the use of indecent language on the amateur service.

General—3—Title: *Memorandum Opinion, Declaratory Ruling and Order* in General Docket No. 83–989. Summary: The Commission will consider a Petition for Declaratory Ruling filed by Multipoint Distribution Systems, Inc. asking for clarification on the issue of whether MDS licensees are required under 47 CFR 21.903(b)(1), or any other Commission regulation or policy or the Communications Act, to allow their facilities to be used to transmit obscene or otherwise unlawful material.

Common Carrier—4—Title: Enforcement of Prohibitions Against the Use of Common Carriers for the Transmission of Obscene Materials, GEN Docket No. 83–989. Summary: The Commission will consider proposals submitted in response to *Third Notice of Proposed Rulemaking*, 51 FR 26915 (July 28, 1986) for modification of § 64.201 of the Rules concerning restrictions of access by minors to obscene or indecent communications provided by telephone.

This meeting may be continued the following work day to allow the Commission to complete appropriate action.

Additional information concerning this meeting may be obtained from Sarah Lawrence, Office of Congressional and Public Affairs, telephone number (202) 632–5050.

Federal Communications Commission.

William J. Tricarico,

Secretary.

[FR Doc. 87–8752 Filed 4–15–87; 10:55 am]

BILLING CODE 6712–01–M

FEDERAL ELECTION COMMISSON

Cancellation of Public Hearing

DATE AND TIME: Wednesday, April 22, 1987, 10:00 a.m.

The Public Hearing on the Proposed Delegate Regulations has been cancelled.

* * * * *

DATE AND TIME: Wednesday, April 22, 1987, 10:00 a.m.

PLACE: 999 E Street, NW., Washington, DC.

STATUS: This meeting will be closed to the public.

ITEMS TO BE DISCUSSED:

Compliance matters pursuant to 2 U.S.C. § 437g.

Audits conducted pursuant to 2 U.S.C. § 437g, § 438(b), and Title 26, U.S.C.

Matters concerning participation in civil actions or proceedings or arbitration.

Internal personnel rules and procedures or matters affecting a particular employee.

* * * * *

DATE AND TIME: Thursday, April 23, 1987, 10:00 a.m.

PLACE: 999 E Street, NW., Washington, DC (Ninth Floor).

STATUS: This meeting will be open to the public.

MATTERS TO BE CONSIDERED:

Setting of Dates for Future Meetings.

Correction and Approval of Minutes.

Eligibility for Candidates to Receive Presidential Matching Funds.

Final Audit Report—Reagan-Bush '84 General Election Committee; Reagan-Bush '84 Compliance Fund.

Financial Control and Compliance Manual for Presidential Primary Candidates Receiving Public Financing.

Draft Advisory Opinion 1986–42 (Reconsideration)—Vigo G. Nielsen, Jr. on behalf of Dart & Kraft, Inc.

Draft Advisory Opinion 1987–8—Timothy L. Dickinson on behalf of American International Group, Inc.

Notice of Availability on Petition for Rulemaking filed by the National Right to Work Committee (NRWC).

Updated Status of Regulations Projects.

Routine Administrative Matters.

PERSON TO CONTACT FOR INFORMATION: Mr. Fred Eiland, Information Officer, Telephone: 202–376–3155.

Marjorie W. Emmons,

Secretary of the Commission.

[FR Doc. 87–8782 Filed 4–15–87; 2:46 pm]

BILLING CODE 6715–01–M

FEDERAL RESERVE SYSTEM BOARD OF GOVERNORS

"FEDERAL REGISTER" CITATION OF PREVIOUS ANNOUNCEMENT: 52 FR 11796, April 15, 1987.

PREVIOUSLY ANNOUNCED TIME AND DATE OF THE MEETING: Approximately 11:00 a.m., Wednesday, April 15, 1987, following a recess at the conclusion of the open meeting.

CHANGES IN THE MEETING: One of the items announced for inclusion at this meeting was consideration of any agenda items carried forward from a previous meeting; the following such closed item(s) was added:

1. Request by the General Accounting Office for Board comment on a draft report regarding supervision of country risk and international lending.

2. Matters relating to the Plans administered under the Federal Reserve System's employee benefits program.

(These items were announced originally for a closed meeting on April 13, 1987.)

CONTACT PERSON FOR MORE INFORMATION: Mr. Joseph R. Coyne, Assistant to the Board; (202) 452–3204.

Dated: April 15, 1987.

James McAfee,

Associate Secretary of the Board.

[FR Doc. 87–8808 Filed 4–15–87; 3:37 pm]

BILLING CODE 6210–01–M

FEDERAL RESERVE SYSTEM, BOARD OF GOVERNORS

"FEDERAL REGISTER" CITATION OF PREVIOUS ANNOUNCEMENT:

52 FR 11796, April 10, 1987.

PREVIOUSLY ANNOUNCED TIME AND DATE OF THE MEETING: 10:00 a.m., Wednesday, April 15, 1987.

CHANGES IN THE MEETING: Deletion of the following open item(s) from the agenda:

Publication for comment of proposed revisions to the Board's Regulation F (Securities of State Member Banks).

CONTACT PERSON FOR MORE INFORMATION: Mr. Joseph R. Coyne, Assistant to the Board; (202) 452–3204.

Dated: April 15, 1987.

James McAfee,

Associate Secretary of the Board.

[FR Doc. 87–8759 Filed 4–15–87; 11:36 am]

BILLING CODE 6210–01–M

FEDERAL RESERVE SYSTEM BOARD OF GOVERNORS

TIME AND DATE: 10:00 a.m., Wednesday, April 22, 1987.

PLACE: Marriner S. Eccles Federal Reserve Board Building, C Street entrance between 20th and 21st Streets, NW., Washington, DC 20551.

STATUS: Open.

MATTERS TO BE CONSIDERED:

Summary Agenda

Because of their routine nature, no substantive discussion of the following items is anticipated. These matters will be voted on without discussion unless a member of the Board requests that an item be moved to the discussion agenda.

1. Proposed revision of reports of financial condition by primary dealers in government securities (FR 2002 and FR 2003).

2. Proposal to extend, without revision, the Mortgage Loan Disclosure Statement (FR HMDA–1).

Discussion Agenda

3. Proposed revisions to the Board's Rules Regarding Availability of Information.

4. Any items carried forward from a previously announced meeting.

Note.—This meeting will be recorded for the benefit of those unable to attend. Cassettes will be available for listening in the Board's Freedom of Information Office, and copies may be ordered for $5 per cassette by calling (202) 452–3684 or by writing to: Freedom of Information Office, Board of Governors of the Federal System, Washington, DC 20551.

CONTACT PERSON FOR MORE INFORMATION: Mr. Joseph R. Coyne, Assistant to the Board; (202) 452–3204.

Dated: April 15, 1987.

James McAfee,

Associate Secretary of the Board.

[FR Doc. 87-8760 Filed 4-15-87; 11:36 am]

BILLING CODE 6210-01-M

FEDERAL RESERVE SYSTEM, BOARD OF GOVERNORS

TIEM AND DATE: Approximately 10:30 a.m., Wednesday, April 22, 1987, following a recess at the conclusion of the open meeting.

PLACE: Marriner S. Eccles Federal Reserve Board Building, C Street entrance between 20th and 21st Streets, NW., Washington, DC 20551.

STATUS: Closed.

MATTERS TO BE CONSIDERED:

1. Personnel actions (appointments, promotions, assignments, reassignments, and salary actions) involving individual Federal Rerserve System employees.

2. Any items carried forward from a previously announced meeting.

CONTACT PERSON FOR MORE INFORMATION: Mr. Joseph R. Coyne, Assistant to the Board; (202) 452-3204. You may call (202) 452-3207, beginning at approximately 5 p.m. two business days before this meeting, for a recorded announcement of bank and bank holding company applications scheduled for the meeting.

Dated: April 15, 1987.

James McAfee,

Associate Secretary of the Board.

[FR Doc. 87-8761 Filed 4-15-87; 11:36 am]

BILLING CODE 6210-01-M

NATIONAL LABOR RELATIONS BOARD

TIME AND DATE: 10:00 a.m., Wednesday 15 April 1987.

PLACE: Board Conference Room, Sixth Floor, 1717 Pennsylvania Avenue, NW.

STATUS: Closed to public observation pursuant to 5 U.S.C. 552b(c)(2) (internal personnel Rules and practices) and (c)(6) (personal information where disclosure would constitute a clearly unwarranted invasion of personal privacy).

MATTERS TO BE CONSIDERED: Presidential Rank Awards.

CONTACT PERSON FOR FURTHER INFORMATION: John C. Truesdale, Executive Secretary, Washington, DC 20570, Telephone: (202) 254-9430.

Dated, Washington, DC, 15 April 1987.

By direction of the Board.

John C. Truesdale,

Executive Secretary, National Labor Relations Board.

[FR Doc. 87-8776 Filed 4-15-87; 1:00 pm]

BILLING CODE 7545-01-M

TENNESSEE VALLEY AUTHORITY

Meeting No. 1384

TIME AND DATE: 2 p.m. (EDT), Tuesday, April 21, 1987.

PLACE: Chattanooga Office Complex, Missionary Ridge Place, Auditorium, 1101 Market Street, Chattanooga, Tennessee.

STATUS: Open.

Agenda

Approval of minutes of meeting held on April 1, 1987.

Discussion Item

1. Progress Report on Chattanooga Area Urban League Word Processing Training Center.

Action Items

A—Budget and Financing

A1. Modification of Fiscal Year 1987 Capital Budget Financed from Power Proceedings and Borrowings: (1) Addtional Funding—Modify SCRAM Discharge Volume at Browns Ferry Nuclear Plant; (2) Additional Funding—Increase Control Bay Heating and Vent Air-Conditioning System at Browns Ferry Nuclear Plant; (3) Additional Funding—Incore Thermocouple Upgrade Unit 1 at Watts Bar Nuclear Plant; (4) Decreased Funding—Upgrade Ion Chromatographs at Browns Ferry Nuclear Plant; and (5) Deferred Funding—Low-Level Radwaste Facility at Watts Bar Nuclear Plant.

B—Purchase Awards

B1. Invitation AA-08376A—Renovation of Old Post Office, Chattanooga, Tennessee, for Use of Office Space.

C—Power Items

C1. Agreement with Nashville and Eastern Railroad Authority for Continuation of Rail Service to TVA's Wilson 550-kV Substation in Wilson County, Tennessee.

D—Personnel Items

D1. Revised Pay Plan and Salary Schedule for Certain Management and Specialist Schedule Employees.

D2. Personal Services Contract with Sargent & Lundy, Engineers, Chicago, Illinois, for Engineering, Design, Drafting and Related Engineering, Construction, and Operations Support Services, Requested by Office of Nuclear Power.

D3. Supplement No. 1 to Personal Services Contract No. TV-71448A with Enercon Services, Inc., for Engineering Services Related to Nuclear Plant Licensing Activities, Requested by Office of Nuclear Power.

D4. Supplement No. 4 to Personal Services Contract No. TV-69766A with Associated Project Analysts, Los Gatos, California, for Assistance in the Development of Documentation for Nuclear Performance Plans for Sequoyah, Watts Bar, and Browns Ferry Nuclear Plants, Requested by Office of Nuclear Power.

D5. Supplement No. 4 to Personal Services Contract No. TV-65378A with Impell Corporation, Atlanta, Georgia, Providing for the Performance of General Engineering, Design, and Architectural Services, Requested by Office of Nuclear Power.

D6. Supplement No. 7 to Personal Services Contract No. TV-65379A with Gilbert/Commonwealth, Inc., Reading, Pennsylvania, Providing for the Performance of General Engineering, Design, and Architectural Services, Requested by Office of Nuclear Power.

D7. Personal Services Contracts for Engineering Services at Watts Bar Nuclear Plant, Requested by Office of Nuclear Power.

E—Real Property Transactions

E1. Sale of Permanent Easement to Edward L. Bass, Jr., for Landscaping, Open Space, and Driveway Purposes, Affecting a .33-Acre Portion of TVA's Fee-owned Ridgedale-Oglethorpe 161-kV Transmission Line Property Located in Walker County, Georgia—Tract No. XORG-1E.

E2. Modification of Deed to State of Tennessee Affecting Approximately 6.3 Acres of Cherokee Reservoir Land in Grainger County, Tennessee, To Allow for Expansion of State Route 32—Tract No. XTCK-19.

F—Unclassified

F1. Supplement No. 3 to Interagency Agreement (TV-67169A) with U.S. Department of Energy Providing for TVA Assistance in Project Management of Environmental Policy Studies Being Conducted at the Oak Ridge National Laboratory for DOE and the Environmental Protection Agency.

CONTACT PERSON FOR MORE INFORMATION: Craven H. Crowell, Jr., Director of Information, or a member of his staff can respond to requests for information about this meeting. Call (615) 632-8000, Knoxville, Tennessee Information is also available at TVA s Washington Office (202) 245-0101.

Dated: April 14, 1987.

W.F. Willis,

General Manager.

[FR Doc. 87-8722 Filed 4-15-87; 9:00 am]

BILLING CODE 8120-01-M

Corrections

Federal Register
Vol. 52, No. 74
Friday, April 17, 1987

This section of the FEDERAL REGISTER contains editorial corrections of previously published Presidential, Rule, Proposed Rule, and Notice documents and volumes of the Code of Federal Regulations. These corrections are prepared by the Office of the Federal Register. Agency prepared corrections are issued as signed documents and appear in the appropriate document categories elsewhere in the issue.

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Part 685

[Docket No. 60964-7028]

Foreign Fishing; Pelagic Fisheries of the Western Pacific Region

Correction

In rule document 87-4119 beginning on page 5983 in the issue of Friday, February 27, 1987, make the following corrections:

§ 685.6 [Corrected]

On page 5988, in the third column:

1. In § 685.6(d)(1), in the first line, the Morse code should read "(.– .–)".

2. In § 685.6(d)(2), in the first and second lines, the Morse code should read "(.–. –.– –.–. –.–)".

3. In § 685.6(d)(3), in the first line, the Morse code should read "(... –.– ...–)".

4. In § 685.6(d)(4), in the first line, the Morse code should read "(.–..).

BILLING CODE 1505-01-D

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[NM-940-07-4220-11; NM 0301943]

Proposed Continuation of Withdrawal, New Mexico

Correction

In notice document 87-6968 beginning on page 10268 in the issue of Tuesday, March 31, 1987, make the following corrections:

1. On page 10268, in the third column, the fourth line from the bottom should read "Sec. 34, S½NW¼SE¼."

2. On page 10269, in the first column, the fourth line should read "Sec. 34, W½NW¼NW¼."

BILLING CODE 1505-01-D

DEPARTMENT OF THE INTERIOR

Bureau of Land Management

[OR-118-07-4212-17; GP7-147]

Public Lands, Establishment of Camping Stay Limit for Campgrounds and Undeveloped Public Lands, Medford District, OR

Correction

In notice document 87-6967 appearing on page 10268 in the issue of Tuesday, March 31, 1987, the subject heading is corrected to read as set forth above.

BILLING CODE 1505-01-D

SELECTIVE SERVICE SYSTEM

32 CFR Part 1630

Registrant Processing

Correction

In rule document 87-6126 beginning on page 8889, in the issue of Friday, March 20, 1987, make the following correction:

§ 1630.16 [Corrected]

On page 8891, in the first column, in § 1630.16(b) in the 14th line "with" should read "without".

BILLING CODE 1505-01-D

DEPARTMENT OF THE TREASURY

Office of the Secretary

31 CFR Part 103

Amendments to Implementing Regulations Under the Bank Secrecy Act

Correction

In rule document 87-7797 beginning on page 11436 in the issue of Wednesday, April 8, 1987, make the following corrections:

1. On page 11436, in the third column, in the third complete paragraph, in the seventh line, "undertaken" should read "undertakes".

2. On page 11437, in the second column, in paragraph 5, in the second line, "transition" should read "transaction".

§ 103.11 [Corrected]

3. On page 11441, in the second column, in § 103.11(c), in the third line, insert "who" before "holds".

4. On the same page, in the third column, in § 103.11(j)(4), in the third line, insert "an" before "enterprise".

§ 103.24 [Corrected]

5. On page 11443, in the second column, the section number in the heading for § 103.24 was incorrect.

§ 103.26 [Corrected]

6. On page 11443, in the second column, in § 103.26(a)(1), in the fourth line, "responsible" should read "reportable", and in the same column, in § 103.26(b)(1), in the third line, "departure" was mispelled.

§ 103.27 [Corrected]

7. On page 11444, in § 103.27, in the first column, in the 18th line, "care" should read "card".

8. On the same page, in the second column, in amendatory instruction 12, in the second line, insert "of" after "(2)".

§ 103.47 [Corrected]

9. On page 11446, in the second column, in § 103.47(e), in the first line, "of violation" should read "violation of".

BILLING CODE 1505-01-D

federal register

Friday
April 17, 1987

Part II

Environmental Protection Agency

40 CFR Parts 280 and 281
Underground Storage Tanks; Proposed Rules

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Part 280

[FRL-3154-6]

Underground Storage Tanks; Technical Requirements

AGENCY: Environmental Protection Agency.

ACTION: Proposed rule.

SUMMARY: The Environmental Protection Agency (EPA) today proposes regulations for underground storage tanks containing petroleum or substances defined as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended (except hazardous wastes regulated under Subtitle C of the Resource Conservation and Recovery Act).

Under Subtitle I, Section 9003 of the Resource Conservation and Recovery Act, as amended (RCRA), EPA must establish requirements for leak detection, leak prevention, financial responsibility and corrective action for all underground storage tanks containing regulated substances. Today's proposal sets forth, and solicits comment on, proposed requirements that would satisfy the mandates of Section 9003.

DATES: Comments must be received on or before June 16, 1987. Public hearings will be held on this rulemaking in conjunction with public hearings on the proposed UST State Program Approval Requirements, published elsewhere in today's **Federal Register.** Public hearings will be held from 9:30 A.M. to 5:00 P.M., unless concluded earlier, and will be carried over to a second day if necessary to allow commenters to speak who have requested to testify. These hearings are scheduled as follows:

1. May 28, 1987, 9:30 A.M. to 5:00 P.M., Washington, DC.
2. June 1, 1987, 9:30 A.M. to 5:00 P.M., Dallas, Texas.
3. June 4, 1987, 9:30 A.M. to 5:00 P.M., San Francisco, California.

Requests to present oral testimony must be submitted in writing and received at least one week prior to the scheduled hearing date.

ADDRESSES: Send comments to Docket Clerk, Office of Underground Storage Tanks (WH-562A), Docket No. UST 2-1, U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460.

Requests to testify at a hearing may be mailed to: Gerri Wyer, Hearings Coordinator, Office of Underground Storage Tanks (WH-562A), U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460, (800) 424-9346 (toll free) or (202) 382-3000 in Washington, DC.

Hearings will be held at the following locations:

1. Washington, DC—The Westin Hotel, 2401 M Street NW., Washington, DC 20037
2. Dallas—The Registry Hotel, 15201 Dallas Parkway, Dallas, Texas 75248
3. San Francisco—The Miyako Hotel, 1625 Post Street, San Francisco, California 94015.

FOR FURTHER INFORMATION CONTACT: RCRA/SUPERFUND Hotline, 1-(800) 424-9346; or in Washington, DC, 2-(202) 382-3000.

SUPPLEMENTARY INFORMATION: The contents of today's Preamble are listed in the following outline:

I. Authority
II. Background
  A. The Law: Subtitle I of RCRA
  B. Description of the Underground Storage Tanks (UST Systems) to be Regulated
    1. Number of Tanks and Facilities
    2. Types of Tanks
    3. Age of Tanks
  C. General Status of Existing Industry, State and Local Practices
III. The Scope and Nature of the Problem
  A. Current Estimates of Leaking UST Systems
    1. EPA Studies
    2. Some Local Government Experiences
    3. Industry Estimates
    4. The Nature and Extent of the Problem
  B. Major Causes of Releases
    1. Corrosion
    2. Installation Failure
    3. Piping Failure
    4. Spills/Overfills
  C. Technical Options Available to Address Causes of Releases
    1. Corrosion Protection
    2. Design and Construction Standards
    3. Spill and Overfill Equipment and Practices
    4. Inspections
    5. Operation and Maintenance
    6. Release Detection Requirements
IV. Important Influences on Today's Proposal
  A. Recommended Industry Practices and National Consensus Codes
  B. Current Status and Future Role of State and Local UST System Programs
  C. Major Trends in the Industry
  D. Small Business Impacts
V. Today's Proposal
  A. Summary of Today's Proposal
  B. Considerations Underlying EPA's Proposed Approach
  C. Options Considered for New and Existing UST Systems
    1. New Petroleum UST Systems
    2. Existing Petroleum UST Systems
    3. New and Existing Hazardous Substance UST Systems
  D. Options Considered for Corrective Actions
    1. Petroleum UST Systems
    2. Hazardous Substances UST Systems
  E. Two-Tiered Regulatory Scheme for Petroleum Tanks; Basis for Determining Class
VI. Analysis of Today's Proposed Rule
  A. Program Scope
    1. Applicability
    2. Exclusion for Tanks Regulated Under Subtitle C
    3. Deferral of Regulation
    4. Definitions
  B. Design, Installation, and Notification Requirements
    1. Performance Standards for New UST Systems
    2. Implementation Schedules for Upgrading of Existing UST Systems
    3. Notification Requirements
  C. General Operating Requirements
    1. Spill and Overfill Controls
    2. Operation and Maintenance of Corrosion Protection
    3. Compatibility
    4. Repairs
    5. Recordkeeping
  D. Release Detection
    1. General Strategy
    2. General Requirements for All UST Systems
    3. Requirements for New UST Systems
    4. Secondary Containment for New Hazardous Substance UST Systems
    5. Additional Requirements for Piping at New UST Systems
    6. Requirements for Existing UST Systems
    7. Release Detection Recordkeeping
  E. Release Reporting and Investigation
  F. Corrective Action Requirements for Petroleum UST Systems
    1. Stage I: Immediate Corrective Action Steps
    2. Stage II: Longer-Term Corrective Action
    3. Responsibilities of Implementing Agencies
    4. Enforcement
  G. Corrective Action Requirements for Hazardous Substance UST Systems
    1. Stage I: Immediate Corrective Action Steps
    2. Stage II: Longer-Term Corrective Action
    3. Responsibilities of Implementing Agencies
    4. Enforcement
  H. Out-Of-Service UST Systems and Closure
VII. Relationship to Other Aspects of the UST System Program
  A. Interim Prohibition
  B. Notification
  C. Leaking Underground Storage Tank Trust Fund
  D. Exempted Tank Studies
VIII. Relationship to Other Agency Programs
  A. CERCLA
  B. Hazardous Waste Tank Program
  C. Used Oil Regulations
  D. Stage II Vapor Recovery Program
  E. SPCC
  F. DOE High-Level Radioactive Waste Program
IX. Economic and Regulatory Impacts
  A. Regulatory Impact Analysis

B. Regulatory Flexibility Act
C. Paperwork Reduction Act
X. Review of Supporting Documents and Request for Public Comment
XI. Schedule of Public Hearings
XII. List of Subjects in 40 CFR Part 280

I. Authority

These regulations are issued under the authority of Sections 2002, 9001, 9002, 9003, 9004, 9005, 9006, 9007, and 9009 of the Solid Waste Disposal Act of 1970, as amended by the Resource Conservation and Recovery Act of 1976, as amended (42 U.S.C. 6912, 6991(a), 6991(b), 6991(c), 6991(d), 6991(e), 6991(f), 6991(g), 6991(h)).

II. BACKGROUND

A. The Law: Subtitle I of RCRA

The Hazardous and Solid Waste Amendments of 1984, Public Law 98–616, were signed by the President on November 8, 1984. These Amendments extend and strengthen the provisions of the Solid Waste Disposal Act as amended by the Resource Conservation and Recovery Act (RCRA) of 1976. One major portion of this new legislation, Subtitle I, provides for the development and implementation of a comprehensive regulatory program for "underground storage tanks."

Subtitle I defines "underground storage tank" as "any one or combination of tanks (including underground pipes connected thereto) which is used to contain an accumulation of regulated substances, and the volume of which (including the volume of the underground pipes connected thereto) is 10 percent or more beneath the surface of the ground." Throughout this Preamble and proposed rule the use of the term "underground storage tanks," "USTs," and "UST systems" are meant to include both the underground storage tank vessel and the underground piping connected to it. The use of the word "tank" pertains to only the storage tank vessel itself. "Regulated substances" are defined as either petroleum or substances defined as hazardous under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA) (except hazardous wastes regulated under Subtitle C of RCRA).

Subtitle I excludes the following from the definition of underground storage tanks:

- Farm or residential tanks of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes;
- Tanks used for storing heating oil for consumptive use on the premises where stored;
- Septic tanks;
- Pipeline facilities (including gathering lines) regulated under (a) the Natural Gas Pipeline Safety Act of 1968; (b) the Hazardous Liquid Pipeline Act of 1979; or (c) which are interstate pipeline facilities regulated under state laws comparable to the provisions of the laws referred to in (a) and (b) above;
- Surface impoundments, pits, ponds, or lagoons;
- Storm water or wastewater collection systems;
- Flow-through process tanks;
- Liquid traps or associated gathering lines directly related to oil or gas production and gathering operations; and
- Storage tanks situated in an underground area (such as a basement, cellar, mineworking, drift, shaft, or tunnel) if the tank is situated upon or above the surface of the floor.

Subtitle I contains several major provisions for the regulation of UST systems. Section 9002 requires UST system owners to notify states of the existence of their UST systems. These notification requirements were addressed in a Final Rule published by EPA (50 FR 46602, November 8, 1985). Section 9002, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), also requires that states use the notifications they receive to compile tank inventories. Also, under federal grant agreements states are providing EPA with aggregated data from these notifications.

Under Section 9003 of Subtitle I, EPA must promulgate regulations applicable to all owners and operators of UST systems to protect human health and the environment. This section requires that EPA issue design, construction, installation, and compatibility standards for new tanks as well as requirements applicable to all tank owners and operators concerning leak detection, recordkeeping, reporting, closure, corrective action, and financial responsibility.

Section 9003(h) was recently added by the Superfund Amendments and Reauthorization Act of 1986 (SARA). This provision gives EPA (and states under cooperative agreements with EPA) authority to clean up releases from UST systems or to require their owners and operators to do so. It also establishes a trust fund to finance some of these activities.

Section 9004 permits EPA to authorize states to implement their own UST programs in lieu of the federal program if their requirements are "no less stringent" than EPA's and provide for adequate enforcement.

Other provisions of Subtitle I pertain to definitions (Section 9001); entry, inspection, and information-gathering (Section 9005); enforcement (Section 9006); federal facilities (Section 9007); state authorities (Section 9008); and studies and reports to Congress required of EPA (Section 9009).

This Preamble and proposed rule pertain to the requirements mandated by Sections 9003(a) and (c)–(e). Proposed financial responsibility requirements under Section 9003(a) and (d) and state program approval requirements under Section 9004 are proposed in other parts of today's Federal Register.

Section 9003(c) requires that EPA establish minimum requirements for all UST systems: to maintain a leak detection system or comparable system designed to identify releases to protect human health and the environment; to maintain records of any such release detection system; to report releases and corrective action taken; to take corrective action in response to a release; and to close tanks to prevent future releases. Under Section 9003(e), EPA must also establish performance standards for new UST systems. At a minimum, these standards must include design, construction, installation, release detection, and compatibility standards.

Until UST system regulations for new tanks are promulgated, Section 9003(g) establishes an "Interim Prohibition" that allows installation of UST systems after May 8, 1985 only if the UST system 1) will prevent releases due to corrosion or structural failure for the operational life of the UST, 2) is cathodically protected against corrosion, constructed of noncorrodible material, or otherwise designed to prevent releases, and 3) is compatible with the substance to be stored. The law allows an exemption from the requirement of corrosion protection if an UST system is located at a site that has a soil resistivity measured at 12,000 ohms/cm or greater. These requirements will be replaced when final new tank standards under Section 9003(e) become effective. An interpretive rule concerning the Interim Prohibition was published on June 4, 1986 (51 FR 20418).

This Preamble will describe in detail the full range of requirements mandated by Sections 9003(a), (c)(1)–(5), and (e). A description of the UST system universe to be regulated by these requirements follows.

B. Description of the Underground Storage Tanks (UST Systems) To Be Regulated

1. Number of Tanks and Facilities

Today's proposed regulation will apply to an estimated 1.4 million UST systems owned or operated at over 500,000 facilities. EPA estimates that over 95 percent of the estimated 1.4 million UST systems are used to store petroleum. Among these petroleum UST systems, there is a fairly even split between the retail motor fuel sales industry (676,000 tanks) and a number of other industries primarily storing petroleum products for their own use (651,000 tanks). EPA estimates that about 4 percent of the total number of UST systems affected by this proposal contain hazardous substances (54,000 tanks).

The following table displays the number of tanks and facilities appearing in various industry sectors.

TABLE 1

Industry sector	Number of UST systems	Number of facilities
RETAIL MOTOR FUELS	(676,000)	(193,000)
Refiners	164,000	47,000
Jobbers	161,000	46,000
Convenience Stores	32,000	15,000
Independent Chains	18,000	5,000
Open Dealers	281,000	80,000
PETROLEUM STORAGE	(651,000)	(298,000)
Agriculture	86,000	54,000
Mining	14,000	6,000
Construction	42,000	21,000
Manufacturing	75,000	30,000
Transportation	58,000	25,000
Communications & Utilities	39,000	19,000
Wholesale & Retail Trade	136,000	65,000
Services	54,000	26,000
Government (Military)	49,000	6,000
(Non-Military)	98,000	46,000
CHEMICAL STORAGE	(54,000)	(21,000)
Manufacturing	27,000	8,000
Wholesale & Retail Trade	14,000	6,000
Services	3,000	1,500
Other Private Sectors	6,000	3,000
Federal Government	2,000	500
State & Local Government	2,000	2,000
Totals	[1] 1,381,000	[1] 512,000

[1] These estimates do not include potentially millions of unusual or small UST systems discussed in Section VI.A. of this Preamble. For example, there are approximately 750,000 hydraulic lift fluid USTs.

2. Types of UST Systems

UST systems generally consist of the following:

- Steel UST systems not protected from corrosion ("bare steel tanks");
- Steel UST systems protected with a noncorrodible coating;
- Steel UST systems with cathodic protection;
- Steel UST systems with a noncorrodible coating and cathodic protection;
- UST systems made totally of noncorrodible materials; and
- UST systems, made of noncorrodible materials or protected steel, using secondary containment systems.

Steel UST systems can be protected against corrosion by applying a coating of noncorrodible material, such as fiberglass-reinforced plastic or coal tar epoxy, or by using cathodic protection (described below in Section III.C.1.). Tanks constructed of noncorrodible materials are usually made of fiberglass-reinforced plastic (FRP). Secondary containment systems are designed to restrict leaks temporarily to a containment area where they can be rapidly detected by leak detection monitors. There are three main types of secondary containment: double-walled tanks, pit lining systems, and vaults.

Of the estimated 1.4 million existing UST systems, approximately 80 percent are believed to be constructed of unprotected steel. As a result of the Interim Prohibition and installation trends in the petroleum industry, however, the number of bare steel UST systems being installed today has significantly declined. For example, the Steel Tank Institute recently reported a dramatic rise in the production and sale of coated and cathodically-protected steel tanks in the United States. They indicate that the cumulative number of STIP[3] tanks installed nationwide since the late 1960s was doubled in one year (1986) from approximately 35,000 to over 70,000 tanks. STI members further estimate that in 1987 approximately 90 percent of the steel tanks they produce will be coated and cathodically protected. (Some manufacturers are now refusing to sell bare steel tanks.) Preliminary data from several state UST programs (for example, Florida, New York, California, Kansas and North Carolina) corroborate this trend away from bare steel tanks. New tanks are reported most commonly to be made out of coated and cathodically-protected steel, and fiberglass reinforced plastic (FRP), and FRP-clad steel.

3. Age of Tanks

Most existing UST systems have already been in the ground for more than ten years. A recent EPA study, *Underground Motor Fuel Storage Tanks: A National Survey*, found that approximately one third of the existing motor fuel storage tanks are over 20 years old or of unknown age. The survey reported a mean tank age of 12 years for large facilities and 14 years for smaller facilities.

C. General Status of Existing Industry, State, and Local Practices

A number of states and localities have adopted requirements applicable to UST systems. These requirements are diverse and vary widely in stringency. Because leaking petroleum UST systems have led to fires and explosions, early state and local UST regulations have focused on fire code authorities, primarily emphasizing concerns with immediate public safety. National consensus codes, such as the National Fire Prevention Association's NFPA 30 and 329, have been adopted by many state and local governments.

At least fourteen states have recently addressed the ground-water contamination and cleanup problems posed by leaking UST systems through comprehensive regulatory programs that attempt to control important aspects of proper UST system management. Several states, like California, New York and Florida, have established specific UST system regulations that include standards for new UST system design, construction and installation; closure, retrofitting, or repair of existing UST systems; release detection; and corrective action requirements.

Numerous non-regulatory initiatives in UST system management include existing recommended industry practices and state-of-the-art professional guidances. For example, the American Petroleum Institute, the Steel Tank Institute, Underwriters Laboratories, the National Association of Corrosion Engineers, and the American Society for Testing and Materials continue to provide benchmark standards for design and materials. Steel and fiberglass tank manufacturers also supply specifications for tank installation and maintenance.

It appears that the Interim Prohibition of Section 9003(g) reinforces current industry and regulatory trends. As previously mentioned, estimates provided to EPA from several representatives of tank manufacturers

and state agencies indicate a sharply increasing trend towards corrosion-protected underground tank systems. The American Petroleum Institute conducted a survey of its membership and reported in December 1984 that 83 percent of the major and semi-major oil companies (which include a total of approximately 175,000 UST systems) have formal plans for scheduling tank replacements and upgrading. Most of these companies are installing single-walled FRP tanks.

Despite these positive trends, however, many other sectors of the retail motor fuel sales industry (e.g., many independent retail marketers) currently appear to have no clear plans to upgrade or replace their aging, corrosion-prone UST systems. The non-retail petroleum and hazardous substance tank sectors also appear to display a wide variety of responses to upgrading and replacement of tank systems. Also, most existing UST systems do not yet have release detection. However, this situation is seen to be rapidly changing in the several state or local communities that have recently enacted UST regulatory programs. All these programs have or are phasing in some type of release detection.

III. THE SCOPE AND NATURE OF THE PROBLEM

A. Current Estimates of Leaking UST Systems

1. EPA Studies

A display of the nature and national scope of the UST problem can be found in three EPA studies. First, in May 1986, EPA published *Underground Motor Fuel Storage Tanks: A National Survey*. In addition to providing data on tank types and ages (briefly referred to earlier in this Preamble), this survey documents the results of a methodical program of tank tightness testing. Using a statistical sample, the study estimates that 35 percent of non-farm UST systems storing motor fuel would prove non-tight under the conditions of a tank tightness test. However, the survey report acknowledges several caveats regarding the interpretation of this data. For example, failing a tank tightness test does not necessarily indicate the tank or piping is leaking under non-test conditions. Under normal operating conditions vent pipes and bung hole fittings on the top of the tank do not come in contact with the substance stored in the tank and, therefore, cannot leak (however, they can leak whenever the tank is overfilled). In contrast, faulty piping that conveys the substance stored in the tank by the use of pressure pumps can potentially result in significant releases into the environment under normal operating conditions. The survey revealed, however, that most of the existing piping systems tested do not convey motor fuel using pressure pumping methods, but instead use suction methods. EPA believes suction methods are significantly less likely to result in large releases. (See Section VI.D.5. of today's Preamble for further discussion of pressure versus suction piping.)

This national survey underscores the difficulty in discovering the extent and cause of the UST "problem." Statistical analysis of the data collected could not identify any single explanatory variable—such as type of tank or type of material stored—that strongly correlated with the fact that an UST failed a tank tightness test, with one exception: UST systems 20 years old or older failed the test more often. For example, the survey results could not distinguish the extent of the non-tightness attributed to loose fittings on top of the tank or faulty vent pipes and other piping and equipment.

A second study, *Summary of State Reports on Releases from Underground Storage Tanks*, was published in August 1986. This study was based on information compiled by all 50 states concerning 12,444 reported UST release incidents that occurred between 1970 and 1984. Although it was not a statistically-based survey, this study represents the most comprehensive information pertaining to leaking UST systems currently available.

The study found a continuously increasing number of release incidents reported over time. In 1980, about 1,000 release incidents were reported. By 1985, the number of releases reported annually had jumped to well over 2,500. This sharp increase may partly be the result of improvements in state reporting systems. Most leaks were detected only after observation of obvious impacts on nearby private water wells, surface waters, basements, utility lines or soils. Leak detection usually resulted when someone saw or smelled the release—only about 10 percent of these state-reported release incidents were discovered by inventory controls or mechanical leak detection. Nearly all of the leaks involved petroleum, and most of those occurred at service stations. Corrosion and improper installation were identified most often as the cause of the leak. Leaking tanks were much more often identified to be the cause of reported releases than faulty piping. However, the volumes of the releases from piping were often estimated by state inspectors to be as large as or greater than those from leaking tanks. Piping leaks generally were also found to occur sooner in the life of the UST system than tank leaks. As with the earlier national survey, no single identifiable variable—such as tank system age or type—strongly correlated in the state release incidents survey with the fact that an UST was reported as leaking. Although only 17 percent of the state release incident reports specified impacts, those that did reported 40 incidents threatening contamination of municipal potable ground-water supplies and 749 incidents contaminating private ground-water wells (or a total of 8 percent of all reported incidents).

EPA recently sponsored another study focusing on experiences in 20 localities (either counties or cities): *Executive Summary of County/City Release Incidents* (Draft, 1986). Of the 908 local release incidents identified in this study, only about 10 percent had been identified in the previous state study. This study provides evidence that many release incidents do not appear in the state reporting systems. As a result, the state release incidents study referred to above may be describing only a fraction of release incidents nationwide. The local incident study confirms a trend also documented by the state study: more release incidents are being reported each year. For example, there were over 60 percent more release incident reports registered locally in 1985 than in the previous year.

As with the earlier studies, the local release incidents survey revealed that no single variable (such as tank type or age) correlated strongly with the leaking UST systems. However, because most existing UST systems are made of bare steel, corrosion was identified as the chief cause of releases from existing UST systems. Of the tank systems reported to have releases, the distribution of their ages and types was comparable to the earlier studies. Unlike previous studies, however, the local incident survey provided more detailed information on the impact of releases to the environment. About 80 percent of the reported release incidents resulted in soil contamination of 0.5 acres or less. About half the release incidents reporting ground-water contamination impacted 0.5 acres or less of the aquifer to a depth of less than 20 feet. Also, this study identified a strong relationship between the year leak detection requirements became effective in these local jurisdictions and an increase in the number of leaks they reported.

2. Some Local Government Experiences

Data collected locally also provide an indication of the number of UST systems that are currently leaking. New York's Suffolk County instituted tank testing requirements in 1980. The data from approximately 6,200 tightness tests required by the county's Health Department from 1980–1986 reveal that 26 percent of the tank systems failed under the conditions of the test. When these failed systems were partially unearthed and investigated, the condition of non-tightness was discovered (by more than a 10 to 1 margin) to be primarily caused by loose fittings on top of the tank or faulty piping in need of repair or replacement. Interviews conducted in 1985 with county health officials and a major local tank installer disclosed to EPA staff that the cumulative failure figures could have been much higher than reported, because many leaking tanks were voluntarily taken out of the ground after 1980 but before they could be tested under the county's program requirements. Tank testing programs in Austin, Texas, and in San Diego, California, (in which thousands of tank systems have been tested) corroborate the finding that most UST systems failing a tightness test do not appear to have leaks in the tanks, but rather loose fittings on top of the tanks and faulty piping in need of tightening or replacement.

A review of ground-water monitoring systems applied to tanks in Florida's Dade County was cited to EPA by county officials as revealing the presence of free-floating petroleum on the ground-water at approximately 10 percent of the sites where monitoring wells were installed on the top of the ground-water table. After further investigation at many of these sites, it was determined that these releases often resulted from an accumulation of spills and overfills that took place in the past.

3. Industry Estimates

The findings from some industry-sponsored studies have tended to suggest that there are very few leaking UST systems. The American Petroleum Institute conducted a survey of its membership over a three-year period ending in 1980 and had only 2,000 release incidents voluntarily identified nationally (*American Petroleum Institute Tank and Piping Leak Survey*, API Committee on Safety and Fire Protection, Washington D.C., 1981). The survey notes that data submittal was voluntary and that the number of leaks were underreported. The survey did not document the effect of releases on the environment. The survey indicated corrosion as the leading cause of leaks—over 60 percent of reported incidents.

A more recent study resulted from a merger of two companies that required the tightness testing of over 3,500 UST systems (letter to Mr. Ron Brand, Director, Office of Underground Storage Tanks, from Chevron, dated June 2, 1986). The report on this company-sponsored testing program notes that the facilities involved represented a typical cross-section of a major oil company's service stations. Using current testing procedures, all tanks were given a tank tightness test and less than 10 percent failed the test. Of that group, after further investigation, less than 2 percent were reported to have actually leaked, but instead were primarily discovered to have loose fittings on top of the tank. Looked at from a facility-wide standpoint, however, this study suggests a wider impact on the environment than do the data from tightness testing of the specific tank systems. At 90 facilities, one observation well (not necessarily in the excavation area) disclosed the presence of released petroleum products pooled on top of the ground-water table. Although 56 of these facilities had passed the tank tightness test, observation wells disclosed the presence of leaked fuel on top of the ground-water. Thus, this study's conservative figures show that releases from approximately 9 percent of these service stations (that is, 90 out of approximately 1,000 facilities) have had an adverse impact on adjacent ground-water. It is possible that many of these impacts may be the result of an accumulation of spills and overfills or earlier releases from subsequently repaired UST systems, and *not* from a currently leaking tank system.

4. The Nature and Extent of the Problem

In summary, the nation may be facing a pervasive threat to its ground-water from leaking UST systems. If even only 10 percent of the nation's gasoline service stations have leaked or are leaking (as one company-sponsored testing program of a typical cross-section of retail motor fuel outlets indicated), then releases to ground-water could exist at approximately 17,500 retail gasoline sites nationally. Many of these releases could be damaging ground-water resources and presenting threats to human health and safety. As stated earlier, retail motor fuel outlets account for only half of the UST systems addressed by today's proposals. Therefore, the actual level of existing impacts to ground-water could be significantly greater than noted above.

Despite these study findings, major uncertainties still remain. For example, fewer cases of potable well contamination have been reported and documented than should be expected with the number of releases that appear to be occurring. EPA is uncertain whether biodegradation, attenuation, the characteristics of petroleum products or other factors combine with slow ground-water movement to eliminate the problem before potable ground-waters are affected; or perhaps some other factor accounts for the proportion of contaminated wells being reported. On the other hand, it may be only a matter of time before more impacts from these numerous suspected leaks become known.

More information on these and related issues regarding the exact magnitude of the problem, or potential problem, associated with underground tanks will become available over the next several years; particularly as the release detection requirements in several lead state UST programs are implemented more fully. The findings to date, however, are sufficient to demonstrate that leaking underground tanks may be a common occurrence throughout the nation. Significant impacts have occurred; in most cases the release is detected inadvertently, by sight or smell; and a variety of available control approaches that can be used to reduce the risk of damage to public health and the environment are not yet being implemented on a widespread basis. The following sections briefly describe the major causes of UST system releases; technical options for addressing releases; and current industry, state, and local attempts to resolve the problem.

B. Major Causes of Releases

There are four major causes of release incidents: corrosion; faulty installation; piping failure; and spills and overfills. These four causes are described in the following sections.

1. Corrosion

Corrosion is reported to be the major cause of leaks from bare steel UST systems. The EPA surveys described above found that 60 to 70 percent of leaks from existing steel underground storage tank systems are reported as caused by corrosion. Because a very large number of existing UST systems are constructed of steel that is unprotected from corrosion, corrosion is presently believed to be the cause of the largest number of releases in general.

Like the more publicly seen and understood phenomenon known as "rust," corrosion is a general description of what happens when hard, manufactured metal breaks down in the underground environment into its natural form as a soft ore. The multiple ways in which corrosion works underground make it a particular threat to bare steel UST systems. The speed and severity of corrosion depend on a number of factors, including soil conditions, ground water location, and tank or piping characteristics. Corrosion can occur over an entire surface or be localized at a few spots (point corrosion). When localized, unprotected metal can corrode very quickly.

Corrosion attacks unprotected steel UST systems mainly through galvanic corrosion. In this case, the bare steel tank system and its underground surroundings act like a battery. For example, part of an unprotected tank can become negatively charged and another part positively charged (or the bare steel tank and its connected piping can become differently charged, particularly if the piping is galvanized). Once a connection is made between these differently charged parts of the system, a full electric circuit is completed. Many factors can account for the slight differences in the charged parts, including even minute differences within the metal on the surface of the same bare tank or between the bare metal of a pipe's thread (or joint) and the pipe itself. Various soil conditions provide the connecting link to complete the electric circuit.

Once the electric circuit begins, the negatively charged part of the tank or piping—where the current exits—starts to deteriorate (sometimes very rapidly). As electric current passes through this part, the metal begins to turn into ore. Eventually holes are formed by this galvanic corrosion and the tank or piping leaks.

A variation of this problem occurs when the UST system is in the path of underground electric currents. For example, if a subway system or other power system operates near an unprotected UST system, stray current from that system can pass through the UST system. When stray electric current passes through an unprotected steel UST system, corrosion—like the galvanic corrosion described above—occurs in the area where the current leaves the tank or piping.

The rate at which this localized corrosion occurs is directly related to the intensity of the stray current. The larger the current, the faster the corrosion rate. Stray currents are often many times stronger than the currents in galvanic corrosion. Thus, stray current corrosion may occur over a wide surface area of a tank or pipe and at some distance from the power source.

Corrosion can be caused by many conditions and these conditions are almost always present when bare steel is placed underground. In addition, corrosion is generally a gradual process. Thus, the longer unprotected steel tanks or piping are in the ground, the more likely they will be subjected to the many conditions that promote corrosion.

2. Installation Failure

Another significant but less frequently reported cause of leaking UST systems is failure resulting from improper installation. EPA's local release incident study found about 25 percent of the release incident reports cited improper installation (often reported as "structural failure") as the cause of the release (*Executive Summary of County/City Release Incidents*, Draft 1986). Improper installation is a term that encompasses a variety of problems. According to industry reports and consensus codes, installation mistakes that can cause tanks or piping to leak include:

- Inadequate pit and trench design;
- Improper handling of a tank at a site;
- Improper tank bedding and placement;
- Poor or unsuitable backfill material and/or compaction procedure;
- Improper tank or piping depth;
- Inadequate anchoring in high ground-water table conditions; and
- Improper installation of attachments, particularly the fittings on the piping.

The term "structural failure" was often used to describe a wide range of causes of tank releases. For example, the most common "structural failure" reported by state agencies resulted from vehicles colliding with gasoline pumps. Other reported causes of structural failure provided in EPA's State Release Incident Survey also point to accidents, or poor installation practices, rather than integral deficiencies in the tank or piping structure (such as improper anchoring of tanks or the rupture of tanks and piping caused by excessive external load due to vehicular traffic, backhoes, shovels, or snow plows).

3. Piping Failure

According to EPA's State Release Incident Survey, over 20 percent of reported releases from UST systems resulted from failure of underground piping. The same study identified piping as the location of over 50 percent of reported structural failure incidents. Also, piping failures accounted for more of the largest release incidents than either tanks or surface spills. Although this was not a statistically-based survey, the number and proportion of the incidents resulting from piping failures was an important finding. These figures underscore the necessity that today's proposed regulations for release prevention and release detection apply to the tank system's piping, as well as to the tanks themselves.

As noted in the sections above, piping is subject to the same harmful effects of corrosion and installation/structural failure that affect tank failures. As a result of its thinner walls, numerous connecting parts, and more vulnerable location nearer the ground surface, piping may be more susceptible to corrosion and installation/structural failure than tanks. More than half the piping structural failures were reported to occur in the supply line between the tank and the pump; however, a significant number of the documented failures involve the fill pipe, loose pipe fittings, and the vent pipe.

As was discussed previously, several locally-required tightness testing programs have resulted in the recent testing and evaluation of several thousands of existing tank systems nationwide. Further investigations of the non-tight systems have consistently implicated the faulty condition of the piping, vent lines, and fittings on top of the tank much more often than the tanks themselves. Although the phenomena of UST system failures are not yet completely understood and documented by EPA, evidence to date from the field appears to indicate that piping failures may be a more common occurrence than tank failures (particularly if a loose bung hole cover on top of the tank is not considered a "tank failure"). Although the results of the State Release Incidents Study do not indicate such a preponderance of piping-related releases, the in-the-field tightness testing results do not necessarily contradict those study findings. Many of the incidents reported by the states were identified because of the impacts of these releases in the surrounding environment. A significant amount of faulty piping is apparently not having noticeable (and reportable) impacts. This is a plausible result given the still predominant use of suction pumping methods at existing tank systems nationwide.

4. Spills/Overfills

According to the *Summary of State Reports on Releases from Underground Storage Tanks*, about 15 percent of the

release incidents studied resulted from surface spills—usually spills caused by human error. These spills occurred during transfer operations as the stored product moved from delivery truck to storage tank.

Although these spills are usually small, frequent spills can accumulate to sizable volumes over a period of time. Even repeated small spills eventually contaminate the soil and can affect groundwater. Repeated spills may increase the corrosive nature of soil and thus accelerate the corrosion of unprotected steel tanks and piping. Further, spilled material is not detected by in-tank leak detectors and can interfere with the capability of external monitors to detect leaks from the UST system.

There are two major types of spills. *First*, product transfer spills occur when the couplings on the ends of the discharge hose are improperly disconnected and release the stored product onto the ground. Transfer spills normally occur near the tank fill pipe area and release liquid into the manhole around the fill pipe. Eventually, these releases can contaminate the groundwater, because the soil around the manhole is usually very porous to allow for water drainage. *Second*, spills occur when the storage tank is overfilled during delivery operations. When the tank liquid level exceeds the tank capacity, stored product escapes onto the ground around the fill pipe's openings or out of the vent pipes.

C. Technical Options Available to Address Causes of Releases

Generally, the technical options available for preventing releases from UST systems fall into the following categories: (1) design, construction and installation requirements; (2) corrosion controls; and (3) operation and maintenance requirements (e.g., spill and overfill controls). Options for detecting releases when they occur may include inspections or requirements for a release detection system. EPA has considered the advantages and disadvantages of each of the available technical options and the degree of assurance they provide individually and jointly for protection of human health and the environment. The following paragraphs describe these technical options in greater detail.

1. Corrosion Protection

One way to protect steel tank system components from corrosion is to disrupt the UST "battery" (as described earlier) by reversing its electric circuit. Galvanic corrosion results when an electric current leaves the tank. If the flow of current is reversed, tank corrosion can be stopped. This kind of protection is called "cathodic." Cathodic protection systems reverse current flow by using either sacrificial anodes or impressed current. "Sacrificial anodes" can be attached to the UST system. Sacrificial anodes are pieces of metal more electrically active than the steel UST system. Since these anodes are more active, the electric current will exit from them rather than the tank. Thus, the "cathode" of the tank remains protected and free of corrosion while the attached "anode" is sacrificed. An "impressed current" protection system introduces an electric current into the ground through a series of anodes *not* attached to the UST system. Because the electric current flowing from these anodes to the tank system is greater than the corrosive current flowing away from the tank, the UST system is protected from galvanic corrosion. Regardless of which cathodic protection system is selected, the system requires monitoring because soil and tank conditions can change over time and alter cathodic protection needs.

Steel UST systems can also be protected from corrosion by applying coatings of a noncorrodible material, by isolating the tank electrically, and by adding soluble corrosion inhibitors to the regulated substance being stored. (Of course, tanks can also be constructed totally of noncorrodible materials.) Corrosion is a complex process that is influenced by many variables, many of which are site-specific. This complexity, particularly with respect to retrofitting corrosion protection on existing tanks, makes it difficult for owners and operators to select the optimum corrosion protection system without outside expert assistance. For new tank systems, this selection process is much easier. Protection systems are available that are premanufactured as part of the tank at the factory, but even these systems must be properly isolated from attached piping, which itself must be separately protected. Even when the optimum system has been selected, it must be properly installed and maintained or the effectiveness of the system is degraded. Over 100,000 tanks with premanufactured protection systems have been installed nationwide. The manufacturers of these tanks now provide 30 year warrantees and report no failures to date due to corrosion that have resulted in releases.

When properly designed, installed, and maintained, several corrosion control methods, or combinations of methods, will provide significant protection against corrosion. The Agency recognizes no system as foolproof, however, and believes human error or negligence will over time eventually result in some corrosion-induced releases, even from some protected systems. While they are not expected to be sufficient to prevent all corrosion-induced failures, the Agency has concluded that available corrosion protection measures can significantly reduce corrosion from current levels.

2. Design and Construction Standards

According to EPA's State Release Incidents Survey, a number of UST releases have been attributed to structural failure, especially releases from FRP tanks. There is no hard evidence, however, that these structural failures are the result of deficiencies in design and fabrication standards or workmanship at the factory. Rather, the evidence suggests that poor installation practices account for most of these releases. For example, a tank that is adequately designed is dependent upon proper backfill for structural integrity.

Most new tanks and piping have been designed to the standards set forth in national consensus codes. Even the vast majority of existing UST system components are believed to have been professionally designed and tested to withstand normal stresses and load with an extra margin of safety. Thus, besides corrosion-induced failures, most structural failure in the tank or piping itself is the result of improper installation practices.

Although information on proper UST system installation practices is provided in many local consensus codes, such guidance is often inadequate because details are frequently vague. More detailed national codes and industry-recommended practices covering underground tank system installation are found in the Petroleum Equipment Institute's "Recommended Practice 100–06" (1986); the National Fire Protection Association's "Flammable and Combustible Liquids Code 30" (1984); and the American Petroleum Institute's Publication 1615, "Installation of Underground Petroleum Storage Systems" (1979). These documents were developed for petroleum storage, but installation procedures for tanks used in other liquid storage situations are very similar. Tank manufacturers have also developed detailed, explicit installation recommendations. If these recommendations were followed carefully, many installation problems that may lead to eventual tank failures could be prevented. Even while using these more detailed codes, however, installations are subject to human error and abuse. Thus, installation-caused

releases can be significantly reduced by adherence to proper practices, but EPA does not believe that they can be eliminated entirely.

As noted previously, structural failures are reported to commonly occur in underground piping and ancillary equipment. Many such failures are suspected to be caused by corrosion that eventually results in these weakened systems succumbing to the typical mechanical and thermal stresses that occur during daily operations. Some piping releases are also due to sloppy installation practices, such as incomplete tightening of fittings or improperly installed seals. Thus, even if piping and ancillary equipment are corrosion protected, EPA believes that some releases will still occur due to human error or negligence in adherence to proper installation procedures.

3. Spill and Overfill Equipment and Practices

Many releases have been traced to spills and overfills that occur during day-to-day operations. These releases usually result from human error. Overfills appear to represent a significant portion of operation and maintenance releases, yet they pose different problems from those associated with leaks from UST systems. For example, when an overfill occurs, the volume released is limited and cleanup can usually take place quickly.

Because these spills are more limited and immediately obvious than releases from UST systems, engineered safeguards, such as overfill alarms, shutdown pumps, or catchment basins around the fill pipe can be installed to help prevent many spills and overfills. Recommended industry practices, such as NFPA 30, also provide procedures that can be followed during the tank filling process to avoid spills and overfills. Further discussion of spill and overfill management controls and equipment appears below in Section VI.C.1.

4. Inspections

Physical inspections can be conducted of the UST system site and equipment in order to detect existing releases and/or to identify problems that could lead to releases if not repaired. Early responses to releases or threatened releases can reduce risks to human health and the environment.

Inspections in conjunction with tank tightness tests, soap tests, air pressure tests and spark tests (for protective coatings) can be most usefully conducted at the time of UST installation to assure the integrity of the new system. Since most UST systems are buried completely underground, inspections of the installation are not very useful after installation is completed.

The inside of the tank can be inspected if the tank has a manway entrance and the tank is carefully cleaned out before internal inspection begins. Periodic internal inspections are a widespread practice in Europe, but they are rare in this country because most of our tanks do not have manways. Available internal inspection equipment includes penetrant dyes, vacuum boxes (for seam testing), ultrasonic instruments and radiographic equipment. Some of this equipment, however, does not provide a clear indication of the current status of an UST system's integrity or condition, particularly on the outside of the tank. None of these methods can be applied to underground piping because it is generally covered and inaccessible to inspection.

5. Operation and Maintenance

The exercise of good housekeeping practices and the proper operation and maintenance of equipment can further curtail releases from UST systems. Periodic maintenance of serviceable equipment such as pumps, accessible valves and dispenser units can forestall their breaking down and perhaps leaking due to normal wear and tear. Unfortunately, with UST systems, there do not appear to be many opportunities to service buried components nor is there a clear understanding of how much maintenance is warranted to prevent releases (e.g., the time period for replacing gaskets on pumps).

6. Release Detection Requirements

There are a number of release detection methods that can be applied to UST systems, particularly those storing petroleum. Numerous devices are marketed today and many more are under development. Traditionally, the principal method of leak detection used at UST systems has been manual product inventory control, sometimes supplemented with a tank tightness test to verify suspected releases. Manual inventory reconciliation, however, has been a controversial method of release detection, principally because of human error or negligence in properly measuring, recording and reconciling the measurements with records of receipts and dispersals. A recent EPA study revealed that only about 20 percent of the surveyed retail service stations kept adequate inventory records (*Underground Motor Fuel Storage Tanks: A National Survey,* May 1986).

As UST system owners and operators have become more environmentally aware, as the cost of cleanup from releases has become known, and as various state and local jurisdictions have passed legislation requiring more reliable forms of release detection, the types of devices that are available for release detection have proliferated. In addition to tank tightness testing and inventory controls, there are several other broad categories of release monitoring techniques specifically addressed by today's proposal:

- Soil gas monitoring in the excavation area;
- Monitoring for liquids on the water table;
- Interception barrier well monitoring;
- Automatic in-tank monitoring; and
- Interstitial monitoring of secondary containment systems.

The limitations associated with each of these techniques (which are discussed in more detail later in this Preamble) stem from the capability of each of the three major components found in any release detection method: (1) Sensors; (2) network design; and (3) data analysis. The major problem EPA has encountered in assessing the reliability and effectiveness of these systems has been a lack of data. EPA has embarked on a research program to gather some performance data, but expects that it will take a considerable period of time to collect such information. There presently is also very little information and experience concerning the installation and operation of these different methods.

There are other methods besides those mentioned above, however, which may merit consideration for inclusion in the regulations. A good example is that of line leak detectors. Methods for detecting releases from pipes conveying products under pressure are purported to be very sensitive in detecting release conditions. Therefore, EPA does not believe that the above general methods list is exhaustive. All of these above methods are discussed in more detail in today's Preamble and more specific public comment and information is solicited (see also Section VI.D.).

IV. IMPORTANT INFLUENCES ON TODAY'S PROPOSAL

To reach the environmental goals mandated by Subtitle I, EPA has considered the influence of each of the following four areas on the development of today's proposal. In each case, the Agency has sought to build upon existing trends in UST system management and regulatory practices in order to ensure more rapid and efficient

implementation of a consistent, nationwide regulatory program affecting a large universe of over 1.4 million UST systems at over 500,000 facilities.

Experience to date shows that many different institutions are already or are soon expected to become involved in the UST regulatory program, including municipal and volunteer fire departments, local health departments, weights and measures inspectors, and both water and hazardous waste regulatory personnel. As the future franchiser of these various state (and local) agencies, EPA believes it must enable these franchisees to establish a basic program and continually work at helping them improve performance over time. Thus, an important consideration in developing today's proposed regulations was to identify approaches that are, to the extent possible, implementable in the field by someone else besides highly trained EPA employees.

The following important influences were considered in developing today's proposal. They provide some indication of how likely today's proposal, or any other basic regulatory approach, will be quickly and voluntarily implemented by this large and diverse regulated community. To promote this nationwide UST franchise, EPA must develop regulations that are readily implementable in the hands of the state and local franchisees, or human health and the environment will not be adequately protected. Accordingly, these influences were important considerations in the evaluation of the several regulatory options discussed in Section V of this preamble.

A. Recommended Industry Practices and National Consensus Codes

Trade associations, institutes and other private organizations have developed technical codes and standards of practice to standardize the design, fabrication, and operations of a variety of tank management alternatives. Historically, the management of UST systems has been addressed and guided by these nonbinding industry standards or practices. Even where state or local UST system regulations are in effect, these industry standards and/or codes are often incorporated into law by reference.

EPA has carefully considered this body of knowledge and expertise in the private sector which has developed and administered these codes and recommended practices. A partial listing of some of the standards and codes that EPA identified in developing today's proposal is provided in Table 2. An important influence on today's proposal is the recognition of this available experience and expertise in underground tanks.

TABLE 2.—MAJOR CODES, STANDARDS, AND RECOMMENDED PRACTICES FOR UNDERGROUND STORAGE TANKS

Corrosion protection	Leak detection	Tank manufacturing	Tank installation	Tank cleaning	Internal lining	Abandonment or removal of underground tanks	Venting and air emissions
NFPA-329	NFPA-329	API-12F	API-1615	API-2015	API-1631	API-1604	API-2000.
NFPA-30		API-12D	PEI-RP-100-86	API-2015A		API-2202	NFPA-329.
NACE RP-01-9		API-650					
API-1621		API-620		NFPA-30	NFPA-30	NPFA-30	
API-1623	NACE RP-01-69	UL-58	UL-58	NFPA-49	NFPA-49		
NFPA-49		ANSI-31.3		NFPA-327	NFPA-321		
NFPA-43C	NACE RP-03-72	UL1316				UFC	
NACE-RP-02-85		ASME-STDS VESSEL CODES			NACE-STDS FOR SURFACE PREPARATION		
		UL-1316					
		UL-1746					
NFPA-30	NFPA-70	API-2510	API-620	API-1628			
NFPA-49	NFPA-77	NFPA-30	API-510	NFPA-30			
	NFPA-78	NFPA-49		NFPA-49			
		NFPA-58		NFPA-329			
		NFPA-510					
		NFPA-59A					
		ASME-STDS					
		ANSI-STDS					

Key: NACE—National Association of Corrosion Engineers; API—American Petroleum Institute; NFPA—National Fire Prevention Association; ASTM—American Society of Testing and Materials; UL—Underwriters Laboratories; PEI—Petroleum Equipment Institute; ANSI—American National Standards, Inc.; ASME—American Society of Mechanical Engineers; UFC—Uniform Fire Code.

While the existing codes and standards of practice form an important body of technical information, to date they have not been universally applied. For example, most existing UST systems do not have release prevention or detection controls. In some cases, EPA questions the ability of commercially available equipment to meet industry-recommended requirements, such as the ability of release detection devices to reliably detect a leak rate of 0.05 gallons per hour. In other cases there is inconsistency among the existing codes and standards of practice. Also, many of these existing practices were developed without consideration of the increased concerns with environmental protection that prompted today's proposal. Finally, some emerging technologies are not yet covered by existing codes. Therefore, today's proposal is intended to build upon this existing body of knowledge and to go beyond it when necessary to fill in gaps or provide consistency.

B. Current Status and Future Role of State and Local UST System Programs

Many states currently have some UST legislation in place. Most of these existing programs are based on national fire code guidelines. However, at least 14 of them have recently developed very comprehensive approaches that address all aspects of UST system management. A number of county and city governments have also recently passed similar comprehensive UST system requirements. In today's proposal, EPA has attempted to construct requirements that will complement and encourage the initiatives taken by state and local governments to manage their own UST programs.

Because the existing regulatory framework is primarily the result of independent efforts at the state and local level, a variety of approaches have been taken. In some cases the approaches reflect regional factors; for example, ground-water monitoring requirements in Florida were influenced by the prevalence of a shallow depth to ground water. In other cases the

differences in approach, scope, and coverage may simply be due to local practices or preferences.

EPA has evaluated these many different state and local approaches towards regulating underground tanks, and today's proposal builds upon this existing state and local regulatory framework. In supporting these existing regulatory programs, EPA hopes to achieve the goals of Subtitle I more quickly and efficiently than would be the case if it were to propose regulations greatly different from requirements that are widely accepted and already being implemented.

C. Major Trends in the Industry

Voluntary changes are occurring in underground tank system management in the retail motor fuel sector. EPA estimates that by 1997, about three fourths of the 700,000 tanks in the retail motor fuel sector will be replaced, upgraded (to the requirements of the Interim Prohibition), or removed from service. This change could occur even in the absence of finalizing today's proposed federal UST system requirements, based on well-documented past trends in the retail motor fuel sector, including a new tank installation rate of about 25,000 per year and a 4.2 percent rate of motor fuel tank system closures per year ("Regulatory Impact Analysis for Proposed Underground Storage Tank Regulation," dated 1987).

This trend to voluntarily upgrade and replace underground tank systems may actually accelerate as major oil companies and other tank owners respond to several factors: the aging of the existing tank systems (more than 50 percent will be over 14 years old by 1990); increasing public awareness of the vulnerability of the nation's groundwater resources; increasing publicity of some underground storage tank release incidents that involve large dollar damage claims and cleanup costs; and the rising cost and scarcity of environmental liability insurance.

In addition, a growing number of state, county, and city governments are requiring some form of leak detection for UST systems. This is probably the result of many of the factors cited above.

Today's approach has been developed to take advantage of and encourage these ongoing, beneficial changes in underground tank system management. It will assure that all segments of industry and geographic areas will participate in these changes, and that needed improvements in UST system management are established nationwide. The Agency intends to foster these trends in voluntary, compliance as an efficient route to implementation of the requirements of Subtitle I.

D. The Number of Small Businesses Owning or Operating UST Systems

A large proportion of operating USTs are owned by small businesses (businesses with $500,000 or less in total assets). For example, 72 percent of all retail motor fuel outlets are owned by small businesses. The small businesses in this sector most likely to be subject to adverse impacts as a result of UST regulations are the open dealers (firms that own a single retail motor fuel outlet). A typical open dealer (the statistical median) has $90,000 in net worth, $210,000 in assets, and $14,000 per year in after-tax profits. Although the typical open dealer is currently a healthy and profitable business, this class also includes many firms owning old, marginal outlets that would be forced to close if faced with significant new expenditures.

In addition to open dealers, any marginal small businesses in the retail motor fuel sector could easily be forced to close as a result of incurring any major regulatory expenditure, including those associated with tank replacement or corrective action. Because of their small size, even profitable small businesses will have difficulty financing major regulatory costs; especially if they face the costly corrective action of cleaning up ground water.

As an important influence in the development of today's proposal, EPA has attempted to minimize regulatory impact on small businesses without compromising the statutory requirements to protect human health and the environment. For example, as will be discussed in Sections V and VI of this Preamble, the corrective action requirements have been specifically developed in a way that protects human health and the environment while maintaining maximum flexibility for owners and operators, including small businesses.

EPA has also conducted a Preliminary Regulatory Flexibility Analysis, as specified by the Regulatory Flexibility Act of 1980 (5 U.S.C. 601–612). This Regulatory Flexibility Analysis is summarized in Section IX.B. of this Preamble and is specifically concerned with potential impacts on small businesses. An important conclusion from this analysis is that significant impacts on small businesses are inevitable, even in the absence of federal UST regulations. Many existing tank systems are old and are either leaking or will soon leak. They will need to be upgraded or replaced. Major capital expenditures, such as the replacement of a tank system, are beyond the reach of many small businesses. These changes may be hastened by future regulations, but many appear to be inevitable no matter which regulatory approach is developed by EPA. Today's proposal attempts, to the extent possible, to provide important flexibility to small businesses in upgrading their USTs to detect and prevent future releases and this flexibility was an important concern recognized in the development of today's proposal.

V. TODAY'S PROPOSAL

This section provides a summary of EPA's proposed rule. It also sets forth the various alternative strategies considered by EPA, the advantages and disadvantages of those alternatives, and EPA's reasons for selecting the proposed alternative. Comments and relevant information are solicited on all the options EPA has considered and, based on a consideration of these comments and information, the Agency may reconsider the option selected in development of the final rule.

A. Summary of Today's Proposal

EPA is today proposing regulations for underground storage tanks storing either petroleum or hazardous substances other than hazardous wastes regulated under Subtitle C of RCRA. These regulatory measures would establish requirements for both new and existing UST systems to control the major causes of releases from these tank systems, and include corrosion controls, proper installation requirements, and spill and overfill prevention measures. The proposed requirements of Part 280 would fulfill the mandates of RCRA Sections 9003 (a), (c) and (e). The major elements of today's proposal are noted below.

- All new UST systems must be designed and constructed to retain their structural integrity for their operating life (that is, in accordance with existing national consensus codes of practice), including the use of corrosion protection of metal components. Cathodic protection must be monitored and maintained to ensure that UST systems remain free of corrosion.
- Proper installation standards must be followed in placing a new UST system into service. The UST's owner and operator must certify that proper installation procedures were followed and identify how the installation was accomplished (for example, installation by a licensed or certified installer).

• Owners and operators of both new and existing UST systems must immediately follow proper tank filling practices to prevent releases due to spills and overfills. In addition, owners and operators of all new UST systems, and existing UST systems equipped with external release detection, must use devices that prevent spills and overfills.

• Tanks can be repaired, but only once, if they are in sound enough condition to be repaired. Recommended industry practices must be followed to conduct repairs, and in addition several tests must be conducted to ensure quality repairs.

• Industry-recommended practices with regard to tank system closure must be followed and, accordingly, the UST system must be removed from the ground or left in place after removing all regulated substances, filling with an inert substance, and closing it off to all future outside access. In addition to these recommended industry practices, all owners and operators must perform an assessment at the time of tank closure to ensure that a release has not occurred at the site. If a release has occurred, then corrective action must be taken.

• Release detection must be instituted at all UST systems. For petroleum UST systems several methods will be allowed, although requirements concerning their use must be adhered to by tank owners and operators. Petroleum UST systems are not required to have secondary containment with interstitial monitoring. Secondary containment and interstitial monitoring will be required at all new or upgraded UST systems storing hazardous substances, unless a variance is granted. Implementing agencies may provide these variances if the owner or operator can demonstrate that a release detection method can be applied reliably.

• Phase-in of release detection at existing UST systems must occur over a 3- to 5-year period. Bare steel UST systems unprotected from corrosion are required to phase in release detection within the shorter time period.

• Requirements for reporting releases are established. Indications of a potential release would have to be reported to the implementing agency, including positive results from release detection methods that have been immediately investigated by owners and operators. After reporting releases, release investigation and confirmation must take place and, where necessary, corrective action must begin.

• All existing UST systems must be upgraded or replaced to the new tank standards within 10 years, or within 3 to 5 years if a release detection method is not available that can be relied upon to detect releases from the UST system. Upgrading of petroleum UST systems would include retrofitting of corrosion protection and spill and overfill controls at all tanks; upgrading of hazardous substance UST systems would also include secondary containment and interstitial monitoring (unless a variance is granted by the implementing agency based on a demonstration and approval of the capability of the hazardous substance UST system's release detection method).

• Finally, today's proposal requires owners and operators of leaking UST systems to follow measures for corrective action. Immediate corrective action measures include mitigation of safety and fire hazards; removal of saturated soils and floating free product; and an assessment of the extent of further corrective action needed. A corrective action plan would be required for long-term cleanups addressing ground-water contamination. Cleanup levels would be established on a site-by-site basis as approved by the implementing agency that would oversee the cleanup by the owner and operator.

EPA believes that the above requirements adequately protect human health and the environment. Individual states and UST owners and operators should recognize, however, that the most cost-effective approach to protection at a single tank site or in a geographic area may involve features that exceed the minimum requirements that apply nationally. For example, if a shallow drinking water source supplying nearby wells underlies a tank site, the cost of a potential cleanup may greatly exceed the national average. At a few such sites, ground-water cleanup has become a long-term program, costing millions of dollars because of the great difficulty of restoring high quality aquifers. In these cases, a preventive approach—such as the installation of secondary containment for new or replacement tanks—may be advisable, even though today's regulations do not propose making this a national requirement. EPA therefore encourages states and individual owners and operators to evaluate local conditions carefully and to select tank systems and associated equipment in accordance with local conditions and needs, rather than merely to achieve compliance with federal requirements.

B. Considerations Underlying EPA's Proposed Approach

In developing today's proposal, EPA took several important considerations into account. As several studies briefly discussed in Section III indicate, many existing UST systems lack corrosion protection, release detection, and overfill and spill controls. Thus, they are the most likely ones to leak over time, and they present the greatest immediate threat to human health and the environment. A significant number of these existing UST systems are already leaking or are likely to leak in the near future. These studies also show that many of these releases are likely to reach ground water and some will pose threats to our drinking water resources, health, and safety. While there are many technical alternatives available for improving this situation, the relative long-term performance of many of these alternatives is uncertain.

In reviewing regulatory choices, EPA concluded that certain management practices are essential to a successful regulatory program. The Agency concluded that any regulatory approach must provide for the improvement of future tanks and piping by requiring standards for the proper design, construction, and installation of new tank systems, as well as corrosion protection for all steel tank systems.

The Agency also concluded that the above measures alone would not completely eliminate all releases from new tanks. Because of the problems that may still occur, particularly with improperly installed new tank systems, the Agency concluded that release detection and corrective action will be needed in any regulatory approach to new tank systems. Because it is difficult to retrofit existing tank systems with measures for the prevention of future releases, the Agency concluded that any regulatory approach should also provide for the identification of currently leaking UST systems, detection of future releases, and the phased-in replacement or upgrading of existing leak-prone UST systems.

As new and improved tank systems replace old UST systems, EPA expects that releases will decrease significantly. EPA also expects a greater proportion of releases that do occur will result from human error in installation or operation rather than corrosion. This change in emphasis—from mechanical to human error—influenced the Agency's decision-making because regulatory requirements and programs can be developed to ensure human mistakes are minimized to the greatest extent possible.

The above basic considerations, goals, and assumptions were important to the Agency's choice of today's proposed regulatory approach. Their contribution in the Agency's decision-making is more

specifically illustrated in the discussions of the regulatory options that follow.

C. Options Considered for New and Existing UST Systems

In developing today's proposal, EPA evaluated several regulatory options for a general approach towards regulating new and existing UST systems. The following subsections describe these options. Further consideration will be given to these options based on public comments and any additional data received prior to final rulemaking.

1. New Petroleum UST Systems

EPA considered three regulatory options for new petroleum tanks: (1) protected single-walled tanks with release detection; (2) secondary containment with interstitial monitoring; and (3) a class approach based upon the degree of risk posed by proximity to valuable ground-water resources.

Option 1: Protected Single-Walled Tanks With Release Detection

Under the first option, EPA would require new tanks to be constructed of a single wall, protected from corrosion, and equipped with a method of release detection. (Of course, owners or operators of new UST systems could voluntarily exceed these requirements, for example by use of secondary containment and interstitial monitoring.)

