a video to the Agency that indicates that its CKD management practices have changed.

[12] A general description of these emissions can be found in the EPA CKD sampling trip reports which are located in the support section of the RCRA docket on the Report to Congress, Docket No. F–94–RCKA–FFFFF.

subsurface investigations at all facilities that dispose of CKD as part of an effort to establish minimum technical standards for the on-site management of CKD.

The Clean Water Act, through existing effluent guideline regulations, NPDES permits, water quality standards, and existing and forthcoming storm water permits, provide considerable authority to control risks associated with contamination of surface waters by the management of CKD.[13] However, EPA has identified releases of CKD to surface waters, and to ground water as well. In its investigation of CKD waste, the Agency uncovered 14 cases of water damage, of which seven involved ground water. Both ground water and surface water damages were major factors cited for including two CKD disposal units on the CERCLA NPL. Furthermore, only 17% of all CKD management units nationwide have ground water monitoring systems, while 25 of 91 cement manufacturing facilities (27 percent) were reported in a 1991 industry survey to be located within one mile of a public drinking water well.

Based on the above analysis, the Agency believes the following factors warrant additional environmental controls for CKD: (1) The general lack of current regulations applicable to contaminant discharges to ground water for protection of human health and the environment; (2) the general lack of ground water monitoring systems at CKD disposal units; and (3) the existence of damages to ground water and air that are persistent and continuing, and for which no requirements exist to address the risks posed via these pathways.

At the federal level, authorities exist to address site-specific problems posing imminent and substantial danger to human health or the environment under RCRA section 7003 and CERCLA sections 104 and 106. However, the Agency believes that cost-effective controls that prevent contamination are preferable to cleaning up after contamination and damages occur.

### *C. Step 3: What Would Be the Operational and Economic Consequences of A Decision To Regulate Under Subtitle C?*

The Agency has determined that industry-wide regulation of CKD under full Subtitle C, including land disposal restrictions, would impose extremely high costs on a substantial portion of the U.S. cement industry. While the Agency believes that CKD waste minimization and reclamation/recycling options exist that could limit the cost exposure for many plants, there is considerable uncertainty and disagreement at this time regarding their general technical availability and ability to serve as low cost substitutes for land management of CKD.

Thus, it is likely that full Subtitle C regulation could impose compliance costs in excess of 20 percent of sales value for a significant part of the industry and a resulting inability to compete. Expected economic consequences include a combination of reduced domestic cement capacity and production, sharply higher prices for cement (particularly in interior regions of the country), and substantially increased imports. Substantial adverse secondary effects on regional construction industries and on communities experiencing losses in cement industry-related employment could also be expected.

Thus, based on the factors in RCRA section 3001(b)(3) and section 8002(o), full RCRA Subtitle C regulation is unwarranted. However, the Agency also believes that special Subtitle C regulations tailored to local cement plant conditions could be developed using the broad regulatory flexibility provided by RCRA, including section 2002, section 3001(b)(3)(C), and section 3004(x). These regulations could be based on either technology or performance standards or a combination of both. These regulations could be implemented at far lower cost at most plant locations requiring controls to prevent contamination of ground water. In addition, regulations for CKD to prevent releases to the air can be improved or implemented under CAA authority, and releases to surface water are regulated under CWA authority. These authorities provide the Agency with additional flexibility to prevent releases of CKD to the environment, while at the same time minimizing the burden on the regulated community.

The cement industry's voluntary CKD management proposal, submitted as a comment on the RTC, tends to support this conclusion. This tailored program for constructing and operating CKD monofills would include the following site-specific features: a hydrogeological assessment, water inflow modeling, ground water monitoring, surface water management in accord with NPDES and storm water discharge permits, run-on/run-off controls, fugitive dust emissions control measures, personnel training, a written closure plan, financial assurance, and post-closure care, including security and maintenance and repair of the cap and vegetation as suggested by periodic inspections. Thus, special tailored standards under Subtitle C of RCRA as well as under other Agency authorities can be expected to pose far less dire consequences for the U.S. cement industry and the economy as a whole than would regulation under full Subtitle C.

## IV. Regulatory Determination for Cement Kiln Dust

Pursuant to RCRA sections 3001(b)(3)(C) and 8002(o), EPA has determined that additional control of CKD is warranted. The Agency's concerns about the harm to human health and the environment posed by CKD suggest the need for regulation under RCRA Subtitle C authority. However, the Agency recognizes that certain of these areas of concern (those related to releases to air and surface waters) are more appropriately controlled under other EPA-administered statutes. In order to avoid unnecessary duplication among regulatory programs, EPA would rather use the other existing regulatory programs to control risks where appropriate, and develop a more creative, affordable, and common sense approach that would control the adverse effects of CKD.

