$40,000 exclusion provided for in the instructions to item 4(f).

Request for Written Comments on the Operation and Efficacy of Certain Recently Adopted Disclosure Requirements

As indicated above, item 6(b) was adopted as part of a series of amendments to the disclosure provisions of the proxy rules in order to provide shareholders with information to assist their evaluation of the structure, composition and functioning of issuers' boards of directors.[2] Item 6(d) requires disclosure of information concerning the existence, composition and functions performed by audit, compensation and nominating committees of the board. Items 6(e) and 6(f) require disclosure of director attendance at board and committee meetings and director resignations, under certain circumstances. At the time these rules were adopted, the Commission's staff was directed to monitor carefully the disclosures made in order to determine whether amendments would be appropriate. The Commission continues to seek information from interested persons and, therefore, is requesting written comments concerning the operation and efficacy of these new disclosure requirements. Commentators are requested to supply empirical data to the extent possible in support of their comments, and to suggest any appropriate modifications to the rules. Commentators are specifically requested to address the following issues:

(a) Does the information elicited by item 6(b) provide a basis for a realistic assessment of the nominee's ability to render independent judgment?

(b) If not, are additional disclosure requirements appropriate?

(c) Should the disclosure thresholds relating to the specified percentages of equity ownership, revenues and assets be modified?

(d) The relationship of a non-officer director of the issuer with another corporation doing business with the issuer may be disclosable where his interest in that corporation arises solely from his service on its board of directors. Should item 6(b) require disclosure of such relationships?

(e) Should the disclosure threshold contained in item 6(b)(3)(iii) relating to the specified dollar amount of outstanding indebtedness be modified?

[2] See Securities Exchange Act Release No. 15384 (December 6, 1978), 43 FR 58522 (December 14, 1978).

The Commission will endeavor to review the comments and take such actions as may appear necessary to propose and adopt amendments, if any, in time for compliance by issuers in the 1981 proxy season.

All interested persons are invited to submit their views and comments on the foregoing proposals in triplicate to George A. Fitzsimmons, Secretary, Securities and Exchange Commission, Washington, D.C. 20549, on or before November 30, 1979. Such communications should refer to File S7-799 and will be available for public inspection.

By the Commission.

George A. Fitzsimmons

Secretary.

September 6, 1979.

[FR Doc. 79-28549 Filed 9-12-79; 8:5 am]

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federal register

Thursday
September 13, 1979

Part VIII

Securities and Exchange Commission

Timely Reporting; Proposed Amendment of Rule and Form and Proposed Rule

SECURITIES AND EXCHANGE COMMISSION

[17 CFR Parts 240 and 249]

[Release No. 34-16162]

Timely Reporting—Proposed Amendment of Rule and Form and Proposed New Rule

AGENCY: Securities and Exchange Commission.

ACTION: Proposed rulemaking.

SUMMARY: The Commission proposes the amendment of Rule 12b-25 and its related form which would eliminate the extension of time to furnish information procedure and, in lieu thereof, institute a system requiring notification of a registrant's or a reporting person's inability to timely file reports or portions thereof with the Commission. Concurrently with this proposal, the Commission proposes for comment a new Rule 12b-26 which would require that an issuer identify on the cover page of periodic reports any required material omitted from such a report.

DATES: Comments should be submitted on or before November 9, 1979.

ADDRESSES: Comments should be submitted in triplicate to George A. Fitzsimmons, Secretary, Securities and Exchange Commission, 500 North Capitol Street, Washington, D.C. 20549. Comment letters should refer to File No. S7-798. All comments received will be available for public inspection and copying in the Commission's Public Reference Room, 1100 L Street NW., Washington, D.C. 20549.

FOR FURTHER INFORMATION CONTACT: Bruce Mendelsohn (202) 272-2589, Division of Corporation Finance, 500 North Capitol Street, Washington, D.C. 20549.

SUPPLEMENTARY INFORMATION: The Securities and Exchange Commission today proposed an amendment to Rule 12b-25 and its related form. In lieu of the present extension procedure in Rule 12b-25, the Commission proposed for comment a new procedure which would require notification when an issuer or reporting person is unable to file on a timely basis any report or portion thereof required by Section 13 or 15(d) of the Securities Exchange Act of 1934 (the "Exchange Act") [15 U.S.C. 78a et seq. as amended by Pub. L. No. 94-29 (June 4, 1975)]. A new Rule 12b-26 which would require prominent disclosure on the cover pages of periodic reports if a required portion of such a report is omitted is also proposed for public comment.

Elimination of the Extension of Time To Furnish Information Procedures [1]

Presently, Rule 12b-25 sets forth the circumstances under which a registrant may apply for an extension of time to furnish information to the Commission required by Section 13 or 15(d) under the Exchange Act. Present Form 12b-25, upon which the application is made, contains specific questions designed to aid the registrant in applying for an extension of time. Under this rule, the application is deemed granted unless denied by the Commission within 15 days after receipt. In practice, the Division of Corporation Finance, by delegated authority, has granted such extensions only in the most compelling and unexpected of circumstances and only where an issuer has demonstrated that the granting of the request is appropriate in the public interest and consistent with the protection of investors.

The Commission is inclined to believe that the purposes of the Exchange Act "to insure the maintenance of fair and honest markets in securities transactions * * *" [2] may be better served without an extension procedure. In this regard, it may not be in the public interest to excuse non-timely reporting through the application process embodied in Rule 12B-25. It is the Commission's position that required reports should always be filed when due.

Moreover, it would appear that an extension fo time to file confers little, if any, substantive benefit upon the requesting party. In this regard, the Commission questions whether the present procedure is any longer warranted. Indeed, the elimination of the extension procedure would result in the most limited consequences to registrants and investors. Furthermore, an inordinate amount of staff time is being sent processing these applications.

By eliminating the review requirement for extension of time requests, the Commission would anticipate being able to place increased emphasis on the review of all Exchange Act filings. In the manner, the Commission will attempt to implement one of the recommendations of the Advisory Committee on Corporate Disclosure which noted that a substantive review of periodic reports consistent with the quality of information sought in registration statements is essential to the end product of a high quality disclosure document.[3]

Although the proposed amendment makes a change from present practice which may be perceived as being less advantageous to registrants, the Commission believes that the limited benefits from the extension procedure are outweighed by the obstacles it may cause to informed markets and by the burden imposed on the Commission.

Proposed Notification Procedure

Concurrent with the elimination of the extension procedure embodied in Rule 12b-25, the Commission proposes the adoption of a new notification procedure under the Rule. The new procedure would require that, no later than one business day after the end of the specified period when the report is due, the registrant or reporting person file with the Commission a notification on the proposed revised Form 12b-25 which identifies the report or portion thereof in question and gives reasons why the filing cannot be made on time. The proposed amended rule relates to reports required to be filed pursuant to Section 13 or 15(d) of the Exchange Act.[4] The Commission notes that the proposed system would only require a notification and thus would not necessitate any responsive staff action.

It should be emphasized that the proposed notification procedure will provide issuers with a public forum in which to address the facts and circumstances relevant to their particular situations.

Effects of the Proposals

It should be emphasized that the proposals, it adopted, would eliminate extensions for the filing of required reports.[5] Moreover, the proposed notification procedure should be taken as neither an invitation for non-timely reporting nor an acquiescence of the Commission to any non-timely filing.

Failure by public companies to observe the periodic reporting requirements presents an obstacle to the maintenance of fair and informed training markets in the securities of publicly-held companies. The applicability of various rules and the availability of certain disclosure forms under the Securities Act of 1933 is predicated upon full compliance with

[1] The Commission is proposing that an extension of time to file procedure be retained for audited financial statements required by Items 2 and 7 of Form 8-K for certain acquired businesses. See the proposed revised Instruction 4 to Item 7(a) of Form 10-K, *infra*.

[2] Section 2 of the Securities Exchange Act of 1934, 15 U.S.C. 78b.

[3] Report of the Advisory Committee on Corporate Disclosure, Chapter XIV, Page 427 (1977).

[4] E.g., Forms 8-K, 10-Q, 10-K, and 13F and Schedules 13D and 13G.

[5] However, as stated in note 1, *supra*, the retention of an extension procedure for certain financial statements required by Form 8-K is being proposed.

the periodic reporting requirements. For example, the use of Form S–7 or S–16 for registration of certain public offerings of securities depends in part upon a company having filed *timely* reports pursuant to Section 13 or 15(d) of the Exchange Act for a least the twelve calendar months preceding the filing of the registration statement. Section 15c2–11 under the Exchange Act requires a dealer to have certain information concerning an issuer before its securities may be quoted by that dealer. Rule 144 under the 1933 Act requires the filing of all Exchange Act reports required to be filed for the 12 months immediately preceding a sale. Indeed, with respect to Rule 144, an effect of the filing of the notification form pursuant to the proposed amended Rule 12b–25 may be to give notice that compliance with Rule 144(c)(1) would not be possible until the subject report is filed (assuming all other required reports had been filed).[6]

The Commission would also like to point out that failure to file a timely notification form pursuant to the proposed rule would create an additional violation of the reporting requirements.

Proposed Rule 12b–26

The Commission is also proposing for comment a new Rule 12b–26 which would require registrants to prominently disclose on the cover pages of periodic reports filed pursuant to Section 13 or 15(d) any required portion omitted from those reports. It is believed that this requirement will assist the investing public and the Commission in the review of Exchange Act reports.

Specific Inquiries

The Commission solicits comment as to whether amended Rule 12b–25 should provide an automatic extension of the applicable filing requirement upon the filing of a revised Form 12b–25 and, if so what period would be appropriate for the automatic extension.

The Commission also solicits comment as to whether the amendment of Rule 12b–25 and its related form and the concurrent adoption of the proposed Rule 12b–26 would have an adverse effect on competition or would impose a burden on competition which is neither necessary nor appropriate in furthering the purposes of the Exchange Act. Comments on this inquiry will be considered by the Commission in complying with its responsibilities under Section 23(a)(2) of the Exchange Act.

[6] However, it should be noted that the proposed amended rule is not meant to create an affirmative obligation to search the Commission's files to ascertain whether a notification was filed.

Text of Proposed New and Amended Rules and Form

Chapter II of Title 17 of the Code of Federal Regulations is proposed to be amended as follows:

PART 240—GENERAL RULES AND REGULATIONS, SECURITIES EXCHANGE ACT OF 1934

1. By revising § 240.12b–25 to read as follows:

240.12b–25 Notification of inability to timely file periodic reports.

(a) If any report or portion thereof required by sections 13 or 15(d) of the Securities Exchange Act of 1934 is not filef within the time period prescribed for filing, the registrant or reporting person, no later than one business day after the due date for such report, shall file with the Commission a notification on Form 12b–25 reporting the inability to timely file the report and indicating the reasons therefor. This paragraph also relates to portions of reports omitted pursuant to Rule 12b-21, 17 CFR 240.12b–21.

(b) If a notification filed pursuant to paragraph (a) of this section related to a portion or portions of a periodic report filed pursuant to sections 13(a) or 15(d), the registrant shall include, on the upper right corner of the amendment to the report (required to be filed on Form 8) which includes the previously omitted information, the following statement:

The following items were the subject of a notification on Form 12b–25 and are included herein: *(List Item Numbers)*

Instruction. The statement required by paragraph (b) is intended to facilitate notification to the Commission and the public that previously omitted portions which were the subject of a Form 12b–25 have been filed. If the statement does not appear on the amendment to the periodic report (Form 8), the registrant runs the risk of being perceived as continuing to be late with respect to such material.

(c) The provisions of this section shall not apply to amendment in accordance with Instruction 3(b) of Instructions as to Financial Statements of Form 10–K.

(d) The provisions of this section shall not apply to reports required to be filed by an investment company registered under the Investment Company Act of 1940 [12 U.S.C. 80a et seq.] pursuant to the provisions of that Act or the rules adopted thereunder notwithstanding the fact that such reports are also required to be filed by the Securities Exchange Act of 1934 or the rules adopted thereunder.

Note.—The disclosures required in reports filed with the Commission are essential to the preservation of full, fair and informed securities markets. Therefore, it is of critical importance that such reports be furnished within the time they are required to be filed under the Commission's rules, and nothing in this section should be construed to mean that the Commission has authorized or approved any nontimely reporting.

2. By adding § 240.12b–26 to read as follows:

§ 240.12b–26 Cover page disclosure when a required portion has been omitted from a periodic report filed pursuant to sections 13(a) or 15(d).

If a required portion of a periodic report filed pursuant to sections 13(a) or 15(d) has been omitted for any reason other than that it is inapplicable under the circumstances, the registrant shall prominently indicate the nature of the omitted portion on both the cover page of such periodic report and in that section of the report where the omitted information normally would have appeared.

PART 249—FORMS, SECURITIES EXCHANGE ACT OF 1934

3. By revising Instruction 4 to Item 7(a) of Form 8–K to read as follows:

§ 249.308 Form 8–K, for current reports.

* * * * *

Item 7. Financial Statements and Exhibits.

* * * * *

(a) Financial Statements of business acquired.

Instructions [Instructions 1 through 3 remain unchanged].

4. Filing of Other Financial Information in Certain Cases. The Commission may, upon the written request of the registrant and where consistent with the protection of investors, extend the time for filing the financial statements herein required or permit the omission of one or more of such financial statements or the filing in substitution therefor of appropriate statements of comparable character, if the required audited financial statements are not reasonably available to the registrant, because the obtaining thereof would involve unreasonable effort, expense or practical difficulties. A request for such relief shall be filed as a part of the report. The request, other than a request for an extension of time to file, shall set forth the following information:

* * * * *

4. By revising § 249.322 to read as follows:

§ 249.322 Form 12b-25—Notification of inability to timely file reports or portions thereof pursuant to sections 13 or 15(d) of the Act.

This form shall be filed pursuant to § 240.12b-25 of this chapter by issuers and reporting persons who are unable to timely file periodic reports, or portions thereof required by sections 13 or 15(d) of the Act. The filing shall consist of a signed original and three conformed copies, and shall be filed with the Commission at Washington, D.C. 20549, no later than one business day after the due date for the periodic report in question. Copies of this form may be obtained form the Commission on request.

BILLING CODE 8010-01-M

The text of the proposed form is as follows:

FORM 12b-25

SEC FILE NUMBER _____

CUSIP NUMBER _____

NOTIFICATION OF INABILITY TO TIMELY FILE REPORTS OR PORTIONS THEREOF PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

Nothing in this Form shall be construed to imply that the Commission has authorized or approved any non-timely reporting.

/_/ Check here if this is an amended notification.

Read Attached Instruction Sheet Before Preparing Form. Please Print or Type.

PART I

Full Name of Registrant

Address of Principal Executive Office (Street and Number)

City, State and Zip Code

PLEASE PLACE AN X IN APPROPRIATE BOX IF A CHANGE IN NAME OR ADDRESS HAS OCCURRED

Former name, if changed: _____ /_/Name /_/Address

Former address, if changed: _____

Name and telephone number of person to contact in regard to this

_____ (Name) _____ (Area Code) _____ (Telephone Number)

REPORT OR PORTION THEREOF WHICH CAN NOT BE TIMELY FILED

(1) Form: _____ Period Covered: _____ Date Due: _____

(2) If the notification relates to a part of a filing, identify the Item(s) to which the application relates Item(s): /_/ The remaining portion has been filed /_/ The remaining portion will be timely filed

(3) Have all reports required to be filed during the preceding 12 months (or for such shorter period that the registrant was required to file such reports) been filed? If answer is no, identity report(s) /_/Yes /_/No

(4) Is it anticipated that any significant change in results of operations from the corresponding period of the last fiscal year will be reflected by the earnings statements to be included in the subject report or portion thereof? /_/Yes /_/No If so, attach an explanation of the anticipated change, both narratively and quantitatively, and, if appropriate, state the reasons why a reasonable estimate of the results can not be made.

PART II

State below in detail the specific reasons in narrative form as to why the report or portion thereof could not be filed within the time required.

NOTE: Stock or boilerplate phrases such as "the auditors have not completed their review" may not provide meaningful explanation unless accompanied by brief disclosure of the basis for such statements.

(Name of registrant as specified in charter)

has caused this application to be signed on its behalf by the undersigned thereunto duly authorized.

Date _____ By _____

Instruction. The form may be signed by an officer of the registrant, by counsel or by any other duly authorized person. The name and title of the person signing the form shall be typed or printed under the signature.

ATTENTION: Intentional misstatements or omissions of fact constitute Federal Criminal Violations (See 18 U.S.C. 1001).

BILLING CODE 8010-01-C

Securities and Exchange Commission

General Instructions

1. This Form is required by Rule 12b–25 of the General Rules and Regulations under the Securities Exchange Act of 1934, which states:

Rule 12b–25. Notification of Inability to Timely File Periodic Reports.

(a) If any report or portion thereof required by Sections 13 or 15(d) of the Securities Exchange Act of 1934 is not filed within the time period prescribed for filing, the registrant or reporting person, no later than one business day after the due date for such report, shall file with the Commission a notification on Form 12b–25 reporting the inability to timely file the report and indicating the reasons therefor. This paragraph also relates to portions of reports omitted pursuant to Rule 12b–21, 17 CFR 340.12b–21.

(b) If a notification filed pursuant to paragraph (a) related to a portion or portions of a periodic report filed pursuant to Sections 13(a) or 15(d), the registrant shall include, on the upper right corner of the amendment to the report (required to be filed on Form 8) which includes the previously omitted information, the following statement:

"The following items were the subject of a notification on Form 12b–25 and are included herein: *(List Item Numbers)*"

(c) The provisions of this rule shall not apply to those financial statements that are to be filed by amendment in accordance with Instruction 3(b) of Instructions as to Financial Statements of Form 10–K.

(d) The provisions of this rule shall not apply to reports required to be filed by an investment company registered under the Investment Company Act of 1940 [12 U.S.C. 80a et seq.] pursuant to the provisions of that Act or the rules adopted thereunder, notwithstanding the fact that such reports are also required to be filed by the Securities Exchange Act of 1934 or the rules adopted thereunder.

Instruction. The statement required by paragraph (b) is intended to facilitate notification to the Commission and the public that previously omitted portions which were the subject of a Form 12b–25 have been filed. If the statement does not appear on the amendment to the periodic report (Form 8), the registrant runs the risk of being perceived as continuing to be late with respect to such material.

2. One signed original and three conformed copies of this Form and amendments thereto must be completed and filed with the Securities and Exchange Commission, Washington, D.C. 20549, in accordance with Rule 0–3 of the General Rules and Regulations under the Act. The information contained in or filed with the Form will be made a matter of the public record in the Commission files.

3. A manually signed copy of the Form and amendments thereto shall be filed with each national securities exchange on which any class of securities of the registrant is registered.

4. Amendments to the notifications must also be filed on Form 12b–25 but need not restate information that has been correctly furnished. The Form shall be clearly identified as an amended notification.

5. These general instructions are not to be filed with the application. Please detach before mailing the Form.

(Secs. 13, 15(d), 23(a), 48 Stat. 894, 895, 901; sec. 203(a), 49 Stat. 704; secs. 3, 8, 49 Stat. 1377, 1379; secs. 4, 6, 78 Stat. 569, 570–574; sec. 2, 82 Stat. 454; secs. 1, 2, 84 Stat. 1497; secs. 10, 18, 89 Stat. 119, 155; sec. 308(b), 90 Stat. 57; secs. 202, 203, 204, 91 Stat. 1494, 1498, 1499, 1500; 15 U.S.C. 78m, 78o(d), 78w(a))

The Commission hereby proposes for comment the proposed amendment of Rule 12b–25 and its related form and proposed Rule 12b–26. Rule 12b–26 and the amendments of Rule 12b–25 are proposed pursuant to Sections 13, 15(d) and 23(a) of the Exchange Act.

By the Commission.

George A. Fitzsimmons,

Secretary.

September 6, 1979.

[FR Doc. 79–28550 Filed 9–12–79; 8:45 am]

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federal register

Thursday
September 13, 1979

Part IX

Environmental Protection Agency

Criteria for Classification of Solid Waste Disposal Facilities and Practices; Final, Interim Final, and Proposed Regulations

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 257

[Docket No. 4004; FRL 1234-1]

Criteria for Classification of Solid Waste Disposal Facilities and Practices

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: This regulation contains minimum criteria for determining what solid waste disposal facilities and practices pose a reasonable probability of adverse effects on health or the environment. Those facilities that violate the criteria are "open dumps" for purposes of the State Solid Waste Management planning effort supported by EPA under Subtitle D of the Resource Conservation and Recovery Act (RCRA or the Act). The criteria also provide the standard to be applied by the Federal district courts in determining whether parties have engaged in acts that violate the prohibition of open dumping, also contained in Subtitle D of RCRA. The criteria also partially fulfill the requirement of Section 405 of the Clean Water Act (CWA) to provide guidelines for the disposal and utilization of wastewater treatment plant sludge. Any owner or operator of a publicly owned treatment works must comply with these criteria when disposing of sludge on the land.

EFFECTIVE DATE: October 15, 1979.

FOR FURTHER INFORMATION CONTACT: Mr. Truett V. DeGeare, Jr., P.E., Office of Solid Waste (WH-563), U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460, Telephone (202) 755-9120.

SUPPLEMENTARY INFORMATION:

I. Authority

This regulation is issued under authority of Sections 1008(a)(3) and 4004(a) of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, 42 U.S.C. 6907(a)(3) and 6944(a), as well as Section 405(d) of the Clean Water Act, as amended, 42 U.S.C. 345.

II. Background

This regulation was published in the **Federal Register** in proposed form for public review and comment on February 6, 1978. The Agency held five public hearings and eleven public meetings to discuss the proposed regulation and received a substantial number of written comments on the proposal. Having considered the views of the public, the Agency is now promulgating this regulation in final form. This preamble discusses some of the more significant issues raised during the public comment period and revisions made on the basis of those comments.

The objectives of the Act are to promote the protection of health and the environment and to conserve valuable material and energy resources. In order to accomplish this, the Act sets forth a national program to improve solid waste management, including control of hazardous wastes, resource conservation, resource recovery, and establishment of environmentally sound solid waste disposal practices. This is to be carried out through a cooperative effort among Federal, State, and substate governments and private enterprise.

Subtitle D of the Act fosters this cooperative effort by providing for the development of State and regional solid waste management plans that involve all three levels of government. As the Federal partner in this process, EPA seeks, through regulations and financial assistance, to aid State initiatives in the formulation and implementation of such plans.

Section 4002(b) of the Act requires the Administrator to promulgate Guidelines for the Development and Implementation of State Solid Waste Management Plans. On July 31, 1979, EPA issued those guidelines (44 FR 45066). While those guidelines are to consider a broad range of topics, Section 4003 of the Act identifies the minimum requirements which State plans must address. EPA provides financial assistance to help the States develop and implement their plans. Under Section 4007, EPA reviews and approves State plans which satisfy the minimum requirements of Section 4003.

The State solid waste management plan is the centerpiece of the Subtitle D program. Through the plan the State identifies a general strategy for protecting public health and the environment from adverse effects associated with solid waste disposal, for encouraging resource recovery and resource conservation, for providing adequate disposal capacity in the State, and for dealing with other issues relevant to solid waste management. The plan must also set forth the institutional arrangements that the State will use to implement this strategy. (A more detailed description of the planning program is contained in the Preamble accompanying the Section 4002(b) guidelines.)

A. Section 4004: Disposal Facility Criteria

Under section 4004(a) of the Act the Administrator is to promulgate "regulations containing criteria for determining which facilities shall be classified as sanitary landfills and which shall be classified as open dumps * * *" The criteria establish the level of protection necessary to provide that "no reasonable probability of adverse effects on health or the environment" will result from operation of the facility. In setting these criteria EPA is providing a general definition of "sanitary landfill" and "open dump". As part of their planning programs, the States will evaluate existing disposal facilities to determine whether they comply with the Section 4004 criteria. Those facilities which do not satisfy the criteria are "open dumps" under the Act. EPA will, under authority of Section 4005(b), publish a list of open dumps in the **Federal Register**.