Under this option, EPA must make additional decisions concerning allowable methods of release detection and the frequency with which those methods would be used. For example, EPA would have to decide whether to require any one or a combination of release detection methods, such as tank tightness testing, inventory controls, ground-water monitoring in the saturated zone, liquid monitoring on the water table, vapor monitoring in the unsaturated zone, or automated monitoring within the tank. EPA would also have to determine the frequency with which these methods must be applied. This frequency could range from continuous monitoring to an infrequent "check" of the tank system. These decisions concerning release detection are discussed in Section VI.D. The following discussion focuses on EPA's choice between single-walled tanks and secondary containment systems for petroleum UST systems.

There are several major advantages in allowing the use of protected single-walled tanks. This option should prevent most of the releases that commonly occur today. It provides the regulated community flexibility to choose among the widest range of protective release prevention and detection options to comply with the regulations. It costs less initially than the other options. And, because this option builds on existing industry practices and is consistent with most state programs now under development, it is most likely (of all the options) to gain voluntary compliance from the regulated community. This approach also has the additional advantage of leaving more options open to the states in defining classes of UST systems or locations.

One significant disadvantage of this option is that the performance of release detection methods is relatively uncertain and detection is not guaranteed at every site that may have a release. Thus, under this option, there is risk that some releases will occur that cause significant damage to groundwater resources before being detected through smell, taste, or other means. Another disadvantage is that long-term costs may be greater than for the secondary containment option due to the use of unproven release detection methods, and to increases in corrective action, operational, and insurance costs. Finally, in contrast to secondary containment (which is designed to capture releases before they have such adverse impacts on the environment) under this approach more drinking water aquifers may be affected, even when releases are ultimately detected and corrective action is taken.

However, EPA believes that there will be few releases from a protected single-walled tank system with release detection which will occur, go undetected, and cause significant damage before corrective action is taken. EPA anticipates that many of the releases occurring today will be prevented by corrosion protection measures. For example, the Canadian Province of Ontario's UST Program has caused 72 percent of their UST universe to be made of noncorrodible materials or provided with corrosion protection since 1974 and government officials report there has not yet been one release discovered from all these protected tanks. Officials from Denmark report similar successes with corrosion protection technology, which has been in use there since 1974. Thus, EPA believes releases will occur much less frequently with new tanks that conform to today's proposed regulatory standards for design, construction, installation, and corrosion protection. Because of human error, especially with respect to installation and operation of underground piping systems, EPA anticipates that releases will continue to occur at some new tank systems. However, release detection methods will be capable, in most instances, of detecting these releases and the number of releases that go undetected should be very small.

As discussed in Section VI, the Agency believes that certain release detection methods are very promising (although not yet completely understood) in their capacity to detect petroleum releases. For example, the Agency believes that various methods used in the excavation zone can be relied upon if certain conditions pertaining to the network of monitors, the backfill, and the hydrogeology are satisfied. The Agency believes that the more frequently these methods are applied, the more reliable they will be in detecting releases. Thus, a continuous monitor or a method that is sampled frequently is more likely to detect releases when they are still small and more easily corrected.

Based upon the above conclusions, the Agency has decided to propose release detection methods sampled on a frequent to continuous basis as capable of detecting the majority of leaks that occur from new petroleum tank systems. Therefore, EPA believes that protected single-walled tanks with these leak detection systems will protect human health and the environment. The Agency solicits any information that may indicate less frequent monitoring may be sufficient if new UST systems are protected from corrosion and carefully installed.

Option 2: Secondary Containment With Interstitial Monitoring

The second option considered by EPA was to require all new UST systems to have secondary containment with release detection in the interstitial space between the tank system and the secondary containment. Under this option, the owner and operator could obtain a variance from the secondary containment requirement upon demonstration to the implementing agency that the tank system has a release detection system that works as effectively as secondary containment with interstitial monitoring.

The major advantage of this option is the added degree of protection it affords. Secondary containment provides two complete barriers to prevent releases, and a simpler, more certain system for detecting releases between the barriers. Requiring all new UST systems to use secondary containment and interstitial monitoring, which is widely believed to be the most accurate monitoring available, would guarantee that fewer releases would go undetected. This is potentially important because cleanup

to drinking water standards can be very difficult and expensive to achieve. Another possible advantage of this option is the long-term savings from reduced costs for corrective action, insurance, leak detection, operation and maintenance. EPA estimates that the added initial costs may be fully offset by these savings and that fewer acres of ground water and soil will be damaged, if this option is chosen. In addition, this option avoids problems that could arise if owners or operators are unable to pay for corrective action, because this is the only option that requires containment of all releases. Finally, this option provides the advantages of being simple, easy to understand, and easy to administer and enforce. Frequent to continuous interstitial monitoring provides enforcers with a mechanism for checking releases instantly. Further, EPA has found no corrective action technology capable of bringing water quality back to national standards, which makes avoidance of releases even more important.

There are several disadvantages, however, to requiring secondary containment as a general rule. First, its initial costs are higher than those for the other options. Although secondary containment may save costs in the long run by reducing the need for corrective action, the higher initial costs would have more adverse impacts on small businesses than any of the other options. (See Regulatory Impact Analysis, Section IX.) Also, the incremental benefit it provides over the single-walled tank system may not be substantial, because relatively few releases are anticipated from new, single-walled, protected tank systems and leak detection systems are expected to be relatively effective with the single-walled tanks. In addition, the secondary containment option conflicts with most emerging state and local programs and significantly curtails state flexibility to allow other approaches. Thus, requiring secondary containment may discourage states from adopting an UST program or may delay state program approvals. Accordingly, EPA could be placed in the difficult position of directly administering a very large regulatory program. Reliance on an overburdened federal program could result in slower compliance with regulatory requirements for new UST systems and a corresponding delay in addressing leaking UST systems. The delay in achieving compliance with these requirements may be exacerbated by a reluctant regulated community discouraged from replacing existing tanks because of the higher cost of secondary containment. Also, because this approach is contrary to the ongoing voluntary selection within industry of single-walled protected tank systems, it would be less selfimplementing. Finally, requiring secondary containment would eliminate the use of protected single-walled technology, which EPA considers to be a relatively effective alternative now widely available and used.

The Agency solicits comment and information concerning the need for, and feasibility of, requiring secondary containment with interstitial monitoring at all new UST systems.

Option 3: The Class Approach

The third option was to require secondary containment at a class of locations where tanks pose a particularly high risk and to allow protected single-walled tanks with release detection at all other locations. Under this option, EPA would need to establish criteria for the high risk settings, usually involving ground water, where "extra" protection would be required. Several alternative criteria are possible: "Class I" ground-water areas, as defined in EPA's Ground-Water Protection Strategy; "wellhead protection areas" designated under the new program established by the Safe Drinking Water Act Amendments of 1986; or areas established by the states, if they satisfy certain minimum criteria established by EPA. Alternatives for determining the class of high risk locations and an approach for achieving implementation by state programs are discussed in more detail in Section V.E. below.

The major advantage of a class approach is that it allows EPA to tailor more closely its requirements to the risk presented at a particular location, thereby minimizing overprotective regulation. It would allow EPA to take a more preventive approach (secondary containment) at locations where a release would present the greatest threat. This approach would permit the Agency to provide this extra protection to sensitive areas without overregulating tanks located in less sensitive areas. EPA estimates that this option is potentially the lowest cost of the three options because the requirements that are more costly in the initial stages of the operational life of a new UST system are tailored to apply only in the more sensitive or vulnerable settings. In addition, the class approach would encourage state efforts to identify and provide greater protection to their most important ground-water resources, activities that EPA supports with funding under the Clean Water Act for development of state ground-water protection strategies. Funding for state designation of wellhead protection areas under the Safe Drinking Water Act will begin in Fiscal Year 1988.

The class approach, however, has several drawbacks. First, it adds a layer of complexity to the regulations. Unless there were a simple means for determining which requirements applied to a particular UST system location, it would be more difficult for the regulated community to know how to comply without significant guidance and support from the implementing agency. The absence of such technical assistance could complicate enforcement for the implementing agency. Further, while many states have either already identified or plan to identify areas where their ground water is especially important (many are also expected to designate wellhead protection areas under the new program), only a few have at this point used such classifications for establishing different regulatory requirements for underground storage tanks. States seeking program approval that have established more protective requirements for some tank locations (based on state classes or criteria) would have to demonstrate that these requirements are applied at least as stringently to all tank systems in locations meeting EPA's criteria, and modify their programs if needed. Other states would need to set up mechanisms for identifying where the more protective requirements apply. These added steps in state program development and in EPA approval of state programs would delay or make program implementation less certain.

While the class approach was considered very attractive, it was not the Agency's selected option in today's proposal due largely to concerns about difficulty of implementation. Because of the substantial interest that has been expressed in this approach, however, the Agency is especially interested in receiving comments about the feasibility of the class option, and is soliciting comments, in particular, on a specific approach for implementing the class option that is discussed in detail in Section V.E. below.

Conclusion

Because of the large number of facilities subject to these regulations, the success of the UST program depends on a high level of voluntary compliance and an effective program implementation at a state or local level of government. For these reasons, the Agency was influenced by a desire to create a program that would protect human

health and the environment as a direct result of the program's being (1) implemented and enforced by state and local governments, and (2) readily accepted and understood by the regulated community as building on acceptable current practices. Upon considering the options for new petroleum UST systems, the Agency has concluded that the requirement of Corrosion-protected, single-walled tanks and piping with release detection would be protective of human health and the environment, would be compatible with many of the more aggressive state and local programs that have been developed or that are under development, and would be more likely to gain voluntary compliance from larger businesses already moving in that direction and from smaller businesses concerned about initial costs.

The Agency is concerned, however, about the lack of data concerning the effectiveness of various release detection methods. EPA is also particularly interested in receiving comments and information relevant to the above consideration of options for new petroleum UST system standards, including the performance of different types of protected UST systems. Based on comments or information provided during the public comment period, the Agency may, for example, decide to promulgate secondary containment requirements, or the class option, for all new UST systems.

2. Existing Petroleum UST Systems

EPA is today proposing that all existing petroleum UST systems be upgraded to new UST requirements or replaced in 10 years, and that they institute a release detection method phased in within 3 or 5 years depending on the type of UST system. This proposed approach results from consideration of several regulatory options that address four important issues associated with existing petroleum UST systems:

(1) Mandatory upgrading or replacement of substandard UST systems;

(2) Methods of release detection;

(3) Frequency of release detection; and

(4) Phase-in of release detection.

These issues are briefly discussed below.

Issue #1: Mandatory Upgrading or Replacement of Substandard UST Systems

As described earlier in this Preamble, existing UST systems are believed to present the greatest and most immediate threat to human health and the environment. EPA has concluded that future releases can be avoided if existing substandard UST systems are upgraded or replaced before they leak. For example, existing steel UST systems that are unprotected from corrosion can be retrofitted with impressed current protection systems that can substantially curtail or stop the effects of corrosion. Or, an existing tank can be retrofitted with an interior coating that provides an extra layer of protection between the regulated substance stored and the environment. (These technical options are discussed in more detail in Section VI.B. and C.)

Four regulatory options for addressing the issue of mandatory upgrading/replacement of existing unprotected petroleum UST systems were considered during development of today's proposal:

- Rapid upgrading/replacement;
- Gradual upgrading/replacement;
- No upgrading/replacement; and
- A class approach.

These options are discussed in more detail below.

Option 1: Rapid Upgrading or Replacement. This option would require all unprotected substandard UST systems to be upgraded to the new tank standards or replaced rapidly (e.g., within 3 to 5 years). Requiring such changes prior to three years is probably not feasible given the large universe of UST systems subject to today's proposal. For example, none of the most aggressive state or local UST programs have attempted to implement a program as ambitious as that.

In theory, the primary advantage of a rapid replacement option is avoidance of most future releases by requiring the upgrading/replacement of many existing UST systems before they leak. Thus, this approach lowers the risks to human health and the environment by preventing many future releases. Similarly, it could also result in lower and more certain total costs to the regulated community by avoiding the adverse impacts of cleanup costs.

Given the large number of existing unprotected UST systems, the major problem with this approach is that it probably cannot be successfully implemented. For example, all 1.4 million UST systems cannot realistically be retrofitted with release detection methods and cathodic protection within a few years. It is doubtful that enough equipment and qualified installation personnel would become available to perform such an enormous task in a short time. None of the existing state or local UST programs has undertaken this approach. Also, because it requires the most initial costs from the regulated community and provides a short amount of time for accomplishing these changes, this option would have the greatest immediate impact on small businesses.

Option 2: Gradual Upgrading or Replacement. This option would require existing substandard UST systems to be upgraded or replaced more gradually than Option 1 (6 to 12 years). EPA believes that this approach can be implemented for the large number of existing UST systems. An implementable regulatory program helps to ensure that safeguarding of the environment actually takes place. The regulatory impact analysis undertaken in support of today's proposal indicates significant improvements can result during this gradual upgrading replacement period (see Section IX). The primary advantage of this approach, therefore, is that it provides a great deal of environmental benefit in a manner that can realistically be accomplished by the regulated community. Also, this more gradual approach provides more flexibility to state and local UST programs and enables them to establish their own priorities for mandating improvements. Finally, a more gradual phase-in enables small businesses to plan ahead and prepare for making the necessary improvements.

The major disadvantage to this approach is that the additional time allowed for improvements to take place also provides additional time for more releases to occur and more product to be released. However, this problem should be reduced by the much wider use of release detection and the fact that, under today's proposal, release detection requirements are phased-in over a shorter time period for the most risk-prone tank systems. This option correspondingly requires more reliance on corrective action to protect human health and the environment.

Option 3: No Upgrading/Replacement. As noted earlier in Section IV, ongoing trends in industry management practices lead the Agency to believe that many existing UST systems will be voluntarily upgraded or replaced over the next several years. In theory, these trends alone could be relied upon to upgrade and replace all existing UST systems. However, it seems unlikely that a purely voluntary program could guarantee nationwide consistency within a few years for the substantially large and heterogeneous universe of 1.4 million UST systems. Also, the same people who cannot afford voluntary upgrading or replacement will not be able to afford the costs of corrective action should their UST systems leak. Therefore, to protect human health and the

environment, the Agency rejected a totally voluntary strategy for upgrading or replacing existing UST systems.

Option 4: Class Approach. Upgrading or replacement of existing UST systems based on a class approach would require rapid improvement of existing UST systems located in more vulnerable areas and allow a more gradual approach towards improvement in all other areas. As with the class approach for new tank requirements, the major advantage of this approach is that it allows EPA to tailor more closely its requirements to the risks theoretically presented at particular locations. The establishment of easily understandable and readily implementable classes that would be adopted by state and local UST programs, however, is difficult to accomplish. (See Section V.E. for further discussion of the possible basis for a class approach in which the Agency is specifically soliciting public comment today.)

Conclusion. EPA has concluded that many existing substandard UST systems are likely to leak in the future if steps are not taken to upgrade or replace them. The Agency believes that upgrading or replacing this existing universe of predominantly bare steel UST systems will reduce the number of releases that threaten the environment. Because of the large number of UST systems, the Agency has also concluded that it is simply not practicable to mandate that this change take place over a period as short as 3 to 5 years. The more gradual approach being proposed today will protect the environment by allowing the regulated community to plan for and carry out this change efficiently. It will also enable the development and sorting out of the most reliable methods of release detection from among the many that are being offered commercially. It also enables state or local programs to establish priorities for implementing improvements to existing UST systems, which should also lead to more effective protection of the environment.

Issue #2: Methods of Release Detection

As discussed earlier in this Preamble, EPA has concluded that a fundamental goal of any regulatory approach must include the establishment of a reliable means of detecting releases at UST systems, including existing UST systems. The Agency is today proposing to allow existing petroleum UST systems to use the same release detection methods that EPA would allow for new petroleum UST systems. (These release detection methods are discussed in detail in Section VI.) For example, as with new UST systems, the Agency believes that various methods used in the excavation zone can be relied upon at existing UST systems if certain conditions pertaining to the level of background contamination, the network of monitoring wells, type of backfills, and site characteristics are satisfied.

Particularly for petroleum, the Agency presently believes that release detection can be used for the first time at most existing tanks in a way that will significantly reduce the number of releases that go undetected. EPA has identified over 250 devices that are available commercially or being developed to detect releases in UST systems. An important consideration in developing today's proposal was to allow this burgeoning field of release detection technology to continue to develop. However, EPA has very little performance data or field experience concerning most of these methods. Therefore, another important objective was to ensure that only sound and reliable release detection methods are applied. Today's proposed approach to determining what methods of release detection are adequately protective has been guided by these two important considerations.

Issue #3: Frequency of Release Detection

As briefly discussed in the options for new tanks, EPA believes that the more frequently the various methods of release detection are applied, the more likely they are to detect releases. Thus, a continuous monitor or a frequently sampled method is more likely to detect releases when they are still small and more easily corrected than less frequent monitoring. Therefore, the Agency is proposing that release detection methods be used that are sampled frequently to continuously. The Agency has considered the risks posed by less frequent approaches and has concluded that they may not be adequate to protect human health and the environment, particularly with older, less protected existing tank systems.

Infrequent monitoring (for example, every 1 to 3 years) may not be repeated often enough to determine or establish whether a particular result is accurate. In addition, the amount of release that could occur between such infrequent monitoring episodes could be substantial, pose risks to human health and the environment, and require significant and costly cleanups. Given these concerns and the current status of existing tank systems (EPA believes most of them are leak-prone), the Agency has concluded that frequent to continuous monitoring should be required. However, considering the estimated number of existing tanks covered by these regulations (1.4 million), all UST systems cannot realistically be retrofitted within a few years with methods that apply frequent to continuous monitoring. In fact, because these methods have not been applied to date on a widespread basis, the Agency is concerned that not enough equipment and qualified installation personnel would become available over the next several years to perform such a retrofitting task reliably on such a mass scale basis. Also given the unproven nature of much of this equipment, the Agency is concerned that requiring UST owner and operators to use only frequent to continuous monitoring methods could force the selection and installation of unsound methods.

In response to these important practical considerations, the Agency has concluded that it should also allow the use of relatively infrequent tank tightness testing, in conjunction with manual product inventory control techniques on an interim basis, before existing UST systems are required to gradually upgrade or replace to the new UST standards (including frequent to continuous monitoring). Tank tightness testing and inventory controls are the two most widespread and available release detection methods and they have been traditionally used within large segments of the regulated community. However, inventory control must be practiced daily to be used for release detection purposes. On the other hand, because of the high costs and difficulties associated with doing a precision tightness test, this method of detection can only be required on a relatively infrequent basis. Thus, today's approach allows the use of relatively infrequent (every 3 to 5 years) precision tightness testing only if this testing is combined with daily inventory controls and monthly reconciliation practices. This "infrequent" release detection method is allowed at existing UST systems *only* during the 10-year period of gradual upgrading and replacement.

Tank tightness testing and inventory controls both have distinct advantages for existing UST systems, because they do not require retrofitting and operation of permanent equipment by the UST owner and operator. These advantages contrast with the difficulty that numerous small businesses in this regulated community would face if they all had to retrofit and operate (for the first time) frequent to continuous monitoring. Thus, today's proposed approach of infrequent tightness testing and frequent inventory controls allows

them more flexibility during the 10-year interim period as they decide whether to upgrade or replace their UST systems to the new tank standards or to close their systems.

As discussed in more detail in Section VI, however, the Agency is concerned with the reliability of manual inventory controls and believes that tank testing cannot realistically be used for a majority of existing UST systems more frequently than once every 3 to 5 years. Thus, EPA believes that, even with the combined use of these methods, releases from existing UST systems can go undetected. Therefore, EPA is proposing to prohibit the use of *infrequent* tank testing combined with inventory controls as a method of release detection for new or upgraded UST systems. Frequent tank testing with inventory controls will be allowed. Thus, infrequent tank testing and frequent inventory reconciliation is proposed only as an interim measure that responds to the practical problems of program implementation resulting from the attempt to establish release detection at a very large number of existing UST systems within a short timeframe. The Agency is interested in receiving data and comments on this issue, particularly whether retrofitting more frequent release detection systems over a 3–5 year time period would be feasible or appropriate.

Issue #4: Phase-In of Release Detection

Today, EPA is proposing to phase in release detection at existing petroleum UST systems over a 3- to 5-year period. EPA has chosen an approach that would require tanks with the greatest propensity to leak to have release detection in place sooner than others. For example, steel UST systems that are not protected from corrosion would have to be provided with release detection within 3 years, whereas protected UST systems already in the ground would have up to 5 years to add release detection. Because of the large number of existing UST systems to be regulated, the Agency has concluded that the implementation of release detection requirements should be phased in. As a practical matter, the various methods allowed by the proposed rule are not yet widely practiced or readily available on a mass scale basis. The Agency considered three different regulatory options regarding the phase-in of release detection: (1) rapid phase-in (over 1 to 2 years); (2) gradual phase-in (over 3 to 5 years); and (3) a class approach (combination of options 1 and 2 based on location).

A more detailed discussion of some of the methods available for implementing these approaches to the phase-in of release detection is provided in Section VI of this Preamble. Although the Agency recognized the benefits that could result from requiring release detection for existing tanks very quickly, as a practical matter, EPA has concluded that implementation of these requirements will take at least 3 to 5 years. Evaluation of several of the most active state or local UST programs indicates that this timeframe is the minimum necessary. Several industry upgrading programs also are phasing in release detection over a number of years.

Tank owners and operators are required by today's proposed regulation to comply with the release detection requirement within 3 years for tanks without corrosion protection and within 5 years for corrosion protected or noncorrible tanks. Tanks that cannot meet the release detection requirement will be required to close within the same 3 or 5 year period.

As stated previously, EPA has concluded that implementation of release detection will take at least 3 to 5 years to phase in. However, EPA has also concluded that certain types or classes of tanks may pose a more substantial threat to public health and the environment than others, and in some situations, that threat might be imminent. As a result, EPA may require in the final regulations certain types or classes of tanks to comply with release detection requirements prior to the end of either the 3- or 5-year phase in periods proposed today. EPA intends to study this issue further to identify those tanks for which it may require compliance on an accelerated basis. The factors EPA plans to consider in identifying these groups will at a minimum include: tank age; vulnerability of hydrogeology; distance to drinking water wells; and distance to vital ecological systems. EPA solicits comments on the appropriateness of these factors and what additional factors it should consider. EPA also strongly encourages states to set priorities for implementing all of the technical requirements of today's proposed regulation.

EPA rejected requiring the use of inventory controls at all UST systems during the phase-in period because of the difficulty of getting the regulated community to implement such a requirement successfully. Most owners and operators do not conduct inventory controls and various studies have led EPA to suspect that many are not monitoring inventory controls carefully enough for leak detection purposes. Thus, in the absence of a massive training and technical assistance program by EPA, use of this method is proposed to be phased in with the periodic use of tank tightness testing.

EPA also considered using a class approach to phasing in release detection requirements. Under this approach, EPA would phase in release detection at locations deserving extra protection first. This approach, however, encountered the same constraints identified for its use with the other regulatory components discussed earlier. (See Section V.E. for a further discussion of the class approach.)

3. New and Existing Hazardous Substance UST Systems

EPA is proposing secondary containment for all new and upgraded existing hazardous substance UST systems, unless the UST owner and operator can demonstrate by means of a variance that a reliable method of release detection can be applied to a particular protected single-walled tank. Such a variance would be based upon consideration of the tank's contents, the site characteristics in the immediate vicinity of the UST system, and the type of release detection method and design chosen. The Agency considered the same regulatory options for new and existing hazardous substance UST systems that it did for petroleum UST systems. The factors that caused the Agency to select a different approach for hazardous substance UST systems are discussed below.

EPA considered several important differences between petroleum UST systems and hazardous substance UST systems. In general, the Agency has much less information and analysis on all aspects of hazardous substance UST systems than it has on petroleum UST systems. First, and most importantly, the Agency has little information demonstrating that release detection methods are available for detecting releases from new or existing hazardous substance UST systems. Also, very few established industry practices or state and local UST programs appear to explicitly apply to these UST systems. Potential impacts on small businesses are much less of a factor because few small businesses have hazardous substance UST systems, and when they do they typically have only one UST system.

The Agency acknowledges that some hazardous substances are very similar to petroleum and that release detection methods for those substances could

perform equally well in detecting releases. For this reason, the Agency has included a variance provision in the rule. There are many hazardous substances, however, for which these methods would not be reliable. For example, excavation zone liquid monitors cannot be used with hazardous substances that have a specific gravity greater than water because of the likelihood that releases of these substances would not be intercepted by monitoring devices located on the ground-water table. Similarly, vapor monitors would not be effective in detecting substances that are not volatile enough to create detectable gas vapors in the excavation area surrounding the UST system.

As mentioned earlier in the discussion of regulatory options for petroleum UST systems, EPA anticipates that many future releases can be avoided by corrosion protection measures applied to new UST systems and upgraded existing UST systems. However, EPA anticipates that some releases will continue to occur at new protected UST systems or upgraded existing UST systems because of faulty installation, inadequate design and maintenance of corrosion protection, or other unexpected events. Given the current lack of information concerning the availability of reliable release detection methods for hazardous substances, EPA is concerned that these releases could go undetected unless secondary containment equipped with interstitial monitoring is used. However, to provide flexibility, the Agency is proposing the following variance to secondary containment: the long-term use of release detection with corrosion protected single-walled UST systems can be allowed with hazardous substance UST systems if it is demonstrated that the release detection system will be adequately protective of human health and the environment. The demonstration must prove to the implementing agency that the detection method selected complies with the performance standards and the requirements provided in the regulations for the particular hazardous substance stored in that UST system and at that site. The Agency requests comment on whether variances should be granted to more than one owner and operator who petition jointly and have similar tank/substance/release detection characteristics. EPA solicits comment on whether UST system owners and operators would find such a provision useful and whether public notice of such variances would be appropriate.

In the short term, while existing hazardous substance UST systems are being upgraded to the new tank standards (using either secondary containment or protected single-walled UST systems under the variance procedure), EPA has decided to propose the use of other methods of release detection—including tightness testing combined with inventory controls—provided the limitations in the regulations concerning the use of these methods are met. As stated earlier, EPA expects that many hazardous substances have properties that are very similar to petroleum and therefore may be able to make reliable use of the same release detection methods currently available or being developed for petroleum UST systems. EPA believes that this interim allowance of a variety of release detection methods is necessary due to the large universe of tanks that must ultimately be retrofitted or replaced with secondary containment. If reliable release detection or tightness testing is not available or cannot be developed, the owner or operator must—within 3 years if the UST system is bare steel or within 5 years if the UST is protected from corrosion or made out of noncorrodible materials—retrofit or replace with secondary containment and interstitial monitoring to ensure releases are reliably detected and human health and the environment protected.

The Agency also considered the advantages and disadvantages of other regulatory issues considered in developing the proposed regulation of existing petroleum UST systems. The Agency concluded that the regulatory options and approaches being proposed today for existing petroleum UST systems are also appropriate for existing hazardous substance UST systems: (1) gradual mandatory upgrading or replacement of unprotected UST systems; (2) frequent to continuous monitoring, with the interim allowance of inventory controls and tank testing where feasible; and (3) phase-in of release detection over a 3- to 5-year period depending on tank type.

EPA believes the use of the same basic underlying approach to technical tank standards for both petroleum and hazardous substance UST systems will minimize confusion within the regulated community and with the state and local UST programs. It also provides significant flexibility, as discussed earlier, and should therefore foster voluntary compliance and more rapid implementation that should greatly improve protection of human health and the environment.

D. Options Considered for Corrective Action

Today's proposal provides for separate corrective action processes for UST systems that contain petroleum and those that contain hazardous substances. These requirements apply to regulated UST systems (as defined by this rule) and UST systems for which tank technical standards have been deferred by the Agency to a subsequent rulemaking.

The Agency recognizes that this decision to propose separate corrective action requirements for petroleum and hazardous substance UST systems differs from its approach to technical tank standards for which many of the standards are common for both petroleum and hazardous substance USTs. The Agency believes, however, that such a separation is desirable for UST corrective action as a means of avoiding confusion over which procedures must be followed at a particular site. The Agency solicits comments on this approach, however, and any specific proposals for an alternative approach. Specifically, the Agency requests comment on whether the requirements should be integrated into one subpart.

An important goal of the Agency's UST program is to safeguard public and private drinking water supplies as necessary to protect human health. In addition, the Agency believes strongly in the value of protecting the environment through its UST programs, and in addressing the safety concerns (e.g., fire and explosion) that can be associated with regulated substances stored in underground tanks. The corrective action processes and requirements for petroleum and hazardous substance UST systems have been crafted to fulfill these objectives.

As discussed in the following sections, the Agency selected a site-specific approach to the setting of cleanup target levels for corrective action of UST releases. In considering this and the other options for UST corrective action, the Agency started from the following assumptions:

- *Protection of human health and the environment is aided through state and local participation in this program.* A corrective action program that is sufficiently flexible to accommodate many existing (and future) state and local approaches to UST corrective action is critical. This will allow for program and cleanup oversight to occur at the level best suited to the size and diversity of the regulated community,

and the diversity of UST environments nationwide.

• *The corrective action program must accommodate expected changes in the nature of the UST release problem.* In the first five years of the federal program, the Agency expects that the UST corrective action program will be confronted with a growing number of identified release sites. Many of these will be discovered with sizeable releases over a long period of time. As the tank standards are implemented and enforced, however, the later years of the program should see fewer releases and these releases should be detected earlier. The UST corrective action requirements should function well in both stages of the program's lifetime.

• *The corrective action process should be constructed to get quickly to the task of cleaning up a release, although the cleanup itself may take time.* If corrective action measures can be taken quickly that can prevent a release from reaching ground water, or to remove a continuing source of contamination, such action may ultimately reduce the scope of the problem (and possibly even the final remedial cost).

1. UST Systems Containing Petroleum

Today's proposal divides regulatory requirements for petroleum UST corrective action into two stages. The first stage consists of the immediate abatement actions all owners and operators must take in response to a release from a petroleum UST system. The second stage concerns requirements that specify longer-term corrective action measures owners and operators must undertake if the implementing agency determines, on the basis of submitted data, that additional corrective action is required to protect human health and the environment. Review and evaluation of owners' and operators' reports, corrective action plans, and establishment of cleanup requirements are left to the implementing agencies.

In choosing its corrective action approach, EPA was most influenced by the need to develop a program that can be implemented at a state or local level at a very large number of sites with a diversity of environments. The Agency considered using the National Contingency Plan (NCP) (40 CFR 300) process or the process established by current RCRA hazardous waste tank regulations (40 CFR 264.196) to structure the petroleum UST corrective action process. The Agency concluded, however, that implementation of the procedures required by the NCP and RCRA tank regulations would not be appropriate for the very large number and diversity of petroleum UST sites. In addition, the lack of explicit provisions in the NCP and RCRA process for free product removal, a common practice for petroleum UST cleanups, convinced the Agency that a slightly modified process is needed for responding to petroleum UST releases. While the proposed petroleum UST corrective action process differs from those of the NCP and RCRA, the basic structure is the same for all three: control the release source, determine the extent of contamination, determine the extent of remediation required, and take the necessary cleanup actions.

Stage I: Investigation of Releases and Immediate Corrective Action

The first stage of the corrective action process concerns immediate steps to abate imminent safety and health hazards whenever a release from a petroleum UST is indicated or suspected. To comply with these requirements, the petroleum UST owners and operators must: (1) immediately notify the appropriate agency of the possible release; (2) stop the release; (3) address safety hazards from fire or explosion; (4) remove visibly contaminated soil from the immediate area; and (5) investigate to determine the existence and extent of floating free product.

If this investigation detects a free product plume, the owners and operators must submit a report to the implementing agency, unless the implementing agency determines that a report is not required. In all cases, the owner or operator shall initiate the removal of the free product to the maximum extent practicable. This requirement to remove free product to the maximum extent practicable in all cases reflects the following conclusions: (a) free product is a safety hazard if left uncontrolled, (b) free product is a continuing source of potential dissolved ground-water contamination, (c) free product removal is a relatively inexpensive corrective action measure, and (d) free product removal is a common practice today in nearly all UST release cases studied by the Agency.

The owners and operators must also investigate and characterize any plume of dissolved contamination in the ground water and the extent of any remaining soil contamination. The results of this investigation must be reported to the appropriate implementing agency. The implementing agency will use this information as the basis for determining, through a site-specific assessment, if the owners and operators will be required to carry out additional steps of the UST corrective action process.

In the course of the development of an approach to petroleum UST corrective action, the Agency requested and received extensive input from participants in state UST programs. Based on this input, the Agency chose an approach that reflects steps consistently taken by states upon the discovery of a petroleum release regardless of differences in standards and regulations. There was consensus within and outside the Agency on the need for these requirements. Nevertheless, public comment is sought on the following issues:

• Is the definition of free product provided in this proposal adequately precise in the context of the first stage of the proposed corrective action requirements, and, if not, what definition would be more appropriate?

• Should the scope of the corrective action measures required in Stage I (to be implemented for all petroleum releases) be expanded or reduced, and, if so, why?

• Should the requirement to undertake an investigation of the extent of contamination explicitly include ground-water sampling and analysis, and, if so, under what conditions?

• Should the steps required for the investigation of contamination be more explicitly detailed in the regulation (which currently only indicate that such an investigation is required)?

Stage II: Longer-Term Corrective Action Options

The second stage of the proposed corrective action process addresses longer-term corrective actions.[1] If the owners' and operators' investigation of a petroleum UST release indicates that there is dissolved contamination in ground water and remaining subsurface soil contamination, longer-term corrective actions may be required. EPA considered three regulatory options for establishing longer-term cleanup requirements in the corrective action process: (1) national cleanup standards with a variance provision; (2) site-specific standards to match the risk presented; and (3) a predetermined class approach. All three options are currently

[1] The reference to "longer-term corrective actions" considers additional response measures that either take more time to implement and complete than most of the first stage actions (e.g., ground-water removal and treatment), or are more permanent in their duration whether or not they take a long time to implement (e.g., providing alternative drinking water supplies).

in use in some form by various states in their UST programs.

EPA proposes to use the second option, under which a site-specific risk analysis is the basis for setting cleanup requirements for longer-term corrective action. The Agency has selected this option based upon a comparison of the merits of all three options and an evaluation of state program experience. The Agency, however, solicits comments with supporting data (where available) on all three options. The three options are described below.

Option 1—National Cleanup Standards with a Variance Provision. The first option is to base cleanup levels for all sites upon uniform national cleanup standards. Under this approach, owners and operators would be required to clean up soil and ground water contaminated by an UST release until specified health-based standards are met, unless a variance is granted.

Cleanup standards would be national health-based standards. They could include all constituents for which EPA has previously developed health-based standards under other regulatory programs (e.g., Maximum Concentration Limits established under the Safe Drinking Water Act) and others for which there is sufficient data available to develop standards. Alternatively, the use of standards for petroleum releases could be limited to a few indicator chemicals such as benzene, toluene, and xylene. Where health-based standards are unavailable, background concentrations could be used to establish cleanup levels.

A variance procedure would provide a method to adjust national cleanup standards to match site-specific risk and thereby minimize unnecessary cleanup. This procedure could employ the model used in states like Florida where variances can be granted under the following two conditions.

The first type of variance is based on the technical feasibility of achieving the cleanup standards. This variance is granted if UST corrective action measures begin with a cleanup level based on health-based standards, but the cleanup reaches a point at which progress toward the health-based standards is no longer being made. Owners and operators who can demonstrate this condition would be allowed to discontinue remedial measures provided: (1) they can show that the remaining contamination does not pose a substantial present or potential hazard to human health and the environment, and (2) they institute monitoring procedures to ensure that the conditions remain stable or improve.[2] If conditions deteriorate, cleanup measures would be resumed.

A second type of variance is risk-based. It would be granted if the owners and operators can show that there is no exposure pathway or that site-specific conditions, such as existing and potential ground water and/or surface water use, are such that the UST release does not pose a substantial present or potential hazard to human health and the environment. If these conditions are met, cleanup to the specific health-based standards would not be required. (The Agency would provide guidance on the variance procedures to be used.)

The principal advantage of a nationwide numeric standard approach is that it provides some certainty about minimum cleanup levels. Without any site-specific analysis, such minimum cleanup levels may result, however, in excessive cleanup at some sites. For example, requiring cleanup to strict health-based standards may be excessive at a site where ambient conditions already preclude potable use of ground water.

To minimize the extent to which excessive cleanups are conducted under this option, a variance provision is included so that an opportunity to consider site-specific factors is provided. Several state programs take this general approach to corrective action for UST releases. The experience of these programs has been that the variance provisions allowing for exceptions to the standards the states have established for their programs are used very frequently. These variance provisions are used extensively for two reasons. First, environmental conditions at UST release sites vary considerably, and in some instances residual contamination poses little or no hazard to health or the environment. Second, available technologies employed to remove groundwater contamination resulting from UST releases are unable to achieve healthbased standards. To adjust clean up to the levels that available technologies can attain, states have had to grant numerous variances based on the remaining threat to health and the environment presented by site-specific conditions. On the basis of such experience, the Agency has concluded, therefore, that an approach to longer-term UST corrective action based on a national standard with a variance provision is unlikely to be successful in avoiding the necessity for site-specific assessments at many UST release sites. Implementation problems arise as the large number of variance reviews lead to delays in effective general implementation.

The consistency of cleanup that might at first appear to result from a national cleanup standards approach is also reduced by the states' ability to impose standards more stringent than federal requirements. The health-based requirements that several states currently employ vary considerably, and, therefore, some variation from any proposed national standard is expected. In addition, the Agency is concerned that these differences may delay authorization of state programs. Given the large number of petroleum UST systems, the diversity of their settings and the states' knowledge and experience gained through their UST programs, state participation through authorized state programs is crucial.

The Agency is also concerned that the long process of establishing defensible national health-based cleanup standards under Option 1 could delay initiation of cleanup actions under the program. The Agency could use background concentrations as the basis for establishing cleanup levels. The use of background concentrations is also problematic, however, because the site-specific data needed to establish background levels is rarely available for UST release sites. In addition, many UST sites are located in developed areas where background levels are already elevated and may not be suitable cleanup levels sufficient to protect human health and the environment. Thus, determining appropriate background levels also may be time consuming (for example, background levels used in the regulation of hazardous waste land disposal facilities under Subpart F of the RCRA regulations are based on a year of ground-water monitoring data). However, as discussed below for Option 2, it may be possible to start longer-term cleanups (e.g., treatment of ground water with dissolved contamination) at some sites before a cleanup levels is established. This is an approach that some states have chosen to implement at selected UST release sites.

In EPA's view, therefore, the theoretical advantage of Option 1 in ensuring consistent cleanups will in practice not be achieved and, in any case, is outweighed by potential delays associated with the development and implementation of standards, applicable

[2] In those instances where remedial measures implemented initially fail to achieve a health-based standard and remaining contamination still presents a substantial present or potential hazard, the implementing agency likely would reevaluate the choice of remedial measures and require implementation of an alternative that would meet the standard or satisfy the conditions for a variance.

to the large UST regulated community, and the potential for conflict with existing state programs.

Option 2—Site-Specific Standards Based on Risk. The second approach considered by the Agency uses exposure and risk assessment techniques to determine the risk to human health and the environment at each site of an UST release. Under this option, the degree of cleanup sought for contaminated ground water and soil would reflect the site-specific risk presented.

The risk assessment would be based directly on analysis of site-specific conditions and problems posed by the release. Factors to be considered include the quantity of material released; the mobility, persistence and toxicity of the material; the exposure pathways (e.g., drinking water wells); the extent of contamination and its relationship to present and potential ground-water well locations and uses; levels of background contamination; and any relevant standards.

Technology-based decisions would also be possible under Option 2 if: (1) the cleanup level used as the basis for initiating UST corrective action measures is found to be unattainable with current technology; and (2) it is shown that the remaining contamination does not pose a substantial present or potential hazard to human health and the environment; and (3) monitoring procedures are instituted to ensure that the conditions remain stable or improve. Unlike Option 1, there would be no variance because site-specific decisions are made for all sites.

EPA has chosen Option 2 as the preferred approach to setting cleanup levels for longer-term corrective action for petroleum UST systems releases. Option 2 fulfills the statutory requirements to protect human health and the environment, and it would accommodate the variety of approaches taken in existing state corrective action programs. The risk assessment approach can accommodate the wide range of situations likely in UST releases and does not preclude states from employing a variety of approaches for their state UST programs. In addition, by allowing implementing agencies to seek out site-specific cleanup solutions, the use of Option 2 is expected to minimize the overall regulatory impact on small business owners, as well as reducing costs of compliance for all owners and operators.

The principal concern raised about the use of the risk assessment approach is the potential for delay in starting a cleanup until the initial risk assessment is completed. In this corrective action program, however, the Agency has structured the risk assessment option in a manner that should avoid delay. Owners and operators must initiate immediate abatement actions in response to *all* releases. Removal of the source of the release, any free product, and any apparent contaminated soil in the excavation zone is required at all sites before the risk assessment process begins.

Secondly, implementing agencies have the discretion to structure the risk assessment process, and would be provided (in guidance documents accompanying this rule) with risk assessment and site investigation methods, so that the time required to carry out an assessment should not be excessive. They also may require owners and operators to begin cleanup actions during the time the risk assessment is being conducted.

The Agency intends to provide owners and operators and implementing agencies with a variety of tools in the following technical areas:

- Decision-making in the site investigation and corrective action process;
- Risk assessment procedures for petroleum releases;
- Toxicity values for gasoline and gasoline vapor, including information on exposure;
- Facilitating corrective action decision-making in the field;
- The effectiveness and cost of control technologies;
- The treatment of petroleum-contaminated soil, including present regulations, guidelines, and state-of-the-art technologies, and possible future technologies.

The guidance document on risk assessment procedures would be the key element of a streamlined process designed to complete a risk assessment for petroleum releases within a shortened time frame. Though still under development, these procedures are based upon those found in the Superfund Public Health Evaluation Manual but modified for USTs. For example, they will have been adapted to consider only benzene, toluene, and xylene as indicator chemicals for an unleaded gasoline release. In addition, the modified procedures would restrict consideration of risk to exposures through ground water. The manual would provide the necessary data for the toxicity assessment (i.e., toxicity values are already provided).

In EPA's opinion, the site-specific risk assessment process can be streamlined so that it does not delay corrective actions for petroleum UST releases. Accordingly, EPA believes that the site-specific approach to establishing UST corrective action requirements for petroleum releases is preferred because it will accommodate a variety of state approaches to UST regulation and can be tailored to the diverse circumstances surrounding UST releases.

EPA's selection of a risk-based approach does not mean an inability to accommodate some of the features of a class approach where clean up levels are tied to predetermined classes of environments. For example, the Agency would allow UST corrective action programs to recognize well head protection zones established under the Safe Drinking Water Act if the States elect to establish such zones to protect public drinking water wells. An implementing agency should recognize the existence of these zones and should adjust its risk-based clean up level to match the degree of protection established for these zones.

Besides the predetermined class approach utilizing the well head protection zone, the implementing agency should take into account the exposure to the public in finalizing the clean up levels. If a drinking water supply, either public or private, is affected by a release from a regulated UST system, an owner or operator must expect that a health-based standard will be used as a target for clean up of that release, e.g., for gasoline the Agency is considering the proposed maximum contaminant level for benzene of 5 ppb in drinking water as the appropriate surrogate clean up level. Similarly, if the exposure or risk assessment is used to establish a site-specific clean up level, an owner or operator must expect an implementing agency to choose levels that fall within the excess cancer risk range of 10^{-4} to 10^{-7} with a departure point of 10^{-6}. This may mean that the maximum contaminant levels are used as a starting point (and possibly as an end point) for an evaluation of the appropriate clean up level for a drinking water supply. Finally, an owner or operator must expect that environmental concerns (e.g., impact on wetlands, surface waters, etc.) will be considered particularly when present drinking water supplies are not affected.

Option 3—A Predetermined Classes Approach. The third option considered combines the national health-based standard and the site-specific standard approaches. It is based on the use of predetermined classifications of different UST environments, for example, using a classification system based on the use and value of ground water. Alternative approaches for establishing classes are discussed in more detail in V.E. below.

In a ground-water classification system, fragile environments, such as recharge areas for public and private drinking water supply wells, could be classified as "Class A" environments and afforded a high-level of protection by requiring cleanup to specific health-based standards. Similarly, the Agency could incorporate a "Class C" category for areas that require little or no cleanup of releases, such as areas defined as Class III in the EPA ground-water protection strategy. As such, all features of Option 1, described previously, except the risk-based variance, would apply to a release in a Class A environment. An UST release to any environment not classified as Class A or Class C would require corrective action measures sufficient to protect human health and the environment as determined by a site-specific risk assessment. This risk assessment would take the same form as that described in Option 2. An UST release in a Class C environment would receive little or no cleanup beyond Stage I.

In the Agency's view, UST corrective action based on predetermined classes is less workable than a site-specific standard approach. The initial disadvantage is the time required for the implementing agency to develop an appropriate and workable classification system, given the number and diversity of sites and environmental conditions that must be considered. The implementing agency also would have to expend additional time to classify various locations. Although the implementing agency could classify all UST environments in advance or could require owners or operators to begin cleanup actions during the classification process in a manner similar to that described for reducing delay during the risk assessment in Option 2, the necessity to apply classification criteria to the site would interject a step that is not normally required under the site-specific option.

EPA's selection of a risk-based approach does not mean an inability to accommodate some features of a class approach where clean-up levels are tied to predetermined classes of environments. For example, the Agency will allow UST corrective action programs to recognize wellhead protection zones established under the Safe Drinking Water Act, if states elect to establish such zones to protect public drinking water wells. An implementing agency should recognize the existence of these zones and adjust its risk-based clean-up level approach to match the degree of protection established for these zones.

Another disadvantage of Option 3 is that, even after narrowly drawn classes are developed, Class A requirements may not be achievable in some environments with existing technology. The variance procedures described in Option 1 could be employed to modify class-based cleanup requirements if the standards are not attainable. If the variance procedure employed is based on an assessment of the risk to health and environment presented by site-specific conditions, however, it will be the equivalent of the approach suggested in Option 2. Once again, if the variance procedure must be used in a large number of cases, this approach can be expected to result in only nominal reductions in the number of site-specific cleanup decisions.

2. UST Systems Containing Hazardous Substances

Today's proposed corrective action requirements for UST systems containing hazardous substances are similar to those for UST systems containing petroleum with one significant exception. The removal of free product is not part of the Stage I requirements that apply to all releases. As with UST systems containing petroleum, the hazardous substance corrective action requirements are divided into two stages. The first stage consists of the initial abatement actions that all owners and operators must take in response to a release from a hazardous substance UST. The second stage concerns requirements that specify longer-term corrective action measures that owners and operators must undertake if the implementing agency determines that additional corrective action is required. Review and evaluation of owners' and operators' reports and corrective action plans, and establishment of cleanup requirements is left to the implementing agencies.

In choosing its corrective action approach for hazardous substance UST systems, EPA was influenced by: (1) The need to implement a program at a state or local level at a large number of sites with a diversity of environments; (2) the need to develop a program that reflects the greater complexity and diversity of regulated substances in hazardous substance tanks compared to petroleum tanks; and (3) the need to construct a program that is similar to that for petroleum UST systems, but moves more quickly to those steps where owners or operators collect, array, and assess (along with the implementing agency) the information needed to determine the nature, extent, and hazard of the hazardous substance release. An earlier assessment of the release is considered crucial given the relatively greater hazard and technical complexity of a hazardous substance release. It is expected that such assessments will require a greater investment of time and resources to complete than an assessment of a petroleum release.

The requirements being proposed today to establish corrective action requirements for USTs containing hazardous substances are similar to RCRA hazardous waste tank regulations. They are very similar to the petroleum corrective action regulations with one significant exception: The removal of floating free product is not required at every site under Stage 1. Whereas most petroleum products and some chemical products float on the ground water, many other hazardous substances will sink or will be dissolved readily in the ground water. Free product removal plans for hazardous substance releases must, therefore, consider so-called "sinkers" as well as "floaters." Nearly every other aspect of the corrective action process devised for petroleum tank releases would still apply.

As with the petroleum tank corrective action there is a Stage I versus Stage II distinction in the proposed hazardous substance corrective action program. There are several differences in these two programs, however. Under the hazardous substance requirements for example, containment of any visible release applies solely to an above-ground release. A similar Stage I requirement for a petroleum UST release response applies to both above-ground releases and releases to the excavation zone, that is, subsurface soil excavation is required at this point in the process. In contrast, response to a below ground release under the hazardous substance requirements takes place as part of Stage II. Thus, the dividing line between Stage I and Stage II occurs earlier in the hazardous substance release response than in the proposed petroleum release response process. The hazardous substance corrective action requirements resemble the Subtitle C hazardous waste tank requirements that also restrict initial response requirements for removal of visible contamination and require a corrective action for the cleanup of any remaining contamination. As noted, the Agency believes that moving quickly to consider a Stage II response is appropriate for a release from an UST containing hazardous substances as well and, therefore, has followed the RCRA hazardous waste tank approach. Choosing this approach:

- Provides for a response process that recognizes the relatively greater hazards to human health and the environment posed by hazardous substances in comparison to most petroleum substances; and
- Provides for a response process that is consistent for hazardous wastes and hazardous substances released from underground storage tanks.

Stage I: Investigation of Releases and Immediate Corrective Action

The first stage of the hazardous substance corrective action process concerns immediate steps to abate imminent safety and health hazards whenever a release from a hazardous substance UST is indicated or suspected. To comply with these requirements, the UST owner or operator must: 1) immediately notify the appropriate agency of the possible release; 2) stop the release and remove any remaining hazardous substances as necessary to prevent further release and to allow inspection and repair of the tank system; 3) contain any aboveground release and remove visibly contaminated soil from an aboveground release; and 4) investigate to determine the extent of soil and ground-water contamination.

The owner or operator must also investigate and characterize any free product or any plume of dissolved contamination in the ground water and the extent of any soil contamination. The results of this investigation must be reported to the appropriate implementing agency. The implementing agency will use this information as the basis for determining if the owner or operator will be required to carry out additional steps of the corrective action process for USTs containing hazardous substances.

In the course of the development of a corrective action approach for USTs containing hazardous substances, the Agency requested and received extensive input from participants in state UST programs. Based on this input, the Agency chose an approach to release investigation and immediate corrective action measures that reflects steps consistently taken upon the discovery of a hazardous substance release. There was consensus within and outside the Agency on the need for these requirements. Nevertheless, public comment is sought on the following issues:

- Is the definition of free product provided in Section 280.11 of the rule adequately precise and, if not, what definition would be more appropriate, and why?
- Should the scope of the corrective action measures required in response to *all* hazardous substance releases from USTs be expanded or reduced, and, if so, why?
- Should the requirement to undertake an investigation of the extent of contamination explicitly include ground-water sampling and analysis, and, if so, under what conditions?

Stage II: Longer-Term Corrective Action Options

The second stage of the proposed corrective action process for hazardous substance UST systems addresses free product removal and longer-term corrective action. If the investigations conducted under Stage I detect free product, the owner or operator may be required to submit and implement an appropriate plan to remove the free product to the maximum extent practicable. Free product removal is included as a second stage activity for hazardous substance releases from USTs due to the greater technical complexity of investigating the extent of free product, and in removing free product to the maximum extent practicable. If an owner's or operator's investigation of a hazardous substance release from an UST indicates that there is dissolved contamination in ground water or subsurface soil contamination, longer-term corrective actions may be required as determined by the implementing agency and specified in a compliance order. EPA considered three regulatory options for establishing longer-term cleanup requirements in the corrective action process for hazardous substance UST systems: (1) National cleanup standards with a variance provision; (2) site-specific standards based on risk; and (3) a predetermined class approach. All three options are currently in use in some form by various states in their UST programs. For a detailed discussion of these options, readers should refer to the section on "Longer-Term Corrective Action Options" for USTs containing petroleum.

As in the case of corrective action measures for USTs containing petroleum, EPA proposes to use the second option, which uses site-specific standards, as the basis for setting cleanup requirements for longer-term corrective action. The Agency has selected this option based upon a comparison of the merits of all three options and an evaluation of state program experience. The rationale for selection of this approach is the same as described in Section VI.F.2. of this preamble for USTs containing petroleum. The Agency, however, solicits comments with supporting data on all three options.

3. Public Participation in Corrective Action

RCRA section 7004 provides for public participation in the development, revision, implementation, and enforcement of any regulation, guideline, information, or program under RCRA. Although the statute does not specifically require public participation in individual site clean-up decisions, it is EPA's policy to involve the public in decisions of environmental impact. Because the Agency believes that public participation in the formulation of UST corrective action remedies is both useful to selection of the most appropriate actions and consistent with the expectations of the public, EPA is proposing to include public participation requirements in the regulations for petroleum and hazardous substance underground storage tanks. EPA also expects the owner or operator to comply with existing state requirements for public participation. While some specific proposals for public participation applicable to UST corrective action are included in this rulemaking, EPA solicits comments addressing whether existing state administrative procedure requirements would provide adequate opportunities for public involvement in authorized state UST corrective action programs.

The corrective action process for both petroleum and hazardous substance tanks includes initial abatement requirements that are in the nature of emergency response. Because the Agency believes that the nature of the response greatly limits the opportunity for public involvement in this stage, the proposed public participation requirements address the development and implementation of the longer-term corrective action plan (See Sections 280.75 and 280.84).

Specifically, we are proposing to require notice to the public with an opportunity to comment on all Stage II corrective action plans proposed by the UST owners and operators. This provides both an opportunity for meaningful involvement by the public as well as additional perspectives on the problem and proposed solutions for the implementing agency. Beyond this, we are proposing that whenever a decision is made to terminate a corrective action cleanup prior to completion of the entire approved plan (unable to meet specific standards set in the plan) the implementing agency must allow the public an opportunity to comment on the proposed plan revision.

E. Two-Tiered Regulatory Scheme for Petroleum Tanks; Basis for Determining Class

From the outset, it was recognized that leaks from petroleum UST systems located in certain settings—such as where the ground water is an important source of drinking water—presented a greater potential for both human exposure and costly damages than those located where there is more limited or no current use of the ground water. As mentioned in the discussion of options, there was considerable interest in establishing a regulatory scheme that would require more protective requirements for UST systems posing a high risk to human health, such as those located near ground water used for drinking water, than would be required for the general tank universe.

Under this scheme, the general petroleum UST universe would be subject to the requirements presented in today's rule: corrosion-protected, single-walled systems with frequent to continuous monitoring for new tanks; phasing in of release detection systems for existing tanks in 3 to 5 years (with periodic tank tightness testing and inventory controls allowed as one form of release detection during a 10-year interim period); and upgrading of existing tanks to the new tank standards, or replacement with conforming tanks, within 10 years. For the higher risk locations, however, the new tank standards would require all tank systems to be secondarily contained and provided with interstitial release detection between the tank system and the secondary containment barrier. In addition, existing UST systems would be subject to more rapid upgrading to these new tank standards. The requirements for new and upgraded petroleum tanks in the higher risk class would be comparable to the performance standards being proposed today for new and upgraded hazardous substance UST systems, which provide flexibility in the choice of secondary barriers and interstitial monitoring techniques that can be used. (In the following discussion, the requirements that would apply to petroleum UST systems in the higher risk settings will be referred to as "secondary containment and associated requirements.")

To implement such a two-tiered regulatory program, the Agency would need to determine the criteria for locations that would be subject to the more protective requirements. While the class option is not proposed in today's rule, the Agency seeks comment on the general desirability and feasibility of a class approach as well as specific comments on the approach discussed below regarding criteria for identifying the higher risk class and implementation by the states.

The Agency explored many possible ways to define high risk tank settings based on hydrogeologic factors (e.g., depth to ground water, soil properties, and other site-specific conditions) and/or ground-water use in the area (e.g., distance to wells). The principal objective was to develop a class approach that would allow easy determination of which requirements applied to a particular tank location. In addition, the Agency wanted to develop an approach that would be compatible with EPA's Ground-Water Protection Strategy as well as with existing state ground-water classification efforts and anticipated state designation of wellhead protection areas under the new Safe Drinking Water Act Amendments. Because of the clear need for a state role in the class approach, the Agency also needed to consider how appropriate state implementation could be assured. The Agency also considered the American Petroleum Institute's "Recommended Practice for Underground Petroleum Product Storage Systems at Marketing and Distribution Facilities" (#1635, Second Edition, December 1984), which in part recommends secondary containment or equivalent protection for new installations where ground water below the facility is within the cone of influence of municipal water supply wells.

With such considerations as background, the Agency is seeking comment on an approach for implementing a two-tiered regulatory scheme which, while not proposed in today's rule, is still under active consideration. The Agency is attracted to the class concept because it could provide significant additional protection at low incremental cost to valuable ground-water resources that are most vulnerable to damage. For example, the closer tanks are to ground-water wells, the more likely a release will contaminate the well, necessitating well replacement. Based on public comments received and additional information and evaluation developed over the next few months, this approach could be included in the final rule. To foster public consideration and comments on this issue, the basic approach is briefly summarized below, followed by a more detailed discussion of key aspects of the approach.

Summary of the Basic Approach

EPA would establish *minimum* criteria for locations that are subject to the secondary containment and associated requirements based principally on use of the ground water, possibly taking hydrogeologic considerations into account. Each state seeking approval to operate in lieu of the federal program would be required to submit a plan to EPA demonstrating that the secondary containment and associated requirements will apply to all of the locations in the state meeting EPA's criteria. States might be given the choice of three alternative methods for delineating the areas where the more protective requirements would apply: (1) areas meeting EPA's criteria for Class I ground water as defined in EPA's Ground-Water Protection Strategy (1984); (2) wellhead protection areas designated by the state under an EPA-approved program as provided for in the 1986 amendments to the Safe Drinking Water Act; or (3) a state-developed classification scheme as long as it resulted in the more protective requirements being applied at least to the locations meeting EPA's criteria for Class I. (Instead of using Class I criteria as minimum criteria for defining higher risk locations, EPA might choose other criteria, such as a minimum distance around public supply wells, to define these locations.) In states that fail to submit and receive authorization of their UST systems under Section 9004, all UST systems located within a specified distance of all public water supply wells (or wells serving a substantial population as defined in EPA's Ground-Water Protection Strategy) would be required to meet the secondary containment and associated requirements.

The Criteria for High Risk Locations

To provide flexibility to the states and build on continuing efforts to identify ground water needing special protection, the above approach offers alternative ways that states may identify the areas where the secondary containment and associated requirements would apply:

1. States could choose to use EPA's criteria for *Class I ground water,* defined in EPA's Ground-Water Protection Strategy as "ground water that is highly vulnerable to contamination and either an irreplaceable source of drinking water to a substantial population or ecologically vital." Guidelines for classifying ground water under EPA's Strategy, published for public comment in December 1986, further refine this definition and provide a methodology for determining the class of ground

water near a specific source of potential releases to ground water.

Since the Guidelines methodology is designed for site-by-site classification and is based on collection and analysis of information pertinent to a specific source, EPA could develop a simplified method for determining Class I ground water on an area-wide basis. Rather than develop the extensive data needed to show high vulnerability and irreplaceability, states could choose to designate all tank locations within two miles of ground water supplying a substantial population (e.g., more than 2,500 people served by a public water supply). This simplification, the Agency believes, would make it easier for states selecting this alternative method to identify the areas meeting the criteria.

Generally, choosing this alternative would result in the smallest number of areas being designated for the secondary containment and associated requirements. Based on information in EPA's Federal Reporting Data System (FRDS), approximately 15 percent of the public water systems using ground water as a principal source of supply serve a population of over 2,500; however, these systems serve more than 80 percent of the population whose public water systems use ground water. Designated areas where the secondary containment and associated requirements would apply would, based on preliminary estimates, encompass less than 5 percent of the nation's land area.

2. The second alternative states could choose would be to apply the more protective requirements in *wellhead protection areas* designated by the states under an EPA-approved plan as provided for in the 1986 Safe Drinking Water Act (SDWA) amendments. Under this new program, states will be submitting state programs to EPA for designating and developing programs to protect wellhead areas around public water supply wells. Under the SDWA, EPA will publish guidelines for delineating wellhead areas and for state grant approval in June 1987. States are expected to submit grant applications for program development in 1988.

States choosing this alternative would be taking advantage of the new wellhead protection program as a means for providing extra protection from leaking tanks to all public water supply wells. According to FRDS, there are approximately 47,700 public water supply systems using ground water, excluding non-community (e.g., non-residential) and seasonal use (e.g., campground) systems. Preliminary estimates indicate that approximately 10 percent of the land area in the nation would be encompassed by this alternative.

3. States with their own *state ground-water classification systems* could choose to apply the secondary containment and associated requirements in the areas they have identified as needing special protection. A number of states have already developed such classification systems, and nearly all states are developing ground-water protection strategies which include an effort to identify their most important ground-water resources.

For states choosing this alternative, EPA would review the state's plan for using the classification system as a means for implementing the more protective tank program requirements, and approve those state plans which would result in the secondary containment and associated requirements being applied to at least those locations meeting EPA's criteria for Class I (or whatever minimum criteria EPA might choose for defining the more protective class). Since EPA's Class I is a very small and tightly drawn class, it is expected that most states with existing systems for identifying important ground-water resources should meet this requirement.

Private Wells. During the development of the two-tiered regulatory approach described above, the Agency also considered whether secondary containment and associated requirements should also apply to UST systems located near private drinking water wells. These wells are of concern because they number about 13 million and because over 90 percent of all wells contaminated in release incidents are private water supply wells. The Agency believes that fewer than 20 percent of all tanks are close to private or public drinking water wells.

The Agency does not contemplate including them in the high risk class discussed above, however, for several reasons. Private wells are not regulated under Federal statute, and States vary in the degree to which they regulate private wells. The exact location of private wells is often difficult for the UST owner and the implementing agency to determine which set of requirements applied to a particular UST location.

If the Agency did include tanks near private wells in the high risk class, the distance from the tank to these wells may or may not be the same as for public water supply wells, which typically draw larger volumes of water. EPA believes, based on available historical data concerning petroleum releases from UST systems, that in excess of 80 percent of contamination incidents could have been avoided if the distance were 500 feet and that over 90 percent of incidents could have been avoided if a 1,000-foot distance were chosen.

The Agency believes that the risks presented by UST systems in these settings may be adequately addressed by the basic requirements and may not warrant the additional costs to the individual UST owner and to the administering agency that would result from extending the secondary containment and associated requirements to UST systems near private wells. The Agency does, however, seek comment on whether UST systems near private wells should be subject to these requirements if the Agency proceeds with a two-tiered regulatory approach, and, if so, what size of protected area adjacent to private wells would be appropriate. The Agency also seeks comment on how implementation might be achieved given the practical problems described above, as well as on whether the decision to place additional requirements on UST systems located near private wells should be left to the States.

Required Use of Distance to Well Criteria in States Without Approved Plans

Because states vary in the degree to which they have delineated or plan to delineate areas where the ground water needs special protection, EPA's two-tiered approach could include the requirement that the secondary containment and associated requirements would apply in higher risk settings in those states without an approved program under Section 9004. In states that fail to gain program approval, the secondary containment and associated requirements might be required to take effect at any tank system located within a specified distance to a public water supply well or a well supplying a substantial population (Class I). EPA believes that such an automatic federal requirement is essential: (1) To assure that higher risk settings in all states receive a higher degree of protection; and (2) to encourage states to develop and implement their own plans to protect their public water supply wells.

The Agency recognizes that any specified distance selected may under- or over-protect in varying hydrogeologic settings. Therefore, the Agency is seeking comment on what the specified distance to the well should be. The Agency has identified several possible alternatives for the distance to wells that could be specified. The Agency is

also seeking comment on whether such a requirement should apply to all public supply wells or just those supplying a "subtantial population" as that term is used in EPA's ground-water protection strategy for Class I ground-water.

One alternative distance to wells might be to specify a 2-mile radius around public water supply wells. The 2-mile distance is based on an analysis of contaminant plume lengths, distances to surface water, and pumping well capture zones. This statistical analysis was performed for the development of EPA's Ground-Water Classification Guidelines to determine how large an area would need protection from a potential source of ground-water contamination. The 2-mile distance was shown to be protective in more than 90 percent of the situations analyzed. Another possible distance is 1,600 feet from a public water supply well. This distance is based on an analysis of 156 known petroleum UST ground-water contamination incidents. Seven of these incidents threatened municipal well systems with releases from leaking petroleum underground storage tanks. According to this analysis, none of the releases travelled a distance greater than 1,600 feet before being discovered. The 2-mile distance has the advantage of being based on analysis of a broad spectrum of releases in a wide variety of hydrogeologic settings. The 1,600-foot distance is based on known plume lengths only, but has the advantage of representing distances that petroleum products actually travelled before discovery as a result of an UST system release.

The Agency is seeking comment on the appropriateness of these (and other suggested) distances in identifying where the secondary containment and associated requirements will be imposed in states prior to receiving approval of their plans. The Agency also seeks comment on whether and how to establish different automatic distances to wells for varying sizes (e.g., pumping rate, population served) of public water supply wells.

State Implementation Plans

A central ingredient of this two-tiered class approach is the state's development, submission, and EPA approval of a plan for implementing the secondary containment and associated requirements in higher risk settings. EPA would review the plans as part of the state program approval process for the UST program.

Tank owners in states failing to receive approval of a state plan to protect higher risk settings would be subject to the federal secondary containment and associated requirements if they are located within the specified distance to wells established by the EPA regulations.

EPA is also seeking comment on the state plan submission and approval process as a critical element of the overall approach.

VI. ANALYSIS OF TODAY'S PROPOSED RULE

A. Program Scope

1. Applicability

As described previously, today's proposed rulemaking generally applies to all owners and operators of "underground storage tanks" (UST systems) containing "regulated substances." Exclusions from this rulemaking and UST systems for which regulation is deferred are discussed in the following sections. UST systems are defined as any one or combination of tanks (including any attached underground piping) used to contain an accumulation of regulated substances. To be considered "underground," the tank must have at least 10 percent of its volume beneath the surface of the ground, including pipes attached to the tank. Section 9001 of Subtitle I, however, expressly excludes the following:

- Farm and residential tanks having a capacity of no more than 1,100 gallons used for storing motor fuel for non-commercial purposes;
- Tanks storing heating oil for consumptive use on the premises where stored;
- Septic tanks;
- Pipeline facilities (including gathering lines) regulated under the Natural Gas Pipeline Safety Act of 1968 or the Hazardous Liquid Pipeline Safety Act of 1979. Also excluded are intrastate pipeline facilities regulated under state laws comparable to the provisions of these two Acts;
- Surface impoundments, pits, ponds, and lagoons;
- Storm water or wastewater collection systems;
- Flow-through process tanks;
- Liquid traps or associated gathering lines directly related to oil or gas production and gathering operations; and
- Storage tanks situated on or above the floor of underground areas (such as basements, shafts, or tunnels).

"Regulated Substance" is defined in Section 9001 of Subtitle I as: (1) Any substance defined in Section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA) as a hazardous substance, except substances regulated as hazardous wastes under Subtitle C of the Solid Waste Disposal Act; and (2) petroleum, including crude oil or any fraction thereof, which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute).[3]

Section 9001 of Subtitle I sets forth definitions for other key terms used in RCRA. These include "release," "non-operational storage tank," "owner," "operator," and "person." The Agency previously codified these definitions along with the definition of "regulated substance" (50 FR 28702). They are presented again in today's proposal so that the public does not have to refer to previous **Federal Register** notices.

Today, the Agency is proposing one regulatory exclusion which is described in Section 2 below. In addition, the Agency is also proposing to defer regulation for certain categories of UST systems because the Agency has insufficient data upon which to fashion appropriate regulations. Deferral of regulation of these tanks is described in Section 3 below. The Agency is also proposing regulatory definitions intended to clarify the terms of the statute. These definitions clarify the universe subject to Subtitle I jurisdiction as well as the statutory exclusions listed above. These definitions are described in Section 4 below.[4] The following

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[3] The list of CERCLA hazardous substances is codified at 40 CFR Part 302. This list contains both commercial chemicals and discarded commercial chemical products. The Subtitle I program only covers those hazardous substances that are not hazardous wastes (except for petroleum wastes). This list was amended in a final rule published on September 29, 1986 (51 FR 34534).

The Agency proposes to apply requirements for hazardous substance UST systems to tanks containing a mixture of petroleum and hazardous substances in which hazardous substances comprise the principal components of the mixture. The Agency is interested in commenters' views on the feasibility (especially for a testing method) of using a concentration threshold to determine when such a mixture would be regarded as principally petroleum or principally hazardous substance, and, therefore, subject to the respective requirements. The Agency recognizes that several petroleum products (e.g., gasoline) are themselves comprised of hazardous substance constituents (e.g., benzene, toluene, xylene), but regards these as petroleum to the extent these substances are present in levels normally found in raw or refined petroleum fractions. The Agency requests comments on the frequency of, problems with, and suggested approach to requirements for UST systems containing both a petroleum product and a regulated hazardous substance. The Agency believes that the largest group of such tanks contain waste oil to which hazardous substances have been added (e.g., solvents).

[4] A number of the definitions that the Agency is proposing today have already been presented in a guidance document issued by EPA on April 7, 1986 to assist the regulated community in complying with the Subtitle I notification requirements.

sections describe EPA's reasons for selecting the proposed deferrals, exclusions and definitions and asks for public comment.

2. Exclusion for Tanks Regulated Under Subtitle C

Underground storage tanks that contain a mixture of hazardous wastes (regulated under Subtitle C) and hazardous substances (regulated under Subtitle I) are subject to overlapping jurisdiction of Subtitles C and I. EPA is proposing today to exempt these tanks from Subtitle I regulation. The Agency believes that this is consistent with congressional intent not to have overlapping requirements evidenced by the Subtitle C exclusion within the definition of "regulated substance." Because of the coverage of these tanks by Subtitle C, the exemption of these tanks will not present a risk to human health and the environment.

3. Deferral of Regulation

Today, the Agency is deferring the proposal of certain requirements for the following categories of UST systems: wastewater treatment tanks, sumps, UST systems containing used oil, underground bulk storage tanks, UST systems containing radioactive waste, UST systems containing electrical equipment (e.g., vaulted transformers and buried power cable conduits), and hydraulic lift tanks. For these tanks, EPA is deferring the proposal of the technical standards set forth today in Subparts A, B, C, D, E, H, and I. EPA is proposing, however, that these tanks be subject to the interim prohibition for new tank systems (today proposed to be redesignated Section 280.11) and corrective action requirements as set forth in Subparts F and G.

a. Wastewater Treatment Tanks

Under the definition of "storm water or wastewater collection systems" that is proposed by the Agency today, wastewater tanks in which treatment is designated to occur would not be exempt from regulation under Subtitle I. Wastewater treatment tanks have been exempted from Subtitle C regulation (45 FR 76074). Elementary neutralization tanks are also temporarily exempted from Subtitle C regulation. The Clean Water Act regulates discharges from tanks containing hazardous wastes or hazardous substances into surface waters but does not regulate the tanks themselves. This means that hundreds of thousands of in-ground tanks that hold wastewater at treatment facilities, including publicly owned treatment works, are now subject to UST jurisdiction.

Also subject to UST jurisdiction are thousands of oil/water separators, which exist at nearly every oil refinery in the United States and many other industrial facilities. These devices are primarily used to separate oil from wastewater and can be considered treatment tanks.

The Agency has considered regulating these tanks under today's proposal. EPA believes, however, that the proposed standards may not be appropriate for these tanks. Thus, EPA is proposing to defer regulation of wastewater treatment tanks and similar apparatuses such as oil water separators until special standards for these tanks can be developed. The Agency requests public comment on the appropriateness of applying the requirements being proposed today to these waste water treatment tanks.

b. Sumps

Under the definition of "tank" that the Agency is proposing today, in-ground sumps would be considered UST systems. According to an industry survey of sumps, there is an estimated 500,000 sumps in the oil and gas industry alone. Typically constructed of cement, these range in size from 55 gallons to 2,100 gallons. (Less than 20 percent of the sumps fall in the 1,260–2,100 gallon range and these are associated with oil and gas wells; thus; they are excluded under the definition of liquid traps. The remainder of sumps range from 55 to 1,260 gallons.)

Sumps in the oil and gas industry are primarily installed and maintained for pollution abatement purposes. Their contents are pumped out and returned to production facilities. As a general practice, wells and production battery sites are inspected daily by production company employees.

Sumps have been linked to a number of ground-water contamination cases. The state of California, relying on studies of ground-water contamination incidents in the Santa Clara Valley, has concluded that sumps should be regulated under that state's UST program. Sumps that contain hazardous wastes are regulated under Subtitle C. Under Subtitle C, sumps are defined as "any pit or reservoir that meets the definition of tank and those troughs/trenches connected to it that serve to collect hazardous waste for transport to hazardous waste storage, treatment or disposal facilities." Certain sumps, however, have been excluded from the secondary containment requirements for hazardous waste tanks, namely sumps that serve as part of a secondary containment system to collect or contain releases of hazardous wastes.

EPA is considering regulating sumps containing regulated substances and requiring owners of these devices to meet the Subtitle I technical standards. EPA is uncertain at this time, however, whether the requirements proposed today are appropriate for these devices. Thus, the Agency has decided to defer proposing technical requirements for these devices at this time. The proposed corrective action requirements, however, would apply to these tanks. The Agency solicits comment on whether special standards should apply to sumps containing regulated substances. EPA also solicits information on (1) the number, location, and substances stored in sumps; (2) how they are protected to prevent releases to the environment from occurring; (3) their leak history; and (4) whether the requirements being proposed today would be appropriately applied to sumps. In the absence of comments and information gathered before final regulations indicating that the proposed requirements are not appropriate for sumps, EPA may determine that the requirements proposed today are appropriate for sumps and would then make the final regulations applicable to them.

c. Underground Bulk Storage Tank

The regulations that the Agency is proposing today were developed to address the majority of tanks in the UST universe. Most of the technical regulations apply to relatively small UST systems of less than 20,000 gallon capacity. Tanks of very large capacities, however, are in use and within the jurisdiction of Subtitle I. The large capacity tanks are sometimes referred to as underground bulk storage tanks (UBSTs). UBSTs are generally located at defense facilities and contain primarily petroleum products, such as jet fuels, motor gasolines, aviation gasolines, and fuel oils. However, such tanks are occasionally used to contain other substances. For example, according to California's inventory of UST systems, two tanks were listed as containing butyl acetate with a combined capacity of 200,000 gallons. The inventory also lists 29 tanks containing potassium hydroxide with a total capacity of 1,032,485 gallons for an average capacity of 35,600 gallons. The majority of UBSTs can be grouped into three categories: 20,000 to 50,000 gallon tanks made of steel or fiberglass that are shaped like smaller UST systems (horizontal cylinders); 50,000 to 1,000,000 gallon bulk tanks made of steel or concrete, usually shaped like vertical cylinders; and 2,100,000 to 3,300,000 gallon bulk tanks

made of concrete and shaped like vertical cylinders. The 20,000 to 50,000 gallon horizontal UBSTs are often located on airport flight lines or refueling stations for ground vehicles. The larger vertical UBSTs are used for storage at terminals, other major distribution and supply centers, and for high volume industrial purposes. In addition, the larger vertical UBSTs are fabricated at the storage facility.