The Agency will develop, promulgate, and implement regulations for CKD as necessary to protect human health and the environment by using a variety of statutes. This regulatory program will apply to CKD from all cement manufacturing facilities, regardless of the type(s) of fuels used in the manufacturing process, or other factors. In particular, the Agency will develop and implement additional controls/activities to limit releases to the air using its Clean Air Act authority. For surface waters, the Agency believes that existing regulations and the planned general permit under the NPDES permitting program will provide an adequate mechanism for controlling point source discharges and for managing storm water that contains CKD. Thus, no additional water controls, beyond these already planned, are considered necessary.

The Agency will evaluate the need for additional controls for a limited number of off-site uses of CKD (such as use as a lime fertilizer on agricultural fields) in its regulatory proposal. However, for most off-site uses (e.g., in waste stabilization or certain construction uses) EPA's current record indicates there are no significant risks. The Agency will restrict its focus to those

[13] In fact, the Agency believes that once the storm water permits are fully implemented, no further water permits or regulations will be needed to address releases to surface water.

off-site uses for which there are significant risks.

With respect to ground water, the Agency will use its authority under Subtitle C of RCRA to address these concerns. The Agency will use its broad authority provided by RCRA section 2002(a), section 3001(b)(3)(C), and section 3004(x) to develop a program tailored to local cement plant conditions to control the specific risks identified while minimizing compliance costs. Until the Subtitle C tailored rules take effect, the Agency will retain the Bevill exemption. The Bevill exemption will be removed when final regulations under RCRA authority take effect.

The Agency believes that subjecting CKD waste to the full RCRA Subtitle C program would be prohibitively burdensome on the cement industry, and is not a feasible regulatory option under the factors cited in RCRA section 8002(o). Although EPA at this time is not proposing the specifics of a RCRA regulatory program for CKD, EPA intends to apply only those components of Subtitle C that are necessary, based on our current knowledge of the cement industry and the human health and environmental concerns associated with CKD, to achieve a common sense result with respect to the hazards posed by CKD on a site-specific basis. The Agency anticipates that any such standards would be designed to be protective, yet minimally burdensome, and may not necessarily apply to all facilities or may not apply to all facilities in the same manner or to the same extent.

The specific RCRA Subtitle C components that EPA believes may deserve particular scrutiny in developing a minimal, tailored approach, including site-specific considerations, include the following: facility-wide corrective action under section 3004(u); land disposal restriction requirements (LDRs) under sections 3004 (c), (d), (e), (f) and (g); minimum technology standards under section 3004(o); and permit requirements under section 3005. EPA believes that most of the concerns addressed by the land disposal restrictions program, permit requirements, and the minimum technology standards might be best addressed through management standards developed specifically for CKD, and the Agency will carefully study those possibilities as an alternative to some or all LDRs and minimum technology standards. Moreover, because the costs for including all solid waste management units under facility-wide corrective action at all cement plants may be prohibitively burdensome on the cement industry, EPA intends to explore less burdensome, site-specific, tailored approaches to identifying and correcting problems that may occur from existing CKD piles and preventing problems arising from future CKD management. This may include ground water monitoring, a reliance on existing response authorities under RCRA section 7003 and CERCLA (or state response authorities), or may focus on site-specific factors, such as geography and hydrology, in determining the need for corrective action requirements. Because most of the Agency's ground water concerns are associated with potential contamination in areas of limestone with karst features, EPA will focus on tailored standards for CKD disposal in karst terrain. The Agency believes that concerns about contamination in non-karst areas can be addressed through the adoption by industry of good CKD waste management practices.

In addition, EPA believes it is appropriate to consider other RCRA Subtitle C requirements to see if, and to what extent, they are necessary to address the human health and environmental concerns discussed in this regulatory determination. In doing so, EPA will also consider the costs associated with those Subtitle C requirements. EPA intends to develop a regulatory program for CKD waste only after full participation by the various stakeholders. Consistent with the spirit of that commitment, EPA at this time is neither definitively limiting the scope of, nor determining that any particular elements necessarily will be included in any proposed CKD regulatory program.

Finally, as discussed in the RTC, CKD is often re-introduced into the kiln as a substitute for raw material in clinker production. In the absence of the CKD regulatory exemption, under certain regulatory scenarios clinker produced from re-introduced CKD could be considered a hazardous waste under the derived-from rule (40 CFR 261.3(c)(2)(i)). As part of the regulations that EPA will promulgate as a result of today's determination, EPA intends to propose exclusion of clinker from regulation as a derived-from hazardous waste when CKD is reintroduced. When reintroduced, CKD does not contribute any constituents to clinker production that are not already present in the production process. Furthermore, at this time, EPA has no indication that such clinker poses unacceptable threats to human health or the environment.