The inventory of "open dumps" will serve two major functions. First, it will inform the Congress and the public about the extent of the problem presented by disposal facilities which do not adequately protect public health and the environment. Second, it will provide an agenda for action by identifying a set of problem facilities, routinely used for disposal, which should be addressed by State solid waste management plans in accordance with Section 4003 of the Act.

Essentially, the inventory is a planning tool which supports the State planning effort. The States must know where the problem facilities are in order to satisfy Section 4003(3) which requires that the plan "provide for the closing or upgrading of all existing open dumps within the States * * *."

B. Section 1008(a)(3): Open Dumping Criteria

Under Section 1008(a)(3) of the Act the Administrator is to publish suggested guidelines that provide minimum criteria "to define those solid waste management practices which constitute the open dumping of solid waste or hazardous waste." Thus, these criteria are to establish a broad definition of the act of open dumping, which is prohibited under Section 4005(c) of the Act.

The prohibition may be enforced in Federal district court through the citizen suit provision in Section 7002. The Act does not give EPA authority to take legal action against parties that may violate the open dumping prohibition. The application of the open dumping criteria to the specific acts of specific

individuals is a matter for the Federal courts to determine in the context of particular cases. Judicial review of specific acts in the context of open dumping suits should not be confused with State planning activities, particularly the evaluation of disposal facilities for the inventory of open dumps. The inclusion of a facility in the list of open dumps is not an administrative determination by EPA that any particular parties are engaging in prohibited acts of open dumping. (The Preamble accompanying the Guidelines for Development and Implementation of State Solid Waste Management Plans (44 FR 45066) provides a more detailed explanation of this issue.)

C. Section 405(d): Sludge Disposal Guidelines

Under Section 405(d) of the Clean Water Act EPA issues guidelines for the disposal and utilization of sludge. Under Section 405(e) of the CWA owners and operators of publicly owned treatment works (POTW's) must dispose of sludges from such works in accordance with those guidelines. Criteria designed to avoid a reasonable probability of adverse effects on health or the environment from disposal of sludge on land are clearly within the scope of this provision of the CWA.

D. Copromulgation of the Criteria

The criteria which EPA promulgates today are designed to fulfill or partially fulfill the requirements of each of the provisions discussed above. While all three provisions embody different implementation schemes, they all are concerned with the adverse effects on health or the environment that may be caused by solid waste disposal activities. Since there is an inherent compatibility of purpose among the three provisions, EPA has decided to structure the criteria so they may be used in all three contexts. EPA believes that co-promulgation of regulations, where possible, improves the quality of its regulatory efforts by eliminating the potential for inconsistencies among similar regulations and by providing a clear statement to the regulated community of the standards to which they will be held.

As an example of the compatibility between provisions, the facility classification criteria for purposes of the State planning program can, and probably should, be concerned with the same set of environmental effects as the criteria defining the prohibited act of open dumping. Regardless of whether one is evaluating facilities to aid in the establishment of setting state planning priorities or examining the acts of specific individuals to determine legal liability for open dumping, the same set of environmental effects should be of concern. At the same time, having a single set of criteria for defining unacceptable environmental effects does not undermine the use of that definition for different purposes.

It should be pointed out that these criteria are not necessarily the only guidelines to be promulgated under Section 405(d) of the CWA. These criteria apply where the owners and operators of POTW engage in the placement of sludge on the land. Future EPA guidelines on sludge disposal and utilization may address incineration, energy recovery, and give-away or sale of processed sludge.

III. General Approach

This regulation sets forth eight criteria that address broad classes of health and environmental effects that may be caused by solid waste disposal activities. The criteria are structured to define unacceptable impacts, those that present a "reasonable probability of adverse effects on health or the environment." In terms of the three statutory provisions authorizing this regulation, the criteria define an open dump (RCRA Section 4004), the minimum elements of prohibited open dumping practices (RCRA Section 1008(a)(3)) and the effects which must be avoided by POTW owners and operators (CWA Section 405).

EPA recognizes that these criteria will be applied to a variety of situations and that there is a need for flexibility in the standards to allow them to be applied to particular circumstances. During the comment period some reviewers expressed preference for greater specificity in the criteria, including more detailed design and operating requirements. Others favored greater flexibility and opportunity for consideration of local, site-specific conditions.

In developing the final criteria the Agency attempted to be as specific as possible without reducing the opportunity for State and local solid waste management and enforcement agencies to take into account the site-by-site variations and make assessments based on local conditions. Wherever possible EPA tried to set specific performance standards that define unacceptable environmental effects. Such an approach should provide a concise and measurable means of determining compliance with the criteria. However, in some situations it was not possible to devise a meaningful performance standard for the environmental effect of concern, given the lack of experience with such an approach to regulation of solid waste.

Where specific performance standards were not possible, EPA specified an operational technique to achieve the desired level of protection. When that approach was necessary the criteria maintain regulatory flexibility by allowing for the use of alternative techniques that achieve the same general performance level. Parties claiming that alternative approaches provide protection equivalent to that of methods described in the criteria have the burden of establishing that fact.

In addition EPA wishes to emphasize that the standards established in the criteria constitute minimum requirements. These criteria do not pre-empt other State and Federal requirements. Nothing in the Act or the CWA precludes the imposition of additional obligations under authority of other laws on parties engaged in solid waste disposal.

Various commenters criticized EPA's general approach as being either too restrictive or too lenient. Some argued that implementation of the criteria would substantially reduce needed disposal capacity. The Agency recognizes that one of the most critical problems in the solid waste management field today is the lack of acceptable disposal facilities due, in part, to public opposition to their siting. However, this particular rulemaking cannot deal directly with this problem.

The Agency is committed to evaluating other means by which it can help with the problem. Adequate disposal capacity is essential nationwide. Hopefully, implementation of the criteria will increase the credibility of disposal operations, thereby aiding in reducing public opposition to acceptable and needed facilities.

Some commenters felt that the criteria should be written very stringently in order to provide an incentive for initiation of resource recovery and conservation practices. Other commenters observed that, even with increased levels of resource recovery and conservation, disposal facilities would continue to be required into the foreseeable future; even resource recovery facilities produce a residue which requires disposal. The Agency believes that resource recovery and conservation are desirable solid waste management approaches which should be actively pursued. However, the purpose of the criteria is to define disposal activities which pose no reasonable probability of adverse effects on health or the environment,

and the criteria have been developed with that goal in mind. While the implementation of these criteria may make resource conservation and recovery more economically competitive, these regulations have not been formulated simply to advance that cause. Such an approach is not authorized by the Act.

EPA also received comments attacking the Agency's use of standards, definitions and approaches developed under other Federal environmental and public health programs. They claimed that incorporating these items into the criteria extends those other programs beyond their statutory authority. While the use of particular Federal standards will be discussed later in this Preamble in the context of each criterion, a general point should be made about the use of approaches developed or employed in other programs. The Act requires that the criteria address adverse health and environmental effects of solid waste disposal, whatever those might be. The use of other Federal Standards in responding to this broad mandate is, in fact, quite desirable in order to minimize duplicative, overlapping and conflicting policies and programs. Unless it can be shown that other Federal standards and approaches are clearly inconsistent with the Act's objectives, it is within the Agency's discretion to use them, where applicable, in writing RCRA regulations.

IV. The Criteria

A. Scope

These criteria apply to the full range of facilities and practices for "disposal" of "solid waste", as those terms are defined in Section 1004 of the Act. Various commenters suggested the exclusion or inclusion of specific types of solid waste disposal activities. EPA examined these suggestions in light of the Act's definitions, Section 1006 of the Act (which directs the Agency to avoid duplicative regulatory programs), the Act's legislative history and the objectives of Subtitle D. EPA has concluded that the criteria apply to all solid waste disposal with the following exceptions:

1. The criteria do not apply to agricultural wastes, including manures and crop residues, returned to the soil as fertilizers or soil conditioners. All other disposal of agricultural wastes, including placement in a landfill or surface impoundment, is subject to these criteria. This exclusion is based on the House Report (H.R. Rep. No. 94–1491, 94th Cong., 2nd Sess. 2(1976)) which explicitly indicates that agricultural wastes returned to the soil are not to be subject to the Act.

2. The criteria do not, at this time, apply to overburden from mining operations intended for return to the mine site. The House Report indicates that this type of overburden is not to be the immediate focus of the Act's programs.

3. The criteria do not apply to domestic sewage or treated domestic sewage. However, the criteria do apply to disposal of sludge resulting from the treatment of domestic sewage. In defining "solid waste" the Act specifically excludes solid or dissolved material in domestic sewage. Treated domestic sewage from which pollutants have been removed in a wastewater treatment plant is still considered to be domestic sewage for purposes of the Act. Including such wastewater effluents within the Act's scope is particularly unnecessary because existing EPA programs concerning treatment of domestic sewage are seeking to assure that these effluents are disposed of in an environmentally sound manner.

However, during the treatment of domestic sewage, solid and dissolved materials are removed from the sewage and collected as sludges. Typically, these sludges are disposed of separately from the treated sewage which passes through the treatment plant. The language of Sections 1004(27) and 1004(26A) indicate that sludge generated by a wastewater treatment plant, water supply treatment plant or air pollution control facility is solid waste for purposes of the Act. EPA believes that while the Congress intended to exempt treated sewage effluents from the Act's provisions, it intended to include sludges created by the operation of treatment facilities. This approach is consistent with Congressional intent, expressed in Section 1002(b)(3) and the legislative history, that the Act specifically address the new solid waste management problem that resulted from effective implementation of programs designed to protect the air, water and other environmental resources.

With this interpretation a question is raised about the operation of septic tanks, a particular type of sewage treatment device. The materials which pass through the tank and are released into drainage fields are analogous to the treated sewage effluent passing through a treatment plant, and thus are not considered solid waste. The materials which settle to the bottom of the septic tank and are subsequently removed for disposal at some other facility are analogous to the sludge created by the operation of other sewage treatment processes. Therefore, septic tank pumpings fall within the Act's definition of solid waste.

4. The criteria do not apply to solid or dissolved materials in irrigation return flows. This exemption is clearly stated in Section 1004(27) of the Act.

5. The criteria do not apply to source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 923). This exemption is stated in Section 1004(27) of the Act.

6. The criteria do not apply to industrial discharges which are point sources subject to permits under Section 402 of the Clean Water Act as amended. In defining solid waste the Act specifically exempts these discharges. The principal purpose of this provision is to assure that waters of the United States (the jurisdictional concern of the Clean Water Act) are not regulated under this Act.

7. The criteria do not apply to facilities for the disposal of hazardous wastes subject to Subtitle C of the Act. Section 3004 establishes the standards which will be applicable to such facilities. EPA's final regulations for its hazardous waste program will delineate the class of facilities subject to the Subtitle C requirements.

8. The criteria do not apply to disposal of solid waste by underground well injection that is subject to regulations (40 CFR Part 146) for the Underground Injection Control Program (UICP) under the Safe Drinking Water Act, as amended, 42 U.S.C. 3001, *et seq.* While the subsurface emplacement of fluids through a well (the activity regulated by UICP) could also fall within the Act's broad definition of disposal, Section 1006 of the Act requires that EPA avoid duplication with its other programs (including those under the Safe Drinking Water Act) in administering the Act. Leaving regulation of underground well injection to the UICP is consistent with that mandate and is especially appropriate since the UICP seeks to achieve objectives similar to those of the Act.

B. Definitions (Section 257.2)

General definitions which apply to all the criteria are presented in § 257.2. The section defines "disposal," "facility," "leachate," "open dump," "practice," "sanitary landfill," "sludge," "solid waste," and "state." Also definitions that are only applicable to a particular criteria are presented in that criteria section.

EPA received many comments that reflected a concern over the definition of "facility". Several commenters suggested that EPA exempt such things

as wastewater treatment lagoons, potable water treatment lagoons, surface impoundments (pits, ponds, lagoons, basins), mining waste disposal facilities, utility waste disposal facilities and agricultural waste disposal facilities. The Act does not define the term "facility". EPA believes that the term should be interpreted broadly unless such an interpretation clearly conflicts with other provisions or objectives of the Act.

After examining these requests for exemptions in light of the Act and its legislative history, EPA concluded that there was no statutory basis for excluding these types of facilities. All such facilities could present a reasonable probability of adverse effects on health or the environment. EPA does not have any basis for determining that such facilities are not "solid waste disposal facilities" for purposes of the Act.

Several commenters asked whether the definition of "facility" would encompass "backyard" disposal practices such as home compost piles or burning of household wastes. EPA does not believe that Congress intended the Subtitle D classification scheme to be implemented at the household level. Section 1004(27) refers to wastes from "community activities". In addition, the legislative history indicates at several points that "municipal" wastes are of concern under Subtitle D. The Act's emphasis on "community" or "municipal" waste, indicates that the Congress intended to focus on solid waste managment at that level rather than at the household level. EPA believes that "backyard" practices should be controlled through State or local nuisance and public health laws.

Some commenters suggested that disposal facilities used by small communities (especially small facilities in rural areas) be excluded from coverage due to the anticipated higher unit cost (cost per capita or cost per ton of waste) of compliance for such facilities. The Agency found no basis for such an exclusion. In fact, such an exclusion could foster the development of additional small facilities in order to escape the cost of compliance and, cumulatively, could result in greater environmental damage in rural areas. Thus, the criteria apply to large and small facilities, whether urban or rural, because it is essential that all facilities prevent adverse impacts on health and the environment in accordance with the criteria.

Less sophisticated and less costly design and operational techniques, however, may be applicable at smaller facilities due to the smaller quantities of waste disposed and reduced magnitude of potential adverse effects. In addition, small or rural communities may take various approaches to reduce the per capita cost burden and achieve economy of scale through regionalized collection and disposal systems, sharing of equipment among facilities, or operation of facilities only during limited hours.

During the public comment period it was suggested that there be less stringent criteria for existing facilities than for new facilities. In considering this suggestion the Agency has found no difference in the potential adverse effects from existing as opposed to new, facilities. With regard to implementation of the criteria, however, the Act does recognize the need to continue the controlled use of existing facilities while alternatives which comply with the criteria are being developed. In taking steps to close or upgrade existing open dumps, a State may issue compliance schedules that allow use of a disposal facility while it is being upgraded or while alternative disposal options are being developed.

A few commenters also raised the question of whether a junk yard, which may buy or sell waste items, is a solid waste disposal facility. While a junk yard is clearly a "solid waste management" facility under the Act, there is some question whether the operation of a junk yard constitutes the disposal of solid waste.

Under Section 1004(3) "disposal" involves the placement of solid waste into or on any land or water so that a constituent of the waste may enter the environment. This entry of waste materials into the environment is an essential component of the Act's definition. As the Senate Report states, "Disposal is letting wastes out of control" (Sen. Rept. No. 94–988, 94th Cong., 2d Sess. 26 (1976)).

If a junk yard is operated in such a way that no waste material enters the environment then it is possible that it is not a solid waste disposal facility. If constituents of the waste, however, are entering the environment (e.g. battery acids from automobiles leaching into the ground), then the junk yard would be a disposal facility. It is up to the State to determine whether particular junk yard operations constitute disposal of solid waste.

C. Reorganization of the Criteria

After reviewing the comments EPA has decided to change the format of two portions of the criteria as they appeared in the proposed regulation. The criteria concerning environmentally sensitive areas and disease have been reorganized.

The proposed regulation had one section that addressed the location of disposal facilities in wetlands, floodplains, permafrost areas, critical habitats of endangered species, and recharge zones of sole source aquifers, all of which were categorized as "environmentally sensitive areas". In the Preamble to the proposed regulation the Agency also requested comment on other areas, specifically karst terrain and active fault zones, for similar consideration.

Environmentally sensitive areas are no longer addressed in a separate section. Criteria regarding floodplains and critical habitats of endangered species appear in independent sections discussed later. Wetlands are addressed in the section on surface water, since wetlands are treated in the same manner as surface waters under the Clean Water Act. Concerns for recharge zones of sole source aquifers are directly related to those for ground-water protection; thus, protection of sole source aquifers has been incorporated into the ground-water section of the criteria.

Permafrost areas are no longer addressed in the criteria. While EPA is not concerned with the effects of solid waste disposal in permafrost areas, there are several reasons why it is not appropriate to establish a national criterion concerning permafrost. Permafrost areas only occur in Alaska in the United States. The State of Alaska has authority to regulate solid waste disposal and to protect permafrost. EPA believes that the State's program is inadequate to protect these areas. Under Section 6001 of the Act Federal facilities must comply with applicable State solid waste disposal requirements. Thus, there should be full compliance with those State disposal requirements affecting permafrost areas. Moreover, the criteria addressing floodplains, surface water and ground water will cover many of the environmental effects of concern in such areas. Under these circumstances it does not seem necessary to establish separate permafrost criteria at this time.

In response to the Agency's request, some commenters described risks inherent in disposal of solid waste in karst terrain and active fault zones. The concerns raised pertained primarily to ground water. The Agency believes that these concerns are adequately addressed by the ground-water criteria and has not provided a separate criteria for karst terrain or active fault zones.

In the proposed regulation the criterion for disease just addressed the

problem presented by disease-carrying vectors. In the section addressing food-chain crops, the proposed criteria provided for controls to reduce the likelihood for transmission of pathogens from the solid waste to humans. Since both provisions concerned the prevention of disease, they have been combined in § 257.3–6.

D. Floodplains (Section 257.3–1)

Disposal of solid waste in floodplains may have several significant adverse impacts: (1) If not adequately protected, wastes may be carried by flood waters and flow from the site, affecting downstream water quality and structures; (2) filling in the floodplain may restrict the flow of flood waters, causing greater flooding upstream; and (3) filling in the floodplain may reduce the size and effectiveness of the flood-flow retaining capacity of the floodplain, which may cause a more rapid movement of flood waters downstream, resulting in higher flood levels and greater flood damages downstream. For these reasons it is generally desirable to locate disposal facilities outside of floodplains.

The proposed criteria required that a facility not restrict the flow of the base flood nor reduce the temporary water-storage capacity of the floodplain, in order to prevent increased flooding upstream or downstream resulting from the base flood. In addition, the proposal required that the facility be protected against inundation by the base flood, unless the facility is for land application of solid waste for beneficial utilization as agricultural soil conditioners or fertilizers.

In developing this criterion EPA sought to comply with Executive Order 11988, "Floodplain Management" (42 FR 28951), which requires Federal agencies, in carrying out their responsibilities, to take actions to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains. In accordance with Executive Order 11988, EPA consulted with the Water Resources Council and the Federal Insurance Administration of the Department of Housing and Urban Development. Both of these agencies deal with floodplain management issues.

A few commenters questioned whether floodplain concerns were within the statutory scope of these regulations. Clearly, improper disposal of solid waste in a floodplain can have adverse effects on health and the environment. EPA is not aware of any other Federal program that addresses the particular environmental threat presented by solid waste disposal activities in floodplains. Therefore, there is no question that these concerns are within the purview of this regulation.

After evaluating the proposed floodplains criterion in light of the comments, EPA re-evaluated the rationale for the proposed regulation. There was an apparent contradiction in the criterion between the requirement to prevent any increased flooding and the provision to protect against inundation. As several commenters pointed out, compliance with one was likely to lead to violation of the other. In addition EPA concluded that it was not necessary to eliminate any and all marginal increases, however small, in flood levels caused by disposal operations. Moreover, not all inundation of disposal facilities leads to adverse environmental effects. Depending on the waste material there may be no adverse downstream effects; where such effects could occur, proper control measures to prevent washout of the waste materials (e.g. diking) would be sufficient to avoid the problem.

Therefore, EPA made the following changes in the floodplain criterion:

1. The disposal facility or practice should seek to avoid washout of solid waste, rather than necessarily prevent inundation of the waste. This change allows for the development of management practices or facility designs that can avoid washout of the solid waste without preventing all inundation by flood waters. (Several commenters indicated that such approaches were feasible.)

2. All of the requirements are linked to an assessment of the hazard to human life, wildlife, land or water. This is designed to avoid a situation where any increase in flood levels attributable to disposal activities or washout of waste is automatically precluded. EPA does not believe that the incremental effect of solid waste operations on floodplain management justifies such a drastic approach. In some cases, however, disposal activities may present a significant marginal increase in the risk of flood damage. It is appropriate to avoid such a risk. EPA cannot specify for all situations what that unacceptable risk will be. This issue must be resolved on a case-by-case basis in the implementation of these criteria.

3. The exception for land application of solid waste for beneficial utilization as an agricultural soil conditioner or fertilizer has been eliminated. EPA believes that special exceptions for classes of activities are no longer necessary. In more clearly specifying the performance objective for disposal in floodplains, the criteria provide the flexibility to allow continuation of those activities that do not present health and environmental hazards.

Some commenters questioned the use of the 100-year base flood in defining the floodplain of concern. EPA believes that this is an appropriate definition. The 100-year floodplain does not represent a flood that will occur only once in 100 years. It is the flood which has a one percent or greater chance of occurring in any one year. Such a flood may occur several times or never occur within a given 100-year period. In selecting the 100-year flood to define the floodplain of concern EPA is maintaining consistency with the approach in other Federal programs and in Executive Order 11988.

Some commenters misinterpreted the criteria as a prohibition against locating facilities in floodplains. While areas other than floodplains are often preferable locations for disposal facilities, the proposed criteria did not provide such a prohibition. Certainly, that point is even clearer in the floodplain criterion issued today.

E. Endangered and Threatened Species (Section 257.3–2)

Solid waste disposal activities can adversely affect endangered and threatened wildlife by releasing toxic materials into the environment and by disrupting the ecosystems on which they rely for food and shelter. Therefore, it is appropriate for these criteria to contain provisions designed to mitigate adverse effects of solid waste disposal activities on endangered and threatened species of plants, fish or wildlife.

The proposed criterion was designed to ensure that disposal activities did not occur in the critical habitats of endangered species unless it was determined that the activities would not jeopardize the continued existence of endangered species. The proposal also required the approval of disposal plans by the Office of Endangered Species (OES) in the Department of Interior (DOI).

Under Section 7 of the Endangered Species Act (ESA), as amended, 16 U.S.C. 1536, all Federal agencies, in consultation with the Secretary of the Interior or the Secretary of Commerce, are to utilize their authorities in furtherance of the purposes of the ESA. EPA held formal consultations with the DOI and received a "biological opinion" recommending changes in the criteria. EPA considered this recommendation from DOI and all public comments in setting this criterion.

EPA has concluded that the criteria should assure that no solid waste disposal facilities or practices cause or contribute to the taking of endangered

or threatened species. Taking means harassing, harming, pursuing, hunting, wounding, killing, trapping, capturing or collecting, or attempting to engage in such conduct. In addition such activitites should not destroy or adversely modify the critical habitats of these species. EPA believes that this criterion is clearly within the scope of the Act and that it satisfies Agency responsibility under the ESA.

Some commenters questioned EPA's authority to address effects on endangered species in the criteria. The Act gives EPA authority to set criteria concerning the full range of health and environmental effects resulting from solid waste disposal. The taking of endangered or threatened species by solid waste disposal activities is certainly an environmental effect of concern. In addition the ESA places a responsibility on the Agency to use its authority under the Act to mitigate such effects.