While there are no exact inventories of these tanks, it has been estimated that approximately 30,000 tanks with a capacity greater than 20,000 gallons are located at defense facilities of all the services. Approximately 10 to 15 percent of these tanks are expected to have capacities exceeding 2 million gallons.

EPA does not have a complete understanding of the design, construction, fabrication and installation processes associated with these tanks. The Agency is concerned that today's proposed requirements for design and construction, installation and leak detection, in particular, may not be appropriate for these tanks. Comment is sought regarding appropriate practices for design and construction, installation, leak detection and other regulatory concerns regarding these tanks. For example, tightness testing is believed to be an unreliable technology for UBSTs. The "noise," or level of interferences, increases with increasing product volume, so that it becomes progressively more difficult to detect a particular threshold leak rate (e.g., 0.10 gallons per hour). In addition, the concrete-type tanks cannot be overfilled for testing because of the lid design. Also, little is known about the application of external leak detection methods to UBSTs. In theory, these methods should work for these tanks; however, due to the difficulty of establishing appropriate monitoring points, effectiveness of external leak detection devices may be questionable. Inventory control is subject to many of the same interferences that affect tightness testing and may not be a feasible release detection technique in UBSTs as well.

Because of all the above concerns about the applicability or appropriateness of today's proposed standard for UBSTs, EPA is evaluating whether only secondary containment may provide the necessary protection for human health and the environment. However, the Agency does not have sufficient information on the effectiveness or costs associated with secondary containment of UBSTs. Comment is sought on the appropriateness of this approach as well as alternate release detection approaches that would be effective.

Given the factors presented above, EPA is proposing today to defer applicability of today's proposed technical standards to UBSTs. (The proposed corrective action requirements of Subparts G and H, however, would apply to these tanks). For the purpose of this deferral, UBSTs are defined as tanks that are approximately 20,000 gallons or larger (they encompass steel, FRP, and concrete tanks) that are field-fabricated, vertical cylinders, because of their size. The Agency is considering the use of secondary containment for all such tank systems and may require it for UBSTs instead of the standards for USTs proposed today. EPA solicits information on (1) the number, location, and substances stored in such tanks; (2) how they are protected to prevent releases to the environment from occurring; (3) the leak history; and (4) applicability and appropriateness of each of the proposed technical regulations for these tanks. Again, if EPA determines that either the requirements being proposed today or secondary containment are appropriate for these tanks, it will make the final rule applicable to them. Comment is requested on this issue.

d. UST Systems Containing Radioactive Waste and Other Radioactive Materials

UST systems that contain high-level radioactive waste or other radioactive materials, e.g., low-level radioactive cooling waters, that are not regulated under Subtitle C are regulated under Subtitle I because their contents are considered CERCLA hazardous substances. The Department of Energy (DOE), which manages high-level radioactive waste, has established a program for the management of its tanks which includes detailed design, operation, maintenance, detection, monitoring, and recordkeeping procedures as well as corrective actions that must be taken in the event of a release. These tanks typically have a capacity of 1,000,000 gallons and contain a variety of high-level radioactive liquids and precipitates. The newer tanks are constructed of double-walled steel and are encased in 18 to 22 inches of concrete.

All UST systems containing high-level radioactive waste are owned by the DOE. The UST systems are located at facilities at Savannah River, South Carolina, Idaho, and Hanford (Richland), Washington. The facility at Hanford, Washington, is being reviewed under the National Environmental Policy Act for the "Disposal of Hanford Defense High Level, Transuranic and Tank Wastes" (DOE-EIS-0113).

Due to the unique nature of the materials stored in tanks, the special operations required in handling them, and the size of the storage tanks, several of the proposed standards are not applicable to these tanks. The EPA has considered developing a separate set of standards that apply to these tanks only. This may be unnecessary for tanks containing high-level radioactive waste in view of the fact that the DOE already has a program in place that adequately addresses, and sometimes exceeds, the proposed requirements for the average UST system. Thus, EPA is deferring the proposal of technical requirements for tanks containing radioactive materials, including high-level radioactive waste, pending receipt of public comment on the issue of whether tanks should meet the proposed standards or separate standards. (The proposed corrective action requirements of Subparts F and G, however, would apply to these tanks.)

e. UST Systems Containing Electrical Equipment

Under the proposed definition of "tank," large numbers of utility units could qualify as tanks. Buried power cable conduits are an example of such units. In urban areas, high tension power cables are encased in piping that acts as a conduit. The piping is typically constructed of stainless steel and covered with a semastic coating to prevent corrosion. It contains dielectric fluid which is used to keep the electrical cables cool. The pressurized piping system includes one or more reservoirs which are generally located above ground through which the dielectric fluid continuously circulates and is pumped back through the system. Also located in urban areas are transformers for large trunk lines. These transformers are located underground and contain dielectric fluid.

EPA believes that attempts to include these structures in the UST program would be impractical from an administrative point of view. Thus, EPA is proposing to defer application of technical requirements to these units until it can assess the necessity of their regulation. (Today's proposed corrective action requirements in Subparts F and G, however, would apply to these tanks.) The Agency requests comment on whether and to what extent such units should be regulated in the UST program. In addition, to determine the scope of the universe of these units as well as the magnitude of environmental impacts from release incidents EPA

solicits the following information: (1) the number, location, and substances stored in such units; (2) how they are protected to prevent releases to the environment from occurring; (3) the leak history; and (4) applicability and appropriateness of each of the proposed technical regulations for these tanks.

f. Hydraulic Lift Tanks

Under the definition of tank that the Agency is proposing today, reservoirs of fluid used in hydraulic lifts at service stations and similar devices such as lubricating oil reservoirs of elevators would be subject to Subtitle I regulation.

Businesses that are involved in automotive service and repair often use in-ground hydraulic lifts to raise and lower automobiles in order to facilitate service and repair work. These lifts are designed to utilize a compressed air/hydraulic fluid system and hold between 27 and 75 gallons of hydraulic oil, with the average being 42 gallons. It has been estimated that there are between 350,000 and 750,000 underground hydraulic lift tanks in this country. Added to this are hundreds of thousands of lubricating oil reservoirs of elevators that are found in almost every multi-story building in the country.

EPA is proposing today to defer the application of its proposed technical standards to such tanks. (Today's proposed corrective actions requirements under Subparts F and G, however, would apply to these tanks.) The Agency requests comments on whether such units should be regulated, and, if regulated, to what extent. To include these tanks in the UST program could overwhelm the regulatory capacity of EPA and the states and lead to a less successful program in terms of protection of human health and the environment. Based on preliminary data that the Agency has collected concerning hydraulic lift tanks, EPA believes that these tanks pose a minimal risk to the environment. If these tanks leak, the machinery stops working. Leak detection and abatement therefore occurs automatically. Furthermore, most of the UST requirements being proposed today would not be applicable to hydraulic lift tanks. These tanks are pressurized and can only be monitored indirectly, i.e., using vadose zone or ground-water monitoring wells. Thus, monitoring of these tanks would require that wells be drilled through the floors of potentially hundreds of thousands of auto repair shops, multi-story buildings with hydraulic lift operated elevators, and factories that use hydraulically powered equipment. EPA believes that regulation of such tanks represents a cost to the regulatory agencies and the regulated community that bears no relationship to the environmental protection to be gained.

g. UST Systems Containing Used Oil

Because any tank containing petroleum (even if mixed with other substances) is subject to Subtitle I, underground storage tanks that contain used oil are subject to both the jurisdiction of Subtitle C (Section 3014) and Subtitle I.

The Agency is assessing whether the regulations that are proposed today would be appropriate for used oil UST systems. Pending the determination of whether different rules than those being proposed today under Subtitle I are necessary, EPA proposes to defer the application of the proposed technical standards to used oil UST systems. One reason for deferral of used oil under Subtitle I is that EPA has not considered the impact of the proposed regulation on the recycling of used oil in accordance with RCRA Section 3014. However, even if Section 3014 considerations are applicable to Subtitle I regulation, it is unclear what impacts on recycling of used oil the UST regulation would have. Subtitle I would apply to all used oil tanks, whether or not the used oil were stored for eventual recycling or disposal and whether or not the used oil was mixed for other hazardous substances (not a hazardous waste). In addition, there does not appear to be any evidence that Subtitle I regulation would create the "stigma" disincentive to recycling allegedly created by Subtitle C regulation of used oil as a "hazardous waste." Based upon public comment, however, EPA may determine that the technical standards being proposed today are appropriate for used oil tanks, in which case, EPA may apply today's proposed technical standards to used oil in the final rule.

The Agency is soliciting comments on the appropriate regulation of used oil tanks. The Agency requests comments on the following issues:

- Are the petroleum underground storage requirements proposed today appropriate for recycled used oil and/or used oil bound for disposal?
- Do the minor constituents found in used oil (water, metals, etc.) alter the appropriateness of the requirements?
- Is it appropriate to have different standards for relatively smaller tanks, such as those used by used oil generators and burners, than for larger tanks typically used by used oil processors?

4. Definitions

a. Definitions of Terms Used in the Statute

(1) Underground Storage Tanks. Underground storage tank is defined in the statute as any one or combination of tanks (including *underground pipes connected thereto*) that is used to contain an accumulation of *regulated substances.* To be considered "underground," the tank must have at least 10 percent of its volume, including the volume of pipes attached to the tank, below ground.

Today's proposal sets forth the following definitions for terms used in the statutory definition of underground storage tank:

(a) *Tank* is a stationary device designed to contain an accumulation of regulated substances and is constructed of non-earthen materials (e.g., concrete, steel, plastic) providing structural support.

The basis of this definition is the definition of tank under Subtitle C of RCRA (40 CFR 260.10). One advantage of borrowing this definition is that it is one with which many members of the regulated community will be familiar. A potential disadvantage of this definition is that it is so broad that literally hundreds of thousands of devices not traditionally regarded as underground storage tanks—but which contain regulated substances for operational or treatment purposes—would be considered tanks. Thus, under the proposed definition, treatment units (such as oil/water separators, traps and interceptors) and equipment and machinery that contain petroleum or other regulated substances for operational purposes (such as vaulted electric transformers and hydraulic lifts) would be subject to regulation. Similarly, underground sumps and drip collection devices could be considered tanks.

EPA has also considered revising the definition of tank to incorporate the concept of storage into the definition to distinguish those tanks which are used to store regulated substances from those tanks which use, treat, or capture regulated substances. The Agency rejected this alternative, however, because it did not have sufficient data on which to base an appropriate definition of "storage" for Subtitle I purposes.

Subsequent to the issuance of the April guidance, a number of people have contacted EPA and have asserted that EPA should revise the definition of "tank" to clarify that devices such as those mentioned above would not be

subject to regulation under Subtitle I. They argued that attempts on the part of EPA to include these structures in the UST program will not only create chaos in the regulated community but will also damage the Agency's ability to administer the UST program.

Many of the people who contacted EPA owned tanks that could be categorized in one or more of the following ways: (1) tanks with a small capacity; (2) tanks that hold small concentrations of a regulated substance; and (3) tanks that store a regulated substance for a short period of time.

Except to the extent the statute applies only where there is an "accumulation of regulated substances," the statutory definition of "underground storage tank" and its exclusions do not provide an exemption for such tanks. Thus, any underground storage tank that contains regulated substances for any period of time, even small amounts, is within the jurisdiction of Subtitle I. However, although there is no legislative history providing a basis for defining "accumulation of regulated substances," as a jurisidictional matter, EPA believes that the statutory language of Section 9001(a) and Section 9003(b) which allows EPA to distinguish on the basis of the size of the tank provides flexibility for EPA to exclude by regulation tanks that accumulate small amounts of regulated substances.

Given the potentially overwhelming UST universe that results from the statutory definitions, EPA must balance several factors to provide maximum protection of human health and the environment. On the one hand, EPA is responsible under Subtitle I to establish a program that minimizes the adverse impact of mismanagement of small quantities of regulated substances stored in UST systems. Even small quantities of some regulated substances may pose serious dangers to human health and the environment. On the other hand, the Agency must focus its limited resources on the most serious potential hazards associated with leaking underground storage tanks.

Various states and localities have different minimum tank size exemptions in their regulations. Several states and localities have selected 1,100 gallons as a minimum tank size. This is apparently patterned after the size exemption in the UST legislation that pertains to "farm or residential tanks of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes." Other states/localities, such as Louisiana, Florida, Wisconsin, and Suffolk County in New York, have minimum tank sizes below which a tank is exempt, but these tank size cutoffs vary from 60 to 1,100 gallons.

The Agency has also considered creating a *de minimus* regulatory exclusion for certain categories of tanks, namely (1) small tanks (e.g., less than 110 gallons or less than 500 gallons); (2) tanks that contain a small concentration of regulated substances (e.g., less than 0.1 percent); and (3) tanks that contain regulated substances for a short period of time (e.g., less than 24 hours or less than 48 hours). On the basis of preliminary data indicating that inclusion of smaller tanks (e.g., less than 110 gallons) could jeopardize the effectiveness of its Subtitle I program, the EPA plans, to exclude de minimus quantity tanks in the future. However, today, the EPA is not proposing a regulatory exclusion due to lack of specific information.

EPA solicits comment on the proposed definition of tank. The Agency also solicits comment on the potential categories of regulatory exclusions discussed above as well as data to support such regulatory exclusions. Specifically, the Agency requests data on the following: (1) Amount of substance and residence time the Agency should consider for a regulatory exclusion; (2) supporting data on the level of risk that such tanks pose; (3) the approximate number of such tanks; (4) the types of tanks; (5) whether the requirements being proposed today would be appropriately applied to such tanks; (6) whether such tanks should be exempted on a conditional basis, and what conditions should be met.

(b) *Underground pipes connected thereto* means all underground piping, including valves, elbows, joints, flanges, and flexible connectors attached to a tank system through which regulated substances flow. For the purpose of determining how much piping is connected to any individual UST system, the piping which joins UST systems should be allocated equally among them.

The definition of connected piping addresses two issues: where the connected piping begins, and how the connected piping should be allocated among tanks. To be consistent with the RCRA Subtitle C tank rules, the starting point of the "connected piping" is the point at which the regulated substance is introduced into the system.

Today's proposed definition has been clarified since issuance of the April guidance to expressly indicate that only *underground* piping is included in the definition of an UST.

(c) *Regulated Substance.* (1) Petroleum, including crude oil or any fraction thereof, means crude oil, crude oil fractions, and refined petroleum fractions, including gasoline, kerosene, heating oils, and diesel fuels. The definition of this term was adopted from EPA's interpretation of the term "petroleum" under CERCLA which defines petroleum under Section 101(14) in a manner substantially the same as Subtitle I. Use of this interpretation eliminates any potential inconsistency with CERCLA.

(2) Hazardous substance is any substance defined in Section 101(14) of CERCLA other than any substance regulated as a hazardous waste under Subtitle C of the Solid Waste Disposal Act (RCRA).

(d) A tank is 10 percent or more *beneath the surface of the ground* if its volume (including the volume of its connected underground piping) is 10 percent or more beneath ground surface or otherwise covered with material so that physical inspection is precluded.

This definition reflects the intent of the UST regulations to govern tanks which could leak directly into the ground undetected. Thus, the following types of tanks are included in the UST jurisdiction: tanks that are underground, inground open-top tanks, and tanks that are covered with ground material (for example, to comply with local fire codes).

The April guidance also included tanks which are "10 percent or more below grade" even if not covered by ground material. A tank whose volume is less than 10 percent beneath the surface of the ground and that is below grade but not covered with ground material, such as a tank in a ditch or natural depression, is not included in today's proposal because it is not substantially different from an above ground tank.

The definition of underground storage tank excludes nine types of tanks that would otherwise be subject to UST regulation.

(2) Farm or Residential Motor Fuel Tank Exclusion.

The first group of tanks excluded by the statute is "*farm* or *residential tanks* of 1,100 gallons or less capacity used for storing *motor fuel* for *non-commercial purposes*." The proposal sets forth the following definitions for the key terms of this exemption.

(a) A *farm* tank is a tank located on a tract of land devoted to the production of crops, or raising animals, including fish, and associated residences and improvements. To be exempt from UST jurisdiction, a farm tank must be located on the farm property. "Farm" includes

fish hatcheries, rangeland and nurseries with growing operations.

"Farm" does not include laboratories where animals are raised, land used to grow timber and pesticide aviation operations. Moreover, this definition does not include retail stores or garden centers where the produce of nursery farms is marketed and where plants and related items are purchased.

In developing this definition, EPA has reviewed definitions currently used by other offices within EPA, the Internal Revenue Service, the Department of Agriculture, and the Bureau of the Census. The Agency also reviewed definitions currently used by a number of states. This review has indicated that there is no standard treatment of the term "farm".

EPA considered adopting the definition of farm that is used by the State of California. California defines farms as "a place of agriculture which has annual sales of agricultural products of $1,000 or more." The Agency rejected this definition because of the difficulty of its application. It would require that the economics of each potential "farm" be evaluated before determining whether its small motor fuel tanks fall within the jurisdiction of Subtitle I.

The basic rationale for EPA's interpretation of "farm" is that, because Congress did not indicate, either in the statute or the legislative history what it intended by "farm", the Agency has chosen to interpret farm in the ordinary, every day sense of the word.

(b) *Residential tank* is a tank that is located on property used primarily for dwelling purposes. Thus, under the proposed definitions, a private school storing motor fuel on site for school buses would not be excluded from UST jurisdiction because the primary use of the property is not residential.

It is important to note that Congress has mandated EPA, under Section 9009 of Subtitle I, to study small farm and residential motor fuel tanks (less than 1100 gallons). In November 1987, EPA will present the results of this study to Congress along with the Agency's recommendations on whether such tanks should be regulated.

(c) *Motor fuel* is a petroleum-based fuel used in the operation of an engine that propels a vehicle for transportation of people or cargo. Therefore, motor fuel refers to motor gasoline and diesel fuel used in a vehicle for transportation purposes.

Limitations inherent in this definition raise several issues with respect to which EPA solicits comment. First, this definition includes only gasoline and diesel fuel, not other types of fuel such as gasohol. Second, "motor fuel" is limited to substances stored in the tanks used to power motor vehicles. Another option would be to exclude tanks containing gasoline and diesel fuel even if their contents are not used to run motor vehicles. Under this approach, tanks storing gasoline at emergency generators would be exempt.

(d) *Noncommercial purposes* means not for resale. The exclusion is limited to motor fuel that is not for resale and that is stored on farmland or residential property. Tanks at gas stations located on "residential" or "farm" property as defined above are not excluded because the motor fuel is stored for resale.

(3) Heating Oil Tanks Exclusion. The second group of tanks excluded from UST jurisdiction by statute is tanks used for storing "*heating oil* for *consumptive use on the premises where stored.*" Today's proposal sets forth the following definitions for key terms of this exclusion:

(a) *Heating oil* refers to a type of fuel oil that is one of the eight technical grades of heating oil. These grades are: No. 1, No. 2, No. 4—light, No. 4—heavy, No. 5—light, No. 5—heavy, No. 6, and residual. Heating oil also refers to fuel oil substitutes such as kerosene and diesel when used for heating purposes.

With respect to fuel oil, the lower the grade numbers, the thinner the oil, and the more easily it evaporates. A high number indicates a relatively thick, heavy oil. No. 1 and No. 2 fuel oils are usually used as domestic heating oil and for moderate capacity commercial-industrial burner units. The other grades of fuel oil are used extensively in industrial plants in the production of electric power, space heating, and other purposes. The No. 5, No. 6, and residual fuels are very viscous liquids which typically must be pre-heated prior to burning.

The Agency has considered narrowing this exclusion to include only petroleum products that are one of the eight technical grades of fuel oil. Under this alternative, tanks containing kerosene or diesel used as a substitute for fuel oil would be regulated under Subtitle I although they are almost identical in their chemical makeup to fuel oil nos. 1 and 2. EPA solicits comment on this issue.

(b) *Consumptive use* means burned on the premises. This exclusion would apply to both residential and commercial heating oil tanks whether they are used for space heating or for producing steam to run generators. The heating oil exclusion does not apply to the storage of heating oil for resale, marketing, or distribution. However, "consumptive use" is not intended to be limited to space heating purposes only.

(c) *On the premises where stored* means tanks located on the same property where the stored heating oil is used. Tanks should be excluded as long as the oil is stored anywhere on the same property. "On the premises" is not limited to the building where the heating oil is stored. Thus, centralized heating units using heating oil that serve more than one building on the same property would be excluded.

(4) Septic Tank Exclusion. The third exclusion covers any *"septic tank."* A *septic tank* is defined in today's proposal as a water-tight covered receptacle designed to receive or process, through liquid separation or biological digestion, the sewage discharged from a building sewer. The effluent from such receptacles is distributed for disposal through the soil. Settled solids and scum are pumped out periodically and hauled to a treatment facility for disposal.

This definition of septic tank is based on common engineering usage. The legislative history of the septic tank exclusion indicates that Congress intended this exclusion to apply to all septic tanks, not just residential tanks. In addition, "septic tank" has been interpreted to include other tanks closely related to the septic tank within a septic system, such as a distribution box, dosing tank, and grease trap, which typically are part of a subsurface disposal system.

(5) Pipeline Facilities Exclusion. The fourth exclusion covers "any *pipeline facility (including gathering lines)* regulated under (1) the Natural Gas Pipeline Safety Act of 1968 (49 U.S.C. App. 1671, et seq.). (2) the Hazardous Liquid Pipeline Safety Act of 1979 (49 U.S.C. App. 2001, et seq.), or (3) which is an intrastate pipeline facility regulated under state laws comparable to the provisions of laws referred to above."

Today's proposal defines *pipeline facilities (including gathering lines)* to include new and existing pipe rights-of-way and any equipment, facility, or building used in the transportation of gas (or hazardous liquids, which include petroleum and any other liquid designated by the Secretary of Transportation) or the treatment of gas or designated hazardous liquids during the course of transportation.

The definition of pipeline facilities was adopted from the Natural Gas Pipeline Safety Act of 1968 and the Hazardous Liquid Pipeline Safety Act of 1979. "Pipeline facility" may also include any such facility as defined and regulated under state laws comparable to these two federal statutes. This definition includes sumps, drip tanks,

skimmer pits, lubrication oil collection devices, and any other containers that are directly connected to regulated oil or gas pipelines or gas plants, which qualify as equipment used in the transportation of gas or hazardous liquid or the treatment of gas or hazardous liquids during the course of transportation.

Although many petroleum pipeline facilities are regulated under the Hazardous Liquid Pipeline Safety Act of 1979, and thus excluded from Subtitle I jurisdiction, tanks associated with gathering lines in rural areas are statutorily exempt from Department of Transportation regulations. However, tanks associated with rural pipelines are exempted as "gathering lines" under the liquid trap exclusion discussed below.

(6) Surface Impoundments, Pits, Ponds and Lagoons Exclusion. The fifth exclusion covers any "*surface impoundment,* pit, pond or lagoon." Today's proposal defines a *surface impoundment* as a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials) that is designed to hold an accumulation of regulated substances and that is not an injection well. This definition was taken from Subtitle C regulations for hazardous waste management established under RCRA (40 CFR 260.10). Because the statute uses the somewhat specialized Subtitle C terms "surface impoundment, pit, pond, and lagoon" to define this exclusion, it is likely that Congress also intended to borrow the meaning of surface impoundment from Subtitle C. Examples of structures thus excluded from UST jurisdiction are holding, storage, settling, and aeration pits, ponds, and lagoons.

(7) Storm Water or Wastewater Collection Systems Exclusion. The sixth exclusion covers a "storm water or wastewater collection system." Today's proposal defines a *"storm water or wastewater collection system"* as piping, pumps, conduits and any other equipment necessary to collect and transport the flow of surface water runoff resulting from precipitation, or domestic, commercial, and industrial wastewater to and from detention areas or any areas where treatment is designated to occur. The collection of stormwater or wastewater must be directed towards conveyance, and does not include storage or treatment of stormwater or wastewater except where incidental to conveyance.

Tanks that are associated with storm water and wastewater collection systems are exempted under this exclusion if the tanks are not designated for detention or treatment. Tanks where incidental treatment or detention occur are exempt. EPA has included the phrase "incidental treatment or detention" to alleviate potential confusion over whether some of the appurtenances associated with these collection systems could be considered tanks.

Several commenters stated that the phrase "incidental to conveyance" in the April guidance definition was unclear and confusing. The Agency has considered eliminating the phrase "incidental to conveyance" but decided to retain it since it is the intent to exempt from regulation those parts of the collection system where incidental treatment or detention occurs and which are also "incidental to conveyance." The Agency solicits public comment on this issue and specifically requests examples of all parts of the collection system that would be exempted. This list could be included in the final rule to provide clarification. To date, the Agency defines devices that are part of the collection system such as weirs, manholes, catch basins, ejector stations, wet wells, and dry wells as examples of structures where treatment or detention is incidental to conveyance. Included in this category are accommodations made in certain collection systems to temporarily detain peak flows until capacity is available for the treatment facility.

One commenter on the April guidance suggested that collection system be defined as the "complete path of the water flow from its first entry into a drain or trench until it is discharged." EPA believes this definition is too broad and includes structures and equipment that are not typically included in an engineering definition of "collection system."

Treatment incidental to conveyance means there is not retention time for the purpose of treatment *and* the tank/pipes subsequently empty into a collection system. Acid neutralization tanks and oil/water separators are considered forms of treatment not incidental to conveyance if the liquid is retained for treatment. Therefore, they are not excluded.

(8) Flow Through Process Tank Exclusion. The seventh exclusion covers any *"flow-through process tank."* Today's proposal defines a *flow-through process tank* as a tank that forms an integral part of an industrial or commercial process through which there is a steady or uninterrupted flow of materials during the operation of the process. The term "flow-through process tank" does not include tanks used to store regulated substances prior to their introduction into the industrial or commercial process, or to store regulated substances as intermediates, byproducts or finished products of the process.

Today's proposed definition differs from the April guidance in that it no longer limits the exclusion to manufacturing process tanks but extends the exclusion to any tank that forms an integral part of an industrial or commercial process.

The proposed definition reflects concerns from several commenters that a process designed to be steady will have some interruptions and pauses due to periodic maintenance or emergency shutdowns. Thus, our proposed definition of "flow-through" clarifies that flow must be "steady" only during the operation of the process. However, if a flow-through tank regularly stores regulated substances during periods of interruption, it is a storage and not a flow-through process tank.

In developing this definition, consideration was given to changing the term "uninterrupted" to "recurring." Some commenters on the April guidance were concerned that the term "uninterrupted" was too restrictive because some processes will have starting and stopping points, such as a batch process; therefore, some of the tanks in the process would be excluded and others would be regulated. EPA rejected including the term "recurring" in today's definition because it is unclear as to what the effect would be and it could be interpreted to eliminate jurisdiction over any UST systems with periodic input and outflow, including UST systems located at gasoline filling stations. The Agency solicits public comment on this issue.

Because EPA does not have sufficient information on the scope of the exemption if revised by the suggested wording changes, the Agency requests factual information, particularly process diagrams, indicating what tanks should be excluded as "flow-through" process tanks given the nature of the specific process and function of the tank. EPA may further refine this definition, based on public comment on specific processes, and is considering including a final definition examples of specific tanks which are "flow-through process tanks."

An issue raised by this definition concerns the meaning of "integral part of the process." EPA interprets this phase to mean that the process could not be operated without the flow-through process tank. Several commenters on the April guidance have asserted that some tanks store

intermediates that are integral to a process and should be included in the definition of a flow-through process tank. Such tanks, it has been argued, are a necessary aspect of a process in order for that process to be conducted safely and to allow for an adequate supply of raw materials to be used for batch operated processes. EPA believes that, because these tanks are intermediate storage tanks, they are not exempt. The Agency solicits further comments on this and on whether "integral part" would include governmentally-required wastewater treatment flow-through tanks that are a necessary part of an industrial or commercial operation.

(9) Liquid Traps or Gathering Lines Related to Oil or Gas Production and Gathering Operations. The eighth exclusion covers *"liquid trap* or associated *gathering lines* directly related to oil or gas production and gathering operations." In today's proposal the oil and gas production *liquid trap* exclusion refers to sumps, well cellars, and other traps used in association with oil and gas production, gathering, and extraction operations (including gas process plants), for the purpose of collecting oil, water, and other liquids. Such liquid traps may temporarily collect liquids for subsequent disposition or reinjection into a production or pipeline stream, or may collect and separate liquids from a gas stream.

Although liquid traps are often used in activities other than oil and gas production, the only type of liquid trap excluded from UST jurisdiction under the statute is a liquid trap used for the purpose of separating unused oil and gas liquids from water at oil and gas production facilities. Liquid traps used in conjunction with landfill methane gas production facilities are within this exclusion and would not be subject to UST jurisdiction. Liquid traps such as grease and oil traps at gas stations, however, are not within this exclusion.

Today's proposal defines *gathering lines* as any pipeline, or associated equipment used in the transportation of oil or gas during oil or gas production or gathering operations.

(10) Underground Areas Exclusion. The ninth exclusion covers "storage tanks situated in an *underground area* (such as a basement, cellar, mine working, drift, shaft, or tunnel) if the storage tank is situated upon or above the surface of the floor." In today's proposal, this exclusion applies to "underground rooms" where tanks are located on or above the floor surface. The purpose of this exclusion is to remove from UST jurisdiction tanks that are technically underground but that are, in a practical sense, no different from above ground tanks. They are situated so that, to the same extent as tanks above ground, physical inspection for leakage is possible. Thus, the requirements to be able to physically inspect the tank for leakage is consistent with the purpose of this exclusion.

Tanks located in a below grade structural vault, cellar, basement, mine or other underground room would be subject to the proposed UST exclusion if the tank sits on or above the surface of the floor and there is sufficient space to enable physical inspection of the tank, but not necessarily the tank bottom.

An issue presented by this definition is that such tanks would *not* be subject to corrosive forces because their components are not placed in direct contact with the surrounding soil. Therefore, they would be less likely to have a release. This would mean that the ability to "physically inspect the tank" may be irrelevant. The Agency has considered revising this definition to include only "underground tanks situated in a room that is part of a larger structure or building." EPA requests comments on this issue.

EPA expects that many new storage tank systems will be placed in underground containment vaults or to aboveground locations as a result of today's rules, once they are finalized. This could result in an increase in volatile emissions to the air because the product stored will be subject to higher temperature conditions that promotes emissions through vent pipes. EPA solicits comments on the need in the future for control measures to reduce the impacts of such developments.

b. Definition of Terms Used in the Regulations

In addition to proposing terms that clarify the statutory definitions contained in Subtitle I, the Agency is proposing to add in 40 CFR Part 280 the following definitions of terms used in today's proposal.

(1) Aboveground Release. Aboveground release means any release to the surface of the land or to surface water. This includes, but is not limited to, releases from the aboveground portion of an underground storage tank system and releases associated with overfills and transfer operations as the petroleum moves to or from an underground storage tank system.

(2) Ancillary Equipment. "Ancillary equipment" means any device including, but not limited to, such devices as fittings, flanges, valves, and pumps, that are used to distribute, meter, or control the flow of petroleum or hazardous substances to and from an underground storage tank.

(3) Below Ground Release. Below ground release means any release to the subsurface of the land and to ground water. This includes, but is not limited to, releases from the below ground portions of an underground storage tank system and releases associated with overfills and transfer operations as the petroleum moves to or from an underground storage tank.

(4) Cathodic Protection. Cathodic protection is a technique to prevent corrosion of a metal surface by making that surface the cathode of an electrochemical cell. A tank can be cathodically protected through the application of either galvanic anodes or impressed current.

(5) Compatible. Two or more substances are compatible if they are able to maintain their respective physical and chemical properties upon contact with one another for extended periods of time and under varied environmental conditions (e.g., temperature).

(6) Corrosion Expert. Corrosion expert means a person who, by reason of his/her knowledge of the physical sciences and the principles of engineering and mathematics, acquired by a professional education and related practical experience, is qualified to engage in the practice of corrosion control on buried or submerged metal piping systems and metal tanks. Such a person must be certified as being qualified by the National Association of Corrosion Engineers (NACE) or be a registered professional engineer who has certification or licensing that includes education and experience in corrosion control of buried or submerged metal piping systems and metal tanks.

(7) Electrical Equipment. Electrical equipment means underground equipment which contains dielectric fluid which is necessary for the operation of equipment such as transformers and buried electrical cable.

(8) Excavation Area. Excavation area is defined as the volume containing the tank system and backfill material as bounded by the ground surface and walls and floor of the pit and trenches into which the tank system is placed at the time of installation.

(9) Existing Tank System. "Existing tank system" means a tank system used to contain an accumulation of regulated substance or for which installation has commenced on or prior to the effective date of this regulation. Installation will be considered to have commenced if the owner or operator has obtained all federal, state, and local approvals, or

permits necessary to begin physical construction of the site or installation of the tank system, and if either (1) a continuous onsite physical construction or installation program has begun, or (2) the owner or operator has entered into contractual obligations—which cannot be cancelled or modified without substantial loss—for physical construction at the site or installation of the tank system to be completed within a reasonable time.

(10) Free Product. Free product refers to regulated substance in the non-aqueous phase (e.g., liquid not dissolved in water) that is beneath the surface of the ground.

(11) Hazardous Substance Tank System. Hazardous substance tank system means an underground storage tank system that contains an accumulation of hazardous substance or a mixture of petroleum and hazardous substances in which hazardous substances comprise greater than 50 percent of the weight or volume of the mixture.

(12) Hydraulic Lift Tanks. Hydraulic lift tank means a tank holding hydraulic fluid for a closed-loop mechanical system that uses compressed air and hydraulic fluid to operate lifts, elevators, and other similar devices.

(13) Implementing Agency. Implementing agency means EPA, or in the case of a state with a program approved under Section 9004, the designated state or local agency responsible for carrying out an approved underground storage tank program.

(14) Interstitial Monitoring. Interstitial monitoring is a leak detection method which entails surveillance of the space between an UST system walls and the secondary containment system for a change in steady state conditions. In a double-walled tank, this change may be indicated by a loss of vacuum, a drop in pressure, a drop in the fluid level in a visible reservoir, or the detection of the regulated substance in the interstitial space. In a secondary containment system consisting of a liner (natural or synthetic), bentonite-sealed soils, or a vault, the surveillance consists of frequent to continuous sampling from a monitoring well between the UST and the liner to detect the presence of substance in the well(s).

(15) Inventory Controls. Inventory controls are techniques used to identify a release of regulated substances that are based on tank liquid level measurements and reconciliation of those measurements with product delivery and withdrawal records.

(16) Liquid Trap. "Liquid trap" means sumps, well cellars, and other traps used in association with oil and gas production, gathering, and extraction operations (including gas production plants), for the purpose of collecting oil, water, and other liquids. Such liquid traps may temporarily collect liquids for subsequent disposition or reinjection into a production or pipeline stream, or may collect and separate liquids from a gas stream.

(17) New Tank System. "New Tank System" means a tank system that will be used to contain an accumulation of regulated substance and for which installation has commenced after the effective date of this regulation. Installation will be considered to have commenced if the owner or operator has obtained all federal, state and local approvals, or permits necessary to begin physical construction of the site or installation of the tank, and if either (1) a continuous onsite physical construction or installation program has begun, or (2) the owner or operator has entered into contractual obligations—which cannot be cancelled or modified without substantial loss—for physical construction at the site or installation of the tank system to be completed within a reasonable time.

(18) Operational Life. Operational life refers to the period beginning when installation of the tank system has commenced until the time the tank system is properly closed under Section 280.80.

(19) Overfill Release. An overfill release refers to a release that occurs when a tank is filled beyond its capacity, resulting in a discharge of the regulated substance to the environment.

(20) Petroleum Tank System. Petroleum tank system means an underground storage tank system that contains an accumulation of petroleum or a mixture of petroleum and hazardous substances in which petroleum comprises greater than 50% of the weight or volume of the mixture.

(21) Positive Sampling, Test, or Monitoring Results. Positive sampling, test, or monitoring results refer to the results of sampling, testing, or monitoring using a method described in Subpart D that indicate that a release from an UST system has occurred.

(22) Release Detection. Release detection means determining whether a release of a regulated substance has occurred from the UST system into the environment or into the interstitial area between the UST system and a secondary barrier around it.

(23) Secondary Containment. Secondary containment refers to a system installed around an UST that is designed to prevent a release from migrating beyond the secondary containment system outer wall (in the case of a double-walled tank system) or excavation area (in the case of a liner or vault system) before the release can be detected. Such a system may include, but is not limited to, impervious liners (both natural and synthetic), double walls, vaults, or impervious soil treatments such as bentonite-sealed soils.

(24) Sump. Sump means any pit or reservoir that meets the definition of tank, including troughs or trenches connected to it, that serves to temporarily collect regulated substances.

(25) Tightness Testing. Tightness testing means a procedure for testing the ability of a tank system to prevent inadvertent release of any stored substance into the environment (or, in the case of an UST system, intrusion of ground water into a tank system).

(26) Underground Release. Underground release means any below ground release.

(27) Unsaturated Zone. The unsaturated zone refers to the subsurface zone containing water under pressure less than that of the atmosphere, including water held by capillary forces within the soil and containing air or gases generally under atmospheric pressure. This zone is limited above by the ground surface and below by the upper surface of the zone of saturation (i.e., the water table).

(28) "UST System" or "Tank System". "UST System" or "Tank System" means an underground storage tank, connected underground piping, other ancillary equipment, and containment system, if any.

(29) Wastewater Treatment Tank. Wastewater treatment tank means a tank that is part of a wastewater treatment facility regulated under either Section 402 or 307(b) of the Clean Water Act, and which receives and treats or stores an influent wastewater which contains regulated substances.

B. Design, Installation, and Notification Requirements

The following sections describe general requirements applicable to all new UST systems storing petroleum or hazardous substances. These requirements also apply to existing UST systems which must be upgraded to meet new UST standards according to the schedule described in Section 2 below.

1. Performance Standards for New UST Systems

a. Design and Construction (Section 280.20 (a) and (b))

Overview. Proper tank system design and construction must not only ensure structural integrity of the tank system at the time of installation, but also throughout the period of its intended use. Proper design and construction encompasses not only the design and fabrication of the tanks and piping themselves, but also ancillary design features, systems, or equipment that enhance or protect the structural integrity of the tank system.

There is concern that, in the absence of adherence to proper standards, tank systems might be inadequately designed or built with inferior materials, thereby resulting in structural failures. Lack of adherence to fabrication standards might also lead to failures from burst seams and couplings, cracked walls, or poor welds. There are very few reported incidents of releases resulting from design or construction failures, and the Agency attributes this low failure rate to widespread voluntary adherence to existing codes and practices. Today's proposal will ensure that these voluntary practices are followed nationwide.

Corrosion is the major cause of releases from the existing UST population. Steel tank systems unprotected from corrosion presently are in widespread use and corrode easily in many soil conditions. EPA's Local Release Incidents Study reported that corrosion of bare steel tank systems was by far the major cause of releases from existing UST systems, roughly 60 percent. Corrosion cells are created across different areas of the tank system, especially vertically as soil moisture and other characteristics vary with depth, and between dissimilar metals. Similar metals that have been in the ground for different periods of time also can establish a corrosion cell. Because of these recognized problems, corrosion protection must be addressed as part of the design and construction of the tank system.

Today's proposal (Section 280.20) requires that new UST systems be designed and constructed in a manner that will prevent releases due to structural failure and corrosion for as long as they are used to store regulated substances. Improper installation is the other major cause of releases from both unprotected and protected tank systems (including FRP) and is intimately connected to ensuring that the structural design of the tank system maintains its integrity. The Agency's proposed approach toward proper installation is addressed in the next section of the Preamble (Section VI.B.1.b.).

Current Practices. Today's proposal is the result of a careful evaluation of the current design and construction requirements embodied in the Interim Prohibition. The Agency specifically questioned whether to make the requirement more stringent. The sections that follow describe various existing practices and regulatory programs aimed at ensuring structural integrity of tank systems through proper design and construction.

(1) National Consensus Codes of Practice. Several professional and scientific organizations have established standards and codes that relate to design and construction of underground tank systems, piping, and ancillary equipment. These include the National Fire Protection Association (NFPA), the Steel Tank Institute (STI), Underwriters Laboratories (UL), National Standards Institute (NSI), the National Association of Corrosion Engineers (NACE), the American Society of Testing and Materials (ASTM), the Western Fire Chiefs Association (WFCA), the Occupational Safety and Health Association (OSHA), the Petroleum Equipment Institute (PEI), the American Petroleum Institute (API). Some additional codes developed by similar organizations in Canada have been adopted by some of the northern states, including standards published by Underwriters Laboratories of Canada (ULC).

Collectively, these organizations have published more than twenty guides, codes and standards relating to the design and construction of tanks, pipes and UST-related systems. Generally, these publications are written by committees of knowledgeable and experienced professionals and are subjected to independent peer review. These guides, codes, and standards are widely recognized as unbiased and independent. Because they represent consensus positions, these publications have become standards which are closely followed in many segments of the industry. Frequently, these codes are adopted by state and local governments in their UST regulations and ordinances.

Some of the most important existing codes follow:

- ASTM D4021–86 provides detailed specifications for fabricating and testing FRP tanks;
- UL 58 describes in detail the standards for fabrication and assembly of steel tanks and the required tests for leakage;
- UL 1316 provides requirements for the construction, performance, manufacture, testing, and installation of FRP tanks;
- "Specification for sti-P3 systems of External Corrosion Protection of Underground Steel Storage Tanks," 1987 addresses the design and fabrication of coated and cathodically protected steel underground storage tanks;
- ULC–S603–M1981 addresses assembly of tank systems comprehensively, design standards, and testing guidelines for horizontal cylindrical steel tanks;
- ULC–S603–M1982 provides guidance on construction requirements, external corrosion protection, installation and maintenance;
- ASTM—"Steel Piping, Tubing and Fittings" details more than 130 standards on the design and fabrication of steel pipe;
- NFPA 30 addresses tank systems comprehensively from a fire explosion perspective. It references the above codes and sets performance standards.

(2) State and Local Regulations. An EPA review of state UST programs identified 14 states that already have UST regulations. Many more regulate UST systems through existing fire codes. Some have promulgated design specifications covering materials, welding, fabrication, and assembly; however, these states are in the minority. Most states adhere to programs that are based on one or more consensus codes. They have accepted strict adherence to these codes as an assurance of the tank system's integrity for its operational life. For example, the Florida UST program requires design, construction, and installation to be in accordance with NFPA 30, Chapters 2–1 and 2–3; API 1615, Chapters 3(3) and 3(4); and UL 58 or UL 1316.

(3) Underground Tanks Storing Hazardous Waste. The Hazardous Waste Tank Regulations promulgated on July 14, 1986, established the following performance standard: owners and operators of new tank systems or components must ensure that the foundation, structural support, seams, connections, and pressure controls (if applicable) are adequately designed and that the tank system has sufficient structural strength, compatibility with the waste(s) to be stored or treated, and corrosion protection so that it will not collapse, rupture, or fail. The owner and operator must obtain a written assessment—reviewed and certified by an independent, qualified, registered professional engineer—attesting that the system has sufficient structural integrity and is acceptable for the storing and treating of hazardous waste. In addition, a corrosion expert must determine the

factors affecting the design and operation of a cathodic protection system. All these components are submitted by the owner and operator in a permit application to EPA or the authorized state.

(4) Interim Prohibition. Subtitle I, Section 9003 (g) of RCRA prohibits installation of an underground storage tank system for the purpose of storing regulated substances unless the tank: (1) will prevent releases due to corrosion or structural failure for the operational life of the tank system, (2) is corrosion protected in one of several ways, and (3) is compatible with the substance stored. The prohibition allows for variance from corrosion protection if soil resistivity is greater than 12,000 ohm-centimeters.

Today's Proposal. (1) *Design and Construction Requirements.* EPA has reviewed data on tank system failures to determine if the design and construction requirements of the Interim Prohibition are adequate. We have concluded that more stringent design and construction requirements are needed, especially with regard to corrosion protection.

Two general approaches to design and construction standards were considered by EPA: detailed design standards or general performance standards. Detailed design standards would specify the proper design and construction of tank systems. Such design standards could be included in the regulation explicitly or the standard could reference existing codes and standards. EPA has reservations about this approach for several reasons.

First, the design and construction of tank systems will change over time and continued advances in tank system material and fabrication technologies are expected. If EPA promulgated detailed design standards, it would have to continually revise and update them to reflect these changes in technology. Second, to keep up with these changes, EPA would have to closely monitor advances in tank design and construction technology to enable updating the design standards. EPA does not believe that it needs to duplicate the existing infrastructure of industry consensus codemaking. Third, detailed design standards that were under continued development would result in conflicts with the many state UST programs, as well as complicate the approval process for state programs.

The use of design standards might be justified if there were no industry consensus with respect to tank design. While a specific design standard provides clear guidance to the regulated community on the design and construction of tank systems, EPA has determined that the standards developed by industry consensus are already providing adequate protection of human health and the environment.

The general performance standard approach that EPA is proposing today for tank and piping design and construction in Section 280.20 (a) and (b) is intended to build upon the Interim Prohibition by requiring that the tank and piping be designed and constructed in accordance with consensus codes and accepted practices. The industry consensus codes are, in fact, being followed for many of the new installations now.

Today's proposed rule requires that each tank be properly designed, constructed and protected from corrosion in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory. Nationally recognized is defined to mean a group or organization that is composed of a national membership that is representative of its members' views concerning tank design and construction or corrosion protection.

Generally, to have achieved nationally recognized status the association will have been in existence for a reasonable period of time, and will have been active in promulgating standards that are in widespread use, and will have been active in research and in the scientific and regulatory debate of issues relating to its areas of interest. The Steel Tank Institute is an example of a nationally recognized association because it has been cooperating with other industries, organizations and government bodies in the development of reliable tank standards since 1916.

Table 2 of this preamble lists a number of codes that have been tested through widespread and lengthy use. In this manner, the codes have become established as surrogate regulations. The Agency considers all the organizations listed in this table as meeting the definition of nationally recognized associations or independent testing laboratories. The Agency invites comment on the methods that should be used to recognize additional codes that meet the intent of the requirement of today's proposed rule that each tank be properly designed, constructed and protected from corrosion in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory.

A number of these codes and standards are listed in today's proposal as guidance in meeting this general performance standard. These codes are referenced in notes and the use of these particular codes is not part of today's proposed requirements. The owners and operators may rely on any other applicable codes and standards. The codes are referenced only to provide examples of codes that meet this general performance standard.

(2) Tank Requirements (Section 280.20(a)). Today's proposal is more stringent than the requirement for corrosion protection in the Interim Prohibition because it requires all new steel tanks to be protected from corrosion by either using both corrosion-resistant coatings and cathodic protection or by being made of composite construction. The Interim Prohibition allows either coatings or cathodic protection.

Today's proposal allows three tank fabrication techniques: fiberglass-reinforced plastic; coated and cathodically protected steel; and steel and fiberglass-reinforced plastic composite. The Agency believes that these three types of tanks will perform adequately if they are designed and constructed in accordance with nationally recognized association or independent testing laboratory codes of practice. In addition, other tank design, construction or corrosion protection techniques are allowed in today's proposal if the implementing agency determines the technique is no less protective of human health and the environment. The Agency has included this provision to allow the development and use of new technologies and to allow design variations for specific site conditions.

These codes of practice are recommended for guidance in the design and construction of fiberglass-reinforced plastic (FRP) tanks in proposed Section 280.20(a)(1). Other codes may also be applicable, but the Agency believes that tanks built in accordance with the American Society of Testing and Materials, Underwriters Laboratories, or Underwriters Laboratories of Canada standards will minimize releases during their intended period of use.

The second type of tank (proposed in Section 280.20(a)(2)(i)) is the coated and cathodically protected steel tank. This type of tank is in wide use and is reported to have very high reliability.

Coatings isolate the external surfaces of the tank system from the environment and reduce the electric current demand on the cathodic protection system required to obtain the desired protection levels throughout the life expectancy of the tank system. EPA has received suggestions that the typically used coatings will inevitably be damaged and "holidays," or separations of the coating from the tank, will occur. Without a

cathodic protection system, all of the galvanic forces will be focused on the holiday, causing rapid corrosion and subsequent release. (The Agency does believe that a coating could be made sufficiently impermeable and durable to prevent the formation of holidays. This type of coating is referred to as a cladding and is discussed in the composite tanks section.) It is also argued that the cathodic protection system on a bare steel tank will be overworked. Particular concern has been raised about the premature consumption of sacrificial anodes. If not checked frequently enough, the tank may quickly become unprotected. Other analyses have suggested a drawback of the combined coated and cathodically protected system. Some data suggest that the cathodic protection system can cause delamination, a large scale separation of the coating from the tank, exposing the tank to the environment. This could lead to serious corrosion problems.

The Agency has reviewed these arguments and is persuaded that coatings will enhance the operation of the cathodic protection system by reducing its electric current demand, and, conversely, the cathodic protection system will protect the coated UST from corrosion-caused releases at holidays. Consequently, today's proposal requires both systems for new UST systems. In addition, the cathodic protection must be inspected and maintained in accordance with the Operation and Maintenance requirements of Section 280.31. The Agency requests comments on the merits of this approach.

There are a number of industry consensus codes that provided detailed performance requirements for coated and cathodically protected steel tanks. The Steel Tank Institute's "Specification for sti-P3 system of External Corrosion Protection of Underground Steel Storage Tanks" is by far the most widely used design standard for coated and cathodically protected tanks. The specification covers joint design, coating selection, and sacrificial anode design and construction. Another code under development is the UL Standard 1746, "Corrosion Protection System for Underground Storage Tanks." The UL code will allow considerable flexibility in the design of the tank. However, the design must meet strict performance requirements related to the structural integrity of the tank coating and sacrificial anodes. This code is just now being issued for comment, but some of the current tank designs (for example, the STIP3 specifications) are expected to pass the UL 1746 performance requirements. The comment period and time required to obtain UL certification adds a degree of uncertainty to the use of this code for coated and cathodically protected tanks. This issue is discussed further in the following section on composite tanks.

Underwriters Laboratories of Canada also publishes consensus codes for the design and construction of coated and cathodically protected steel tanks. These codes are reported to be in use in areas bordering Canada and include CAN4-603-M85M, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids"; CAN4-403.1-M85, "Galvanic Corrosion Protection Systems for Steel Underground Tanks for Flammable and Combustible Liquids"; and CAN4-S631-M84, "Isolating Bushings for Steel Underground Tanks Protected with Coatings and Galvanic Systems." The Agency believes that tanks designed and constructed in accordance with these three codes, will perform adequately throughout their period of intended use and will not fail due to corrosion.

The Agency believes that pre-engineered, factory-installed coatings combined with sacrificial anodes for cathodic protection provides very reliable and longlasting cathodic protection for most situations. However, some tank configurations and site conditions may require the use of field-installed cathodic protection. Because the selection of field-installed cathodic protection is complex, today's proposal requires in Section 280.20(a)(2)(ii) that field-installed cathodic protection systems for tanks be designed by an independent corrosion expert. Among the variables which can affect corrosion are electrolyte activity, acidity, moisture levels, soil resistivity, temperature, bacterial action, and the presence of oxidizing agents. Because of the complexity of these influences, either operating singly or together, UST system owners and operators do not have the necessary expertise to select the most effective materials of construction and corrosion protection systems. Proper attention to these problem areas can practically eliminate the likelihood of releases caused by corrosion. EPA has concluded that an independent corrosion expert can best assess the corrosion protection measures that are most suited for the site-specific cathodic protection system. The Agency requests comments on the merits of this approach.

The third type of tank allowed in today's proposal (in § 280.20(a)(3)) is the composite tank. In this type of tank, a noncorrodible cladding covers a steel tank and prevents corrosion of the steel. It is essential that the cladding completely isolate the steel structure from the environment because, as described above, accelerated corrosion can occur at holidays or voids in the cladding. Therefore, the cladding must withstand rough handling during installation and must remain intact throughout the life of the tank. The composite tanks that are currently marketed are clad with FRP. However, it has been reported to the Agency that other cladding materials are currently being tested.

The Agency has reviewed the performance requirements and manufacturing techniques for composite tanks and has concluded that it is feasible to construct tanks with claddings that are sufficiently continuous, impermeable and durable to protect the steel structure of the tank from corrosion. Underwiters Laboratories is developing detailed performance standard for the design and construction of composite tanks and today's proposal recommends UL Standard Number 1746, "Corrosion Protection for Underground Storage Tanks," for guidance in meeting the requirements. The UL standard includes many of the performance requirements from both FRP and coated steel tank standards.

These tank types are presently allowed under the Interim Prohibition and according to the manufacturers, some of these tanks have been in use for as long as 20 years without a documented case of failure. However, because of a lack of any test data on the field performance of a large number of these types of tanks, the Agency is still concerned about the long-term impermeability of the cladding. Should the cladding lose some of its characteristics of impermeability, holidays could develop. Some manufacturers argue that corrosion would passivate in small holidays and cause the corrosion to cease. However, according to information available to the Agency, one user of composite tanks has retrofitted its composite tanks with cathodic protection. The tank manufacturer contends that this retrofit was precautionary and that there was no overt sign of corrosion.

Although UL is still developing UL 1746, three major composite tank manufacturers have received approval from UL to manufacture composite tanks. The UL 1746 standard is reported to be ready for public comment. This process will require a 60- to 90-day comment period and a short period after the comment period closes before final

publication. After final publication, a test period of about 6 months plus an additional month will be required before the tank manufacturers are certified. This adds a degree of uncertainty to the final UL approval of the use of these tanks.

Because of these uncertainties and because of the potential for corrosion at breaches in the cladding, the required level of performance must be greater for composite tanks than for coated tanks. The cladding on composite tanks must be more resistant to damage than coating on coated steel tanks. It must be highly impermeable to moisture to prevent corrosion-induced delamination of the cladding. In addition, the cladding must provide a greater degree of electrical isolation than a coating to provide certainty that the cladding alone will protect the steel from corrosion. The Agency invites comments and documented performance data regarding these issues. If no acceptable data exist regarding these concerns, then the Agency may require periodic tests conducted over the operating life of these tanks to identify any holidays. This subject is discussed further in the operation and maintenance section.

The Agency expects that other tank design, fabrication and corrosion protection techniques will be developed. In addition, certain environmental settings may have a very low potential for corrosion. Therefore, today's proposal includes a provision in Section 280.20(a)(4) for using alternative design and corrosion protection methods if the implementing agency determines that the method is no less protective of human health and the environment.

The owner and operator may use alternative designs and construction methods if the implementing agency finds, as a result of a demonstration or other means, that the alternative design or method is no less protective of human health and the environment. In deciding on whether an affirmative finding shall be issued, the implementing agency may consider:

- The nature and quality of the product;
- The proposed alternate design and operation; and
- All other factors that would influence the quality and mobility of the constituents and the potential for them to migrate to ground water or surface water.

If an affirmative finding is issued, the implementing agency will require the owner and operator to construct and operate the system in a manner consistent with the demonstration.

This approval process has been included to encourage innovation. In the process of preparing this proposed rule, the Agency has seen reference to several potential alternative systems such as nylon tanks, jacketed tanks, lined steel tanks and lined concrete tanks. In addition, some sites may not require the degree of corrosion protection required under today's proposal. If such systems are as protective of human health and the environment, the Agency desires to provide a mechanism for allowing approval of such alternatives. This provision will apply to both new and upgraded tank systems.

EPA intends that the implementing agencies have the responsibility of developing the approval process for alternative design and construction techniques. However, the Agency expects that requests for approval of alternative designs will be made by owners, operators, installers, and manufacturers. For example, an owner and operator may request an exemption from the corrosion protection requirements based on the low corrosion potential of the site. In another case, a tank manufacturer may request approval for the use of an alternative tank design at any site based on the corrosion resistance of the tank. The Agency anticipates that, in both cases, the implementing agency would review performance data prepared by a corrosion expert and product demonstration information submitted by the party requesting approval. In addition, EPA recognizes that the implementing agency could also review data and opinions from independent experts in the field of concern.

Today's proposal drops the 12,000 ohm-cm exclusion of the Interim Prohibition. This exemption has been criticized as an inadequate measure of the propensity to corrode. Soil resistivity values are average resistivities of the soil between the surface of the ground and the depth being measured, and variability is common. Large variations result in soil composition changes which are responsible for the promotion of corrosion activity. A concentrated corrosive attack can occur even in areas of generally high resistance and low variability. It is reportedly not uncommon to find premature pipe leaks and tank failures in soil of more than 30,000 ohm-cm due to soil resistivity variations.

Soil corrosivity is actually a function of many variables in addition to resistivity, including soil conductivity, pH, moisture content, chloride and sulfide ion concentration. The use of the single resistivity variable is inadequate to measure the propensity to corrode and proposes today to drop the 12,000 ohm-cm exclusion. Further, because of the complexities involved in attempting to accurately measure the propensity to corrode, the Agency is not proposing any alternative exclusions. This increases the stringency of the rule by requiring all tank systems to have corrosion protection systems.

(3) Piping Requirements (Section 280.20(b)). The design and construction of underground piping is addressed in today's proposal. Although the requirements for piping are similar to those for tanks, the Agency feels that design and construction requirements for piping should be addressed specifically in the regulation to identify them clearly.

There are numerous industry consensus codes that are specific to the design and construction of UST piping systems. These include codes written by the Underwriters Laboratories, Underwriters Laboratories of Canada, National Fire Protection Association, and American Petroleum Institute. In addition, American Society for Testing and Materials has published more than 130 standards on the design and fabrication of steel pipe. The Agency believes that they provide adequate guidance for ensuring compliance with the requirement.

The standards that are recommended for guidance in the design and construction of FRP pipe (in § 280.20(b)(1)) include standards for flexible connectors. The ends of each line as well as changes in direction should be fitted with flexible connectors or swing joints to allow movement of the tank and pipe system. These flexible connectors can be used with steel or FRP piping, but swing joints built of threaded connectors cannot be used for FRP pipes. Swing joints are also discussed in the following section on installation requirements.

Steel piping is required to be coated and cathodically protected in § 280.20(b)(2). The cathodic protection system must be designed by an independent corrosion expert because the Agency believes that the layout of piping systems has a major impact on the type and degree of cathodic protection needed. There are many possible piping layouts, depending on the site plan, making even a pre-engineered sacrificial anode system essentially field-installed. Therefore, the requirements for cathodic protection of steel piping are the same as those for field-installed cathodic protection for tanks.

Only FRP and cathodically protected steel pipe are identified specifically in the regulation. The Agency does not

know enough about other types of pipes to allow them specifically. However, as in the tank corrosion protection section, there is an allowance for alternative methods. The Agency expects that other design, construction and corrosion protection techniques may be developed in the future or already in use (e.g., cooper tubing). In addition, certain environmental settings may have a very low potential for corrosion. Therefore, today's proposal in Section 280.20(b)(3) includes a provision allowing for using alternative design and construction methods if the implementing agency determines that the method will prevent releases in a manner that is no less protective of human health and the environment than the two other methods described above.

Other Issues Requiring Public Comment. The Agency has identified three other aspects of design and construction that could have an impact on the structural integrity of UST systems. The advantages and disadvantages of these other aspects are not clearly established, and the Agency therefore is seeking public comment and information on whether there is a need to address them in regulation. The following is a brief discussion of those issues.

(1) Manways. All pipes and gauge hatches in an underground tank can be installed through a manway in the top of the tank. The principal use of a manway is to gain access to the interior of a tank for inspection and repair. In addition, all of the connections can be made to the manhead that covers the manway, protecting the integrity of the tank which is only violated by the installation of the manway itself. The mandated use of manways as the sole entry point for all pipes and gauge hatches in all UST systems is apparently a widespread practice in Europe. However, the common U.S. practice is to have several openings on the top of the tank for piping and gauge hatches. When all of the connections are made to several different openings in the shell of the tank, there is a much greater chance that one or more of the connections will be installed improperly. Multiple connections are believed to increase the probability of a release developing after the tank has been put into operation. A third benefit in the use of manways is that the manhole liner can function as an overfill catchment basin.

The manway also has disadvantages. If the manway is to also function as the route providing access to the appurtenances attached to the tank then all the pipes must be fitted with flanges, unions, or other couplings that can be disconnected without having to cut the pipes. These types of couplings offer an added place for releases to occur and thereby reduce the reliability of the tank system as a whole. However, even though these devices can fail, the coupling failures in a manway are easier to repair than failures in pipes that are connected in multiple places directly to inaccessible places on top of the shell of the tank. Manway couplings are accessible without excavation and are designed for easy replacement of the seals or the whole coupling.

The Agency recognizes there may be significant additional benefits from using manways. Comment and information is requested about the relative risks of the manway and traditional systems and, if EPA requires manways in the final rule, whether it will lead to a significant reduction in the number or volume of releases.

(2) Pumps. Two basic methods exist for removing the liquid stored in underground storage tanks: pressure methods and vacuum methods.

Pressure methods pressurize the entire tank or lines with either the liquid itself or a gas, such as air or nitrogen. This method is inexpensive but has some disadvantages: It can be unreliable and it can pose environmental problems if leaks occur. If a leak occurs in a pressurized system, when activated, it will pump the stored substance into the environment.

Vacuum methods draw the liquid out of the storage tank by subjecting the pipe to a suction. In this system, a pump is installed above grade level and the suction line is extended down into the tank near its bottom. The advantage of this system is that the line from the tank to the surface uses less than atmospheric pressure so that if there is a leak in the pipe, only air will enter the pipe—no liquid would escape into the environment. From an environmental standpoint this is the most desirable system. Several European programs have mandated suction pumps as intrinsically protective of the environment.

Pumping problems may arise with the suction method if leaks develop in the suction line. The operation of the pump can be quite erratic and if the tank systems run unattended for an extended period of time the pump can be severely damaged before the condition is discovered. Such behavior is indicative of a leak and alerts the tank owner that repair is necessary.

The Agency seeks comments on the advantages and disadvantages of suction versus pressurized piping systems; their prevalence in use today; and whether pressure pumps present such a risk to human health and the environment that they should be subject to more stringent controls (e.g., line leak detectors or secondary containment) or even prohibited from new tank systems; and whether suction pumps present less of a risk and should be subject to less stringent controls (e.g., reduced leak detection requirements). The Agency is specifically interested in receiving information concerning experiences with the sizes and impacts of releases from these two different types of systems. (See Section VI.D.5. for further discussion of line leak detection methods and solicitation of comments and information on this subject.)

(3) Internal Corrosion Protection. Until the last few years, little attention has been paid to internal corrosion protection in the United States. Internal corrosion results from the reaction of water and oxygen in the stored product with the inside of the steel structure.

External corrosion has been the major type of corrosion-induced failure in unprotected steel tanks. However, as the incidence of external corrosion is reduced by coating and cathodically protecting steel tank exteriors, internal corrosion could become a major source of failure.

The Steel Tank Institute has identified two areas that are susceptible to internal corrosion and has developed recommended practices that protect them. The first area subject to internal corrosion is under the fill openings where filling the tank and taking dip stick readings can lead to accelerated corrosion. STI recommends that this area can be protected by welding wear plates to the bottom of the tank. Another area subject to internal corrosion is the unwelded plate overlaps. Water can become trapped in these crevices resulting in accelerated localized corrosion. These overlaps can often be eliminated by design changes, or they can be seal welded. A third solution to corrosion in plate overlaps is to cathodically protect the seam with sacrificial anodes. Another method to protect against internal protection, not included in the Steel Tank Institute's recommended practice, is to coat or line the tank interior with a noncorrodible material. Various countries in Europe mandate some of these practices to prevent internal corrosion.

EPA requests comments on industry experience with internal corrosion protection in terms of design, installation, efficacy and problems found. Information on the need for internal corrosion protection is also requested, including whether it should

be required for all new steel tank systems.

b. Installation (Section 280.20(c))

Overview. Proper installation is crucial to ensure the structural integrity of a new tank system. Installation includes excavation, tank system siting, burial depth, tank system assembly, backfilling of the tank system, and surface grading.

The data reviewed by EPA indicates that improper installation is a significant cause of steel and FRP UST system failures, particularly piping failures. Installation problems result from careless installation practices that do not follow recognized codes and procedures. For example, mishandling of the tank during installation can cause structural failure of FRP tanks or damage to steel tank coatings and cathodic protection. Improper anchoring, backfilling, inadequate cover, and insufficient tightening of loose fittings can also lead to system failures (including the piping).

EPA believes that if owners and operators would follow correct procedures for all tank system installations, then the number of releases would be significantly reduced.

Current Practices. Several professional and scientific organizations have established standards for the installation of underground tank systems. These organizations include the National Fire Protection Association (NFPA), the Steel Tank Institute, Underwriters Laboratories, the National Association of Corrosion Engineers (NACE), the Western Fire Chiefs Association, the Occupational Safety and Health Association, the Petroleum Equipment Institute (PEI), and the American Petroleum Institute (API).

Collectively, these organizations have published more than ten guides, codes, and standards for installing UST systems. As discussed above, generally these publications are written by committees of knowledgeable professionals and subjected to independent peer review.

Some of the most important codes follow:

- PEI/RPIOO–86 provides the most recently developed and comprehensive of the recommended practices for installation of underground storage tank systems;
- NFPA 30 addresses tank systems comprehensively from a fire explosion perspective. It references other codes and sets performance standards;
- API 1615 covers the factors that can contribute to successful installation of petroleum UST systems;
- NACE/RP–01–69 and RP–02–85 contain chapters on the installation of cathodic protection systems for metallic storage and piping systems.

In addition, several tank manufacturers also provide their own installation instructions. At least one manufacturer of FRP tanks seals the instructions onto the tank.

State practices display considerable variation. At least 23 states have established requirements for proper installation. Most of the state regulations reference NFPA 30 as a general installation standard. However, other consensus guides, codes, and standards related to installation are also included by reference in some state regulations. For example, eleven states require that tank systems be installed according to the manufacturer's instructions, ten states require certification of the installation, and five states require installer certification.

EPA has previously addressed installation requirements for UST systems in two ways. First, under the Hazardous Waste Tank Rules, underground tank installers must follow proper installation procedures (in effect by requiring adherence to industry consensus codes) and the installation must be inspected by a registered professional engineer or qualified installation inspector before covering, enclosing, or placing a tank system into operation.

Second, although the Interim Prohibition of Subtitle I does not explicitly require the proper installation of new underground tank systems, the existing EPA guidance ("The Interim Prohibition: Guidance for Design and Installation of Underground Storage Tanks") recommends following the industry consensus codes and provides installation guidance in accordance with those codes.

Approaches to Regulation. The Agency considered six different methods or approaches that the owners and operators could use to assure themselves that the installations are properly completed. These alternative approaches are:

- Certification or approval of installers by tank system manufacturers;
- Certification of installers by state or local regulatory agencies;
- Inspection of the installations by registered professional engineers;
- Inspection of the installation by state or local agencies;
- Completion of a manufacturer supplied check list of installation procedures; and
- Testing of the tank and piping for leaks during and after installation.

EPA does not have information indicating that one of the above approaches is better than the others. EPA is seeking comment on the advisability of these approaches. The Agency would especially like comments on the relative merits of certifying the installation versus certifying the installers. A desirable attribute that should be considered with any approach is its flexibility in tailoring an installation to site-specific considerations.

EPA believes that regulation of installation practices is primarily an institutional problem. A key element to successful implementation of installation requirements will be a program for education and outreach. EPA intends to pursue such a program and seeks comment on how to proceed with an education and outreach program for owners, operators and installers regarding proper installation procedures.

Today's proposal builds on the Interim Prohibition Guidance, but is more explicit. Because of the importance of proper installation and its complexity, the Agency has proposed a set of nine performance criteria that must be met in order to satisfy § 280.20(c). These performance criteria are based upon recommended industry practice. They represent the major installation steps outlined in the Petroleum Equipment Institute Report RPI00–86, and the American Petroleum Institute Publication 1615.

The first of the proposed performance criteria is that precautions must be used to prevent damage to the tank and pipe coatings or structures during installation. Also, any damage to the tank or pipe must be repaired in accordance with the manufacturer's instructions. The Agency included this criteria because it believes that many tank and piping failures result from mishandling of the tanks before and during placement. The tank and pipe manufacturers generally provide instructions on proper storage and handling procedures. In addition, the tank and piping should be tested for structural failure at each major installation step (i.e., upon receipt of the tank, once the tank is placed in the ground, and after piping has been connected) prior to backfilling; tanks and piping should be pressurized with air and visually inspected for leaks using a soap solution. The test should be performed to provide assurance that the tank and piping are structurally sound before proceeding with the next installation step. The manufacturer's instructions must be followed when repairing tanks and piping to ensure that

the repaired tanks or piping will perform adequately. Generally, repair instructions are provided as a standard industry practice with each tank and piping system. However, if additional instructions are needed, the manufacturer must be contacted.

The second performance criterion is that the excavation must be large enough to properly backfill the tank, piping, and associated equipment. EPA believes that backfill is a major component of the structural integrity of the tank and piping system and that enough space must be provided in the excavation to adequately place and compact backfill. Sufficient excavation space is particularly necessary for proper, careful backfilling under the tank.

The third installation performance standard concerns the selection, placement and compaction of backfill materials. As mentioned above, EPA feels that the backfill is an important feature of the installation and that many tank and piping failures can be prevented by careful attention to backfilling. In general, the backfill material must be a clean, noncorrosive, free-flowing material such as washed sand or gravel. However, a specific type of backfill may be required by the manufacturer because of unique structural or coating features. The manufacturers also specify the thickness of lifts in which the backfill is placed, and the degree and method of compaction that must be used to support the tank and piping.

The fourth requirement is for supports and anchorage of tanks that are subject to high water tables or in flood prone areas. High water can create strong lifting forces on an UST, causing movement and structural failure if the tank is not properly supported. The possibility of a high water table that may result from flooding should be carefully considered when deciding whether anchorage and supports are needed. Surface water can fill the tank excavation area if the surface is not properly sealed. The tank manufacturers generally provide anchorage design information.

The fifth installation performance criterion concerns piping layout and installation. The Agency believes that unnecessarily complex piping layouts can complicate backfilling of the pipe system and lead to structural failure. Structural failure of the piping could also result from improper installation of the piping and piping accessories. Therefore, in today's proposal, EPA is requiring that the piping and piping accessories be installed in accordance with the manufacturer's instructions.

The sixth performance criterion is that the pipe joints must be cut accurately and deburred to provide liquid-tight seals. FRP pipe joints must be cut squarely and tapered cleanly to ensure a structurally sound joint. The tolerances and procedures for preparing FRP pipe joints are provided by the manufacturers. Steel pipe joints must also be prepared carefully to prevent failures. The pipe must be cut squarely and the thread cutting die must be sharp to produce tight fitting thread.

The seventh performance criterion is that swing joints or flexible connectors must be installed at the beginning and end of each line as well as where the line changes direction. Swing joints or flexible connectors prevent differential movement of the tank, piping and dispensing equipment from causing stress in the pipe joints. These swing joints can be constructed in several ways. A series of threaded elbows and connectors can be used with steel pipe. Flexible connectors can be used with either steel or FRP pipe.

The eighth performance criterion is that the tank and piping cathodic protection must be installed in accordance with the manufacturer's instructions, plans and specifications. Some of the cathodic protection systems have important layout and installation limitations. The manufacturers of these systems provide instructions on how to layout and install their systems.

The last installation performance criterion is that a tank and piping tightness test must be performed after the backfill is placed into the excavation area and before the tank and piping are placed into operation. This test must meet the same requirements as the tightness test in § 280.41(c)(1). API 1615 recommends performing this test as a final check that the tank and piping are properly installed. Eight states also require this test at new installations. The requirements for this test are similar to NFPA 329 requirements; however, EPA believes that the accuracy standard for the test in NFPA 329 cannot be met reliably. EPA is concerned that even with the other eight installation requirements that a final check of the tank and piping installations needs to be made. Tank and piping leaks could still occur even though the proper installation procedures are followed. The tightness test provides assurance that the tank and piping are structurally sound.

In addition to setting these nine performance criteria, the Agency is proposing today in § 280.20(d) to require that owners and operators certify that they have complied with certain requirements concerning the installation, leak detection, corrosion protection and financial responsibility associated with each new UST system. The Agency is proposing an amendment to the existing EPA notification form that must be submitted by owners upon first bringing an UST system into use. This proposed modification will cause owners and operators to indicate the manner in which the installation requirements have been met. EPA will require owners and operators of UST systems to use the Agency's form unless the states develop their own forms that require, at a minimum, the information required under the amended form. Other changes to the notification form are discussed later in Section 3 of this part of this preamble.

EPA has amended the notification form in a manner that makes it still easy to complete (in most cases, answers may be provided by checking a box) to minimize the burden on tank owners and operators, the majority of whom are small businesses. In the proposed form, the owners and operators are required to check off which of the six alternative methods were used to ensure proper installation of tanks and piping. There is also a provision for owners and operators to describe any other methods used to ensure proper installation.

For the purposes of complying with the certification requirements, an authorized representative of the owner and operator may sign the form. In addition to the owner and operator's signature, the tank installer must also sign the certification of compliance form.

The Agency requests comment on today's proposed installation requirements. In particular, EPA asks for comment and experience on checking a new tank system installation with a tightness test of the tank and piping. The Agency is concerned that the tightness test may be redundant because new tanks are also required to have release detection. For example, is such a requirement necessary with double-walled tanks or UST systems provided with some method of frequent to continuous excavation zone monitoring? The Agency seeks comment on when the tightness test should be performed. If the test is intended to detect installation errors, then should it be conducted after the tank system has completed any possible settling within the excavation area (e.g., 6 months or 1 year after installation)?

In addition to specifying key installation requirements in today's proposed rules the Agency is examining various programmatic means of ensuring improvement of UST installations. A

number of potential tools for improving installations have been identified; however, we are now in the process of determining the appropriateness of these tools in various situations.

2. Implementation Schedules for Upgrading of Existing UST Systems (Section 280.21)

a. Overview

Because of the potential problems associated with releases from UST systems, the proposed new tank performance standards require features designed to prevent releases, including: Proper tank and piping design, construction and installation; and corrosion protection systems. Later in this preamble, additional requirements that are being proposed today to prevent or minimize releases from all new UST systems are discussed in more detail, including: Release detection methods; overfill/spill protection devices; and, in the case of hazardous substance tank systems secondary containment and interstitial monitoring.

The majority of the estimated 1.4 million existing UST systems regulated under Subtitle I do not presently include any of the release prevention and detection features that are being proposed today for new UST systems. In fact, EPA estimates that approximately 80 percent of existing UST systems are bare steel and about 60 percent of them are more than ten years old. Most owners and operators do not yet practice any form of release detection and have not fitted their tanks with overfill/spills control equipment. Fortunately, most existing UST systems can be retrofitted with many of these safeguards (for example, cathodic protection to prevent corrosion at bare steel tank systems), thereby upgrading them with some of the protections expected to be provided by the proposed requirements and standards for new UST systems.