## V. Next Steps

This section provides an overview of the Agency's plans for developing and issuing tailored regulations for CKD. The Agency recognizes that the selection of a regulatory approach for CKD waste may involve difficult choices and policy decisions with wide-ranging economic and environmental implications. EPA believes that the development of regulations under multiple statutes (without duplication among regulatory programs) that adequately address the risks identified in the RTC, yet are economically affordable to the industry, should involve participation by all interested parties. To this end, EPA is announcing a regulation development process designed to encourage involvement by all stakeholders. The regulation development process will be conducted in similar fashion to the Agency's Common Sense Initiative, notably with early-on participation by all stakeholders. This process will be directed towards development of environmentally protective regulations that provide for highly flexible methods to administer and implement them. The Agency's concern for minimizing the burden on State and local regulatory authorities and minimizing compliance costs and resource burdens on the regulated community will be an important principle in the regulation development process.

EPA will begin this process by conducting a series of meetings with interested parties, including industry, government, and public interest groups. The initial meetings with the parties will be used to solicit technical information and approaches that will facilitate the Agency's analysis of regulatory options (e.g., CKD management technologies, cost information, and economic information). The Agency plans to conduct the initial meetings during the spring and summer of 1995. Before these meetings are held, the Agency will identify specific questions and issues on which the Agency would like to receive information.

During the regulation development process, the Agency will use the information in the cumulative record of the RTC and regulatory determination, along with any new information received, to formulate its approach to developing tailored regulations for CKD. Before the rule is proposed, the Agency may publish an advance notice of proposed rulemaking (ANPR) to present and solicit comment on various approaches to developing the regulations.

## VI. Regulatory Flexibility Analysis

The Regulatory Flexibility Act (RFA) of 1980 (Pub. L. 96–354), which amends the Administrative Procedure Act, requires Federal regulatory agencies to consider ''small entities'' throughout the regulatory development process. Section 603 of the RFA requires an initial screening analysis to be performed to determine whether a substantial number of small entities will be significantly affected by a regulation. Under current internal EPA guidance, however, any economic impact is considered a significant impact, and any number of small entities is a substantial number.[14]

In keeping with this policy, EPA has performed an initial evaluation of the domestic cement industry to determine whether or not there are small entities operating U.S. cement plants. The results of this analysis show that 23 of the 115 operating domestic cement plants are owned and operated by companies that are defined as small entities.[15] These 23 plants are owned/operated by 16 of the 40 companies comprising the domestic cement industry.

Because in today's regulatory determination EPA does not establish new regulatory controls, the Agency has not conducted a full Regulatory Flexibility Analysis in support of today's action. EPA will, however, consider the potential impacts of the new regulations that will be developed as a result of this action on these small entities. In the process, the Agency will examine potential impacts of regulatory alternatives on these entities, and identify and evaluate alternative approaches that could mitigate such impacts, as required by the RFA.

[14] USEPA, 1992. *EPA Guidelines for Implementing the Regulatory Flexibility Act,* Office of Regulatory Management and Evaluation, Office of Policy, Planning, and Evaluation.

[15] The definition of small entity is established by the Federal Small Business Administration, which has promulgated regulations found at 13 CFR 121.601. The criterion for determining small business status in the hydraulic cement industry (SIC Code 3241) is company-wide employment of less than 750 employees.

## VII. Executive Order 12866

Under Executive Order 12866 (58 FR 51735, 10/4/93), the Agency must determine whether the regulatory action is ''significant'' and therefore subject to OMB review and the requirements of the Executive Order. The Order defines ''significant regulatory action'' as one that is likely to result in a rule that may:

(1) Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or State, local, or tribal governments or communities;

(2) Create a serious inconsistency or otherwise interfere with an action taken or planned by another agency;

(3) Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or

(4) Raise novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order.

Pursuant to the terms of Executive Order 12866, it has been determined that this rule is a ''significant regulatory action'' because it raises novel legal or policy issues arising out of legal mandates, the President's priorities, or the principles set forth in the Executive Order. This action was submitted to OMB for review. Changes made in response to OMB suggestions or recommendations will be documented in the public record.

## VIII. Regulatory Determination Docket

Documents related to this regulatory determination, including EPA's response to the public comments, are available for inspection in the docket. The relevant docket numbers are: F–95–RCKD-FFFFF for the regulatory determination, F–94–RCKA–FFFFF for the RTC and F–94–RC2A–FFFFF for the NODA. The EPA RCRA docket is located at the following address: United States Environmental Protection Agency, EPA RCRA Docket, Room M2616, 401 M Street SW., Washington, DC 20460. The docket is open from 9 a.m. to 4 p.m., Monday through Friday, except for Federal holidays. The public must make an appointment to review docket materials. Call the docket clerk at (202) 260–9327. Copies are free up to 100 pages and thereafter cost $0.15 per page.

In addition to the data and information that was included in the docket to support the RTC on CKD and the Technical Background Documents, the docket also includes the following documents:

- Analysis of and Responses to Public Comments on the Report To Congress; and
- Analysis of and Response to Comments on the Notice of Data Availability.

## List of Subjects in 40 CFR Part 261

Environmental protection, Bevill exemption, Cement kiln dust, Incineration, Special wastes.

Dated: January 31, 1995.

**Carol M. Browner,**

*Administrator.*

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