The major change in this criterion from what was contained in the proposed regulation is the shift in concern to the *taking* of endangered and threatened species. The proposed regulation focused on avoiding modifications of critical habitats that *jeopardized the continued existence* of a species. After examining that approach in light of the comments, EPA decided that the "jeopardize" language was inappropriate for a definition that would be applied to a vast number of site-specific conditions. In deciding whether an act or facility would jeopardize the continued existence of a species, the officials implementing the criteria would have to examine the marginal effect that harm to particular members of a species would have on the national population of that species. Particularly in the case of the open dump inventory, which involves the evaluation of thousands of solid waste disposal facilities, it would be extremely difficult to implement a "jeopardize" standard.

A determination of whether disposal activities are "taking" endangered species is more readily applicable to the site-specific situations for which these regulations will be used. Officials charged with implementing the criteria, as well as parties engaged in solid waste disposal, can quickly determine what is necessary to achieve compliance. Such an approach is consistent with EPA's general intent to establish concise, measurable performance standards wherever possible.

The use of the "taking" concept does not reflect an EPA belief that the ESA requires such an approach. EPA's obligation under Section 7 of the ESA, if any, is to assure that the criteria, which provide a national definition of the unacceptable environmental effects of solid waste disposal, do not jeopardize endangered species. Where those criteria are applied by State agencies, such implementation activities are not subject to Section 7 because no Federal action is involved.

Some commenters suggested that in complying with Section 7 EPA could not set criteria applicable to non-Federal parties that are more restrictive than what Section 9 of the ESA now requires of such parties. (Section 9 prohibits the taking of endangered species.) EPA rejects that argument. The Act and Section 7 of the ESA give EPA authority to set criteria different than the requirements otherwise applicable under Section 9.

EPA believes that the best way to ensure that national populations of endangered and threatened species are not jeopardized is to avoid the destruction of members of that population in site-specific situations. While the standard could have been written several ways to accomplish that objective, EPA believes that preventing the "taking" of endangered and threatened species has several advantages. This approach will aid coordination between solid waste and endangered species programs where feasible. It also gives the regulated community a uniform standard defining its responsibility in both contexts. The "taking" definition is broadly stated and thus would encompass the variety of adverse effects on endangered and threatened species that could be caused by solid waste disposal. In its "biological opinion" DOI endorsed this approach.

In the proposed regulation EPA only addressed endangered species. Several commenters suggested that "threatened" species identified by DOI also be included for consideration. EPA believes that such threatened species of wildlife are also deserving of protection and, therefore, has included them in the criteria. Thus, the endangered and threatened species of concern are those listed under authority of Section 4 of the ESA.

In endorsing the "taking" language, DOI's "biological opinion" included exceptions for activities covered by permits under Section 10 of the ESA or allowed by Section 6(g)(2) of the ESA. Section 10 authorizes the issuance of permits for the taking of species "for scientific purposes or to enhance the propagation or survival of the affected species." The operative portion of Section 6(g)(2) makes the Section 9 prohibition of taking inapplicable in states that have negotiated cooperative agreements with DOI. Under cooperative agreement, designated State officials may take endangered species for conservation purposes. Since neither of these situations seemed applicable to solid waste disposal activities they have not been included in the criteria.

EPA has decided to retain that part of the proposed regulation that reflected a concern for the wildlife habitats. Where "critical" habitats of threatened or endangered species have been identified by DOI it is unacceptable under the Act for solid waste disposal activities to destroy or adversely modify such habitats. In setting this criterion EPA is not precluding all disposal in a critical habitat area. Only when such disposal appreciably diminishes the likelihood of the survival and recovery of threatened or endangered species using the habitat does a violation occur. The "biological opinion" from DOI endorses this approach.

EPA has decided to drop that portion of the proposed criteria which required approval of disposal plans by the Office of Endangered Species, Department of Interior. EPA agrees with the several commenters, including OES, who said that such a requirement was inappropriate. The Act and the CWA create the implementing mechanisms for these criteria. While the OES may, and probably should, be consulted on the application of § 257.3–2 to particular situations, the officials responsible for applying the criteria, rather than the OES, must determine whether a violation has occurred.

F. Surface Waters (Section 257.3–3)

It is essential that solid waste activities not adversely affect the quality of the nation's surface waters. Rivers, lakes and streams are important as sources of drinking water, as recreational resources and as habitats for a wide variety of fish and other aquatic organisms. The nation's coastal and inland wetlands provide natural flood and storm control, sediment and erosion control, recharge of acquifers, natural purification of waters, and flow stabilization of streams and rivers. Wetlands produce nutrients which support complex ecosystems extending into estuaries and streams well beyond the marshes and wetland areas. Wetland habitats support fish, shellfish, mammals, waterfowl, and other wildlife fauna and flora.

Solid waste disposal has led to surface-water contamination from runoff of leachate, accidental spills, and drift of spray occurring at dumps, landfills, surface impoundments, farmlands, and landspreading operations. In the

proposed criteria EPA sought to coordinate its surface water standards under the Act with programs developed under the Clean Water Act (CWA) to restore and maintain the integrity of the waters of the United States (including wetlands.)

The proposed criteria required that point source discharges of pollutants comply with a National Pollutant Discharge Elimination System (NPDES) permit issued for the facility according to Section 402 of the Clean Water Act. A separate section addressed wetlands, a particular category of waters of the United States. This section, which has now been combined with the other surface water provisions, required that facilities not be located in wetlands unless permits were obtained under provisions of Section 402 and/or 404 of the Clean Water Act. The proposed criteria also required non-point source discharges of pollutants to be prevented or minimized.

The final regulation maintains this general approach and has eliminated those parts of the proposed regulation that might have created conflicting RCRA and CWA requirements concerning the adverse effects of solid waste disposal on surface waters. The separate section for wetlands was eliminated because they are treated like all other surface waters under the CWA. The provision affecting non-point source discharges to surface water has been linked more directly to applicable requirements developed for State and areawide water quality management planning programs under Section 208 of the CWA.

Under Section 1006 EPA is required to integrate, to the maximum extent practicable, the provisions of the Act with the Clean Water Act and other statutes. Under the CWA, EPA conducts programs designed "to restore and maintain the chemical, physical and biological integrity of the Nation's water." EPA believes that this goal is also a legitimate objective for its regulatory activity under the Act and that, in the spirit of Section 1006, EPA should use its authority under the Act to see that the goals of the CWA are achieved. Thus, in defining unacceptable solid waste disposal activities, EPA can and should determine that facilities and practices violating the Clean Water Act cannot be acceptable for purposes of RCRA.

Thus, in establishing the surface water criterion EPA used concepts, and approaches used under the CWA. The surface waters of concern are the waters of the United States, which include "wetlands" meeting the Agency's and the Corps of Engineers' definition of that term. All point source discharges of pollutants must comply with requirements for NPDES permits pursuant to Section 402 of the CWA. Discharge of dredge or fill material to waters of the United States must comply with requirements for permits established pursuant to Section 404 of the CWA. ("Requirements" under the 402 and 404 permit programs include the general requirement to apply for such permits, as well as the substantive provisions of issued permits.) Non-point source pollution from solid waste disposal activities must not be in violation of legal requirements established to implement a water quality management plan under Section 208 of the CWA. Water quality standards developed to satisfy Section 303 of the CWA may be implemented through either NPDES permits, Section 404 dredge and fill permits, or legal requirements developed to implement a Section 208 plan.

Some commenters suggested that in using a CWA-based approach in these regulations EPA was attempting to regulate discharges to waters of the United States under the Act. This is certainly not the intent or result of these criteria. The implementation of CWA programs will be left to those responsible for those programs. In these criteria EPA is merely indicating that where solid waste activities violate the CWA, as determined by officials implementing that law, EPA cannot determine that those activities provide adequate protection to public health and the environment for purposes of RCRA.

Commenters also expressed concern over the definition of "wetlands", arguing that man-made channels and basins (particularly wastewater treatment lagoons) that happen to support vegetation should not be subject to protection under this criterion. In keeping with the goal of coordination, EPA is accepting the approach taken under the CWA, as expressed in the recently issued NPDES regulations (44 FR 32854). Thus, waste treatment lagoons or other waste treatment systems that happen to support vegetation are not waters of the United States. (As indicated in the NPDES regulations, cooling lakes and ponds are generally within the definition of waters of the United States, but certain kinds of cooling ponds may be excluded.)

Several commenters questioned the proposed inclusion of "surface runoff" as a point source discharge of pollutants. Under the existing NPDES regulations the term "discharge of pollutant" is defined to include "* * * surface runoff which is collected or channelled by man." EPA will maintain that approach in these criteria. All other surface runoff is subject to applicable requirements developed under section 208 plans for non-point source pollution.

Several public comments reflected concern about what permits would be necessary under the CWA for solid waste disposal in wetlands. Diking or other dredge or fill operations designed to prepare an area within waters of the United States for disposal of wastes would require a 404 permit as a matter of course. A question arises, however, concerning the actual deposit of the waste material into waters of the United States. Such a discharge could be treated as a discharge of pollutants requiring a Section 402 NPDES permit or as a discharge of dredged or fill material requiring a 404 permit.

Under previously issued regulations implementing the CWA (42 FR 37122), where the "primary purpose" of the discharge of waste material is for disposal, rather than for filling an area, the discharge is subject to the NPDES program.

Some commenters suggested a need for procedures establishing how NPDES permits will be applied to solid waste disposal. In response the Agency is developing policy guidance for this permitting process. As of this writing a draft of this policy guidance, "NPDES Permits for Solid Waste Disposal Facilities in Waters of the United States—Policy Guidance Memorandum, August 23, 1978," has been distributed for external review. A public meeting for discussion of the draft policy guidance memorandum was held on December 11, 1978. EPA is currently reviewing the public comments submitted on this issue. EPA is also considering whether solid waste disposal in wetlands is more appropriately handled under the Section 404 permit program. EPA intends to explore this issue with the Corps of Engineers.

EPA has dropped any reference to a presumption against issuance of an NPDES permit for discharge of solid waste into wetlands. That reference, contained as a comment in the proposed regulation, reflected EPA's general belief that disposal activities should not be conducted in wetlands if other alternatives exist. The NPDES permit, however, will define the legal responsibilities of parties engaging in disposal of solid waste near or in waters of the United States. If the requirements of an applicable NPDES permit can be satisfied, then there will be no added "presumption" against the facility or practice.

Commenters raised concerns over the ability of NPDES permitting agencies to

process applications and issue permits for point source discharges of pollutants from solid waste disposal facilities. It was noted that not many NPDES permits have been issued to such discharges.

It has been Agency policy to prioritize issuance of NPDES permits based on the potential adverse environmental impact of the discharge. However, all discharges require NPDES permits, and it is incumbent on the discharger to apply for the NPDES permit. Generally, no enforcement action is taken if application for an NPDES permit has been made, but the permit has not yet been issued. Upon issuance, the discharger must maintain compliance with the NPDES permit. Upon denial or revocation of a permit, the discharge must be discontinued.

In using the 208 planning program, EPA has dropped the proposed requirement to "prevent or minimize" nonpoint source pollution from solid waste disposal activity. Several commenters were concerned that such a requirement might duplicate or conflict with provisions developed to implement a State water quality management plan. EPA shares that concern and, therefore, has made the changes described above. However, EPA is also aware that not all 208 plans will have addressed the non-point source pollution problems presented by solid waste disposal. EPA intends to explore this problem further to determine whether uniform national guidance is needed and can be given on how to handle this type of pollution problem. If a set of standards can be devised EPA will consider amending these criteria.

Not all portions of a 208 plan will necessarily be applicable to solid waste disposal activities, and it will be up to officials implementing the criteria to make the appropriate determination. The criteria are linked only to those portions of the plan that have been translated into legal requirements (i.e. statute, regulation, ordinance, administrative orders.) This assures clarity on what is required, avoiding questions about how to comply with broadly-stated policy statements.

G. Ground Water (Section 257.3–4)

Ground water, generally a high quality, low cost, readily available source of water, is the drinking water source for at least one half of the population of the United States; often it is the only economical and high quality water source available. Ground water is generally suitable for human consumption with little or no treatment necessary.

Ground water has been contaminated by solid waste disposal on a local basis in many parts of the nation and on a regional basis in some heavily populated and industrialized areas, precluding its use as drinking water. Existing monitoring of ground-water contamination is largely inadequate; many known instances of contamination have been discovered only after ground-water users have been affected. The Act and its legislative history clearly reflect Congressional intent that protection of ground water is to be a prime concern of the criteria.

The proposed criteria established requirements for ground-water protection based on the utilization of the ground water. Ground-water utilization was divided into two categories: Case I addressed ground water currently used or designated for use as drinking water supplies or ground water containing 10,000 miligrams per liter (mg/l) total dissolved solids or less; and Case II addressed ground water designated for other uses.

For Case I, the proposed criteria required that the quality of ground water beyond the disposal facility be maintained for use as a drinking water supply. The proposed criteria were based on the "endangerment" approach adopted from previously proposed regulations for the Underground Injection Control Program (41 FR 36726). "Endangerment" was defined to mean introduction of a contaminant that would require additional treatment of current or future drinking water supplies or would otherwise make the water unfit for human consumption. The proposed criteria required that the disposal facility not "endanger" Case I ground water beyond the property boundary. (Comments were specifically requested on the use of other distances in lieu of or in addition to the property boundary.) For Case II, States could, where consistent with their authority, designate ground water for uses other than drinking water and would establish the quality at which the ground water was to be maintained consistent with the designated use.

In order to predict, as early as possible, the potential for ground-water endangerment, the proposed criteria required that ground water be monitored so as to indicate the movement of contaminants from the disposal facility where endangerment was likely. Contingency plans were required for corrective actions to be taken in the event that an adverse impact was indicated by the monitoring.

For sole source aquifers, the proposed criteria required that facilities not be located in the recharge zone unless alternatives were not feasible and unless "endangerment" was prevented.

Under the final ground-water criteria, the facility or practice must not *contaminate* an *underground drinking water source* beyond the *solid waste boundary or an alternative boundary* set by the State. Contamination occurs when leachate from the disposal activity causes the concentrations of certain pollutants in the ground water to either (1) exceed the maximum contaminant level (based on the primary drinking water standards) specified for that pollutant, or (2) increase at all where the background concentration of the pollutant already exceeds the applicable maximum contaminant level. An underground drinking water source is an aquifer currently supplying drinking water for human consumption or an aquifer in which the concentration of total dissolved solids is less than 10,000 milligrams per liter (mg/l). Generally, the existence of contamination is determined at the waste boundary. However, States with approved solid waste management plans may establish an alternative boundary if, after thorough examination of the site-specific situation, a finding is made that an adjustment of the boundary would not result in contamination of ground water needed or used for human consumption.

(1) *Approach to Ground-water Protection.* A few commenters suggested that the proposed regulation was beyond EPA's authority becaue it allegedly involved the establishment of ambient ground-water standards. This charge reflects a misunderstanding of the approach taken in the proposed, as well as the final, regulation. EPA is not regulating ground water with these criteria; rather, EPA is setting standards applicable to disposal of solid waste. In defining the unacceptable effects of such disposal on ground water, EPA has concluded that solid waste activities should not degrade ground water beyond levels established to protect human health. The criteria are designed to achieve that objective.

EPA recognizes that ground-water quality is important for other purposes (e.g. for irrigation of plants, for its effect on fragile ecosystems.) Differing standards may be appropriate to protect its usefulness for these other purposes. At this time, however, EPA has decided to define "contamination" in terms of the water's use as a drinking water source. EPA believes that the prevention of adverse human health effects from direct consumption of ground water, should be the first among several objectives in protecting ground-water quality. Moreover, the Agency has

developed standards for drinking water but has not established standards for other uses.

These criteria reflect EPA's concern for both present and future users of ground water. A significant number of people in the country take their drinking water directly from ground-water resources. EPA expects that such direct use will continue in the future. In defining unacceptable solid waste disposal activities, these criteria cannot be based only on current patterns of ground-water use. Potential future users of the aquifer must be considered.

EPA believes that solid waste activities should not be allowed to cause underground drinking water sources to exceed established drinking water standards. Future users of the aquifer will not be protected unless such an approach is taken. Where maximum contaminant levels have already been exceeded due to other conditions or actions affecting the aquifer, solid waste activities should not be allowed to increase the risk of damage to present or future users of the aquifer.

(2) *Contaminants of Concern.* Commenters stated that the "endangerment" standard in the proposed regulation was vague, especially since it did not specify contaminants that would make more extensive treatment necessary or otherwise make the water unfit for human consumption. Some felt this approach would allow too much contamination, given the lack of certainty regarding toxicity of many contaminants and the state-of-the-art of monitoring and water treatment. Others stated that it would require facility operators to demonstrate protection from a myriad of substances, that the levels to which those substances should be tolerated was not defined, that the standard was based on unspecified treatment and changing technology, and that the capability of existing treatment is a function of too many parameters. In order to respond to these comments the Agency explored various lists of contaminants upon which to base the criteria.

Several reviewers supported the proposed criteria's use of the National Interim Primary Drinking Water Regulation (NIPDWR) in the definition of "endangerment". Some reviewers pointed out, however, that the list of contaminants in the NIPDWR (40 CFR Part 141) was not created to serve as ground-water quality standards, and that it does not include all potentially harmful substances which might be associated with leachate from solid waste.

EPA recognizes that the NIPDWR lists only those parameters commonly found in public drinking water supplies. Other substances which may be harmful to human health were not included in Part 141 due to their relatively rare occurrence in drinking water systems, the unsuitability of analytical methods, the high costs of monitoring, or the lack of toxicity data. For example, cyanide was not listed in the NIPDWR because of its low rate of occurrence. Several potentially dangerous substances which were excluded from the NIPDWR are present in leachate from waste disposal.

There is no doubt, however, that the contaminants identified in the NIPDWR are appropriate for consideration in the criteria. Generally, no commenters opposed the inclusion of any listed contaminant in this regulation. The one exception is the manmade radionuclides identified in the NIPDWR. These substances fall within the class of radioactive substances excluded from the Act's definition of solid waste and, thus, the leaching of these materials into ground water should not be addressed by these criteria.

EPA has evidence that all of the contaminants identified in the NIPDWR have been in wastes covered by these criteria and that such materials are likely to enter ground-water supplies. Therefore, while it may be advisable to expand the list of contaminants covered by the criteria as new information is developed by the Agency, it is certainly appropriate to use the contaminants identified in the NIPDWR in the criteria at this time.

The Agency has also explored the use of the National Secondary Drinking Water Regulations (NSDWR) in defining maximum contaminant levels. The NSDWR (40 CFR Part 143) represent the Agency's best judgment on the standards necessary to protect underground drinking water supplies from adverse odor, taste, color and other aesthetic changes that would make the water unfit for human consumption. EPA believes that this is a serious concern which deserves consideration in the criteria. In addition, many of the substances listed in the NSDWR often occur together with other substances in leachate which can be injurious to health.

However, EPA has decided not to include the contaminants identified in the NSDWR in the criteria at this time. It was not clear in the proposed regulation that EPA was considering their use for purposes of the criteria. To avoid any question about the adequacy of opportunity to comment on the use of the NSDWR in the criteria, EPA has decided to specifically seek public comment on this issue. Thus, EPA is also issuing today a proposed amendment to the criteria which would add the maximum contaminant levels in the NSDWR to the definition of ground-water "contamination."

Two other sets of pollution parameters were considered for inclusion in these criteria: the *Quality Criteria for Water* (EPA 1976) and the list of toxic pollutants referenced in Section 307(a)(1) of the Clean Water Act, as amended.

The publication *Quality Criteria for Water* recommends levels for water quality in accord with the objectives in Section 101(a) and the requirements of Section 304(a) of the Clean Water Act. The primary purpose of that publication is to recommend levels for surface water quality that will provide for the protection and propagation of fish and other aquatic life and for recreation. Although recommended levels are also presented for domestic water supply, and for agricultural and industrial use, ground water was not a major consideration.

Quality Criteria for Water lists most of the substances in Parts 141 and 143. Several of the additional parameters listed are only of interest in surface water protection, such as mixing zones (one third the width of a stream, 10 percent of the area of a lake, etc.), temperature, and suspended solids. While several health related substances that could be present in leachate are listed (e.g., boron, beryllium, cyanide, nickel and several insecticides and other organics), the recommended limits are specified for aquatic life protection and these are not appropriate for ground water. Furthermore, the recommended limits were written to be guidance in developing standards, not to be used as standards themselves. Therefore, EPA decided that this list was inappropriate for these criteria.

Under Section 307 of the CWA the Agency may establish either technology-based or stricter health-based standards for toxic pollutants identified under Section 307(a)(1). EPA is investigating the appropriateness of using the health-based standards in the criteria. Such substances as aldrin/dieldrin, DDT, endrin, toxaphene, benzidine and polychlorinated biphenyls (PCB's) are not subject to section 307 standards. EPA may be establishing such standards for other pollutants some time in the future. At this time, however, for purposes of these criteria, EPA will rely only on established drinking water standards.

(3) *Levels of Contamination.* While the design of the ground-water criteria is similar to the "endangerment" approach

of the Underground Injection Control Program under the Safe Drinking Water Act, it provides for greater specificity and does not use the exact wording of that program or statute. Therefore, to avoid confusion the term "endangerment" is no longer used in the criteria. Instead, the word "contaminate" has been employed. A facility "contaminates" ground-water if it introduces a substance that would cause:

(a) The concentration of that substance in the ground water to exceed specified maximum contaminant levels, or

(b) An increase in the concentration of that substance in the ground water where the existing concentration of that substance exceeds the specified maximum contaminant level.

The first part of the above definition is intended to protect water that can be used as drinking water without treatment. The second part is intended to protect ground water already at or above the maximum contaminant level by preventing introduction of substances that would exacerbate the problem.

Many comments were received on levels of contamination. Some suggested using the maximum contaminant levels (MCL's) in the National Primary and Secondary Drinking Water Regulations; others suggested using higher limits or using lower limits. Some reviewers suggested varying the levels with the background quality or the potential use of the ground water.

The reasons given for adopting higher allowable levels, or more lenient standards, (than the MCL's) included contention (1) that the increased cost of land disposal would be greater than the value of the threatened resource; (2) that the more efficient approach for some of the substances was to remove them from the water supply by treatment after contamination; and (3) that some of the Secondary MCL's are commonly exceeded in ambient or native ground water, thereby effectively resulting in a non-degradation standard for those aquifers. EPA sees no reason to doubt that some people will continue to consume ground water directly without treatment. That portion of the public should be protected from adverse effects (as defined by the drinking water standards) caused by solid waste leachate entering their drinking water. In some situations protection of the public will require non-degradation of an aquifer. The Act does not call for a balancing of the costs of disposal against the "value" of ground-water resources. EPA believes that this criterion represents a reasonable approach to ground-water protection. It allows for the use of natural mechanisms (e.g. soil attenuation, diffusion of contaminants in the aquifer) to reduce the risk of adverse health effects without compromising the general objective of protecting drinking water supplies.

The reasons given for more stringent limits included: (1) Land disposal facilities are but one of several sources of ground-water contamination, and each source contributes to the overall rise in contaminant levels, (2) future research may find that lower levels are necessary to adequately protect health, (3) some agricultural, industrial and other important uses of ground water may be impaired, and (4) since ground water is often consumed without treatment, more stringent limits would require less reliance on programs to monitor and to require treatment before domestic usage.

Generally, EPA has not written more stringent standards because existing information does not indicate that such standards are needed to protect public health. Future research results might, of course, justify changing the criteria. As discussed earlier EPA does not now have the scientific basis for setting stricter standards designed to protect ground-water's use for non-drinking water purposes. The standard does recognize that an aquifer may be polluted by several sources. Where existing ground-water quality levels exceed the MCL's, the solid waste activity may not degrade ground-water quality at all. No matter what the standard, the need for monitoring must be determined on a case-by-case basis, and it seems doubtful that differing standards would change that need.