Today, EPA is proposing in § 280.21 two different schedules for upgrading existing UST systems to the new tank system design and construction requirements just described, and to the release detection requirements discussed in Section VI.D of this Preamble. As discussed in more detail below, EPA believes that the implementation of these requirements should be phased in because of the enormous size of the existing UST universe, and the practical implementation difficulties that owners and operators face as they upgrade their tanks to the new tank standards.

b. Current Practices

Most of the major oil companies, and at least one of the larger convenience store chains, have embarked on phased programs to upgrade their retail motor fuel tank systems. In ranking these UST systems on a priority list that is based on factors believed to be associated with the probability of release, these programs typically take into account the age of the UST systems, their material of construction (protected steel or not), and the corrosivity of the surrounding soils. The highest priority UST systems are replaced as quickly as possible with protected single-walled UST systems equipped with spill controls. The next priority UST systems are quickly repaired and upgraded to new tank standards. The lowest priority UST systems are those that already meet new tank standards or are otherwise unlikely to leak and thus have little need to be upgraded.

EPA has also identified several other major companies storing hazardous substances who have already embarked upon UST system upgrading programs. In many cases, these tanks appear to be phased out and replaced by either aboveground storage tanks or underground UST systems provided with secondary containment.

The majority of state and local regulations addressing new tank specifications have requirements for corrosion protection, release monitoring, and overfill/spill protection. However, four jurisdictions also explicitly mandate retrofitting existing tanks to these new tank specifications. One state requires retrofitting only as an option to removing, abandoning, or extending the life expectancy of the UST system. Other states increase release detection requirements as the UST system ages, thereby prompting voluntary retrofit or retirement of the UST system. Generally, state and local regulations address the various upgrading topics individually. For example, of the 18 UST regulations that include retrofit requirements for existing UST systems, 6 require corrosion/cathodic protection, 1 requires secondary containment, and 13 require some type of release detection. Eleven regulations specify retrofitting systems with overfill protection, with 5 of the 11 also requiring spill containment. Two jurisdictions have regulations which mandate the upgrading of tank systems in all four areas (corrosion protection, secondary containment, release detection and overfill/spill protection). In summary, there currently appears to be wide diversity concerning requirements for the upgrading of existing tank systems at the state and local level.

The majority of states have not yet established comprehensive UST regulations. However, 18 states are enforcing at least one of the major national consensus codes. Of these consensus codes, only the Uniform Fire Code, 1985, has guidelines addressing retrofit technologies. Eight states without comprehensive UST regulations enforce this standard and appear to therefore adhere to this code's retrofit guidelines for corrosion protection and spill containment.

Two nationally recognized standards address the retrofit of cathodic protection on existing tank systems. They are the American Petroleum Institute (API) publication 1632, "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems and the National Association of Corrosion Engineers (NACE) Recommended Practice RP–02–85, "Control of External Corrosion on Metallic Buried and Partially Buried, or Submerged Liquid Storage Systems."

Corrosion protection can be retrofitted to existing steel tank systems and is expected to be very effective in eliminating galvanic corrosion as a source of UST system releases. Such retrofitting is not an uncommon practice, and at least one major oil company and one major convenience store chain are retrofitting many of their unprotected steel tanks with corrosion protection. One corrosion engineering firm alone has retrofitted over 2500 tanks with cathodic protection. Because each UST site is unique in its exact requirements for adequate corrosion protection, in practice the retrofitting of corrosion protection must be designed for a specific site by a trained corrosion expert experienced in the protection of underground storage tank systems.

Although relatively inexpensive to do, it is critical that the retrofitting of cathodic protection only be undertaken by a trained professional. First, the corrosion engineer must gather a site history including detailed information on tank location, dimension, age, coating and lining, material of construction, type of backfill, anchor system, history of repair, and inventory problems. The engineer must also obtain information on possible interference sources (stray currents) and corrosion protection in place at nearby buried metal structures. Second, the corrosion engineer must do field testing. This includes measurement of structure-to-soil potentials, a site inspection, and at least one test boring at the end of each tank. The borings are generally used to produce analyses such

as structure-to-soil potential profiles and soil electrical resistivity profiles. Third, the soil samples obtained in the field borings are also analyzed in the laboratory to determine presence or absence of sulfides, chlorides, hydrocarbons, moisture content, conductivity, and pH of the soil.

After analysis of this data, a decision needs to be made as to whether or not the UST system is likely to be in good enough condition to upgrade. If the system is judged to be in sound enough condition to be upgraded, the proper type, number, and placement of anodes is next determined. In localities with relatively new coated tank systems in soils of low corrosivity, a tank system may be protected by a series of several sacrificial anodes. However, at sites with moderate to highly corrosive soils or with large bare steel tanks without any coatings, the analysis may reveal that sacrificial anodes cannot generate enough current to protect the system. In such cases, an impressed current system must be installed. Impressed current systems have been recommended to EPA by several highly experienced corrosion experts as a preferred system for retrofitting cathodic protection because impressed current can be used to protect any UST system in any soil conditions, and current output can be easily adjusted to changing conditions at the site.

Carefully applied in a wide variety of settings, retrofitting of corrosion protection to existing bare steel UST systems appears to have significant potential to forestall corrosion-induced releases that are otherwise inevitable in the future. It is a relatively inexpensive procedure when compared to the costs of UST system replacement. Several firms are available nationwide that offer the full array of necessary expertise and experience to correctly apply this technology. Application of this technology to the UST universe addressed by today's proposal will require an enormous expansion of their services, if many existing UST owners and operators decide to upgrade their unprotected UST systems instead of replacing them.

Existing tank systems can also be upgraded by applying release detection for the first time. The wide variety of release detection methods available for new tanks is discussed later in this Preamble, but they are generally applicable to existing tank systems as well. Most state UST regulations have some form of release detection requirements. While these regulations ultimately determine which method can be used, generally, the regulations offer the option of choosing among several release detection methods.

Implementation difficulties anticipated with retrofitting of release detection to the large number of existing UST systems addressed by today's proposal has led EPA to conclude that these requirements must be phased in over a significant period of time. In particular, recent experiences from state UST program enforcement of their new release detection requirements corroborate this concern. Several of the most aggressive state UST programs have decided to phase in their release detection requirements over a 4- to 5-year period and have advised EPA that this is the quickest that the large universe of tank systems can be realistically addressed. (For example, both Florida and New York are phasing in programs within this time frame). States attempting to require more immediate compliance have also discovered that actual compliance has taken much longer than originally intended (for example, this has proved to be the case in California, which tried to require release detection in one year but now reports that the phasein of release detection will take up to three years). EPA believes that the national UST program will experience these same problems. The current market conditions and technological capabilities of the release detection industry, the size of the regulated community, and the widespread lack of application of or familiarity with any release detection to date at most UST facilities indicates that requiring the immediate retrofitting of release detection at existing UST systems is not practical or achievable.

Another possible approach to release detection retrofitting is provided by interstitial monitoring. Technically, impermeable liners and vaults may be retrofitted to existing UST systems, however, they are very costly and impractical retrofit techniques. Installation of impermeable liners and vaults require the excavation and removal of the UST system and then its reinstallation. Currently, in the United States there is no widely available technology for retrofitting existing UST systems to provide double-walled protection. This form of secondary containment requires replacement of the single-walled UST with a double-walled one.

A potentially more simple retrofit technology that will provide existing tanks with a form of interstitial monitoring that can be continuously monitored is available in Europe and has been widely used for diesel fuel and heating oil tanks. Systems under development in this country for gasoline UST systems consist of coating the inside of the tank and then also retrofitting a membrane liner inside the tank to enable interstitial release detection in the space between the tank and liner. This offers several features that may make it a promising retrofit technology. However, it is only commercially available in this country on a very limited basis as a new technology, and must otherwise be imported.

Finally, in order to fully upgrade to the new tank standards being proposed today, all existing UST systems would also need to retrofit controls to address releases from spills and overfills. Releases from spills and overfills can be prevented by implementing a spill prevention program, which begins with the simple practice of good transfer techniques. These techniques consist primarily of assuring enough space is available in the tank to receive the load of product to be delivered, as well as to closely oversee the in-filling process to assure trouble-free transfers from the delivery truck. In addition, existing tank systems can be retrofitted with overfill/spill protection devices. There are already a variety of overfill/spill protection devices available that can be installed on existing tank systems, and several more are under development. Several current state UST regulations require existing tank systems to be eventually retrofitted with overfill/spill protection using one of several methods. (Spills and overfills are discussed in more detail in the next section of the preamble.)

c. Approaches to Regulation

The Agency has considered several approaches and requirements that could be used to upgrade existing UST systems, as well as ways of phasing in the release detection requirements. The following discussions focus on the reasoning behind the approach proposed today as well as some of the alternatives considered during its development.

In summary, EPA is today proposing that all existing UST systems storing regulated substances upgrade or replace to the new tank standards over no longer than a ten year period. The proposed upgrading consists of several steps. First, in § 280.30(a), all existing UST systems are immediately required to institute practices for the careful filling of tanks to avoid spills and overfills. Release detection must be phased in § 280.40(c) within a 3- to 5-year period based on the type of tank

(i.e., the bare steel UST systems before the protected systems). All UST systems that cannot apply a reliable and effective method of release detection within those time frames must be permanently closed. Within ten years, all UST systems must be retrofitted or replaced to comply with the new tank standards, including the provisions for corrosion protection under § 280.21 and spill/overfill control equipment under § 280.30(c).

(1) Basic Requirement for Mandatory Upgrading or Closure of Existing UST Systems (Section 280.21). Today's proposal requires all existing UST systems storing regulated substances to be upgraded to the new tank standards within 10 years or be closed. EPA believes the present unprotected condition of most existing UST systems provides the greatest and most immediate threat to human health and the environment. A significant level of future releases can be avoided if these UST systems are upgraded or replaced to the new tank standards. As discussed earlier in Section V of this preamble, the Agency has decided to propose a gradual upgrading or replacement approach as the most feasible and implementable with this large regulated universe. The regulatory impact analysis described in Section IX estimates that significant environmental benefits will result from upgrading or replacing all UST systems within 10 years. Upgrading would generally consist of instituting a corrosion protection system and some spill and overfill equipment at the typical tank system.

By proposing to give the regulated community the flexibility to plan for and set their own priorities in upgrading their UST systems, EPA intends to encourage a more rapid upgrading to take place voluntarily. It also provides state and local UST programs the flexibility to establish their own priorities for mandating the phasing in of the needed improvements. Several states and local programs are already using the age of the UST systems to trigger mandatory upgrading or replacement.

As an alternative to the proposed approach, EPA has also considered several other ways of requiring UST systems to be upgraded within the proposed 10-year period:

- All UST systems could be required to replace or upgrade based on age, phasing in required improvements at the oldest tank systems first.
- Separate milestone years could be identified for different stages of the upgrade. For example, release detection, spills and overfill controls, and cathodic protection, could be required by different cutoff dates. The tank owners could upgrade as quickly as they desired as long as they also met these individual milestone dates.
- All UST systems could be required to upgrade or replace only if and when they leaked. This approach is used by several states, including South Carolina, New York, and California (with hazardous substance tanks).

EPA decided to propose in § 280.21 that all upgrades (or closures) of substandard existing tank systems simply be completed within 10 years. This approach is believed to complement numerous current industry trends towards upgrading or replacing UST systems voluntarily, while also setting a maximum time limit within which the benefits of upgrading must be obtained nationwide. EPA believes that the proposed maximum 10-year time period will allow existing UST owner and operators numerous ways of planning an orderly transition towards achieving the protections afforded by new tank requirements. This target approach is also believed to have the distinct advantage of providing states and local programs with the flexibility to take any of the different approaches described above (or some other approach) as long it is completed within this ten year period. Although this is the maximum time period allowed, EPA will encourage a more rapid transition where possible, so that the benefits of these improvements can be realized sooner.

(2) Phase-in of Release Detection at Existing UST Systems (Section 280.40(c)). Today EPA is also proposing in § 280.40(c) (1)–(2) to require that all existing protected single-walled UST systems have release detection within 5 years of the effective date of the final regulation, and the more leak-prone bare steel UST systems within 3 years. This means that the vast majority of existing UST systems will be required to have release detection within three years. State experiences to date suggest that this timeframe will be difficult to achieve with a regulated universe of this size. EPA does not believe that this implementation can take place in less than this time frame. Upgrading all existing UST systems with any one of the proposed release detection methods being proposed today will generate a tremendous new demand for services. It is doubtful that system manufacturers and installers could supply their products and services to all UST owners and operators in a reliable fashion that would ensure full compliance in less than three years. More rapid implementation is made even more difficult by the fact that today's proposed requirements will cause release detection to be applied to the vast majority of existing UST systems for the first time.

As is discussed later in today's proposal (see Section VI.D.), the Agency expects many owners and operators of existing UST systems to choose the combined infrequent tank tightness testing and inventory control method during the 10-year interim period allowed for upgrading all USTs to the new tank standards. They are the most widely used methods today and require the least amount of retrofitting. EPA anticipates this approach will result in much of the demand for release detection services to be placed on these technologies. Thus, in order to be applied in a reliable fashion, the expansion of these services will have to be phased in. As is also discussed in more detail later in this Preamble, today's proposed 5-year phase-in period for protected steel or fiberglass UST systems is expected to enable approximately 20 to 25 percent of the existing UST systems, those that are less susceptible to leakage as a class—to actually retrofit release detection at a later date. Allowing this additional time for these more protective UST systems should not result in significant adverse impacts to human health and the environment because corrosion-induced releases (the most common by reported cause of releases today) should be significantly less frequent at these UST systems.

Another approach that the Agency considered for phasing in release detection requirements was to base the phase-in on tank system age instead of tank system type. Because EPA has some evidence that older existing UST systems are more likely to leak (because they do not have corrosion protection) than younger tanks, release detection could be required sooner at the older UST systems than the younger ones. For example, UST systems over 15 years in age (as well as those of unknown age) could be required to phase in release detection within two years, the UST systems between 5 and 15 years old within 4 years, and the most recently-installed protected UST systems within five years. This alternative approach could have similar practical impacts, however, because most of the protected UST systems have been installed recently and, thus, would be phased in last under both approaches. The major difference between these two phase-in approaches is that the older USTs would be *required* to have release detection much sooner under the alternative approach. The Agency solicits comments and information pertaining to

the benefits that could be obtained by phasing in release detection based on age instead of tank system type. Information is also solicited concerning data that may further reveal whether, and to what extent, older tanks and piping may pose significantly more of a threat to human health and the environment than younger tank systems.

(3) Accelerated Upgrading or Closure of Existing UST Systems that Cannot Meet Release Detection Requirements (Section 280.40). Today's proposal (in § 280.40(c)(3)) requires all existing UST systems that cannot provide a method of release detection that meets today's proposed requirements to be closed within 3 to 5 years. This requirement is based on the Agency's conclusion that all existing UST systems, particularly those unprotected from corrosion, must have a method of release detection to protect human health and the environment. Thus, UST systems unprotected from corrosion and without release detection would have to be closed before the end of the 3-year phase-in period that would begin on the effective date of the final regulations. Similarly, protected UST systems without release detection would have to be closed before the end of the 5-year phase-in period proposed today.

(4) Request for Public Comment. The Agency is requesting comments on today's proposed schedules for implementing this program; including the requirements for the upgrading of existing tank systems and the scheduled phase-in of release detection. Comments and information are specifically requested in the following four areas:

- Is the proposed 10-year limit for upgrading existing UST systems appropriate or should certain components of these required improvements be mandated sooner (for example, see the next section of this preamble concerning the phase-in of spills and overfill equipment)? Should the states and UST owner/operators be allowed to set their own priorities in upgrading to the new tank standard?
- Are the proposed requirements to upgrade release detection, corrosion protection, overfill/spill protection, and, in the case of hazardous substance tanks, upgrading to secondary containment adequate? For example, is it necessary for steel UST systems being retrofitted with cathodic protection to also be required to have an internal coating applied to the inside of the tank to ensure releases are prevented?
- EPA has been informed by several experts in the corrosion-protection field that impressed current corrosion protection is the preferred technology for retrofitting existing tanks. For retrofit purposes, should only the use of this technology be allowed or should EPA also allow retrofit of sacrificial anodes to existing bare (or inadequately coated) steel systems?
- Current recommended industry practices (API) include the use of structural integrity standards to determine if an existing tank is sound enough to be repaired, because it is unreasonable to cathodically protect and otherwise upgrade a tank that is in imminent danger of leaking. The Agency specifically requests comments on what minimum structural integrity requirements may be needed to ensure an existing tank system can be safely upgraded to the new tank standards. Information is also solicited concerning methods and expenses associated with assessing existing USTs to determine whether they should be upgraded.

3. Notification Requirements (Section 280.22)

On November 8, 1985, EPA published the Final Rule on Notification Requirements for Owners of Underground Storage Tanks (50 FR 46602). Included in that rule was the notification form. Owners of existing UST systems were required to fill out and submit the form to their designated state or local agencies by May 8, 1986. This earlier notification complied with the requirements of section 9002(a)(1) of the federal statute. Section 280.3(c) of the November 1985 final rule (which today's proposal re-designates as § 280.22) also required owners and operators who bring UST systems into use after May 8, 1986, to notify the designated state departments or agencies within 30 days of installation. Such notification by new UST systems should be made using the November 8, 1985, federal form, as modified in today's proposed rule, or an approved alternate state notification form.

Beginning 30 days after the issuance of the final regulations resulting from today's proposal, § 280.3(h) of the November 1985 rule (which today's proposal redesignates as § 280.22) requires any person who sells a tank intended to be used as an UST system to notify the purchaser of such tank of the new owner's notification obligations under the regulations.

Owners who place new UST systems into use should note that we are today not proposing to modify the notification form promulgated in November 1985, except to require additional information regarding certification of the methods used to comply with the installation, financial responsibility, release detection and corrosion protection requirements. In particular, the proposed modification to the form requires the installer of the new UST system to sign the form along with the owner. This information has been added to the form so that EPA can be assured that the installation has been completed competently.

C. General Operating Requirements

1. Spill and Overfill Control (Section 280.30)

As discussed earlier in Section III, spills and overfills can occur in a variety of ways, usually as the result of human error. Because spills and overfills account for at least 15 percent of all state-reported petroleum releases, EPA believes that incidents of spills and overfills should be addressed in future regulations. Thus, EPA is proposing today to require spill and overfill controls.

The situation can be improved markedly through the use of any of the following:

- Proper operating procedures to include measuring the available capacity in the tank and using dry-disconnect couplings on all transfer hoses;
- A liquid level sensor with an alarm that is triggered when the liquid reaches a predetermined level;
- An automatic shutoff device that is triggered when the liquid reaches a predetermined level; and
- A spill catchment basin located around the fill pipe.

Many of these types of devices can be used to provide protection on either new or existing tank systems.

EPA considered several alternative regulatory approaches to reducing spills and overfills. One approach was to require specific design and construction techniques to be implemented at all UST sites, both new and existing facilities. This approach, however, in certain respects deprives the states of the ability to require different types of solutions based on site-specific information concerning the location of the UST system with regard to valuable ground water and potable water sources, the type(s) of product to be stored, and the likelihood of overfills and spills causing significant adverse effects on human health and the environment. Thus, EPA chose instead to allow the use of any of the above techniques to address the problem.

Overfill and spill prevention requirements are recommended in most national association and industry standards as well as the majority of available state regulations. The proposed approach allows the states to

retain the variability currently in their regulations while staying within the minimum national standard provided by EPA. There is currently no data available to suggest that one approach to the elimination or reduction of overfills and spills is more effective than any other.

In § 280.30(a), EPA is proposing a general performance standard that will require all tank owners and operators to ensure that releases due to spills or overfills during product transfer or delivery do not occur. Owners and operators of all tank systems must ensure that the operator gauges the tank to determine that the capacity available in the tank is greater than the volume of product to be transferred. This measurement is the logical, necessary first step in preventing overfills—it assures that there is enough empty space for the product being delivered. The owners and operators must also ensure that other proper product transfer procedures are followed, such as overseeing the transfer operations, draining the hose carefully before disconnecting it, and using dry-disconnect couplings.

Under § 280.30(b), all new tank systems must be equipped with spill and overfill protection by installing one or more of the following devices:

- A liquid level sensor with an audible or visual alarm that is triggered when the tank reaches 95 percent of its capacity;
- An automatic flow shutoff device that is triggered when the tank reaches 95 percent of capacity;
- A spill catchment basin around the fill pipe; or
- An equivalent device approved by the appropriate regulatory authority.

This requirement is built upon the list of recommended spill and overfill protection equipment set forth in NFPA 30. Proper product transfer procedures as discussed in NFPA standard 385 and in API Bulletin 1621 "Recommended Practice for Bulk Liquid Stock Control at Retail Outlets" describe, among other things, the requirements for the use of tight fill connectors and the need for the tank truck operator to oversee the transfer.

When existing tank systems are upgraded to new tank standards, or when external monitoring wells are put in place, the owner and operator must ensure that the system complies with the new tank design standards for overfill protection. As discussed later in this Preamble (see general requirements for release detection), existing and new spills may confound external-to-the-tank sensors and preclude the detection of a release from the UST system. Thus, today's proposal requires that any existing UST system using external release detection be provided with spill and overfill equipment.

There are several options for upgrading of overfill and spill equipment. One regulatory approach would be to require upgrading to new tank overfill and spill standards on the same schedule as the leak detection phase-in (i.e., 3–5 years). A second approach would be to require the retrofit of overfill and spill protection at the same time that corrosion protection of existing UST systems must be upgraded to new tank standards (i.e., within 10 years). The earlier phase-in (3–5 years) would help prevent overfill releases that would otherwise trigger alarms on newly installed external monitors. Florida, for example, requires monitoring and overfill protection retrofits simultaneously, at an earlier date than corrosion protection. Comments are requested on this issue of which time frame is most appropriate for phasing in spill and overfill equipment at existing UST systems.

The Agency has decided to propose in 280.30(c) a 10-year deadline for upgrading overfill protection at all existing UST systems to the level provided by the new tank standards. During the intervening period, owners must use improved product transfer procedures (280.30(a)). There are two major reasons for tying phase-in of overfill equipment to the cathodic protection retrofit requirement. The first is simplicity—keeping all the leak prevention upgrade requirements scheduled together will be easier to implement and more easily understood by the regulated community. The second is related to available technology. For several years, European countries have relied predominantly on overfill prevention as opposed to overfill and spill containment. These new types of prevention devices, both foreign and domestic, appear to be just beginning to enter the American market. A short upgrade deadline could force tank owners toward the overfill and spill containment equipment that is readily available now. A longer upgrade period gives the marketplace more time to adjust and could allow technological advances recently introduced more time to be made available.

2. Operation and Maintenance of Corrosion Protection (Section 280.31)

a. Background

Proper operation and maintenance of corrosion protection systems can reduce the incidence or volume of releases due to corrosion. Corrosion was found to be the single most common cause of releases in existing underground tank and piping systems reported by State and local officials in the two EPA State Release Incidents Studies. All presently available studies of UST releases and their causes cite corrosion as the leading cause of failure in the existing unprotected steel tank systems.

Today's proposed rule requires corrosion protection of all new steel tank systems as the means of preventing corrosion. All existing steel tanks systems will have to be upgraded to include corrosion protection within 10 years. In order to be effective, these corrosion protection systems must be inspected and maintained. Corrosion protection systems can fail in a number of ways. For example, coatings can deteriorate, wire leads to cathodic protection can break, sacrificial anodes can be consumed, impressed current can be shorted or otherwise fail, adequate potential may not be maintained. Proper operation and periodic maintenance of these systems can avoid all of these potential problems.

b. Current Practices

The National Association of Corrosion Engineers (NACE) provides guidance on the proper design, installation, operation, and maintenance of corrosion protection for steel tank systems. In particular, NACE provides standards for cathodic protection systems. In Chapter XIII of its publication "Guide for Inspection of Refinery Equipment," the American Petroleum Institute (API) has also developed recommended practices for the proper inspection and maintenance of corrosion protection for tank systems.

Over fifteen states already have requirements concerning the monitoring of corrosion protection systems. Seven require monthly inspections of impressed current rectifiers; nine require annual site inspections by a qualified person; one requires semi-annual inspections; and two require these inspections after the first year of operation and every five years thereafter. Most of these states require that the site inspections include measurements of the structure-to-soil and structure-to-structure potential as well as rectifier voltage and current readings.

Under the Hazardous Waste Tank Rules, inspections of corrosion protection for underground tank systems are required. Cathodic protection must be inspected at least annually. However, those systems with impressed current must be inspected at least every other month. Under Subtitle I, the Interim

Prohibition (Section 9003(g)) does not explicitly require the maintenance of corrosion protection at new UST systems. However, as explained in EPA's Interim Prohibition Guidance Manual, the performance of corrosion protection should be monitored periodically.

c. Today's Proposal

Today's proposed rule requires that all corrosion protection systems be operated and maintained to continuously provide corrosion protection to the metal components of an UST system. The Agency has not specifically addressed the issue of whether all metal components on a FRP tank or pipe should be protected by cathodic protection, but only requires that corrosion protection be provided. The Agency considered requiring cathodic protection for all metal components because of potential failure of such components (e.g., pumps, pump housing and fittings). Because such a requirement could be construed to cover other metal components such as striker plates, bushings, and bunghole covers, the Agency has not incorporated the requirements in today's rule. The Agency does not have sufficient data on failures of these individual metal components on a FRP tank or pipe to determine that this level of protection is needed. The Agency invites comment on which components, if any, should be cathodically protected, whether there are noncorrodible, metal alternatives for these components, and what form of corrosion protection is appropriate if cathodic protection is not required.

In today's proposed rule, EPA is proposing two different inspection schedules for coated steel tanks and piping with cathodic protection. After the initial inspection, it is proposed that factory installed cathodic protection systems (such as those included with sti.P3® tanks) be inspected at least every five years. All other cathodic protection systems on steel tanks and piping are to be inspected at least annually after the initial inspection. The less frequent inspection interval for the factory installed cathodic protection is proposed because of the stringent fabrication and installation standards for these tanks. EPA feels that there is less chance of damage to, or failure of, the factory installed cathodic protection systems that are built to national fabrication requirements (e.g., sti.P3) than for field fabricated systems. Generally, these factory installed systems have 30 year limited warranties provided by the tank manufacturer.

For field fabricated cathodic protection systems, EPA is proposing that the NACE standard for inspection intervals (not less than once per year) be adopted. EPA feels that this more stringent inspection standard is appropriate because there is more potential for faulty installation of these systems and for damage to the system either during or after installation. All steel piping will be subject to this requirement. The annual inspections required by NACE RP–02–85 (and the five year inspections noted above) ensure that adequate corrosion control has been achieved for underground steel structures by observing the following criteria:

- A negative (cathodic) potential of at least 0.85 volts as measured between the structure and a saturated copper-copper sulfate (Cu-$CuSO_4$) reference electrode contacting the soil; or
- A negative (cathodic) potential shift of at least 300 mv as measured between the structure and a Cu-$CuSO_4$ reference electrode contacting the soil. This shift is the difference between the unprotected potential and the potential with the protective current applied; or
- A negative (cathodic) polarization potential shift of at least 100 mv measured between the structure and a Cu-$CuSO_4$ reference electrode contacting the soil. This shift is the polarization decay which is determined immediately after the protective current is interrupted.

There is currently a proprosal before a technical practices committee of NACE to revise the criteria for determining that cathodic protection systems are functioning properly. The proposed revisions would refine some criteria and there is discussion of deleting other criteria entirely. The Agency is today proposing that cathodic protection be monitored according to currently applicable NACE criteria. In the event these criteria are modified in the near future, the Agency will evaluate at that time whether to make parallel changes in its final regulations.

NACE RP–02–85 recommends more frequent inspection intervals where indicated by operating experience. The annual and bimonthly inspection requirements are therefore minimum requirements. In accordance with the NACE code, the bimonthly inspections of impressed current systems can be done by the owner or operator, and do not require the services of a corrosion expert. The third requirement, that the corrosion protection system be operated and maintained to protect the tank system from corrosion, effectively requires more frequent inspections when warranted.

As mentioned previously, the Agency is aware that some tank manufacturers recommend less frequent inspection intervals for coated tanks that have galvanic type cathodic protection systems attached to the tank body. The Steel Tank Institute recommends inspection by a corrosion expert of the cathodic protection system on this type of tank system one year after installation and every five years thereafter. The Agency seeks comments on the advantages and disadvantages of allowing less frequent inspections for those tank systems that are equipped with premanufactured corrosion protection.

In addition to the minimum requirements for inspections at least once per year or once every five years, today's proposal also requires testing or inspection of impressed current systems on a bi-monthly basis. The rule also specifies that those inspections that are required at least once a year or at least once every five years be conducted by a qualified corrosion expert. The bi-monthly impressed current test or inspection, however, may be conducted by employees of the owner or operator, provided the employee has been trained in the procedural steps for conducting and recording the results of the inspection or test. This distinction is made because the less frequent inspections require a complete knowledge of cathodic protection systems, their modes of failure or malfunction, proper diagnostic procedures, proper data interpretation and corrective action options whereas the bi-monthly inspection or test is principally a matter of visually verifying that the system is operational and performing adequately.

d. Inspections

The Agency has considered a range of alternatives for the required operation and maintenance of tank systems. Three alternatives included considerations for requiring maintenance and inspections for (1) the entire site, (2) the tank system equipment, and (3) the corrosion protection systems only. For each of these three approaches, consideration was also given to whether the requirements should apply to new tank systems only or to all tank systems. The Agency also considered a general performance standard which would simply require that the tank system would be maintained in proper working order.

The site inspection alternative could cover inspection of (1) piping and auxiliary equipment, (2) instrument controls and electrical systems, and (3)

concrete pads, foundations and surrounding flora and soils. These are discussed in more detail below.

(1) Piping and auxiliary equipment. All accessible piping, pumps, valves and fittings could be visually inspected for leaks, proper supports, proper alignment, external corrosion, and signs of fouling. Pumps and valves could be checked for leaking seals or other signs of mechanical wear.

(2) Instruments, controls, and electrical systems. These systems could be checked for proper power supply, signs of leaks or corrosion, integrity of mountings and enclosures, proper lubrication and adverse environmental conditions.

(3) Foundations, pads and surrounding areas. Concrete bases for pumps or other equipment could be checked for deterioration, erosion settlement, cracks, or spalling. Concrete pads and surrounding soil could be checked for subsidence, unexplained moisture spots and deterioration. Grass and other flora around the concrete could be checked for damage that could be caused by releases.

The second option, to inspect tank system equipment, would principally encompass item number 1 from the Site Inspection Alternative. Such an inspection could cover some items from item numbers 2 and 3 of the Site Inspection Alternative. For example, equipment foundations could be inspected for cracks and settling and the equipment could be checked for proper anchoring. Similarly, visual checks could be made of instruments, controls, and electrical components associated with various equipment items.

The Agency considered requiring an inspection for tank deflection as part of a tank system inspection. As the tank and surrounding soils shift due to settlement, aging and frost heave, the tank may be distorted from its original shape. Small distortions are expected at most installations and the tanks are designed to withstand them. However, failure of the tank's backfill or foundation anchors can lead to excessive distortion of the tank and rupture. This type of failure, while not widespread is reported to occur most often in FRP tanks. One way to measure this tank distortion is to measure the inside height of the tank and compare it to the original design height. If this tank deflection exceeds a limit which depends upon the design and the size of the tank then the tank could be expected to rupture and cause a release. At least two FRP tank manufacturers require a measurement of tank deflection after installation to assure proper backfill placement. If the deflection exceeds two percent of the original diameter, the tank must be reinstalled. The Agency is not aware of any tank inspection programs that include regular, periodic tank deflection tests and is today seeking comment on industry experience with tank deflection measurement programs. EPA specifically requests comments on the advisability of EPA requiring periodic tank deflection measurements for steel and FRP tanks as a means of preventing tank failures. Of particular concern is how EPA could set a deflection standard for the different tank styles and materials of construction.

The third option, to inspect only the corrosion protection system, is a subset of the tank system equipment inspection. In this option, only the corrosion protection system would be inspected regularly to ensure continued corrosion protection for steel tanks. Two types of corrosion protection system inspections were considered. One type of corrosion protection system inspection is the inspection of the cathodic protection of steel tanks and piping. This type of inspection is described earlier in this section of the Preamble.

The second type of corrosion protection system inspection considered by EPA evaluates the integrity of the cladding on composite tanks. As described earlier in this Preamble under performance standards for new UST systems, the Agency is concerned about the corrosion protection performance of composite tanks. In the absence of definitive performance data, the corrosion resistance of composite tanks is a subject of continuing debate. Measuring the rate of corrosion or the integrity of the cladding would provide confidence that the cladding on a composite tank is protecting the tank from external corrosion.

Theoretically, the rate of corrosion could be measured by determining the electrical current flowing between the tank and the surrounding soil. This current is proportional to the rate of metal oxidation or corrosion. However, the Agency is concerned that this current is difficult to reliably measure because it could be masked by the current from other metal structures and environmental factors.

The integrity of the cladding could be determined by a test similar to the holiday test that is used to assess the integrity of a coating or cladding prior to installation. In this test an electrical potential is induced between the tank and a metal rod that is inserted in the surrounding soil. Current flow between the tank and the rod could indicate a gap or holiday in the cladding.

EPA requests comments on the advisability of requiring corrosion protection inspections for composite tanks. The Agency is particularly interested in comments and field data regarding experience in conducting these tests and their ability to indicate failures in coatings and claddings.

The advantages and disadvantages of each of the above three general approaches to inspection requirements are not clearly established. The Agency is today seeking public comment and information on whether there is a need to have a broader requirement that addresses the maintenance and inspection of the entire site or other tank system equipment. The Agency presently has several reservations with these approaches, however, because the general site inspection and the tank system inspection alternatives may be duplicative of the release detection requirements. Release detection systems have been proposed that should provide effective warning of releases from all components of the tank system, thereby reducing the need for general inspections. Also, because the vast majority of underground tank systems are completely underground and inaccessible to inspection, an inspection requirement appears to promise little practical benefit. Finally, our scrutiny of the numerous state and local programs in place or under development reveals that they do not consider those broader requirements for inspection to be necessary. Therefore, the Agency is proposing to require regular inspection and maintenance of the cathodic protection systems only.

3. Compatibility (Section 280.32)

a. Overview

In proposing a regulation on compatibility, the Agency intends to prevent tank system structural failure due to chemical and physical interaction between the stored substance and the tank system material. A compatible substance will not interact with the tank system to undermine its integrity or promote its corrosion. While no stored substance is totally inert with respect to the materials of a tank system, compatibility exists when such interaction is minimal and does not result in structural failure or corrosion-related releases during the operating life of the tank system.

Issues of compatibility differ depending on the tank material used. Compatibility with metal tank systems means that chemical and electrochemical internal corrosion is held to a minimum. For plastic

materials, compatibility means that the dimensional, physical, and mechanical properties of the materials are not eroded by the material stored. For tank linings, compatibility means the material stored does not cause blistering, underfilm corrosion, and internal stress or cracking. Compatible materials will not be able to permeate the lining to cause corrosion or deterioration of the tank.

Incompatible substances can attack metallic and FRP tanks in different ways. The interior of metallic tanks can be subjected to various corrosive attacks. The stored substance or impurities within it may be corrosive agents, or either one may act as a catalyst enabling the other to corrode the tank. Corrosive processes are themselves complex. In certain cases, the process is self-limiting, because an oxide film is deposited over the corrosion site and prohibits further corrosion. In other cases, the oxide film may enhance the corrosive process. Also, agitation caused by inflows or outflows may dislodge the film.

Incompatible substances subject plastic tanks to physical deterioration in several ways. Incompatible substances may chemically react with and alter the mechanical properties of the tank system, resulting in structural failures. Solvation, a process in which the stored substance is absorbed into the plastic tank, may cause the tank material to warp, soften, weaken, or become brittle. Also, the stored substance can interact with the tank while the tank is under stress, as when under a heavy load, to produce environmental stress cracking. In this way, an incompatible substance can initiate cracks that could lead to structural failure.

Trace impurities can also cause incompatibility. For example, a few parts per million of chloride in solution can quickly break down a protective oxide layer on stainless steel and lead to corrosion. Also, while hydrochloric acid is compatible with polyvinyl chloride, trace levels of benzene will allow the HCl to deteriorate a PVC tank or pipe.

EPA's review of available information concerning the causes of releases indicates that incompatibility is not frequently reported as a cause of releases. In fact, incompatibility was not even listed as a cause of releases in several analyses. Available data further suggest that most petroleum products stored in underground tanks—the major portion of the UST regulated community—are compatible with most of the common tank and pipe materials available. However, EPA does have information on releases caused by the incompatibility of hazardous substances with tank system materials.

Two situations require owners and operators to address the issue of compatibility. First, adequate care must be taken in the initial match of tank and pipe material to stored substances. Second, owners and operators must carefully consider the use of existing tanks for substances other than those originally stored. It is conceivable that a lack of care in ascertaining the tank or pipe material could lead to the storage of an incompatible substance.

Also, it has been suggested to EPA that additives to substances may be altered over time and cause future compatibility problems. For example, alcohol blends in gasoline may have harmful effects on FRP tanks. However, the Agency has not been able to document any instances of releases due to this type of incompatibility. The increasing use of fiberglass tanks by many of the major oil companies may mitigate against the use of new additives that could undermine the structural integrity of FRP tanks.

b. Current Practices

Industry groups, such as ASTM, NACE, and UL, have established tests and criteria for evaluating different aspects of compatibility. Many of these are tests of physical properties evaluated before and after the material is placed in contact with the substance to be stored. If the property change is within prescribed limits, the substance is said to be compatible. Different tests of compatibility can be chosen based on the substance to be stored, tank material, and environmental conditions of the site. Because of the variability in these factors, no compatibility test applies to all circumstances.

Tank manufacturers generally take responsibility for disseminating information on their tank's or pipe's compatibility with various substances. Manufacturers will also test a potential customer's substance to ascertain compatibility or, in the case of FRP, to design a customized compatible resin. Some FRP tank manufacturers have extensive R&D programs to develop new resins resistant to specific substances.

Of 22 state and local UST programs that were evaluated, 8 specifically address compatibility through a general requirement that all tank owners and operators use compatible materials and substances. In addition, 15 states base their UST regulation in large part on one industry code—National Fire Protection Association 30—and reference it as a general performance standard. NFPA 30 requires compatibility between the stored substance and the tank material.

Under Subtitle I, the Interim Prohibition requires all new tank systems to be compatible with the substances stored. As stated in "The Interim Prohibition: Guidance for Design and Installation of Underground Storage Tanks," EPA expects new tank system owners and operators to work with manufacturers to ascertain compatibility.

c. Approaches to Regulation

One of several approaches to compatibility that the Agency considered would require specific test protocols for compatibility. However, available information suggests that because no one compatibility test or set of tests would adequately cover all circumstances, such an approach would not be appropriate.

The Agency also considered a requirement that all tank owners and operators test for compatibility before placing the substances in the tank system. However, the compatibility of many substances is already well known and thus requiring all tank owners and operators to conduct compatibility tests should not be necessary.

The Agency also considered a requirement that tank owners and operators certify compatibility, particularly at existing tank systems which have had new or different substances introduced into the tank system. As mentioned above, this has been raised as a concern with respect to changes in gasoline blends that are stored in FRP tanks. There is also concern regarding the introduction of new substances into existing tanks where the precise nature of the tank material or lining is unknown. The Agency solicits comment on this issue and on whether some type of compatibility certification is necessary or appropriate for addressing such concerns.

d. Proposed Regulation

The Agency believes that the existing mechanisms for establishing compatibility are generally adequate and do not need to be improved by regulation. Manufacturers have taken the lead to demonstrate compatibility as an outgrowth of their desire to sell their equipment. Established test protocols are adequate and accurate for their intended use. As a result, today's proposal represents no change from the Interim Prohibition.

Today EPA proposes a performance standard requiring all tank system owners and operators to ensure the compatibility of the tank or piping with the regulated substance stored. EPA

believes this simple approach is sufficient given the minor role incompatibility appears to play in release incidents.

With this approach, the Agency intends to allow significant flexibility for state programs, while establishing a simple basic performance standard that prohibits any deterioration of any tank system due to incompatibility.

EPA expects that this standard will be easily satisfied by the regulated community. Compatible tank and pipe materials are well known and are already widely used to store the bulk of the substances regulated under Subtitle I. When new substances are to be stored in existing tanks or when new tanks are to be used for "unusual" substances, the Agency expects the owners and operators to take steps to ensure compatibility. These steps may include simply checking with the manufacturer, requesting the manufacturer to show compatibility, or commissioning compatibility tests.

A precaution that EPA has considered adding to this proposed rule is a requirement that all fill ports on new UST systems be equipped with a collar label that would provide information regarding the products which can be safely stored in the UST. This rule would require the owner and operator to check the collar prior to inserting a new product into the tank. The Agency is concerned, however, that it would be difficult to provide both complete and accurate information in such a condensed form. EPA solicits comment on this and other approaches of ensuring that all stored substance is compatible with the UST system.

4. Repairs Allowed (Section 280.33)

a. Overview

The repair of an existing bare steel tank typically involves the correction of deficiencies in the tank: repairing broken seams and welds, plugging corrosion-related holes, and applying an interior lining to extend the useful life of the tank. The application of the lining is an integral part of the repair process and consists of the application of a protective material to the entire interior surface of the tank. Pipes, fittings, and joints are not normally lined as part of this process due to the difficulty of applying the lining material in such confined spaces.

An existing steel tank is lined for two reasons: To provide additional internal corrosion protection and to repair tank systems that are not tight. In both cases, the lining is applied to extend the useful life of the tank.

Internal lining of a existing steel tank is a retrofit method that has been employed since the 1950s. (Both steel and FRP tanks can be lined internally provided they meet basic structural integrity requirements.) The American Petroleum Institute Bulletin 1631, "Recommendations for the Interior Lining of Existing Underground Storage Tanks," states that the following minimum standards must be met before a steel tank can be repaired:

- A tank may have no open seam or split more than 3 inches long;
- A tank may have no perforation larger than 1.5 inches in diameter, except under the gauge opening where the perforation may be no larger than 2.5 inches in diameter;
- A tank may have no more than 5 perforations (all less than 0.5 inches in diameter) in any one square foot area;
- A tank may have no more than 20 perforations (all less than 0.5 inches in diameter) in any 500 square foot area;
- Before measuring the diameter of perforations and the length of seams and splits, these openings must first be reamed until their edges are a minimum of ⅛ inch thick; and
- If any of these criteria are not met, the steel tank should not be repaired and lined. Tanks not meeting these criteria may not be structurally sound and should be closed permanently.

Usually FRP tanks are patched, rather than lined, with fiberglass matting and resin. For FRP tanks, the interior diameter of the tank should not have compressed more than one percent from its original measure in any direction. Tanks that have compressed more than one percent may be in danger of eventual failure and should not be patched. Patching is unable to provide the added structural support needed for such tanks.

b. Current Practices

Eight of the 21 states with regulations addressing tank repair refer to API 1631, the Uniform Fire Code, or similar guidelines. These guidelines include sections on tank purging, lining selection, tank manways, tank interior preparation, lining application, and tank sealing.

Currently, the Western Fire Chiefs Association is evaluating a proposal to eliminate from the Uniform Fire Code (UFC) the option of lining underground tanks in place. EPA plans to track the outcome of this proposal, and monitor industry efforts to develop improved recommended practices and concensus codes for tank repairs in response to the UFC proposal. The final rule may differ somewhat from today's proposal as the consensus codes upon which they are based may be changed in the near future.

A few companies account for over 99 percent of the services associated with lining of steel underground tanks in the United States. Contractors throughout the country are affiliated with these companies and perform tank lining according to the parent companies' stringent specifications. When the lining is installed in accordance with company specifications, it comes with a 10-year limited warranty against internal corrosion and defects in the lining materials.

Although the cost for removal and replacement of tanks is often significantly higher than the cost of lining a tank, tank owners and operators must evaluate this specific requirements based on operational needs and the technical feasibility of upgrading the existing tank.

c. Approaches to Regulation

One possible approach to repairs would be to prohibit any tank system repairs. If a tank system were found to be leaking, it would need to be replaced, or closed in accordance with applicable closure procedures. This regulatory option appears to be inappropriate because EPA has no definitive data to indicate that tank repair, if performed properly, does not work, and because a number of states currently permit tank repairs in their regulations. In addition, the choice of this regulatory option would prevent the use of an approach that may be particularly attractive to small businesses and which are able to make technically sound repairs to their existing tanks.

Another approach would be to allow unlimited repairs to the tank and its associated piping. This approach does not appear prudent because a tank system that leaks more than once indicates a propensity for failure that, given the consequences to the environment, is not worth risking.

In addition, the lining of pipes, joints, and fittings is not a viable method of repair. Wrapping or coating the leaking joint or section of pipe may under field conditions actually cause increased corrosion problems due to trapped moisture or incorrect coating application. It is typically more effective and less expensive to replace the leaking joint or section of pipe.

d. Today's Proposal

Today's proposed regulation diverges somewhat from the regulations for hazardous waste tank repairs. Under the Subtitle C regulations, repairs to existing hazardous waste tanks are allowed only

if they are extensive enough to constitute complete upgrading to the new tank standards (i.e., secondary containment). The system must also be tested and its integrity certified before it can be put back into service. A goal of the Subtitle C regulations is to replace or upgrade all tank systems with secondary containment as soon as possible, focusing first on leaking and old tanks.

Due in part to the size of the regulated community and other reasons discussed above in Section V, the Agency has decided to propose a rule for Subtitle I tank systems following a strategy that calls for an upgrading of all UST systems to new tank standards within 10 years. As described below, today's proposed repair regulations require upgrading to meet the corrosion protection provisions for new tank systems. Additionally, as in the Subtitle C hazardous waste tank rules, today's proposal requires that the integrity of tank systems must be tested before the system can be returned to service.

EPA believes that technically viable tank repairs should be an option available to tank system owners and operators. The approach proposed today in § 280.33 allows a one-time repair of tank vessels, if it can be accomplished in a technically sound manner, but requires the replacement of leaking sections of pipe, pipe joints, and fittings (if tightening joints does not stop the release). EPA decided to allow the tank repair process as a viable means of extending the useful life of an underground tank because many state and local regulations currently allow non-tight UST systems to be repaired, and acceptable industry recommended practices exist that, if followed, should extend the life of a tank appreciably and reliably. At present, EPA has no information to indicate that tank repairs conforming to API 1631 recommended practices are not effective or feasible.

On the other hand, repeated releases from the same tank are indicative of a fundamental problem in the tank system that most likely could not be rectified by continued repair. In addition, the repair of an already lined steel tank would require that the interior of the tank be sandblasted down to bare metal to allow the proper application of the new lining. This does not appear feasible and supports the proposed requirement that UST systems be repaired no more than one time.

The proposed approach also requires that some type of corrosion protection system must be retrofitted at the same time a steel tank is repaired/lined for failure due to corrosion. A tank that has failed due to corrosion will likely suffer additional corrosion following the repair/lining operation, unless this step is taken. According to API, bare steel tanks normally should be protected using an impressed current system, because this system can adjust voltage requirements for any tank-to-soil potential differential. Coated tanks may be protected using either the impressed current or sacrificial anode type of protection system provided that the coating is in reasonably good condition and still provides corrosion protection for the tank. Comment is specifically invited regarding this retrofit requirement for corrosion protection.

The proposed regulatory approach (in § 280.33(a)) for the repair of existing UST systems allows owners and operators to repair and line a tank to stop the tank from leaking or to extend the tank's useful life only if the person repairing the tank, or an independent registered professional engineer, will certify in writing that the repaired tank meets the following conditions:

- It passed the vacuum test with no adverse impact to the lining, determined by an internal inspection after the test;
- The liner material chosen is fully compatible with the contents to be stored in the tank;
- The tank has not been repaired or lined previously;
- A corrosion protection system is retrofitted if the tank being repaired is a steel tank that failed due to corrosion; and
- The tank was internally inspected and ultrasonically tested and determined to be structurally sound.

The use of the vacuum test proposed today (Section 280.33(d)) simulates a greater external pressure on the tank than would be found under normal operating conditions. A tank that is not properly relined (for example, if holes were not plugged or the surface improperly prepared) could not withstand the pressure of the test. Either the lining would not adhere or the tank could not hold the vacuum. A tank that is not structurally sound also would not hold the vacuum and could buckle.

EPA believes that immediate tank tightness tests are inappropriate for determining the success of repair procedures. Such tests cannot ascertain whether the lining material has properly bonded to the steel. In addition, tank tightness tests require tanks to be at least partially filled with product. EPA believes the owner and operator should know that the repaired system will hold product before introducing product into the system. Today's proposal (Section 280.33(f)) does require a tightness test within a year after the installation is completed. EPA believes that such a test is an important quality assurance test, if it is applied after the repaired tank has been subject to typical operating stresses for a sufficient period of time. A tightness test is unnecessary if the tank has interstitial monitoring or continuous to frequent monitoring because a repair failure will be quickly detected.

The owner and operator must replace all leaking pipes. The proposed regulations will not allow piping to be repaired (Section 280.33(e)). Leaking joints could first be tightened to see if this procedure corrects the leak. Joints and fittings that continue to leak after being tightened, or that are obviously damaged, must be replaced. The replacement piping must be installed in accordance with § 280.20, the performance standards for new UST systems.

5. Recordkeeping

a. Overview

Under the proposed regulations, recordkeeping is an important compliance tool for both owners and operators of UST systems and regulatory agencies. Records demonstrate that certain important past actions actually took place. When properly maintained, records can also serve to remind the owner and operator of regularly scheduled actions that must be performed in order to remain under warranty or within regulatory compliance. Finally, properly maintained records also allow later analysis of the tank systems by either the owner and operator or the regulatory agency.

Given the size of the regulated UST community, resources are not available that will allow a regulatory agency to physically inspect each major event as it occurs throughout the life of every underground tank system (for example, installation, release detection, repair, and closure). The availability of proper records, therefore, is the essential track record that allows the regulatory agency to gain rapid insight into the status of compliance at facilities when they are inspected.

b. Current Practices

Existing state and local regulations governing underground storage tanks address recordkeeping to some degree. Many of them have relatively comprehensive requirements. The most prevalent records required in state regulations involve notification, release detection, closure, operation and maintenance of corrosion protection systems, and tank system repair.

All existing programs that require release detection also require the maintenance of records for release detection. Daily recordkeeping of product inventory is usually required, including the amount of sales, deliveries, inventory on hand, measurements of water level in the tank, and reconciliation of any losses or gains. More than half of the programs examined require recordkeeping with other methods of release detection, including data derived from monitoring well samples, visual inspections, in-tank monitors, and interstitial space monitoring for double-walled UST systems.

Many of the regulations also address recordkeeping for tank closure. For example, temporarily out-of-service UST systems are normally subjected to the same recordkeeping requirements as operating tanks. Several regulations require documentation of temporary closure. Records of permanent tank abandonment or removal are also mandated. Usually, this includes record of the closed UST system's capacity, age, specific location at the site, as well as the date and method of closure. A few programs require recording of key closure information on the property deed as well as documentation concerning the disposal or reuse of permanently closed tanks.

Existing regulations often require maintenance of records for tests or checks of various system operations. Specifically, results of cathodic protection and leak detection system operational checks are to be recorded. In addition, records of the most recent tank and piping tightness test results must be maintained. Finally, results of maintenance service checks on corrosion protection, leak detection, and other system components are sometimes recorded.

Most state and local regulations require records of repair and/or substantial modification of tank systems. These records may include certifications from lining installers or repair contractors. In addition, certifications from the original tank manufacturer that a particular tank can be reused following repair are common.

Normally, the state regulations specify a minimum period of time for which tank system records must be maintained. This period varies from 1 year up to 6 years, with the majority of existing regulations specifying 3 years.

c. Approaches to Regulation

The regulatory approach to recordkeeping proposed by EPA today follows directly from the technical standards set out in today's rule. Although EPA could require owners and operators to adhere to the technical standards proposed today with minimal recordkeeping requirements, this approach would result in numerous implementation problems, if not making it completely impossible to determine whether individual UST systems are in compliance with these standards. EPA is convinced that there are several recordkeeping requirements that are essential and will serve both the regulated community and the implementing agency's mutual interests in assuring proper UST system management. These records will prompt effective UST system management and will demonstrate to the regulatory agency that the owner and operator are managing each UST system in accordance with the technical standards.

Accordingly, EPA believes that some recordkeeping is necessary in support of the technical standards for release detection, closure, operation and maintenance of corrosion protection systems, and UST system repair. Today's proposed recordkeeping requirements are intended to impose the minimum burden on the regulated community while at the same time still ensuring that owners and operators can demonstrate (on a site visit by the implementing agency) proper management of their tank systems. These requirements were not developed to ensure that compliance can be demonstrated over the total operating life of the facility; records demonstrating such long-term operational compliance were deemed unnecessarily burdensome. Given the enormous size of this regulated community, today's proposed recordkeeping requirements are instead intended to demonstrate recent compliance status prior to the on-site inspection by the implementing agency. In proposing these minimum requirements, EPA recognizes that state and local governments may want to augment them with more recordkeeping requirements as specific local conditions dictate.

Today's proposed rule sets forth recordkeeping requirements for release detection, closure, operation and maintenance of corrosion protection systems, and tank system repair. The recordkeeping requirements for release detection and closure are discussed later in this Preamble, where the corresponding technical requirements are described. Following is a discussion of the specific recordkeeping requirements for repairs and operation and maintenance of corrosion protection, and the general requirement that records be properly maintained and made available upon request.

(1) Corrosion Protection Operation and Maintenance Records (Section 280.31(d)). To assure continuing compliance with the performance standards in proposed 280.31 concerning the maintenance of corrosion protection at steel UST systems, all owners and operators with cathodically protected UST systems must retain records of recent maintenance service checks performed by a corrosion expert as well as inspections of each impressed current system s running condition by the owner and operator. The recordkeeping requirements in this area reflect the operation and maintenance standards proposed in 280.31. Thus, for field-constructed cathodic protection methods using impressed current, the results of the last three bi-monthly inspections must be available. For field constructed methods using anodes, the results of the last two annual service readings must be kept. At UST systems using premanufactured (and applied at the factory) corrosion protection under the tank warranty, the last service check conducted under the tank warranty, but completed no longer than five years ago, must be kept. Each of these requirements for recordkeeping were developed to reflect the level of oversight EPA believes is necessary to ensure corrosion protection is operating continuously and being properly monitored. For example, under today's proposal, the premanufactured cathodic protection systems for tanks require less frequent service checks and correspondingly less recordkeeping to ensure compliance with the operation and maintenance requirement. EPA expects that many corrosion protection systems will have at least annual service checks performed (and thus could have two service records under this proposed requirement) because cathodic protection for steel piping must be constructed in the field and is not available in a pre-manufactured form.

(2) Tank Repair Records (Section 280.33(g)). Also proposed today is a requirement that all owners and operators with repaired tanks retain a record that demonstrates the repair was properly conducted as required under 280.33. The certification of the repair required in 280.33(a) must be kept for as long as the tank is used for storage. Also, the results of the ultrasonic tank thickness test required by 280.33(a)(3) and the vacuum test required by 280.33(d) must also be retained for as long as the tank is used. These records are the minimum necessary to show

compliance with the 280.33 requirements.

No records of piping repairs are required because faulty piping and fittings cannot be repaired; they must be replaced in accordance with the new tank standards. Records concerning the repair of tanks must be kept for as long as the tank is used because it can only be repaired once, and a record of repairs will provide the owner and operator and implementing agency with the information that will ensure that more than one repair is not made and has been done properly.

(3) Maintenance and Availability of Records (Section 280.34). Today's proposal includes a provision that requires all UST system owners and operators to cooperate fully with the implementing agency by making all records immediately available regarding inspections, monitoring and testing results, and by complying with requests for document submission, testing and monitoring. This requirement stems from section 9005 of RCRA.

Also proposed is a provision that requires all the records required as part of the UST system standards be maintained either on-site and be available for immediate inspection, or at a readily available alternative site and be available for inspection upon 24 hours notice. This provision is intended to avoid unnecessary delays in determining compliance with today's proposed requirements during inspections. Most of the time, the Agency anticipates that all required records will be maintained on-site and therefore must be immediately available for inspection. However, the Agency recognizes that the maintenance of records on-site is not always possible at all sites. Therefore, if such records are stored off-site they must be available for inspection within 24 hours after the implementing agency provides notice to the owner and operator. This notice may be provided before an inspection takes place to make sure the records are available during the inspection.

(4) Issues for Public Comment. The Agency requests comment on today's proposed recordkeeping requirements. EPA also requests comment on the need for additional recordkeeping requirements. One type of record that the Agency considered requiring at all new UST systems in today's proposal is a site plan. This plan would show locations for the tank system components and would be useful for investigating suspected releases and for checking compliance. Several states now require site plans. The Agency did not include site plans for today's proposed recordkeeping requirements because of a number of issues noted below.

Comment is requested on several of the issues related to site plans. One of these issues is what features should be shown on the site plan. The Agency has considered requiring the site plan to show the locations of the tanks, piping, monitoring wells and other underground structures in the excavation area. A second issue is the level of detail that should be required. It has been reported to EPA that most tank installations are completed without engineering drawings. However, the installer could draw a schematic showing critical dimensions before closing the excavation. A third issue is whether the site plan should be submitted as part of the notification form or retained by the owner or operator at the tank site. The fourth site plan issue that EPA is requesting comment on today is whether the site plan should be retained for the life of the facility or some shorter period of time. EPA requests comments on these specific issues and on the advisability of including site plans as a part of the final recordkeeping requirements.

D. Release Detection

1. General Strategy

a. Overview

As discussed in Section V of today's Preamble, EPA has concluded that early detection is necessary to minimize contamination of soil, ground water, and surface water from underground storage tank system releases. Records from past release incidents indicate that, without the use of release detection, a release can become substantial before it is detected. In fact, the *Summary of State Reports on Releases from Underground Storage Tanks* notes that most release incidents were first detected by people seeing, tasting, or smelling the released material in the environment. To adequately protect human health and the environment, releases need to be detected well before they have become easily noticed through the basic human senses.

Several release detection methods are now available that can be used to detect releases before they have adverse impacts on human health and the environment. These methods range from periodic precision tests for tank tightness to continuous tank monitoring instruments. They vary widely in sophistication. Any method includes at least one sensor, a design that assures collection of data from any point in the tank system, and a data analysis capability to interpret results. (The variety of technologies available is described in detail in the sections below.) EPA believes that widespread implementation of release detection methods will result in more effective environmental protection. Several states and local communities implementing various approaches to release detection for UST systems are already recording a dramatic increase in the number of releases being detected. EPA is today proposing to allow several methods that, properly used by UST owners and operators, can quickly detect releases.

b. Current Practices

Release detection has been practiced as a voluntary activity by UST owners and operators only to a very limited degree in this country. They have mainly used the traditional methods of product inventory control and tank tightness testing. The *Summary of State Reports on Releases from Underground Storage Tanks* indicates that, for those incidents reporting a release detection method, about 20 percent of the releases were discovered as a result of inventory control and tank tightness testing. Most of the others were detected through inadvertent human observation (sight, smell or taste).

As a result of the limited use of release detection at existing UST systems, there is very little information concerning how to conduct release detection. Unlike many of the other aspects of proper UST management, recommended industry practices and consensus codes are not yet well established. Thus, a significant factor that has been recognized by EPA during the development of today's proposed approach towards release detection is the lack of industry consensus codes, recommended practices and guidances, and experience with release detection at UST systems.

The National Fire Protection Association's (NFPA) publication, "Recommended Practices No. 329: Underground Leakage of Flammable and Combustible Liquids, 1985," is one of the few documents presently available for use by UST owners and operators and state and local regulatory agencies as a source of guidance for appropriate release detection methods. NFPA 329 gives recommended procedures for the investigation, confirmation, abatement, and remediation of underground releases of petroleum products.

The most widely recognized information from NFPA 329 concerns its performance standard for a "precision test" (i.e., tightness test) that may be used to determine whether a tank is leaking. It defines a precision test as "any test that takes into consideration

the temperature coefficient of expansion of the product being tested . . . and is capable of detecting a loss of 0.05 gallons per hour." The recommendation that tank tightness testing be capable of detecting leaks as small as 0.05 gallons per hour was established over 40 years ago. It was based on performance NFPA believed could be achieved. However, in actuality, the standard is a goal that no one has yet demonstrated can be reliably met. NFPA 329 provides no guidance on how to meet this goal, but does describe several important variables that must be taken into account in conducting accurate tank tightness tests.

Although many state and local UST regulatory programs are just beginning to require release detection of various types, several of these programs suggest different possible regulatory approaches towards release detection that EPA could take. These programs often provide several methods for UST owners or operators to choose from in implementing release detection requirements. Some of the most common of these methods are tank tightness testing, inventory reconciliation, and monitoring wells. These methods are briefly discussed below.

Many states and local governments have adapted requirements for tank testing. Tank testing requirements generally build on NFPA 329. That is, the tightness testing techniques utilized must satisfy the requirements of NFPA 329 and be performed on a schedule or frequency set by the implementing agency. More than half of 23 states that were evaluated and determined to have enacted or promulgated UST regulations refer to NFPA 329. Seven other state and local regulations also incorporate the 0.05 gallon per hour detection requirement found in NFPA 329. In general, the frequency of the testing required by these programs increases with the age of the tank system.

Manual inventory control is the most commonly cited form of release detection in existing state or local regulations. Inventory reconciliation attempts to account for all product additions and removals in the operation of the UST system. The required frequency of the inventory control measurements and reconciliation varies, but all of the regulations that were reviewed by EPA identified the use of inventory control methods for release detection purposes. Several of the regulatory agencies require a more sophisticated form of inventory control, often referred to as in-tank monitoring.

Monitoring wells are another common method of UST release detection addressed in state and local regulations. Releases may be detected either by continuous or intermittent automatic sensors placed in the wells or by periodic manual sampling and analysis. Monitoring wells may be placed in the excavation area around the tank or within secondary containment. Generally, if secondary containment is used, a single monitoring well placed in a collection sump is considered adequate. The number of wells required by state and local programs, if no secondary containment is provided, ranges from two to six per UST site.

Also, various techniques exist for release detection within the walls of a double-walled tank. Manual (or continuous automatic) devices can be used to detect the presence of liquids or vapors, or changes in pressure or the level of liquids within the interstitial space between the walls.

EPA has noted that there sometimes is a difference between what particular state or local regulatory agencies require by regulation for release detection and what they actually implement or enforce. In some state and local jurisdictions, the regulatory agencies have been able to accomplish a higher level of control than that set forth in their regulations. In others, typically because of a lack of sufficient personnel, training and funds, the regulations have not been widely enforced. In addition, the quality control aspects of these regulatory programs are difficult to assess. For example, when a tank tightness test is currently performed on an existing tank, it is difficult, if not impossible, for the regulatory agency to verify the results. Thus, the impact of these new regulatory programs is not clearly established. However, EPA's study of local UST programs reveals that where release detection is being required, significant increases have occurred in the number of USTs found to be leaking.

A rapid increase in the development and implementation of many state and local UST regulatory agencies, as well as the development of the federal program, has spurred an increasing level of research and development of release detection technologies related to UST systems. For example, the American Petroleum Institute has recently prepared guidances concerning the use of monitoring well techniques and automated in-tank monitoring methods. Development of new release detection methods, often relying on sophisticated electronics, has also resulted in the formation of several new companies offering tank system testing. EPA has identified at least 250 different devices under development or already commercially available, primarily for use in release detection at petroleum UST systems. Presently, several of the release detection equipment manufacturers offer training programs for operators who purchase their systems. These training programs are usually short (at most five days) and may not have the time to adequately instruct the operators in both the theory and practice of tank system testing. Many new systems have circuitry that allows the integration of alarms and control equipment. The reliability of these new developments and of sensors, network design, and data analysis capabilities and performance has not been tested by long-term operation. Further, maintenance and quality assurance/quality control (QA/QC) programs are frequently not well developed.

The increasingly widespread availability and untried nature of these newly developed technologies, and the anticipated development of even more techniques, presents an additional challenge in generating release detection regulations for UST systems. As noted in the discussion of state regulations, a common approach is to allow the tank system to be equipped with one method from a list of release detection alternatives. However, as the number of available techniques increases, it becomes more difficult to provide quality control for the application of the various methodologies. Another approach taken by several states is to require the approval of various release detection methods on a device-by-device basis. This approach presents difficulties to an implementing agency because of the large number of sites that must be evaluated independently. The following section discusses the general regulatory approaches to release detection considered by EPA.

c. Approaches to Regulation

In developing today's proposal the Agency identified and evaluated the following different approaches towards establishing national requirements for release detection at UST systems. These approaches would establish fundamentally different roles for the federal government, state and local implementing agencies, and industry, by having each of these groups play a central role in one of the approaches:

• *General Performance Standard.* EPA would establish a release detection performance standard that would apply to all methods. The standard would require a detectable quantity (e.g., an amount leaked or a leak rate), a frequency of testing, a probability of detection, a probability of false alarm,

and a relationship of the detection limit to tank size. This approach would allow maximum flexibility (and responsibility) to industry to choose the reliable methods of release detection. EPA would provide technical guidance on designing, selecting, installing, and operating release detection;

• *Certification of Methods.* EPA would allow only release detection methods that have been approved by EPA. Approved methods would have to be backed up by specific procedures for installing, operating, and maintaining them, as well as by requirements for quality assurance/quality control and installer or operator qualifications. EPA would establish some measure of performance upon which to approve methods; or

• *Method-Specific Performance/Requirements.* EPA would establish requirements concerning the use of individual classes of methods of release detection and their performance. The underlying performance of the different methods could vary depending on the effectiveness and reliability inherent in each method.

Each of the above approaches requires that EPA establish acceptable performance standards for release detection. There are two ways to establish such standards of performance. The first is to specify a standard based on a predetermined size of release or release rate that is expected to pose a threat to human health and the environment. Once this unacceptable level of release is established, setting performance standards for release detection is somewhat simplified. Unfortunately, this approach towards standard-setting does not appear to be possible at this time because: (1) Determining the size or rate of an unacceptable UST release should be site-specific, and (2) the Agency's present level of knowledge as to the rates, sizes, and the development of typical releases from UST systems is insufficient to know whether a particular standard of performance would result in most releases being detected before they posed a threat to human health and the environment. The second approach towards specifying performance standards is to base them on the technological limits of release detection and require them to take place at a minimum within these limits of current technology. The release detection standards specified in today's proposal are based on this second approach to standard-setting. The Agency selected this approach recognizing that the performance limits of various methods of release detection are not equally understood.

Because some methods of release detection (such as in-tank volumetric release detection systems) are presently better understood than others, EPA considered setting minimum standards based on the performance of the better-known devices. However, today's proposal rejects this approach in order to avoid prematurely excluding the use of many other potentially viable—but less understood—methods. For example, some out-of-tank release detection methods offer significant potential for detecting even small releases, are in common use, and are an integral part of many local and state programs. While the precision of some of the sensors used in these methods are well known, the impact of environmental sources of interference that limit accuracy is not yet well known.

The standards being proposed today for each method of release detection are based on EPA's current limited understanding of the present technologies. Preliminary evidence from EPA's research program suggests that some of these technologies may become more refined and reliable in the future. Therefore, while the Agency wants to set a standard that would challenge present technologies, there is also a practical need to develop a rule that does not go too far beyond the reach of current practices. The available data suggests that there already is a significant number of leaking UST systems. Thus, EPA believes a program of regular release detection—even at a minimum performance level that is not as good as may ultimately be possible—will significantly reduce threats to human health and the environment. With this in mind, EPA is setting different requirements for different classes of release detection methods. The discovery of releases identified simply through the initiation of this release detection program is expected to provide significant benefits nationwide.

If EPA were to set a general performance standard for all methods, such a standard should require that the performance of the release detection method, along with the frequency of the testing, be specified. The standard should include:

- An amount released or release rate;
- Probability of detection;
- Probability of false alarm; and
- Frequency of test.

This four-parameter specification defines the limits of the threat to the environment and the confidence with which these limits can be met. For example, if the detection limit is expressed as a release rate, the relationship of the detection limit to tank size, should also be stated. Selection of this approach, along with the specific values for each parameter, requires the knowledge that each general class of detection can be understood in terms of these parameters and can perform up to or better than each value set by EPA. EPA does not believe that the data required to specify such a comprehensive standard is sufficiently complete for most methods of release detection and is concerned that such an approach may preclude the use of many methods of detection that will not be understood in this way for the foreseeable future.

Today, EPA is proposing a method-specific performance requirement approach to release detection. For certain classes of methods, EPA is proposing specific standards for the four parameters described above. For other classes of methods, EPA determined that it had insufficient information to specify such standards. The following discussion provides details of the alternatives considered and the rationale for selecting the proposed approach.

Approach 1—General Performance Standard. Using this approach, EPA would require release detection at all UST systems and would establish the same release detection performance requirement for each method, but would not specify the particular methods that are acceptable or unacceptable. The general performance standard would specify a complete four parameter performance standard (i.e., the amount of release within a specified period of time that must be detectable by any method used with specified probabilities of success and failure). The choice of appropriate technology would be left in the hands of state and local regulators, the regulated community, and the vendors of release detection methods. EPA would periodically report on the results of numerous ongoing research efforts and provide guidance that would assist state, local, and industry officials in implementing the release detection requirement. As technology and the knowledge of performance capability evolves, the Agency could revise the general performance standard to reflect the then current state of the release detection art.

This approach has several advantages. First, all methods would adhere to the same standard and would be required to equally protect human health and the environment, and the relative performance of all the methods could be directly compared when

enough information is developed to allow it. Second, by simply specifying a general performance standard, this approach provides the greatest flexibility to UST owners in selecting and implementing their preferred method. Third, the Agency could develop such a rule fairly quickly and it could challenge the vendors of the different methods to develop more performance-oriented test data to show they could meet the general standards.

This approach has some disadvantages. Selection of a general performance standard may preclude the use of promising types of release detection (an outcome that EPA cannot predict and does not deny). This approach also requires that the capability of release detection technology, and the impact of an uncontrolled release, be known. Any standard defined today would have to be based primarily on the current performance of volumetric tank tightness tests because they are the best understood of the methods currently available. It is also uncertain under this approach how the performance of other methods could be compared to such a standard. Further, as knowledge of all the methods increases, future revision to a general performance standard developed based on today's limited data could result in some confusion and implementation difficulties in the regulated community and the states (who would have to revise their programs and reassess methods of detection to keep up with these changes).

A major problem in specifying a single release detection rule is that a "typical" quantity of product released at the tank is not easily related to the quantity-of-material measured by some methods of release detection especially most out of tank leak detection methods. A detectable quantity, may be expressed as a release volume rate (most easily defined for in-tank release detection systems) or as a concentration of soil contamination in ppm (most easily defined for external release detection systems). A single performance standard would require that the relationship between the release rate and concentration of soil contamination be quantified. In-tank measurements provide the most direct measure of a leak and can, in principle, identify a leak before any significant product is released into the environment (provided the test is conducted frequently and release exceeds the threshold of the test). The product level measurements can be quantified in terms of flow rate, and the performance of the release detection systems is reasonably well known. In practice, tank tightness tests are not performed as frequently as desired because of their impact on dispensing operations and cost. The automatic product level methods can be applied more frequently than tightness tests and thus could at least partially alleviate this problem. Data available to EPA on these methods, however, suggest that they may be less sensitive than some methods of tank tightness testing. Out-of-tank release detection methods can be operated continuously or frequently without affecting dispensing operations, but it may be necessary to calibrate monitors at each site to interpret a measurement as a rate of leakage. A further difficulty is that the performance of these out-of-tank monitors is not well known, and regulated substances may be released in significant quantities in the environment before a release is detected.

Under this approach, EPA would specify a four-parameter performance standard applicable to all classes of release detection methods. The standard considered by EPA for this purpose is the one specified today for tightness test devices; this standard was considered because: (1) The capability of tank tightness testing is the best known; and (2) this standard would challenge vendors to improve their knowledge of the capabilities of these and other classes of methods. EPA lacks sufficient data, however, to ascertain that the in-tank parameters are achievable by all other classes of methods. Moreover, EPA's research necessary to establish the technological limits of performance for each class and an evaluation of these systems will not be complete before final rules are written. Alternatively, EPA could eliminate those methods of release detection for which information is incomplete in the proposal, but did not, because it wants to maximize the number and variety of detection systems available for use.

If EPA selected this approach, each manufacturer of a release detection method will eventually specify the precision and accuracy of its methods in terms of the four-parameter test description. This performance data is needed for owners and operators to make environmentally protective and cost-effective choices. Of particular concern to EPA is how the performance of non-volumetric methods can be measured against the volumetric four-parameter standard described in today's proposal for tank tightness testing. Requiring all methods to meet this standard could necessitate on-site calibration each time such a method (e.g., soil gas or groundwater monitoring) is used.

Approach 2—Certification of Methods. Under this approach, EPA would establish criteria and procedures for judging and certifying the various commercially available methods and devices. EPA could review and evaluate methods through these established procedures as well as foster and accept the results of such reviews by independent professional associations capable of doing these certifications (e.g., Underwriters Laboratories or the American Society of Mechanical Engineers). Under this approach, the manufacturers of the various methods could conduct the necessary performance evaluation reviews and submit these results for consideration to EPA or an independent review organization.

Under this approach, a release detection method could not be used until approved by EPA. Thus, unacceptable or questionable methods would not be allowed until demonstrated to be accurate and reliable. This approach provides the clearest direction possible to the tank owner and operator about methods that can be used so that implementation by the regulators would be simple and straightforward.

There are several disadvantages to this approach. The most significant disadvantage is that it would be difficult to implement a certification program rapidly. Such a continuing, affirmative federal regulatory presence would also run counter to the approach being taken to bolster and encourage the lead of state and local programs in all aspects of this program. It would undoubtedly result in significant changes to regulations currently in place at the state and local levels. Based on the experiences of similar approaches taken under other EPA programs, it could take up to two or three years beyond final rule promulgation to begin actually approving devices, thereby delaying implementation of these release detection programs. These delays in program implementation would enable numerous releases to erupt undetected over the next several years with potentially significant adverse consequences to human health and the environment. This approach also would pose significant implementation problems; for example, decisions would have to be made as to which of these devices to review first. The first approved devices would have significant marketing advantages over methods yet to be reviewed.

Approach 3—Method-Specific Performance Requirements. Under the

approach which is proposed today, EPA would establish specific performance standards and a minimum frequency of test for each class of release detection methods. A different performance standard could be specified for each method and performance standards for some classes of methods would not contain all of the parameters discussed under approach 1. Restrictions governing the frequency of each method's use and siting would be specified. The type of performance standards for each general method would depend on the principle of its operation. For example, one criterion for volumetric tank tightness testing would be a minimum release rate, while for soil vapor monitors a minimum detectable concentration may be more suitable. The development of performance standards would be primarily based on data provided by manufacturers and the results of EPA research as well as that of other groups.

This approach is very similar to the first approach but provides performance standards for each specific method rather than establishing one performance standard for all methods. The primary advantage of this approach is that it would set separate standards for each class of release detection methods. These standards could be based on data available to EPA at this time. Also, this approach would allow industry and the states to have significant flexibility about the choice of individual methods that can meet the minimum performance standards. Because certain limitations of use will be necessary to meet this required performance, not all methods could be used in all situations; this would reduce misapplication and incorrect installation of methods.