Some reviewers mentioned that relying only on upper water quality limits results in more stringent requirements for protection of contaminated water than for uncontaminated water (i.e. facilities over uncontaminated waters could introduce substances up to the maximum contaminant levels, while facilities over contaminated waters could not introduce any substance that would increase contaminant levels). While this is a possible result of the standard, EPA does not believe that the health risk justifies a complete non-degradation standard.

In adapting the NIPDWR for the criteria a few modifications were necessary. As indicated earlier the standards for man-made radionuclides were not included because the statutory definition of solid waste excludes such materials from the Act's scope. The contaminant level for coliform bacteria had to be modified because under the NIPDWR the MCL varied somewhat depending on sampling frequency and community size. EPA assumed that sampling of ground water around disposal sites would be less frequent than in a public water system, and so the NIPDWR coliform standard related to the least frequent sampling regimen was selected for the criteria. Also, the criteria do not include the NIPDWR limit for turbidity, since that limit was established for surface water supplies.

(4) *Where the Standard is Applied.* Another concern regarding the ground-water criterion is the issue of where the standard is to be applied (i.e. at what point in the aquifer does contamination from the facility or practice constitute non-compliance). In the proposed criteria, the point of application was at the facility property boundary. The rationale for applying the standard at the property boundary was that it would provide for protection of off-site ground water while affording the opportunity for natural soil attenuation and dispersion and dilution of leachate in ground water underlying the area designated for waste deposition (i.e. within the facility).

However, the proposed criteria recognized that monitoring and control of leachate within the property boundary would generally be necessary in order to assure that the standard at the property bountary would be met. Therefore, there also were proposed operational requirements including monitoring of ground water, prediction and control of leachate migration, collection and removal of leachate and prevention of water infiltration.

Commenters indicated two potential shortcomings of the facility property boundary approach: (1) That future owners of the facility property might use contaminated ground water underlying the facility as drinking water and (2) that if the facility property were very large, great expanses of ground water could be contaminated and purchase of additional property could be used to circumvent the intent. EPA agrees that such results could occur.

Commenters also expressed concern that the operational controls and monitoring provisions were vague and could be meaningful only if specified on a site-by-site basis, rather than generally prescribed in a regulation of national applicability. Commenters also described these operational provisions as inappropriate to a regulation which must delineate acceptable performance levels.

The Agency considered use of other distance specifications in lieu of the property boundary in order to try to respond to reviewers' concerns about

the potential for contamination of large expanses of ground water. The proposed criteria requested comments on alternative distances and the rationale for specification of such distances. Various distances were suggested in the public comments; however, there was no basis presented for selection of one distance over another. While there is a rationale for limiting migration of contamination to within the areas to be used for waste disposal in order to protect neighbors who may use the ground water untreated as a drinking water supply, there is no rationale for limiting migration to any *particular* distance.

In evaluating this issue EPA recognized that the point of application of the standard must be mindful of the ability to monitor at that point. Ideally, the best way to protect present and future users of an aquifer is to assure that drinking water standards are not violated anywhere in the aquifer, including the area immediately under the waste material.

However, any attempt to monitor directly under the waste presents two major difficulties. First, an environmental risk may be posed by the installation of monitoring wells through the waste material or in areas where waste will be deposited. These wells may become conduits for direct flow of waste constituents (e.g. leachate) into the aquifer. While it may be theoretically possible to construct a well that doesn't allow such infiltration, the technology for this has not been sufficiently demonstrated that EPA would want to encourage this practice on a national scale. Secondly, the immediate proximity of waste to the well, in conjunction with the "conduit" phenomenon, would undermine the utility of the monitoring well. Samples extracted would not be likely to be representative of the aquifer; rather, they would be likely to contain concentrated leachate, overestimating the contamination of the aquifer.

EPA also examined the possibility of other fixed distances from the center of the waste area. This approach was rejected because it was impossible to establish a uniform distance that would be meaningful for the vast number of situations to which this standard applied. In some instances a fixed distance would mean that monitoring wells would still be placed through waste material. A longer distance might, in some cases, put the point of measurement beyond the area of likely placement of drinking water wells.

After examining all of these approaches EPA concluded that the *solid waste boundary* is the appropriate point for application of the standard. The solid waste boundary is intended to be taken as the outermost perimeter of the solid waste as it would exist at completion of the disposal activity. With that as the point of measurement, ground-water contamination will be detected as soon as possible without presenting the risks inherent in monitoring under the waste. Likewise, it avoids the problem of guessing the distance at which a potentially affected party is likely to put a drinking water well. (The only assumption is that drinking water won't be taken from wells drilled directly through the area of solid waste deposition.)

In most cases, for disposal facilities, the solid waste boundary would be the boundary of the solid waste as shown on the design and operating plans which are provided to and approved by the State agency as part of the State's facility permitting or certification program. Where such plans do not exist to designate the perimeter at completion, especially for the practice of indiscriminate or unauthorized disposal, the perimeter at completion can only be taken as the current boundary of the deposited waste.

With this approach to the point of application for the MCL's, the monitoring requirements are relatively clear. Monitoring wells should be placed so as to avoid their becoming conduits for waste materials. Unsaturated and saturated zones underlying the area of the facility designated for waste deposition (i.e. within the solid waste boundary) may be employed for attenuation or control of leachate migration, but contamination of underground drinking water sources outside of these zones constitutes non-compliance with the criteria.

The point of application of the MCL's may be modified under certain circumstances. EPA recognizes that hydrogeological conditions, property rights or legal arrangements concerning an aquifer may limit the ability of the public to directly use some or any part of a particular aquifer as a drinking water source. EPA believes that some flexibility is needed in the criteria to provide for such situations. Therefore, the criteria allow the State to modify the point for application of the MCL's.

To prevent this from becoming a major loophole, the criteria establish limits to this flexibility. Only States with approved solid waste management plans may modify the point of measurement. This may only occur where the State has conducted a thorough examination of the site-specific situation and has made a specific finding that establishment of the alternative boundary would not result in contamination of ground water needed or used for human consumption. The examination leading to the finding should include the opportunity for public participation. The criteria specify the key factors that must go into this determination.

The proposed criteria would have allowed a State to designate an aquifer as a Case II aquifer (an aquifer designated for use other than as a drinking water supply). For an aquifer so designated, the proposed criteria required the ground water to be maintained at a quality as specified by the State. Several commenters challenged the use of this approach. Some argued that, given the uncertainties in future drinking water needs, all potentially usable drinking water should be conserved. They also pointed out that there was inadequate data on ground-water quantity, quality and use projections to make such designations and that institutions and authorities to make such trade-offs are non-existent. Commenters also suggested that it was improper for the criteria to defer totally to State standards for designated aquifers.

EPA generally agrees with the comments. These and other factors lead EPA to drop the aquifer designation provision and rely on the alternative boundary approach as the means for allowing flexible application of the criteria.

(5) *Underground Drinking Water Source.* The final criteria maintain the general approach found in the proposed regulation. The reference to aquifers that "may be designated by the State for future use as a drinking water supply" has been deleted. EPA concluded that this was unnecessarily vague. Any future drinking water source would be likely to fall within the second portion of the definition (aquifers in which ground water contains less than 10,000 mg/l total dissolved solids).

Some commenters questioned the use of the 10,000 mg/l total dissolved solids measure for usable aquifers. It is the Agency's general policy that ground-water resources below that concentration be protected for possible use as a drinking water source. This policy is based on the Safe Drinking Water Act and its legislative history which reflects clear Congressional intent that aquifers in that class deserve protection.

(6) *Sole Source Aquifers.* These aquifers are those which the Administrator specifically designates under authority of Section 1424(e) of the Safe Drinking Water Act (Pub. L. 93-523; 42 U.S.C. 300f, 300h-3(e); 88 Stat. 1660 et

seq.). This provision of the Safe Drinking Water Act is administered through regulations proposed as 40 CFR Part 148. As applied through RCRA, the Agency's concern for the impact of disposal facilities on these aquifers is not different from that for other underground drinking water sources as defined in the criteria. Therefore, for clarity and consistency, this area of the proposed criteria has now been incorporated into the ground-water section. Rather than addressing the location of facilities in recharge zones of such aquifers (an operational standard), the criteria apply the performance standard described above for all underground drinking water sources, including sole or principal drinking water sources, regardless of location.

H. Application To Land Used For The Production Of Food-Chain Crops (Section 257.3–5)

The conservation of the nation's natural resources is one of the Agency's highest priorities. The application of sewage sludge, as well as other solid wastes, to the land surface or incorporation within the root zone of crops may provide significant benefit through the addition of organic matter, nitrogen, phosphorus and certain other essential trace elements to the soil. Specifically, land application of solid waste coupled with good management techniques for enhancement of parks and forests and reclamation of poor or damaged terrain is a desirable land management technique.

Application of solid waste to agricultural lands may also be an environmentally acceptable method of disposal. However, when improperly managed, the application of solid waste to agricultural lands can create a potential threat to the human food chain through the entry of toxic elements, compounds, and pathogens into the diet. (It should be noted that pathogens are covered under the Disease section of the criteria.) In developing these criteria, the Agency attempted to achieve the benefits of resource conservation while at the same time providing for protection of public health and the environment. In recognition of the above public health concerns, the Agency prefers the application of solid waste to non-food-chain land rather than to agricultural lands. However, the Agency believes that food-chain land application practices which comply with these criteria will pose no reasonable probability of adverse effects on public health or the environment.

This section is only concerned with disposal activities affecting food-chain crops. The other sections of the criteria apply to all disposal activities, including those occurring on lands producing food-chain crops. However, solid waste facilities and practices are only affected by this section if the site of disposal is also a field for production of food-chain crops.

In their role as guidelines under Section 405 of the Clean Water Act the criteria define the responsibility of owners and operators of POTW's when they apply sewage sludge directly to the land. In an effort to encourage the beneficial use of sludge in small communities EPA is concerned that these criteria could present an unwarranted administrative burden upon such communities. Therefore, EPA will explore the possibility of reducing monitoring and recordkeeping requirements for those POTW's with small design capacity which do not have significant industrial inflow and which generate a sludge with a low contaminant level. Such reduced requirements for facilities which apply sludge to land used for the production of food-chain crops would be a part of future regulations or guidance designed to implement Section 405. EPA is considering using a design capacity of 1.0 million gallons or less per day to define "small" facilities and cadmium concentrations of less than 25 mg/kg (dry weight) to define "low-contaminant" sludge.

This section of the criteria is being issued today as an "interim final" regulation. This means that, while the regulation is "final" and legally enforceable, EPA is seeking further public comment on the regulation. If changes are warranted by suggestions or new information generated during the public comment period, EPA is quite willing to modify this section.

The "interim final" approach has been recognized by the courts as a permissible means for EPA to use when trying to satisfy the competing demands placed on its rulemaking efforts. Particularly where EPA is under court order to issue regulations by certain dates, this approach has been used to satisfy the spirit of the court's order without curtailing opportunity for additional public participation in the rulemaking process.

These criteria are subject to the mandate of the U.S. District Court for the District of Columbia in *State of Illinois v. Costle*, No. 78–1689 (D.D.C. Jan. 3, 1979). Under the order of that court the criteria were to be issued by July 31, 1979, and EPA intends to satisfy the spirit of that order. EPA believes that the standards established in this section provide a reasonable approach to the environmental problem at issue. However, the public has not had a full opportunity to comment on some of the technical data and analyses supporting this portion of the regulation. The "interim final" approach is appropriate because it allows the Agency to accommodate these two competing interests. It achieves substantial compliance with the court mandate while allowing full public participation in the rulemaking effort.

As proposed, this section of the criteria addressed four general categories of pollutants: (1) Cadmium; (2) pathogens; (3) pesticides and persistent organics; (4) ingestion of toxic organic chemicals and heavy metals (especially PCB's and lead). In the final regulation this section addresses cadmium and PCB's. Pathogens are considered under the disease criterion (§ 257.3–6). Lead, pesticides and persistent organics will not be addressed at this time because current information available to the Agency is inadequate to support specific standards. EPA will investigate the possibility of adding more pollutants to the criteria at a later date.

(1) *Cadmium.*—The proposed criteria included two approaches for the land application of solid wastes containing cadmium. The first approach incorporated four site management controls: Controls of the pH of the solid waste and soil mixture; annual cadmium application limits that were reduced over time; cumulative cadmium application limits based on soil cation exchange capacity (CEC); and a restriction on the cadmium concentration in solid wastes applied to facilities where tobacco, leafy vegetables and root crops are grown. The second approach required comparability of the cadmium content of crops and meats marketed for human consumption to the cadmium content of similar crops and meats produced locally where solid waste had not been applied. Also, a contingency plan was required which identified alternative courses of action that would be taken if the cadmium levels were not found to be comparable. This approach was only available to facilities possessing the necessary resources and expertise to adequately manage and monitor their operations to assure such comparability.

In the final regulation, application of solid waste to land is specified as a disposal practice in which the solid waste is applied to within one meter (three feet) of the surface of the land. That distance was selected to represent the root zone of food-chain crops, where uptake of cadmium by plants is likely to occur.

The final regulation maintains the same general approach as the proposed regulation. Under the first option controls are placed on both annual application rates and maximum cumulative loadings. The provision mandating that the pH of the mixture of soil and solid waste be maintained at 6.5 has been changed to a requirement that the pH be at 6.5 or more at the time of each solid waste application (except when cadmium concentrations are 2 mg/kg or less in the solid waste).

While the annual application rate limits are basically the same as those in the proposed regulations, two changes have been made. The limit for annual cadmium application to "accumulator" crops is now 0.5 kilograms per hectare/yr. (In the proposed regulation the limit was expressed in milligrams per kilogram dry weight of waste.) In addition, the annual application rate limit for all other crops will be phased in over a slightly longer time period than that which was proposed.

The limits on cumulative loadings are also basically the same as those in the proposed regulation. However, they have been modified to account for pH effects. Where natural soil background pH is at 6.5 or greater, or where the natural soil background pH is less than 6.5 but safeguards exist at the site which will assure that the soil pH will be maintained at 6.5 or greater for as long as food-chain crops are grown, the maximum limits contained in the proposed regulation are applicable. In all other situations maximum cumulative loadings may not exceed 5 kg/ha.

As in the proposed regulation, there is a second approach that would allow unlimited application of cadmium providing that four specific control measures are taken: First, the crop grown can only be used as animal feed. Second, the pH of the soil must be maintained at 6.5 or above for as long as food-chain crops are grown. Third, a facility operating plan must describe how the animal feed will be distributed to prevent human ingestion. The plan must also describe measures that will be taken to prevent cadmium from entering the human food-chain due to alternative future land uses of the site. Fourth, future owners are provided notice (through provisions in land records or property deed) that there are high levels of cadmium in the soil and that food-chain crops should not be grown.

EPA received many comments on the cadmium controls in the proposed regulation. In order to clearly explicate the final standard and respond to major public comment, this preamble will discuss the issues under five headings: (a) Health effects; (b) trace amounts of cadmium; (c) maximum cumulative loadings; (d) annual rates of application; and (e) closely controlled facilities.

(a) *Health Effects of Cadmium.*—The comments that were received exhibited widely divergent views on the health implications of cadmium contained in solid waste. As a result, the Agency reexamined the available scientific data and reached the following conclusions.

A variety of adverse health effects have been documented in humans and experimental animals under conditions of acute as well as chronic exposure to cadmium. While acute health effects in humans are generally caused by high-level occupational exposure through inhalation, chronic health effects may result through the diet and cigarette smoking, which are the major routes of cadmium intake for most people. The kidney is considered the main target organ for chronic exposure to cadmium, although chronic respiratory effects have been observed in long-term occupational settings. Upon ingestion or inhalation, the metal gradually accumulates in the kidney cortex. According to both clinical-epidemiological and model-calculation data, the critical concentration of cadmium in the kidney cortex is approximately 200 micrograms per gram (ug/g), wet weight, in the average human. At that level, renal tubular dysfunction, characterized by proteinuria, is expected to occur. This condition is manifested by the excretion of B_2-microglobulin, which is the earliest discernible laboratory evidence of organ damage. Although mild or moderate increases in excretion of B_2-microglobulin, per se, are not life-threatening, the condition is often irreversible, and continued excessive exposure to cadmium can lead to other renal function abnormalities (such as glycosuria, amino-acid uria, and phosphaturia).

Several autopsy studies have been performed to determine the cadmium content of various types of body tissue, such as the kidney and the liver. These studies confirm that the kidney is the organ which contains the highest concentration of cadmium and that the concentration of the metal increases with age. Further, the autopsy data indicate that for the general United States population (smokers included) the mean cadmium levels reached in the kidney cortex are in the range of 20–35 micrograms per gram wet weight. Smoking would tend to raise the mean cadmium concentration since the data also show that smokers have approximately double the concentration of non-smokers. There were significant individual variations from the mean value, with some concentrations over 60 micrograms per gram.

Various models have been established to calculate the daily level of exposure which will result in a cadmium concentration of 200 ug/g in the kidney cortex, i.e., the concentration at which tubular proteinuria can be expected to occur. EPA scientists reviewed these models and have reached the following consensus. Ingestion of 440 micrograms of cadmium per day over a 50-day period is a reasonable estimate of the amount of cadmium necessary for 50 percent of the individuals within the population to develop proteinuria. It is significant to point out, however, that there are many individuals who may develop proteinuria at lower exposure levels. The metabolic model, developed by Friberg, shows that ingestion of about 200 micrograms per day over a 50-year period is the level at which most sensitive individuals accumulate 200 ug/g cadmium in the kidney cortex. The dose-response model, developed by Kjellstrom and Nordberg, reflects a non-threshold dose-response. Using this model, daily cadmium exposures in the range of 100 to 125 micrograms would produce renal dysfunction in about 5 to 8 percent of the population after some 50 years of exposure.

These model calculations are based on the assumption that all cadmium intake is through the diet. Therefore, allowances are necessary for non-dietary routes of cadmium intake, such as smoking or occupational exposure. (The contribution of smoking to cadmium intake is readily quantifiable. Available data show that smoking one pack of cigarettes a day is roughly equivalent to cadmium retention in the body resulting from a dietary intake of 25 micrograms.)

In 1972, the World Health Organization (WHO) used a model such as the ones referred to above to arrive at a recommended maximum cadmium intake level through the diet. Employing a margin of safety to allow for non-dietary intake sources and for sensitive individuals, the WHO recommended that human exposure to cadmium should not exceed 57 to 71 micrograms per day from the diet.

There is no general consensus on the current dietary cadmium levels in the United States, but there is wide agreement that the daily intake levels vary significantly according to individual dietary habits. Based on annual market basket surveys conducted by the Food and Drug Administration (FDA), the median ingestion level is about 39 micrograms

per day and the mean ingestion level is about 72 micrograms per day for male teenagers, who have the highest per-capita food intake among any age group. Any average value as an estimate for cadmium intake through the diet has the shortcoming that it does not represent those individuals with unusual dietary habits, such as the heavy consumption of cadmium-rich foods (e.g., leafy vegetables); and the available evidence shows that there is a wide range of dietary cadmium exposure among the population.

One other source for estimating cadmium intake levels in the human body was reviewed by the Agency. This comprises chemical analysis of fecal excretions. The fecal excretion studies are based on the experimental finding that only about 6 percent of ingested cadmium is retained in the body, while the rest is excreted. Three recent fecal excretion studies derived the daily mean dietary cadmium intake estimate of about 20 micrograms for American teenage males. The reasons for the significant differences between the results of the fecal excretion studies and the FDA market basket surveys are not yet understood. The fecal excretion studies also showed significant individual variations in derived cadmium ingestion levels. Thus, five percent of the population appeared to exceed 30 to 40 micrograms per day intake, and one percent appeared to exceed 50 micrograms per day intake.

There are population groups for whom an increase of cadmium levels in the diet may be more significant than for the average population. Among these are the smokers, who are known to receive an added body burden of cadmium via inhalation. Vegetarians also may be experiencing higher cadmium intake than the average population, since certain vegetables contain significantly more cadmium than other food items. Also, the scientific literature indicates that certain nutritional deficiencies, such as low calcium, zinc, or protein, result in a marked increase in cadmium absorption through the gastrointestinal tract, while individuals with vitamin D deficiency are more susceptible to injury by a given level of cadmium in the body.

Both the FDA approach and the fecal study approach are legitimate means of estimating current average intakes of cadmium. However it is also clear that "sensitive" individuals may be experiencing much higher absorption of cadmium. Since under this regulation higher estimates of current intake will mean that lower levels of cadmium will be allowed to be added from solid waste disposal, EPA believes that it should use the higher estimate of current diet levels in order to provide greater protection for sensitive individuals. Therefore, as will be explained later, the criteria will rely on the FDA estimate of 39 ug/day as the median level in the diet, which was derived by averaging the median levels over several years.

In addition to the concerns over renal toxicity, several commenters raised questions over potential oncogenic, carcinogenic, mutagenic and teratogenic effects of cadmium. Based on an evaluation of the currently available scientific data, the Agency has concluded that the evidence that cadmium may cause these effects in man is suggestive but not decisive enough to serve as the basis for this regulation. Consequently, the limitations on cadmium incorporated in the criteria are based on the substantial evidence of that metal's impact on the kidney, specifically the renal cortex, which the Agency considers to be the main target organ for chronic environmental exposure. However, if cadmium is determined to cause the aforementioned effects in humans, the Agency will reevaluate the regulations and establish appropriate new limits.

The Agency is concerned over the conduct of any practice which could significantly increase the amount of cadmium in the diet beyond current levels. Therefore, it is the intent of this rulemaking to minimize the movement of cadmium into the human food chain from solid waste applied to the land. After an evaluation of the full range of scientific information concerning cadmium, EPA has decided to make the following assumptions to serve as a basis for setting limits on solid waste application.

First, the Friberg model, which defines 200 ug/day as the "danger level" in the human diet, is most appropriate for regulatory purposes. There is more data to validate that approach than there is for the Kjellstrom dose-response model.

Second, to provide an adequate safety margin in defining the risk from solid waste applied to food-chain crops, the criteria should be concerned about daily dietary intake of 70 ug/day of cadmium.

Third, for analytical purposes, EPA will assume a maximum increment of 30 ug/day in conjunction with high risk diet assumptions. In order to relate the health effects analysis to the diverse and complicated data that exist on crop uptake, it is necessary to make a judgment about the incremental cadmium ingestion that must be prevented by this regulation. Clearly, this is a difficult task in light of the various sensitivities of particular individuals, the long-term nature of the health risk and the various dietary patterns which may occur.

In using this assumption, EPA is not stating that such an increase in the diet of the average American is acceptable. An increase of that magnitude in the *average* diet would clearly be unacceptable. For the average to increase by this increment, many individuals would be experiencing much higher cadmium intakes.

It must be emphasized that the 30 ug/day figure will be used in an analysis of a high-risk situation. That high-risk situation is one where an individual receives 50% of his vegetable diet from sludge-amended soils for a period of 40 to 50 years. While such a situation could occur, due to a wide variety of other mitigating factors most people will experience much smaller exposures to cadmium.

Realizing that any numerical expression of unacceptable health risk can only be an approximation, EPA used the 30 ug/day as a reasonable assumption for this analysis. The Agency's Office of Research and Development determined that daily cadmium intake of about 200 ug/day could lead to serious health effects. To provide a margin of safety, that office suggested that a limit of 150 ug/day from all sources of exposure be considered for regulatory purposes. EPA is also concerned about the added cadmium which may enter the human body due to smoking. Heavy smokers (those smoking 3 packs of cigarettes per day) can expect to add the equivalent of 75 ug of cadmium to their daily intake.

Reducing the 150 ug/day by that figure gives an estimate of the "danger level" for dietary intake. The result of that calculation (75 ug/day) is close to the World Health Organization's recommendation of 57–71 ug/day. EPA decided that a level of 70 ug/day represented a reasonable limit on the maximum acceptable daily dietary intake of cadmium. The FDA's estimate of current levels of cadmium in the median American is 39 ug/day. Therefore the 30 ug/day assumption would keep cadmium ingestion within the limit of 70 ug/day.

(b) *Trace Amounts of Cadmium.*—Where the cadmium content of sludges is quite small the likelihood of a significant uptake in plants is also relatively small. Several commenters suggested that the requirement for pH control (6.5 at time of waste application) should not apply to those solid wastes which contain only trace amounts of cadmium. EPA agrees with this comment and, therefore, has exempted wastes with cadmium concentrations of 2 mg/kg (dry weight) or less from the pH

control provision. This modification would allow such wastes as food processing residuals to be landspread without unnecessary pH control measures.

(c) *Maximum Cumulative Loadings of Cadmium.*—Comments received on the cumulative cadmium application limits, soil pH, and soil cation exchange capacity (CEC) are interrelated and, therefore, will be discussed concurrently. In general, commenters felt that varying degrees and combinations of the three aforementioned parameters will limit the uptake of cadmium by food-chain crops.

Most commenters agreed that it is necessary to control the pH of the solid waste/soil mixture to minimize the uptake of cadmium by food-chain crops. The final regulation recognizes that need by requiring that the pH of the soil/solid waste mixture be 6.5 at the time of application. The proposed regulation required that pH be maintained at 6.5 for as long as food-chain crops were grown. Several commenters pointed out that such a provision would be difficult to implement or enforce in many situations. The Agency agrees that this may be true in some instances but did not want to preclude the application of solid waste to food-chain crops where soil pH can be maintained at acceptable levels.

These considerations prompted EPA to modify the standard for cumulative loadings to delineate three soil categories based on pH: (1) Those with natural pH of 6.5 or above; (2) those with natural pH below 6.5; and (3) those with natural pH below 6.5 but where pH will be maintained at or above 6.5 for as long as food-chain crops are grown. The criteria establish the same set of standards for categories (1) and (3) but tighten the standard for soils with the more dangerous condition reflected in category (2).

The prime data base for the calculation of acceptable cumulative loadings was a set of field studies on former landspreading sites where crops were grown at least two years after application of solid waste. This approach was appropriate for setting maximum cumulative limits because such standards are primarily concerned with future uses of landspreading sites for home gardening or commercial agriculture.

These data correlated cumulative loadings of solid waste in the soil to plant uptakes of cadmium in representative leafy vegetables. From existing data comparing uptakes of leafy vegetables to other basic food classes, EPA calculated the ratio of uptakes in leafy vegetables to those in other classes. The ratios were than applied to the field data to predict what uptakes would have been if other types of crops had been grown on former landspreading sites. This gave an estimate of cadmium uptakes that would be likely to occur in fields with differing cumulative levels of cadmium.

EPA then used a "diet scenario" analysis to translate the plant uptake levels into predictions about the amount of cadmium entering the human food chain. The Agency's assumptions about intake of the various food classes followed that of the U.S. Food and Drug Administration's 1974 Total Diet Studies. From this, EPA calculated the additional cadmium entering the human diet, assuming varying levels of dependence on crops from waste-amended fields. (EPA calculated intakes for situations where 100%, 50%, 25% and 10% of the diet come from such fields.)

The 5 kg/ha limit for acid soils (below 6.5 pH) was established by relating the diet scenario analysis to the health effects analysis. The diet scenario analysis indicated that on mildly acid soils (pH=5.8) 5 kg/ha of cadmium only increased dietary cadmium by 22 ug/day (making the assumption that no more than 50 percent of one's vegetable diet is derived from sludge fields). However, a cumulative loading of 7 kg/ha on very acid soils (pH=4.9) increased the dietary level by 211 ug/day. This marked increase in dietary cadmium may be attributed to both the increase in the cumulative cadmium application rate from 5 kg/ha to 7 kg/ha and the drop in pH from 5.8 to 4.9. Such an increase is far above the acceptable level in the diet. Therefore, EPA has established the maximum cumulative limit at 5 kg/ha for acid soils.

Soil cation exchange capacity was also utilized in calculating the permissible loadings for soils with pH of 6.5 or greater. The evidence available to EPA indicates that CEC is an important index of soil factors in limiting uptakes in high-pH soils. However, in highly acidic soils, pH becomes the dominant factor affecting plant uptake.

Soil CEC is an easily measured index of those properties, particularly the nature and content of clay and organic matter, that affect the soil's ability to absorb cadmium. High CEC levels mean that a soil has a greater capacity to adsorb cadmium and thus prevent that cadmium from entering plants grown in the soil. Several studies have demonstrated the inverse raltionship between CEC and plant uptake of cadmium.

The proposed cadmium standard recognized the importance of CEC and established differing limits depending on CEC levels in the background soil. The actual numbers selected were based on recommendations from recognized agricultural research groups (including the North Central Regional Extension Services and the U.S. Department of Agriculture). Several commenters supported the selected levels as providing adequate protection against excessive uptake of cadmium.

Where possible, EPA also used existing field studies on former landspreading sites to validate those recommendations. An application of the diet scenario analysis to available data on high-pH soils with mid-range CEC's supports the conclusion that the levels established in the recommendations provide adequate protection to the public. As an example, again assuming that half of the vegetable diet comes from sludge-amended fields, the data show that a cumulative level of 7 kg/ha could result in an 11.9 ug/day dietary increment, while a level of 15 kg/ha could result in a 39.2 ug/day increment. Using the 30 ug/day increment assumption discussed previously, the 15 kg/ha loading is too high, while the 7 kg/ha loading is well within the acceptable range. EPA believes that this analysis supports the selection of 10 kg/ha is an appropriate standard for soils with a mid-range CEC. In light of the other clear evidence of the role of CEC in limiting uptake EPA believes that it is, therefore, appropriate to use the limits recommended by the research community.

The Agency recognizes that there are some facilities with naturally acid soils where land management practices can be implemented with adequate safeguards to assure that the soil pH will be maintained at 6.5 or higher for as long as food-chain crops are grown. Where such safeguards exist, the criteria provide an option to permit such facilities to use the CEC-based cadmium loading rates. However, the Agency is concerned that the application of up to 20 kg of cadmium per hectare may result in significant cadmium uptake by crops if the pH is not controlled for as long as food-chain crops are grown. Therefore, unless the facility can clearly demonstrate long-term control over pH, the Agency strongly recommends that those facilities having naturally acid soils select the option which limits the cumulative cadmium application rate to 5 kg/ha.

The Agency considered establishing even lower cumulative cadmium application rates on soils with a natural pH that is very highly acidic (including prohibition on landspreading on soils

with very low pH). While it is clear that leafy vegetables, root crops and tobacco tend to accumulate cadmium in their tissues and, therefore, are more sensitive to high soil cadmium concentrations under acid soil conditions, insufficient data exist to establish more restrictive cumulative levels for such soils. The Agency is continuing to examine this situation and will, upon development of additional data and information, propose new cumulative limits for highly acidic soil. However, in recognition of the higher uptake of cadmium by these crops, the Agency recommends avoiding the application of solid waste containing cadmium (e.g., sewage sludge) on very acidic soils used for the production of leafy vegetables, root crops and tobacco and discourages the application to agricultural land which is likely to be converted to production of such crops.

The Agency also considered requiring a soil analysis for total cadmium prior to the application of solid waste and adjusting the cumulative limit for cadmium additions downward to account for soils with high background cadmium concentrations. However, the Agency was not able to justify the use of a background correction factor since there is a paucity of data concerning the relationship between naturally occurring cadmium and solid waste-added cadmium, with respect to crop uptake. Until these questions are resolved, the Agency recommends that a soil test be performed prior to initiating landspreading, in order to establish the background conditions at the site. Further, for those facilities which have unusually high background cadmium soil concentrations, the Agency recommends that consideration be given to reducing cadmium application.

(d) *Annual Cadmium Application Limit.*—Comments received on the proposed annual cadmium application limits were widely divergent. Several commenters stated that the proposed cadmium limitation of 0.5 kilogram per hectare (kg/ha) per year was unnecessarily restrictive. The indicated reasons were primarily that the reduction in solid waste application would result in increased costs and that the potential risk to human health was not sufficient to justify that reduction. A second group of commenters suggested that the annual limitations on cadmium application were not sufficiently protective of public health and should be reduced much further or the application of cadmium-containing solid waste to agricultural lands be prohibited altogether, since the proposed limits would permit the entry of significant quantities of cadmium into the human diet.

Comments were also received on the proposed cadmium concentration limit of 25 mg/kg for solid wastes applied to facilities where tobacco, leafy vegetables or root crops are grown for human consumption. Some commenters viewed the proposed limit as being overly restrictive, while others recommended that cultivation of those crops which tend to accumulate cadmium to relatively high levels should not be allowed on waste-amended soils.

EPA believes that annual cadmium application limits are particularly important on those active sites which are nearing the cumulative cadmium application limits. As the total amount of soil cadmium at such sites begins to reach the cumulative loading limits, both the cadmium previously applied to the soil and new additions of cadmium from solid waste will affect crop uptake of cadmium. In setting annual application rates EPA must account for this factor.

Available research indicates that there are significant differences in uptake among crop species. It would, however, be impossible to write specific cadmium limits for each crop type based on the available data. Moreover, such an approach would complicate the regulation, making implementation confusing and impractical.

In looking at individual crop uptakes, however, EPA determined that there is a set of "accumulator" crops which tend to absorb very large quantities of cadmium as compared to all other crops. Tobacco, leafy vegetables and root crops constitute the "accumulator" class. In order to provide an adequate margin of safety EPA believes that the annual application rates should be based on data from representative "accumulator" crops. This assures that when a mix of crops is grown on sludge-amended fields no crop will have dangerous up takes of cadmium.

The available data indicates that significant increases of cadmium occur even with small applications of waste. For example, annual rates of approximately 0.7 kg/ha applied to soils which have not received sludge previously have been shown to triple the amount of cadmium in lettuce leaves. Using the diet scenario analysis it can be demonstrated that application rates of 0.8 kg/ha can lead to dietary increases of 10.3 ug/day from leafy vegetables alone. Other data indicate that this level may be even greater where cadmium from landspreading in previous years is already in the soil. Under these circumstances EPA concluded that an annual limit of 0.5 kg/ha is necessary to provide adequate protection to the public health.

EPA recognizes that not all crops will present the same risk as accumulator crops, particularly in the first few years of landspreading. However, due to the factors discussed above applications of solid waste should eventually be limited to 0.5 kg/ha for all food-chain crops. Therefore, the Agency has decided to distinguish between accumulator and non-accumulator crops in the annual limits. When wastes are applied to accumulator crops the annual limit will be 0.5 kg/ha immediately. For all other crops a phased reduction will be allowed.

The criteria limit additions to 2.0 kg/ha until June 1984 and 1.25 kg/ha until December 1986. This gives communities and industry the time necessary to implement programs, such as cadmium source control and pretreatment of industrial discharges, to reduce current cadmium concentrations in their wastes or to develop alternative disposal practices. The schedule has been slightly relaxed from the proposed criteria in order to make it compatible with the Agency's pretreatment program schedule. The Agency believes that allowing higher cadmium application rates than 0.5 kg/ha through 1986 will have a negligible human health effect because the health impacts from cadmium are long-term and cumulative in nature. Based on assumptions similar to those used in the "diet scenario" analysis (see the discussion of cumulative loading limits), it can be shown that during this initial period applications of 2.0 kg/ha do not present significant health risks.

The proposed regulation also distinguished between accumulator and non-accumulator crops, and that approach is being maintained in the final criteria. However, the proposed limit for accumulator crops was expressed in terms of sludge quality (cadmium concentration in the waste not to exceed 25 mg/kg dry weight). Calculations show that a cadmium concentration limit of 25 mg/kg in the solid waste will not necessarily preclude application rates above 0.5 kg/ha, the level which EPA believes is more directly related to the human health risk.

For example, some solid wastes are often applied to the land as soil conditioner or mulch. Such a solid waste (e.g., composted sewage sludge), at a cadmium concentration of 25 mg/kg, would contribute cadmium to the soil at the rate of about 1.5 kg/ha when applied 1.3 cm (0.5 inch) thick to the land surface. Therefore, EPA decided to integrate this standard with the rest of

the section and express the limit in kg/ha.

(e) *Closely Controlled Facilities.* Substantial public comment was received on the second major approach proposed for controlling dietary intake of cadmium via the application of solid waste to land. This approach required cadmium levels in crops or meats produced from solid waste-amended soils to be comparable to cadmium levels in similar crops or meats produced locally where solid waste had not been applied. Several commenters stated that this approach would be very difficult to implement because of problems in establishing an effective system to monitor and control agricultural products. Moreover, terms such as "local market" and "comparable levels" are vague and, therefore, subject to varying interpretations.

Commenters suggested two major alternatives to the proposed approach; both of these were considered by the Agency. They were dilution of cadmium-containing crops and meats in the market place, and establishment by the FDA of maximum permissible levels of cadmium in food products. Dilution in the market place was not selected as a control option, partly because of the difficulty of implementation. More importantly, the dilution of a toxic contaminant into the food chain is an unacceptable long-term policy because it could, over a number of years, significantly increase the total body burden in humans.

The FDA indicated that the alternative approach of establishing a tolerance level for cadmium in food products commodities; however, several years will be required to obtain the statistically meaningful data necessary to establish tolerance levels in agricultural crops.

Based on the public comments received, the proposed criteria have been modified to simplify implementation yet still provide adequate health protection. As promulgated, this cadmium management approach sets forth four requirements which will serve to minimize the increase of cadmium in the human food chain.

First, only animal feed may be grown under this option. Research data show that animals excrete most of the ingested cadmium; the small amount that is absorbed is accumulated in viscera such as the kidney and the liver. The likelihood of significantly increasing individual or general dietary cadmium levels through animal feeds is negligible. Several commenters suggested that the Agency consider prohibiting the marketing of livers and kidneys of such animals for human consumption. There is some question whether such an approach is within EPA's authority under the Act. Moreover, control of distribution in this manner is unnecessary because the marketing of organs from such animals would not result in a significant increase of cadmium in an individual's diet.

The second control to assure proper management of the facility is the requirement that the solid waste and soil mixture have a pH of 6.5 or greater at the time of solid waste application or at the time the crop is planted, whichever occurs later. The Agency believes that maintaining the soil pH at a near-neutral level is particularly important under this cadmium management approach where the cadmium application rate is unrestricted.

The third requirement calls for the development of a facility operating plan. The purpose of this plan is to demonstrate how the animal feed will be distributed and what safeguards are utilized to prevent the crop from becoming a direct human food source. EPA is primarily concerned about crops such as corn, wheat and soybeans which may be used for animal feed or direct human ingestion. In addition, the facility operating plan should describe the measures that have been taken to safeguard against possible health hazards resulting from alternative future uses of the land. Some future land uses, such as the etablishment of vegetable farms or home vegetable gardens, could result in significant dietary increases of cadmium. Such provisions in the facility operating plan could cover a range of options, such as dedication of the facility as a public park, placement of fresh top soil over the site, or removal of the contaminated soil.

The fourth requirement is a stipulation in the land record or property deed which states that the property has received solid waste at high cadmium application rates and that foodchain crops should not be grown, due to a possible health hazard.

(2) *Poly-chlorinated Biphenyls (PCB's).* The proposed criteria required that solid waste containing pesticides and persistent organics, when applied to land used for the production of food-chain crops, not result in levels of these substances in excess of the tolerances set pursuant to the authorities of the Federal Food, Drug and Cosmetic Act. The proposed criteria also required that solid waste of concern due to its toxic organic chemical or heavy metal content (e.g., PCBs and lead) not be applied to a site so that the freshly applied solid waste may be directly ingested by animals raised for milk or by humans.

At this time, EPA has decided not to establish tolerances for pesticides and persistant organics in solid waste. They were not developed because there were no adequate data on the amounts of these substances in solid waste to demonstrate a public health risk. An ongoing study is expected to obtain information on the amount of pesticide and persistent organics in sewage sludge to help develop a standard relating to this subject. After reviewing existing FDA tolerance limits for such substances, EPA has determined that they are impractical as a basis for standards for solid waste application to food-chain lands, because those tolerance limits are based on food contamination from pesticide application. At this time there is almost no information available indicating the relationship between the level of such substances in solid waste and the resulting food contamination. Direct application of the FDA tolerance limits would require extensive chemical analysis for a very large number of pesticides and toxic organic substances that might be present in the solid waste in trace amounts. Other data sources also did not provide an adequate basis for setting standards. The Agency will continue to evaluate data on this subject and explore this problem with the FDA and other interested parties. It is possible that standards on this subject could be part of pending sewage sludge disposal guidelines under Section 405 of the Clean Water Act, as well as future amendments to the criteria.

While EPA is concerned about the health problem posed by ingestion of lead, the Agency is not aware of any evidence that increased lead ingestion by dairy animals results in elevated lead levels in milk. Consequently, the Agency is not able to promulgate a standard for lead based on ingestion of solid waste by dairy animals, as was suggested by some commenters. While direct ingestion of lead by children, which may occur when they play in areas where sludge has been applied, may also be a concern, there is limited data available to establish a standard for this situation. The Agency intends to explore this potential problem further in the pending sewage sludge disposal guidelines under Section 405 of the Clean Water Act.

In establishing the standard for PCB's, the Agency looked to tolerance levels established by the FDA to define the health risk. The FDA has established maximum tolerance levels of 0.2 mg/kg (actual weight) for animal feeds and 1.5 mg/kg (fat basis) for milk. The standard

promulgated in the criteria is designed to prevent PCB levels from exceeding these levels due to application of solid waste to fields growing animal feed. When solid wastes are applied to the land surface so as to allow direct contact between the solid waste and the crop, the animal feed can become contaminated. By incorporation of the solid waste beneath the soil surface (generally below the root zone of pasture grasses), the amount of ingested PCB's is greatly reduced. Therefore, EPA has concluded that the proper regulatory strategy is to require incorporation of the solid waste into the soil when the PCB level in the waste material is so high that direct contact between the crop and the soil could cause the FDA tolerances to be violated.

Based on assumptions recommended by FDA, EPA calculated the concentration level of PCB's in solid waste which might cause the FDA tolerances to be violated. These calculations established the PCB concentration threshold at 10 mg/kg. Generally, then, any sludge which exceeds that level of PCB's must be incorporated into the soil when applied to land used for the production of food-chain crops.

There is, however, one exception to that requirement. Wastes which exceed 10 mg/kg of PCB's may be applied to fields without incorporation if testing of the animal feed grown on the field demonstrates that the FDA standards will not be violated. If such testing indicates that the FDA standards have been violated, then the solid waste disposal activities leading to the contamination have violated the criteria.

It should be noted that the calculation of the 10 mg/kg level for PCB levels in the waste is based on the assumption that the only way PCB's enter a grazing animal is through the adherence of waste material to the vegetation eaten. EPA recognizes that a certain amount of PCB's may enter the animal due to direct ingestion of soil. At this time, however, EPA does not have sufficient data to know how that factor should be used in the analysis. Moreover, the recommendations from FDA did not take that factor into consideration.

As discussed earlier this portion of the regulation is being issued as "interim final", which means that further public comment is solicited. EPA encourages the public to provide suggestions and data that would help the Agency to account for the direct ingestion of soil in setting a PCB standard.

I. Disease (Section 257.3–6)

Solid wastes can contain pathogenic bacteria, viruses and parasites which can infect both humans and animals. Wastes can provide food and harborage for rodents and flies which are capable of transmitting these disease organisms to humans and animals. Other routes of disease transmission to humans and animals include direct contact with wastes during landspreading operations, contact with soil or plants which have been contaminated with wastes, or ingestion of food and water contaminated with wastes.

The proposed criteria required protection of public health by control of disease vectors. This requirement was to be met through minimizing the availability of food and harborage for disease vectors or through other techniques where appropriate. In another section, the proposed criteria required stabilization of solid waste of concern due to its pathogen content when applied directly to the surface of land used for the production of food-chain crops. In addition, a one-year waiting period was prescribed before growing human food crops which are normally eaten raw. In yet another section, the proposed criteria required controlled access to solid waste disposal facilities so as to minimize exposure of the public to exposed waste.

The final disease criterion combines provisions concerning vectors and pathogens. The provision concerning vectors calls for the minimization of on-site populations of disease vectors. Periodic application of cover material (usually at the end of each operating day) or other appropriate techniques should satisfy the performance standard.

Sewage sludge and septic tank pumpings are the solid wastes which are generally applied to the surface of the land and are of concern due to their pathogen content. To protect public health, the criteria provide for control of pathogens in disposal of these wastes by one of several operational approaches as described below.

Sewage sludge applied to the land surface or incorporated into the soil must be treated by a Process to Significantly Reduce Pathogens. Aerobic digestion, air drying, anaerobic digestion, composting, lime stabilization, or other similar techniques will satisfy this requirement. In addition, public access to the site must be controlled for at least 12 months, and grazing by animals whose products are consumed by humans must be prevented for at least one month.

Septic tank pumpings must be treated by one of the Processes to Significantly Reduce Pathogens, unless public access to the facility is controlled for at least 12 months and grazing by animals whose products are consumed by humans is prevented for at least one month. Neither set of provisions for sewage sludge or septic tank pumpings apply where these wastes are disposed of by a trenching or burial operation.

Further public health protection is required when sewage sludge or septic tank pumpings are applied to land where crops for direct human consumption are grown less than 18 months after waste application. In these instances, the waste material must be treated, prior to application, by a Process to Further Reduce Pathogens. Beta ray irradiation, gamma ray irradiation, pasteurization or other equivalent methods will satisfy this requirement if performed after a Process to Significantly Reduce Pathogens. High-temperature composting, heat drying, heat treatment and thermophilic aerobic digestion will satisfy this requirement without prior treatment. A Process to Further Reduce Pathogens is not required if there is no contact between the solid waste and the edible portion of the crop, as long as the solid waste is treated by a Process to Signficantly Reduce Pathogens prior to application. In addition, public access to the facility must be controlled for at least 12 months after solid waste application, and grazing of animals whose products are consumed by humans must be prevented for at least one month.

Like the portion of the criteria concerning application of solid waste to food-chain crops (§ 257.3–4), the sewage sludge and septic tank pumpings provisions of the disease section are being issued as an "interim final" regulation. While there was extensive public review and comment on the proposed regulation, the public has not had a full opportunity to examine and analyze the new data and technical support for this section. At the same time EPA believes that it must promulgate this portion of the regulation in order to satisfy the spirit of the court order mandating issuance of the criteria. EPA will fully review all comments and make changes in the regulation if such modifications are warranted by the data.

(1) *Disease Vectors.* Some commenters sought a more specific statement of the performance objective of this provision. EPA explored the possibility of developing a numerical performance objective, but determined that such a standard would not be meaningful. While the risk from disease vectors is very real, the risk cannot be translated into a measure of "rats per square meter" or "flies per cubic foot of air space." Moreover, such performance

standards could not be measured with any accuracy. Therefore, EPA made the standard more specific by requiring minimization of on-site populations of disease vectors. This statement of the standard leaves no question that the facility must not be a breeding ground, habitat or feeding area for vector populations. At the same time, it provides some flexibility in the implementation of the standard.

Several commenters indicated that, since there are a number of techniques to protect public health from disease vectors, the phrase "minimizing the availability of food and harborage for vectors through periodic application of cover material" should be deleted. EPA agrees and has done so.

At most facilities which dispose of putrescible wastes, the most effective means to control rodents is the application of cover material at the end of each operating day. Other means include composting or processing the waste, so as to render it unattractive to rodents, or using rodenticides. At some facilities, disease vectors such as flies may be more difficult to control than rodents; but certain practices, such as the periodic application of cover material, can help alleviate the problems. Mosquitoes can be controlled by eliminating stagnant water for breeding, by predatory or reproductive control and, if necessary, by spraying with insecticides or repellants.