The primary disadvantage of this approach is that standards of release detection performance will be nonuniform. The standard for one release detection system may be more or less stringent than other systems. Further, individual owners and operators may have more difficulty than under approach 1 in achieving a desired degree of protection. Another disadvantage is that future EPA revisions of specific performance standards to reflect new data could result in some confusion and implementation difficulties in the regulated community and the states.

Under this approach, a four-parameter performance standard can be specified today for tightness test devices, but not for other methods. The parameters selected are believed to be achievable by most in-tank release detection systems that are in current use; although some small modification to current operation might be required. The research necessary to establish the technological limits of performance and an evaluation of these systems will be complete before final rules are written. EPA encourages the developers of release detection systems to strive to detect the smallest leaks possible because the standard may become more stringent with time. The data are available to evaluate inventory reconciliation and EPA may develop a four-parameter specification for this method before promulgating final rules. EPA believes that the data are generally insufficient to specify a four-parameter standard for out-of-tank release detection methods at this time. EPA is conducting research on the performance of these devices but does not expect the results of this research to be available before the rules are finalized. Nevertheless, EPA did not eliminate these methods of release detection in the proposal because it wants to maximize the number and variety of detection systems available for use. Out-of-tank methods have detection potential equivalent to or better than the in-tank methods.

In addition, the out-of-tank release detection methods do not generally measure the rate of leakage; they detect the presence of leaked material. Therefore, an on-site calibration may be required if a four-parameter specification, which is volumetric in nature, is chosen.

EPA expects, under this approach, that manufacturers of a release detection method will eventually specify the precision and accuracy of its method in terms of the four-parameter description. Manufacturers or providers of release detection services will be in the position to furnish the performance data for their method that supports their claims. This information will give each owner and operator information for making cost-effective choices. EPA recognizes that any method of unknown performance has the potential for a significant level of false alarms and missed detections.

Today's proposal was developed to establish release detection standards using this third approach. Although preferable in several ways, EPA rejected the first approach at this time because the Agency did not feel that there were sufficient data to assure that all release detection systems meet a single standard. The Agency was concerned that the first approach (a general performance standard) could, at present, be based primarily on the performance of volumetric test methods, yet would apply to all methods. The second approach (certification of methods) was rejected because of the time delays that would be required for formal certification of adequate release detection. This would reverse the trends towards rapid implementation of release detection that are presently being fostered by numerous state and local programs. The third approach (method-specific performance requirements) is being proposed because the Agency believes that enough information is already available, and will be developed before the promulgation of final rules, to enable the establishment of standards that can in many ways limit possible confusion and abuses that might otherwise occur under the more general approach. This method specific performance standard approach would also avoid the delays associated with trying to certify and approve the various alternatives at the national level. It would still allow states and local governments to continue to take their different paths towards release detection as long as the underlying requirements for the methods are observed. Finally, this approach provides flexibility and choice to the regulated community, and also attempts to foster and limit their search to acceptable uses of allowed methods.

EPA recognizes that the third approach is a subset of the first approach. The Agency believes that, ultimately, a single performance standard that can be met by all classes of methods may be possible. However, this was not possible by time of proposal and must wait until the Agency has a better understanding of the behavior of UST releases and the performance of various methods of release detection. Although EPA is not planning to undertake certification of different methods of release detection, research has already begun, and more studies are planned, that will more conclusively reveal the dependability of, as well as the effect of factors controlling the performance of many different release detection methods. Should EPA decide to finalize the requirements for release detection proposed today, the results of much of this work may be provided in the form of guidances that should prove very helpful to state and local communities and to the regulated community in assessing which methods work best under different conditions. EPA will consider, however, selecting the first approach in the final rule, if sufficient data can be developed from ongoing research and public comment.

EPA has set up a testing apparatus in its Edison, New Jersey laboratory that has already begun to assess the performance of the different in-tank monitors under carefully controlled test conditions. The results of these investigations will be made available to both the owners of these commercially available devices, as well as to the public.

In our Las Vegas laboratory, we have begun an evaluation of out-of-tank monitoring methods of release detection and expect those efforts to provide significant additional information concerning monitoring for liquids or vapors in and immediately beneath the UST excavation area. Awareness of the potential need for external release detection should foster rapid development of new technologies and products for release detection. Because the external release detection industry has a relatively limited history, it has few reference standards and no consistent criteria for evaluating these devices. EPA has chosen to use a series of standard laboratory benchtop test methods and specifications to evaluate important operational parameters such as detectable quantities, specificity, response time, accuracy, and precision. Based on these and other data, EPA could determine the capabilities of each of the release detection devices for each of the four parameters in a general performance standard. EPA will report findings of this research as it is completed. Guidance documents may also result from these efforts.

Public Comments. EPA requests public comment concerning the feasibility of the three general approaches towards release detection standard-setting discussed above. Specifically requested are comments and information concerning:

- The appropriateness of the approach selected;
- The need for uniform performance standards applicable to all classes of release detection methods;
- The validity of the specific values of the four parameters proposed for tank tightness testing if these values were applied in a general performance standard to all classes of release detection methods;
- The appropriateness of specific values proposed for the performance standards required of each class of method;
- The need for a more complete performance standard with respect to certain methods; and
- The concept of making the performance standards more stringent as future research reveals how this can be accomplished.

EPA is particularly interested in research results and release detection performance data which permit the choice of a single four parameter general performance standard applicable to all categories of release detection methods or a better method-specific standard for each category of release detection methods. This information is important given the present state of knowledge about, and the rapid development of, the various release detection technologies.

The relationship between concentrations measured at an external leak detection monitoring point and a leak rate measured within the tank is difficult to develop. Mathematical models or the release of a tracer at a tank and measured by the external monitoring system may be used to estimate the performance of the external leak detection method. The Agency cannot provide at this time further guidance on the development of this relationship. Consequently, comparisons of the performance of tank tightness tests, inventory reconciliation techniques, pipe-line monitoring systems and external leak detection systems are difficult at best. The Agency seeks to develop a common performance standard for all leak detection monitoring techniques. Comments are solicited on how this may be done.

2. General Requirements for All UST Systems (Section 280.40)

Today, EPA is proposing to require release detection for all UST systems. In the following sections of the Preamble, the numerous methods and the performance requirements conditioning their use are discussed in detail. However, no matter which release detection method is chosen by an owner or operator, the Agency believes there are some requirements that must be adhered to at all UST systems to ensure that an adequate and reliable level of release detection is provided. Those general requirements proposed for release detection at all UST systems are briefly discussed below.

a. Capable of Detecting a Release From Any Portion of the UST System (Section 280.40(a)(1))

No matter which method of release detection is used by the UST owner and operator, it must be able to detect a release from all the components of the UST system. For example, release detection must be able to detect releases not only from the tanks, but from the underground piping and equipment. As discussed earlier in Section IV of this Preamble. releases from piping are an important source of the reported releases from UST systems and the definition of UST in Section 9001 includes underground piping connected to the tank. Thus, EPA has proposed in 280.40(a)(1) a general requirement that UST owners and operators use a release detection method that includes consideration of all the UST components. A test of the piping and another test of the tanks separately is one such alternative. If wells, barriers, or secondary containment are used, they must address all the UST system. A combination of more than one method can be used as long as each UST system component is monitored by one of the methods.

An associated concern with the question of the capability of detecting releases is the reliability or dependability of the method used. Even if it does address all the UST system components, it could fail to work and not detect a release. Under today's proposal, each UST system would be required to be monitored by only one method of release detection. Because no one method works perfectly, this will result in some releases not being detected. EPA considered requiring the use of more than one method at each site, and thereby providing a redundancy to the release detection that would provide more assurance that, if a release escaped one failed method of monitoring, it would be picked up by the other method before adverse impacts to human health and the environment could occur. This principle is a feature of the California UST program's approach towards release detection of existing UST systems.

The Agency rejected requiring the use of redundant methods of release detection for several reasons. First, as stated previously, most UST systems presently do not have any release detection, and the more widespread use of at least one method for each site is expected to reduce risks markedly, even if these methods do not work perfectly at all sites. The Agency's new UST system requirements and upgrading requirements for all UST systems (discussed later in this Preamble) are expected to dramatically reduce the number of releases that do occur over time, and the potential adverse impacts associated with any imperfections in particular release detection methods thereby will be diminished. Second, today EPA is proposing to allow the use of different methods of release detection, but only following several requirements that must be met to ensure that they are properly used. These performance requirements are intended to make the detection of releases using a single method much more certain. Third,

it is not clear that if redundant methods are used they will pick up the types of releases that might be missed by the first method. For example, a vapor monitoring method could miss the detection of very small releases. However, the added use of various in-tank tightness tests might miss them also if the releases were very small and below the detection thresholds for this method of detection. Finally, with the exception of requiring inventory controls, most existing state and local UST programs do not require redundant monitoring programs at UST sites.

In summary, the Agency was not convinced that the use of duplicative monitoring methods at each UST system would gain significant environmental benefits, in comparison to the possible adverse impacts on program implementation. The Agency specifically seeks comment concerning the proposed approach to require only one method of release detection at each UST system. For example, would a requirement that all environmental monitoring methods be coupled with an infrequent tightness testing program provide significant additional protection to human health and the environment that would justify such an approach?

b. Installation, Calibration, Operation, and Maintenance of Release Detection (Section 280.40(a)(2))

In order for any release detection method to reliably detect releases, it must be installed, calibrated, operated, and maintained properly. EPA believes that any system designed to detect releases within or outside of the UST system must account for various factors and variables, some of which may be unique to the equipment. Improper installation of any method could undermine its designed effectiveness. Improper operation of the monitoring method could also result in faulty measurements or equipment failure. Much of the equipment being developed for UST release detection has electronic or mechanical components that require periodic calibration and maintenance on schedules specific to the monitoring technique and equipment.

EPA believes that the suppliers of these release detection devices are in the best position to understand how they work and to specify proper installation and operation, as well as when and what routine maintenance and service checks for recalibration, operability, and running conditions are necessary. Thus, today EPA is proposing in 280.40(a)(2) to require that all release detection equipment and methods be installed, calibrated, operated, and maintained in accordance with the manufacturer's instructions. An UST owner or operator who purchases and installs a monitoring device must adhere to what is considered good practice for that monitoring approach and equipment. For example, neglect of a system's maintenance so that it is out of operation or in need of recalibration would be a violation of this requirement. A written record of all calibration, maintenance and repair work will be required. This record should at least include the date and nature of work performed.

Because UST release detection is such a new and burgeoning field of technology, the Agency has identified several possible concerns that may be associated with a manufacturer's instructions for the proper installations, calibration, operation, and maintenance of various monitoring methods. With the wide variety of devices that are now available, many techniques are obviously new or in the experimental stage. Also, some of the methods require significant training to install and may require (under the requirements proposed today) some assessment of the site-specific conditions of the UST system. The manufacturer's representative may not be particularly well suited to acknowledge unusual location-specific variables that may preclude the use of the method at that particular site.

One approach to alleviating some of these concerns would be to require that all release detection methods applied externally to the UST system be installed and maintained by someone certified to do such work. A major drawback to this approach is that there do not appear to be any certification programs available or under development. The manufacturers of the various release detection methods do supply some expertise through different levels of training (some more rigorous than others). The Agency presently believes that, while the certification of release detection equipment installers is not presently required, the expertise of these manufacturers and installers will continue to improve rapidly as release detection becomes a more widespread practice. The Agency requests information and comment on the necessity for more than what is being proposed today concerning reliance on the manufacturer's instructions. Specifically, should special skills, judgment, and training be required of installers and operators of the various types of release detection methods so that the performance requirements for the methods being proposed today are met? Should certification of installation be required? Information also is solicited concerning experiences with the operation, use, and maintenance of various methods of release detection.

c. Performance Requirements and Records of Performance Claims (Section 280.40(a)(3))

The confident detection of small releases from UST systems represents a considerable technical challenge and is often, by its nature, a statistical process. The uncertainty in release detection is a consequence of a number of variables including environmental factors, operational practice, and instrumentation accuracy. Testing errors are manifested in one of two ways: (1) Missed detections of actual releases; and (2) false alarms that result in unnecessary release investigations and tank system repairs or replacements.

The detection of a small release is somewhat like trying to find a "needle in a haystack" (or a signal among various sources of noise). For release detection, the "needle" (or signal) is represented by the correct indication of the existence of a release and the "haystack" (or noise) is the sum of the interferences that may hinder or prevent the correct identification of the signal. Based on an analysis of the causes of fluctuations in testing measurements, the performance of different methods of release detection could be specified in terms of the probability of detection (PD) and the probability of false alarm (PFA) for a given leak rate (L). To develop this specification, it would be necessary to develop a history of measurement fluctuations for each method as determined for a range of test conditions. The actual state of the UST system being tested (e.g., whether, and at what rate, it is leaking) would also need to be understood to develop the performance claim. Classes of methods of release detection are not necessarily inhibited by similar sources of measurement fluctuation; for example, internal as well as external methods experience different sources of measurement noise. As a consequence, additional testing by an alternative release detection method should improve the confidence of release detection results.

EPA believes that widespread disclosure of release detection information will afford the UST owner or operator the means for making cost-effective decisions in the selection and implementation of release detection technology. Elements of information that are of particular interest to the owner or operator relate to the performance and operation of the release detection

method. As a consequence, EPA proposes to require UST owners and operators to request, obtain, and keep on file the information relevant to their release detection technology of his choice. The information obtained from the manufacturer should include statements that address each of the following:

- Detectable leak rate, including PD and PFA;
- Test data that support performance claims;
- Equipment operation;
- Equipment calibration requirements; and
- Equipment maintenance requirements.

EPA seeks public comment on this requirement for this information collection and its storage.

d. Release Detection Frequency (Section 280.40(a)(4))

As discussed in more detail in Section V.C. of today's Preamble, in developing today's proposed regulatory strategy, EPA decided to propose the use of "frequent to continuous" monitoring or sampling of release detection as necessary to protect human health and the environment at both new and existing petroleum UST systems. To carry out this portion of the strategy, EPA is proposing a general requirement in § 280.40(a)(4) that all UST systems (both new and existing) be sampled, monitored or otherwise tested for releases at least once every 30 days. All the release detection methods allowed today (and discussed later in this Preamble) would have to be applied at least once every 30 days under this general requirement.

There are two important exceptions to this general requirement. The first exception allows infrequent use of tank tightness testing at existing UST systems for 10 years, if manual (or automated) inventory reconciliation is performed both weekly and monthly. The second exception allows the use of tank tightness testing at new or upgraded UST systems if the tests are conducted at least once every six months along with inventory reconciliation at least monthly. (These exceptions to this general 30-day rule being proposed today, and the reasons for them, are discussed in more detail later in this Preamble.)

In considering the frequency of release detection needed, the Agency examined four different time periods for release detection monitoring: continuously, monthly, quarterly, and semi-annually. As was discussed earlier, given the uncertainty associated with the methods of release detection proposed today, EPA believes that one way to ensure more reliable results is to apply them frequently. Frequent monitoring will provide numerous measurements during the year that can be evaluated to determine trends (if any) as well as to reveal potential problems and malfunctions of the release detection equipment (or practices used).

Other than tank tightness testing, which is generally done infrequently, there do not appear to be any established preferences concerning how often release detection should be carried out, based on a review of the most aggressive state and local UST programs. For example, California opted for a weekly detection sampling under several alternatives allowed for existing UST systems. Florida requires a monthly frequency as a minimum for both new and existing tanks. Several other states appear to emphasize continuous monitoring when environmental monitoring methods are used. No one appears to use a semi-annual frequency for release detection.

EPA's Regulatory Impact Analysis (see Section IX for more details) provided in support of today's proposal does not show distinguishable differences between applying the variously modeled monitoring methods at different frequencies at new UST systems protected from corrosion. With existing UST systems there are some differences modeled between methods used frequently versus infrequently. However, the biggest improvement still appears to come from simply applying release detection in the first place no matter quickly it is reapplied. In general, EPA believes that the more frequently release detection is used, the more reliable release detection results will be, and the less likely releases will go undetected and present risks to human health and the environment.

EPA decided not to propose continuous release detection at all USTs for several reasons. Continuous monitoring is not easily retrofitted to existing UST systems. Also, as described earlier, the continuous monitoring technologies for either outside- or inside-the-tank applications are not yet in widespread use. The Agency is concerned that forcing the use of such technology may be premature until the methods are more proven and available to the regulated community. The Agency also believes that there are many methods of detection available that appear to offer significant promise for release detection purposes, including several manual methods. A continuous monitoring requirement would prohibit this type of release detection. On balance, the Agency has decided the best approach is to allow as much flexibility to owners and operators as is possible while remaining protective of human health and the environment. Most existing UST systems do not yet have release detection and it will take a tremendous effort nationally to have release detection applied at all of them within the timeframes mandated by today's proposal.

EPA decided for several reasons to propose that manual methods, if chosen by the owner or operator, must be used at least once every 30 days, as opposed to every 90 or 180 days. First, as previously explained, the more frequently release detection is correctly applied, the more opportunity is provided for early detection. Release detection applied at least once every 30 days should more adequately minimize the threat to human health and the environment. Second, a significant benefit can result from requiring at least 12 measurements per year by fostering trend analysis, comparability of results, and assuring that the method being used is providing reliable and meaningful results. The 30-day minimum frequency does not appear to conflict with most established state and local UST programs, and should not present an intolerable burden to owners and operators. The proposed approach allows the use of manual methods at a frequency that is believed workable for the regulated community. The additional flexibility provided by the manual methods allowed by the proposed 30-day monitoring requirement gives the regulated community more choice, which is intended to foster more rapid implementation.

EPA requests information and comment on the selection of a 30-day minimum monitoring frequency for all release detection methods, except tank tightness testing. (The frequency allowed for tightness testing coupled with inventory monitoring is discussed in Section VI.D.3.a. of this Preamble.)

e. Site Assessment for External Release Detection Methods (Section 280.40(b))

The performance standards for external release detection methods can only be partially defined because the necessary data does not yet exist to specify the smallest release that can be detected with a high probability of detection and a low probability of false alarm. Today's rule only specifies the release to be detected with the external methods and mandates several performance requirements on how and where different methods can be used (for example, they are required to be

used within or immediately below the UST system excavation area). Because all external release detection methods cannot be used at every site, EPA is proposing that an assessment be conducted to ensure these method-specific requirements can be met and the appropriate external monitoring method is chosen.

Any one of several factors could be present in a particular setting surrounding an UST system that might adversely impact the performance of any external release detection method. Therefore, users of external release detection methods must gather basic information about the status of nearby site conditions to ensure the method of external monitoring selected is appropriate for the site and is designed and installed properly. Today's proposal includes a general requirement in § 280.40(b) for UST owners and operators who may choose an external release detection method to conduct a site assessment. Any external release detection method whose application is determined to be inhibited by some site characteristic may be precluded from use at that site. Without certain basic information, which can only be obtained through a site assessment, the owner or operator could fail to identify factors that may inhibit the functioning of the release detection method. Thus, today's proposal requires that the assessment be sufficient to ensure the specific performance requirements proposed for the particular methods of external detection in § 280.41 are complied with.

EPA believes that using external release detection properly requires basic information about the subsurface within and immediately below the excavation area. Probably no external release detection method can be used at an existing site in a very shallow water table where significant levels of product have already been released. (Of course, corrective action may already be necessary at such site.) Similarly, the selection of a particular method will be influenced by such site information. For example, as discussed in more detail later in this Preamble, today's proposal precludes the use of ground-water table monitoring at locations where the depth to ground water exceeds 20 feet, or the use of vapor monitoring where background concentrations of total hydrocarbons in the excavation area exceed 500 ppm. Therefore, the site assessment requirement proposed today is intended to provide the basic information that is needed to: (1) Help the owner and operator determine whether the use of external release detection is appropriate for the site, (2) help the owner and operator select an external release detection system appropriate for site conditions, (3) aid in designing a network of sensors and wells which will give the greatest likelihood of detecting a release from any part of the UST system, and (4) indicate the potential for possible problems in interpreting data from the release detection system.

Of particular importance in a site assessment are potential sources of product and vapors, such as previous contamination from earlier releases and leaking UST systems at neighboring locations. Also, the site assessment must consider natural and man-made factors in or below the excavation area which will influence the movement of product and vapors (such as product type, water table depth, soil moisture, soil characteristics, excavation zone design, and subsurface utilities intersecting the excavation). EPA has identified several types of information which might be significant during a site assessment:

UST SYSTEM CHARACTERISTICS
- Existing UST System or New Installation
  - (the excavation zone of new installations can be designed to enhance external release detection; existing sites are not able to be redesigned)
- Existing Contamination
  - (creates background levels in the excavation area against which new releases must be detected)
- Tank Size and Number
  - (a factor in determining how many sensors and wells are needed and where they should be located)
- UST System Age and Construction
  - (a possible indicator of excavation zone design and backfill characteristics)
- Presence of Overfill Prevention Controls or Containment
  - (a factor in sensor and well placement as well as sensor data interpretation)
- Product Type
  - (different products have different properties such as viscosity, density, and volatility which will influence sensor selection and product and vapor mobility)
- Layout of Tanks, Pipes, and Connections
  - (may influence sensor and well placement)
- Adjacent UST Systems
  - (potential interfering or confounding sources; may influence sensor and well placement, as well as sensor data interpretation)

MAN-MADE SITE CHARACTERISTICS
- Excavation Zone Design
- Impermeable Liner
  - (possible aid to sensor and well placement in well-designed installations)
- Backfill Porosity and Permeability
  - (influences product and vapor mobility)
- Interfering Sources
  - (possible cause of false positives; must be discriminated against in data interpretation; may influence well and sensor placement)
  - Adjacent Sources
  - Surface Spills
- Spurious Pathways
  - (man-made pathways from within or beneath the excavation area can influence product and vapor movement; must be taken into account in sensor and well placement)
  - Sewers
  - Underground Utilities
  - Pipes
  - Basements
  - Wells
- Obstacles to Measurement
  - Electrical utility conduits in the excavation area
  - Pavement over the excavation
  - Buildings adjacent to or in the excavation area
  - Transient or steady-state releases
    - (transient or intermittent releases such as spills may obscure continuous releases such as tank and piping leaks)

SITE HYDROGEOLOGY
- (important factors in selecting external release detection systems likely to determine product and vapor movement within the excavation area, sensor and well placement, data interpretation procedures)
- Vertical Structure
- Soil Composition
- Permeability and Porosity
- Depth to Water (with seasonal variations)
- Rainfall

The levels and variations in "background" concentrations of product within or beneath the UST excavation area are particularly important to the success of external release detection monitoring. In general, small releases are expected to be detected more

readily at relatively clean sites than slowly developing releases at heavily contaminated sites. The amount of contamination in the excavation area will depend on whether releases from the UST system have already occurred at a site, on the care used in the past to prevent spillage from tank filling operations, and on the location of the UST system with respect to such past and present sources of petroleum and hazardous substance contamination. Site assessments for existing UST systems are likely to be more complicated and difficult than assessments at new sites because of past operational practices that resulted in product releases; such existing contamination can obscure future efforts with external release detection.

EPA considers evaluation of the magnitude and extent of the existing contamination at both new and existing sites to be an important first step in determining how well external release detection monitoring will work at a particular site. Of primary importance are existing concentrations of total hydrocarbon vapors in soil gas in the unsaturated zone if vapor detection is to be the principal monitoring method. Likewise, existing contaminant concentrations in the soil below the UST system and the presence of floating free product on the water table are of principal concern if monitoring on the ground water is to be the principal detection method.

If EPA allows the use of external release detection in the final rule, more detailed guidance on performing site assessments may be provided at that time. In the meantime, EPA is soliciting information and comments on: (1) Whether site assessments should be required at all UST systems or just those where the use of external release detection systems are required; (2) whether different types of information should be obtained in site assessments at new locations as compared with site assessments at existing UST systems; (3) the necessary elements of a site assessment; (4) the use of site assessment data in selection of release detection sensors and systems; (5) the types and levels of contamination at sites where no releases have ever occurred; and (6) the variations in contamination levels over time at sites where releases have been known to occur.

f. Other General Issues Concerning External Release Detection Methods; Solicitation of Public Comments and Performance Data

In discussing external release detection, an important distinction must be made between release detection sensors and release detection methods. A release detection sensor is a physical device capable of responding to released product. Examples are flame ionization detectors for vapors and colorimetric pastes for determining the presence of floating product. A release detection method is the entire procedure by which releases are detected. The design of an external release detection method includes three essential components: (1) Sensor selection, (2) network design, and (3) selection of a method for data analysis.

Sensor selection is the process of selecting one or more devices which will operate satisfactorily in the environment of the specific site under consideration. Several factors to be considered include: (1) Whether the sensor will operate under saturated or unsaturated conditions (i.e., below or above an existing water table; (2) type of product to be detected; (3) necessary detection thresholds (e.g., vapor concentrations or product thicknesses); (4) sensor accuracy, precision, and drift; (5) sensor response times; (6) whether the sensor is to be operated automatically or manually; (7) whether the sensor is to be operated continuously or intermittently; (8) frequency of maintenance; and (9) the physical environment of the site, including such factors as ambient temperature range. In general, this information will be available from the manufacturer, and the release detection system owner or operator must ensure that appropriate sensors are chosen for the site in question. EPA believes that release detection sensors exist which have adequate sensitivity and which will function satisfactorily in the UST excavation area. EPA solicits comments on the adequacy of existing external release detection sensors and the type and values of minimum performance specifications which should be established as mandatory.

Network design is the process of determining the necessary numbers and locations of external release detection sensors, as well as the frequency of sampling. The overall objective of network design is to install a method which has the greatest practicable likelihood of detecting a release from the UST system and its associated piping. A useful detection method must also be capable of detecting a release as soon as possible to minimize hazards to human health and to prevent irreparable damage to the subsurface resource (and to minimize remedial action costs). The principal considerations in determining locations of wells and sensors are the geometry of the UST system (tanks and piping), the characteristics of the product, and factors which influence the mobility of product and vapors.

In general, EPA believes that the topic of network design is not well understood. In particular, the processes which govern product and vapor mobility and migration are poorly understood. Because product and vapor movement from a typical UST system is likely to involve three components (product, vapor, and water), exact prediction of the movement of product vapor in the subsurface environment is quite complex. While predictive methods are being developed by several investigators, product and vapor movement in the UST system excavation area is not well known at the present time. Today's requirements, which generally limit use of external methods to within or immediately below the excavation area, are intended to ensure that this uncertainty is kept to a minimum.

Factors which are believed to possibly affect network design include product characteristics, unsaturated zone characteristics, saturated zone characteristics, natural ambient environmental factors, and man-made site characteristics. These factors are listed in more detail below:

FACTORS INFLUENCING NETWORK DESIGN

- Product Characteristics
  - Vapor Pressure
  - Molecular Weight
  - Henry's Law Constant
  - Dielectric Constant
  - Density
  - Water Solubility
  - Viscosity
  - Boiling Point
- Unsaturated Zone Characteristics
  - Air-Filled Porosity
  - Pore Size and Shape
  - Volumetric Water Content
  - Unsaturated Zone Depth
  - Soil Organic Matter Concentration
  - Temperature and Temperature Gradients
  - Soil Texture
  - Retention
  - Microbial Influence
- Saturated Zone Characteristics
  - Water Table Fluctuations

Soil Characteristics
Natural Ambient Environmental Factors
Barometric Pressure Fluctuations (for vapor monitoring impacts)
Wind
Rainfall
Man-Made Site Characteristics
Excavation Zone Design
Liner and Backfill Characteristics
Interfering Sources of Contamination
Spurious Pathways from or beneath the Excavation Zone (utility conduits, etc.)
Obstacles Aids to Measurement (e.g., paved areas over the UST system)

The relative importance of each of the above factors cannot presently be determined, and consequently the exact movement of product and vapor outside of the excavation zone cannot be predicted at all sites. EPA believes that the uncertainties involved in network design are likely to be more important to detection of releases than sensor performance characteristics. EPA solicits comments and information related to external release detection network design and the impact the excavation zone surrounding an UST will have on product and vapor movement.

At least four different approaches to the interpretation of data from release detection methods can be considered. The first is to determine a release from the appearance, taste, odor, or samples collected from observation wells. In this case, the decision that a release has occurred is left to the human observer and may be somewhat subjective. The second approach involves the statistical comparison of data collected at different times at one monitoring point, or at the same time from several monitoring points; in this case the decision that a release has occurred is made by statistical hypothesis testing. The third approach is to plot, over time, the measurements from a monitoring point to look for trends in the data. The fourth option is to establish alarm or action levels so that observation of values over this limit would immediately trigger some type of action. The action could range from making additional measurements to excavating the tank.

Incorrect decisions from any one of the four methods can be described as either false positives (concluding that a release has occurred when no release exists) or false negatives (concluding that no release has occurred when in fact one exists). False positives and negatives from sight, taste, or odor will be influenced by the sensitivity of the observer's senses and by his subjective decisions. The number of false positives and negatives from the other three options depends on the decision values chosen (statistically significant variations, changes in the rate at which measured concentrations increase, or the action level selected) and on the sampling frequency. Depending on the selected action level and frequency of sampling, the number of false positives can be progressively reduced while the detection of small releases becomes progressively more difficult. The number of false positives has consequences to both the tank owner and to the regulator, who must decide what action to take when the detection system indicates that a release may have occurred. The number of false negatives also is important, since adverse environmental impacts will generally increase when a release continues undetected. EPA solicits comments, including relevant data and recommendations, concerning methods of data analysis for external release detection systems.

3. Requirements for New UST Systems (Section 280.41)

Today EPA is proposing in 280.41 to require that all new UST systems be provided with release detection before they begin operation. The proposal allows UST owners and operators to choose from a wide variety of different release detection methods provided that they meet the requirements for each method. Methods allowed include:

- Tank tightness testing with monthly inventory reconciliation;
- Vapor monitoring within the soil gas of the excavation area;
- Monitoring for liquids on the ground water;
- Monitoring for releases in an interception barrier;
- Automatic monitoring of product level and inventory control;
- Interstitial monitoring between the UST and a secondary barrier; and
- Other methods approved by the implementing agency.

These methods and the proposed performance requirements and limitations are discussed below. Any special conditions for use of these methods for hazardous substance UST systems is also discussed below.

a. Tank Tightness Testing and Inventory Reconciliation Controls (Section 280.41(c))

EPA is today proposing to allow the use of tank tightness testing and inventory reconciliation control (or a method of equivalent performance) in combination as one method of release detection at new petroleum UST systems. Each of these two release detection components, and the requirements proposed concerning their use, is discussed separately below.

(1) Tank Tightness Testing (Section 280.41(c)(1)). Tank tightness testing is the most commonly used procedure for determining whether an UST system is leaking. A wide variety of tightness testing techniques are available, including many that are described in the report, *Underground Tank Leak Detection Methodology: A State-of-the-Art Review* (EPA 1986). All these techniques test the integrity of the tank; some test the integrity of the piping. Owners or operators who choose to use a method which only tests the tank must use another technique for testing the piping.

Tank testing techniques can be classified as either volumetric or non-volumetric. Volumetric tests identify whether a system is tight by measuring product level changes over time and converting these measurements to a flow rate based on tank geometry. Non-volumetric tests measure something other than product volume changes and, therefore, do not as easily define a flow rate. They simply indicate whether the tank or piping is leaking. These include ultrasound techniques and trace gas detectors.

The procedures for conducting volumetric tests generally involve filling the tank with product to a specified level and measuring the change in this level over a period of time. In addition, product temperature is measured so that the effects of temperature on product volume can be subtracted from the estimated product level measurement. If the estimated change in product level exceeds a certain amount, the system is judged to be non-tight. The various volumetric techniques differ in the method for measuring and recording the liquid level changes, in the temperature measurement and compensation procedures, in their data analysis methods, and their detection criterion.

There are a wide variety of volumetric tank tightness test methods currently available. All test methods require that dispensing operations at the UST be curtailed during the test. Some test methods overfill the tank, while others do not; some test the entire system, including piping, while others test either the tank or the piping. The most common test methods require extensive preparation to conduct a test, have a high cost per test, and as a consequence cannot be used frequently. More

recently developed systems can be permanently installed in the tank. These systems require initial capital investment, but can perform frequent tests with only minimum preparation and interruption to dispensing operations. These latter systems are the automatic product level monitoring systems that have a precision test mode for the conduct of a tightness test. (They are discussed in more detail in a later part of this section of the Preamble.)

The performance of the volumetric test methods is being evaluated in the EPA's research program being conducted in Edison, New Jersey and the test results will be available before the rule is finalized. In addition, the technological limits of volumetric tightness tests will also be determined. As noted earlier in this preamble, preliminary results suggest that reliable detection of leak rates at 0.05 gal/hr may be scientifically possible for tanks whose capacity is less than 12,000 gal.

A major concern with this method of release detection is that several key factors can significantly undermine the test's accuracy in actual practice. A review of several of these techniques, prior to EPA's National Motor Fuel Tank Survey in 1985, revealed that many of the leading commercially available procedures do not appear to adequately control these factors. Also, the way these tests are carried out at the site as well as their data analysis procedures, can provide other sources of operator-induced errors. Because tank tightness testing cannot be performed frequently, EPA considered not allowing the use of this method. However, the Agency has concluded that, because this method can provide reasonably accurate, though infrequent "checks" for releases, it should be allowed for release detection purposes, if it is used in compliance with several proposed performance requirements and limitations:

- The test must be used in combination with daily inventory measurements and monthly reconciliation techniques (or a test of equivalent performance);
- The test must be conducted at least every six months; and
- The test must be capable of detecting a release rate of at least 0.10 gallons per hour from the UST system, determined with a probability of detection of 0.99 and a probability of false alarms of 0.01.

Each of these limitations are discussed in more detail below.

(a) Tightness Tests Must Be Used in Combination With Inventory Reconciliation Techniques. As discussed previously in this Preamble, EPA has decided to propose the use of "frequent to continuous" release detection as part of the national strategy to regulate new UST systems. Numerous advantages were identified that caused the Agency to propose, at a minimum, monitoring for all new UST systems once every 30 days. However, the Agency believes it is unrealistic to require tank tightness testing that often. Tightness testing, as currently practiced, is a fairly expensive one-time procedure that requires the UST system to be out of service for a number of hours prior to and during the test. Because monthly testing is infeasible, the Agency is proposing that it must be combined with inventory reconciliation techniques (discussed in the next section of this Preamble) before it can be used to comply with today's release detection requirements for new UST systems.

The tank tightness testing technique is expected to be able to detect releases that may be too small for inventory reconciliation procedures to identify. In contrast, the inventory reconciliation is intended to address today's general requirement for frequent monitoring through the requirement of daily measurements reconciled at least monthly. Thus, the inventory reconciliation portion of this combined method of release detection is for use between the infrequent tightness tests required today.

The Agency considered allowing tightness testing alone for release detection. However, EPA believes that tightness testing can only be used practically on a relatively infrequent basis because of the cost and difficulty to the owner and operator associated with its use. Infrequent testing alone could provide too much time for the UST to leak in between the tests. Inventory reconciliation is intended to ensure that significant releases do not go undetected between tightness tests.

(b) Tightness Tests Must Be Conducted at Least Every Six Months. As discussed earlier, EPA has proposed a general requirement that all new UST systems be provided with a method of release detection that conducts a test at least once every 30 days. EPA is also proposing to allow the use of tank tightness testing at new UST systems if it is conducted at least once every six months and is combined with daily inventory measurements and monthly reconciliation techniques.

EPA's review of the various schedules for tightness testing of new petroleum UST systems currently used in several states reveals testing frequencies between one to five years depending on the age of the UST system. Most states that allow tightness testing for new UST systems protected from corrosion require it be used with inventory reconciliation, as well as to be performed at a minimum once every four or five years. Thus, the standard proposed today is much more stringent than what has been established for new petroleum UST systems in several states (such as Wisconsin, Rhode Island, Maryland, and Delaware). This more frequent standard was developed in keeping with today's proposed general approach to require more frequent monitoring in order to detect releases sooner. An important consideration in developing this proposed frequency was the Agency's uncertainty about the long-term use of inventory controls for release detection purposes. (Discussed in more detail in the next subsection of this Preamble.)

EPA specifically solicits comment on the appropriateness of a semi-annual testing frequency at new UST systems. Information indicating that the performance of new UST systems protected from corrosion does not warrant semi-annual testing could cause EPA to require less frequent tank testing in the final rule (as do many established state UST programs). Another key consideration in the decision concerning the frequency of tank testing is the effectiveness of inventory controls in detecting leaks. If a new UST system is provided with automated inventory control and reconciliation equipment, should EPA reduce the required frequency of tank tightness testing? On the other hand, to be consistent with its strategy to require "frequent to continuous" monitoring, should EPA allow tightness testing but require that it be used every 30 days, with the expectation that more practical, less expensive technologies may be developed that could be applied with such frequency in the future?

(c) Performance Standard for Tightness Tests. Today's proposal specifies the performance standard for tightness testing in terms of the minimum release to be detected (0.10 gallons per hour), the probability of detection (P_D=0.99), and the probability of false alarm (P_{FA}=0.01). A complete performance standard is proposed for tightness testing as a consequence of the advanced understanding of this technology. This exactness and reliability is also important considering the more infrequent testing schedule being considered for this test method. This standard applies to the testing of both the tanks and the underground piping.

As described earlier, a number of commercial tank testing techniques are currently available. Although the

commonly used NFPA criterion is 0.05 gallons per hour, and vendors of available testing techniques claim that their methods can reliably detect such a small release rate, at this time the Agency has not been provided with evidence that this standard is being reliably met by any device now in practice. EPA has initiated research that will evaluate the performance of many of the commercially available methods. This program is described in *Protocol for Evaluating Volumetric Leak Detection Methods for Underground Storage Tanks* (1986).

EPA has field experience with tank tightness testing. This experience is described in *Underground Motor Fuel Storage Tanks: A National Survey* (1986). The national survey experience suggests that the leak rate capable of being detected by current practice is higher than 0.05 gal/h. In the survey, EPA carried out a nationwide test of over 450 UST systems and was able to reliably detect releases of 0.1 gallons per hour with a $P_D=0.95$ and $P_{FA}=0.05$. The Agency used a modified, commercial tightness testing procedure that emphasized numerous quality control/assurance procedures and was supported by carefully designed statistical analyses. These tests were conducted with skilled and experienced practitioners.

EPA rejected the widely used 0.05 gal/h criterion in developing today's proposal because the Agency presently believes that this standard is not being reliably achieved with the most common tank sizes in use today (4,000 to 12,000 gallons capacity). Consideration was given to setting today's performance standard at 0.20 gallons per hour. However, EPA technical staff and the experience of the practitioners who executed the national survey have indicated that, if presently available procedures and practices were modified and improved, they could achieve a reliable detection of leak rates smaller than 0.20 gallons per hour.

EPA believes that its ongoing tank test evaluation program will result in significant new information that will result in dramatic improvements of current practice over the next few years. With significant improvements in today's practice, EPA believes many testing procedures and techniques should be able to reliably detect a release rate between 0.05 and 0.10 gallons per hour in the tanks that are widely in use today. Although at the present time quantitative data is unavailable concerning the achievement of the above performance levels at larger tanks (e.g., greater than 20,000 gallons in volume), EPA doubts that those levels can be achieved at the larger tanks.

Testing methods are affected, to varying degrees, by factors such as temperature changes, trapped vapor pockets, condensation and evaporation, and tank-end deflection. Some of these factors can be controlled or minimized by proper design of the equipment and test procedures. The degree to which any of these factors are in effect during a given test will also vary between different tanks, and even between separate tests on the same tank. (In the national field survey, at some of the UST systems, crews repeated tests at the same tank during the same day as well as at a different time several days later.) The ability of the available test methods to compensate for these variables is not yet well known and there is an important reliance on the test operator to recognize and adjust for these factors as they occur. These factors must be monitored very closely because even the slightest changes can either mask leaks that exist, or mimic a leak where none exists.

Volatile liquids such as gasoline, jet fuel, and many solvents are sensitive to temperature variations. For example, a temperature decrease of 0.02 °F in one hour within a 6,000 gallon tank containing gasoline would cause a decrease in the volume of 0.084 gallon. This change exceeds the 0.05 gallon per hour rate now commonly used to indicate a leak (NFPA, 1983). Temperature changes of this magnitude within a tank are common. One reason for this is that new product added to a tank is generally at a different temperature than product already in the tank. After product is added to the tank, it takes time for the tank contents to mix and achieve a nearly static condition. Even as the tank contents settle, the cooler, heavier product tends to settle towards the bottom of the tank, while the warmer, lighter product locates nearer the surface. In other words, the product tends to settle in layers, with a slight temperature drop from the surface to the bottom. This process is called stratification. With stratification, the rate of change of the temperature, and therefore the volume, may vary through the depth of the product.

Vapor pockets within the tank pose serious problems for tank tightness tests that require overfilling of the tank. These pockets are often present at high spots of sloped tanks or in protrusions, such as manways in the tops of tanks. These pockets of trapped vapor expand and contract with changes in temperature and barometric pressure. Furthermore, their size is difficult to estimate because they cannot be seen. Therefore, when present, they must be eliminated for a valid volumetric test to be performed.

Tank-end deflection may also affect the results of a tank tightness test. When a tank is filled in order to perform testing the ends of the tank may deflect outward. The technician performing the test must be aware of this phenomenon and apply the necessary adjustments or corrections to ensure accurate results.

Finally, evaporation and condensation activity inside the tank can affect test results under certain conditions.

Volumetric tests generally cannot be accurately applied to large tanks. The 0.05 gallon per hour criterion was originally developed for a 6,000 gallon tank. Most testing practitioners will not apply their tests to tanks greater than 20,000 gallons. This is due to the increasing effect of many of the variables which cloud the accuracy of this type of test.

Automatic product level monitors that have the capability of compensating for temperature fluctuations can be used to conduct a precision tank tightness test and, if used semi-annually with monthly inventory controls for release detection purposes, they must meet the same standard as other volumetric tank tightness test methods. As with other volumetric tests, tank operations must be curtailed during the test. The direct access of automatic in-tank equipment offers several advantages over other tank tightness methods. First, the tests can be conducted frequently without expense and without having a significant impact on dispensing operations because the systems are permanently installed in the UST. Second, these methods maximize the available test time because the set-up time can be made to be minimal.

EPA recognizes that the performance standard proposed today for tank tightness testing is challenging, but preliminary results from the EPA research program suggests that this standard is achievable. However, more frequent data sampling, a longer test time, improved compensation schemes, and better analysis algorithms might be required of available methods to achieve it.

(2) Inventory Reconciliation Controls (Section 280.41(c)(2)). Inventory reconciliation techniques detect releases by reconciling product deliveries, withdrawals and inventory remaining in the UST system each day to identify shortages. A large shortage in a single day or small persistent shortages over a month can indicate a release of product.

As discussed previously in the section on tank tightness testing, today's proposal only allows the use of tightness testing to detect releases if it is used with inventory reconciliation. Monthly inventory reconciliation is proposed as the means for detecting any significant releases that could occur between the more accurate, but less frequent, tightness tests.

Major concerns have been identified concerning the use of manual inventory control as a release detection method with new petroleum UST systems. Manual inventory control depends on considerable operator involvement, and with it the attendant opportunity for human error. In fact, several studies have shown that inventory control records often contain errors that diminish their utility for release detection. In one EPA study, *Underground Motor Fuel Storage Tanks: A National Survey* (where survey participants were required to supply one month's worth of inventory data on forms supplied by the EPA), 80 percent of the participants initially supplied incomplete or incorrect inventory data. Some of these records were corrected or completed through intensive follow-up contacts with EPA, and 50 percent of the inventory records were eventually complete enough for analysis. The Agency has serious reservations about depending on a long-term basis on manual inventory control for release detection because of this reliability issue. The Agency solicits comment and information on this issue.

Inventory reconciliation is a common and highly encouraged practice in the petroleum industry. Inventory is reconciled for management of the inventory, reorder policy, control functions and detection of large uncontrolled releases. Most state and local regulations require it as an element of their release detection strategy because it is inexpensive and can be done as part of the normal day's activities. Product deliveries, withdrawals, and tank inventory are reconciled daily to identify shortages or overages. Persistent shortages (or overages) over one or more months suggest the possibility of uncontrolled release of product from the UST system. Daily product level and dispensing pump measurements are required for meaningful inventory reconciliation. Product level measurements are made manually with a calibrated stick, or automatically with an in-tank product level monitor. The precision of either measurement can be approximately one-eighth inch. The automatic product level monitor has several important advantages over manual stick measurements. First, the measurements are not subject to operator error which could arise from misreading or improperly using the stick. Second, a more sophisticated data collection and analysis approach can be accommodated with the automatic monitors.

The performance of inventory reconciliation has not been articulated. The major sources of interference "noise" that limit the detection of releases using this methodology are:

- Withdrawal volume;
- Delivery volume;
- Product expansion or contraction;
- Structural deformation of the tank;
- Pilferage; and
- Product level measurement.

The first five sources of noise are systematic and are the largest sources of error in reconciling inventory. The fluctuation in product level measurement is random if the stick measurements are properly executed. Delivery uncertainties of several hundred gallons can occur. Withdrawal errors produced by pump calibration errors can be large. Pilferage will obviously affect the accuracy of the reconciliation. Product temperature changes and structural deformation can be large enough to be sensed by the stick measurements if the stick measurement is made shortly after filling a tank.

There are many means to reconcile inventory data. Some methods attempt to compensate for the errors and claim greater accuracy than the traditional method of reconciliation. Several different detection criteria have been developed to define a leak. The volume threshold is the most commonly used. A volume threshold is established and a leak is declared if a monthly shrinkage crosses a threshold. Thresholds of 100 to 200 gallons are typical. Another detection criterion requires that the difference in the number of overages or shortages each month exceed a specified threshold before a leak is suspected.

The primary limitations proposed today for the use of inventory reconciliation techniques for the purpose of release detection at new UST systems are:

- Inventory reconciliation (or another test of equivalent performance) must be used in combination with tightness testing;
- Inventory reconciliation controls must include reconciliation of product inputs, withdrawals and stored inventory each operating day so that a release greater than 5 percent of the flow through on a weekly basis or 0.5 percent of the flow through on a monthly basis will be detected;
- The height of the stored inventory must be measured to a 0.125 inch accuracy;
- Inputs must be reconciled with delivery receipts by measurement of tank inventory prior to and after delivery;
- Deliveries must be made through a drop tube;
- The product dispensing must be metered and recorded within an accuracy of 5 cubic inches for every 5 gallons of regulated substance withdrawn; and
- The inside of the tank must be checked for the presence of water at least every 30 days if any portion of the tank is in ground water.

Each of these performance requirements and limitations are discussed below.

(a) Inventory Reconciliation (or Another Method of Equivalent Performance) Must Be Used in Combination With Tightness Testing (Section 280.41(c)). Today's proposal requires that inventory reconciliation be used together with semi-annual tank tightness testing. Although inventory reconciliation is concerned with the measurement of product volume in the tank, it is generally believed to be less accurate than tank tightness testing. However, inventory reconciliation can provide a nearly continuous method of release detection once a base analysis period is obtained. Typically, the reconciliation is done monthly using 30 days of data. Therefore, a well-designed and properly executed inventory reconciliation test is believed to complement the more accurate but more infrequently done tightness tests.

Today's proposed rule also allows for any method or combination of methods of equivalent performance to be substituted for inventory reconciliation providing that the method(s) perform a tank test with the same frequency, tests the entire tank system (including the piping), and has the same or better performance. For example, an automatic in-tank volumetric level testing conducted weekly and monthly combined with an automatic pipe monitoring system would be an example of a substitute system, if the performance of these tests are equal to or better than the performance required of inventory reconciliation (discussed below).

(b) Inventory Reconciliation Performance (Section 280.41(c)(2)). Today's proposal sets performance requirements for inventory

reconciliation that generally agree with the American Petroleum Institute's Recommended Practice #1621, which provides detailed guidance on inventory reconciliation practices. Product inputs, withdrawals and stored inventory must be reconciled each operating day. The reconciliation must be accurate enough to identify an inventory loss of five percent of product volume flow through on a weekly basis and 0.5 percent of flow through on a monthly basis. The Agency is not proposing detailed requirements on inventory reconciliation procedures and report formats.

The required reconciliation accuracy of 0.5 percent of flow through on a monthly basis that is being proposed today is an API #1621 recommended practice and is equivalent to a 90 gallon loss in a typical monthly flow through of 18,000 gallons. Even though the error in one day may exceed this value, when 30 days are considered, the errors in individual days tend to balance out. EPA believes that this monthly standard can be met if the inventory control procedures are followed consistently. Equipment is commercially available that can accomplish this automatically. The 5 percent of weekly flow through loss standard is similar to the California weekly loss standard and is intended to provide early warning of major losses. Five percent of the weekly flow through for a typical monthly flow through of 18,000 gallons corresponds to approximately 200 gallons. The Agency included this requirement because it believes that the additional effort required to compute a weekly loss is justified by the additional confidence that large releases will be detected quickly.

The Agency is not aware of any research that suggests an optimum weekly loss standard. However, EPA believes that a more restrictive weekly loss standard (e.g., 2 percent of the flow through) would result in excessive false alarms because of the unavoidable inaccuracies associated with inventory measurements. On the other hand, the Agency believes that a less restrictive weekly loss standard (e.g., 10 percent of the flow through) would allow large releases to go undetected for too long. The 5 percent standard is believed to be achievable with consistent adherence to the industry-recommended inventory reconciliation practices. EPA also considered including a daily loss standard in today's proposal, but concluded that the interpretation of a single day's reconciliation is better left to the operator's judgment because of the many potential sources of error.

The probability of detection and the probability of false alarms for the above detection thresholds are not known, but sufficient data exists to evaluate and amend performance of the proposed inventory reconciliation performance requirements before the rule is finalized. At present, EPA is proposing to follow recommended industry practices, but requests comments and information on this approach.

(c) Stored Inventory Measurement Accuracy (Section 280.41(c)(2)(ii)). Today's proposal requires that the height of the stored product be measured to a 0.125 inch accuracy. The Agency believes that a major source of error in manual inventory control practices involves measurement of the height of the stored product. There are many reported cases of operators using improperly calibrated or damaged gauging poles, of operators neglecting to take tank level readings during bad weather, and of miscalculation of the stored volume from the tank level reading. Most manual gauging poles are calibrated in 0.125 inch increments. Therefore, if the operator adheres to standard industry practices in the gauging procedure, greater accuracy can be achieved through careful measurement practices. Although today's proposal does not require automatic level sensing equipment, the Agency believes that they too can significantly reduce the incidence of errors in inventory control.

(d) Delivery Reconciliation (Section 280.41(c)(2)(iii)). Another limitation in today's proposal is that product deliveries must be reconciled by measuring the tank before and after each delivery. The Agency is concerned that neither delivery receipts or tank level readings taken after delivery are consistently accurate. The Agency is therefore requiring that they be compared to each other to increase confidence that actual deliveries are accurately recorded.

(e) Drop Tubes (Section 280.41(c)(2)(iv)). Today's proposal requires that deliveries be made using a drop tube that extends to within one foot of the tank bottom. This tube is usually attached to the tank's fill pipe and minimizes the surface waves during product deliveries. A tank that is not equipped with a drop tube cannot be accurately measured for inventory for several hours after a delivery, making it difficult to reconcile the delivery. This appears to already be a common practice because many existing UST systems are reported to be already equipped with drop tubes.

(f) Dispensing Meters (Section 280.41(c)(2)(v)). Today's proposal requires that product dispensing be accurately metered. Accurate metering of product withdrawals is essential to inventory control. The Agency chose the National Conference on Weights and Measures standard of 5 cubic inches for every 5 gallons of product withdrawn. This is equivalent to 0.6 percent; which is the acceptable tolerance level for retail gasoline dispensing meters that retail gasoline facilities are already required to meet. However, many UST systems, such as those used for fleet service or farm use, are not metered this accurately. The Agency recognizes that some owners and operators if they choose this release detection method may have to install dispensing meters, or calibrate their existing meters to meet this requirement.

(g) Water Detection (Section 280.41(c)(2)(vi)). Today's proposal also requires that the operator check for water in the tank at least every 30 days if any portion of the tank is located in water. Ground water can intrude through a hole into a tank if it is at least partially below the water table. Petroleum products are less dense and immiscible in water, so incoming water will appear at the bottom of the tank. Generally, with manual inventory controls, the operator can apply a water-sensitive paste to the end of the gauge pole to determine how much water is in the tank. (Automated inventory measuring equipment is also available that can measure the presence and level of water in the bottom of an UST system.)

Water can also enter the tank through other means such as product deliveries, but the presence of (or rapid increases in) water in a petroleum UST system could result from ground-water intrusion and may need further investigation if the UST system is in ground water. Checking for water in the tank is recommended by the American Petroleum Institute's Recommended Practice 1621 as part of the daily inventory control practice. However, the Agency believes that for release detection purposes, only those tanks that are in ground water need to be checked for water, and that the inspection interval need only be every 30 days. A recent national EPA survey of motor fuel tanks found that approximately 20 percent of the UST systems are reported to be at least partially located within ground water.

(h) Issues for Public Comment. EPA is seeking public comment and performance-related information regarding the use of manual inventory

reconciliation for release detection. EPA is particularly interested in receiving comment on the appropriateness of the limitations proposed for the use of the method. Because of the limited performance data concerning the method, EPA has had to develop today's proposal based on partial information. Therefore, EPA is specially seeking information regarding the field performance of manual inventory controls or the results of any relevant performance evaluation studies. The Agency is also interested in receiving comment and information concerning automatic inventory measurement/reconciliation equipment. The Agency is considering whether it should be required in lieu of allowing the use of manual methods of inventory control with tank tightness testing at new UST systems.

In addition to these general areas, the Agency is interested in comments concerning three specific issues. The first of these concerns the accuracy requirement for inventory reconciliations. Accuracies of 5 percent of flow through on a weekly basis and 0.5 percent on a monthly basis are required in today's proposal. Should these accuracy values be increased or decreased? Should they be expressed as single values or as fractions of the tank volume instead of fractions of the flow through? Should there be an accuracy requirement for a single day's reconciliation?

A second specific issue that the EPA is interested in receiving comment on is the use of inventory control without metered dispensers. A 1984 EPA Chemical Advisory provides an inventory control procedure for non-metered tanks. In this method, the tank level is recorded using a gauge pole before and after each withdrawal and delivery. Changes in the tank level are estimated by comparing level readings made immediately before a withdrawal to the reading after the previous withdrawal. These differences can be accumulated over a period of time to calculate a loss or gain. The Agency did not allow this method for petroleum UST systems in today's proposal because it does not know of any criteria that can be used with this method to indicate a release. The Agency also does not have any way of confirming the accuracy and reliability of this method and seeks comment on the performance of this type of inventory control method and whether it should be allowed in the final regulations.

EPA is also interested in receiving comments on whether inventory controls should be required at all UST systems (where it is feasible to apply) before and after UST owners and operators phase in release detection over a 3- to 5-year period (the phase-in of release detection was discussed earlier in this preamble. As discussed earlier, EPA has identified several concerns with the current practice of manual inventory controls and is doubtful that it can be meaningfully applied on a widespread basis without significant increases in training and technical assistance. Even though numerous state UST programs require inventory control, today's proposal only requires that it begin within 3 to 5 years, and only if tank tightness testing is chosen as the method of release detection. EPA believes that application of the general phase-in schedule to include inventory controls will provide the regulated community with sufficient time to develop and implement the expertise and training necessary to ensure manual inventory requirements are carried out in a reliable way. EPA considered requiring a more rapid application of inventory controls at all UST systems (where it is feasible) than is proposed for the other methods of release detection, but is concerned that widespread implementation problems will result because of the labor-intensive nature of the method and the significant improvements and training that will be necessary to ensure sound practices are followed. The Agency solicits comment and information on this issue, including whether inventory controls would provide significant benefits and improvements in environmental protection if required at all UST systems where it is feasible.

b. Testing or Monitoring for Vapors Within the Soil Gas of the Excavation Area (Section 280.41(d))

Liquid hydrocarbon and other volatile products will vaporize when released into the soil surrounding the UST system. Today's proposal in 280.41(d) allows the use of a monitoring method that samples the soil gas in the excavation area surrounding the UST system to detect the presence of vapors that result from such releases.

The use of soil vapor monitoring for UST system release detection is very recent. Therefore, only limited information and experience exists with vapor sensors used in this capacity. However, vapor monitoring has been used for other purposes for a number of years, such as for industrial safety and ground-water plume mapping. As a result, a wide variety of vapor detection devices are available.

Commercially-available, manually operated devices use several operating principles, including flame ionization, gas chromatography, infrared absorbtion, and photo-ionization. Permanently installed continuous sensors use several operating principles, including catalytic combustion, diffusion, solid state semi-conductors, and product permeable materials. Although there is little documented performance data for the wide range of vapor detection equipment that is commercially available for release detection, many of these devices are expected to be able to detect very small concentrations. (EPA has already begun a survey of available methods to validate information obtained from vendors.) For example, portable gas chromatographs can detect and identify compounds in the parts per billion range; photo-ionization devices in the parts per million range. The limiting factor in the systems' accuracy is more likely to be the design and placement of sensors in wells so as to intercept vapors, and the capability of the release detection equipment to interpret correctly the same readings, rather than the sensors' sensitivity in detecting them.

In evaluating the use of this method, the Agency had to consider the present lack of information concerning sensor capabilities and the characteristics of vapor transport in the unsaturated zone under various conditions. Likewise, the Agency had to consider the uncertainties associated with interpreting the meaning of vapor gas measurements at sites where significant previous contamination levels exist in the form of background interferences. Although EPA is currently undertaking several studies to better characterize these processes, only preliminary results will likely be available in some areas by the time EPA develops a final rule. Thus, the Agency considered rejecting the use of this method for release detection purposes until many of these technical issues are settled.

However, EPA has concluded that this method of leak detection may be usefully applied in a manner that will detect releases if used within certain limitations. Limited data based on practical field experience suggests that the vapor levels in the excavation zone will rapidly and dramatically increase when a release of a highly volatile liquid (for example, gasoline) occurs. One study found that when fuel samples were introduced at 10 feet below the ground surface, trace quantities of vapors were detected at the surface within 10 hours. Vendors of these devices widely claim that vapor levels jump to 3,000 to 12,000 ppm when

gasoline releases into the excavation area. Therefore, today's proposal provides several important limitations on the use of this method that, when combined with corrective action of releases that are detected in the UST excavation area, are expected to effectively minimize potential adverse impacts to ground water.

Several primary limitations on the use of soil vapor monitoring for release detection are being proposed today:

- The backfill must be sufficiently porous to allow diffusion of vapors readily into the excavation area;
- The released liquid must be sufficiently volatile to result in detectable vapor levels;
- The measurement of soil gas contamination must not be rendered inoperative by ground water, rainfall, or flood conditions so that releases cannot be detected for more than 30 days;
- The level of background vapor contamination must not interfere with the detection of releases from the UST system, and cannot be greater than 500 ppm of total hydrocarbons as measured in the soil gas;
- The monitoring equipment must be capable of being pre-set to detect the type of regulated substance stored in the tank system at significant levels above background contamination in the excavation area;
- The monitoring well network (including the number and location of monitoring wells) must be designed to detect a release from any portion of the UST system in the excavation area, and be based on an assessment of the conditions immediately surrounding the UST system; and
- All monitoring wells open to outside access must be clearly marked for their purpose and secured from unauthorized entry.

Each of these limitations is discussed in more detail below.

(1) Porous Backfill in the Excavation Area (Section 280.41(d)(1)). Today's proposal limits the use of this method of release detection to UST excavation areas that have sufficient porosity for the diffusion of vapors from releases to the monitoring wells in the excavation area. As previously mentioned, EPA has recently begun the study of characteristics of vapor transport in the unsaturated zone. However, rapid transport of vapors would occur in many of the types of backfill that are used when proper installation procedures are followed (e.g., use of pea gravel, sand, crushed rock). Therefore, this proposed limitation is intended to exclude the use of this method at existing UST systems where soil removed from the excavation area was simply placed back at the time of installation, particularly if less than the most porous types of soil were used. The Agency is less confident that vapor detection will work as reliably under conditions where the soil gases might be just as likely to diffuse into the surrounding soils as into the other parts of the excavation area itself; such as excavation areas refilled with native surrounding soils or at sites with previous man-made disruptions (for example, pipeline conduits and foundations) within or beside the excavation area. The Agency suspects that many older installations will not be able to meet this limitation. Newer installations will generally be surrounded by porous soils if recommended good installation practices were followed.

(2) The Volatility of the Liquid Stored (Section 280.41(d)(2)). Liquids volatilize at different rates and, thus, intrinsically make available different concentrations of vapor gases for detection when a release occurs. Gasoline and many other petroleum products and solvents contain highly volatile components that are expected to produce high levels of vapors in the excavation area as a result of a release. Other substances, such as diesel fuels or heating oils, have a much lower volatility and will produce a much lower level of vapors as a result of a release. Today's proposal includes a general performance standard that limits the use of this method to UST systems storing liquids that are sufficiently volatile to be detected by the device and sampling method employed.

Sampling of gases may be either active (e.g., a soil gas sample is sucked through tubing to a central detection device) or passive (the gas travels unassisted based on the natural rate of diffusion through the excavation soil to the sensor). Thus, passive systems of vapor detection are expected to be less likely to meet this criterion, particularly with the less volatile substances (e.g., diesel fuels), than the more active sampling devices that mechanically draw soil gases towards the sensors. In general, the passive detectors may also need to be set to detect lower concentrations of vapors than the active sampling sensors, and also may need to have more monitoring sensors to be able to detect the volatilized gases from a release into the excavation area.

EPA expects that the determination of whether releases of the product stored in the UST will be reliably detected by a particular network of sensors is necessarily a site-by-site determination and cannot be specified for all sites in regulation. The volatility of the substance, the type of backfill in the excavation area, the type of sampling device used (active or passive), as well as the location and number of wells employed must all be considered together to determine if this limitation can be met at the site.

Today's general standard is intended to provide state and local governments and the regulated community the flexibility to design systems that are appropriate to the particular excavation area, the tank system configurations, and the substances stored. EPA has initiated several studies that will more completely characterize these factors and how they need to be considered. If the Agency decides to allow this method of release detection in the final rule, guidance will be provided on how to assure this limitation is met.

(3) Avoidance of Other Interferences (Section 280.41(d)(3)). EPA is today proposing a general performance standard that requires vapor monitoring be used only where ground water, rainfall, or soil moisture will not render the monitoring technique inoperative so that a release could go undetected for more than 30 days. This limitation is intended to ensure that the owner and operator applies this method at a particular site only after determining there are no interferences that could render this method of monitoring useless for release detection purposes over extended periods of time. Vapor monitoring sensors must not be located in the excavation area where they would be subject to inundation by a high water table. Also, at sites located in areas prone to flooding for extended periods of time, this method would not work and is insufficient for release detection purposes. A site located in a 25-year flood plain, for example, may not be able to make use of this method of detection if it is located in the excavation area such that it could be inundated by these flood waters for more than 30 days. Finally, in locations where heavy and continuous levels of precipitation are common, the type of monitoring method chosen, including the location of wells, would have to be able to detect soil vapor contaminants under these conditions at least every 30 days. The adequacy of detection performance under frozen topsoil conditions should also be considered.

(4) Background Contamination and the Capability of Vapor Monitoring Equipment (Section 280.41(d)(4)). Today EPA is proposing to limit the use of external vapor monitoring methods to sites that have relatively low levels of background concentrations of hydrocarbons to prevent an excessive number of false alarms and false

negatives (leaks not being detected). Previous contamination from surface spills and leaks can contaminate the soil and ground water to the point where small, slowly developing leaks may be difficult to detect. Natural factors such as fluctuating barometric pressure, temperature, soil moisture content, methane, microbial activity and ground-water elevation and direction are believed to contribute to fluctuations in contaminant levels that are measured by external leak detection methods at previously contaminated sites. The Agency has sought to develop a standard for when existing contamination is so high as to prevent the selection and use of vapor monitoring methods as an option in detecting new leaks or spills.

There appears to be very little experience with applying vapor monitoring to hazardous substances. The proposed wording in 280.41(d)(4) requires that the level of background contamination not interfere with the detection of release. This general performance standard establishes the limitation that all volatile hazardous substances are, in a similar manner, masked by the same background interferences as are volatile petroleum products when they are subject to vapor monitoring in the excavation area. This general standard is intended to make it clear that with the use of this type of method, it is incumbent upon the owner and operator to determine how the problem of background concentration will be adequately controlled given the sensitivity of the equipment used, the volatility of the substance stored, and the background level (if any) of contamination at the site's excavation area.

Today EPA is proposing to limit the use of this method to sites that have a background concentration of vapors in the excavation area of no more than 500 ppm of total hydrocarbons. This requirement stems in part from EPA's concerns about the interferences that are posed to this detection method by background vapor concentrations from prior releases; for example, available field data suggest that background vapor concentrations in the excavation areas at existing retail gasoline stations may range from essentially zero to 300,000 ppm. EPA is planning a field monitoring program to better characterize background vapor concentrations. However, it is expected that there will often be some background concentrations of vapor contamination in the excavation areas surrounding many UST systems that stem from an accumulation of small spills as a result of past poor housekeeping practices.

The proposed requirement is also based upon consideration of the unlikely event of a release occurring that adversely affects human health and the environment while the background concentration of total hydrocarbons in the excavation area remains below 500 ppm. As stated earlier, vapor detection sensors are believed to be very sensitive for use in monitoring for releases because they use the phenomenon that volatile liquids such as gasoline will, in a porous soil medium such as sand, rapidly volatilize and spread out through diffusion in the soil at high vapor concentrations that are relatively distant from the source of contamination. EPA has documented cases where vapors traveled hundreds of feet underground from the location of the volatile liquid that was released underground. Vapors have been noted in many cases to travel much farther than the liquids released underground, though not necessarily in the same direction. With an ongoing release (a leaking tank or pipe) or a large spill, soil gas vapor concentrations will generally increase to high levels in the presence of this continuing source of volatile liquid in the excavation area. With small spills of limited volume (for example the accumulation of many small spills from sloppy past practices), similar to the evaporation of liquid gasoline above ground, the volatilization/diffusion process will continue underground until the original release volume has almost entirely evaporated—except for residual amounts that become bound to the soil. Thus, a low background contamination vapor level in the soil gas of the porous soil medium that typically surrounds an UST system in the excavation area is a good indication that no recently released liquids are available nearby to be volatilized.

By setting today's proposed standard at a maximum background concentration of 500 ppm of total hydrocarbons in the soil gas of the excavation area, EPA intends to not allow vapor monitoring at sites with higher background concentrations (for example, 1000 ppm) that might, under some circumstances such as improper well placement, result in a release going undetected because it was masked by pre-established contamination levels. The level proposed today may actually be much lower than could be tolerated by available vapor monitoring methods for purposes of detecting releases into an UST excavation area. A release of a volatile liquid into an excavation area constructed according to current recommended practices is reported (by vendors of this equipment and some local officials already allowing it) to diffuse rapidly through the excavation area soils at much higher concentrations than 1000 ppm. However, particularly at background soil gas vapor concentrations of higher than 500 ppm, the Agency is concerned that an UST site might already have a need to undertake corrective action in accordance with Subparts F and G of today's proposed rule.

The Agency also considered setting the maximum allowed level of soil gas background contamination much lower, for example, at a concentration of 100 ppm total hydrocarbons. At this lower threshold level, however, the Agency is concerned that measured concentrations of total organic hydrocarbons in the soil gas of the excavation area can fluctuate widely due to: (1) Small amounts of residual liquid contamination bound to the soil that can volatilize when the barometric pressure lowers; (2) a rise in the nearby water table that frees some residual contamination previously bound within the soil matrix that then volatilizes; (3) a new surface spill, even a very small one; or (4) the impacts of several other factors currently under study by the Agency but not completely understood yet. Because of such factors, EPA believes setting the background standard at 100 ppm in the soil gas of the excavation area would virtually eliminate the use of this method of monitoring at existing sites because the number of false positives would be unacceptably high. This low background level was not chosen also because it is not believed to be necessary for assuring that a release of volatile liquids in the excavation area will be detected. For example, liquids present in the soil of the excavation area at concentrations below 100 ppm of total organic hydrocarbons (that have not yet completely volatilized) are expected to result in concentrations of total hydrocarbons in the soil gas that are much higher than 100-500 ppm. Thus, this approach coincides with EPA's proposed requirements on release reporting, discussed later in this Preamble, that requires reporting of all soil contamination that is greater than 100 ppm of total hydrocarbons.

The Agency is aware that some methods, such as the use of tracers in the tank, may permit external leak detection monitoring to be used at existing sites with relatively high background concentrations of hydrocarbons. Careful selection of the sensor, design of the monitoring network, and manner in which the data

is interpreted from external leak detection methods may allow their use at sites where previous contamination has occurred. The Agency does not seek to limit the development or use of these methods at sites with previous contamination.

The Agency seeks to encourage the use of vapor monitoring so as to assure accurate and early detection of leaks; however, it may be necessary in the final rule to limit the use of the method through the establishment of not a single background contamination value (500 ppm TOH) but ranges of contaminant levels where the use of vapor monitoring may be preferred, marginal, or unacceptable. Data from soil-gas measurements or soil cores, made during the site characterization effort, may be used to assess the applicability of a particular vapor monitoring system. Factors such as seasonal variability, network design, and method selection, which are known to affect soil-core and soil-gas measurement data, are presumed to be less important in the measurement of existing contaminant concentrations at sites when ranges of background concentrations are used to predict the accuracy and reliability of a vapor monitoring system at a particular site. Comments are solicited on this approach as well as on the procedures to be used in reporting data on existing contaminant concentrations. What ranges can be established to limit the use of external leak detection at existing, previously contaminated sites?

Another alternative to the establishment of a standard, or ranges, to limit the use of vapor monitoring at sites with relatively high background levels of contaminants is the on-site calibration of a vapor monitoring system with a small, controlled release of a volatile tracer. Such a test would provide an estimate for the amount of product that could be detected from a leaking tank and the time that would be required for the leak to be detected. Such an approach would be particularly useful in setting the alarm level for an external vapor monitoring system. However, future research is required before the Agency can provide technical guidance on this approach for assessing the performance of vapor monitoring equipment. Comments are solicited on this concept.

(5) Must Be Capable of Being Pre-Set To Detect the Type of Substance Stored at Significant Levels Above Background in the Excavation Area (Section 280.41(d)(5)). In developing today's proposal for vapor monitoring methods, EPA also considered proposing a threshold sensitivity requirement. For example, devices that are designed to detect only the explosive limits of hydrocarbon vapors would not be able to meet the requirements proposed today. However, as mentioned previously, some devices are available that can detect concentrations of contaminants in soil gas in the parts per billion range. EPA has proposed that the monitoring device used must be able to detect the background concentration level in the excavation area (which must be less than 500 ppm of total organic hydrocarbons) and "any significant increases" above it. The determination of what constitutes a "significant increase" for detection purposes will depend in part on what is the background level in the excavation area and the volatility of the substance stored in the UST system. A small increase over the background level would have more significance for lower volatility substances such as fuel oil than it would for highly volatile substances such as gasoline.

What is "significant" may also differ between passive and active vapor monitoring methods, with smaller increases having more significance for passive methods that require vapors to reach the sensors through the process of diffusion. Such small increases have less importance with methods that advect (mechanically pull) vapors to the monitoring sensors through suction, unless an increase in the level continues over time. Today's minimum requirements for at least one measurement at each sensor every 30 days will result in numerous readings that could be evaluated to determine whether such increasing concentrations over time represent a statistically significant trend.

EPA believes that evaluation of soil gas concentrations over time will identify the trends that will define a significant increase. Such trend analysis may reveal unabated increases in concentrations that provide clear evidence of a release. The Agency has initiated several studies concerned with environmental monitoring techniques. The results of these efforts are expected to be provided in guidance that will further explain how trend analysis should be used to determine whether an increase is actually significant or not. For example, any rapid and dramatic jump in concentration levels in the excavation area soil gas above the maximum background level of 500 ppm may be considered significant, for example, a measured jump to 1000 ppm of total organic hydrocarbons.

In today's proposal, the background standard against which a "significant increase" is judged is expressed in terms of a volumetric concentration of total organic hydrocarbons. This reference standard was chosen because it is a common measurement that can be made for all volatile substances. Vapor monitoring sensors can also be designed to detect particular constituents (such as benzene, xylene, and toluene) or volatile organic compounds (VOCs) in general. The determination of what is measured can significantly affect the way measurements are performed. For example, VOCs (including benzene) make up a small portion of the total hydrocarbons in gasoline. Therefore, equally effective monitoring would have to take place at proportionately lower concentrations for these other substances to assure that rapid detection would take place (for example, benzene at 5 ppm and VOCs at 125 ppm). Likewise, VOCs would tend to evaporate and diffuse very rapidly while the total hyrdocarbon measurement would be relatively slower to diminish through the volatilization/diffusion process. Thus, monitoring for benzene at low levels could miss very high concentrations of total hydrocarbons in the excavation area that are the result of large old leaks or spills where the passage of time has allowed the "light ends" of the product (e.g., benzene, toluene and xylene) to evaporate and move away through diffusion.

Today's proposal is in terms of a total organic hydrocarbon measurement in the soil gas because it is believed to be a more thorough test of the condition of the environment. It is at a higher level than corresponding values for benzene or VOCs because it measures the complete volatile fraction of a released regulated substance. For example, small concentrations of petroleum in the soil are generally going to produce high levels in the soil gas because of the volatility of hydrocarbons. Thus, EPA believes that 500 ppm total hydrocarbons found in the soil gas will be indicative of a much smaller concentration (e.g., 50 ppm) of total hydrocarbons in the soil or ground water.

(6) Sensor and Well Network Based on Assessment of the Excavation Area (Section 280.41(d)(6)). The number, type, and locations of sensors or wells in the excavation zone are important elements in the success or failure of vapor monitoring to reliably and rapidly detect releases. EPA considered the need to develop design requirements, such as the number and location of wells and their construction requirements. However, a general performance standard was proposed instead because

the optimum design of any given vapor monitoring system is based on the consideration of several site-specific factors, such as the type of soils in the excavation area; the level of the background contamination in the soil gas; the location of the water table; the size, number, and configuration of the tanks; the volitility of substance stored; and the type and location of monitoring devices used (e.g., passive or active, periodic or continuous sampling). Therefore, the performance standard simply requires that a monitoring well network be designed that is capable of intercepting the vapors resulting from any release of the regulated substance stored at that particular site. To comply with this requirement, a brief assessment of the factors mentioned above will be necessary to determine how many sensors or wells are needed, including their design and location. EPA has initiated research into the factors that impact monitoring well network design and will provide guidance in this area if vapor monitoring wells are allowed under the final rules. (See General Requirements section for more details concerning site assessments, well networks, sensor capabilities, and data analysis; all are topics on which the Agency is today seeking comment and information.)