Cover material also serves other purposes: (a) It helps contain odor, litter, and air emissions, thereby improving the facility's aesthetic quality; (b) it reduces the potential for fires; (c) it reduces rainwater infiltration, thereby decreasing leachate generation and surface and ground-water contamination; and (d) it improves the facility's appearance and enhances utilization after completion.

Since periodic application of cover material is an effective, widely used and generally preferred means of controlling vectors, EPA believes that it is appropriate to specify it in the criteria. It is impractical, however, to cover some wastes. Moreover, cover material is not generally necessary for wastes which are non-putrescible, relatively stable or inert. The criteria allow for other techniques to be employed in these situations.

EPA has not included the phrase "minimizing the availability of food and harborage" in the final standard. That language would not cover such control measures as repellants, insecticides and rodenticides, which could be effective in meeting the objective of this section.

Commenters also requested a definition of the term "disease vector." Disease vectors are rodents, flies and mosquitoes, since these are the known organisms common at disposal facilities that are capable of transmitting disease.

(2) *Sewage Sludge and Septic Tank Pumpings.* In establishing regulations to protect public health from pathogen-induced disease, it must be recognized that there is a distinction between being exposed to disease-producung organisms and actually acquiring a disease. Healthy humans and animals can tolerate small numbers of pathogenic organisms without acquiring a disease. Disease normally occurs when the body's immune system is impaired, or the dose of pathogens is so great that it overwhelms the body's defense mechanism. In setting these criteria, the goal is to prevent human exposure to large numbers of pathogenic organisms due to solid waste disposal activities.

Commenters requested specification of which solid wastes are of concern due to their pathogen content. The criteria have been modified to specify sewage sludge and septic tank pumpings as the wastes which are generally applied to the surface of the land and are of concern due to their pathogen content. Although little information is available on septic tank pumpings, the relatively long residence time of the bulk of the waste material in a septic tank should reduce the density of pathogenic organisms. Therefore, the Agency has tentatively concluded that septic tank pumpings have the same general characteristics with regard to land application as partially treated municipal sewage sludge. The public is invited to submit pertinent data on this subject; the Agency will review any new information and reassess these regulations accordingly.

Sewage sludge and septic tank pumpings contain various types of pathogenic bacteria, viruses and parasites. While bacteria are greatly reduced by sunlight and drying, viruses may persist in soils and on vegetation for several weeks or months. Parasitic ova and cysts are quite resistant to disinfectants and adverse environmental conditions. Many, in fact, require a period of free-living existence in the soil before becoming infectious to man. Therefore, a major reason for requiring the control of pathogens is the potential for human ingestion of soil or plants contaminated with such wastes containing ova or cysts.

Some commenters suggested that the criteria require a "pathogen-free" sewage sludge. EPA does not believe that such regulation is necessary to avoid a reasonable probability of adverse effects on the population that may come in contact with sludge-amended fields. A greater degree of protection is needed for certain solid waste disposal practices (i.e., application to land where food-chain crops are grown), and this section provides for such protection.

The proposed regulation relied on stabilization as the principal treatment technique to reduce the risk of pathogen-induced disease. However, because the term "stabilization" conventionally related to odor control and to a lesser degree pathogen reduction, this term is no longer used in the criteria. The criteria have been revised to require that sewage sludge and, under certain conditions, septic tank pumpings be treated by a Process to Significantly Reduce Pathogens. These processes include aerobic digestion, air drying, anaerobic digestion, composting (three techniques), lime stabilization or other equivalent techniques.

EPA recognizes that not all of these processes achieve exactly the same level of pathogen reduction. Variations in weather, residence times, temperatures and other factors will influence the effectiveness of each process. The Agency also recognizes that different processes may be more or less effective in destroying certain types of pathogens (i.e., bacteria, viruses or parasites). Each process, however, has been shown to achieve a significant reduction in pathogen levels. Therefore, EPA believes that they are appropriate to achieve the objectives of this section.

The proposed regulation required controlled access to disposal facilities so as to minimize exposure of the public to hazards posed by exposed waste. The final regulation seeks to minimize exposure of the public to pathogens in the upper layers of waste-amended soils. Since pathogens in the surface soil are generally reduced to insignificant levels within 12 months of application, the criteria require that public access to the facility be controlled for that period of time. "Controlled" does not mean that all entry on the site be precluded. The term "controlled," rather than "prevented," was chosen for regulating public access, because with proper precautions there appears to be no health hazard. However, there would be a health hazard if, for example, children were permitted to play on the waste-amended soil. Therefore, fencing would be necessary if these wastes were applied to areas frequented by the general public (e.g., park lands) but fencing would not be necessary on farm land which was not available for use by the public.

This section also includes a limit on animal access to the fields for grazing

for one month after sewage sludge is applied. This is appropriate for several reasons. First, the animal acts as a first line of defense against human contact with pathogens. The products derived from the animal (meat or milk) will not contain the same level of pathogens as might enter the animal due to grazing on waste-amended fields. Second, in many cases rainfall in the one-month period after application will wash the sludge off the crop. Third, available evidence indicates that where sludge does remain on the crop, a one-month period should be sufficient for natural weather conditions (e.g., sunshine, wind) to destroy most pathogenic organisms.

The access restrictions described above are required for all facilities receiving sewage sludge, even after the waste has been treated by a Process to Significantly Reduce Pathogens. For septic tank pumpings, the access restrictions may be used as an alternative to such a Process. This is due to the fact that containment in a septic tank will result in partial pathogen reduction in the waste and should diminish its attractant potential to disease vectors such as flies and mosquitoes. However, septic tank pumpings do not undergo the kind of pathogen destruction that can occur with anaerobic digestion, because the waste is being continually reinoculated with fresh waste material. Therefore, EPA concluded that such wastes should be treated with a Process to Significantly Reduce Pathogens or be subject to the access restrictions.

As indicated earlier, special treatment is necessary for food-chain crop cultivation, where the risk of direct human consumption of crops contaminated by pathogens is higher. To provide protection, the proposed regulation relied on a one-year waiting period between waste application and use of that land for food-chain crops. The regulation now calls for the use of a Process to Further Reduce Pathogens if crops for direct human consumption are grown within 18 months of application or incorporation of the sewage sludge or septic tank pumpings. If no such crops are grown within 18 months of application, treatment by a Process to Further Reduce Pathogens is not required.

The processes chosen should essentially destroy all bacteria and viruses and greatly reduce the number of parasites in the waste material. Two sets of processes are permitted—those which are sufficient in themselves and those which must follow a Process to Significantly Reduce Pathogens in order to be effective. Processes which are adequate in themselves are high-temperature composting, heat drying, heat treatment and theromophilic aerobic digestion. Processes which must follow a Process to Significantly Reduce Pathogens are beta ray irradiation, gamma ray irradiation and pasteurization. This sequence of processes is necessary to assure that the waste is not an attractant to vectors. Irradiation or pasteurization, while effective against pathogens, do not provide the volatile solids reduction necessary to prevent a vector problem.

Based on available data, the Agency concluded that a Process to Further Reduce Pathogens is not necessary when there is an 18-month interval between land application of solid waste and the growing of crops for direct human consumption. EPA recognizes that there is some uncertainty about the life expectancy of pathogens in wastes applied to croplands. Bacteria and viruses persist for only a few months, but parasites, particularly resistant species such as *Ascaris lumbricoides*, may last much longer. Reports range from "no survivors" after a few months to "some survivors" (not necessarily viable) after ten years for such organisms.

Survival is most likely in the soil below the top five centimeters of soil. Field conditions such as sunlight, desiccation, freezing, heat and freeze-thaw cycles are effective at reducing survival times in the upper layer of the soil. EPA selected the 18-month period because within that period most of the waste-amended soil will be exposed to the hostile environment found at the soil surface. Agricultural soils are typically plowed or cultivated at least annually. Thus, an 18-month waiting period assures that soil which was previously below the surface will be exposed to the harsh surface conditions for at least six months before planting. The growing period will provide additional exposure of the pathogens before harvest. EPA believes that this will provide a reasonable probability that pathogen levels will be greatly reduced. Since this is an "interim final" regulation, EPA encourages public comment on the appropriateness of this rationale.

EPA recognizes that for some crops (e.g., citrus fruits, corn) the edible portions are not exposed to, nor are likely to come in contact with, the sewage sludge or septic tank pumpings. Therefore, there is no need to use a Process to Further Reduce Pathogens when such a crop is grown. However, in this case the waste must be treated by a Process to Significantly Reduce Pathogens, public access to the facility must be controlled for at least 12 months, and the grazing of animals prevented for at least one month after application of the waste. The Agency chose the more conservative approach of requiring significant pathogen reduction and controlled access for both sewage sludge and septic tank pumpings because even where direct contact appears unlikely, the quality of crops which are directly consumed by man must be assured.

In examining the health risk presented by pathogens, EPA determined that pathogens are not likely to migrate in the soil. Pathogens tend to remain intimately associated with the waste material and are often too large to move through soil pore systems. Also, soils have been reported to be effective in removing viruses and bacteria from water. Surface erosion with the resultant water runoff seems to be the only route for movement of pathogens. Based on these findings, the Agency concluded that sewage sludge and septic tank pumpings that are placed underground by a trenching or burial operation should not be subject to this section. Under such circumstances there will be minimal movement of the organisms through the soil, and the risk of erosion is slight because the wastes are completely covered.

J. Air (Section 257.3–7)

Open burning is the uncontrolled or unconfined combustion of solid wastes. Open burning is a potential health hazard, can cause property damages, and can be a threat to public safety. Smoke from open burning can reduce aircraft and automobile visibility and has been linked to automobile accidents and death on expressways. The air emissions associated with open burning are much higher than those associated with incinerators equipped with air pollution control devices.

The proposed criteria provided for control of air emissions through three stipulations: First, the facility was to control air emissions so as to comply with Federal, State, and local air regulations. Second, all open burning of residential, commercial, institutional, and industrial solid wastes was prohibited. Third, open burning of other solid wastes could be permitted if in compliance with State and local air regulations.

This final air criterion has two components. First, there shall be no open burning of residential, commercial, institutional or industrial solid waste. (This provision does not apply to infrequent burning of agricultural wastes, silvicultural wastes, land-clearing debris, diseased trees, debris

from emergency clean-up operations and ordnance.) Second, air emissions caused by solid waste disposal activities shall not violate applicable requirements developed for State implementation plans (SIP's) under Section 110 of the Clean Air Act.

While several commenters suggested that a ban on open burning is unnecessary, EPA has decided to retain that provision for residential, commercial, institutional or industrial waste. The ongoing open burning of these wastes presents significant hazards to human health, and no health or environmental benefit is derived from the practice. Several commenters suggested allowing open burning with a variance. There is no environmental rationale for such a variance because open burning does not lessen the need for disease vector control or leachate control for maintaining surface and ground-water quality. Moreover, variance procedures for this situation would be particularly difficult to administer because of the dynamic nature of the many variables involved (existing air quality, wind speed, humidity, mixing and vertical dispersion, efficiency of the burn, amount and type of waste, etc.).

EPA decided to exempt from the open burning prohibition those wastes which are typically burned infrequently. The burning of agricultural wastes in the field, land-clearing debris, standing trees in a forest, diseased trees, debris from emergency clean-up operations and ordnance is not typically an ongoing practice and, thus, does not present a significant environmental risk. In addition some of these practices, particularly the destruction of disease-carrying trees or debris from emergency clean-up operations, provides an added environmental benefit in preventing chances of disease or accident. It should be noted, however, that the criteria assure that the conduct of these infrequent acts of burning must be in compliance with applicable requirements developed under the State SIP.

In requiring compliance with the SIP, EPA is seeking to coordinate the criteria with the Clean Air Act, as mandated in Section 1006 of the Act. The regional health concerns addressed through the SIP's are clearly of concern under the Act as well. The prohibition of open burning should prevent most air quality problems. Where such concerns are not covered by the open burning ban, EPA believes that it is unacceptable for solid waste disposal activities to cause violations of SIP requirements.

EPA has eliminated that part of the proposed regulation that required compliance with "all applicable Federal, State and local air regulations" and the reference to protection of public health and welfare. Some commenters said that the proposed criteria "federalized" State and local air regulations. EPA is not federalizing any such regulations in the final criteria. In tying the criteria to the SIP's, EPA is assuring that, at a minimum, solid waste activities that undermine Congressionally-established Federal environmental air quality objectives will not be considered adequate under the Act.

Several commenters requested clarification regarding the impact of the criteria on the use of pit or trench incinerators. Emission factors (i.e., particulates) for such incinerators equal or exceed those for open burning dumps. Since such devices do not control emissions, they fit the definition of open burning. Thus, for purposes of the criteria, combustion in a trench incinerator constitutes "open dumping."

Comments were requested in the Preamble of the proposed regulation on the advisability of including in the final promulgation specific air quality limits which would be based on Occupational Safety and Health Administration (OSHA) air quality standards. Several commenters noted that since OSHA air quality standards are based on workplace exposure and not ambient air quality, the inclusion of these standards would be inappropriate and possibly confusing. Air quality standards based on OSHA regulations have not been included in the final promulgation.

Commenters also suggested that the content of the air criteria be moved to the safety criteria (§ 257.3–8) since many of the dangers of open burning relate directly to public safety. The Agency considers the problems of open burning to be broader than just public safety; thus, this change was not made. However, the safety criteria have been revised to reference the air criteria.

K. Safety (Section 257.3–8)

This portion of the criteria addresses a set of adverse effects involving potential accidents which could be caused by solid waste disposal activities. The legislative history of the Act indicates that in passing the provisions authorizing these criteria the Congress was concerned about all of the effects addressed in this section. The safety hazards addressed in the final regulation include explosive gases, fires, bird hazards to aircraft and public exposure to wastes due to uncontrolled access to disposal sites.

The proposed regulation also contained a provision for toxic and asphyxiating gases. While EPA is quite concerned about the emission of such gases from solid waste, EPA was unable to identify sufficient information on the nature of this problem to support the setting of particular standards. The existing data on the generation of toxic and asphyxiating gases in solid waste is quite limited. In particular, it is difficult to define a set of gases generated in solid waste disposal that present a public health hazard. Even if such a set of gases could be identified it is difficult to determine, on the basis of data currently available to EPA, what levels of such gases may be tolerated without a substantial risk to public health or the environment. EPA will continue to explore this problem. However, at present there is insufficient information to support particular limits on toxic and asphyxiating gases.

(1) *Explosive gases.* Solid waste disposal activities may produce explosive gases. In particular, methane gas is a product of solid waste decomposition. The accumulation of a sufficient concentration of methane gas in disposal facility structures or nearby off-site structures may pose a serious threat to the health and welfare of facility employees, users of the disposal site, and occupants of nearby structures. Explosions resulting in injury and death have been caused by gases from solid waste disposal.

The proposed criteria required that the concentration of explosive gases in facility structures and in soil at the facility property boundary not reach the lower explosive limits (LEL) for the gases. The final regulation is essentially the same except that concentrations in facility structures will not be allowed to exceed 25 percent of the lower explosive limit for the gas. In addition the final standard, which could potentially be applicable to several explosive gases, will only be concerned with methane at this time.

Commenter suggested that the gas criteria be deleted and that control be left to the Occupational Safety and Health Administration (OSHA). Following consultation with OSHA, the Agency rejected this suggestion because the jurisdiction of OSHA does not include all solid waste disposal facilities and practices of concern to the Act, nor does it include off-site residences to which gases can migrate.

The Agency has decided to adjust the standard for facility structures to provide a margin of safety. Several commenters suggested such a change, since allowing explosive gas to accumulate in concentrations just under the lower explosive limit would be extremely dangerous and would not provide for a reasonable probability of

avoiding adverse effects. In selecting the 25% figure EPA is using a safety factor recognized by other Federal agencies as being appropriate for similar situations.

EPA also concluded that such a safety factor was unnecessary at the property boundary. Gases at or below the LEL at the property boundary will necessarily become somewhat diffused before passing into a structure beyond the property boundary. Thus, in assuring that the LEL is not exceeded at the boundary EPA has provided a margin of safety against an off-site explosion.

EPA has selected methane as the single gas of concern. The information available to EPA indicates that build up of methane gas has been the principal source of explosions associated with solid waste disposal. Other gases may be added to the list as new information develops.

Commenters recommended that disposal facilities not in close proximity to off-site structures be exempted from the gas criteria. Considering that gas production in disposal facilities is a long-term process continuing for decades, the Agency rejected this recommendation. Facilities which are remote today may be surrounded by extensive development in the future, especially after completion of disposal operations.

(2) *Fires.* Fires at solid waste disposal facilities pose the threat of property damage and injury or death to facility employees, users, and nearby residents. Examples of circumstances which can lead to fires associated with disposal facilities or practices are: Vandalism, carelessness, spontaneous combustion, open burning of wastes, and disposal of hot ashes.

The proposed criteria required that all fires be extinguished expeditiously and that fire hazards be minimized through proper site construction and design and periodic application of cover material where appropriate.

According to the final regulation, the facility or practice shall not pose a hazard to the safety of persons or property from fires. This objective can be served by compliance with the air criterion (§ 257.3–7), particularly the open burning ban, and through periodic application of cover material.

Commenters objected to the vague nature of this provision as originally proposed. While some level of flexibility is necessary, EPA has tried to make this standard as specific as possible. The reference to "expeditious" extinguishing of fires was eliminated. EPA also specified types of operational practices to accomplish the goals of this section.

Commenters suggested that, due to the relationship between open burning and potential fire hazards, the prohibition on open burning be incorporated into this section. As explained previously the safety criteria now reference the air criterion (which contains the prohibition of open burning.)

(3) *Bird Hazards.* Many reports and investigations show that disposal facilities and practices involving putrescible wastes often attract birds, in spite of vector control efforts (compaction and cover of wastes, etc.). When solid wastes are disposed in the vicinity of airports, the birds attracted to the area can present a significant risk of accidents due to collisions between birds and planes. The Federal Aviation Administration (FAA) has issued FAA Order 5200.5, "FAA Guidance Concerning Sanitary Landfills on or Near Airports" (October 16, 1974). The order states that solid waste disposal facilities have been found by study and observation to be artificial attractants of birds and, therefore, "may be incompatible with safe flight operations" when located in the vicinity of an airport.

The proposed criteria required that disposal facilities not be located within the two distance limits (10,000 feet for turbojets and 5,000 feet for piston-type aircraft) specified in FAA Order 5200.5 unless the facility was found to not pose a bird hazard to aircraft. For facilities beyond the specified distances, but within the conical surface described by FAA Regulations (FAR), Part 77, facilities were to be reviewed on a case-by-case basis for a potential bird hazard.

The final regulation retains the basic approach but clarifies several terms, including "airport" and "bird hazard." The provision for case-by-case analysis of facilities within the conical surface has been dropped.

Some commenters questioned whether the Act provides authority to control solid waste disposal on the basis of bird hazards to aircraft. They claimed that the FAA has adequate authority to prevent bird hazards to aircraft, concluding that this section of the criteria is not necessary.

The criteria are required to address the prevention of adverse effects on health and the environment from solid waste disposal facilities. The legislative history (H.R. Rep. No. 94–1491) cites an aircraft crash resulting from birds attracted to a disposal facility as one example of adverse effects of open dumps. There are also many other examples of such hazards from disposal facilities. Therefore, the Agency has concluded that this issue is clearly within the scope of this regulation.

Although the FAA is authorized to control airport operations to reduce bird hazards to aircraft, its authority does not extend to disposal facilities outside airport boundaries which may pose such hazards. It should be noted, however, that EPA is not "enforcing" the FAA order. The selection of the distances specified in that order is merely a recognition that they represent a reasonable determination of the danger zone around an airport. Likewise, it should be made clear that neither this regulation nor the proposed standard prohibited the disposal of solid waste within the specified distances. Instead, the distances define a "danger zone" within which particular care must be taken to assure that no bird hazard arises.

Some commenters challenged the relevancy of the 10,000 foot (for turbojets) and 5,000 foot (for piston-type aircraft) distances for defining the danger zone for bird/aircraft collisions. The distances cited were derived from FAA Order 5200.5. The distances are based on the consideration that over 62 percent of all bird strikes occur below altitudes of 500 feet (150 meters), and that aircraft are generally below this altitude within the distances specified.

Some commenters emphasized that bird strikes do occur outside the distances established in the regulation. Consultation with FAA personnel and other experts in the field of bird/aircraft hazards has revealed that, even when disposal facilities are located beyond the distances specified, hazards can exist where an airport is situated between a disposal facility and bird feeding, roosting, or watering sites. The hazard arises as birds traverse the airport in flying between the disposal facility and watering, feeding or roosting areas. However, EPA does not have sufficient information to indicate how serious this problem is. Moreover, the available data is insufficient to support the setting of national regulations to cover such contingencies. At some point it becomes difficult to isolate the independent effect of solid waste disposal activities on the bird hazard problem.

EPA has also decided to give a clearer definition of some key terms. The definition of "Airport" includes those airfields currently defined by the FAA as public-use airports. The regulation applies to that set of airports because existing data indicates that the preponderance of bird strikes occur at public-use airports. For example, 120 of the 121 airports reporting strikes in 1977 were public-use airports, and 220 of the 223 airports reporting strikes in 1978

were public-use airports. The FAA agrees with this approach. EPA, in consultation with the FAA, may broaden the class of airports of concern if it receives information demonstrating that a similar bird hazard exists at other fields.

In defining the airports of concern EPA has also eliminated the proposed criteria's reference to "runways planned to be used." As several commenters pointed out, such a reference would not be workable because it would require speculation about future siting of airports.

EPA also makes it clear that the "bird hazard" of concern is "an increase in the likelihood of bird/aircraft collisions." Solid waste disposal within the danger zone may continue as long as it can be shown that the operation can be managed in such a way as to not increase the risk of collision within the specified distances.

After considering public comments, EPA has deleted portions of the proposed standard. Several commenters stated that the use of the conical surface in the criteria was ambiguous and not applicable to this standard. The conical surface is an imaginary plane delineating an airspace segment 150 feet above the established airport elevation. The FAA prohibits stationary objects in this space because they might interfere with approaching and departing aircraft. This is inapplicable to solid waste disposal activities for two reasons: (1) Birds, the "obstructions" of concern in this regulation, are hardly stationary; and (2) solid waste disposal activities are typically low-profile operations (below 150 feet) and are not likely to constitute obstructions into the conical surface.

Commenters asked who was responsible for determining whether a facility posed a bird hazard to aircraft. The Act and the CWA create the implementing mechanisms for these criteria. However, in this instance consultation with the FAA and the Fish and Wildlife Service would be very helpful. Furthermore, actions at *both* the airport and the disposal facility can reduce or eliminate hazards. Therefore, where appropriate this determination should be made in consultation with these agencies, as well as with the owners and operators of the airport of concern.

(4) *Access.* Materials and activities associated with solid waste disposal facilities can cause injury or death to persons at the facilities. Potential causes of such harm include:

(a) Operation of heavy equipment and haul vehicles;

(b) Hazards associated with the types of waste, including sharp objects, pathogens, and toxic, explosive, or flammable materials; and

(c) Accidental or intentional fires.

The proposed criteria required that entry to the facility be controlled in order to minimize exposure of the public to hazards of heavy equipment operation and exposed waste.

The final criteria call for control of access to protect the public from on-site exposure to health and safety hazards.

The importance of access control cannot be overstated, since persons have suffered injury and even death at uncontrolled waste disposal facilities. Furthermore, in most cases, there is little economic impact on solid waste disposal operations in accomplishing such control.

During normal operating hours, proper management controls can minimize safety hazards. For example, potential harm to facility operating personnel can be reduced through proper training, use of safety equipment, control of waste types, and other practices. The most effective means of minimizing the risk of injury to other persons is by complete prohibition of access to the site by non-users (e.g. by suitable fencing) and strict control of users while on the site. For individuals disposing of small amounts of wastes, storage or special disposal facilities can be provided at the entrance to the facility or away from the area being utilized by professional solid waste management personnel.

The principal change from the proposed regulation is the broadening of the regulation's coverage. Accidents at solid waste disposal sites are not limited to hazards caused by heavy equipment operation and exposed waste. EPA believes that particular types of hazards should not be specified in the regulation, thereby allowing for flexibility in how the standard is applied. Therefore, the criteria seek to avoid public exposure to all potential health and safety hazards at solid waste disposal sites.

Two commenters stated that the proposed requirement for fencing was unreasonable. It should be noted that the Agency did not propose a requirement for fencing. At many facilities natural barriers exist which make public access very difficult; however, even if the criteria were complied with through the installation of a fence around the entire property the cost would be relatively insignificant when compared to the other costs required to properly operate a disposal facility.

V. Environmental and Economic Impacts

Voluntary environmental and economic impact analyses onthis regulation have been performed and are presented in the "Final Environmental Impact Statement on the Criteria for Classification of Solid Waste Disposal Facilities". These analyses are not required by the National Environmental Policy Act but provide information pertinent to the development and use of this regulation. Copies of this two-volume report may be obtained on request from: Solid Waste Information, U.S. EPA, 26 West St. Clair, Cincinnati, Ohio 45268.

EPA has also prepared a number of background documents that respond to public comments not addressed in the Preamble. These documents may be examined at E.P.A., 401 M Street, S.W., Washington, D.C. 20460 in room 2632. If there are apparent inconsistencies between these documents and this Preamble, the latter shall represent the Agency's position.

Dated: September 10, 1979.

Douglas M. Costle,

Administrator.

Title 40 CFR is amended by adding a new Part 257 to read as follows:

PART 257—CRITERIA FOR CLASSIFICATION OF SOLID WASTE DISPOSAL FACILITIES AND PRACTICES

Authority: Sec. 1008(a)(3), and sec. 4004(a), Pub. L. 94–580, 90 Stat. 2803 and 2815 (42 U.S.C. 6907(a)(3), 6944); sec. 405(d), Pub. L. 95–217, 91 Stat. 1591, 1606 (33 U.S.C. 1345).

§ 257.1 Scope and purpose.

(a) These criteria are for use under the Resource Conservation and Recovery Act (the Act) in determining which solid waste disposal facilities and practices pose a reasonable probability of adverse effects on health or the environment.

(1) Facilities failing to satisfy these criteria will be considered open dumps for purposes of State solid waste management planning under the Act.

(2) Practices failing to satisfy these criteria constitute open dumping, which is prohibited under Section 4005 of the Act.

(b) These criteria also provide guidelines for sludge utilization and disposal under Section 405(d) of the Clean Water Act, as amended. To comply with Section 405(e) the owner or operator of any publicly owned treatment works must not violate these criteria in the disposal of sludge on the land.

(c) These criteria apply to all solid waste disposal facilities and practices with the following exceptions:

(1) The criteria do not apply to agricultural wastes, including manures and crop residues, returned to the soil as fertilizers or soil conditioners.

(2) The criteria do not apply to overburden resulting from mining operations intended for return to the mine site.

(3) The criteria do not apply to the land application of domestic sewage or treated domestic sewage. The criteria do apply to disposal of sludges generated by treatment of domestic sewage.

(4) The criteria do not apply to the location and operation of septic tanks. The criteria do, however, apply to the disposal of septic tank pumpings.

(5) The criteria do not apply to solid or dissolved materials in irrigation return flows.

(6) The criteria do not apply to industrial discharges which are point sources subject to permits under Section 402 of the Clean Water Act, as amended.

(7) The criteria do not apply to source, special nuclear or byproduct material as defined by the Atomic Energy Act, as amended (68 Stat. 923).

(8) The criteria do not apply to hazardous waste disposal facilities which are subject to regulation under Subtitle C of the Act,

(9) The criteria do not apply to disposal of solid waste by underground well injection subject to the regulations (40 CFR Part 146) for the Underground Injection Control Program (UICP) under the Safe Drinking Water Act, as amended, 42 U.S.C. 3007 et seq.

§ 257.2 Definitions.

The definitions set forth in Section 1004 of the Act apply to this Part. Special definitions of general concern to this Part are provided below, and definitions especially pertinent to particular sections of this Part are provided in those sections.

"Disposal" means the discharge, deposit, injection, dumping, spilling, leaking, or placing of any solid waste or hazardous waste into or on any land or water so that such solid waste or hazardous waste or any constituent thereof may enter the environment or be emitted into the air or discharged into any waters, including ground waters.

"Facility" means any land and appurtenances thereto used for the disposal of solid wastes.

"Leachate" means liquid that has passed through or emerged from solid waste and contains soluble, suspended or miscible materials removed from such wastes.

"Open dump" means a facility for the disposal of solid waste which does not comply with this part.

"Practice" means the act of disposal of solid waste.

"Sanitary landfill" means a facility for the disposal of solid waste which complies with this part.

"Sludge" means any solid, semisolid, or liquid waste generated from a municipal, commercial, or industrial wastewater treatment plant, water supply treatment plant, or air pollution control facility or any other such waste having similar characteristics and effect.

"Solid waste" means any garbage, refuse, sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, including solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations, and from community activities, but does not include solid or dissolved materials in irrigation return flows or industrial discharges which are point sources subject to permits under Section 402 of the Federal Water Pollution Control Act, as amended (86 Stat. 880), or source, special nuclear, or byproduct material as defined by the Atomic Energy Act of 1954, as amended (68 Stat. 923).

"State" means any of the several States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, and the Commonwealth of the Northern Mariana Islands.

§ 257.3 Criteria for classification of solid waste disposal facilities and practices.

Solid waste disposal facilities or practices which violate any of the following criteria pose a reasonable probability of adverse effects on health or the environment:

§ 257.3-1 Floodplains.

(a) Facilities or practices in floodplains shall not restrict the flow of the base flood, reduce the temporary water storage capacity of the floodplain, or result in washout of solid waste, so as to pose a hazard to human life, wildlife, or land or water resources.

(b) As used in this section:

(1) "Based flood" means a flood that has a 1 percent or greater chance of recurring in any year or a flood or a magnitude equalled or exceeded once in 100 years on the average over a significantly long period.

(2) "Floodplain" means the lowland and relatively flat areas adjoining inland and coastal waters, including flood-prone areas of offshore islands, which are inundated by the base flood.

(3) "Washout" means the carrying away of solid waste by waters of the base flood.

§ 257.3-2 Endangered species.

(a) Facilities or practices shall not cause or contribute to the taking of any endangered or threatened species of plants, fish, or wildlife.

(b) The facility or practice shall not result in the destruction or adverse modification of the critical habitat of endangered or threatened species as identified in 50 CFR Part 17.

(c) As used in this section:

(1) "Endangered or threatened species" means any species listed as such pursuant to Section 4 of the Endangered Species Act.

(2) "Destruction or adverse modification" means a direct or indirect alteration of critical habitat which appreciably diminishes the likelihood of the survival and recovery of threatened or endangered species using that habitat.

(3) "Taking" means harassing, harming, pursuing, hunting, wounding, killing, trapping, capturing, or collecting or attempting to engage in such conduct.

§ 257.3-3 Surface Water.

(a) A facility or practice shall not cause a discharge of pollutants into waters of the United States that is in violation of the requirements of the National Pollutant Discharge Elimination System (NPDES) under Section 402 of the Clean Water Act, as amended.

(b) A facility or practice shall not cause a discharge of dredged material or fill material to waters of the United States that is in violation of the requirements under Section 404 of the Clean Water Act, as amended.

(c) A facility or practice shall not cause non-point source pollution of waters of the United States that violates applicable legal requirements implementing an areawide or Statewide water quality management plan that has been developed and approved by the Administrator under Section 208 of the Clean Water Act, as amended.

(d) Definitions of the terms "Discharge of dredged material", "Point source", "Pollutant", "Waters of the United States", and "Wetlands" can be found in the Clean Water Act, as amended, 33 U.S.C. 1251 et seq., and implementing regulations, specifically 33 CFR Part 323 (42 FR 37122, July 19, 1977).

§ 257.3-4 Ground Water.

(a) A facility or practice shall not contaminate an underground drinking water source beyond the solid waste boundary or beyond an alternative boundary specified in accordance with paragraph (b) of this section.

(b) Only a State with a solid waste management plan approved by the Administrator pursuant to Section 4007 of the Act may establish an alternative boundary to be used in lieu of the solid waste boundary. A State may specify such a boundary only if it finds that such a change would not result in contamination of ground water which may be needed or used for human consumption. This finding shall be based on analysis and consideration of all of the following factors:

(1) The hydrogeological characteristics of the facility and surrounding land;

(2) The volume and physical and chemical characteristics of the leachate;

(3) The quantity, quality, and directions of flow of ground water;

(4) The proximity and withdrawal rates of ground-water users;

(5) The availability of alternative drinking water supplies;

(6) The existing quality of the ground water including other sources of contamination and their cumulative impacts on the ground water; and

(7) Public health, safety, and welfare effects.

(c) As used in this section:

(1) "Aquifer" means a geologic formation, group of formations, or portion of a formation capable of yielding usable quantities of ground water to wells or springs.

(2) "Contaminate" means introduce a substance that would cause:

(i) The concentration of that substance in the ground water to exceed the maximum contaminant level specified in Appendix I, or

(ii) An increase in the concentration of that substance in the ground water where the existing concentration of that substance exceeds the maximum contaminant level specified in Appendix I.

(3) "Ground water" means water below the land surface in the zone of saturation.

(4) "Underground drinking water source" means:

(i) An aquifer supplying drinking water for human consumption, or

(ii) An aquifer in which the ground water contains less than 10,000 mg/1 total dissolved solids.

(5) "Solid waste boundary" means the outermost perimeter of the solid waste (projected in the horizontal plane) as it would exist at completion of the disposal activity.

§ 257.3-5 Application to land used for the production of food-chain crops (interim final).

(a) *Cadmium.* A facility or practice concerning application of solid waste to within one meter (three feet) of the surface of land used for the production of food-chain crops shall not exist or occur, unless in compliance with all requirements of paragraph (a)(1) (i) through (iii) of this section or all requirements of paragraph (a)(2) (i) through (iv) of this section.

(1)(i) The pH of the solid waste and soil mixture is 6.5 or greater at the time of each solid waste application, except for solid waste containing cadmium at concentrations of 2 mg/kg (dry weight) or less.

(ii) The annual application of cadmium from solid waste does not exceed 0.5 kilograms per hectare (kg/ha) on land used for production of tobacco, leafy vegetables or root crops grown for human consumption. For other food-chain crops, the annual cadmium application rate does not exceed:

Time period	Annual Cd application rate (kg/ha)
Present to June 30, 1984	2.0
July 1, 1984 to Dec. 31, 1986	1.25
Beginning Jan. 1, 1987	0.5

(iii) The cumulative application of cadmium from solid waste does not exceed the levels in either paragraph (a)(1)(iii)(A) of this section or paragraph (a)(1)(iii)(B) of this section.

(A)

Soil cation exchange capacity (meq/100g)	Maximum cumulative application (kg/ha)	
	Background soil pH <6.5	Background soil pH ≥6.5
<5	5	5
5-15	5	10
>15	5	20

(B) For soils with a background pH of less than 6.5, the cumulative cadmium application rate does not exceed the levels below: *Provided,* That the pH of the solid waste and soil mixture is adjusted to and maintained at 6.5 or greater whenever food-chain crops are grown.

Soil cation exchange capacity (meq/100g)	Maximum cumulative application (kg/ha)
<5	5
5-15	10
>15	20

(2)(i) The only food-chain crop produced is animal feed.

(ii) The pH of the solid waste and soil mixture is 6.5 or greater at the time of solid waste application or at the time the crop is planted, whichever occurs later, and this pH level is maintained whenever food-chain crops are grown.

(iii) There is a facility operating plan which demonstrates how the animal feed will be distributed to preclude ingestion by humans. The facility operating plan describes the measures to be taken to safeguard against possible health hazards from cadmium entering the food chain, which may result from alternative land uses.

(iv) Future property owners are notified by a stipulation in the land record or property deed which states that the property has received solid waste at high cadmium application rates and that food-chain crops should not be grown, due to a possible health hazard.

(b) *Polychlorinated Biphenyls (PCBs).* Solid waste containing concentrations of PCBs equal to or greater than 10 mg/kg (dry weight) is incorporated into the soil when applied to land used for producing animal feed, including pasture crops for animals raised for milk. Incorporation of the solid waste into the soil is not required if it is assured that the PCB content is less than 0.2 mg/kg (actual weight) in animal feed or less than 1.5 mg/kg (fat basis) in milk.

(c) As used in this section:

(1) "Animal feed" means any crop grown for consumption by animals, such as pasture crops, forage, and grain.

(2) "Background soil pH" means the pH of the soil prior to the addition of substances that alter the hydrogen ion concentration.

(3) "Cation exchange capacity" means the sum of exchangeable cations a soil can absorb expressed in milli-equivalents per 100 grams of soil as determined by sampling the soil to the depth of cultivation or solid waste placemant, whichever is greater, and analyzing by the summation method for distinctly acid soils or the sodium acetate method for neutral, calcareous or saline soils ("Mehods of Soil Analysis, Agronomy Monograph No. 9." C. A. Black, ed., American Society of Agronomy, Madison, Wisconsin. pp 891-901, 1965).

(4) "Food-chain crops" means tobacco, crops grown for human

consumption, and animal feed for animals whose products are consumed by humans.

(5) "Incorporated into the soil" means the injection of solid waste beneath the surface of the soil or the mixing of solid waste with the surface soil.

(6) "Pasture crops" means crops such as legumes, grasses, grain stubble and stover which are consumed by animals while grazing.

(7) "pH" means the logarithm of the reciprocal of hydrogen ion concentration.

(8) "Root crops" means plants whose edible parts are grown below the surface of the soil.

(9) "Soil pH" is the value obtained by sampling the soil to the depth of cultivation or solid waste placement, whichever is greater, and analyzing by the electrometric method. ("Methods of Soil Analysis, Agronomy Monograph No. 9," C.A. Black, ed., American Society of Agronomy, Madison, Wisconsin, pp. 914–926, 1965.)

§ 257.3–6 Disease.

(a) *Disease Vectors.* The facility or practice shall not exist or occur unless the on-site population of disease vectors is minimized through the periodic application of cover material or other techniques as appropriate so as to protect public health.

(b) *Sewage sludge and septic tank pumpings (Interim Final).* A facility or practice involving disposal of sewage sludge or septic tank pumpings shall not exist or occur unless in compliance with paragraphs (b) (1), (2) or (3) of this section.

(1) Sewage sludge that is applied to the land surface or is incorporated into the soil is treated by a Process to Significantly Reduce Pathogens prior to application or incorporation. Public access to the facility is controlled for at least 12 months, and grazing by animals whose products are consumed by humans is prevented for at least one month. Processes to Significantly Reduce Pathogens are listed in Appendix II, Section A. (These provisions do not apply to sewage sludge disposed of by a trenching or burial operation.)

(2) Septic tank pumpings that are applied to the land surface or incorporated into the soil are treated by a Process to Significantly Reduce Pathogens (as listed in Appendix II, Section A), prior to application or incorporation, unless public access to the facility is controlled for at least 12 months and unless grazing by animals whose products are consumed by humans is prevented for at least one month. (These provisions do not apply to septic tank pumpings disposed of by a trenching or burial operation.)

(3) Sewage sludge or septic tank pumpings that are applied to the land surface or are incorporated into the soil are treated by a Process to Further Reduce Pathogens, prior to application or incorporation, if crops for direct human consumption are grown within 18 months subsequent to application or incorporation. Such treatment is not required if there is no contact between the solid waste and the edible portion of the crop; however, in this case the solid waste is treated by a Process to Significantly Reduce Pathogens, prior to application; public access to the facility is controlled for at least 12 months; and grazing by animals whose products are consumed by humans is prevented for at least one month. If crops for direct human consumption are not grown within 18 months of application or incorporation, the requirements of paragraphs (b) (1) and (2) of this section apply. Processes to Further Reduce Pathogens are listed in Appendix II, Section B.

(c) As used in this section:

(1) "Crops for direct human consumption" means crops that are consumed by humans without processing to minimize pathogens prior to distribution to the consumer.

(2) "Disease vector" means rodents, flies, and mosquitoes capable of transmitting disease to humans.

(3) "Incorporated into the soil" means the injection of solid waste beneath the surface of the soil or the mixing of solid waste with the surface soil.

(4) "Periodic application of cover material" means the application and compaction of soil or other suitable material over disposed solid waste at the end of each operating day or at such frequencies and in such a manner as to reduce the risk of fire and to impede vector's access to the waste.

(5) "Trenching or burial operation" means the placement of sewage sludge or septic tank pumpings in a trench or other natural or man-made depression and the covering with soil or other suitable material at the end of each operating day such that the wastes do not migrate to the surface.

§ 257.3–7 Air.

(a) The facility or practice shall not engage in open burning or residential, commercial, institutional or industrial solid waste. This requirement does not apply to infrequent burning of agricultural wastes in the field, silvicultural wastes for forest management purposes, land-clearing debris, diseased trees, debris from emergency clean-up operations, and ordnance.

(b) The facility or practice shall not violate applicable requirements developed under a State implementation plan approved or promulgated by the Administrator pursuant to Section 110 of the Clean Air Act.

(c) As used in this section "open burning" means the combustion of solid waste without (1) control of combustion air to maintain adequate temperature for efficient combustion, (2) containment of the combustion reaction in an enclosed device to provide sufficient residence time and mixing for complete combustion, and (3) control of the emission of the combustion products.

§ 257.3–8 Safety.

(a) *Explosive gases.* The concentration of explosive gases generated by the facility or practice shall not exceed:

(1) Twenty-five percent (25%) of the lower explosive limit for the gases in facility structures (excluding gas control or recovery system components); and

(2) The lower explosive limit for the gases at the property boundary.

(b) *Fires.* A facility or practice shall not pose a hazard to the safety of persons or property from fires. This may be accomplished through compliance with § 257.3–7 and through the periodic application of cover material or other techniques as appropriate.

(c) *Bird hazards to aircraft.* A facility or practice disposing of putrescible wastes that may attract birds and which occurs within 10,000 feet (3,048 meters) of any airport runway used by turbojet aircraft or within 5,000 feet (1,524 meters) of any airport runway used by only piston-type aircraft shall not pose a bird hazard to aircraft.

(d) *Access.* A facility or practice shall not allow uncontrolled public access so as to expose the public to potential health and safety hazards at the disposal site.

(e) As used in this section:

(1) "Airport" means public-use airport open to the public without prior permission and without restrictions within the physical capacities of available facilities.

(2) "Bird hazard" means an increase in the likelihood of bird/aircraft collisions that may cause damage to the aircraft or injury to its occupants.

(3) "Explosive gas" means methane (CH_4).

(4) "Facility structures" means any buildings and sheds or utility or drainage lines on the facility.

(5) "Lower explosive limit" means the lowest percent by volume of a mixture of explosive gases which will propagate

a flame in air at 25°C and atmospheric pressure.

(6) "Periodic application of cover material" means the application and compaction of soil or other suitable material over disposed solid waste at the end of each operating day or at such frequencies and in such a manner as to reduce the risk of fire and to impede disease vectors' access to the waste.

(7) "Putrescible wastes" means solid waste which contains organic matter capable of being decomposed by microorganisms and of such a character and proportion as to be capable of attracting or providing food for birds.

§ 257.4 Effective date.

These criteria become effective October 15, 1979.

Appendix I

The maximum contaminant levels promulgated herein are for use in determining whether solid waste disposal activities comply with the ground-water criteria (§ 257.3–4). Analytical methods for these contaminants may be found in 40 CFR Part 141 which should be consulted in its entirety.

1. *Maximum contaminant levels for inorganic chemicals.* The following are the maximum levels of inorganic chemicals other than fluoride:

Contaminant	Level (milligrams per liter)
Arsenic	0.05
Barium	1.
Cadmium	0.010
Chromium	0.05
Lead	0.05
Mercury	0.002
Nitrate (as N)	10.
Selenium	0.01
Silver	0.05

The maximum contaminant levels for fluoride are:

Temperature[1] degrees Fahrenheit	Degrees Celsius	Level (milligrams per liter)
53.7 and below	12 and below	2.4
53.8 to 58.3	12.1 to 14.6	2.2
58.4 to 63.8	14.7 to 17.6	2.0
63.9 to 70.6	17.7 to 21.4	1.8
70.7 to 79.2	21.5 to 26.2	1.6
79.3 to 90.5	26.3 to 32.5	1.4

[1] Annual average of the maximum daily air temperature.

2. *Maximum contaminant levels for organic chemicals.* The following are the maximum contaminant levels for organic chemicals:

	Level (milligrams per liter)
(a) Chlorinated hydrocarbons:	
Endrin (1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-1,4-endo, endo-5,8-dimethano naphthalene)	0.0002
Lindane (1,2,3,4,5,6-Hexachlorocyclohexane, gamma isomer	0.004
Methoxychlor (1,1,1-Trichloro-2,2-bis (p-methoxyphenyl) ethane)	0.1
Toxaphene ($C_{10}H_{10}Cl_8$-Technical chlorinated camphene, 67 to 69 percent chlorine)	0.005
(b) Chlorophenoxys:	
2,4-D (2,4-Dichlorophenoxy-acetic acid)	0.1
2,4,5-TP Silvex (2,4,5-Trichlorophenoxypropionic acid)	0.01

3. *Maximum microbiological contaminant levels.* The maximum contaminant level for coliform bacteria from any one well is as follows:

(a) using the membrane filter technique:

(1) Four coliform bacteria per 100 milliliters if one sample is taken, or

(2) Four coliform bacteria per 100 milliliters in more than one sample of all the samples analyzed in one month.

(b) Using the five tube most probable number procedure, (the fermentation tube method) in accordance with the analytical recommendations set forth in "Standard Methods for Examination of Water and Waste Water", American Public Health Association, 13th Ed. pp. 662–688, and using a Standard sample, each portion being one fifth of the sample:

(1) If the standard portion is 10 milliliters, coliform in any five consecutive samples from a well shall not be present in three or more of the 25 portions, or

(2) If the standard portion is 100 milliliters, coliform in any five consecutive samples from a well shall not be present in five portions in any of five samples or in more than fifteen of the 25 portions.

4. *Maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity.* The following are the maximum contaminant levels for radium-226, radium-228, and gross alpha particle radioactivity:

(a) Combined radium-226 and radium-228—5 pCi/l;

(b) Gross alpha particle activity (including radium-226 but excluding radon and uranium)—15 pCi/l.

Appendix II

A. Processes to Significantly Reduce Pathogens

Aerobic digestion: The process is conducted by agitating sludge with air or oxygen to maintain aerobic conditions at residence times ranging from 60 days at 15° C to 40 days at 20° C, with a volatile solids reduction of at least 38 percent.

Air Drying: Liquid sludge is allowed to drain and/or dry on under-drained sand beds, or paved or unpaved basins in which the sludge is at a depth of nine inches. A minimum of three months is needed, two months of which temperatures average on a daily basis above 0° C.

Anaerobic digestion: The process is conducted in the absence of air at residence times ranging from 60 days at 20° C to 15 days at 35° to 55° C, with a volatile solids reduction of at least 38 percent.

Composting: Using the within-vessel, static aerated pile or windrow composting methods, the solid waste is maintained at minimum operating conditions of 40° C for 5 days. For four hours during this period the temperature exceeds 55° C.