This limitation is also intended to ensure that all detection takes place within the excavation area. Vendors of these devices commonly report that they should be used within the excavation area and local officials contacted by EPA who allow the use of this method have reported that this is a requirement they commonly employ to ensure more reliable release detection. Therefore, because of present limitations concerning data on soil vapor transport and the likelihood that vapors will disperse more quickly in the excavation area than in the surrounding undisturbed native soils, EPA has proposed limiting the use of vapor monitoring to within the excavation area.

(7) Marking Monitoring Wells and Securing from Tampering (Section 280.41(d)(7)). The final condition proposed for this method of release detection is that all monitoring wells be clearly marked and closed to outside access and tampering. This marking should make it distinct in appearance from that of the fill pipe. EPA has been informed by state, local, and industry officials about incidents where, for example, product deliveries have been inadvertently introduced into monitoring wells. EPA is concerned that such incidents could increase with today's proposed requirement that all vapor monitoring wells be located within the excavation area of the UST system. This proposal could also result in the placement of wells in close proximity to the tank fill port.

The requirement that monitoring wells be marked and secured from tampering can be met by simply locking well ports to prevent unauthorized outside entry and marking them as "observation wells." Care should be taken to not mark them with a color that signifies a fill port under the marking systems now prevalent in the retail gasoline marketing industry (as recommended by the American Petroleum Institute).

(8) Issues for Public Comment. Because of the limited experience with vapor monitoring as a release detection method, EPA is requesting comment on the appropriateness of each of the proposed requirements and standards, with supporting data and studies where available. Comments and information on detection limits, probabilities of detection and false alarms for various equipment, as well as on the appropriateness of every 30-day sampling using vapor monitoring is also solicited. EPA is especially interested in receiving information regarding the field performance of vapor sensors in detecting releases from underground storage tanks. The Agency requests comments specifically on whether the use of this technology should be limited at existing UST systems. Information and comments concerning the applicability and reliability of passive versus active vapor monitoring/sampling methods is requested.

The Agency requests public comment and available information, including summaries of field experiences, that would provide an indication of what constitutes an appropriate maximum background concentration and what constitutes a significant increase above background levels of contamination in the soil gas of the excavation area. For example, at an UST storing gasoline would an increase of 100 ppm, 200 ppm, 400 ppm, or 1000 ppm total hydrocarbons in the excavation area constitute a significant increase for release detection purposes? Are there advantages and disadvantages in the selection of the specific components of the soil gas to be measured (specific constituents, volatile organic compounds, total organic hydrocarbons) and should it vary for use in release detection versus the cleanup of releases?

The measurement of hydrocarbons, or organic solvents in the soil-gas, soil, and ground-water is a difficult process with the sampling and analytical methods being important factors. Standards are in various stages of development for many aspects of an on-going EPA site characterization study involving the measurement of organics. Soil-gas measurements may be made with a variety of methods some of which will identify individual constitutents in a complex mixture of hydrocarbons, e.g., gas chromatographic analysis. Some measurements include methane while others exclude this naturally occurring constitutent. Should soil-gas data used to characterize existing contamination at a site be reported in terms of ppm total hydrocarbons, or should some constitutents such as methane be reported separately? Should the units be in terms of ppm, or micrograms per cubic meter with respect to methane, benzene or some other standard?

The Agency also seeks information on the sensitivity, and reliability of external leak detection methods for use at previously contaminated sites. How and when can a leak of, for example, 0.1 gallons per hour be detected at a site with previous contamination? What levels of contamination will prevent external leak detection methods from being effective in detecting small, slowly developing leaks without an excessive number of false alarms? Data showing the fluctuation of contaminations over time at sites where leaks are not believed to be occurring is specifically requested. Data on the concentrations of organic contaminants in the soil gas, soils, and ground water is solicited for sites where no leakage from the tank system is believed to have occurred. These data will be useful in determining the long-term performance of external leak detection systems in contaminated environments where the sensitivity and response time of the external leak detection system must be assessed in relationship to alternative leak detection systems.

Finally, the Agency specifically requests comment on the applicability of the requirements proposed for vapor monitoring to new hazardous substance UST systems. Are more requirements necessary to assure that the use of this method can be done reliably with different hazardous substances? Do the requirements provide a sufficient standard of performance for UST owners and operators so that they may adequately develop a method that will work at a particular site, given the volatility of the substance stored?

c. Monitoring for Liquids on the Ground Water (Section 280.41(e))

Today's proposal also allows monitoring techniques that are based on detecting the physical presence of released liquids on top of the water table. Under this method, monitoring wells located within the excavation area take advantage of the physical properties of certain regulated substances that cause them to "float" on top of the ground water when released into the underground environment. This method can be used with most petroleum products because they are lighter than and largely immiscible with water, and may be used through a case-by-case variance for other regulated substances that are lighter than and immiscible with water.

Because it is keyed into particular properties of the liquids being stored, monitoring for liquids on the water table can be used for various types and sizes of UST systems. The technique also can be used for UST systems which are partially below the water table if the characteristics of the released liquid will cause it to float on top of the ground water. This method of release detection can be performed either manually or automatically. Three general techniques would be allowed:

- Physical inspection of ground water using a water sampling bailer to detect a visible thin film of product on the water table or to smell the product in the water sample;
- Application of a thin film of paste to a rod or tape which, when lowered into the well, will change color upon exposure to any hydrocarbons on top of the water table; and
- A variety of automatic sensing devices which, after placement in monitoring wells, can be continuously operated to electronically detect the physical presence of hydrocarbons on the ground water.

A major concern with the use of this method is that some soil and ground water will be contaminated before a release is detected. Some of the hundreds of organic compounds comprising gasoline are soluble in water and will dissolve and enter the ground water, including some which could under certain conditions present a risk to human health and the environment (such as benzene, toluene, and xylene in gasoline). This is particularly important because cleanup of an aquifer to drinking water requirements is not possible, as a matter of routine. On the other hand, several states allow the use of ground-water monitoring, reasoning that this method offers rapid and certain detection, if properly applied. In fact, at many sites no other method may work as well as ground-water monitoring to rapidly and assuredly detect leaks from single-walled tank systems. If EPA barred the use of ground-water monitoring, therefore, the effect might be the creation of a *de facto* class of tanks at some sites where secondary containment would be required. EPA is seeking public comment on this point.

Despite these concerns, however, the Agency has concluded that this method can be applied to detect and minimize releases if it is used within certain prescribed limits which are intended to ensure rapid detection. Therefore, today's proposal provides several important requirements on the use of this method that, when combined with rapid corrective action when a release is detected, is believed to effectively minimize potential adverse impacts to ground water.

The primary limitations on the use of ground-water table monitoring being proposed today are:

- The substance stored is immiscible in water and has a special gravity of less than one;
- The ground water must be in or very near the UST excavation area (never more than 20 feet below the ground surface) and the backfill soils must have a sufficient hydraulic conductivity (not less than 10^{-3} cm/sec) to allow the released product to flow freely to the monitoring wells;
- Monitoring equipment or practices must detect at a minimum the physical presence of a release of 0.125 inches of free product pooled on the ground water in the monitoring wells;
- The monitoring wells must be located in the excavation area, and the monitoring well network must be designed to detect a release from any portion of the UST system and be based on an assessment of the conditions immediately surrounding the UST system; and
- All monitoring wells open to outside access must be clearly marked for their purpose and secured from unauthorized entry.

Each of these limitations is discussed in more detail below.

(1) The substances stored is immiscible in water and has a specific gravity of less than one (Section 280.41(e)(1)).

Today EPA is proposing to require that ground water table monitoring only be allowed where the substance stored in the UST system is immiscible in water with a specific gravity less than one. This requirement is intended to restrict the use of this method to situations where a release from the UST system of the regulated substance stored will pool on top of the nearby water table (like many of the lighter petroleum substances such as gasoline). A specific gravity of less than water will assure this. The requirement also establishes the general criterion of immiscibility to assure that even small releases will not rapidly dissolve in water so that a sensor located on top of the groundwater table will not be able to detect the presence of the released material.

(2) Twenty Foot Depth to Ground Water and Porous Soils (Section 280.41(e)(2)). Today's proposal limits the use of this method of release detection to areas with shallow depths to the water table and porous soil conditions. These requirements are intended to assure that potential impacts to the environment are minimized and that release detection is more certain. Typically, UST excavations extend between 10 to 15 feet below the ground surface. Thus, a release would only have to normally travel between 0 to 30 feet to reach the ground-water table (at 10 to 45 foot depths) and the point of monitoring. While the amount of the release necessary to reach a monitoring well will vary under site-specific conditions, EPA expects in the shallow water and highly conductive soil conditions proposed today that small releases will rapidly reach the monitoring wells, rapid detection will be possible, and corrective action would be relatively simple. The porous soil conditions with at least a 10^{-3} cm/sec hydraulic conductivity are also intended to ensure rapid detection. Existing UST systems with proper installation procedures and sand or gravel backfill will be able to meet this condition provided that the soils beneath the UST system have a hydraulic conductivity of at least a 10^{-3} cm/sec or more between the UST system and the location of the sensors in the monitoring wells on the water table. This minimum conductivity was selected to ensure that releases do not begin to travel laterally and miss the monitoring points. The above conditions also promote more certainty in detecting a release because they require the point of monitoring to be very close to the UST system and, therefore, assure that there is little potential for interference with rapid detection once a release occurs.

Some industry representatives have recommended in discussions with EPA that the use of this release detection method be allowed at locations with a greater maximum depth to the water table, such as 40 feet. After examining this option, EPA identified two concerns with the use of this method of detection

at such lower depths to ground water. First, this approach would allow an increase in the amount of release that could occur prior to detection and, thus, an increase in the impacts that could require more extensive corrective action (including the amount of underlying soils contaminated). As depths to ground water increase, there is also an increased concern that a release could travel sideways before reaching ground water due to unknown soil conditions such as a layer of less conductive silts or clays. This could result in the release missing the monitoring wells located beneath the UST until detection of the release (if ever) is even more significant and difficult to correct.

Representatives of one manufacturer of continuous automated ground-water table monitoring equipment have stated to EPA staff that this equipment is not recommended at locations where depth to ground water exceeds 20 feet. The state of Florida UST program requires that the depth to water table at the time of drilling not exceed 20 feet for this type of monitoring. EPA's proposed requirement reflects the concerns addressed in the paragraphs above and these established approaches, by proposing to limit the use of this method to areas where the seasonal maximum depth to the water table from the ground surface does not exceed 20 feet.

Another approach considered by EPA was to limit the use of this method to areas where ground water is within the excavation area (typically, between 10 to 15 feet from the ground surface to the excavation bottom). This would reduce impacts, possible interferences at greater soil depths, time to detection, and clean-up costs to the minimum possible. This limitation could be particularly important at sites with complex native soil structure that could enhance the flow of leaked product away from, rather than towards, monitors. EPA did not, however, propose limiting this method to excavation area water table conditions. The Agency does not believe the difference of 5 to 10 feet from the proposed depth of 20 feet would result in contamination that would significantly increase adverse impacts to human health and the environment. In using a seasonal maximum depth to ground water, the Agency expects the distance between the excavation area and the ground water to be negligibly small for detection and cleanup purposes.

Finally, EPA is also concerned that ground-water table monitoring in relatively impermeable soils (or in soil with impermeable layers), or in disturbed soils, could result in a horizontal movement of released product to areas other than where the monitoring wells are located. Today's requirements that such methods be used only in highly conductive soils (for example, sand) is intended to minimize this concern by limiting its use to soils where this potential problem would be unlikely to occur.

(3) Capability of Monitoring Equipment or Practices (Section 280.41(e)(3)). In developing today's proposal, EPA considered the effectiveness of both the manual or automatic ground-water table monitoring techniques. A major constraint in trying to limit these methods to a particular threshold of detectability is the current lack of field experience and performance data on the long term reliability and operating performance of automated equipment.

EPA believes that both the manual and automated approaches have certain advantages and disadvantages. For example, manual monitoring relies on the ability and motivation of the owner or operator to properly perform the test at required intervals, and the tests are somewhat qualitative (determined by human sight or smell of the contents in a bailer that pulled a water sample from the observation well). As stated previously in this Preamble, most existing UST systems do not have release detection. Thus, this manual approach would require a significant change in owner and operator behavior. Manual methods do allow inspectors to take their own samples during visits to the site. Continuous, automated systems are subject to failings in proper installation, operation, and maintenance. However, they have the distinct advantage of being continuous and automatic and not subject to the need for routine human attention.

In order to provide flexibility to both the states and the regulated community, while encouraging technology innovation and improvement, EPA has decided to allow both manual and automatic methods under the proposed rule.

EPA also has concluded there is a need to limit the performance of both the manual and automated approaches so that small releases will be detected. Manual approaches, whether through physical inspection of monitoring samples for odors or a visual sheen, or the use of detection pastes, are invariably somewhat subjective. However, when the presence of product can be seen or smelled, a release is expected to be small if quick action is taken to correct the problem. Existing field experience with the automated detection devices is limited because they have only recently become available. EPA has no documented test results concerning their performance. However, manufacturers of these devices consistently claim they can detect product on the water table where it is within a thickness of from $\frac{1}{32}$ to $\frac{1}{8}$ inches. Therefore, EPA is proposing today a requirement that devices used at a minimum be capable of detecting a release measuring $\frac{1}{8}$ inch on the ground water. This approach applies to both the use of automated or manual techniques. This level of detection is expected to be achievable using current practices and equipment already available to the regulated community.

(4) Monitoring Well Network Based on Assessment in the Immediate Vicinity of the UST (Section 280.41(e)(4)). An important factor in the success or failure of the use of the ground-water monitoring method is the number, type, and location of wells that are used. In developing today's proposal, EPA considered requiring detailed design criteria. For example, Florida's requirements specify such criteria as minimum well diameter, well screen location, minimum screen opening size, backfill material, construction material, seal requirements, and cap requirements.

However, EPA has decided not to specify this level of design detail and is instead proposing a general performance standard requiring that the system be designed to detect a release from any portion of the UST system based on an assessment of the area in the immediate vicinity of the UST system (i.e., the excavation area and soils and water table immediately below it). This general approach is intended to provide the states and the regulated community significant flexibility in the design of well systems that allow various location-specific characteristics and local approaches to be considered.

When released liquids reach the water table, their dominant movement is expected to be primarily in the direction of ground-water flow. However, this direction is not often precisely known and is often difficult to determine in developed areas. Therefore, placing several wells on various sides of the UST system will increase the probability of detecting a release quickly. EPA considered requiring a minimum number of wells in various configurations and locations. However, there is no one optimum number and location of wells for all locations and EPA believes a brief assessment will have to be conducted at each location to tailor an approach that suits the conditions in

and immediately below the excavation area. The optimum approach will vary by the size, number, and design of the tank, as well as other site-specific factors (such as the depth to the water table and the type of substance stored). EPA has initiated research concerning the factors that influence proper well network design. EPA intends to publish guidance concerning an approach to determine the proper number, location, and types of wells under various conditions, if water table monitoring wells are allowed under the final rules.

In general, EPA has concluded that all monitoring wells should be located as close as possible to the UST system when using ground-water table monitoring. This is believed to assure the fastest and most certain detection of releases. Thus, today EPA is proposing that all monitoring wells must be located close enough to the UST system to be within or through the UST excavation area. Because EPA believes that the predominant flow of a release under the conditions specified today will be directly down to the water table, and well location through the excavation area will assure that the placement of monitoring points will be as close as possible to the pooled release.

(5) Marking Monitoring Wells and Securing Them From Tampering (Section 280.41(e)(5)). Today's proposal for monitoring liquids on the ground water requires that monitoring wells be located in the excavation area. As was discussed for vapor monitoring, EPA believes that the owner and operator must take steps to make sure all such wells are of different designs than product fill ports or otherwise clearly marked and closed to unauthorized outside access. Today's proposal requires that these simple, prudent steps be taken at all monitoring wells.

(6) Issues for Public Comment. EPA is seeking public comment and performance-related information regarding the use of liquid monitoring on the water table. EPA is particularly interested in receiving comment on the appropriateness of the requirements proposed for the use of this method of release detection. The Agency is also interested in receiving information on the design and use of this method in the field, particularly the likelihood of ambiguous or false detection results that are the result of previous contamination. Comments on whether specific techniques of ground-water table monitoring, or the method itself should be allowed, are also solicited; particularly in drinking water aquifer locations.

d. Monitoring for Releases in an Interception Barrier (Section 280.41(f))

Interception barriers are generally basin-shaped impermeable liners installed beneath the UST system to intercept downward-migrating releases and direct them to a monitoring well. These barriers have no walls and only offer partial containment of releases. Interception barriers are generally for use in regions where ground water will not normally reach them. They are often constructed of compacted natural clays, cement, soil-cement mixtures, or of synthetic materials. Today's proposal allows the use of interception barriers as a way of enhancing the capability of a detection device to intercept and detect a release from any portion of the UST system.

Because this method of monitoring enhancement is often used with only one monitoring well, it is important that the interception barrier properly intercept and direct releases to this single monitoring point. A faulty design or installation that does not catch a release; a crack or hole in the barrier; or improper routing of the release to the monitoring well are examples of ways this simple release detection enhancement scheme can potentially be undermined. Because of these and other possible problems with this method of release detection, the Agency considered not allowing it. However, it is allowed in at least three states (California, New York, and Kansas). and the Agency has concluded that it can provide adequate release detection at UST systems if carried out within certain limitations. Therefore, today's proposal includes this method subject to certain requirements that must be met before it can be used at a particular UST system. The requirements on the use of interception barriers that have been proposed today include:

- The interception barrier must be sufficiently thick and impermeable to ensure interception and detection of a release from the UST system;
- It must be designed to intercept any release and ensure its detection in the monitoring well;
- It must be compatible with the substance stored so as to not deteriorate in the presence of the released product;
- Soil moisture or rainfall must not render the monitoring method used inoperative for release detection purposes for more than 30 days;
- The barrier must always be above the highest historical ground-water level and not in a 25-year flood plain, unless the barrier and monitoring designs are intended to still operate under such conditions; and
- Monitoring wells must be clearly marked (or of a different design) and closed to unauthorized outside access and tampering.

These limitations are discussed in more detail below.

(1) Impermeable Barrier (Section 280.41(f)(1)). Today's proposal allows the use of interception barriers only if they are sufficiently thick and impermeable to permit interception and detection of releases. This limitation is intended to ensure that the barrier is, in fact, an obstacle to the downward migration of a release; and that the barrier would cause the release to accumulate and make contact with the barrier's detection device. Natural clays must have at least a $1x10^{-6}$ cm/sec impermeability. This value was chosen on the basis that a release would not be able to traverse a two foot thickness of such material in one month's time. (This is a typical minimum thickness that can be easily spread and compacted by hand on the bottom of an excavation area.) Also, artificial liners and cements must be of sufficient thickness to avoid cracking and splitting due to settling or other underground pressures.

(2) Intercept and Detect Releases (Section 280.41(f)(2)). Another general limitation to the use of interception barriers is that they must be designed to intercept all releases and ensure they are directed to the monitoring well. Because a release must be captured by the barrier and directed to the monitoring well before it can be detected, the design and construction of the barrier is important for the release detection to work. The barrier must be large enough to catch all releases and must not settle, warp, or otherwise deteriorate so that the release is misdirected away from the monitoring well.

There are no codes or recommended practices available concerning the design and construction of barriers. Therefore, EPA is proposing a performance standard for the design and construction of the barrier which must be met by the owner and operator utilizing this method. The barrier performs the function of enhancing the performance of the monitoring well(s) and thereby foregoes the need for several monitoring wells that follow a careful network design around the UST.

(3) Barrier Compatibility (Section 280.41(f)(3)). Whatever type and design of barrier is used, it is important that it be compatible with the substances stored in the UST. Small spills or releases cannot be allowed to undermine the integrity of the barrier because of the critical function it

performs in detecting releases. If the integrity of the barrier is undermined in any way by released product so that it will deteriorate and not deter a release for detection, the UST will no longer be equipped with reliable release detection.

(4) Soil Moisture, Rainfall, and Ground-Water Level (Section 280.41(f)(4)–(5)). The presence of water, from whatever source, within the interception barrier can undermine the monitoring device's ability to detect releases. Some barriers are designed to act as a bathtub and the monitoring is designed to take place on top of the captured water within the "wet" barrier. Other systems are so-called "dry" detection methods because they depend on the detection of released liquids within the low area (sump) of the barrier and pooled water can hinder the accuracy of this determination. Thus, this proposed general performance standard requires that the UST owner and operator consider possible interferences that could overcome the effectiveness of the barrier's detection technique, including a rising water table that overtakes the monitoring well's location within the barrier or a surface water saturation event in a flood-prone area (e.g., a 25-year flood plain) that could inhibit the detection of a release for more than 30 days.

(5) Marking Monitoring Wells and Securing Them from Tampering (Section 280.41(f)(6)). Today's proposal could result in a monitoring well in the excavation area that is open to aboveground, outside access. For the same reasons as discussed under other methods, these wells must be clearly marked and secured from unauthorized access and tampering.

(6) Issues for Public Comment. EPA solicits comment and information concerning the performance of interception barriers, particularly their efficacy in detaining and directing releases reliably to ensure their detection. EPA specifically requests comments and information concerning the proper design and use of such barriers, for example, the use of "dry" as contrasted to "wet" sump techniques of release detection. Also, the Agency requests comment concerning the 1×10^{-6} cm/sec permeability requirement. EPA is concerned that small releases may not be intercepted and directed to the monitoring point by this type of barrier.

e. Automatic Monitoring of Product Level and Automatic Inventory Reconciliation (Section 280.41(g))

Automatic product level monitoring and automatic inventory reconciliation are two methods of release detection that rely on measurement of product volume in the tank. In product level monitoring the product level in the tank is measured several times during a period when there are no product inputs or withdrawals. A consistent drop in product level over a several hour period can indicate a release from the tank. In the second method, automatic inventory reconciliation, the operator reconciles product deliveries, withdrawals and inventory each day to identify shortages. A large shortage in a single day or small, persistent shortages over a month can indicate a release of product. Today s proposal allows the combined use of automatic product level monitoring and automatic inventory reconciliation to detect releases. Automatic product level monitoring requires measurement of small changes in product height, as little as 0.001 inches. In addition, small changes in product temperature must also be measured to accurately compensate for temperature-induced changes in the product volume. Several level sensing systems are available for UST systems and are claimed by vendors of these devices to detect release rates of 0.2 gallons per hour. Although there is little documented performance data for these systems, the sensitivity of these devices is expected to be extremely good in most situations. In fact, some manufacturers claim that their systems reliably detect release rates of 0.1 gallons per hour. There are EPA studies in progress that are evaluating the performance of these automatic level sensing systems.

Automatic inventory reconciliation requires that the product inputs, withdrawals and the stored volumes are reconciled daily for an extended period of time. Many of the errors associated with these measurements are random and a loss trend that is smaller than the typical measurement error can be detected by analyzing many daily losses as a group. For many years, manual methods have been an industry-recommended practice for detecting losses due to both theft and tank system leaks and is widely practiced. Generally, automatic inventory reconciliation requires significantly less diligence on the part of the operator to ensure consistent and accurate inventory computations.

There are several major concerns with the use of either automatic product level monitoring or automatic inventory reconciliation as release detection methods. Similar to tank tightness testing, there is a lack of performance data for product level monitoring systems. Also, the product level monitors detect releases from the tank only, and do not sense losses from the pipe system. Although significantly less so than manual methods, some automatic inventory reconciliation equipment involve considerable operator involvement, and with it, opportunity for human error. The Agency considered not allowing the use of either of these methods because of these major issues. However, EPA believes that these methods may be usefully applied in a manner that will detect releases if they comply with certain performance requirements. Today's proposal provides several important requirements concerning the use of these methods that, when combined with any necessary corrective action when a release is detected, are believed to effectively minimize potential adverse impacts on ground water.

Today's proposed requirements on the use of automatic product level monitoring (section 280.41(g)) are that the test be conducted at least once every 30 days when the tank is at least 80 percent full, and is capable of detecting a 0.2 gallon per hour leak rate with a probability of detection of 0.99 and a probablity of false alarm of 0.01.

Proposed requirements for the use of automatic inventory reconciliation are the same requirements proposed for inventory reconciliation used with tank tightness testing, except that inventory measurement must be done automatically:

- Inventory reconciliation controls must include reconciliation of inputs, withdrawals, and stored inventory each operating day so that a release greater than 5 percent of flow through on a weekly basis or 0.5 percent of flow through on a monthly basis will be detected;
- The height of the stored inventory must be automatically measured to a 0.125 inch accuracy;
- Inputs must be reconciled with delivery receipts by measurement of tank inventory prior to and after delivery;
- Deliveries must be made through a drop tube; and
- The product dispensing must be metered and recorded within an accuracy of 5 cubic inches for every 5 gallons of petroleum withdrawn.

These proposed requirements are discussed in more detail below.

(1) Use of Both Methods Together. Today's proposal requires that both automatic product level monitoring and automatic inventory reconciliation be used in combination. As previously mentioned, EPA has concerns about the performance of either of these methods

used alone. Product level monitoring generally can only be used to detect losses from the tank, so another method of release detection must be used for the piping system. Second, the performance claims of the product level monitoring system manufacturers have not been confirmed through independent testing nor is the reliability of these systems exactly known. Vendors of these devices do not commonly claim that product level monitoring can be done with the same effectiveness as tank precision tightness testing. Although testing and evaluation programs are in progress, EPA has concluded that it is prudent in this situation to require a second, redundant method (automatic inventory reconciliation) that is generally available using the same equipment to increase confidence that releases will be detected. Third, as with precision testing, automatic product level monitoring cannot be conducted on a continuous basis because inputs and withdrawals interfere with the test results. Often stations operate 24 hours a day, 7 days a week and must schedule monitoring periods. In such situations, automatic inventory reconciliation provides more frequent release detection. Conversely, the Agency is concerned that automatic inventory reconciliation, used alone, still may not provide adequate release detection because it may be subject to considerable error. EPA believes that requiring these automatic techniques to be used in combination increases confidence that releases will be detected, and that the incremental costs will be small because several level sensing systems are available that can perform both tank level sensing and inventory reconciliation operations.

(2) Level Monitoring Requirements (Section 280.41(9)(1)). Today's proposal requires that product level monitoring must be conducted at least every 30 days. As mentioned above, some stations are operated continuously and therefore their operators will have to schedule product level monitoring periods. Other stations close for a period each night, but the tank may not always be 80 percent full at night. The Agency considered requiring more frequent product level monitoring, but this is believed to be unnecessary if inventory is reconciled daily. Another consideration is that owners and operators would have some difficulty scheduling more frequent tests, even if done automatically.

Today's proposal also requires that the tank be at least 80 percent full during the test because this ensures that more of the tank surface is checked for releases. The Agency considered requiring the tank to be completely full, but decided that would make the performance of the test unnecessarily difficult for the regulated community to achieve. Tanks are routinely used at below 80 percent capacity most of the time during operation. Also, because this is a minimum requirement, the Agency expects the test will sometimes be conducted at full tank capacity.

Today's proposal requires that product level monitoring be conducted to detect a 0.2 gallon per hour leak rate, with a probability of detection of 0.99 and a probability of false alarms of 0.01. The 0.2 gallon standard is based on manufacturers' performance claims. As previously mentioned, the Agency is not aware of independent performance data for these systems.

The Agency chose this performance standard because it believes that it will challenge the manufacturers to prove that their systems can meet the standard and thereby will result in the approved use of these systems. EPA recognizes that the currently available systems may not provide adequate performance on tanks larger than 12,000 gallons.

The Agency's testing evaluation program in our Edison, New Jersey laboratory will soon be evaluating some of this equipment more closely. Should new information reveal that automatic product level monitoring is as effective as precision tank testing, this equipment may be held in the final rule to the same standard proposed today for tank tightness testing. The requirements proposed today for automatic product level monitoring are intended to hold users of these devices to the maximum performance described as achievable by their vendors. Therefore, while the proposal holds this equipment to a higher threshold rate than tank tightness testing, it is otherwise being held to the same probability of detection and false alarm.

(3) Inventory Reconciliation Requirements (Section 280.41(g)(2)).

Today's proposal sets the same requirements for inventory control and reconciliation as when it is required in combination with tank tightness testing, except that it must be performed using the same automatic equipment used for the monthly product level monitoring. (See the discussion of inventory controls in Section VI.D.3.a. of this Preamble for details concerning these requirements.) This equipment can generally be used for both purposes and today's proposal requires that they be used in combination (in order for it to satisfy today's requirements for release detection).

Although the performance of automatic inventory control and reconciliation has not been quantified, it is not yet believed to be sufficiently accurate to meet the performance standard of 0.1 gallons per hour required for the precision tightness test discussed earlier in this section of the Preamble. Therefore, it is not presented as a separate testing alternative in this proposal, unless it is used in combination with semi-annual tightness testing or monthly automatic product level checks. EPA, however, may accept automatic inventory reconciliation alone as a viable alternative release detection method in the final rule should it be demonstrated to meet the tank tightness test standard. The Agency solicits comment and performance information concerning the use of this method for release detection purposes.

f. Interstitial Monitoring Between the UST and a Secondary Barrier (Section 280.41(h))

Interstitial monitoring is a method of detecting releases in the space between the UST and a secondary barrier. It is believed to be reliable, easy to use, and the least expensive release detection system to operate once the secondary barrier is provided. Today's proposal allows the use of interstitial monitoring techniques that sample automatically or manually in the space between double-walled tanks and piping systems or single walled tanks and piping surrounded by an excavation liner.

The appropriate use of interstitial monitoring techniques varies with the design of secondary barrier used. The most common methods include either the use of concrete vaults, double-walled tanks and pipes, and synthetic flexible membrane or clay liners in the UST excavation area. Most of the various sensors associated with the liquid and vapor monitoring methods previously discussed for the other methods of release detection can be used within the secondary barrier. In many cases only one monitor is necessary because all releases are contained and, thus, more easily detected by a single sensor.

As with the case of other methods of release detection, there is little performance data concerning the use of the various techniques of release monitoring within the interstitial area between the UST system and the various types of secondary barriers surrounding it. Although this method is commonly perceived to be the most reliable form of release detection, an important concern with the various techniques of interstitial detection is

their improper use (e.g., the careless design, location, operation, and maintenance of the detection sensor or secondary barrier). When improperly used, these systems could result in false alarms or fail to detect releases but still provide a false sense of security concerning the UST system's integrity, the method's ability to detect releases, and the containment of releases. Another concern is ensuring the integrity of the secondary barrier so that releases do not escape detection by the single monitoring sensor. Today's proposal establishes several requirements concerning the use of secondary barriers and interstitial monitoring that are intended to ensure that it is effective in detecting releases. These limitations are:

- The design construction and installation of the secondary barrier must assure detection of any release from the UST system.
- Double-walled UST systems must use monitoring that is capable of detecting any breach in the inner wall;
- UST systems with a secondary barrier/liner within the excavation must use monitoring that is capable of detecting any release into the interstitial area:

—The secondary barrier must be sufficiently impermeable to permit containment and detection of a release;
—The secondary barrier is compatible with the regulated substance stored;
—The secondary barrier must be above ground water and not used in a 25-year flood plain unless the design specifically allows for these conditions, and must be compatible with the substance stored;
—The monitoring device must not be rendered incapable of detecting releases due to changes in soil moisture conditions or rainfall events;
—All monitoring wells open to outside access must be clearly marked for their purpose and secured from unauthorized entry.

- UST systems with internally-fitted membrane liners must use an automated device that can detect when the integrity of the tank is breached, and the liner must be compatible with the substance stored; and
- Tanks provided with interstitial monitoring must also have release detection for all attached underground piping and equipment.

Each of these limitations is discussed in more detail below.

(1) Must Be Designed, Constructed and Installed To Assure Detection of Any Releases (Section 280.41(h)(1)). The general performance standards approach that EPA is proposing today in § 280.40(h) for secondary barriers with interstitial monitoring is intended to enable tank owners and operators to follow any available industry codes and accepted engineering practices in establishing these secondary barriers. The industry consensus codes are, in fact, already now being followed for many of the new double-walled UST installations. Today's proposal in 280.40(h)(1) is intended to permit flexibility in the choice of secondary barriers and interstitial monitoring techniques that can be used. Some of the secondary containment barriers that can be used are double-walled tanks and pipes, concrete vaults, synthetic flexible membrane liners, and compacted or treated clay soils.

Existing consensus codes and recommended industry practices do not yet exist on a wide-spread basis for the use of secondary containment at UST systems. Today EPA is not proposing detailed design and construction standards in this area. The rapid development of numerous technologies at the national level precluded EPA proposal at detailed design standards. Instead, the owner and operator should consult with the UST system installer to determine which form of secondary containment is appropriate for the site and will assure releases are detected. For example, the Steel Tank Institutes "Standard for Dual Wall Underground Storage Tanks" can be used as guidance for meeting this requirement. In addition, United Laboratories is developing testing standards for the listing of flexible membrane linear systems for UST excavation applications that also can be used to assure compliance with this proposed performance standard. However, for many of the choices of secondary barriers the owner and operator will need to consult the guidance of a trained and experienced engineer familiar with accepted engineering practices in this area.

(2) Must Detect Breaches in the Inner Wall of a Double-Walled UST System (Section 280.41(h)(2)). A variety of interstitial detection techniques are allowed within the double-walled systems. The only limitations EPA is proposing today on their use is that they be able to detect a breach in the inner wall. Thus, the Agency is not requiring detection of breaches in the outer wall unless they can interfere with the detection of actual releases through the inner wall.

The techniques of monitoring for pressure or liquid level changes within the interstitial area would be activated by a failure of the outer wall but, in this condition, it is unable to detect if there is a breach in the inner wall (or whether an actual release is occurring). Therefore, under today's proposed limitation for double-walled UST systems, when a pressure monitor is being used, the owner and operator would have to assure breaches in the outer wall are immediately repaired so that release detection compatibility is maintained. Similarly, if the inner wall fails it must also be immediately repaired, or the tank system component replaced, because under this condition the pressure monitor system would no longer be able to ascertain whether a release to the environment was occurring.

(3) Secondary Barriers Within the Excavation Area Must Be Able To Detect Any Release Between the UST System and the Barrier (Section 280.41(h)(3)). Under specific circumstances, secondary barriers that surround an UST system in the excavation area (vaults, clay walls, or membrane liners) may not facilitate the detection of releases. Today, EPA is proposing some general limitations that would not allow the use of secondary barriers that are not sufficiently thick or impermeable to assure containment and detection of releases. Natural or artificial liners should not be used in the excavation area where site conditions could render them useless for release detection purposes. For example, flood waters or high ground water could invade the interstitial area and render the release detection sensors useless. Likewise, under such conditions the associated pressure gradients could force a substantial breach in an inadequately designed secondary barrier, thus providing a pathway for a future release to go undetected through the barrier after the return to low water conditions. Today's performance standard is intended to require avoidance of all the above conditions that could render release detection monitoring incapable of detecting releases. There are, however, barriers that can be engineered to work well in high water saturation conditions. In these instances, the barrier is filled deliberately (partially or fully) with water and the monitoring takes place on the water surface. Today's proposal allows the use of such designs. Both natural and artificial barriers that are incompatible with substances stored are prohibited because such incompatibility can weaken and ultimately breach the barrier's design. This could render them useless in containing a release sufficiently for detection purposes.

Secondary barriers that surround a UST system in the excavation area (vaults, clay walls, or membrane liners) can also trap soil moisture, rainfall, or flood waters to such an extent that the vapor or liquid monitoring device is rendered completely inoperative for release detection purposes. EPA is today proposing a general performance standard that requires the owner and operator to ensure that the monitoring technique used will not be rendered inoperative by these conditions on-site for more than 30 days.

There are two basic ways of meeting this limitation. First, an impermeable cap can be provided over the top of the secondary barrier system, thereby preventing rainfall and soil moisture from entering and pooling within the interstitial monitoring area. Second, equipment could be provided for periodically pumping out moisture that becomes trapped within the secondary barrier system, thereby maintaining the system's design for release detection.

For reasons already discussed above concerning other release detection methods using monitoring wells, all wells must be clearly marked and closed to unauthorized outside access.

(4) Internally-Fitted Membrane Liners (Section 280.41(h)(4)). EPA is aware of an interstitial monitoring technique within internally-fitted membrane liners that is currently available on a very limited basis in the United States. This technique has been widely used in West Germany for a number of years (primarily for diesel fuel storage). It consists of internally fitting a membrane liner into the inside of the tank and monitoring the space between using a device that maintains a partial vacuum pressure in the interstitial space. EPA has today proposed to allow the use of this type of monitoring technology, using those designs that are activated when the integrity of the tank is breached. Because the tank itself provides the structural support to the liner, a breach in the tank indicates a weakening of that support and a potential release. Also, once the vacuum is broken, and the interstitial monitor is activated, it will no longer be able to detect future releases. Thus, the tank would have to be replaced or repaired for the release detection to operate again. A breach in the membrane would also break the vacuum and cause the need for its immediate repair.

Today, EPA is also proposing the limitation that an internally-fitted membrane be compatible with the substance stored. Incompatible materials could render the membrane, and the release detection system associated with it, useless overtime.

(5) Release Detection for the Piping (Section 280.42). The final requirement proposed today for interstitial monitoring is that release detection be provided for the underground piping and equipment. Double-walled tanks and internally fitted membranes do not address release detection for piping. Other secondary barrier designs likewise do not always include piping. This requirement makes it clear that owners and operators must provide interstitial or some other type of monitoring for the underground piping and equipment attached to the tank that meets the requirements of one of the other methods of detection proposed today.

(6) Issues for Public Comment. EPA is seeking public comment and information on the reliability and effectiveness of various interstitial monitoring techniques, particularly as they are used with the different secondary containment designs. Specific comments are requested concerning the appropriateness of the limitations proposed today in assuring that releases from UST systems will be detected.

EPA is particularly interested in comments regarding todays performance standard for liner systems in the excavation area. The Agency is concerned that in the absence of detailed performance standards, some liners may not perform adequately. It has been reported to EPA in the past that field-seamed flexible membrane liners frequently leak. In addition, in the absence of a permeability standard, clay liners may not be sufficiently impermeable to intercept and direct a release to the monitoring point. Comment is requested regarding experience with performance and dependability of liner systems. In addition, EPA requests comment on performance standard that could be applied to liners and other types of secondary containment for the purpose of enhancing the success of release detection.

g. Other Methods Approved by the Implementing Agency (Section 280.41(i))

As previously described, today's proposal identifies requirements and general standards of performance for several basic methods of release detection for new UST systems. However, many other techniques and devices are under development in this rapidly growing field. EPA has identified over 250 devices being commercially developed. Some methods, other than the six general ones proposed, today may also be able to successfully detect releases within varying circumstances and limits. Therefore, in 280.41(i), EPA is also proposing to allow the use of other methods, or combinations of methods, of release detection that can be shown to reliably detect releases in a manner which is no less stringent than one of the allowed methods described above.

Many different methods of release detection are under development or already available. There are numerous in-tank non-volumetric monitoring devices (for example, helium gas tracer monitoring) under investigation; several devices for use in the physical or electronic measurement for the presence of liquids or vapors in the excavation area's soil (for example, U-tubes and soil resistivity sensors); numerous products for use in completely wrapping tanks to enhance release detection; and relatively sophisticated devices reported to detect small volume releases from pressurized pipes. EPA has not evaluated the performance of all these methods and, as described earlier, has rejected a regulatory approach towards release detection that would require certification of these methods or devices in regulation before they can be used.

A major concern with these other various methods, however, is whether they perform adequately or only work properly under specific conditions. One alternative that the Agency considered was simply to not allow any of these other methods, thereby restricting the use of release detection to those methods proposed today. This was rejected, however, because EPA believes that other methods, or combinations of methods, may be shown in the future to reliably detect releases. The Agency's intent is to foster continued experimentation, development, and use of other methods that can detect releases from UST systems at least as successfully as those specified today.

To further ensure that other methods, or combinations of methods, can be used if they are shown to reliably detect releases, today's proposal allows their use if they are approved by the implementing agency. To be approved, they must be shown to perform as capably as any of the other proposed methods of detecting releases before they migrate beyond the UST excavation area and result in adverse impacts to human health and the environment. These approvals may be site-specific or more generic, depending on the performance and limitations of the methods. For example, there are some sophisticated pipeline release detection devices available and under development that may be able to reliably detect small releases from pressurized pipes. Such devices, used with appropriate release detection for

the UST may constitute a combination of methods that would be allowed by the implementing agency.

EPA is presently collecting information and conducting research addressed to various methods of release detection. Should the Agency finalize the regulatory approach proposed today, the results of these research efforts may be provided in guidance that should be helpful to implementing agencies in deciding whether other methods of release detection should be allowed. These guidances would identify criteria to be considered in judging any additional methods and their performance in comparison to these six methods proposed today.

The Agency solicits public comment and performance information concerning other methods of release detection that may be capable of detecting releases from UST systems. Information concerning the accuracy and reliability of pressurized line leak detection devices is specifically requested along with public comment on whether they should be allowed in lieu of other methods of release detection for this type of piping. Comments are specifically requested concerning the feasibility of allowing the use of other methods or release detection if they are approved by the implementing agency to be no less stringent than any one of the six methods identified today.

4. Secondary Containment For New Hazardous Substance UST Systems (Section 280.41(b))

a. Overview

As discussed in the previous section, EPA is today proposing several methods of release detection for new UST systems. However, the Agency is concerned that releases of various hazardous substances can be more difficult to reliably detect than petroleum releases. Releases of hazardous substances may not be detected by some or all of the methods allowed for petroleum because most of these techniques and devices have apparently not been designed or calibrated to detect hazardous substances. In many instances, they may never have been previously used for this purpose. In contrast, the Agency has concluded that interstitial monitoring between the UST system and a secondary barrier surrounding it is a method that should be readily available for use in the detection of hazardous substance releases. As discussed previously, there are a number of approaches to secondary barriers for UST systems including vaults, double-walled tanks, and liners. The secondary barrier outside of the UST system prevents the movement of released material into the environment and enables the use of various interstitial monitoring techniques for detecting a release between this barrier and the UST system. These barriers should be readily available for use with hazardous substances.

Today EPA is also proposing § 280.41(b) to require the use of secondary containment/interstitial monitoring at all new hazardous substance UST systems. The Agency believes that a secondary barrier provides a more controlled environment, free of many of the factors that can reduce the probability of detection of some hazardous substances when other methods of release detection are used. A properly constructed and designed secondary barrier will ensure retention of a release for detection so that corrective action can be taken under Subparts F and G of the regulations (which includes free product removal and soil and ground-water cleanup). An added benefit of the secondary barrier will be to simplify the cleanup of releases from the tank system. Only a limited area can be contaminated if the secondary barrier retains the release for purposes of reliable detection and corrective action. This is a significant benefit for some highly mobile, highly soluble, or high specific gravity hazardous substances, which are difficult to remove from the soil or ground water and pose an inherently higher level of risk to human health when coupled with unreliable release detection.

There are several interstitial monitoring techniques that can be used to detect releases of hazardous substances in the interstitial area between an UST system and the secondary barrier surrounding it. These detection devices typically detect or monitor for the presence of either vapors or liquids and can operate either continuously or manually. Manual liquid detection systems come in a variety of designs. A number of these use chemical sensitive pastes that change color when exposed to water or hydrocarbons.

Some of the continuous liquid detection systems trigger an alarm by using a device that softens or dissolves if liquid (water or hydrocarbons) appears in the interstitial space. Other types of continuous liquid detection systems use level gauges or switches to set off alarms when the liquid rises to the detection level. In all of these liquid detection systems, the sampling point is usually at the lowest point in the secondary containment structure with all areas having free drainage to this point. This interstitial area must also be sealed off from the outside environment to prevent corrosion condensation or precipitation-induced interferences to the monitoring techniques.

Most vapor sensors used for monitoring the interstitial space are continuously in operation and can be used with volatile hazardous substances. However, some manual detectors that are marketed principally as personnel safety devices may also be used. These continuous interstitial monitoring techniques are activated when the concentration of hydrocarbon vapors exceeds a preset level. The preset level is set above the background level at the time of installation. Because of the confined nature of the space between the UST system and the secondary barrier, hydrocarbon vapors from a hazardous substance release are generally expected to reach the alarm quickly.

In addition to these monitoring methods, the interstitial space between the two walls of double-walled hazardous substance UST systems can be monitored using pressure sensors. The pressure systems use either a vacuum or a pressure sensing device in the interstitial space to detect failure of the inner or the outer walls. Loss of the vacuum or pressure signifies a breach in one of the two walls.

b. Current Practices

Four states (CA, DE, RI, SC) and Puerto Rico utilize secondary containment barriers for hazardous substance UST systems. California and Puerto Rico require them for new UST systems. South Carolina requires them only in ground-water sensitive areas (aquifer recharge or drinking water well zones). Rhode Island allows them as an alternative to leak monitoring.

In all the above states, double-wall UST systems are accepted as meeting requirements for new hazardous substance UST systems. In general, they state specifications for construction or approve the tanks on a case-by-case basis. For example, the outer jacket of a double-walled tank must be constructed of coated steel and cover at least the lower 85 percent of the circumference of the tank, and no penetrations through the jacket may be present other than manholes and fittings.

Three states (CA, DE, and RI) address requirements for vaults used as secondary barriers for hazardous materials. Specifications for construction of vaults is generally not given. Some states require visual observation of tanks in vaults as a leak detection method. This requirement implies a necessity for access to the

vault and space available for observation.

Under federal regulations, secondary containment with monitoring is required for underground hazardous waste tank systems. The secondary containment barrier must prevent the migration of a release into the soil, ground water, or surface water and must meet several design, installation, and operation criteria concerning the type of containment, capacity, material selection, foundation support, release collection, and sealing from infiltration of surface or ground water. A registered professional engineer must attest that the tank system design is adequate, and an independent installation inspector or professional engineer must inspect the tank system for adequate construction and installation. Monitoring must be provided between the primary and secondary containment structures to detect releases from the primary containment within 24 hours.

c. Approach to Regulation

EPA is today proposing in § 280.41(b) that secondary barriers with interstitial monitoring be required for all new UST systems storing hazardous substances. EPA is also proposing to allow the owner and operator to use an alternative method of detection if it can be demonstrated to accurately and reliably detect releases from the UST. Owners and operators must provide a demonstration of the applicability of any of the other methods to the implementing agency for approval prior to its use. (A more detailed discussion of this alternative demonstration immediately follows in the next section of the Preamble.)

(1) General Performance Standards for Secondary Containment/Interstitial Monitoring (Section 280.41(h)). The Agency is aware that the performance and durability of the many types of secondary containment barriers and interstitial monitoring techniques is unknown. New hazardous substances UST systems must therefore meet the performance requirements of (§ 280.41(h)). Many of these interstitial monitoring systems have been in use for only a short period of time at a limited number of sites. Of particular concern to the Agency is the use of synthetic membrane liners wrapped around and in immediate contact with the tank. This type of liner system could be subject to greater stresses during installation than a typical liner system which has fine-grained backfill between the liner and the tank. The increased stresses could result from friction among the tank, liner, and backfill, while placing the tank and compacting the backfill. These stresses could result in tears that allow the escape of releases prior to detection. Another containment technology that the Agency is concerned about is the bentonite clay barriers. Certain hazardous substances may be incompatible with bentonite clays and may not be effectively retained. Also, such sealed-soils have been found by the Agency under its hazardous waste program to perform significantly less effectively than man-made flexible membrane liners, for example. (See today's solicitation of information and public comment on this subject in the previous section of this preamble addressed to interstitial monitoring).

The Agency is today requesting information and comment on the applicability of the various secondary barrier methods and interstitial monitoring techniques to UST systems that contain hazardous substances.

(2) Variance from Secondary Containment/Interstitial Monitoring Requirements for New/Upgraded Hazardous Substance UST Systems (Section 280.41(b)). (a) Overview. EPA recognizes that secondary containment with interstitial monitoring may not be necessary for all hazardous substance tanks to protect human health and the environment, and that there may be alternative release detection methods that protect human health and the environment based on the tank system characteristics, location, and stored substance.

At present, there is an extensive and rapidly growing universe of release detection methods for petroleum substances. The Agency believes that, for hazardous substances which are similar to petroleum substances, some of the release detection methods currently available may be able to provide a similar level of protection. Further, new release detection methods may be developed in the future which will provide this level of protection for other hazardous substances.

Generally, there are two procedures through which variances can be obtained: (1) They can be specified in regulations and thus be self-implementing; or (2) they can be granted through a review and approval process. However, EPA is concerned that the large size of this regulated community poses unique challenges concerning variance implementation. For example, if the Agency selects a self-implementing system, it is possible for abuses to occur. On the other hand, the review and approval oversight process for implementing variances could be logistically overwhelming.

(b) Current Practices. Of the few states that do regulate hazardous substances, most allow tank owners to apply for variances based on equivalent technologies. For example, Rhode Island will consider variances from program requirements (and does not require secondary containment) if there is clear and convincing evidence that an "alternative design or operating standard is substantially equivalent to the regulation and will have no adverse effect on public health and the environment." California regulations allow categorical and site-specific variance requests. Categorical variances allow an alternative method of construction or monitoring which is applicable to more than one local agency jurisdiction. Site-specific variances would be applicable at one or more sites within one local agency's jurisdiction. Most states grant variances through a review and approval process.

EPA recently promulgated regulations for hazardous waste storage and treatment tank systems. They contain variance procedures for tanks storing hazardous wastes. The regulations basically require phased-in secondary containment with interstitial monitoring for underground tank systems. These regulations allow both a risk-based variance and a technology-based variance. The risk-based variance can be obtained if the "owner/operator demonstrates that there will be no substantial present or potential hazard to human health or the environment in the event hazardous waste is released from the storage or treatment system." It is not available for new underground hazardous waste tank systems. The technology-based variance can be obtained if the *"owner/operator can demonstrate to the Regional Administrator that alternative design and operating practices, together with location characteristics will prevent the migration of any hazardous waste or hazardous waste constituents into the ground water or surface water at least as effectively as secondary containment with interstitial monitoring."* "This type of variance would be granted, for example, if a release detection method not believed generally reliable will be reliable for a tank system because of its characteristics, location, and other factors such as the wastes stored or treated." However, variances based on ground water monitoring is not allowed because the overall strategy for regulating hazardous waste tank systems is based on the prevention of contamination of ground water by releases from tank systems.

(c) Approaches to Regulation. EPA has considered two basic approaches for granting variances for hazardous substance tanks: A chemical class approach and a tank system-specific approach. Through the class approach, the Agency would define groups of hazardous substances that would not require secondary containment when stored in underground tanks. The tank system-specific approach would grant variances by taking into account tank contents and siting considerations. In either case the variance would waive secondary containment requirements if an alternative release detection system design and operating practices applied to a protected single-walled tank can be shown to provide reliable protection of human health and the environment.

(i) Chemical Class Approach. The Agency examined various ways to create classes of hazardous substances for which a variance could be obtained. For example, a report prepared for EPA entitled *Evaluation of Grouping Methodologies Based on Regulated Substances Properties* investigated the feasibility of classifying the regulated substances based on their physical and chemical properties for the purpose of setting different tank standards. This report concluded that, while all of the methods considered did to some degree distinguish between potential impacts of different regulated substances, the relative differences in the results were not significant enough to confidently define groups of substances for different tank standards. The report further pointed out that the currently weak understanding of some basic transport processes (e.g., movement of liquids and vapors in the vadose zone) and key data deficiencies (e.g., a uniform scale of toxicity values) decreased the confidence in the results.

A feasibility study prepared for EPA, entitled *Risk-Based Ranking of Chemicals in UST Systems,* investigated the use of a preliminary scoring technique in which the chronic toxicity characteristics used to establish reportable quantity (RQ) levels under CERCLA were used to rank the chemicals stored in underground tanks. Then a panel of scientists used this information and additional information pertaining to the potential fate of these chemicals to sort them into categories of high, moderate, and low concern. The report found that chemicals stored in underground tanks vary substantially in terms of risk. Some concerns have been raised about this method (1) that toxicity characteristics used to set RQs were developed to address spills and emergency releases rather than the long-term, low-level continuous releases anticipated from underground tank systems; (2) environmental fate parameters considered did not address the role of biodegradation; and (3) environmental fate of compounds stored in underground tanks is likely to be not only site-dependent, but also solvent-dependent.

The Agency also considered various criteria which could be used to identify groups of hazardous substances which might require less stringent tank standards. The criteria included (1) detection of the substance by vapor-phase sensors; (2) detection by the human sense of smell; (3) high toxicity; and (4) cost of cleanup. Of these approaches, the detectability of hazardous substances appeared to be the most promising criterion for grouping hazardous substances. However, only limited analysis could be performed because many of the hazardous substances are solids under standard conditions, but would be dissolved in a vast array of unknown solvents and mixtures when found in underground storage tanks. Many of the release detection methods have not been assessed for the detection of hazardous substances.

Therefore, the Agency concluded that development of class criteria was difficult primarily due to the wide variety of tank siting conditions and tank contents, the lack of some basic data, and the currently weak understanding of some basic transport and fate processes. The development and analysis of these data was judged to be very time consuming. The Agency is continuing to examine this class approach based on the above criteria and today EPA is requesting public comment and information concerning feasible ways of implementing this approach.

(ii) Tank System-Specific Approach. Based on the above discussion, EPA is today proposing that variances from secondary containment requirements be obtained on a tank system-specific basis. This type of variance would be for each tank system taking into account considerations for tank contents and siting. Variances would only be available for new and upgraded existing tank systems, and would be granted by the implementing agency through a review and approval procedure. EPA, however, is still considering the feasibility of granting variances for classes of hazardous substances if the Agency receives evidence that would justify this type of exemption.

Today, EPA has proposed simple procedures in § 280.41(b) for use in applying for individual variances. These procedures are based somewhat on the procedural framework developed for variances that are applied for under the Agency's hazardous waste tank program in 40 CFR 264.193(h). (See 51 FR 25476; July 14, 1986.) If the Agency adopts this approach, guidance for developing and applying for a variance may need to be developed to give a clearer indication of the requirements that a tank owner or operator will need to meet. It is the Agency's intent if such guidance is developed it would be somewhat flexible in approach and some initial concepts which may be included in the guidance are laid out in the subsequent paragraphs.

Today, the Agency proposes that when applying for a tank system-specific variance the owner or operator must demonstrate the reliability of the alternate release detection method(s) to be used taking into account the stored substance, the immediate subsurface tank environment, the characteristics of the tank system, and the performance characteristics of the proposed release detection method and its site-specific design. This will be accomplished in the context of the requirements for at least one of the methods of release detection proposed in 280.41. These demonstrations will be expected to receive careful scrutiny that will determine, with considerable technical certainty, if the proposed use of a particular method will meet all requirements and perform reliably in detecting releases of the hazardous substances in the proposed setting for that particular UST system configuration. This closer type of oversight by the implementing agency is believed necessary to assure that the significant technical uncertainties that now exist concerning the use of several release detection methods—particularly with various hazardous substances—will be carefully reviewed before they are allowed to be used on a long-term basis.

During the early implementation of the variance procedures it may become evident that certain combinations of hazardous substance/release detection systems may be shown to provide reliable detection (for instance, highly volatile chemicals and vapor monitoring). The Agency anticipates that these variance applications will thus be simplified by allowing the tank owners and operators to take advantage of these previously demonstrated combinations and, thus, only be required to show that the site-specific environmental factors are appropriate

for the use of the proposed release detection.

The immediate subsurface tank environment will need to be assessed to determine if the methods of detection will work reliably. This means that the excavation zone and other subsurface areas between the UST and the proposed monitor installation points must be considered in the design of the method for the site. The evaluation of this area would include an assessment of factors such as soil types, site location, historical high water table, localized ground water flow patterns as well as any potential interferences that would affect the accuracy and reliability of the monitoring devices. Interferences are considered to be such things as clay layers, buried electrical lines, or a site located in a flood plain, which could result in periodic flooding of the vadose zone affecting the performance of some release detection systems, such as vapor monitors.

The five general release detection methods proposed for use with new UST systems are available to a tank owner or operator to use as an alternative to secondary containment with interstitial monitoring: frequent tightness testing and product inventory reconciliation; testing and monitoring of vapors in the excavation area; monitoring for liquids on the ground water; monitoring for liquids in the unsaturated zone between the UST and an impermeable barrier immediately below it; and automatic liquid monitoring and inventory control inside of the tank. Because all of these methods cannot be used in all situations, certain requirements on the use of each of these methods have been set by the Agency. These requirements are described above in Section VI.D.3. When selecting an alternative release detection method, the owner and operator must demonstrate that site-specific conditions meet these requirements.

Because the current state-of-knowledge of release detection of hazardous substances is relatively weak, the burden of data development and initial analysis of specific release detection methods and their application at a site is placed with the regulated community. This includes analysis of the number and placement of monitors, the detection threshold of the monitor, and the sampling frequency to insure reliable release detection. EPA believes that this approach will foster further experimentation and allow for careful selection and application of release detection systems. Because this field is rapidly developing, the Agency believes it is incumbent upon the owners and operators to work with release detection manufacturers in the development of adequate systems. The Agency will remain open to various methods for implementation of this type of variance. For example, the appropriate detectable level could vary from chemical to chemical because the Agency would want to be sure that a release could be detected before an environmental hazard developed.

The Agency, however, has several concerns about the feasibility of this approach. For example, the Agency believes that there are some hazardous substances for which variances should not be granted. These hazardous substances would include those that are acutely hazardous, pyrophoric, or highly water reactive. A specific example of these chemicals are those classified as Poison A in the U.S. Department of Transportation (DOT) Hazardous Materials Table. The Poison A category includes seven poisonous gases and liquids which when mixed with air in very small amounts are dangerous to life. The Agency also believes that the properties of other hazardous substances would either make them not amenable to some of the alternative release detection methods, or result in more careful scrutiny of variance applications. For instance, dense liquids (those with a specific gravity greater than water) cannot use the alternative of monitoring for liquids on the ground water. Substances with toxicity greater than benzene (one of the most toxic constituents of gasoline) might suggest more careful scrutiny of proposed alternative release detection methods. These highly toxic substances could be defined as those that are in the "X" category for the toxicity criterion used to establish CERCLA RQs. Approximately 60 of the hazardous substances expected to be found in UST systems have an RQ toxicity value of "X."

EPA today requests comments on the variance procedures discussed above, and is particularly interested in comments on the feasibility of implementing a risk-based variance procedure similar to that in the Hazardous Waste Tanks rules. However, today EPA has not proposed the use of the risk-based variance procedure for tanks storing hazardous substances because of several implementation concerns which include the wide array of hazardous substances and their associated solutions and mixtures, the size of this regulated community, and the potential administrative burdens that might be imposed by such a procedure. The Agency also requests comments and information on how (and by what basis) EPA might identify chemicals that have properties similar to petroleum that could warrant regulation in the manner that is being proposed today for petroleum UST systems.

5. Additional Requirements for Piping at New UST Systems (Sections 280.42)

a. Additional Requirements for Pressurized Piping (Section 280.42(a) and (b))

One method of withdrawing substances from an UST is to use a transfer pump which is usually placed in or near the tank. This pump withdraws regulated substances from the tank and forces it under pressure through a pipe to the dispensing meter. Because the substance is under pressure, a structural failure or leak in the transfer pipe will allow it to be released. Today's proposal contains additional release detection requirements for pressurized piping systems using less than continuous monitoring.

A major concern with the use of pressurized piping systems is the potential for large releases. Data from the Agency's State Release Incidents Survey indicate that releases from piping are somewhat larger than the releases from tanks. This same data also indicates that piping is involved in 20 to 35 percent of all releases reported to the states examined in the study. The Agency suspects that pressurized piping is involved in the larger piping releases because the other approach to product transfer, which uses suction pumps, fails to operate properly when there are leaks in the pipe. Also, it is widely reported that pressurized pipe is the most commonly used petroleum withdrawal system at new installations.

In addition to the general UST system release detection methods that were discussed earlier in this Preamble, pressure-loss sensors are commercially available for use as release detection with pressurized piping systems. These methods sense the pressure in the piping when the transmission pump begins to transfer petroleum from the tank to the product dispenser. A slower than expected rise in pressure could indicate a failure in the pipe and a possible release. This type of system automatically shuts off the product dispensing pipe when the pressure does not reach the expected preset level within a few seconds. Although there is little documented performance data for these piping pressure sensing methods, they are reported to detect at least large rates of release. One currently marketed

system is claimed to detect and shutdown in the presence of releases of 2 gallons per hour. Several more sensitive systems are also currently available or under development.

The characteristics of pressurized piping described above have caused the Agency to consider not allowing its use at new UST installations. However, this method of product transfer is reported to be widely applied at newer retail gasoline outlets, for example, and is an important factor in the current design of these new stations. EPA has concluded that this method of withdrawal can be used reliably, in a manner that protects human health and the environment, if continuous release detection methods are employed to ensure potentially large "run-away" releases from pressurized piping are detected quickly so they can be minimized and contained. As described earlier in this Preamble, the Agency believes that several release detection methods may be reliably applied in a manner that will rapidly and reliably detect releases, even from the piping. However, EPA is today proposing to allow frequent release detection that is not continuous. Because of the concern that run-away releases from pressurized piping can create a large release in a relatively short period of time, today's requirements for release detection at new UST systems could allow, under the 30-day sampling frequency required under § 280.40(d), a pressurized pipe leak to develop into a large release before it is detected.

Today EPA is proposing in § 280.42(b), as an addition to the other release detection requirements, that pressurized piping release detection and shutoff devices must be used at new UST systems with pressurized delivery lines, unless the piping system is provided with:

- A continuous method of release detection that complies with requirements proposed for new USTs in § 280.41; or
- Interstitial monitoring in accordance with the UST system release detection requirements in § 280.41(h).

The Agency has concluded that the above two methods of release detection adequately address the threat posed by underground pressurized run-away leaks, provided these methods include piping in their coverage.

Each of the additional requirements for pressure piping is discussed in more detail below.

(1) Automatic Release Detection and Shutoff Equipment (Section 280.42(b)). Today EPA is proposing that pressurized piping at new USTs without continuous release detection or interstitial monitoring must also be provided with automatic release detection and shutoff equipment. Numerous such devices are already commercially available and in widespread use. One of the performance requirements proposed today concerning this equipment is that the system be capable of automatically detecting a release rate of at least 2 gallons per hour. It has been reported to EPA that there is equipment commercially available that can achieve this performance and that it is relatively inexpensive to install. EPA believes that releases from pressurized piping can often rapidly advance to a level that is greater than 2 gallons per hour and will, therefore, activate these devices. Another performance standard proposed today for this equipment is that it must automatically shut off the transfer pipe when a release greater than 2 gallons per hour is detected. To minimize adverse environmental impacts, these releases should be stopped as quickly as possible. Again, equipment is reported to be widely available and in use that will be able to accomplish this performance requirement.

(2) Issues for Public Comment. Because of the limited experience with piping release detection methods, EPA has had to develop today's proposal based on partial information. Therefore, EPA is especially seeking information regarding the field performance of pressurized piping release detectors. EPA is requesting comment on the proposed methods and limitations with supporting data where available. We are also interested in receiving information concerning experience with releases from pressurized piping and whether additional requirements proposed today are needed to protect human health and environment.

b. Exemption For Suction Piping Systems (Section 280.42(b))

Today's proposal provides an exemption from the UST system release detection requirements of § 280.40-41 as they pertain to underground piping if a suction-type piping system is used that meets certain other requirements. This method of withdrawing regulated substances from an UST uses a suction pump which is usually placed away from the tank at or near the dispensing meter. This pump draws substances from the tank by applying a suction to the transfer pipe. Because the substance is at less than atmospheric pressure, a structural failure or leak in the transfer pipe will allow air or ground water to be drawn into the pipe instead of allowing the regulated substance to be released. In addition, if the leak is large enough and a significant amount of air enters the pipe, the pump and dispensing meter will operate erratically, calling the operator's attention to a suspected failure.

Although there is a lack of performance data for suction piping systems, many of these systems are currently in use in this country. In addition, suction piping systems also are in wide use in Europe. For example, West Germany has required suction piping for several years and it has been reported that these systems are successful in minimizing releases due to piping failures because they are considered "intrinsically safe."

The apparent inherent fail-safe nature of suction piping systems has caused EPA to allow (within certain limitations) an exemption for such piping from all release detection requirements in today's proposal. The requirements in today's proposal that suction piping systems must meet in order to be exempted from all other piping release detection requirements are:

- The underground piping operates at less than atmospheric pressure;
- The piping is sloped to drain back to the tank;
- Only one check valve is included in each suction line; and
- The check valve is located directly below, and as close as practical to the suction pump.

Each of these requirements are briefly discussed below.

(1) Operating Pressure (Section 280.42(c)(1)). Today's proposal allows an exemption from release detection requirements as they pertain to piping if the underground piping operates at less than atmospheric pressure. The pressure in the soil around the pipe will be atmospheric, if above the water table, or greater than atmospheric, if below the water table. When the pressure in the pipe is less than the atmospheric pressure, a lead in the pipe will allow air or ground water to enter the pipe and the contents of the pipe will not be released. Although EPA has little documented performance data concerning the operating pressures in typical suction piping systems, EPA believes that the currently marketed systems adequately prevent releases.

(2) Piping Slope. For a suction piping system to be exempt from the release detection requirements proposed in today's rule, it must be sloped to allow the pipe's contents to drain back into the tank in the event that the suction is released. The Agency believes that simply operating the piping at less than atmospheric pressure will prevent major releases. However, small releases for the piping would still be possible if a

leak were to occur at a low point in the piping. If a portion of the piping drains to a low point rather than back to the tank, then some amount of fluid would be trapped there in the event of a loss of suction. A leak at this low point could then allow trapped fluid to be released. This type of release would be small (tens of gallons) in a typical piping layout for retail petroleum product dispensing. However, it can be easily avoided by sloping the pipe back to the tank. If suction is lost in a properly sloped piping system, the contents of the pipe will drain back into the tank. The Petroleum Equipment Institute's RPIOO-86 "Recommended Practices for Installation of Underground Liquid Storage System" recommends sloping the line one-eighth inch per foot back to the tank for all piping systems. The Agency believes that this is an easily applied measure that will prevent even small releases from the suction piping systems.

(3) Check Valves. Today's proposal also requires that only one check valve be included with each suction line to be exempt from the piping release detection requirements. The rationale for this requirement is similar to the argument for the piping slope requirements. Check valves allow the movement of fluid in only one direction and are typically used in suction piping systems to prevent the fluid from returning to the tank. The check valve maintains the prime on the pump and allows dispensing to begin as soon as the pump is turned on. In addition, pump wear would be substantially increased if the line drained back into the tank after each use. When two check valves are used, then the fluid in the line between the check valves can develop a greater than atmostpheric pressure. This situation could result from a leak in the upper check valve or a leak in the line between the two check valves. A leak in this pressurized portion of the piping could then cause a small release in a fashion similar to a release in an improperly sloped line. The Agency believes that only one check valve is needed for the proper operation of the suction piping system. However, it has been reported that some existing suction piping systems have more than one check valve due to modification and repairs in the piping systems. This practice would not be allowed under today's proposed exemption from release detection for suction piping.

(4) Check Valve Location. The fourth and final requirement that suction piping must meet to be exempt from the piping leak detection requirements is that the check valve must be located directly below, and as close to as practical, to the suction pump. This requirement ensures that as much as possible of the piping is under suction when the transfer pump shuts off. Historically, check valves have been placed in one of several locations in suction piping systems. One location that is common in older suction piping systems is at the right angled joint directly above the tank. This location allows a large portion of the piping system to pressurize to one to three pounds per square inch when the transfer pump shuts off. While this pressurization is not nearly as great as the typical 40 pounds per square inch pressure in a pressurized piping system, it could cause a release out of a leak in the piping. There are several manufacturers of check valves for use directly below the pump and they are reported to operate satisfactorily in a wide range of conditions.

(5) Issues for Public Comment. Because of the limited performance data on suction piping system, EPA has had to develop today's proposal based on partial information. Therefore, EPA is seeking information regarding the field performance of suction piping systems. The Agency is particularly interested in receiving information on the potential for releases from suction piping systems.

The Agency is also seeking comment on the need for periodic monitoring of the suction piping systems to ensure that the system is operating as intended. It has been reported that the suction piping systems in West Germany are equipped with a bleed valve below the check valve for periodic inspection of the suction line. Every fifth year an inspector opens this valve to check the condition of the suction line. Air entering the line through the open valve indicates that suction is being maintained in the piping. No air entering indicates that suction is not being maintained in the line and the check valve or piping need repair. Fluid coming out of the line through this valve indicates that the line is pressurized and the piping system is in need of modification or repair. EPA is not aware of such a system in use in this country and requests comments on the availability of this type of system and the need for it.

6. Requirements for Existing UST Systems

Today EPA is proposing to require that all existing UST systems have release detection. To meet this requirement, UST owners and operators are provided with a wide variety of different monitoring methods to choose from.

In proposed 280.40 existing UST systems are allowed to use any of the monitoring methods that can be used by new UST systems: tightness testing and inventory reconciliation, vapor monitoring, liquids on the water table monitoring, automated in-tank monitoring, interception/detection barriers, secondary barriers with interstitial monitoring, or some other no less stringent detection method, or combination of methods, approved by the implementing agency. Any method used to meet the release detection requirement must meet the performance requirements provided for each method in 280.41 for new UST systems (as previously discussed in this Preamble). It must also meet the general release detection requirements for all UST systems provided in 280.40: a minimum monitoring frequency of no less than every 30 days; use of a method that detects releases from the tank and the piping; the required use of manufacturer instructions for installation, calibration, operation, and maintenance schedules; documentation of vendor performance claims; and a site assessment when external methods are used.

In accordance with § 280.30(b), for all methods used outside of an existing UST system (for example, vapor and ground-water table monitoring), the owner or operator must also retrofit the use of spill and overfill equipment at the same time as the release detection. As discussed in more detail in Section VI.D.2 of this Preamble, existing and new spills can confound the external sensors and preclude the detection of a leak in the UST system. Thus, any existing UST system that utilizes external release detection must also be provided with spill and overfill equipment at the same time.

Because the above alternative monitoring methods for new UST systems would require retrofitting and use of wells and other equipment at existing UST systems, the Agency evaluated whether any more implementable (and less burdensome) avenues might be open. As described earlier, tank tightness testing and inventory reconciliation are the two most widely used methods of release detection for UST systems. Both of these methods have the advantage of not requiring significant retrofitting (although tightness testing may require some retrofitting) and being more readily available to the regulated community than other methods.

Therefore, EPA is proposing to allow the use of the combination of infrequent tank tightness testing and manual (or automatic) inventory reconciliation

controls as another release detection method available for use by owners and operators of existing USTs.

The performance requirements proposed for tightness testing and inventory reconciliation controls were discussed earlier in this Preamble. Therefore, the discussion that follows focuses only on this additional proposed use—on an interim basis only—of infrequent tightness testing combined with inventory reconciliation at existing UST systems. (This interim method differs in frequency from the semi-annual tightness testing and inventory reconciliation proposed as an alternative available for new UST systems).

Under today's proposal in 280.40(c), an owner and operator of an existing petroleum UST system who chooses to use the infrequent tightness testing method to meet release detection requirements must repeat the tank test at least once every 3 years for steel UST systems that are not protected from corrosion; and once every 5 years for all other UST systems. The primary basis for this distinction is the fact that unprotected steel UST systems are more susceptible to corrosion and need to be tested more frequently than the protected steel or fiberglass UST systems.

In developing this proposed frequency for tank tightness testing, EPA reviewed the various schedules for tightness testing currently used in the states. For example, Connecticut specifies a schedule based on the type and age of the UST system, with annual tightness testing required for the oldest UST systems. Rhode Island varies between 1 and 5 years depending on the age of the UST system. New York requires testing every 5 years. The states with variable schedules apply more frequent tank testing to the older UST systems. Annual tightness testing is required to prompt the retirement of old UST systems and has been reported to have that effect in the states that require it.

EPA considered establishing a tank tightness testing requirement that, like several state programs, would require all old UST systems to be more frequently tested (thereby prompting their upgrading or replacement) for several reasons. However, a significant amount of data has been collected that reveals that existing tank systems have been found to leak at all ages. Furthermore, on a national basis, many of the existing tanks appear already to be over 10 years old or their age is unknown. In either situation, significant implementation difficulties are posed for a schedule based on age. Thus, as is discussed in more detail earlier in this Preamble, EPA has instead decided to propose that all UST systems be upgraded or replaced to the new tank standards within 10 years and to require tank testing on an infrequent schedule during this interim transition period. (See Section VI.D.3 for more details.)

Under the testing frequency proposed today, the vast majority of existing UST systems (the unprotected bare steel variety) will be required to conduct a tightness test once every 3 years if they choose this alternative method of release detection. Judging from experience in California, where several alternative detection methods have been allowed but the choice of tank testing predominates, it appears likely that many owners and operators will select this one alternative method of release detection if allowed for existing UST systems by EPA. This raises a concern about whether this frequency of tank tightness testing can be accomplished for such a large portion of the existing UST systems in this universe. To alleviate this concern somewhat, the Agency decided to propose a longer time period between tests for UST systems that are protected from corrosion (the primary cause of release). Current estimates are that new fiberglass and corrosion-protected steel UST systems may comprise as much as 20 to 25 percent of the existing tank universe by the time the final rule is effective. These safer (corrosion-resistant) existing UST systems would, therefore be required to conduct a tightness test only once every 5 years. This lower demand on tank testing, plus the numerous new replacement tanks that we expect will be installed within the first 5 years of the program using various other methods of detection should enable tank testing to be reliably accomplished at this more infrequent and implementable level nationwide.

EPA solicits comments and information concerning the use of infrequent tank tightness testing combined with inventory controls at existing UST systems during the 10-year period before all UST systems have to be replaced or upgraded to the new tank standards. EPA also solicits comments and information about the appropriateness of the proposed frequency of tank tightness testing combined with inventory reconciliation allowed at existing systems. Another frequency that was considered by the Agency during the development of this proposal was to require existing tank systems to perform annual tightness testing plus inventory controls if they are not provided with frequent to continuous monitoring after the 3- to 5-year phase-in period for release detection that is also being proposed today (see Section VI B.2 for more details on the phase-in period for release detection). Annual tightness testing plus inventory reconciliation would detect releases sooner than infrequent testing and would place less dependence on manual inventory reconciliation as a release detection method. This would reduce the quantity of a release at any one site prior to detection and thereby enable reductions in the potential environmental impacts and cleanup costs.

After the phase-in period of 3 to 5 years, the vendors of tank tightness testing services, as well as the regulated community, would be in a better position than today in providing annual tightness testing. EPA requests comment on whether annual tank testing is necessary and implementable for existing USTs after this initial phase-in period.

Today's proposal allows existing hazardous substance UST systems to use the same methods of release detection allowed for new UST systems. Similarly, existing hazardous substance UST systems are allowed to use the infrequent tank tightness testing and monthly inventory controls method of detection during the 10-year interim period when all existing UST systems must be upgraded or replaced to the new tank standards (with interstitial monitoring secondary containment for hazardous substances USTs).