Lime Stabilization: Sufficient lime is added to produce a pH of 12 after 2 hours of contact.

Other methods: Other methods or operating conditions may be acceptable if pathogens and vector attraction of the waste (volatile solids) are reduced to an extent equivalent to the reduction achieved by any of the above methods.

B. Processes to Further Reduce Pathogens

Composting: Using the within-vessel composting method, the solid waste is maintained at operating conditions of 55° C or greater for three days. Using the static aerated pile composting method, the solid waste is maintained at operating conditions of 55° C or greater for three days. Using the windrow composting method, the solid waste attains a temperature of 55° C or greater for at least 15 days during the composting period. Also, during the high temperature period, there will be a minimum of five turnings of the windrow.

Heat drying: Dewatered sludge cake is dried by direct or indirect contact with hot gases, and moisture content is reduced to 10 percent or lower. Sludge particles reach temperatures well in excess of 80° C, or the wet bulb temperature of the gas stream in contact with the sludge at the point where it leaves the dryer is in excess of 80° C.

Heat treatment: Liquid sludge is heated to temperatures of 180° C for 30 minutes.

Thermophilic Aerobic Digestion: Liquid sludge is agitated with air or oxygen to maintain aerobic conditions at residence times of 10 days at 55–60° C, with a volatile solids reduction of at least 38 percent.

Other methods: Other methods or operating conditions may be acceptable if pathogens and vector attraction of the waste (volatile solids) are reduced to an extent equivalent to the reduction achieved by any of the above methods.

Any of the processes listed below, if added to the processes described in Section A above, further reduce pathogens. Because the processes listed below, on their own, do not reduce the attraction of disease vectors, they are only add-on in nature.

Beta ray irradiation: Sludge is irradiated with beta rays from an accelerator at dosages of at least 1.0 megarad at room temperature (ca. 20° C).

Gamma ray irradiation: Sludge is irradiated with gamma rays from certain isotopes, such as ^{60}Cobalt and ^{137}Cesium, at dosages of at least 1.0 megarad at room temperature (ca. 20° C).

Pasteurization: Sludge is maintained for at least 30 minutes at a minimum temperature of 70° C.

Other methods: Other methods or operating conditions may be acceptable if pathogens are reduced to an extent equivalent to the reduction achieved by any of the above add-on methods.

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ENVIRONMENTAL PROTECTION AGENCY

[40 CFR Part 257]

[FRL 1234-2]

Criteria for Classification of Solid Waste Disposal Facilities and Practices Amendment

AGENCY: Environmental Protection Agency.

ACTION: Proposed Rule.

SUMMARY: This proposed amendment would expand the list of maximum contaminant levels (MCL's) used in the ground-water quality standard of the Criteria for Classification of Solid Waste Disposal Facilities and Practices (40 CFR Part 257). The criteria were developed and issued as a regulation under the authority of the Resource Conservation and Recovery Act of 1976. The purpose of the criteria is to provide the basis for determining whether solid waste disposal facilities or practices pose no reasonable probability of adverse effects on health or the environment.

The ground-water quality standard which has been promulgated in the criteria contains maximum contaminant levels for health-related parameters (specific inorganic and organic chemicals, coliform bacteria, and radioactive contamination). This amendment proposes limits for the following additional eleven contaminants: Chloride, color, copper, foaming agents, iron, manganese, odor, pH, sulfate, total dissolved solids, and zinc. These additions are designed to protect ground water from odor, discoloration, and taste-causing contaminants.

DATES: Comments are due November 13, 1979. One hearing will be held; it will be on November 1, 1979 at 9:00 AM. Registration for the hearing will begin at 8:30 AM.

ADDRESSES: The official record for this amendment (Docket No. 4004.2) is located in room 2107, 401 M Street, SW, Washington, D.C. 20460. The record is available for viewing from 9:00 AM to 4:00 PM Monday through Friday, excluding holidays.

The public hearing will be held in room 3906, 401 M Street, SW, Washington, D.C. Persons wishing to make oral presentations are requested to restrict their presentations to less than ten minutes.

Written comments may be submitted at the hearing or mailed to: Comments Clerk, Amended Criteria, Office of Solid Waste (WH-564), EPA, Washington, D.C. 20460.

FOR FURTHER INFORMATION CONTACT: Mr. Truett V. DeGeare, Jr., P.E. at the above address or at (202) 755-9120.

SUPPLEMENTARY INFORMATION:

Authority

The statutory authorities for this proposed amendment are Sections 1008 (a)(3) and 4004 (a) of the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976 (42 U.S.C. 6907(A)(3) and 6944(a)), later referred to as RCRA or the Act; also, Section 405(d) of the Clean Water Act, as amended (33 U.S.C. 1345).

Discussion

This action proposes to amend the Criteria for Classification of Solid Waste Disposal Facilities and Practices (40 CFR Part 257) which has been promulgated pursuant to the above authorities.

The purpose of the criteria is to provide the basis for determining whether solid waste disposal activities pose "* * * no reasonable probability of adverse effects on health or the environment * * *" (RCRA, Section 4004). The criteria define an open dump (RCRA Section 4004), the minimum elements of prohibited open dumping practices (RCRA Section 1008(a)(3)), and the effects which must be avoided by POTW owners and operators (CWA Section 405). For a full discussion of the criteria's role see the Preamble to that regulation.

The criteria provide a ground-water quality standard consisting of specified substances or parameters. When a facility or practice causes protected ground water to exceed the contamination levels specified in that standard, the facility fails to comply with the criteria. The standard which has been promulgated in the criteria contains maximum contaminant levels for health-related parameters. This amendment proposes limits for the following additional eleven contaminants: chloride, color, copper, foaming agents, iron, manganese, odor, pH, sulfate, total dissolved solids, and zinc, in order to protect against malodorous, discoloring, foul-tasting substances in ground water.

The criteria provide that solid waste disposal facilities or practices shall not *contaminate* an *underground drinking water source* beyond the *solid waste boundary*. The italicized terms are specifically defined for their use in the ground-water section of the criteria.

Underground drinking water sources are aquifers supplying drinking water for human consumption or aquifers in which the ground water contains less than 10,000 mg/l total dissolved solids. *Solid waste boundary* is the outermost perimeter of the solid waste (projected in the horizontal plane) as it would exist at completion of the disposal activity. (There is a provision in the criteria allowing a State with an approved State solid waste management plan to establish an alternative boundary to be used in lieu of the solid waste boundary in accordance with specified procedures and conditions). *Contamination* is defined as the introduction of listed substances to ground water so as to cause (1) the concentration of the substance in the ground water to exceed the maximum contaminant level specified, or (2) an increase in the concentration of the substance in the ground water where the existing concentration of the substance exceeds the specified maximum contaminant level.

As promulgated, the criteria establish specified maximum contaminant levels which were designed to be protective of the health of persons consuming the ground water. It includes levels for ten inorganic chemicals, six organic chemicals, coliform bacteria, and radioactive contaminants. These levels are based on the National Interim Primary Drinking Water Regulations (40 CFR Part 141).

The criteria were initially proposed for public comment at 43 FR 4942 on February 6, 1978. In that proposal, the water quality standard for ground water used or usable for human consumption was that the water not be made unfit for

human consumption. The maximum contaminant levels (MCL's) of the National Interim Primary Drinking Water Regulations were included for determining fitness. Commenters noted that the term "fitness" was too vague to be workable. It was unclear whether foul-smelling, discolored, but not unhealthful water is "fit" for consumption. Others noted that since the proposed standard did not specify the contaminants or the concentrations at which unfitness would be reached enforcement would be troublesome. In considering the merits of these comments, the Agency decided that the ground-water quality standard should be specific regarding contaminants and levels which represent adverse effects on public health and the environment. Since the maximum contaminant levels in the National Interim Primary Drinking Water Regulations were the only specific contaminants and levels which were contained in the proposed criteria, the Agency has decided to promulgate the criteria based only on those contaminant levels. Before other contaminant levels are incorporated in the standard, public scrutiny and the opportunity for comment should be offered. Thus, this amendment is proposed for public review.

RCRA clearly provides that the criteria should address effects on the environment as well as on health. The House Report (No. 94–1491) instructs that the legislative standard for the Administrator in developing the Criteria is "no reasonable chance of adverse effects" on the environment. The report defines an open dump as a land disposal site where discarded materials are deposited with little or no regard for pollution controls or aesthetics. It provides specific examples of the impacts to be prevented, including 47 cases of recorded fishkills and 30 cases of recorded contamination of drinking water wells. The adverse impact on the ground water at most of the cited examples was principally due to high color and odor characteristics associated with iron, manganese and other contaminants not generally associated with direct health effects. It is thus evident that Congress intended to include foulsmelling, discolored ground water as an adverse environmental effect.

The Agency has reviewed monitoring data from a number of facilities which indicates that about half of those monitored facilities have caused ground water to exceed the health-based maximum contaminant levels promulgated in the criteria. An additional thirty percent of these contain unacceptable levels of other (non-health-related) contaminants. Additional research is needed regarding the probability that disposal activities may cause adverse environmental effects without posing direct health threats. Nevertheless, the existing literature does indicate that including malodorous, distasteful and discoloring contaminants in the ground-water quality standard might significantly increase the number of facilities in violation, and that unless these contaminants are included in the standard, a significant number of facilities which cause ground water to be foul-smelling and bad-tasting will not be classified as unacceptable.

Therefore, the Agency has decided to propose an amendment to the criteria's ground-water quality standard which would include contaminant limitations protective against malodorous, distasteful, foaming, staining, corrosive and otherwise adverse effects on ground water. In this proposed amendment, comment is being solicited on the use of the maximum contaminant levels published in the National Secondary Drinking Water Regulations (40 CFR Part 143) for that purpose. Eleven contaminant levels were specified in 40 CFR Part 143 which are of significance in the classification of disposal activities; some discussion is provided below, giving rationale and potential problems for each of the eleven and pertinent comments received by the Agency when the National Secondary Drinking Water Regulations were originally proposed.

A. *Chloride* (250 mg/1). The proposed MCL for chloride is the level above which the taste of the water may become objectionable to the consumer. In addtion to the adverse taste effects, high chloride concentration levels in the water will contribute to the deterioration of domestic plumbing, water heaters, and municipal water works equipment. Higher concentrations may also be indicative of the presence of sodium and other contaminants commonly occurring in leachate, which are not listed in either of the national drinking water regulations and, thus, not directly a part of the ground-water quality standard.

Leachate commonly contains high concentrations of chlorides. Since chloride ions are quite mobile in both saturated and unsaturated zones, isograms of chloride concentrations are particularly useful for inscribing leachate plume envelopes. In most cases, the chloride concentration is a key parameter which will indicate the potential presence of any other leachate constituent.

Comments received by the Agency on the proposed level for chlorides concerned the high costs of removal and consumer tolerance or acclimatization. Neither of these issues is appropriate for consideration in the water quality standard for the criteria. High removal costs support keeping the contaminant out, and leachate-caused concentrations are too unstable to allow acclimatization. In regions where naturally occurring or background concentrations of chloride are consistently high, people can become tolerant of the taste well in excess of the MCL. In such regions, the National Secondary Drinking Water Regulations suggest that States exercise discretion, establishing limitations commensurate with local conditions. However, such discretion is inappropriate for a leachate induced violation of the water quality standard. The concentrations of chloride often fluctuate widely in a leachate plume, and their introduction would represent a new condition to which acclimatization may take years, and increasing concentrations of chlorides is a harbinger indicating the likelihood of the presence of harmful constituents of leachate.

B. *Color* (15 Color Units). Color may be indicative of the presence of a host of organic materials against which protection is not provided elsewhere in the ground-water quality standard. Many of these organic materials are of direct health concern and of indirect concern as precursers for the formation of trihalomethanes and other halogenated organic compounds.

Experience has shown that changes in color levels will stimulate consumers' complaints more readily than a relatively high constant level. The MCL at 15 color units is set quite high; consumers of clear water would be immediately aware of the presence of leachate if it were to cause color to exceed that level. The color standard is not redundant for the staining problems which are caused by iron or manganese, since these constituents are not visible until oxidation, usually only occurring after withdrawal of the water.

The only comments rceived on the proposed color standard were that it was set too high. Support for a lower MCL included the argument that protection from halogenated organic compounds would be enhanced. This argument is quite significant for solid waste purposes. Fifteen color units may allow quite a high level of contaminants to be present. However, the Agency has proposed inclusion of these compounds directly in the Primary Regulations

(Federal Register notice, February 9, 1978, 40 CFR Part 141). The approach proposed herein, then, is to employ the higher color standard and wait for the specific MCL to be established for those compounds in the Primary Regulations.

C. *Copper* (1 mg/l). Copper, in trace quantities, is an essential and beneficial element in human metabolism but imparts an undesirable taste to drinking water at the MCL. Small amounts are generally regarded as non-toxic, but large doses may produce emesis, and prolonged consumption may result in liver damage. Copper, in some soft waters, will cause staining at the MCL.

Copper is generally quite low in both native ground water and in leachate from mixed municipal refuse; it generally occurs at concentrations less than 20 micrograms per liter except at facilities receiving wastes from industrial sources. The metal is used extensively in electroplating, chemical manufacturing and in oil refining, and the salts of copper are used in textiles, photography and pesticides. The inclusion of copper in the standard should only affect the assessment of industrial waste facilities.

High cost of removal was the basis for comments for relaxing the MCL for copper. This comment supports maintaining stringent water quality standards for the criteria. In responding to that comment, the Agency notes that the MCL was only exceeded in 1.6% of the samples in EPA's 1970 Community Water Supply Study, and that wherever high copper concentrations were observed the other heavy metals were also high. Consequently, the inclusion of the copper standard appears appropriate.

D. *Foaming Agents* (0.5 mg/l). Foaming is a characteristic of water which has been contaminated by the presence of detergents and similar substances. Water which foams in excess of the MCL will exhibit undesirable taste and foaming properties. Comments received suggested that the MCL was too stringent and that since the analytical procedure specified for the detection of foaming agents is the methylene blue test, the MCL should be stated in terms of methylene blue active substances.

The 0.5 mg/l limit for foaming agents is based upon the fact that at higher concentration levels the water may exhibit undesirable taste and foaming properties. Also concentrations above the limit may be indicative of undesirable levels of pollutants from questionable sources, such as infiltration by sewage. Because there is no standardized foamability test, this property is determined indirectly by measuring the anionic surfactant concentration in the water utilizing the test procedure specified for methylene active substances. Many substances other than detergents will cause foaming and interfere with the methylene blue test. Since most of these interferences are positive, the Agency believes that the MCL designated for foaming agents is the correct one.

E. *Iron* (0.3 mg/l). Iron is a highly objectionable constituent of water supplies. It imparts a brownish discoloration to laundry, a bitter or astringent taste to drinking water, and stains to clothing, dishes and plumbing fixtures. However, in some areas of the country, the native concentration of iron well exceeds the MCL. The limit on iron may be one of the most frequently violated standards in the criteria. Iron is very common in leachate, quite mobile in most soils, and, significantly, the concentration may be further elevated due to the release of soil-fixed iron as an effect of pH and other changes caused by the passage of leachate through the soil.

At 1.0 mg/l, a substantial number of people will note the bitter astringent taste of iron. Also, at this concentration level the staining problems associated with iron will be pronounced, thus making the water unpleasant to the consumer and unsatisfactory for most industries. Therefore, the Agency believes that the proposed MCL of 0.3 mg/l) for iron is reasonable.

F. *Manganese* (0.05 mg/l). Manganese, like iron, discolors and imparts taste. At concentrations exceeding MCL it can cause build-up in distribution piping which can slough off and cause laundry spotting and unaesthtic black precipitates. Relatively fewer regions have high native manganese than have high native iron; however, it is not unusual. For instance, New York State Health Department surveys indicate that manganese is found in every public drinking water system, and exceeds the MCL in about 10%. The Agency received no comments on the proposed standard for manganese.

G. *Odor* (3 threshold odor number). The principal reason for establishing this MCL at 3 Threshold Odor Number in the Secondary Drinking Water Regulations is that beyond that odor level, consumers would be tempted to avoid the public water system and choose alternative, possibly unmonitored, water sources. Thus, it is an odor level which is considered definitely unacceptable, particularly when newly or intermittently introduced, as may be the case from leachate.

Odor is due to the presence of a variety of substances. Most organic and some inorganic chemicals contribute taste and odor. Because odorous materials are detectable when present in only a few micrograms per liter and are often complex, it is usually impractical and often impossible to isolate and identify the odor-producing chemical. Although many of the odor-producing chemicals are not known to have other adverse effects, inclusion of odor in the standard has the additional advantage of warning of the presence of organic and inorganic pollutants often associated with municipal and industrial wastes but not otherwise listed in the standard.

Comments received by the Agency on the proposed regulation suggested that the proposed MCL should be deleted from the regulations, arguing that the threshold odor number is an arbitrary value and the analytical results obtained vary greatly from person to person. On the other hand, one commenter suggested that the MCL should be lowered to one. The level of three was determined by the Agency to be appropriate because most consumers find the water at this limit unacceptable. Determination of odor at that level is considered reliable, but below the MCL it is difficult because of possible interferences from other sources and variation of the sensing capabilities of the personnel performing the test.

H. *pH* (6.5—8.5). A variety of health and environmental effects are associated with the range of pH which could result from contamination by leachate. pH is an important determinant of corrosivity; below 6.5, significant corrosion effects become noticeable. The treatability of many of the other parameters in the water quality standard is also dependent upon pH. For example, while a facility might emit no selenium, the selenium treatment which would be required because of high background concentrations could be rendered ineffective due to the facility's effect on pH. Also, pH can interfere with existing treatment because of its effects on the efficiency of chlorination and on the solubility of toxic metals.

Naturally occurring pH is found lower than two in some volcanic situations and nearly 11 in contact with some silicates in desert basins. However, acidities and alkalinities of these magnitudes are quickly reduced by reaction with their environment. Most ground waters which lie subject to contamination by solid waste disposal activities are subjected also to atmospheric and other neutralizing

influences. A reasonable range of pH at the water table may be considered to lie between 4 and 9, numbers which also represent the reported range of the pH of leachate. Naturally occurring pH in ground water is slightly basic in most regions of the country, with sufficient buffering capacity to withstand significant stresses associated with solid waste disposal activities. Leachate from mixed municipal wastes is quite erratic, varying by both age and constituents of the waste. The occurrence of contaminated ground water in which the MCL for pH is exceeded after a reasonable mixing zone is highly indicative of adverse health and environmental effects.

Most of the comments received by the Agency concerned the upper limit for pH. Since raw leachate seldom exceeds the upper limit, these comments are not applicable for the Criteria. The remainder of the comments concerned corrosivity. The Agency is still evaluating tests and maximum concentration levels for corrosivity; these comments and the issue of corrosivity in leachate will be addressed on conclusion of the evaluations.

I. *Sulfate* (250 mg/l). Sulfate is a commonly occurring natural constituent of ground water in many regions of the country. Some States report as much as 10 percent of the underground drinking water supplies exceed the MCL. Sulfate is listed in the Secondary Drinking Water Regulations principally because of its cathartic or laxative effect in humans and to a lesser extent because of taste considerations. Its presence in leachate is frequently attributable to industrial sources of refuse such as textile and paper industries. Leachate analyses frequently report sulfate far below MCL, with occasional reports as high as 1500 to 2000 mg/l. For these facilities it is a good indicator of the extent of contamination, and its laxative and taste effects are useful indices of the adverse effects.

Comments received by the Agency were not appropriate to this amendment, considering the objectives of the criteria. Cost of treatment, and long-term acclimatization do not suggest allowing greater concentrations to result from land disposal.

J. *Total Dissolved Solids (TDS)* (500 mg/l). Dissolved solids content is useful as the single parameter which most closely describes a given water in terms of usefulness of the native water and influence of a heterogenous contaminant source. It reflects the influence of all the dissolved constituents. It reflects mineralization and, thus, the taste of water. Additionally it accelerates deterioration of plumbing and water fixtures. (One study finds a reduction of one year of water heater life per 200 mg/l TDS). Although it is a very non-specific indicator which may be difficult to isolate by source, it is useful for covering both hardness and corrosivity effects which are not otherwise a part of the water quality standard of the criteria.

In some regions of the country, particularly in the Southwest, the ground water commonly exceeds the MCL for TDS. A dissolved solids limit (10,000 mg/l) is used as the demarcation in the criteria for water too contaminated to warrant protection. Leachate is high in TDS, commonly reported between 5,000 and 40,000 mg/l.

Excessive hardness, taste, mineral deposition and corrosion are among the associated adverse effects listed in the rationale for limiting TDS in the Drinking Water Regulations. Comments received on TDS were mostly requests for flexibility or for a higher limit from water suppliers in area of high background TDS levels. No comments of concern to the criteria addressed areas of low background TDS.

K. *Zinc* (5 mg/l). Like copper, zinc is an essential and beneficial element in human metabolism, but it imparts an undesirable taste to water. It also can create a milky appearance in water and cause a greasy film on boiling. In native ground water it is seldom found in concentrations exceeding 2 or 3 mg/l. Frequently, it is reported in leachate at concentrations below the MCL; however, in industrial areas zinc concentrations in leachate have been reported up to 370 mg/l. The Agency received no comments on the proposed MCL.

Key Issues

EPA believes that this list of eleven maximum concentration levels may be appropriate for addition to the criteria. In order to properly solicit public comment, yet not delay State implementation of RCRA, the Agency is promulgating the criteria at the same time as this amendment is being proposed; the alternative of promulgating interim regulations, with the expanded ground-water quality standard in effect during the comment period, was rejected.

Several key questions are specifically highlighted for public comment. First, are these eleven proposed contaminant levels appropriate for the objectives of the criteria? Are they characteristic of leachate? Are they too commonly present in ground water to serve the purpose? Secondly, are there additional contaminants or characteristics which should be used to determine adverse effects on health and environment? Thirdly, what effect will the expansion of the standard have on compliance with the criteria? Will only those facilities with impervious liners for the prevention of discharges be acceptable, or will there be only a small incremental increase in non-complying facilities consisting of sites which do cause adverse environmental effects?

We specifically highlight for comment the fact that several States have considered these contaminant levels as they were proposed in the National Secondary Drinking Water Regulations and have chosen to promulgate State drinking water regulations based on higher or lower levels. Should these criteria permit similar State-by-State variations in the ground-water quality standard? This question should be addressed considering that without State discretion, some State agencies may be in the awkward position of requiring facilities to close or upgrade for causing effects which the State considers acceptable in drinking water supplies. Yet, on the other hand, in order to protect against the potential for inconsistencies and abuses, a flexible standard will require adding a justification and approval process. This is a level of EPA oversight not otherwise needed in implementation of the regulation.

Comments are also requested on the practicality of implementation (such as replicability of taste and odor tests), potential impacts of this amendment on segments of society and the economy, and the adequacy of the amended regulation in providing for protection of the public health and the environment. Written public comment is invited on all issues raised by the proposal.

Dated: September 10, 1979.

Douglas M. Costle,

Administrator.

Appendix A [Amended]

Accordingly, 40 CFR Part 257 is amended by adding to Appendix A a paragraph 6 as follows:

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6. *Maximum contaminant levels for other than health effects.*

The following are the maximum levels for odor, taste and miscellaneous contaminants:

Contaminant	Level
Chloride	250 mg/l.
Color	15 Color units.
Copper	1 mg/l.
Foaming agents	0.5 mg/l.
Iron	0.3 mg/l.
Manganese	0.05 mg/l.
Odor	3 Threshold odor No.
pH	6.5–8.5.
Sulfate	250 mg/l.
TDS	500 mg/l.
Zinc	5 mg/l.

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