In developing today's proposed approach for existing hazardous substance UST systems, the Agency was concerned about the lack of release detection for these UST systems. As discussed earlier, all release detection is being developed and primarily aimed at petroleum UST systems because they represent at least 95 percent of the UST universe. Through today's proposal, the Agency intends to encourage the extension of this developing technology to the many hazardous substance UST systems storing chemicals that are similar in nature and detectability to petroleum. Any hazardous substance UST system that cannot apply accurate and reliable release detection according to the limitations proposed today will be required to upgrade to secondary containment and interstitial monitoring within 3 to 5 years.

As with new hazardous substance USTs, the Agency considered requiring all existing hazardous substance UST systems to receive a variance if they wanted to apply a method of release detection other than secondary containment and interstitial monitoring. However, this was not proposed for

several reasons. First, with over 50,000 existing hazardous substance UST systems, the Agency was concerned that the variance process, as required for new UST systems, could not be accomplished within 3 to 5 years for existing UST systems. The Agency could be overwhelmed by variance requests, because an existing UST system would have to get a variance within 3 to 5 years or retrofit/replace with secondary containment. Second, EPA believes a variance process would unnecessarily slow down the development and application of other methods of release detection to hazardous substances that are very similar in nature (and detectability) to petroleum products. Instead, EPA will provide closer oversight of the review of these applications at new and upgraded UST systems (under the variance process previously described) and this will provide important experience for both EPA and the regulated community to discover what methods of release detection can be used with which types of hazardous substances. In the absence of such experience, a variance for existing UST systems would be difficult to accomplish. Third, the Agency will require submission of an alternative demonstration (and EPA review and oversight) after 10 years. Thus, anyone using any of these methods inappropriately and who has not been discovered through routine on-site inspections) will have to demonstrate the method is reliable when all existing UST systems are to be upgraded to new UST standards.

EPA requests comments and information on the appropriateness of the above approach toward allowing existing hazardous substances UST systems to utilize an alternative method of release detection for up to 10 years without an approved demonstration. Should the Agency set a shorter time frame for upgrading hazardous substance UST systems?

7. Release Detection Recordkeeping (Section 280.43)

EPA is today proposing that all UST owners and operators must maintain release detection records capable of demonstrating compliance with the applicable requirements of release detection in Subpart D. These records must include:

- All written performance claims, and their manner of determination for the method of release detection used, as provided by the equipment manufacturer or the installer, to be maintained for a period of 5 years; and
- The results of sampling, testing, or monitoring, to be maintained for at least one year, except that the results of tank tightness testing must be retained until records are available for the next test.
- A record of all calibration, maintenance and repair of release detection equipment maintained for at least one year from the date the service is performed.

The need to maintain a record of all release detection performance claims and their derivation, is discussed earlier in the Preamble (see Section VI.D.2). Among other uses, these materials provide owners and operators an important basis with which to evaluate the future performance of the equipment at a given site. Although many owners and operators will choose to retain such information for as long as they use the equipment, today's proposal requires in § 280.43(a) that they be retained for at least 5 years. This is intended to provide the implementing agency with sufficient time to ascertain the release detection method's compliance with the regulations through routine site inspection. EPA recognizes that these records may vary considerably in detail depending upon the owner and operator's choice of method and the availability of proof of performance from the vendors of the equipment.

Proposed § 280.43(b) requires all sampling, monitoring or testing results to be maintained for at least one year, except that the more infrequent tank tightness testing results allowed on an interim basis for existing UST systems must be retained until records are available from the next test. These requirements are expected to be sufficient for an inspector to determine that the UST owner and operator is complying with the release detection requirements. For example, the results of the last tightness test (plus a year's inventory control records), or the recorded results of monthly well samples, must be inspected to determine compliance with the applicable requirements for those methods of detection. Automatic, continuously-alarmed monitoring systems need not keep records that must be maintained for one year, because compliance will be determined during a site visit that shows whether the system is operating properly.

Section 280.43(c) requires a record of all calibration, maintenance and repair of release detection equipment be kept for at least one year after the service is completed.

After the service is performed for the owner and operator, many of the methods of release detection allowed in today's proposal are implemented through the use of automated equipment that consists of sensitive electronics and instrumentation. To work properly and within the specifications of the manufacture, such sophisticated methods of detection generally need to be periodically calibrated and maintained to assure measurement performance that will achieve designed detection performance. Repairs of this equipment will be inevitable over the life of its operation. Such periodic maintenance and repairs are necessary for the release detection sensors and data analysis to be able to achieve the performance standards proposed for each method today.

Maintenance calibration and repairs will be generally performed by the equipment installer or manufacturer according to schedules and procedures particular to the type of instrumentation used. Because of the critical nature of this activity, EPA is proposing that a record of such work be maintained for one year. A copy of any invoice receipts or a completed manufactured/installer maintenance checklist signed by a technician servicing the equipment would be sufficient record to enable an inspector to assure that proper steps are being taken towards calibrating and maintaining equipment. This record must be kept for at least one year to enable an inspector to assure during an on-siste visit that the instrumentation is being properly maintained by the owner and operator to obtain meaningful and reliable detection results.

E. Reporting of Suspected Releases, Spills, and Release Investigation and Confirmation

a. Overview

All suspected releases must be investigated in order to discover if an UST is leaking. This is a necessary step prior to the abatement and remediation of a possible release. In addition, reporting of suspected and/or confirmed releases to implementing agencies allows the authorities to ensure that appropriate actions are taken to protect human health and the environment.

EPA's State Release Incidents Study indicates that most releases today are first identified by sensory observation of the stored product in the environment. More than 70 percent of the releases were identified by these observations, which include the sight, taste, or smell of the released product in ground water, surface water, sewer lines, electrical conduit/vaults, excavations, or basements. Consequently, in most cases, it is necessary to conduct an investigation to identify (or confirm) the source of the suspected release.

The release investigation and confirmation process, however, is sometimes complex. For example, the owner of an UST system may typically be reluctant to begin the process of release investigation, due to the significant cost involved. In addition, complications are posed by the development and implementation of criteria and procedures to determine the appropriate circumstances for initiation, conduct, and conclusion of the confirmation process. Also, conclusive proof of the presence or absence of an underground release is not always easily obtained because release detection methods used may yield contradictory or inconclusive results. For instance, regulated substances could be discovered in the soils surrounding the UST, yet a tank tightness test may not indicate the presence of a leak. As discussed previously in this Preamble, tank tightness test results alone cannot absolve the UST owner/operator from consideration as a possible contaminant source because this method of detection cannot detect small releases or spills. Thus, another method of release detection (e.g., test samples taken from within the excavation) must be employed to corroborate or contradict the tightness test results. When previous results contradict each other, another release detection procedure may be warranted to corroborate whether the UST is leaking or not.

The accuracy of a release detection method is often an issue of concern during a suspected release investigation. For example, inventory control is used fairly frequently as a method for confirming releases; however, it possesses a variable accuracy that is influenced by a number of factors including temperature, meter calibration, and theft. Consequently, indications of small releases by inventory control must be carefully evaluated for the influence of such factors. Moreover, confirmation by another more conclusive release detection method may be necessary. Indications of leakage obtained from other monitoring methods may need to be similarly verified. There currently exists several inventory reconciliation analysis service firms that provide such an evaluation for a fee using computerized statistical techniques.

Testing methods must be utilized with great care to provide an effective means of release confirmation. For example, as discussed in Section VI.D. of this Preamble, the use of tightness testing to confirm releases relies upon the accuracy of the test procedures. Variables such as temperature, tank end deflection, and vapor pocket formation may substantially influence the results of the testing procedures. The use of testing methods for release confirmation is further complicated by the possible incompatibility of some hazardous substances with certain testing procedures. Equipment used in some test procedures may be damaged when exposed to specific hazardous substances that are stored in underground storage tanks. Thus, care must be exercised in choosing the appropriate testing method as well as in interpreting the test results to assure compliance with the performance requirements for tank tightness testing as specified elsewhere in today's rule.

All the above concerns have prompted EPA to propose requirements for the reporting, investigation and confirmation of releases today.

b. Current Practices

A review of state and local procedures specified in regulation for release reporting, investigation, and confirmation showed that nineteen states and one local regulation (out of 23 states and 4 local regulations recently reviewed) address leak investigation and confirmation. Most require the reporting of suspected releases. They also specify the type of evidence that should raise suspicion concerning an UST system's integrity. In most cases, this involves identifying variations in the reconciliation of product inventory in excess of a specified volume, such as 0.5 percent of total weekly throughput. Other indications often specified include a rapid change in the water level in the bottom of petroleum storage tanks, the observed presence of released material in the environment, or an alarm activated by a leak monitoring system. In any case, most of these regulations require any suspected release to be reported immediately to the implementing agency.

The investigative response for a suspected release is prescribed by all of these UST regulations. Less than half of them require a release investigation that consists exclusively of tightness testing as the specified investigation procedure. Several states give a detailed set of procedures for the identification of leaking systems. In all cases, the procedure begins with a recalculation of inventory records. Further steps may include a physical inspection of readily-accessible system components, the recalibration of system dispenser meters, and the tightness testing of the tank and associated piping.

The National Fire Protection Association (NFPA) 329, "Recommended Practice for Handling Underground Leakage of Flammable and Combustible Liquids," and the American Petroleum Institute (API) publication, "Underground Spill Cleanup Manual," provide methods and procedures currently used in the release confirmation process. This NFPA "Recommended Practice" is the current national standard most often cited by existing UST regulations. It addresses release investigation methods and tightness testing procedures in great detail. The investigation process calls for checking of various potential sources and emphasizes the possibility of multiple sources. The investigation process includes physical inspection, product inventory verification, and the tightness testing of the tank and piping system. NFPA's recommended approach is to require inspection of the storage facility, verification and reconciliation of inventory records, verification of proper dispenser calibration, pressure testing of the piping system, and tightness testing of the tank system. The American Petroleum Institute (API) 1628 recommended practice addresses release investigation procedures. Multiple methods of leak confirmation are emphasized by API, as opposed to reliance on a single release detection method. The possibility of multiple sources of release at the same facility is also stressed.

c. Regulatory Approaches

(1) Reporting of Suspected Releases (Section 280.50(a)). EPA considered three approaches towards requirements for release reporting that basically differed as to when the reporting would take place:

- Reporting of any suspected release when it is discovered;
- Reporting only when preliminary investigation has begun to reveal whether a release exists or possible sources of a release; and
- Reporting only when releases are confirmed.

Today's approach is based on the first approach (with the exception of small spill reporting) because it enables the implementing agency to become involved early in the development of procedures to be undertaken for release investigation. This provides the agency with the opportunity to provide guidance to help ensure the use of practices that are appropriate to the situation. The implementing agency also needs to be informed of suspected releases because, until it is confirmed and the source is identified, most often there is a general disavowel of responsibility for "suspected releases." The second approach was not chosen

because, while it reduces the reporting to only those situations where a responsible party is actually initiating an investigation into a suspected release, it does not allow the agency as much input into the initial planning and decision of whether to proceed with an investigation. Also, once an investigation has been initiated, its course has largely been decided and this choice sometimes predetermines its eventual results. The third approach would require the least amount of interaction between the implementing agency and the regulated community because only confirmed releases would be reported. However, this approach would allow very different investigative methods for similar situations, with a wide variation in the reliability of the results. Similarly, "borderline" incidents might never be investigated or confirmed.

The Agency rejected the last two approaches primarily because significant time periods could pass before investigations were initiated or releases confirmed. During these periods, the public would not be informed as to the possibility of a release and its potential adverse impact to human health and the environment. These approaches could also result in significant increased adverse impacts in the environment prior to the identification of any need for corrective action. Therefore, today's proposal requires reporting of all suspected releases to the implementing agency within 24 hours.

Several situations have been identified by EPA as warranting such quick reporting by the UST owner and operator. Many of these conditions have already been identified as warranting investigation in the two recommended practices mentioned earlier, as well as in several state UST regulations. EPA is proposing the reporting of all the following conditions within 24 hours because they are believed to represent important indications that a release has occurred. This requirement is satisfied by a telephone call. The situations requiring reporting a "suspected release" are:

- Testing, monitoring, or sampling results that exceed the specified limitations for release detection methods as set forth in today's proposed regulations;
- Unusual facility operating conditions including:

—Erratic behavior of regulated substance delivery/dispensing equipment,
—Sudden loss of regulated substance from the UST system,
—Unexplained presence of water in the tank, or
—Physical presence of the regulated substance or an unusual concentration of vapors in the immediate vicinity of the UST that are of unknown origin;

- Detection of regulated substance or any associated vapors in areas outside the immediate vicinity of the UST such as in soils, basements, sewers, utility conduits, or nearby surface water; and
- Any spill or overfill of a regulated substance that has entered the underground environment or surface waters, with the exception of small spills that can be immediately contained and completely removed.

The Agency is seeking public comment on the need to quickly report the above conditions. Of particular interest is the question of whether the unusual facility operating conditions proposed today are of sufficient concern or conclusive enough in nature to warrant immediate reporting. Are there other operating conditions that are indicative of a potential release requiring reporting? The reportable situations proposed today will result in some false reports if the equipment indicates a release although none has taken place. Should the owner and operator have more than 24 hours to determine, perhaps in coordination with the manufacturer, if the equipment is indeed operating correctly before reporting to the implementing agency?

Another important question is the reporting of spills and overfills. The Agency believes that spills are not an uncommon occurrence at many of the facilities in the regulated community. As was described earlier, today we are also proposing to require spill and overfill controls and procedures, with control equipment immediately applied at all new tanks and phased-in at existing tanks. The concern about spills reporting is that they appear to occur very frequently and generally in small quantities. The Agency believes very little threat is posed by the smaller spills if they are contained and completely cleaned-up, including contaminated surface soils.

The Agency is proposing a "reportable quantity" (RQ) approach to indicate to the owner or operator when reporting is necessary. This approach requires reporting of aboveground releases to land in excess of 25 gallons, and of aboveaground releases to water if they result in an oil sheen on the water, in accordance with the requirements of 40 CFR Part 110. The sheen test has been a useful trigger under Section 311 of the Clean Water Act for oil spills to navigable waters. A sheen is easily recognized and does not require the sometimes difficult determination of the volume of spilled petroleum. Further, it has been supported by scientific studies which have concluded that repeated and low level releases of oil may cause harm to aquatic environments. The choice of a 25-gallon reporting threshold is linked to data showing that this amount of petroleum is often left in the delivery lines of tanker trucks after product delivery to an UST, and to an analysis done for used oil when listing this waste as a RCRA hazardous waste was proposed. See the discussion of "Two Release Categories" in Section VI.F. of this preamble (for a more complete discussion of the rationale for selecting a 25-gallon reporting threshold).

Although reporting triggers have been established for aboveground releases, this does not relieve the owner or operator of the responsibility to undertake all other appropriate elements of the corrective action process under Subparts F and G for an aboveground release that is more or less than the reportable quantity. The Agency requests comments on the appropriateness of the proposed reporting cutoff of 25 gallons for aboveground releases to land and surface water.

(2) Release Investigation and Confirmation At The Site (Section 280.51). Some of the major shortcomings described above with less than immediate reporting by the owner or operator could be alleviated by providing a detailed set of standards and procedures in regulation for owners and operators to follow in the investigation and confirmation of suspected releases. However, EPA has determined that it is not possible to comprehensively cover in regulations the wide variety of possible situations that could occur with the investigation of UST releases. The Agency examined several approaches concerning the investigation and confirmation of releases.

In addition to an exact step-by-step investigation procedure, the Agency also considered an alternative approach that would not identify any procedures but rather would leave it completely to the implementing Agency to develop, on a site-by-site basis, requirements for release investigation and confirmation. Such an approach would provide much flexibility to the implementing agency, but would also provide the added burden of performing site-by-site determinations. EPA is concerned that such an approach could actually impede the timely implementation of suspected

release investigations because it would not allow initiative to be taken by owners and operators until they were certain as to their ultimate responsibilities based on a determination by the implementing agency.

Today EPA is proposing a third approach toward release investigation and confirmation: A basic, but not detailed, set of release investigation and confirmation requirements with notification of the suspected release to the implementing agency, so that the agency can have the opportunity to require specific confirmatory actions. After the immediate reporting of all suspected releases and reportable spills, the owner and operator must take one of possibly several routes to investigate and confirm a suspected release.

It should be emphasized that the confirmation provisions of the proposed regulations require UST owners and operators to initiate investigative actions when a suspected release is discovered. After the implementing agency is notified of a suspected release, it has the option under the proposed regulations to require a specific confirmation test to be performed by the owner and operator. The implementing agency has been provided the ability to select an investigative method that will produce the best results, because sometimes additional site-specific judgments are needed in the determination of the appropriateness of a particular confirmation test at a particular site. If such specific directions are not provided by the implementing Agency, the owner and operator must follow the procedure required by the proposed regulation. Of course, the owner and operator may undertake immediate corrective action rather than the release confirmation procedures under these proposed regulations.

Proposed § 280.51 establishes that a suspected release will need to be investigated by one of the following methods:

- A site-specific investigation, as required by the implementing agency, that determines whether a release has occurred impacting ground water or soils surrounding the excavation area. The purpose of this environmental assessment is to substantiate or disprove a release at that particular location.
- If a suspected release was detected within the interstitial area between the UST and the secondary barrier around it, an investigation must be performed to determine if the interstitial monitoring is working properly. For example, a double-walled tank may be investigated by the use of a second method of interstitial monitoring instead of tightness testing the tank or conducting soil borings and analysis outside the tank to substantiate or disprove the occurrence of a release;
- When a suspected release is identified by the failure of a tank and/or piping tightness test, an investigation that included all of the following steps would be sufficient to substantiate or disprove the presence of a release. A failure of any of these tests would be sufficient to substantiate a release has occurred for the purposes of initiating corrective action under Subpart F or G.
  - —Verification and reconciliation of any available inventory records to detect whether a discrepancy exists that exceeds the performance requirements set forth in § 280.41(c)(2) (5 percent of weekly flows through or 0.5 percent of monthly flow through);
  - —After isolating the piping from the tank, the piping fails or passes a retest that must be conducted within 7 days of the initial reporting of a suspected release to the implementing agency;
  - —After isolating the tank from the piping, the tank fails or passes a retest conducted within 7 days of the initial reporting despite excavating to the tank top and checking/tightening all loose fittings, vent pipes, or other UST system equipment; or
  - —Analysis of soil core samples indicates a level of hydrocarbon or chemical contamination in the unsaturated zone beneath the UST that would warrant corrective action in accordance with Subpart F or G.
- If a suspected release is identified by an inventory reconciliation discrepancy, or other unusual operating conditions, an investigation that evaluated all the following would substantiate or disprove the presence of a release. A failure of any of the tests would be sufficient to substantiate that a release has occurred:
  - —Tanks or piping fail a tightness test (conducted within 7 days of initial reporting) performed in accordance with § 280.41(c)(1); or
  - —Analysis of soil core samples indicates a level of hydrocarbon or chemical contamination in the unsaturated zone beneath the UST that would warrant corrective action in accordance with Subpart F or G.
- With approval by the implementing agency, the performance of an alternative investigation procedure that is no less determinative than any of the above approaches and is considered a more appropriate approach by the implementing agency for the suspected release conditions.

There are several important considerations that influenced the development of the above requirements. The first is an acceptance of tank tightness testing as a valuable tool for quickly evaluating the integrity of the UST. It is a procedure that can be performed rapidly, generally with little or no retrofitting of equipment, and should reliably identify large releases. However, this test is not completely determinative and cannot detect small release rates. Thus, where proposed and used as a method for investigating suspected releases, it must be backed up by the use of soil borings samples taken out of the unsaturated zone under the UST (or some equally determinative technique approved by the implementing agency). If both methods do not reveal a release condition, then the initial cause for concern about a suspected release can be discounted.

This regulatory approach is being proposed by EPA because it requires the owner and operator to rapidly begin and complete an investigation procedure (within 7 days) in the absence of specific direction from the implementing agency. However, EPA anticipates that this important interaction between the owner and operator and the implementing agency will often take place after the reporting required in § 280.50(a). In many situations this interaction is a necessary ingredient to establishing appropriate and expeditious measures unique to investigating and confirming that a release has taken place at a particular site. For example, sometimes the implementing agency may decide that a more rigorous examination of the ground water and soils surrounding the UST is needed at certain sites because of its nearness to public or private drinking water wells, or nearby places of human habitation (a public school or private residence, for example). Thus, today's proposal is intended to also allow for the development and use of special procedures or enforcement orders by the implementing agency in lieu of the specific investigation procedures proposed today, should they appear to be warranted by that agency to assure human health and the environment is protected.

The procedures proposed today generally require that two methods of measurement be used to corroborate whether a suspected release is actually a release requiring corrective action. Thus, for example, if a monitoring method has identified a suspected release, this can be verified by tank testing and soil borings, or ground water sampling and soils analysis, or any

other combination believed equally determinative by the implementing agency at that site. Tank testing and inventory controls, however, may not be sufficiently determinative because they may not be able to detect small releases.

Another important consideration is that particular methods of investigation may be unworkable, or may not be necessary, at certain sites. Therefore, today's proposal allows for the implementing agency to approve any investigative procedure believed to be no less determinative than any of the other methods allowed. For example, tank testing may prove unworkable in high water tables or at tanks with certain configurations and equipment. Therefore, other investigation techniques can be substituted by the implementing agency (for example, chromatographic mapping of the soil gas at the site). Also, there are situations where a full investigation may be unnecessary because, for example, the owner and operator has demonstrated to the satisfaction of the implementing agency that the original cause for suspecting a release was a result of a malfunctioning monitor which has been fixed and put back into operation. Finally, there may be situations where the implementing agency decides that the "suspected release" is in fact a release requiring an immediate site assessment and mitigating actions by the owner or operator as part of a corrective action under proposed Subpart F or G of the regulation. For example, a large discrepancy found through an inventory reconciliation or a large amount of product visible in an observation well may, in the judgment of the implementing agency, be sufficient evidence that a release has occurred and that further investigation would just delay needed corrective action.

(3) Off-Site Impacts and Source Investigation (Section 280.52). There is one other release investigation situation that is now commonly occurring and, therefore, is addressed by today's proposal. As stated earlier, releases are now often occurring (given the absence of release detection practices) without the owner or operator's knowledge. These releases are discovered off-site because of impacts to such things as nearby streams, buildings, utility lines or groundwater wells. However, there can be several possible sources in any one area where an impact has occurred. Therefore, a release can be verified but the source unknown.

An investigation is needed in these situations to identify possible sources of the release and to confirm and stop the actual source(s) from continuing to release regulated substances. Because each of these investigations are unique to the area of impact and will be directed by the implementing agency, today's proposal does not attempt to establish detailed procedures on how owners and operators must carry out any release investigation and confirmation activities. These are necessarily determined on a site-specific basis. However, today's proposal does obligate owners and operators to conduct investigations to identify the source of a known release. The same methods are expected to be used as those used when investigating a suspected release on-site under § 280.51. To protect human health and the environment, the implementing agency may require the owner or operator to test the tank or equipment for tightness or structural soundness or to conduct environmental testing to determine the magnitude, extent, and effect of the release.

F. Corrective Action Requirements for Petroleum UST Systems

Today's proposal sets forth separate corrective action regulations for UST systems that contain petroleum and those that contain hazardous substances. While the basic philosophy, objectives, and structures of the two sets of requirements are the same, EPA believes two distinct subparts addressing petroleum and hazardous substance UST systems are desirable as a means of avoiding confusion over which procedures are applicable to a particular site. The Agency solicits comments on this approach. Specifically, the Agency requests comment on whether the requirements should be integrated into one subpart in which only the differences in the two processes would be highlighted.

Corrective action is comprised of those activities required or otherwise necessary to respond adequately to a release from an UST that contains petroleum.[1] These requirements apply to regulated petroleum UST systems containing petroleum and such petroleum UST systems for which tank technical standards are being deferred (i.e., are subject to exclusions) by the Agency. This proposal divides specific regulatory requirements for petroleum UST corrective action into two stages.

Stage I consists of the immediate abatement actions that all owners and operators are required to take in response to a release from an UST containing petroleum. It incorporates relevant experience of state and local UST regulatory programs and some of the main features of these programs.

Stage II addresses requirements that specify longer-term corrective action measures that owners and operators must undertake if the implementing agency determines on the basis of submitted data and a site-specific risk assessment that additional corrective action is required to protect human health and the environment. Although owners operators will undertake the corrective action, the implementing agency will determine the measures necessary to protect human health and the environment.

The following sections discuss the steps owners operators must take to respond to a release and the complementary role of the implementing agency in overseeing the owner/operators' activities.

1. Stage I: Immediate Corrective Action Steps

a. Reporting Requirements

Section 9003(c)(3) mandates that EPA promulgate "requirements for reporting of releases and corrective action taken in response to a release from an underground storage tank."

Based on available data, EPA believes that many petroleum UST releases and cleanups are currently not being reported to state and local authorities:

- A survey of UST release files in 50 states identified 12,444 state-reported releases.
- Another statistical study leads EPA to estimate that somewhere between 75,000 and 300,000 (5 to 20 percent of the million petroleum UST systems) may be leaking now or will leak in the near future.
- State and local cleanup officials have reported to EPA that typically over half of their work is triggered by reports

[1] The Agency proposes to apply the "hazardous substance" corrective action requirements to tanks containing both a petroleum and a hazardous substance if hazardous substances comprise 50% or more of the volume or weight of the total mixture. The Agency is interested in commenters' views of the feasibility (especially for a testing method) of using a concentration threshold to determine when such a mixture would be regarded as principally petroleum or principally hazardous substance, and, therefore, subject to the respective corrective action requirements. The Agency recognizes that several petroleum products (e.g., gasoline) inherently contain certain levels of hazardous substances (e.g., benzene, toluene, xylene), but regards these to be part of "petroleum" for the purposes of Subtitle I. The Agency requests comments on the frequency of, problems with, and suggested approach to corrective action requirements for UST systems containing both petroleum and a hazardous substance. The Agency believes that the largest group of such tanks contain waste oil mixed with hazardous substances (e.g., solvents).

of "nuisance conditions"—indicators of leaks from unidentified UST sources.

(1) Two Release Categories. To address the type of releases to be reported and the reporting trigger for those releases, the Agency proposes to classify releases into two categories: Releases below ground and releases aboveground. A release includes releases to secondary containment devices because the Agency believes such reporting is necessary for the Agency to ensure that released materials are removed from the secondary containment area in a timely fashion and that it is aware of any tank system repairs that may be necessary to prevent further releases from the primary tank system.[2]

Owners and operators must report all below ground petroleum releases of any amount that have been detected using the leak detection methods required by section 9003(c)(1) and described in Section VI.D of this proposal, or using any other indication of a release, such as visual observation. Although reporting of all below ground releases places a substantial reporting burden on owners and operators, the Agency views this requirement as an essential part of effective implementation and enforcement of the statutory requirements and objectives of Subtitle I because determination of the quantity of a below ground release is generally not possible.

For aboveground releases, however, EPA proposes a "reportable quantity" (RQ) approach. Above-ground releases to land must be reported if they exceed 25 gallons, and aboveground releases to water must be reported if they result in an oil sheen on the water, in accordance with the requirements of 40 CFR Part 110.

This approach recognizes the potentially high frequency of small aboveground spills (and, therefore, the potentially large reporting burden) and their limited environmental impact. Nonetheless, the Agency believes knowledge of frequent, repetitive, small releases of petroleum may indicate possible tank system and product management problems worthy of concern if allowed to accumulate. In addition, the Agency is concerned about the potential for a series of small aboveground releases of petroleum to effectively invalidate the use of some release detection methods.

The choice of the 25-gallon reporting threshold for petroleum is based on two separate rationales. The first is linked to data that show that this amount of petroleum is often left in the delivery lines of tanker trucks after product delivery to an UST. If this residual product cannot be returned to the truck, it has often been drained out around the fill pipe and spilled into the excavation area. The frequency of this kind of "routine" spillage seems to be high and of a sufficient magnitude to warrant a reporting requirement, while avoiding the requirement to report releases for much smaller quantities.

The 25-gallon reporting threshold is also based on an analysis done in establishing a CERCLA RQ for used oil when it was proposed for listing as a RCRA hazardous waste. Used oil was examined in this analysis for its aquatic toxicity, mammalian toxicity, ignitability, reactivity, and chronic toxicity. This analysis indicated an RQ of 100 pounds or about 20 gallons. As the only oil product so analyzed to-date, this analysis for used oil represents the best basis for establishment of a reporting threshold for aboveground releases to land associated with petroleum UST systems. Public comment is requested on the use of other reporting thresholds that are less than or greater than the 25 gallon threshold selected.

A reporting threshold does not reflect a determination that a release will necessarily present a hazard in that quantity and not a hazard in any smaller quantity. The Agency has found that the actual hazard will vary with the unique circumstances of the release. Extensive analysis is necessary to determine the hazard presented under a number of possible circumstances. The RQ analyses and resulting values represent a determination only of possible or potential harm.

Although reporting triggers have been established for aboveground releases, this does not eliminate the responsibility of the owners and operators to undertake all other appropriate elements of the UST corrective action process described in the proposed rule for an aboveground release that is less than the reportable quantity.

EPA solicits comments with supporting data on these two release categories, including the appropriate reporting threshold for aboveground releases to land and surface water.

(2) Reporting Within 24-Hours. Suspected releases shall be reported to the implementing Agency within 24 hours. This allows implementing officials to advise the owners and operators of the appropriateness of corrective action steps already taken and to suggest additional measures that could be implemented. This approach also ensures that the implementing agency can move quickly to assist a private party in taking corrective action or, in imminently dangerous situations, to intervene directly itself under the authority provided by Subtitle I or an approved state program. This capability for direct government response has been enhanced by the recent Superfund Amendments and Reauthorization Act of 1986, which established a fund for federal response to releases from petroleum UST systems. (Implementation of that authority is addressed below in Section VII.C. of this Preamble.)

b. Initial Abatement Requirements

If a release is confirmed in accordance with § 280.51 or 280.52, owners and operators must take all necessary actions to abate acute risks to human health and safety. The proposed requirements reflect the approaches taken in emergency responses under section 311 of the Clean Water Act and Superfund cleanups, responses to releases from hazardous waste tanks (Sections 264.196 and 265.196), as well as the experience and practices of existing state UST programs. At a minimum, these actions include stopping the release and mitigating fire and explosion hazards. Stopping the release means, at a minimum, removing as much petroleum from the tank system as is necessary to prevent further release and to allow inspection and repair of the tank system. Mitigation of fire and safety hazards may include contacting local fire and public safety officials for assistance; evacuating affected persons; installing venting systems; and recovering product leaking into subsurface structures, such as basements and sewers.

Once immediate health and safety concerns have been addressed, owners and operators must take additional steps to remove visibly contaminated soil in the excavation zone and in the immediately surrounding area.

Next, owners and operators must report these initial corrective action measures to the implementing agency. If corrective actions are taken immediately upon suspicion or detection of the release, the release and corrective action reports can be made at the same

[2] The Agency believes that the reporting of releases to secondary containment areas provides benefits for the Subtitle I regulatory program for the reasons cited. The Agency is aware, however, that such notification is presently not required for similar releases from Subtitle C-regulated tanks (40 CFR 264.196 and 40 CFR 265.196). The Agency has concluded that this difference in reporting requirements is necessary because the Subtitle I program lacks the opportunity to impose additional controls through a permitting process for tanks or facilities operating waste tanks such as is available for many regulated tanks under Subtitle C of RCRA.

time. However, initial corrective action measures must be reported no later than 20 days after a release is confirmed. If appropriate, this report should include verification of tank repair or closure.

Owners and operators are also responsible for conducting an investigation to determine the presence of free floating product on the water table. This investigation may rely on excavations, borings, or monitoring wells to identify the amount of free product, if any, present in the release area. Data generated should be sufficient to determine the need for free product removal activities. Finally, owners and operators are required to assemble from investigations of the release area or other sources, any information that the implementing agency considers necessary for completing the initial abatement actions described in these paragraphs. Possible data requirements are specified in the rule.

c. Free Product Removal

If free product is detected floating on ground water, the owner or operator must remove free product to the maximum extent possible. Unless alternative instructions are provided by the implementing agency, the owner or operator must submit a report for free product removal to the implementing agency within 30 days of confirming the release.

Removal of free product is proposed for inclusion as a Stage I activity (which will be performed at all sites where free product is discovered). The Agency believes, based primarily on state UST program experience, that mitigation of present and potential fire and safety hazards due to free product will require removal of the free product in virtually every instance. This requirement to remove floating free product to the maximum extent practicable in all cases reflects EPA's beliefs that: (a) Free product is a safety hazard if left uncontrolled, (b) free product is a continuing source of dissolved ground-water contamination, (c) free product removal is a relatively inexpensive corrective action measure, and (d) free product removal is a common practice today in nearly all UST release cases studied by the Agency.

d. Additional Site Investigation

Owners and operators are also responsible for investigating the nature and size of the release to determine the extent of additional soil and ground water contamination. This investigation may include collecting and analyzing soil samples, testing the ground water to define the nature and extent of any dissolved contamination plume, and testing adjacent drinking water supplies. While the Agency expects that collection and analysis of soil samples will be a part of virtually all such investigations, the Agency believes that ground water sampling and analysis may not be required at some sites (e.g., sites without fractures, faults or similar heterogeneous geological features) if the owners' and operators' investigation of the extent of soil contamination demonstrates that such contamination does not extend to or come in contact with the water table.

When conducting additional site investigations, owners and operators should make use of data collected during investigations conducted previously or concurrently for purposes other than corrective action. For instance, as discussed previously, § 280.40(b) of the rule requires that a site assessment be conducted to ensure that the method of external release detection selected is appropriate for the site and is designed and installed properly. Since studies of the magnitude and extent of contamination as well as the presence of free product are necessary for determining how well external release detection monitoring will work at a particular site, it is likely that data generated during a release detection site assessment will be applicable to additional site investigations conducted during corrective action. Besides, site investigation activities conducted during release detection and corrective action phases should be coordinated with efforts to assess the excavation area around the UST system prior to permanent tank closure. The activities required for this site assessment are specified at § 280.70(d) of the rule and resemble the requirements for release detection and corrective action investigations.

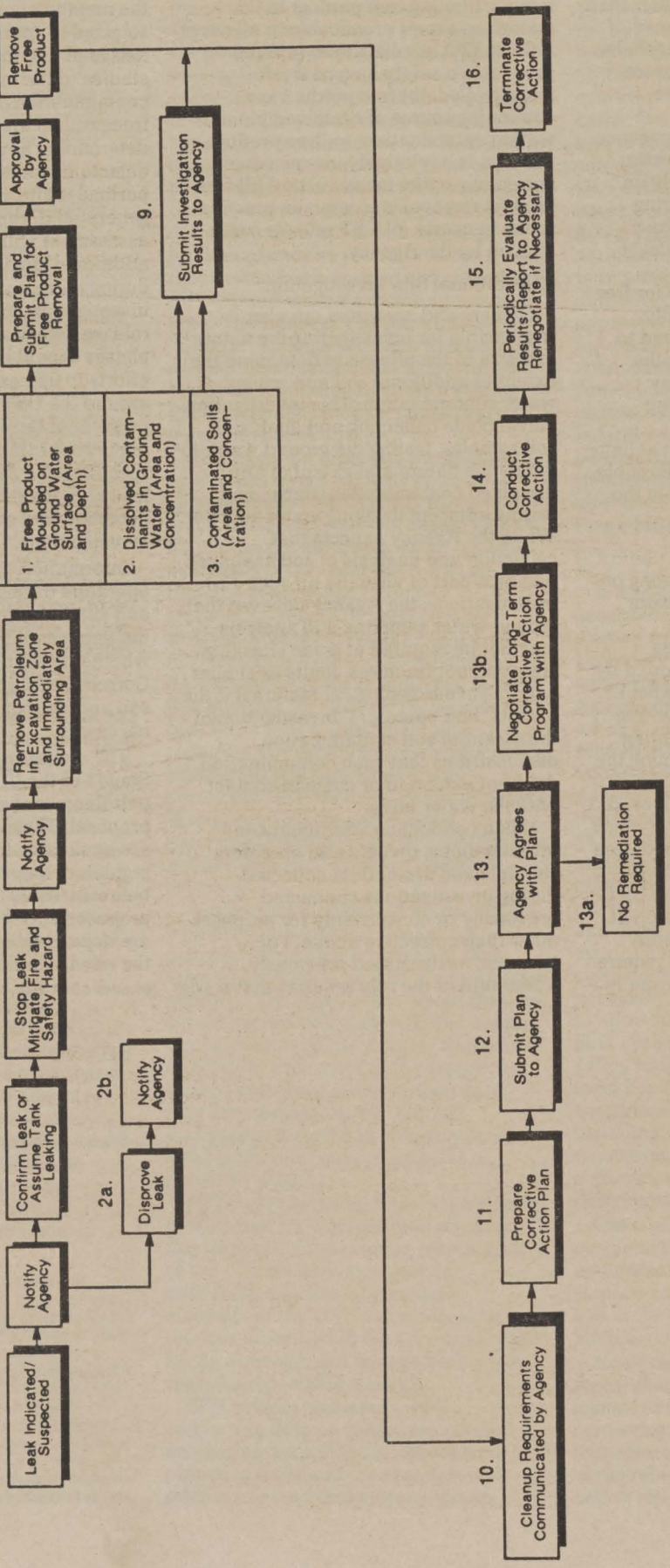
Information collected by owners and operators during free product removal and site investigations may be used by the implementing agency to determine whether additional information and/or a Corrective Action Plan for additional soil and/or ground water cleanup is necessary.

The above requirements comprise Stage I of the UST corrective action for petroleum tanks required by this proposal. These minimum requirements are applicable to all releases. These regulatory steps are further illustrated below in Table 3. Stage II of these proposed corrective action requirements are dependent on the risk presented by the release and are described below.

BILLING CODE 6560-50-M

Table 3

Corrective Action Process for Petroleum Underground Storage Tanks



BILLING CODE 6560-50-C

2. Stage II: Longer-Term Corrective Action

Generally, reporting releases, abating acute risks, and free product removal are steps that must be taken in all cases of petroleum UST releases. After these steps, variations in the response to a release are likely to occur. Variations in the determination and implementation of appropriate longer-term remedial corrective action plans are discussed below.

To establish appropriate cleanup levels, EPA has studied various options and has evaluated state UST program experience. As a result, EPA proposes a site-specific approach for petroleum UST corrective action regulations. (For a full discussion of the options, see Section V of this Preamble.) This site-specific approach will require a risk assessment for each site to determine if and to what extent soil or ground-water contamination threatens human health or the environment.

a. Establishing a Corrective Action Plan

After the owner or operator has submitted the results of the previously required site investigations of possible soil and ground-water contamination (as described above), the appropriate implementing agency will conduct its analysis—a risk assessment—of the submitted site investigation data. Based on its risk assessment, the implementing agency will establish the requirements for additional cleanup as part of a cleanup plan that must be implemented by the owner or operator. EPA believes that some variability in how the results of the risk assessment process are used to establish cleanup requirements is required to reflect the variability in UST release sites. The Agency, however, intends to develop several tools designed to assist the implementing agency in conducting the risk assessment.

This required risk assessment must be an evaluation of the site-specific risk to human health and the environment based on data drawn from the particular site. At a minimum, the risk assessment should:

- Consider the quantity, toxicity, persistence, and mobility of the material released and include selection of indicator chemicals for use in the analysis;
- Determine the potential pathways of exposure and the number of persons who would be exposed to contamination at various intensities and durations;
- Estimate the concentrations of indicator chemicals at the exposure points identified;
- Estimate human intakes and exposures due to background sources and the release;
- Characterize the resulting risk, including the uncertainties in the risk assessment; and
- Consider the technological feasibility of corrective action measures.

On the basis of the risk assessment, the implementing agency will set the site-specific level that the owners or operators must achieve to clean up contaminated soil and ground water. Cleanup levels based on site characteristics must be identified for all affected media, including subsurface soils, ground water, and surface water. In selecting appropriate clean up levels through the risk assessment process the implementing agency may incorporate consideration of available health-based standards or a state's ground-water classification system (or the EPA's Ground-Water Protection Strategy).

The owner or operator must then submit to the implementing agency for review, in accordance with procedures established during approval of the implementing agency's program, a Corrective Action Plan for achieving the cleanup levels established through the risk assessment. An implementing agency may require owner or operator to commence cleanup before a Corrective Action Plan is approved if such action is necessary to protect human health and the environment. After the implementing agency has approved the Plan, the owner or operator must carry out the Plan. Cleanup could include excavating and repairing the tank (if this was not done as part of initial corrective action); containing the dissolved contamination plume with trenches and barriers; excavating additional contaminated soil; providing alternative drinking water supplies to area residents or applying point-of-use controls; restoring the ground-water source; restricting the use of the contaminated ground water; or allowing natural cleansing of an aquifer. Selection of a proposed remedy is the responsibility of the owners and operators, but the implementing agency must approve of the proposed remedy.

During the cleanup, the owner/operators must periodically evaluate the effectiveness of the remediation process. In some cases, the cleanup plan may be modified after these periodic evaluations. For example, existing state UST program experience indicates that the UST corrective action measures initiated with cleanup targets, which were based on the results of the risk assessment process, may sometimes reach a level at which progress toward the cleanup targets is no longer being made. In these situations, modification of the Corrective Action Plan may be appropriate to reassess the choice of a remedial measure or to allow monitoring procedures to be substituted for additional remedial measures, as long as conditions remain stable or improve.

3. Reporting Requirements

The Agency proposes that the owner or operator report all corrective actions, including all immediate response actions taken after a release is suspected or detected and all steps in longer-term corrective action. However, this proposed regulation does not specify the number of corrective action reports to be submitted or the method of reporting. EPA believes these requirements are best left to the discretion of the implementing agency, but is interested in receiving comments suggesting other approaches.

4. Responsibilities of Implementing Agencies

Implementing agencies must monitor the actions required of petroleum UST owners and operators. For example, implementing agencies are responsible for the review of all reports and summaries submitted by owners and operators. These reports include release reports, immediate abatement action reports, site investigation summaries, free product removal plans, Corrective Action Plans, and periodic progress reports on implementation of the Corrective Action Plan. The implementing agency may also assist in or undertake immediate abatement actions in response to a release.

After the owner or operator submits results of the site investigation, the implementing agency is responsible for performing and evaluating the site-specific risk and exposure assessment. On the basis of this assessment, the implementing agency determines the cleanup levels that the owner/operators must attain through response actions described in the Corrective Action Plan. Cleanup levels will be identified for all media affected by the release, including subsurface soil, ground water, and surface water. The implementing agency is also responsible for all oversight of the development and implementation of the Corrective Action Plan by owner and operators, and for the conduct of any public notice and/or public meetings on Corrective Action Plans as established in the public participation requirements of this rule (or under an approved state program).

G. Corrective Action Requirements for Hazardous Substance UST Systems

Corrective action is comprised of those activities required or otherwise necessary to respond adequately to a release from an UST system containing hazardous substances. UST systems subject to these requirements include regulated UST systems containing hazardous substances and UST systems containing hazardous substances for which tank technical standards are being deferred by the Agency.

This proposal divides specific regulatory requirements for UST hazardous substance corrective action into two stages. The first stage consists of the abatement actions that all owners and operators are required to take in response to a release from USTs containing hazardous substances. It follows requirements established for a response to a release from a hazardous waste tank regulated under Subtitle C of RCRA (40 CFR 264.196 and 265.196). Stage two addresses requirements that specify longer-term corrective action measures that owners and operators must undertake if the implementing agency determines on the basis of submitted data that additional corrective action is required to protect human health and the environment. Although owners and operators will undertake the corrective action, the implementing agency may intervene under the authority provided in RCRA or CERCLA, or as provided in an approved state program, if necessary to ensure that adequate measures are taken to protect human health and the environment.

The following sections discuss the steps owners and operators must take to respond to a release and the complementary role of the implementing agency in overseeing the owners' and operators' activities.

1. Stage I: Immediate Corrective Action Steps

a. Reporting Requirements

As with releases from USTs containing petroleum, to address the type of releases to be reported and the reporting trigger for those releases, the Agency proposes to classify releases into two categories: releases below ground and releases aboveground. A release includes releases to secondary containment devices because the Agency believes such reporting is necessary for the Agency to ensure that released materials are removed from the secondary containment area in a timely fashion and that it can be made aware of any tank system repairs that may be necessary to prevent further releases from the primary tank system.

Owners and operators must report all below ground hazardous substance releases of any amount that have been detected using the leak detection methods described in Section VI.D of this proposed rule, or using any other indication of a release, such as visual observation. Although reporting of all below ground releases places a substantial reporting burden on owners and operators, the Agency views this requirement as an essential part of effective implementation and enforcement of the statutory requirements and objectives of Subtitle I because determination of the quantity of a below ground release is generally not possible.

For aboveground releases, however, EPA proposes to base UST reporting on the reportable quantities developed under CERCLA (40 CFR Parts 117 and 302). The CERCLA RQs (i.e., reporting thresholds that warn of possible or potential hazard that should be investigated) already apply to UST releases of hazardous substances since such releases must also be reported to the National Response Center under CERCLA section 103. Although reporting triggers are proposed for notification of an aboveground release, this does not eliminate the responsibility of the owners and operator to undertake UST corrective action as required in today's proposed rule for all aboveground releases, including those that are less than the reportable quantity.

EPA solicits comments with supporting data on these two release categories, including using the reportable quantity thresholds of CERCLA to require reporting to the UST implementing agency as well as the National Response Center.

b. Initial Abatement Requirements

When a release is reported in accordance with Section 280.50, owners and operators must take all necessary actions to abate acute risks to human health and safety. The proposed requirements reflect the approach adopted for response to releases from hazardous waste tank systems regulated under RCRA. At a minimum, these actions include stopping the release and removal of any remaining hazardous substances as is necessary to prevent further release and to allow inspection and repair of the tank system to be performed. Owners/operators must take additional steps to prevent further migration of an aboveground release to soils or surface water, and remove visibly contaminated soil from an aboveground release.

Next, owners and operators must report these initial corrective action measures to the implementing agency. If corrective actions are taken immediately upon suspicion or detection of the release, the release and corrective action reports can be made at the same time. However, initial corrective action measures must be reported no later than 20 days after a release is confirmed. If appropriate, this report should include verification of tank repair or closure.

Owners and operators are also responsible for investigating the nature and size of the release to determine the extent of additional soil and ground-water contamination. This investigation may include collection and analysis of soil samples, installing of monitoring wells to identify the presence of free product, testing the ground water to define the nature and extent of any dissolved contamination plume, and testing adjacent drinking water supplies. This information, or other data that may be required, must be sufficient for the implementing agency to make a decision with respect to what type and degree of additional corrective action, if any, may be appropriate.

The above requirements comprise Stage I of the UST corrective action for hazardous substance tanks required by this proposed rule. These minimum requirements are applicable to all releases. Stage II actions of these proposed corrective action requirements are dependent on the risk presented by the release and are described below.

2. Stage II: Longer-Term Corrective Action

Generally, stopping the releases, release reporting, and containment of visible contamination are steps that must be taken in all cases of releases of hazardous substances from an UST. After these steps, variations in the response to a release are likely to occur. Variations in the determination and implementation of appropriate longer-term remedial corrective action plans are discussed below.

EPA proposes a site-specific approach for hazardous substance UST corrective action regulation. (For a full discussion of the options, see Section V of this Preamble.) This site-specific approach will require an assessment for each site to determine if soil or ground-water contamination threatens human health or the environment. As discussed in the section on additional site investigations for purposes of petroleum UST corrective action, owners and operators conducting additional site investigations for purposes of hazardous substance UST corrective action should utilize

relevant data generated during site investigations conducted for external leak detection and tank closure purposes.

a. Establishing a Corrective Action Plan

After an owner and operator has submitted the results of the previously required site investigations of possible soil and ground-water contamination (as described above), the appropriate implementing agency will conduct its analysis of the submitted site investigation data. The implementing agency may require additional assessments of the release to be performed. Based on its assessment, the implementing agency will establish the requirements for additional cleanup as part of a corrective action plan.

On the basis of the assessment, the implementing agency will set the site-specific requirements for free product removal and/or cleanup of contaminated soil and ground water that the owner and operator must attain as part of the corrective action plan. Clean-up levels based on site characteristics must be identified for all affected media, including subsurface soils, ground water, and surface water. In selection of appropriate clean-up levels through the risk assessment process, the implementing agency may incorporate consideration of available health-based standards or a state's ground-water classification system.

The owner and operator must then submit to the implementing agency for its review a plan for free product removal and for achieving the clean-up levels established through the risk assessment. After the implementing agency has approved the plan, the owner and operator must carry out the plan. Cleanup could include excavating and repairing the tank (if this was not done as part of initial corrective action); removing free product; containing the dissolved contamination plume with trenches and barriers; excavating additional contaminated soil; providing alternative drinking water supplies to area residents or applying point-of-use controls; restoring the ground-water source; restricting the use of the contaminated ground water; or allowing natural cleansing of an aquifer. Selection of a proposed remedy is the responsibility of the owner and operator, while the implementing agency must approve the proposed remedy.

During the clean-up, the owner and operator must periodically evaluate the effectiveness of the remediation process. In some cases, the clean-up plan may be modified after these periodic evaluations. For example, in some instances the UST corrective action measures initiated with cleanup targets based on the results of the assessment process may reach a level at which progress toward the cleanup targets is no longer being made. In these situations, modification of the plan may be appropriate to reassess the choice of a remedial measure or to allow monitoring procedures to be substituted for additional remedial measures as long as conditions remain stable or improve.

3. Reporting Requirements

The Agency proposes that owners and operators report all corrective action, including all immediate response actions taken after a release is suspected or detected and all steps in longer-term corrective action. However, the proposed regulation does not specify the number of corrective action reports to be submitted or the method of reporting. EPA believes these requirements are best left to the discretion of the implementing agency, but is interested in receiving comments suggesting other approaches.

4. Responsibilities of Implementing Agencies

The responsibilities of the implementing agency for tanks storing hazardous substances are similar to those for tanks storing petroleum.

H. Removal From Use, Temporary Closure, and Permanent Closure (Section 280.80)

a. Overview

When a UST reaches the end of its useful life, it must be permanently closed. Improper closure or abandonment of a UST may contaminate the environment and endanger the public health.

EPA's *State Release Incident Study* identified approximately 300 incidents implicating abandoned UST systems as the source. In addition, discussions with state officials suggest that many more improperly abandoned UST systems throughout the nation are leaking or may leak in the future. EPA believes that requirements for the proper closure of UST systems is necessary to prevent future releases from abandoned tanks.

There are two methods to permanently close a UST: Removal from the ground or closure in place. The choice of method depends on the particular site, the applicable state and local regulations, and financial considerations.

Both of these methods for permanent closure have advantages and disadvantages. Closure in place typically costs less than removal from the ground, but it is difficult to remove all product and residuals from the buried tank and to completely fill the tank with an inert material. Future construction at the site may be hampered by the presence of a UST filled with concrete or sand. Tank removal avoids these problems, but it costs somewhat more and creates a potentially dangerous situation when the tank's vapors are purged into the air. Disposal of removed tanks also presents a problem in many areas of the country.

b. Current Practices

Of the eighteen states with existing regulations for permanent closure, nearly all require the reporting of closure to the regulating authority and the removal of all product from the UST. Tanks closed in place must be filled with an inert material. Tanks closed by removal must be purged of vapors on site and either rendered useless before disposal or cleaned and prepared for reuse. Beyond this consensus, however, state regulations vary greatly. Some states allow closure in place only when tank removal is impossible or impractical. Some mandate precision testing of tanks prior to closure in place to ensure that the tank is not leaking.

Most states that address permanent closure also regulate temporary closure. These regulations allow a UST a limited time to remain out of service before it must be returned to service or permanently closed. The time limit and accepted procedures for temporary closure vary. Some states allow product to remain in the tank; others require the tank to be empty during temporary closure. Still others require that product be removed from the tank and replaced with water and a corrosion inhibitor.

There are also existing industry consensus codes, such as NFPA 30 and API 1604, which recommend procedures for permanent closure. Although these codes should ensure containment of product, they could allow a tank owner to literally cover up prior releases and leave a site that could cause future environmental contamination.

c. Today's Proposal

Today, EPA proposes a regulatory approach that builds on these existing consensus codes and state regulatory approaches. This approach will also require owners and operators to conduct a limited site assessment at the time of permanent closure. The advantage of this approach is that it will prevent contamination problems from being covered up at closure. With numerous closings of UST systems expected over the next five to ten years, EPA believes that it is important that owners and

operators of UST systems determine if there is a contamination problem before they walk away from these sites.

The proposed regulatory approach in 280.80 covers tanks temporarily out of service, and the temporary and permanent closure of tank systems. These are the topics covered by most state regulations. In summary, any tank that contains product is subject to release detection requirements regardless of whether the tank is in service. Tanks out of service for a period of time may become a receptacle for illegal dumping of hazardous materials unless the fill and delivery lines are capped. The Agency is proposing that after three months tanks must be temporarily closed, leaving only the vent line open. EPA solicits comments on the appropriateness of this time frame, and especially hopes to elicit data showing the environmental risks associated with different schedules.

At some later point, if the UST is not going to be put back in service, the system should be permanently closed. EPA believes that two years is a reasonable amount of time for a tank owner or operator to decide whether to permanently close or to re-use the tank. During this time the environment will remain protected by lines being capped and continued release detection. The Agency, however, needs to put a limit on how long "temporary" should be, and solicits comment on the 24 month limit proposed today.

(1) Temporary Closure (Sections 280.80 (a) and (b)). If a tank system is taken out of service for any period, the owner and operator must continue to maintain the corrosion protection system as well as monitor or test for leaks as required by the leak detection regulations. If a leak is detected, release investigation and corrective action regulations will apply.

A tank system out of service for 3 to 24 months must be temporarily closed. The owner or operator must:

- Continue monitoring for leaks;
- Leave the vent line open and functioning;
- Cap and secure all other lines, pumps, manways, and ancillary equipment;
- Notify the implementing agency of a return to service or permanent closure.

(2) Permanent Closure (Sections 280.80(c)–(f)). If a tank system is taken out of service for over 24 months, it must be permanently closed.

Today's proposal requires than any tank system that is taken out of service permanently must be removed from the ground or be closed in place. If the tank is removed, the owner and operator must:

- Remove all flammable liquids from the tank system;
- Remove all pipes from the UST; and
- Purge the UST of all hazardous vapors before removal and disposal.

If the tank is closed in place, the owner and operator must:

- Remove all flammable liquids from the tank system;
- Disconnect or cap all pipes; and
- Fill the tank system completely with an inert solid material.

The above steps are widely-accepted industry closure practices and are reflected in national consensus codes such as NFPA 30.

For permanent closure, EPA is proposing an additional step beyond the current industry recommended practices. The owner or operator must assess the site for contamination from the tank.

The use of release monitoring methods that utilize sensors external to the tank will meet this requirement. The owner or operator may also use such techniques as gas chromatograph mapping or the analysis of ground water or soil core samples for evidence of contamination by released product.

The purpose of this site assessment is to ensure that there is a clean site at closure. If this site assessment indicates that a release has occurred, the owners operator must perform corrective action in accordance with applicable regulations in Subparts F and G.

In an effort to keep owners and operators from improperly closing UST systems before these proposed regulations become effective and to combat contamination from UST systems improperly abandoned in the past, the Agency proposes that the closure provisions be applicable to UST systems taken out of operation prior to the effective date of these regulations. Thus, the proposal requires that UST systems that are improperly closed prior to the effective date of these regulations be revisited and properly closed. All UST systems improperly closed before the effective date of the final regulation must therefore be either removed or filled with an inert substance. There are no proposed requirements for UST systems properly closed in the past.

All owners and operators who improperly closed UST systems before the effective date of the regulation must, in addition to properly closing their systems, perform a site assessment and notify the implementing agency.

Congress expressed its concern for abandoned tanks by including tanks closed in place within Subtitle I's jurisdiction. The Agency believes that such tanks must be closed properly but believes that owners and operators who followed the NFPA code and the recommended practices described in API 1604 when they closed their tank systems, representing the state-of-the-art at the time, need not be required to revisit their tanks and conduct the site assessment required for improperly closed systems. EPA specifically solicits comments on the proposal to exempt tanks that were closed in accordance with API 1604 and NFPA 30 from the site assessment requirements.

d. Closure Records (Section 280.80(g))

EPA is proposing some basic requirements concerning recordkeeping that will ensure the closure requirements in 280.80 are being complied with. Section 280.80(g) requires that the sampling, testing, or monitoring results required during temporary closure (under § 280.80 (a) and (b)) be maintained for at least one year. Section 280.80(g) also requires that a record of the results of the area assessment performed for closure under § 280.80(d) be maintained for at least 3 years after permanent closure is completed. This closure record consists of the results of all tests, soils samples analysis, site inspections, or other site assessment methods required by the implementing agency. This record is instrumental in demonstrating that closure was performed properly. The proposed regulation also addresses the question of where records can be kept after UST system closure. In many instances, this will be conveniently accomplished at the closed site by either the owner and operator who caused the UST system to be permanently closed, or the new site owner and operator. In some instances, for example with the cessation of all operations on the site, this record may have to be kept off-site. However, this record must be made immediately available at the request of the implementing agency. The proposal also allows owners and operators the alternative of mailing a copy of these assessment results to the implementing agency, particularly if the records cannot be maintained at the closed facility.

VII. RELATIONSHIP TO OTHER ASPECTS OF THE UST PROGRAM

A. Interim Prohibition

Section 9003(g) of RCRA Subtitle I sets forth requirements for tank systems installed between May 7, 1985 and the effective date of the final rules resulting from today's proposal. During this period, UST installations used to store regulated substances must be corrosion protected, made of noncorrodible materials, or otherwise designed and

constructed to prevent releases during the operating life of the facility due to corrosion or structural failure. The tank material(s) of construction must also be compatible with the substance(s) to be stored.

The standards for new tank systems in today's proposed rules (as discussed in Section VI of this Preamble) are designed to modify and expand upon the Interim Prohibition requirements. The proposed rules include design, construction, installation, release detection, and compatibility standards for new tank installations. The Interim Prohibition requirements will continue in place until the effective date of the final rules when the standards for new tanks will replace the Interim Prohibition standards for most new UST systems. The Interim Prohibition will, however, remain in effect for those tanks which have been deferred from coverage under the technical standards in Subpart A (i.e., sumps, hydraulic lifts, bulk tanks, radioactive waste tanks, tanks containing electrical equipment, used oil tanks, and wastewater treatment tanks).

B. Notification

On November 8, 1985, EPA published the Final Rule on Notification Requirements for Owners of Underground Storage Tanks (50 FR 46602). A form to be used for the required notification was included as part of the rule.

The UST rules and standards for new tanks proposed today are not intended to affect these established notification requirements except to add to the information required to be submitted with the notification (see Section VI.B.). Owners of existing UST systems were required to notify their designated state agencies by May 8, 1986. Owners of new or replacement UST systems must notify their designated state agencies within 30 days of bringing the tank into use by submission of the November 8, 1985 federal form, or an approved alternate state notification form.

Section 9002(a)(6) of RCRA requires that, beginning thirty days after the issuance of the final new tank performance standards, and for 18 months thereafter, any person who sells a tank intended to be used in an UST system must advise the tank purchaser of the owner's notification requirements. This requirement would begin after the finalization of the new tank performance standards that are being proposed today.

C. Leaking Underground Storage Tank Trust Fund

Amendments to Subtitle I of RCRA recently enacted as part of the Superfund Amendments and Reauthorization Act of 1986 (SARA) provide for a Leaking Underground Storage Tank Trust Fund. The amendments provide funds for cleanup of petroleum spills from UST systems and give EPA, and states that enter into a cooperative agreement with EPA, the authority to respond to releases of petroleum from UST systems. These amendments to RCRA were necessary because no other federal environmental program includes specific authority for response to petroleum UST releases, although releases of petroleum affecting navigable waters can be responded to under section 311 of the Clean Water Act.

The amendments provide that the Administrator may issue an order requiring corrective action prior to the promulgation of final corrective action regulations under Subtitle I. After the promulgation of the corrective action regulations being proposed today, the Administrator may use this same order authority, under section 9003, as well as the enforcement authority of section 9006, to require owners or operators to undertake corrective action.

The Leaking Underground Storage Tank Trust Fund will be financed by taxes on motor fuels to pay for response costs in a limited set of circumstances. Before the effective date of the final corrective action rules, the Administrator, or states under cooperative agreements, may use the Fund to pay for a particular corrective action whenever that action is necessary to protect human health and the environment.

After the effective date of the corrective action regulations, the amendments provide for the use of the Fund primarily where the financial resources of the owner or operator are not available. In some cases, an identifiable and solvent owner or operator may be in compliance with all UST financial responsibility requirements (discussed elsewhere in today's **Federal Register**) but lack financial resources to pay the entire cost of a response. In those cases, the Administrator or a state with a cooperative agreement is authorized to use the Fund to pay the costs that exceed the level of financial responsibility required of the owner and operator by the final financial responsibility regulations.

If the owner and operator has failed to maintain the required level of financial responsibility, the Trust Fund may *not* be used, unless: (1) The owner or operator is insolvent; (2) there is an imminent and substantial threat to human health or the environment; or (3) there is a need to provide alternative water supplies or relocation of residents. In all other instances the Administrator, or state (under a cooperative agreement), can use the order authority provided by the Trust Fund and section 9006, to require corrective action by the responsible party prior to the use of the Trust Fund.

Before the effective date of the final corrective action regulations, cleanups carried out using the Trust Fund will be based on guidance issued by EPA. After the effective date of the final regulations, cleanups under the Trust Fund must be conducted in accordance with the corrective action regulations.

D. Exempted Tank Studies

The regulations proposed today do not apply to certain tank systems that were exempted under section 9001 of Subtitle I. Section 9009 of Subtitle I requires that EPA conduct a study of several of these systems and report to Congress by November 8, 1987. The report to Congress will include recommendations as to whether these tanks should be regulated in the future.

The Report to Congress will cover the following exempted tanks whose volume, including piping, is at least ten percent below ground:

- Farm or residential tanks of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes, and
- Tanks used for storing heating oil for consumptive use on the premises where stored.

VIII. RELATIONSHIP TO OTHER AGENCY PROGRAMS

This section discusses the relationship of today's proposed rules to certain other EPA regulatory programs. This discussion is for informational purposes only; no new requirements are being proposed.

A. CERCLA

Section 105 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA or Superfund) requires development of a list of national priorities among known sites with releases and threatened releases of hazardous substances, pollutants, and contaminants. The National Contingency Plan (40 CFR Part 300) regulates development of the National Priorities List (of sites with releases) as well as appropriate

responses to the most serious releases. These regulations pursuant to CERCLA currently apply to releases of CERCLA-designated hazardous substances from underground storage tanks. CERCLA, however, does not apply to releases of petroleum from USTs or other sources.

Releases of hazardous substances from UST systems may require removal or remedial action responses by federal or state agencies, in accordance with 40 CFR Part 300. Some UST releases of hazardous substances are already included in the National Priorities List. When the final rules resulting from today's proposal become effective, owners of sites with releases from USTs containing nonpetroleum regulated substances are expected to be subject to the corrective action provisions of these rules and, in selected cases, the removal or remedial action measures of 40 CFR Part 300.

Under section 102(a) of CERCLA, EPA has promulgated regulations (40 CFR Part 302) that identify hazardous substances and quantities of releases of these hazardous substances that must be reported to the National Response Center. Those regulations contain reporting requirements for releases equal to or in excess of the established reportable quantities (RQs). Thus, UST releases of hazardous substances that exceed the RQs set forth in 40 CFR Part 302 will continue to be subject to those CERCLA reporting regulations, as well as any reporting requirements under this rule. UST releases of hazardous substances that are less than the reportable quantity will be subject to the release reporting requirements in the final published version of today's proposed regulations.

These provisions of CERCLA will not impact the vast majority of UST facilities because most facilities store only petroleum and thus are not subject to CERCLA requirements. However, for UST facilities storing regulated hazardous substances, certain releases will continue to be subject to CERCLA requirements as well as the final published version of today's proposed rules.

B. Hazardous Waste Tank Program

Under RCRA Subtitle C, EPA has promulgated regulations for UST systems containing hazardous wastes (40 CFR Part 264, July 14, 1986). The RCRA Subtitle I rules proposed today will, when finalized, apply to USTs containing "regulated substances." These regulated substances include hazardous substances defined in section 101(14) of CERCLA, *except* for hazardous wastes regulated under Subtitle C and petroleum. The exclusion of hazardous wastes within the definition of regulated substance avoids most of the overlapping jurisdiction of Subtitle I and Subtitle C. An overlap in jurisdiction does exist, however, for USTs containing petroleum wastes that are subject to the provisions of RCRA 3014. This overlap is discussed in the next section. There is also a potential overlap in jurisdiction for USTs containing mixtures of petroleum and hazardous wastes. Today's proposal resolves this potential overlap by excluding such USTs from the universe of USTs subject to the proposed requirements. Unless otherwise exempted, such USTs would be subject to the requirements of Subtitle C. It is intended that the final rules resulting from today's proposed rules will regulate, for the most part, a different set of UST systems from those regulated under Subtitle C.

C. Used Oil Regulations

Underground tanks storing used oil (e.g., automobile and truck used crankcase oil) are under the jurisdiction of Subtitle I. Pursuant to section 9001(2)(B) of RCRA, underground tanks containing "petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure . . ." are within the scope of Subtitle I. Thus under Subtitle I requirements, owners and operators of UST systems containing used oil were required to notify designated state agencies of the presence of such tanks by May 8, 1986. Owners and operators of newly installed used oil UST systems are subject to the requirements of the Interim Prohibition, which has been in effect since May 7, 1985.

Under Subtitle C of RCRA, EPA also has the authority to regulate recycled oil, and to regulate used oil that is disposed of under Subtitle C if such oil is identified or listed as a hazardous waste. Under the authority of Subtitle C of RCRA, EPA proposed to list used oil as hazardous waste (50 FR 49269–49270, November 29, 1985) and has proposed standards for recycled oil (50 FR 49250–49258, November 29, 1985). Since publication in the **Federal Register**, several important decisions in terms of these proposed rulemakings have been made, namely:

(1) Storage of used oil (even when recycled) will be regulated, and

(2) Recycled oil will *not* be listed as a hazardous waste (51 FR 41900, November 19, 1986).

The Agency is proposing today to defer application of the technical requirements to used oil UST systems. This is discussed in further detail in Section VI.A.4(c).

D. Stage II Vapor Recovery Program

The Agency is in the process of conducting rulemaking proceedings to decide whether and how to regulate vehicle refueling emissions. Under consideration are Stage II controls (which would be applied to gasoline pumps) or onboard canisters (which would be part of automobiles). The Agency has not yet made a decision as to which method to adopt for control of these emissions. If at some time EPA should decide to call for Stage II systems as a means for controlling emissions, the Agency would examine the interaction of these requirements with the UST Program.

E. SPCC

Under section 311 of the Federal Water Pollution Control Act, EPA has promulgated regulations for the prevention of and response to oil spills into navigable waters. These rules (40 CFR Part 112) known as the Spill Prevention Control and Countermeasure (SPCC) regulations are intended to prevent and contain releases of oil into surface waters which are navigable.

Comparatively few UST systems are subject to SPCC regulations. Only those tanks of greater than 42,000 gallons capacity that are located near navigable waters of the U.S. or adjoining shorelines may be affected. Releases from these UST systems must reach navigable waters or shorelines to be subject to SPCC response actions. For those comparatively few UST systems meeting the volume and location requirements indicated above, both today's proposed rules and the SPCC rules apply.

F. DOE High-Level Radioactive Waste Program

Under the Atomic Energy Act of 1954 (42 U.S.C. 2011 et seq.) the U.S. Department of Energy (DOE) has promulgated rules for the management of high-level radioactive waste resulting from atomic energy defense activity. DOE Orders 5480.1, 5480.2, and 5820.2 regulate the underground tank storage of these wastes including corrective actions in the event of a release.

The UST rules proposed today include radioactive waste because any radionuclide is a "hazardous substance" under CERCLA. However, in view of the differences in high-level radioactive waste from other RCRA Subtitle I regulated substances and the much larger tanks storing this waste, EPA is proposing to defer from today's

proposed rules the DOE radioactive waste facilities. Until a determination is made as to whether, and how, the proposed UST rules should apply to DOE facilities storing high-level radioactive wastes, the proposed UST rules and requirements, except corrective action and the interim prohibition requirements, do not apply to these facilities. More details are provided on this in Section VI.A.4(e).

IX. ECONOMIC AND REGULATORY IMPACTS

Section IX.A. discusses the Regulatory Impact Analysis of this proposed rule, as required by Executive Order 12291. Section IX.B. then discusses the analysis of the effects of the proposed rule on small businesses, as required by the Regulatory Flexibility Act. Requirements under the Paperwork Reduction Act are addressed in Section IX.C.

A. Regulatory Impact Analysis

1. Executive Order 12291

Executive Order 12291 (46 FR 13193, February 19, 1981) requires regulatory agencies to conduct a Regulatory Impact Analysis (RIA) for any major rule. A major rule is one likely to result in (1) an annual cost of $100 million or more, (2) a major increase in costs or prices for consumers, individual industries, federal, state or local government agencies, or geographic regions, or (3) significant adverse effects on competition, employment, investment, productivity, innovation, or the ability of United States-based enterprises to compete in domestic or export markets.

EPA has conducted an RIA to compare several regulatory alternatives for USTs, as explained in the following sections. The RIA provides an analysis based on the guidelines contained in the Office of Management and Budget's "Interim Regulatory Impact Analysis Guidance" and EPA's "Guidelines for Performing Regulatory Impact Analysis".

Based on the results of this analysis, the Agency has concluded that this proposed regulation is a major rule which produces significant net benefits to society. Average annualized costs are $210 million, which include incremental costs of installing and maintaining USTs, incremental detection and monitoring costs, incremental tank removal and replacement costs, incremental pipe repairs, and adjustments for value of product lost. Based on an existing population of 1.4 million USTs, as specified in Section II.B. of this Preamble, this corresponds to an annualized cost of $150 per UST. This increased expenditure of $150 per UST produces significant benefits due to both the prevention of releases from UST systems that otherwise would have gone undetected, as well as earlier detection of releases.

If it is assumed that the benefits of either preventing an aquifer from becoming contaminated or reducing the amount of contamination (due to earlier detection) are equal to the costs of corrective action avoided, annualized benefits are on the order of $1.53 billion or $1100 per UST. However, each potential corrective action must be evaluated on its own merits, as explained in Sections V.A.5. and V.B.4. of this Preamble. Due to the case-by-case nature of these cleanup decisions, it was not possible to quantify the precision with which a cost of corrective action avoided approach approximates benefits.

The purpose of Section IX.A.1. is to summarize the intent and findings of the RIA. Section IX.A.2. discussed the basic approach taken in the RIA, and specifies the regulatory alternatives analyzed. Section IX.A.3. lists the industries projected to be affected by the proposed action, and Section IX.A.4. discusses the methodologies employed in the cost, effectiveness, benefits, and economic impact analyses. Section IX.A.5. reviews the results of the cost effectiveness and economic impact analyses. The full draft RIA is available as part of the background documents supporting this proposed regulation. This proposed rule was submitted to the Office of Management and Budget for review, as required by Executive Order 12291.

2. Basic Approach/Regulatory Alternatives

A principal goal of Executive Order 12291 is to ensure that a regulation confers net benefit—that is, that the benefits of a regulation outweigh its costs to society. A second goal is that a regulation be cost-effective—that is, to ensure that a regulation is not selected if, among the group of feasible regulatory alternatives, there is an approach that is expected to confer benefits at least as high as the proposal but at lower cost, or to confer greater benefits than the proposal but at no greater cost. The RIA supports these goals by providing a systematic presentation of information on benefits, costs, and economic impacts in a way that clarifies the implications of alternative regulatory approaches. In addition to serving as a tool for selecting from among alternatives, the RIA process can also prove useful in developing new regulatory alternatives. However, ultimate selection of a regulatory alternative must be consistent with statutory directives.

The EPA has specific guidance regarding the contents and conduct of RIAs. The key elements of an RIA are: (1) Stating the need for and consequences of the proposal; (2) considering alternative approaches; (3) assessing benefits; (4) assessing costs; and (5) evaluating costs and benefits. These components are interdependent; for example, stating the need for the proposal, considering alternative approaches, and assessing costs all depend critically on understanding the base case in the absence of regulation. Thus, each part of an RIA must be developed with the others in mind. Certain data input and analytical steps occur more than once in addressing the key questions posed in an RIA.

The difficulties in preparing an RIA that will answer this broad array of interlocking questions are compounded by the complexity of the regulated universe and the large combination of approaches available for reducing damages. The proposed rule addresses the problem of leaking USTs by regulating several distinct groups of tanks: existing tanks and replacement tanks, including those used for petroleum and hazardous substances. The proposed rule employs a combination of approaches designed to reduce damages from these disparate populations including: Prevention of releases; early detection to minimize releases both from tanks and piping systems; and corrective action to reduce the impact of those releases that do occur.

The analytical problems posed by these goals and constraints are best addressed by combining as many of the analytical issues as possible into a single framework. That framework is the UST Model, a computer simulation model designed to yield estimates of releases and life-cycle costs for the entire UST universe. The use of this model ensures that, to the greatest extent possible, all of the data and assumptions required will be consistent across the analyses that go into the RIA. The cost outputs from the model include UST repair and replacement, detection and monitoring costs, value of product lost, and corrective action costs. Effectiveness measures include plume areas and durations that result for the leaks that occur during the period they remain undetected. The design and operation of this model are discussed in more detail in the RIA.

It was not practical to include all of the analysis directly in the UST model. Some important issues, including the

effects of the regulatory costs on businesses, risk reductions, and some other measures of benefits, were analyzed separately. However, these analyses were based on outputs from the UST model. For example, the UST model provides outputs regarding floating plumes and their duration. That information was then used in the risk analysis to characterize the dispersed plumes that resulted from the floating plumes, to provide a basis for assessing health risks due to ingestion of contaminated water.

Grouping of Potential Actions into Distinct Options. As discussed in detail in Section V of this Preamble, many actions can be taken to reduce damages from leaking USTs. They can be aimed at existing tanks, at new tanks, or at releases that have already occurred; they can emphasize leak prevention, leak minimization, or leak containment. Because the effectiveness of these various components of a regulatory strategy are interdependent, the RIA needs to account for that phenomenon. For example, the effectiveness of leak detection on reducing the ultimate damages from USTs depends on tank replacement requirements and corrective action requirements, and the effectiveness of actions taken as a result of such requirements. Thus, the approach used for the RIA is to analyze sets of components grouped into distinct regulatory options. The cost and effectiveness of these options are then computed as a whole, and compared to a "no further regulation" base case.

Base Case and Options Modeled for the Analysis. This section defines the regulatory options that were analyzed in the RIA. The prevention, detection, and corrective action components of these regulatory options are described below.

"NO FURTHER REGULATION" BASE CASE assumes no regulation beyond the interim prohibition requirements; existing tanks are mostly bare steel tanks without supplementary detection or inventory control. Tanks found to be leaking are replaced with corrosion-resistant tanks, assumed to be coated and cathodically protected.

OPTION I (Baseline level) requires manual inventory control, periodic leak detection within 3 years (5 years for corrosion-resistant tanks) for existing and new tanks, and corrosion-resistance for all replacement tanks. Given that the regulated community is allowed to choose from a variety of detection measures, the option is modeled as though half of operators choose quarterly vapor well monitoring, and the other half choose the less effective tank infrequent tightness tests every 3 years (5 years for corrosion-resistant tanks). Tanks are assumed to be replaced with coated and cathodically protected tanks with line leak detectors, and either quarterly vapor well monitoring or tightness tests every 5 years.

Steps assumed to be taken in response to a release are the same for this option as for all others. Where a release has occurred, an investigation and actions to reduce immediate hazards is followed by limited removal of contaminated soil, removal of any free product from the ground water, and ground-water cleanup at 40 percent of sites where ground water has been contaminated.

OPTION II—The Proposed Rule (Enhanced baseline plus targeted upgrading) is similar to Option I with upgrading to new tank standards within 10 years, though leak detection systems must be sampled monthly rather than quarterly and infrequent tightness tests are not permitted after tanks are replaced. For modeling purposes, operators are assumed to retrofit with cathodic protection and monthly vapor wells to meet new tank standards after 8 years. Replacement tanks are assumed to be coated and cathodically protected, with vapor wells sampled monthly.

OPTION III (Baseline plus secondary containment for new tanks) requires periodic leak detection for existing tanks and secondary containment with interstitial monitoring for new tanks. For existing tanks, this option was assumed to be identical to Option I; replacement tanks are assumed to be lined systems with interstitial monitoring.

OPTION IV (Class option) requires rapid replacement of existing tanks and secondary containment for replacement tanks at state-designated wellhead protection areas. Tanks in other areas are required to conform to baseline standards (Option I). It is assumed that 40 percent of the tank population is located within a wellhead protection area. Tanks located in these state-designated areas are assumed to be fitted with continuous vapor wells after one year, and then replaced before the fifth year with protected tanks in liners. The other 60 percent of tanks (those outside wellhead protection areas) are modeled the same as Option I. As in other options, ground water is cleaned up at 40 percent of sites where the release has reached ground water; all of these cleanups are assumed to be performed in the wellhead protection areas.

OPTION V (Emphasis on Prevention) For existing tanks, this option requires manual inventory control, frequent leak detection starting in 3 years, and early retirement. Replacement tanks must have secondary containment. Half of all existing tanks are modeled with continuous vapor well monitoring, and half are modeled with monthly vapor well monitoring and 3-year tightness tests. Existing tanks are replaced with lined systems either when they fail, or after 8 years.

3. Affected Industries

EPA has identified 3 classes of tank-owning facilities that would be directly affected by this proposed rulemaking: (1) Facilities using USTs for storing motor fuels for the retail market; (2) facilities using USTs for storing fuels for non-retail purposes; and (3) facilities using USTs for storing regulated hazardous substances. The major sector to be affected by this regulation is the motor fuel retailing sector. There are approximately 193,000 outlets selling motor fuel. Owners for these outlets range from the largest oil refiners to open dealers who own and operate a single station. Table 4 provides more detail about ownership and operation of retail motor fuel outlets.

Facilities using USTs for storing fuel for non-retail purposes cut across many sectors of the economy, both private and non-profit. Affected sectors include agriculture, mining and construction, manufacturing, utilities and transportation, wholesale trade, retail trade, services, governments, and non-profit organizations. Generally, such USTs are used to service in-house vehicle fleets.

Facilities using USTs for storing regulated hazardous substances are somewhat more limited to certain sectors of the economy. EPA has tentatively identified the following industries as owning the greatest number of chemical tanks: Industrial Inorganic Chemicals (SIC 2819); Plastic Materials and Resins (SIC 2821); Paints and Allied Products (SIC 2851); Industrial Organic Chemicals (SIC 2869); Chemical Preparations (SIC 2899); Plating and Polishing (SIC 3471); Chemical Wholesalers (SIC 5161); Petroleum Bulk Stations and Terminals (SIC 5171); Petroleum Product Wholesalers (SIC 5172); and Drycleaning Plants (SIC 7216). Subsequent analysis may reveal additional industries where a substantial fraction of facilities maintain USTs for storing regulated hazardous substances. EPA invites comment on this issue.

Economic impacts are far more likely to be significant for the retail fuel market than for the other two classes mentioned above. Reasons for this include: (1) There are no substitutes for USTs at a retail fueling facility; (2) there

are many outlets owned by small businesses and (3) there tend to be at least 3 USTs per facility, so UST costs represent a significant fraction of capital and operating expense. Thus, the economic analysis has focused on the retail motor fuel sector. Because the types of facilities in classes other than retail motor fuel are so diverse, and the potential for economic dislocation less significant (as will be discussed in Section IX.5.b.), detailed characterizations of facility types in classes other than retail motor fuel have not been developed as part of this analysis.

Table 4.—Ownership and Operation of Retail Motor Fuel Outlets

Category	Number of firms	Number of retail outlets owned and operated	Number of retail outlets owned and leased	Total retail outlets
Refiners	27	9,964	36,817	46,781
Jobbers	8,766	25,333	20,713	46,046
Convenience stores	516	14,732	0	14,732
Independent Chains	125	4,010	1,127	5,137
Open dealers	80,304	80,304	0	80,304
Total	89,738	134,343	58,657	193,000

4. Methodology Employed

This section specifies the methodologies used in this analysis. Methodologies are presented for costs, effectiveness, benefits, and economic impacts.

a. *Cost Estimation Methodology.* Estimating the costs of the proposed regulation requires the following: (1) Base case specification (i.e., from where are costs counted?); (2) cost element specification (i.e., which costs per tank are counted?); (3) tank universe specification (i.e., how many tanks are affected and how is this universe distributed over the relevant characteristics that affect costs and effectiveness?); and (4) accounting framework for costs (i.e., how are costs counted?). These are addressed in turn.

Base Case. The base case represents the point from which incremental costs and benefits of the proposed regulation will be estimated. The base case for this analysis is the status quo under the 1984 RCRA Reauthorization Amendments, which includes the Interim Prohibition against installing new bare steel tanks in corrosive settings. Any upgrading beyond this is included as a regulatory cost, even if such upgrading were voluntary. This ensures that regulatory costs are not understated.

Cost Elements. The major categories of costs include: (1) initial facility costs (includes obtaining and installing new tanks); (2) detection and monitoring costs; (3) value of product lost; (4) tank removal and replacement, and pipe repairs; and (5) corrective action costs. Cost element 1 applies only to new tanks. Cost element 2 applies to all tanks. Cost elements 3, 4, and 5 apply only to leaking tanks. All costs are based on best available engineering estimates. Only cost elements affected by the proposed rules are analyzed.

Tank Universe. Descriptive data on the tank universe comes primarily from studies by EPA contractors, Census data, and industry sources. Key assumptions include number of tanks, age distribution, the distribution of hydrogeological settings, and the number of new tanks installed annually. These are documented in the Regulatory Impact Analysis.

Accounting Framework. Costs are estimated on a present value basis, based on costs incurred over a 30-year modeling period starting at the time of promulgation. The real discount rate used for the analysis is 3 percent per year. In the base case, tanks are assumed to last until leaks are detected, so the time horizon for operation and maintenance costs for existing tanks varies with each tank modeled. The cost of installing a replacement for each tank that fails and operating that tank up to the end of the 30-year time horizon is calculated for all tanks. All costs are presented on a pre-tax basis, so as to best capture the real resource costs to society.

b. *Effectiveness Estimation Methodology.* The benefits of improved release prevention and detection methods result from avoiding future release incidents or detecting releases earlier to reduce damages. Presumably, the benefits of avoiding such future pollution incidents can be valued. Such benefits include the on-site benefits of reduced health and safety risks, reduced material and structural damages, and improved inventory management. In addition, there are off-site benefits relating to improved health and safety, avoided property damage, improved aesthetics, option value, and existence value for the environmental media of soil, ground water, surface water, and air. The process of valuing such benefits is quite difficult and time-consuming, and is still ongoing. For that reason, the analysis of regulatory options presented in the Regulatory Impact Analysis focuses on the trade-off between costs and plume area avoided. Plume area avoided is a measure of the magnitude of contaminated ground water that is avoided due to a regulatory option. The underlying assumption is that benefits are directly proportional to plume area avoided.

For any given regulatory option, costs and effectiveness are modeled through the UST model. The UST Model provides a systematic basis for evaluating how different regulatory options would be expected to reduce the damages that motivate regulation. The UST Model provides information about the performance of different combinations of tank types and detection methods in different hydrogeologic settings. The cost outputs include the costs associated with product loss, UST repair and replacement, detection and monitoring, and corrective action. Measures of damages include plume areas and durations that result from the leaks that occur during the period they remain undetected. Thus, costs and effectiveness of any regulatory option are modeled by estimating costs and damages associated with the base case, costs and damages associated with the regulatory option, and subtracting.

c. *Benefits Estimation Methodology.* To the extent feasible, the benefits of today's proposed rule are estimated by predicting the reduction in damages which would occur if it were implemented, compared to a base case of no further regulation. There are numerous difficulties in estimating damage reductions, stemming partly from the large number of potentially important types of damages USTs can cause, partly from the difficulties in measuring and predicting damage reductions, and partly from the problems of valuing in dollars many of the most important damages.

In light of these difficulties, the approach used in measuring benefits is to estimate the monetary damages avoided by the regulatory options, and to supplement this with estimates of other avoided damages (such as damage to the health of individuals exposed to released products, and option/existence value of ground water) that are very difficult to express in monetary terms. Three basic steps must be taken to estimate monetary damages from leaking USTs: (1) Identification of the types of damages; (2) valuation in dollars of the damages estimated to occur; and (3) estimation of the frequency and extent of the different types of damage. In-depth studies of actual cases of damage from USTs were used to develop data for the first two steps. UST Model simulations were combined with data from EPA's State

Release Incidents Survey for estimates of the frequency of damage incidents under the base case and under the regulatory options.

Forty-four case studies of UST release incident damages were used to identify the types of damages caused by leaking USTs and place monetary values on some of the major types of damage. Damages were valued in dollars by estimating the actual sums spent to repair damages caused by releases (e.g., replacing contaminated wells, compensation for damaged structures) plus the losses to businesses closed or disrupted by the releases and the contamination they caused. The advantages of this approach include: (1) Damaged parties may identify damages that would otherwise be overlooked; (2) reported damages are "real" rather than abstract; (3) damaged parties may be able to provide monetary estimates of the damage costs; and (4) damaged parties can indicate intangibles.

There are disadvantages to this approach, however. The case study selection process probably identified and profiled incidents causing more damage than is typical from a release. Consequently, the findings must be interpreted with caution. Because they are not typical or average cases, scaling them up to estimate nationwide total damages may not accurately reflect benefits.

Given a distribution of monetary damages associated with serious release incidents, total damages are calculated using estimates of the number and size of leaks under the base case, the proposed rule, and various regulatory options. These estimates are made using the UST Model of tank system failures and releases. Data from the State Release Incidents Survey provide estimates of frequency with which releases of various sizes are likely to have serious consequences (e.g., lost drinking water, or vapor contamination). UST Model predictions of the timing of the damage incidents are used to discount the monetary damages back to the implementation time of the regulations, providing estimates of the present value of the damages.

The risks avoided by the proposed rule were not considered in the same framework discussed above, due to the problem of valuing health risks. Instead, the UST Model's outputs in terms of predicted frequencies and magnitudes of contamination incidents were used as inputs into a separate analysis of concentrations of carcinogens at various possible exposure points, the size of the exposed populations, and the duration of exposure. The UST Model, linked to a ground-water transport routine, provided all inputs except estimates of the size of the exposed population at different exposure points. The exposure estimates were made using estimates of private and public well distributions relative to USTs, based on nationwide Census data supplemented with in-depth case-by-case mapping exercises.

Other categories of benefits not readily amenable to valuation in dollars include aesthetic concerns, option value, and existence value. Although a contingent valuation approach provides some hope for ultimately being able to monetize such phenomena, such analysis has not yet been conducted. EPA invites comment on the general issue of benefits assessment of today's rule. EPA is particularly interested in comments regarding the valuation issues addressed above. The benefits analysis conducted to date is contained in the RIA.

d. *Economic Impacts Estimation Methodology.* Economic impacts result from the costs attributable to the regulatory alternative. The EPA guidelines for performing regulatory impact analysis recommend an analytical approach based on combined financial and market analysis, consisting of the following steps: (1) Segment the regulated industry into groups by relevant characteristics; (2) perform baseline financial analysis on segments or on model plants; (3) separate resource costs from transfers, such as taxes, that distribute the resource costs to parties other than the directly regulated community; (4) estimate effects of cost pass-throughs, including the assumption (and estimated likelihood) of no pass-through; and (5) where data allow, perform discounted cash flow analysis or return-on-investment analysis. The results will estimate the impacts of regulatory costs on firm or facility revenue and profit for the segments of the regulated industry. This is the basic approach employed in this Regulatory Impact Analysis.

According to the EPA guidelines, the general framework to be used is based on the static partial equilibrium model of supply and demand relationships in the affected markets. In this model, if regulations on suppliers increase the costs of providing a particular good or service, the market price of the affected good or service will increase and the amount provided to the market will decrease at any given price (i.e., the supply curve will shift upwards). In the short run, increased variable costs will determine the extent of supply curve shifts, though in the long run, fixed costs will also affect supply. The magnitude of the effects will depend on the relative sensitivity of supply and demand to changes in price (that is, the price elasticities of supply and demand). Economic effects (i.e., changes in profitability, plant closures, employment, inflation, capital availability, etc.) all flow from the changes in prices and quantities predicted by appropriate shifts in supply/demand schedules within the partial equilibrium framework. At a minimum it is helpful to examine the bounding cases of perfectly elastic demand (full absorption) and perfectly inelastic demand (full pass-through).

For the 3 classes affected (i.e., retail motor fuel USTs, non-retail motor fuel USTs, and hazardous substances USTs), the extreme case of full cost absorption is likely to be of most concern. This is the case because within any sector, UST regulatory requirements will not affect establishments uniformly. For example, for retail motor fuel, UST regulatory costs are independent of quantity of gasoline pumped. Therefore, regulatory costs per gallon are likely to be much less for high volume stations, thus limiting the potential for pass-through.

Thus, economic impacts analysis focuses on the extent to which the proposed regulation will affect the viability of firms. A return on assets approach is used in this analysis as the basic measure of viability. Return on assets was chosen because the rate of expected return on assets is reasonably consistent across size classes and across industries. Furthermore, documented benchmarks exist which correspond to likely failure and severe financial distress.

As with any environmental regulation, adverse economic effects on the industries directly affected are offset somewhat by potential economic gains for industries providing the goods and services as required by the proposed regulation. In this case, tank manufacturers, providers of leak detection equipment and services, and corrective action providers stand to gain from the proposed regulation. However, EPA's Guidance on Executive Order 12291 suggests that the economic impacts analysis should focus on the primary industries affected, not on those receiving secondary economic benefits. That is the approach followed in this regulatory impact analysis.

5. Results

a. Analysis of Cost and Effectiveness of UST Regulatory Options

This section presents and discusses cost-effectiveness exhibits showing the results of the analysis of the proposed rule and the alternative regulatory

options. The analysis shown is for the nation as a whole, considering the distribution of tank characteristics by age and hydrogeologic setting. All costs shown are for a population of 1.4 million tanks. Costs are for a 30-year period and are discounted at 3 percent.

The corrective action costs were calculated assuming the floating plume and some contaminated soil are removed at all sites where there is ground water contamination (50 percent of releases are assumed to result in ground-water contamination). In addition, the dispersed plume is removed at 40 percent of all sites where there is ground-water contamination, on the assumption that at 40 percent of all sites with ground-water contamination, a leaking facility will threaten a nearby ground-water well. Actual costs for corrective actions will differ from those presented here depending on the frequency that extensive cleanup actions are actually judged to be needed under site-specific criteria.

The analysis shows that the proposed rule and all of the alternative options could provide a great degree of protection relative to a "no further regulation" base case. The results could also be used to identify the most effective and least costly option. The reader must be cautioned, though, that this use of the analysis could be misleading because the ordering of the options in terms of cost and effectiveness is quite sensitive to changes in assumptions (e.g., assumptions about the effectiveness of detection methods). In addition, the identity of the apparent "low cost option" for technical standards is significantly affected by assumptions regarding the appropriate level of corrective action. Sufficient information is not yet available to ensure that the assumptions used in the analysis adequately reflect reality. The sensitivity of the results to changes in some key assumptions is presented further below. EPA is currently pursuing additional analyses where analytical results are sensitive to such key assumptions. EPA also invites comment on these issues.

TABLE 5 shows the cost and effectiveness of the technical standards of each of the five regulatory options compared to the "no further regulation" base case. It does not include the costs of corrective action regulations. Table 5 shows that all the options can provide substantial improvements over the "no further regulation" base case: between 54 and 83 percent of the floating plume area that would occur under the base case is avoided by the various options. The main reasons for this improvement are the inventory control and periodic monitoring requirements for existing tanks in each option. Any program requiring at least inventory control in combination with periodic leak monitoring will alleviate a large portion of the potential damage from leaking underground storage tanks. Base detection (reflecting primarily sensory perception with some crude inventory control) is assumed to detect releases greater than 3 percent of monthly throughput. Inventory control is assumed to detect releases greater than 0.5 percent of monthly throughput, though only 25 percent of the time. Tank tightness tests are assumed to detect releases greater than 0.15 gallon per hour 90 percent of the time. Vapor wells are assumed to detect 70 percent of all releases. Effectiveness assumptions for other leak detection methods are detailed in the RIA. The more protective options are generally shown to have greater total present value costs, since they require earlier and more expensive upgrading of existing tanks. Today's proposal (originally Option II) ranks high in both effectiveness and cost minimization, partly because tank upgrading is a cost-effective means of minimizing releases from existing tanks.

TABLE 5.—COST AND EFFECTIVENESS OF OPTIONS: NO CORRECTIVE ACTION

Scenario	Total present value cost	Annualized cost (billions of dollars)	Plume area avoided relative to base (percent)
Base case (No further regulation)	31.0	$1.58	0
Today's proposal (Originally Option II)	35.0	1.79	67
Regulatory Alternatives			
Option I (Baseline level of regulation)	33.0	1.68	54
Option III (Stringent for new tanks)	43.0	2.19	55
Option IV (Classes)	45.0	2.30	68
Option V (Stringent)	56.5	2.88	83

Note: Annualized costs calculated from total present value of all capital and operating costs, smoothed over 30 years at 3%. Annualization factor is 0.051 of total present value costs.

TABLE 6 shows the dramatic change in both absolute and relative costs of the options when the costs of corrective actions are included. The base case jumps from the lowest in cost to the highest in cost, by many billions of dollars. This is because it is so lacking in protection that the costs of cleaning up the plumes that it allows to occur are extremely high. At the opposite extreme, the most protective technical options are revealed to save more than their incremental cost in avoided corrective action.

TABLE 6.—COST AND EFFECTIVENESS OF OPTIONS: WITH CORRECTIVE ACTION COSTS

Scenario	Total present value costs	Annualized cost (billions of dollars)	Plume area avoided relative to base (percent)
Base Case (No Further Regulation)	120.8	$6.16	0
Today's Proposal (Originally Option II)	94.8	4.84	67
Regulatory Alternatives			
Option I (Baseline Level of Regulation)	113.9	5.81	54
Option III (Stringent for New Tanks)	118.6	6.05	55
Option IV (Classes)	95.1	4.86	68
Option V (Stringent)	97.1	4.95	83

Note: Annualized costs calculated from present value of all capital and operating costs, smoothed over 30 years at 3%. Annualization factor is 0.051 of total present value costs.

Options II and V are shown to be the most cost-effective options, though the differences among options are relatively small and quite sensitive to a number of uncertain assumptions. The performance of these two options illustrates the effectiveness of early retirement or upgrading of bare steel tanks, and frequent leak detection. The relative cost-effectiveness of Option V also illustrates that the most effective regulatory alternatives can, in fact, be the least costly in the long run because effective leak detection and early retirement and replacement of bare steel tanks with corrosion protected tanks eliminates a large proportion of potential corrective action costs. This result, of course, depends on the level of corrective action assumed to be appropriate.

Option III is the most costly alternative because tanks are replaced with secondary containment only after they leak. Corrective action costs are higher than the corrective action costs for the options requiring mandatory retirement. Option III also has high facility costs due to the secondary containment requirement for new tanks. Option III is, however, effective; it may eliminate 80 percent of the potential plume area. It is more costly than other options which have the same relative effectiveness.

Sensitivity of Results to Assumptions. The cost-effectiveness of the options is strongly affected by several of the assumptions used in the analysis of the options.

One important source of uncertainty in predicting the effects of the options is that many options allow choices. Option I, for instance, allows either quarterly vapor wells or tightness tests every five years. The analysis assumed that half of tank owners choose each method, but there is no way to be sure how the owners would actually choose. These choices are important because the two methods are substantially different in cost and effectiveness. If 100 percent vapor wells were chosen, and if vapor wells were as reliable as assumed in the modeling (able to detect 70 percent of releases) Option I would be less costly than any other option, even considering the cost of corrective action. This result is, however, sensitive to unverifiable assumptions about the operation of vapor wells.

The assumed effectiveness level of leak detection or leak monitoring alternatives has a direct effect on the results of the analysis. If leak detection is assumed to be effective and reliable, it can be shown to be highly cost-effective. On the other hand, if more conservative assumptions are made concerning its performance, it can be shown that options that protect against releases with more certainty (e.g., early retirement and secondary containment) are more effective. For example, if the proposed regulation is run through the model assuming all UST's use vapor wells and that those vapor wells detect 70 percent of releases, 68 percent of base case plume area is avoided. If vapor wells are assumed to detect 90 percent of releases, 76 percent of base case plume area is avoided. If vapor wells are assumed to detect 50 percent of releases, 59 percent of base case plume area is avoided. Additional sensitivity analysis is presented in the RIA.

The level of corrective action required and the estimated cost of corrective action will affect both the absolute cost of the options and the relative cost between options, as discussed in Sections V.A.5. and V.B.4. As corrective action costs increase, the absolute cost of the options increase. Also, increasing the estimated costs for corrective action will cause options requiring frequent leak detection or early retirement for existing tanks and secondary containment for new tanks to appear to be relatively more cost effective. At present, corrective action costs used in the model range from $26,000 to $388,000, with $140,000 being the corrective action cost for responding to the median plume.

A particularly important assumption, in light of its prominence in the proposed rule, is that retrofitted cathodic protection will stop localized corrosion of bare steel tanks, allowing them to perform virtually as well as new tanks, as discussed in Section VII.E.b.

Other assumptions that could affect the results include assumptions about the mix of hydrogeologic settings in which tanks are found, the discount rate used in computing present value costs, and the frequencies and costs associated with "false alarms," in which a detection method erroneously indicates that a system is leaking. Sensitivity analyses for these various assumptions are presented in the RIA.

As stated previously, EPA is pursuing additional analyses to help clarify some of these issues raised above. EPA invites comment on these issues.

b. Analysis of Economic Impacts

Economic impacts need to be considered for 3 previously mentioned classes of facilities with USTs: (1) facilities using USTs for storing motor fuels for retail marketing; (2) facilities using USTs for storing petroleum products for purposes other than retail motor fuel marketing; and (3) facilities using USTs for storing regulated hazardous substances.

Economic impacts are far more likely to be significant for the retail motor fuel marketing class than for the other two classes mentioned above. As stated previously, reasons for this include: (1) There are no substitutes for USTs in retail motor fuel marketing; (2) there are many outlets owned by small businesses; and (3) there tend to be at least 3 USTs per facility, so UST costs represent a significant fraction of capital and operating expense. Thus, the economic analysis has focused on the retail motor fuel marketing sector.

Economic impacts have been assessed for the retail motor fuels marketing class using a return on assets measure, as discussed in Section IX.A.4. That analysis has shown that, under the assumptions of no revenue increase per facility and limited ability of small firms to get loans to cover compliance-related costs, the burden on small firms could be significant. Because it is likely that small firms would bear a large share of the economic impact, these potential economic effects are discussed further in Section IX.B. (Regulatory Flexibility Act).

For the class of facilities using USTs for non-retail motor fuel storage, the option exists to cease using USTs and purchase motor fuel at retail. Thus, there are limits on the burden these facilities will face due to UST regulatory requirements. Furthermore, because these USTs are used primarily to fuel in-house vehicle fleets, and larger firms are probably more likely to maintain such fleets than smaller firms, smaller firms are not likely to be significantly represented among the class of firms using USTs for non-retail fuel storage. EPA has not yet been able to discover or develop definitive data which specifies how firms using USTs for non-retail motor fuel storage are distributed over size classes. Therefore, EPA invites comments on this issue.

There are additional reasons why EPA believes the non-retail fuel marketing classes will bear less significant economic impacts than the retail motor fuel marketing class. First, only a fraction of the firms in any given industry are identified as using USTs for non-retail motor fuel. In many cases, this fraction is less than five percent. Second, available data suggest that the average number of non-retail motor fuel USTs per establishment is less than 3. Third, USTs represent a smaller fraction of total capital stock for these industries than they do for the retail motor fuel marketing industry. Therefore, UST regulations are less likely to significantly affect return on assets.

Although facilities in this class can largely avoid the possibility of significant regulatory burden by ceasing to use USTs and switching to retail purchase of fuel, there is one burden that cannot be avoided by such a switch. Existing leaks will require corrective action as part of tank closure. However, to the extent that businesses owning such facilities are typically larger than the smallest retail motor fuel outlet owner, this impact is likely to be less severe.

Economic impacts on facilities using USTs to store regulated hazardous substances are also expected to be less significant than economic impacts on motor fuel retailing facilities, for reasons similar to those for non-retail fuels. First, for the ten chemical UST-intensive industries mentioned previously, the percentage of facilities in the industry owning chemical USTs ranges from 1 percent to 40 percent. This suggests the existence of substitutes for chemical USTs. Such substitutes include aboveground tanks, drums (especially for small businesses), and process changes. As one example of substitution, a switch from oil-based paint to water-based paint eliminates the need for solvents, which are the chemicals generally stored in USTs at paint-producing facilities. As another example, chemical USTs at petroleum bulk stations might store additives for gasoline. These additives could be blended in at an earlier point in the

distribution chain. The existence of such alternatives tends to mitigate the potential economic effects of regulations for chemical USTs. In addition, firms owning USTs storing regulated substances will typically be larger than the smallest firms in the retail motor fuel marketing class. However, corrective action responsibilities for existing tanks cannot be avoided by switching to substitutes, so corrective action requirements pose some potential for economic dislocation.

B. Regulatory Flexibility Act

Under the Regulatory Flexibility Act of 1980 (5 U.S.C. 601–612), agencies publishing a proposed or final rule must prepare and make available for comment a Regulatory Flexibility Analysis that describes the potential impact of the rule on small entities (i.e., small business, small organizations, and small governmental jurisdictions). The purpose of the Regulatory Flexibility Act is to ensure that regulations do not impose unnecessary costs or other burdens on such entities. No Regulatory Flexibility Analysis is required if the Agency's Administrator certifies that the rule will not have a significant impact on a substantial number of small entities.

The Agency has examined the potential impact on small entities of the rule being proposed today and has concluded that this regulation will have a significant impact on a substantial number of small entities. The Agency has therefore prepared a Preliminary Regulatory Flexibility Analysis, which is summarized below.

Small Entities Potentially Affected by This Regulation. For this Preliminary Regulatory Flexibility Analysis, the Agency divided the businesses potentially affected by the regulation into two categories: firms engaged in retail motor fuel marketing (e.g., gasoline service stations), and firms owning other USTs. An initial review of these two categories of businesses showed that firms engaged in retail motor fuel marketing included a substantial number of small businesses, including many with fewer than 10 employees and less than $100,000 in net worth. The category of other USTs breaks down into two sub-categories: non-retail petroleum USTs and hazardous substances USTs. A preliminary analysis of the category of businesses owning non-retail petroleum-containing USTs (i.e., those used to store petroleum products that are not retailed as motor fuel), revealed that such USTs are used for a variety of purposes by a large and diverse group of businesses. The most common uses of non-retail petroleum-containing USTs are to store motor fuel at facilities where fleets of vehicles or off-the-road vehicles are located. For example, the owner of a fleet of busses or a farmer with many gasoline-powered off-the-road vehicles would be likely to have an UST at his or her facility. Owners and operators of non-retail petroleum USTs are found in all sectors of American business, including farming, timber operations, mining, manufacturing, transportation, and wholesale and retail trade; and these owners and operators own and operate firms of all sizes. Similarly, owners and operators of USTs containing hazardous substances are also widely distributed throughout the economy.

Because firms owning non-retail petroleum and hazardous substance USTs fall into hundreds of Standard Industrial Classifications (SICs) and range in size and type from one-person nonprofit organizations to small governmental jurisdictions to major corporations, and because no data are currently available to identify these firms and entities, EPA is placing the primary emphasis of this Regulatory Flexibility Analysis on the retail motor fuel marketing sector. The Agency solicits comments both on the extent of small business ownership of USTs outside the retail motor fuel marketing sector and the industries in which UST-owning small businesses are located.

The Agency believes that, by focusing on the retail motor fuel marketing sector, the Regulatory Flexibility Analysis will identify those impacts of the proposed rule with the greatest potential of significantly affecting a substantial number of small entities. Several characteristics of the retail motor fuel marketing sector support the Agency's decision to emphasize this sector in its Regulatory Flexibility Analysis. First, all of the businesses in this sector must store their product in underground storage tanks; they cannot choose either not to store product or not to store it below ground. Second, this sector of the economy is overwhelmingly dominated by small businesses; it is estimated that more than 3-quarters of all retail motor fuel outlets are owned or operated by small businesses. Finally, data on which to base the analysis are available for this sector in sufficient quantity and quality to ensure that the Regulatory Flexibility Analysis will be reasonably accurate and will capture the most severe small-business impacts likely to occur as a result of the issuance of this proposed rule.

EPA has used a variety of data sources to develop estimates of the number of small businesses engaged in retail motor fuel marketing and to describe the economic and financial characteristics of this sector and these firms. The American Petroleum Institute, the National Association of Convenience Stores, the Petroleum Marketers Association of America, the Society of Independent Gasoline Marketers of America, and the Service Station Dealers of America have assisted EPA by providing data and by suggesting possible data sources. EPA also used data on the small businesses in this sector compiled by the Small Business Administration and the Department of Energy and data made available in many private-sector publications (particularly *The Lundberg Letter* and *National Petroleum News*).

For this Regulatory Flexibility Analysis, small businesses in the retail motor fuel marketing segment are defined as firms with less than $4.6 million in annual sales. This is the definition used by the Small Business Administration (SBA) to identify small businesses in this sector, and this annual sales figure has also been shown in EPA's preliminary analysis to reflect an appropriate size cutoff for small firms in this sector. This definition includes all firms in the retail motor fuel marketing sector with two or fewer outlets. Firms with $4.6 million in sales will typically have approximately $500,000 in assets and $250,000 in net worth. The SBA sales-based definition of small business includes those firms most vulnerable to significant economic impacts, and those firms least likely to have insurance to cover their corrective action expenditures. This definition also includes all firms with a net worth less than the costs of replacing 3 tanks or the cost of performing a corrective action that involves ground-water cleanup.

There are two major classes of firms in the small-business segment of this sector: those that own and operate their own outlets and those that operate outlets that they lease. Firms in this latter class are termed "lessee" or "independent" dealers. In the group of firms in this sector owning their own outlets are many "open" dealers, defined as firms owning and operating a single retail motor fuel outlet.

EPA estimates that in 1984, small businesses either owned or operated 75 percent of the 193,000 retail motor fuel outlets in the United States. Of this number, open dealers were estimated to own approximately 80,000 or 42 percent of all retail motor fuel outlets. Open dealer firms vary widely in size and age; some open dealers have new outlets, over $500,000 in assets, and $400,000 in

net worth, while others have older outlets with 30-year-old tanks, only $42,000 in assets and $30,000 in net worth. EPA estimates that the typical open dealer (the statistical median) has $90,000 in net worth, $210,000 in assets, and $14,000 in annual after-tax profits. Such a typical open dealer firm is thus a business earning a reasonable profit and having a reasonable expectation of continuing in business.

In addition to open dealers, small business owners in the retail motor fuel marketing sector include owners of small chains of retail outlets. It is common for owners of small chains to own 2 or 3 retail outlets and also to act as wholesale suppliers for several open dealers. (This business pattern is particularly common in rural areas.) It is also common for firms in this sector to own a chain of several convenience stores (C-stores), some of which do not supply gasoline. For such small C-stores chains, gasoline sales are not generally the primary line of business. EPA estimates that there were 3,700 such chains owning 8,200 retail motor fuel outlets in 1984.

The Agency estimates that 58,000 retail motor fuel outlets are operated by lessee dealers, whose outlets thus represent 30 percent of all retail motor fuel outlets. The majority of these lessee dealer-operated outlets are owned by large, vertically integrated petroleum firms that engage in production, refining, and marketing, but many are owned by independent marketers who own chains consisting of between 2 and 100 retail motor fuel outlets. The outlets operated by lessee dealers range in characteristics from some of the most modern and efficient outlets in the country to some of the most financially marginal operations in the retail motor fuel marketing sector. EPA estimates that the typical (statistical median) single-station lessee dealer is a firm with 82,000 in assets, 62,000 in net worth, and $6,000 a year in after-tax profits; the typical lessee dealer is thus a very small firm, but one which nevertheless has reasonable profits for the size of the business and a reasonable expectation of continuing in business.

Open dealers, who both own and operate an outlet, will have to meet all of the costs of UST regulations. However, the situation is more complex for lessee dealers because, although the terms and conditions of leases vary widely, the most common arrangement makes the lessee dealer responsible for "sounding the alarm," i.e., for operating whatever leak detection and inventory control systems have been agreed to by both the owner and the lessee, but not for maintaining or replacing tanks or paying for corrective action. However, EPA is aware that some lessors are attempting to alter these arrangements to increase the responsibilities of lessees by, for example, holding the lessee responsible for releases or requiring the lessee to buy the tanks. In the Preliminary Regulatory Flexibility Analysis, EPA has assumed that the terms of traditional lease arrangements will prevail, and the analysis therefore does not assess the impacts of changes in lease terms on lessee dealers. However, the analysis does consider cases in which severe economic impacts could cause the owner of a leased outlet to close the outlet and thus force the lessee dealer out of business.

Although the typical open dealer and lessee dealer are sound businesses, there are marginal firms in both categories. A marginal firm is defined as one that is making very low profits or that has an aging outlet and cannot afford to invest any substantial amount of money into this outlet. In time, outlets age and become more marginal, and, as a result, EPA estimates that existing outlets have tended to exit the industry at a rate of 2 to 4 percent per year. Because many of the outlets that close are replaced by new businesses that are small, this 2 to 4 percent exit rate does not necessarily mean that the small business share of the retail motor fuel marketing sector is significantly declining.

Economic Impacts of the Proposed UST Regulations on Small Business. EPA's Regulatory Flexibility Analysis has focused on the potential impact of the proposed regulation on currently existing retail motor fuel marketing outlets that are owned by small businesses. Today's proposed regulation will have very little impact on the costs of building new outlets or of entering the retail motor fuel marketing industry. The installation of coated and cathodically protected tanks or fiberglass reinforced plastic (FRP) tanks is standard at facilities that are being constructed today. Further, facilities that are being constructed today tend to have leak detection equipment installed at the time of construction. The costs of these measures add little to the total costs of constructing a new facility. Therefore, while the effect of this regulation may be to force existing outlets owned by small businesses to close, it may also have the effect of presenting an increased opportunity for entry by new outlets meeting today's regulatory standards, regardless of their size.

To examine the potential economic impacts of the proposed regulation on small businesses, EPA developed an economic impact model that could combine financial and economic data on firms in the industry with cost and probability-of-release data from the Regulatory Impact Analysis to estimate the rates at which existing firms in the retail motor fuel marketing sector leave the industry for reasons unrelated to UST regulations and as a result of business failures caused by these regulations. The economic impact model was used to develop these estimates assuming first that no revenue increase will occur and then that varying levels of revenue increase will occur. The economic impact analysis assumes that small firms will not be able to obtain insurance or to receive support from state UST funds designed to assist small firms to meet the costs of corrective action. Such state assistance might include loans, loan guarantees, insurance, or other programs designed to smooth the regulatory burden over time or over a larger affected population. The assumption that neither the insurance industry nor state funds will be available to assist small firms in meeting their corrective action costs reflects the situation confronted by most small firms today. EPA hopes to encourage both the insurance industry and the states to provide UST coverage for small firms in the future. If such coverage becomes available at a reasonable cost, the adverse impacts on small businesses predicted by the Regularly Flexibility Analysis could be significantly over-estimated.

The most important source of substantial impacts in today's proposed UST regulation is the cost of corrective action. EPA estimates that 89 percent of all small businesses owning retail motor fuel outlets would fail if they were forced to meet the full costs of corrective action for a release sufficiently serious to reach ground water. Fourteen percent of all small businesses owning retail motor fuel outlets would fail if they were forced to pay the average costs of corrective action for a release that does not reach ground water; in this second case, most of the firms that would fail would be considered marginal. If releases requiring a corrective action with average costs occur at the level estimated by the Regulatory Impact Analysis and no revenue increases are possible for small businesses, 10 percent of small firms will fail in each of the first five years as a result of these corrective action costs. A price increase of 5 percent on all goods and services

provided by retail motor fuel outlets would be necessary to enable retail motor fuel outlets owned by small firms to bear the costs of corrective action without failing in significant numbers. A price increase of this magnitude is unlikely, however, because a price increase of only 3 percent would enable these firms' larger competitors to bear the costs of all UST regulations with higher profits than these larger firms have today. With a 3 percent price increase, 3.7 percent of all small firms will fail as a result of corrective action costs in each of the first five years after promulgation. EPA also estimates that corrective action costs may be high enough and frequent enough to cause many independent marketers to close outlets that are operated by lessee dealers. It is possible that these closed outlets might be replaced by newer facilities, which might in turn be operated by lessee dealers.

EPA considered a variety of alternative approaches to the proposed corrective action requirements for USTs, including an exemption for small businesses in this sector. However, the Agency has determined that such an exemption would mean that EPA had failed to achieve the statutory goals set forth in Subtitle I. Because there is no difference in terms of the threat to human health and the environment posed by releases from USTs owned by small businesses and releases from those owned by large businesses, the Agency cannot justify exempting 76 percent of all retail motor fuel outlets in the United States from the corrective action requirements being proposed today, as would be necessary if small businesses were exempted. Instead, EPA has developed an approach to UST regulation that is designed to minimize corrective action costs by providing site-by-site flexibility in implementation.

EPA has attempted to provide the flexibility needed by small firms in this sector in the proposed requirements related to replacement and repair of leaking tanks and upgrading of existing tanks. Leaking tanks can be repaired rather than replaced whenever this is a feasible option. New tanks used to replace leaking tanks can be single-walled (although they must be coated and cathodically protected) rather than double-walled tanks, which are more expensive. Ten years are allowed for the upgrading of existing bare steel tanks, and the upgrade requirement can be met by retrofitting tanks with cathodic protection rather than by replacing the tanks. In combination, these requirements related to the replacement and upgrading of tanks will cause no more than 2 percent of small firms to exit the industry even in the absence of any revenue increases. The small firms forced to exit are marginal operations, and the exit caused by the regulation is simply a small acceleration of trends that are occurring in this industry. A regulation that required the replacement of all existing bare steel tanks with double-walled tanks within 3 years would cause the exit of 56 percent of all small businesses in this sector (assuming no revenue increase).

The regulations being proposed today include requirements for leak detection for USTs. EPA considers these requirements essential to the success of the UST program, and the costs of leak detection are not estimated to have significant economic impacts on small businesses. The costs of leak detection are relatively small, even compared to the profits of marginal small businesses. For example, tank tightness tests are assumed to cost $500 per test and need only be performed every 3 to 5 years. Further, according to industry sources, inventory control is already commonly practiced by many small firms. For example, most lessee dealers are required to conduct inventory control as a condition of their leases.

C. Paperwork Reduction Act

Pursuant to section 3504(h) of the Paperwork Reduction Act of 1980, the reporting and recordkeeping provisions of today's proposed rule have been submitted to OMB for approval. Comments on these requirements should be submitted to the Office of Information and Regulatory Affairs, OMB, 726 Jackson Place NW., Washington, DC 20503, marked: Attention—Desk Officer for EPA. Should EPA promulgate a final rule, the Agency will respond to comments by OMB or the public regarding the information collection provisions of the rule.

X. REVIEW OF SUPPORTING DOCUMENTS AND REQUEST FOR PUBLIC COMMENT

EPA invites public comments on all aspects of these proposed regulations, including all issues raised in the Preamble. In preparing this proposal, the Agency has used several sources of data. These sources have been placed in the rulemaking docket, which may be inspected by the public in LG–100, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC, from 9:00 a.m. to 4:00 p.m., Monday through Friday, excluding holidays. Copies of several of these documents are also available for public inspection and review in the libraries of EPA's Regional Offices.

Comments are solicited in regard to this information, especially their relevance to today's proposed rulemaking. The Agency requests that these comments be submitted by June 15, 1987 to the RCRA Docket Clerk [Docket No. UST–2], Office of Underground Storage Tanks, WH–562, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460.

XI. SCHEDULE OF PUBLIC HEARINGS

The Agency will hold three public hearings on today's proposal. They are scheduled to convene at three different locations and at the dates indicated below:

1. May 28 (and 29, if necessary), 1987—The Westin Hotel, 2401 M Street, NW., Washington, DC 20037
2. June 1 (and 2, if necessary), 1987—The Registry Hotel, 15201 Dallas Parkway, Dallas, Texas 75248
3. June 4 (and 5, if necessary), 1987—Miyako Hotel, 1625 Post Street, San Francisco, California 94015

The hearings will begin at 9:30 a.m., with registration at 9:00 a.m. The hearings will end at 4:30 p.m., unless concluded earlier. Anyone wishing to make a statement at a hearing should notify, in writing, Ms. Helga Butler, Public Participation Officer, Office of Underground Storage Tanks [WH–565], U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460.

Oral and written statements may be submitted at the public hearing. Persons who wish to make oral presentations must restrict them to 15 minutes and are encouraged to have written copies of their complete comments for inclusion in the official record.

List of Subjects in 40 CFR Part 280

Administration practice and procedures, Confidential business information, Hazardous materials, Reporting and recordkeeping requirements, Underground storage tanks, Water pollution control, Water supply.

Lee M. Thomas,

Administrator.

March 29, 1987.

For the reasons set out in the Preamble, Part 280 of Title 40 of the Code of Federal Regulations is proposed to be revised as follows:

PART 280—TECHNICAL STANDARDS AND CORRECTIVE ACTION REQUIREMENTS FOR OWNERS AND OPERATORS OF UNDERGROUND STORAGE TANKS

Subpart A—Program Scope and Interim Prohibition

Sec.
280.10 Applicability.
280.11 Interim prohibition.
280.12 Definitions.

Subpart B—New UST Systems: Design, Construction, Installation and Notification

Sec.
280.20 Performance standards for new UST systems.
280.21 Upgrading of existing UST systems.
280.22 Notification requirements.

Subpart C—General Operating Requirements

Sec.
280.30 Spill and overfill control.
280.31 Operation and maintenance of corrosion protection.
280.32 Compatibility.
280.33 Repairs allowed.
280.34 Maintenance and availability of records.

Subpart D—Release Detection

Sec.
280.40 General requirements for all UST systems.
280.41 Requirement for new UST systems.
280.42 Additional requirements for piping.
280.43 Recordkeeping

Subpart E—Release Reporting and Investigation

Sec.
280.50 Reporting of suspected releases and spills.
280.51 Release investigation and confirmation.
280.52 Off-site impacts and source investigation.

Subpart F—Corrective Action for UST Systems Containing Petroleum

Sec.
280.60 General.
280.61 Initial abatement requirements and procedures.
280.62 Free product removal.
280.63 Additional site investigation.
280.64 Soil ground water clean-up.
280.65 Reporting.
280.66 Public participation.

Subpart G—Corrective Action for UST Systems Containing Hazardous Substances

Sec.
280.70 General.
280.71 Initial abatement requirements and procedures.
280.72 Additional site investigation.
280.73 Soil and ground-water clean-up.
280.74 Reporting.
280.75 Public participation.

Subpart H—Out-of-Service UST Systems and Closure

Sec.
280.80 Temporary removal from use, temporary closure, and permanent closure.

Authority: Sections 2002, 9001, 9002, 9003, 9004, 9005, 9006, 9007, and 9009 of the Solid Wate Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976, as amended [42 U.S.C. 6912, 6991(a), 6991(b), 6991(c), 6991(d), 6991(e), 6991(f), 6991(h)].

§ 280.10 Applicability.

(a) The requirements of this Part apply to any owner and operator of an UST system as defined in § 280.12 except as otherwise provided in paragraphs (b) and (c) of this section. Any UST system listed in paragraph (c) of this section must meet the requirements of § 280.11.

(b) Any UST system holding hazardous wastes that are listed or identified under Subtitle C of the Solid Waste Disposal Act, or a mixture of such hazardous waste and other hazardous substances, are excluded from the requirements of this Part. This paragraph does not apply to any UST system containing petroleum.

(c) Subparts A, B, C, D, E, H and I do not apply to any of the following types of UST systems:

(1) Wastewater treatment tanks:

(2) Sumps;

(3) UST systems containing used oil;

(4) Underground bulk storage tanks;

(5) UST systems containing radioactive waste;

(6) Electrical equipment; and

(7) Hydraulic lift tanks.

§ 280.11 Interim prohibition.

(a) No person may install an UST system listed in § 280.10(c) for the purpose of storing regulated substances unless such UST system (whether of single or double wall construction):

(1) Will prevent releases due to corrosion or structural failure for the operational life of the tank;

(2) Is cathodically protected against corrosion constructed of noncorrosive material, steel clad with a noncorrosive material, or designed in a manner to prevent the release or threatened release of any stored substance; and

(3) The material used in the construction or lining of the tank is compatible with the substance to be stored.

(b) Notwithstanding paragraph (a) of this section, if soil tests conducted in accordance with ASTM Standard G57–78, or another standard approved by the Administrator, show that soil resistivity in an installation location is 12,000 ohmcm or more (unless a more stringent standard is prescribed by the Administrator by rule), a storage task without corrosion protection may be installed in that location.

§ 280.12 Definitions

"Above ground release" means any release to the surface of the land or to surface water. This includes, but is not limited to, releases from the above ground portion of an underground storage tank system and releases associated with overfills and transfer operations during regulated substance deliveries to or dispensing from an UST system.

"Ancillary equipment" means any device including, but not limited to, such devices as piping, fittings, flanges, valves, and pumps, that are used to distribute, meter, or control the flow of petroleum or hazardous substances from an underground storage tank.

"Below ground release" means any release to the subsurface of the land and to ground water. This includes, but is not limited to, releases from the below ground portions of an underground storage tank system and releases associated with overfills and transfer operations as the regulated substance is delivered to or dispensed from an underground storage tank.

"Beneath the surface of the ground" means beneath the ground surface or otherwise covered with materials so that physical inspection is precluded.

"Cathodic protection" is a technique to prevent corrosion of a metal surface by making that surface the cathode of an electrochemical cell. A tank system can be cathodically protected through the application of either galvanic anodes or impressed current.

"Compatible" means the ability of two or more substances to maintain their respective physical and chemical properties upon contact with one another for extended periods of time and under varied environmental conditions (i.e., at different temperatures).

"Connected piping" means all underground piping including valves, elbows, joints, flanges, and flexible connectors attached to a tank system through which regulated substances flow. For the purpose of determining how much piping is connected to any individual UST system, the piping which joins the two UST systems should be allocated equally between them.

"Consumptive use" with respect to heating oil means burned on the premises.

"Corrosion expert" means a person who, by reason of his knowledge of the physical sciences and the principles of engineering and mathematics, acquired

by a professional education and related practical experience, is qualified to engage in the practice of corrosion control on buried or submerged metal piping systems and metal tanks. Such a person must be certified as being qualified by the National Association of Corrosion Engineers (NACE) or be a registered professional engineer who has certification or licensing that includes education and experience in corrosion control of buried or submerged metal piping systems and metal tanks.

"Electrical equipment" means underground equipment which contains dielectric fluid which is necessary for the operation of equipment such as transformers and buried electrical cable.

"Excavation area" is defined as the area containing the tank system and backfill material bounded by the ground surface, walls, and floor of the pit and trenches into which the UST system is placed at the time of installation.

"Existing tank system" means a tank system which is used to contain an accumulation of regulated substances or for which installation has commenced on or prior to the effective date of this regulation. Installation will be considered to have commenced if the owner or operator has obtained all federal, state, and local approvals, or permits necessary to begin physical construction of the site or installation of the tank system, and if either (a) a continuous on-site physical construction or installation program has begun, or (b) the owner or operator has entered into contractual obligations—which cannot be cancelled or modified without substantial loss—for physical construction at the site or installation of the tank system to be completed within a reasonable time.

"Farm tank" is a tank located on a tract of land devoted to the production of crops, or raising animals, including fish, and associated residences and improvements. To be exempt from UST jurisdiction, a farm tank must be located on the farm property. "Farm" includes fish hatcheries, rangeland and nurseries with growing operations.

"Flow-through process tank" is a tank that forms an integral part of an industrial or commercial process through which there is a steady or uninterrupted flow of materials during the operation of the process.

"Free product" refers to regulated substance in the non-aqueous phase (e.g., liquid not dissolved in water) that is beneath the surface of the ground.

"Gathering lines" means any pipeline, equipment, facility, or building used in the transportation of oil or gas during oil or gas production or gathering operations.

"Hazardous substance tank system" or "hazardous substance UST" means an underground storage tank system that contains an accumulation of hazardous substances defined in section 101(14) of CERCLA other than any substance regulated as a hazardous waste under Subtitle C of the Solid Waste Disposal Act (RCRA) or a mixture of such substances and petroleum in which hazardous substances comprise greater than 50% of the weight or volume of the mixture.

"Heating oil" refers to a type of fuel oil that is one of eight technical grades. These grades are: No. 1; No. 2; No. 4—light, No. 4—heavy; No. 5—light, No. 5—heavy; No. 6; and residual. Heating oil also refers to fuel oil substitutes such as kerosene or diesel when used for heating purposes.

"Hydraulic lift tank" means a tank holding hydraulic fluid for a closed-loop mechanical system that uses compressed air and hydraulic fluid to operate lifts, elevators, and other similar devices.

"Implementing agency" means EPA, or, in the case of a state with a program approved under section 9004, the designated state agency responsible for carrying out an approved UST program.

"Interstitial monitoring" is a leak detection method which entails the surveillance of the space between an UST system walls and the secondary containment system for a change in steady state conditions. In a double-walled tank, this change may be indicated by a loss of vacuum, a drop in pressure, a drop in the fluid level in a visible reservoir, or the detection of the regulated substance and/or water in the interstitial space. In a secondary containment system consisting of a liner (natural or synthetic) or a vault, the surveillance consists of frequent to continuous sampling from a monitoring well between the UST and the liner to detect the presence of regulated substance in the well(s).

"Inventory controls" are techniques used to identify a loss of product that are based on volumetric measurements in the tank and reconciliation of those measurements with product delivery and withdrawal records.

"Liquid trap" means sumps, well cellars, and other traps used in association with oil and gas production, gathering, and extraction operations (including gas production plants), for the purpose of collecting oil, water, and other liquids. Such liquid traps may temporarily collect liquids for subsequent disposition or reinjection into a production or pipeline stream, or may collect and separate liquids from a gas stream.

"Motor fuel" is a petroleum-based fuel used in the operation of an engine that propels a vehicle for transportation of people or cargo.

"New tank system" means an UST system for which installation has commenced after the effective date of this regulation. Installation will be considered to have commenced if the owner or operator has obtained all federal, state and local approvals, or permits necessary to begin physical construction of the site or installation of the tank, and if either (a) a continuous on-site physical construction or installation program has begun, or (b) the owner or operator has entered into contractual obligations—which cannot be cancelled or modified without substantial loss—for physical construction at the site or installation of the tank system to be completed within a reasonable time.

"Non-commercial purposes" with respect to motor fuel means not for resale.

"On the premises where stored" with respect to heating oil means UST systems located on the same property where the stored heating oil is used.

"Operational life" is the period beginning from the time when the installation of the tank system is commenced until it is properly closed under § 280.80.

"Operator" means any person in control of, or having responsibility for, the daily operation of the UST system.

"Overfill release" is a release that occurs when a tank is filled beyond its capacity, resulting in a discharge of the regulated substance to the environment.

"Owner" means: (a) in the case of an UST system in use on the date of enactment of the Hazardous and Solid Waste Amendments of 1984, or brought into use after that date, any person who owns an UST system used for storage, use, or dispensing of regulated substances; and (b) in the case of any UST system in use before the date of enactment of the Hazardous and Solid Waste Amendments of 1984, but no longer in use on the date of enactment of such Amendments, any person who owned such UST immediately before the discontinuation of its use.

"Person" means an individual, trust, firm, joint stock company, federal agency, corporation, state, municipality, commission, political subdivision of a state, or any interstate body. "Person" also includes a consortium, a joint venture, a commercial entity, and the United States Government.

"Petroleum" means crude oil, crude oil fractions, and refined petroleum fractions, including gasoline, kerosene, heating oils, and diesel fuels.

"Petroleum tank system" or "Petroleum UST" means an UST system that contains an accumulation of petroleum or a mixture of regulated substances and petroleum in which petroleum comprises greater than 50% of the weight or volume of the mixture.

"Pipeline facilities (including gathering lines)" are new and existing pipe rights-of-way and any equipment, facilities, or buildings regulated under (a) the Natural Gas Pipeline Safety Act of 1968 (49 U.S.C. App. 1671, et seq); (b) the Hazardous Liquid Pipeline Safety Act of 1979 (49 U.S.C. App. 2001, et seq); or (c) which is an intrastate pipeline facility regulated under State laws comparable to the provisions of law referred to in (a) or (b) of this definition.

"Positive sampling, test, or monitoring results" refer to the results of sampling, testing, or monitoring using a method described in Subpart D that indicate a release from an UST system has occurred.

"Regulated substance" means: (a) any substance defined in Section 101(14) of CERCLA (but not including any substance regulated as a hazardous waste under Subtitle (C); and (b) petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute).

"Release" means any spilling, leaking, emitting, discharging, escaping, leaching or disposing from an underground storage tank into groundwater, surface water or subsurface soils.

"Release detection" means determining whether a release of a regulated substance has occurred from the UST system into the environment or into the interstitial area between the UST system and a secondary barrier around it.

"Residential tank" is a tank located on property used primarily for dwelling purposes.

"Secondary containment" is a system installed around an UST that is designed to prevent a release from migrating beyond the secondary containment system outer wall (in the case of a double-walled tank system) or excavation area (in the case of a liner or vault system) before the release can be detected. Such a system may include, but is not limited to, impervious liners (both natural and synthetic), double-walls or vaults.

"Septic tank" is a water-tight covered receptacle designed to receive or process, through liquid separation or biological digestion, the sewage discharged from a building sewer. The effluent from such receptacle is distributed for disposal through the soil and settled solids and scum from the tank are pumped out periodically and hauled to a treatment facility.

"Stormwater or wastewater collection system" means piping, pumps, conduits, and any other equipment necessary to collect and transport the flow of surface water run-off resulting from precipitation or domestic commercial, or industrial wastewater to and from retention areas or any areas where treatment is designated to occur.

"Sump" means any pit or reservoir that meets the definition of tank, including troughs or trenches connected to it that serves to temporarily collect regulated substances.

"Surface impoundment" is a natural topographic depression, man-made excavation, or diked area formed primarily of earthen materials (although it may be lined with man-made materials) that is designed to hold an accumulation of regulated substances and that is not an injection well.

"Tank" is a stationary device designed to contain an accumulation of regulated substances which is constructed of non-earthen materials (e.g., concrete, steel, plastic) that provide structural support.

"Tightness testing" means a procedure for testing the ability of a tank system to prevent an inadvertent release of any stored substance into the environment (or, in the case of an UST system, intrusion of ground water into a tank system).

"Underground area" means an underground room, such as a basement, cellar, shaft or vault, providing enough space for physical inspection of the exterior of the tank situated on or above the surface of the floor.

"Underground release" means any below-ground release.

"UST system" or "Tank System" means an underground storage tank and its associated ancillary equipment and containment system, if any.

"Underground storage tank" or "UST" means any one or combination of tanks (including underground pipes connected thereto) that is used to contain an accumulation of regulated substances, and the volume of which (including the volume of underground pipes connected thereto) is 10 percent or more beneath the surface of the ground. Such term does not include any:

(a) Farm or residential tank of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes;

(b) Tank used for storing heating oil for consumptive use on the premises where stored;

(c) Septic tank;

(d) Pipeline facility (including gathering lines) regulated under:

(1) The Natural Gas Pipeline Safety Act of 1968 (49 U.S.C. App. 1671, et seq.), or

(2) The Hazardous Liquid Pipeline Safety Act of 1979 (49 U.S.C. App. 2001, et seq.), or

(3) Which is an intrastate pipeline facility regulated under state laws comparable to the provisions of the law referred to in paragraph (d)(1) of (d)(2) of this definition;

(e) Surface impoundment, pit, pond, or lagoon;

(f) Storm water or waste water collection system;

(g) Flow-through process tank;

(h) Liquid trap or associated gathering lines directly related to oil or gas production and gathering operations; or

(i) Storage tank situated in an underground area (such as a basement, cellar, mineworking, drift, shaft, or tunnel) if the storage tank is situated upon or above the surface of the floor.

The term "underground storage tank" or "UST" shall not include any pipes connected to any tank which is described in paragraphs (a) through (i) of this definition.

"Unsaturated zone" is the subsurface zone containing water under pressure less than that of the atmosphere, including water held by capillary forces within the soil and containing air or gases generally under atmospheric pressure. This zone is limited above by the ground surface and below by the upper surface of the zone of saturation (i.e., the water table).

"Wastewater treatment tank" means a tank that is part of a wastewater treatment facility regulated under either Section 402 or 307(b) of the Clean Water Act, and which receives and treats or stores an influent wastewater which contains regulated substances.

SUBPART B—NEW UST SYSTEMS: DESIGN, CONSTRUCTION, INSTALLATION AND NOTIFICATION

§ 280.20 Performance standards for new UST systems.

In order to prevent releases due to structural failure or corrosion for as long as the UST system is used to store regulated substances, all owners and operators of new UST systems must meet the following requirements.

(a) *Tanks.* Each tank must be properly designed, constructed and protected from corrosion in accordance with a

code of practice developed by a nationally recognized association or independent testing laboratory as specified below:

(1) The tank is constructed of fiberglass reinforced plastic.

[Note.—Underwriters Laboratories Standard 1316, "Standard for Glass- Fiber-Reinforced Plastic Underground Storage Tanks for Petroleum Products"; Underwriter's Laboratories of Canada CAN 4–S615–M83 "Standard for Reinforced Plastic Underground Tanks for Petroleum Products"; or American society of Testing and Materials Standard D4021–86 may be used as guidance for complying with paragraph (a)(1) of this section.] or

(2) The tank is constructed of coated steel and cathodically protected in the following manner:

(i) The tank is coated and cathodically protected with factoryinstalled sacrificial anodes, and the cathodic protection system is operated and maintained by an independent corrosion expert in accordance with § 280.31(b)(2)

[Note: The following codes and standards may be used as guidance for complying with paragraph (a)(2)(ii) of this section:

(A) Steel Tank Institute "Specification for sti–P3 System of External Corrosion Protection of Underground Steel Storage Tanks";

(B) Underwriters Laboratories Standard 1746, "Corrosion Protection Systems for Underground Storage Tanks";

(C) Underwriters Laboratories of Canada CAN4–S603– M85, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids", and CAN4– G03.1–M85, "Standard for Galvanic Corrosion Protection Systems for Underground Tanks for Flammable and Combustible Liquids", and CAN4–S631–M84, "Isolating Bushings for Steel Underground Tanks Protected with Coatings and Galvanic Systems."]; or

(ii) The tank is coated and cathodically protected with a field-installed cathodic protection system and the cathodic protection system is designed by an independent corrosion expert and operated and maintained in accordance with § 280.31(b) (1) and (c).

[Note: The following codes and standards may be used as guidance for complying with paragraph (a)(2)(ii) of this section:

(A) National Association of Corrosion Engineers (NACE) Standard RP–02–85, "Control of External Corrosion on Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems" and Underwriters Laboratories Standard 58, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids";

(B) National Association of Corrosion Engineers (NACE) Standard RP–02–85, "Control of External Corrosion of Metallic Buried, Partially Buried, or Submerged Liquid Storage Systems" and Underwriters Laboratories of Canada CAN4–S603– M85, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids."];

(3) The tank is constructed of a steel-fiberglass-reinforced-plastic composite;

[Note: The UL Standard 1746, "Corrosion Protection Systems for Underground Storage Tanks" may be used as guidance for complying with paragraph(a)(3) of this section.];

(4) The tank design, construction and corrosion protection is determined by the implementing agency to prevent the release of any stored regulated substance in a manner that is no less protective of human health and the environment than paragraphs (a) (1) through (3) of this section.

(b) *Piping.* The underground piping must be properly designed, constructed and protected from corrosion in accordance with a code of practice developed by a nationally recognized association or independent testing laboratory as specified below:

(1) The piping is constructed of fiberglass reinforced plastic.

[Note: The following codes and standards may be used as guidance for complying with paragraph (b)(1) of this section:

(i) Underwriters Laboratories (UL) Subject 971, "UL Listed Non-Metal Pipe" and UL Standard 567, "Pipe Connectors for Flammable and Combustible and LP Gas"; or

(ii) Underwriters Laboratories of Canada (ULC) Guide ULC–107, "Glass Fiber Reinforced Plastic Pipe and Fittings for Flammable Liquids", and ULS Standard CAN4– S633–M81, "Flexible Underground Hose Connectors."];

(2) The piping is coated steel and cathodically protected with a field-installed cathodic protection system that is designed by an independent corrosion expert and operated and maintained in accordance with § 280.31(b) (1) and (c); or

[Note: The following codes and standards may be used as guidance for complying with paragraph (b) (2): National Fire Protection Association Standard 30, "Flammable and Combustible Liquids Code", American Petroleum Institute (API) Publication 1615, "Installation of Underground Petroleum Storage Systems"; API Publication 1632, "Cathodic Protection of Underground Petroleum Storage Tanks and Piping Systems and National Association of Corrosion Engineers Standard RP–01–69, "Control of External Corrosion on Submerged Metallic Piping Systems."]

(3) The piping design, construction and corrosion protection is determined by the implementing agency to prevent the release of any stored regulated substance in a manner that is no less protective of human health and the environment than the requirements in paragraphs (b) (1) and (2) of this section.

(c) *Installation.* All tanks and piping must be installed according to the manufacturer's instructions and must meet the following requirements:

(1) Precautions must be taken to prevent damage to the tank and piping coating during installation. Any damage must be repaired in accordance with the applicable manufacturer's instructions.

(2) The excavation must provide space for the tanks, piping and associated equipment, and for the placement and compaction of backfill materials, particularly under the circumference of the tank shell and ends.

(3) The backfill material must be clean, washed, non-corrosive material such as sand, crushed rock, or pea gravel. It must be selected in accordance with the manufacturer's instructions and placed and compacted in uniform lifts for proper support and protection of the tank and piping after installation.

(4) Supports and anchorage must be provided for installations located in areas subject to high water tables or flooding to avoid flotation.

(5) The piping layout must be designed to minimize crossed lines and interference with conduit and other tank system components. If crossing of lines is unavoidable, adequate clearance must be provided to prevent contact.

(6) The pipe joints must be cut accurately and deburred to provide liquid-tight seals.

(7) Swing joints or flexible connectors must be installed at the beginning and end of each line as well as where lines change direction.

(8) Installation of tank and piping cathodic protection must be in accordance with manufacturer's instructions, plans and specifications.

(9) Tank and piping tightness tests must be performed after backfill is installed and before the system is placed in operation. This test must be performed in accordance with § 280.41(c)(1).

Note.—Tank and piping system installation practices and procedures described in the following codes may be used as guidance for meeting the requirements of paragraph (c) of this section:

(i) American Petroleum Institute (API) Publication 1615, "Installation of Underground Petroleum Storage System"; or

(ii) Petroleum Equipment Institute (PEI) Publication RP100, "Recommended Practices for Installation of Underground Liquid Storage Systems"; or

(iii) American National Standards Institute (ANSI), Standard B31.3, "Petroleum Refinery Piping", and ANSI Standard B31.4 "Liquid Petroleum Transportation Piping System".

(d) All owners and operators must submit information demonstrating compliance with paragraph (c) of this section and provide a certification of compliance on the UST notification form in accordance with § 280.22.

§ 280.21 Upgrading of existing UST systems.

(a) No later than (insert date 10 years after the effective date of the final regulations), all existing UST systems must:

(1) Comply with the requirements for new UST systems under § 290.20;

(2) Have a field installed cathodic protection system that is designed by an independent corrosion expert and operated and maintained in accordance with § 280.31; or

(3) Permanently close in accordance with § 280.80.

§ 280.22 Notification requirements.

(a) On or before May 8, 1986, each owner of an underground storage tank currently in use must submit, in the form prescribed in Appendix I of this section, a notice of the existence of such tank to the State or local agency or department designated in Appendix II of this section to receive such notice.

(b) On or before May 8, 1986, each owner of an underground storage tank taken out of operation after January 1, 1974 (unless the owner knows that such tank has been removed from the ground) must submit, in the form prescribed in Appendix I of this section, a notice of the existence of such tank to the State or local agency or department designated in Appendix II of this section to receive such notice.

(c) Any owner who brings an underground storage tank into use after May 8, 1986, must within 30 days of bringing such tank into use, submit, in the form prescribed in Appendix I of this section, a notice of existence of such tank to the State or local agency or department designated in Appendix II of this section to receive such notice.

(d) In States where State law, regulations, or procedures require owners to use forms that differ from those set forth in Appendix I of this section to fulfill the requirements of this section, the State forms may be submitted in lieu of the forms set forth in Appendix I of this section. If a State requires that its form be used in lieu of the form presented in this regulation, such form must meet the requirements of Section 9002.

(e) Owners required to submit notices under paragraphs (a) through (c) of this section must provide notices to the appropriate agencies or departments identified in Appendix II of this section for each tank they own. Owners may provide notice for several tanks using one notification form, but owners who own tanks located at more than one place of operation must file a separate notification form for each separate place of operation.

(f) Notices required to be submitted under paragraphs (a) through (c) of this section must provide all of the information indicated on the prescribed form (or appropriate State form) for each tank for which notice must be given.

(g) Beginning on December 9, 1985 through May 9, 1987 any person who deposits regulated substances in an underground storage tank must make reasonable efforts to notify the owner or operator of such tank of the owner's obligations under paragraphs (a) through (c) of this section.

(h) Beginning 30 days after the Administrator issues new tank performance standards pursuant to RCRA section 9003(e), any person who sells a tank intended to be used as an underground storage tank must notify the purchaser of such tank of the owner's notification obligations under paragraphs (a) through (c) of this section.

(i) Paragraphs (a) through (c) of this section do not apply to tanks for which notice was given pursuant to section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

(j) All owners and operators of new UST systems must certify in the notification form that the methods used comply with the following requirements:

(1) Installation of tanks and piping under § 280.20(c);

(2) Cathodic protection of steel tanks and piping under § 280.20 (a) and (b);

(3) Financial responsibility under Subpart I; and

(4) Release detection under §§ 280.41 and 280.42.

(k) All owners and operators of new UST systems must assure that the installer certifies in the notification form that the methods used to install the tanks and piping complies with the requirements in § 280.20(c).

BILLING CODE 6560-50-M

APPENDIX I to §280.22

Notification for Underground Storage Tanks

FORM APPROVED
OMB NO. 2050-0049
APPROVAL EXPIRES 6-30-88

STATE USE ONLY

I.D. Number

Date Received

GENERAL INFORMATION

Notification is required by Federal law for all underground tanks that have been used to store regulated substances since January 1, 1974, that are in the ground as of May 8, 1986, or that are brought into use after May 8, 1986. The information requested is required by Section 9002 of the Resource Conservation and Recovery Act, (RCRA), as amended.

The primary purpose of this notification program is to locate and evaluate underground tanks that store or have stored petroleum or hazardous substances. It is expected that the information you provide will be based on reasonably available records, or, in the absence of such records, your knowledge, belief, or recollection.

Who Must Notify? Section 9002 of RCRA, as amended, requires that, unless exempted, owners of underground tanks that store regulated substances must notify designated State or local agencies of the existence of their tanks. Owner means

(a) in the case of an underground storage tank in use on November 8, 1984, or brought into use after that date, any person who owns an underground storage tank used for the storage, use, or dispensing of regulated substances, and

(b) in the case of any underground storage tank in use before November 8, 1984, but no longer in use on that date, any person who owned such tank immediately before the discontinuation of its use.

What Tanks Are Included? Underground storage tank is defined as any one or combination of tanks that (1) is used to contain an accumulation of "regulated substances," and (2) whose volume (including connected underground piping) is 10% or more beneath the ground. Some examples are underground tanks storing: **1.** gasoline, used oil, or diesel fuel, and **2.** industrial solvents, pesticides, herbicides or fumigants.

What Tanks Are Excluded? Tanks removed from the ground are not subject to notification. Other tanks excluded from notification are:
1. farm or residential tanks of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes;
2. tanks used for storing heating oil for consumptive use on the premises where stored.
3. septic tanks;
4. pipeline facilities (including gathering lines) regulated under the Natural Gas Pipeline Safety Act of 1968, or the Hazardous Liquid Pipeline Safety Act of 1979, or which is an intrastate pipeline facility regulated under State laws;
5. surface impoundments, pits, ponds, or lagoons;
6. storm water or waste water collection systems;
7. flow-through process tanks;
8. liquid traps or associated gathering lines directly related to oil or gas production and gathering operations;
9. storage tanks situated in an underground area (such as a basement, cellar, mineworking, drift, shaft, or tunnel) if the storage tank is situated upon or above the surface of the floor.

What Substances Are Covered? The notification requirements apply to underground storage tanks that contain regulated substances. This includes any substance defined as hazardous in section 101 (14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), with the exception of those substances regulated as hazardous waste under Subtitle C of RCRA. It also includes petroleum, e.g., crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute).

Where To Notify? Completed notification forms should be sent to the address given at the top of this page.

When To Notify? 1. Owners of underground storage tanks in use or that have been taken out of operation after January 1, 1974, but still in the ground, must notify by May 8, 1986. **2.** Owners who bring underground storage tanks into use after May 8, 1986, must notify within 30 days of bringing the tanks into use.

Penalties: Any owner who knowingly fails to notify or submits false information shall be subject to a civil penalty not to exceed $10,000 for each tank for which notification is not given or for which false information is submitted.

INSTRUCTIONS

Please type or print in ink all items except "signature" in Section V. **This form must by completed for each location containing underground storage tanks.** If more than 5 tanks are owned at this location, photocopy the reverse side, and staple continuation sheets to this form.

Indicate number of continuation sheets attached ☐

I. OWNERSHIP OF TANK(S)

Owner Name (Corporation, Individual, Public Agency, or Other Entity)

Street Address

County

City State ZIP Code

Area Code Phone Number

Type of Owner *(Mark all that apply ☒)*

☐ Current ☐ State or Local Gov't ☐ Private or Corporate

☐ Former ☐ Federal Gov't (GSA facility I.D. no. _____) ☐ Ownership uncertain

II. LOCATION OF TANK(S)

(If same as Section 1, mark box here ☐)

Facility Name or Company Site Identifier, as applicable

Street Address or State Road, as applicable

County

City (nearest) State ZIP Code

Indicate number of tanks at this location ☐

Mark box here if tank(s) are located on land within an Indian reservation or on other Indian trust lands ☐

III. CONTACT PERSON AT TANK LOCATION

Name (If same as Section I, mark box here ☐) Job Title Area Code Phone Number

IV. TYPE OF NOTIFICATION

☐ Mark box here only if this is an amended or subsequent notification for this location.

V. CERTIFICATION (Read and sign after completing Section VI.)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Name and official title of owner or owner's authorized representative	Signature	Date Signed

CONTINUE ON REVERSE SIDE

EPA Form 7530-1(11-85)

Owner Name (from Section I) _____ Location (from Section II) _____ Page No. ____ of ____ Pages

VI. DESCRIPTION OF UNDERGROUND STORAGE TANKS *(Complete for each tank at this location.)*

Tank Identification No. (e.g., ABC-123), or Arbitrarily Assigned Sequential Number (e.g., 1,2,3...)	Tank No.	Tank No.	Tank No.	Tank No.	Tank No.
1. Status of Tank *(Mark all that apply ☒)*					
Currently in Use	☐	☐	☐	☐	☐
Temporarily Out of Use	☐	☐	☐	☐	☐
Permanently Out of Use	☐	☐	☐	☐	☐
Brought into Use after 5/8/86	☐	☐	☐	☐	☐
2. Estimated Age (Years)					
3. Estimated Total Capacity (Gallons)					
4. Material of Construction *(Mark one ☒)*					
Steel	☐	☐	☐	☐	☐
Concrete	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify	_____	_____	_____	_____	_____
5. Internal Protection *(Mark all that apply ☒)*					
Cathodic Protection	☐	☐	☐	☐	☐
Interior Lining (e.g., epoxy resins)	☐	☐	☐	☐	☐
None	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify	_____	_____	_____	_____	_____
6. External Protection *(Mark all that apply ☒)*					
Cathodic Protection	☐	☐	☐	☐	☐
Painted (e.g., asphaltic)	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic Coated	☐	☐	☐	☐	☐
None	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify	_____	_____	_____	_____	_____
7. Piping *(Mark all that apply ☒)*					
Bare Steel	☐	☐	☐	☐	☐
Galvanized Steel	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic	☐	☐	☐	☐	☐
Cathodically Protected	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify	_____	_____	_____	_____	_____
8. Substance Currently or Last Stored in Greatest Quantity by Volume *(Mark all that apply ☒)*					
a. Empty	☐	☐	☐	☐	☐
b. Petroleum					
Diesel	☐	☐	☐	☐	☐
Kerosene	☐	☐	☐	☐	☐
Gasoline (including alcohol blends)	☐	☐	☐	☐	☐
Used Oil	☐	☐	☐	☐	☐
Other, Please Specify	_____	_____	_____	_____	_____
c. Hazardous Substance	☐	☐	☐	☐	☐
Please Indicate Name of Principal CERCLA Substance	_____	_____	_____	_____	_____
OR					
Chemical Abstract Service (CAS) No.	_____	_____	_____	_____	_____
Mark box ☒ if tank stores a mixture of substances	☐	☐	☐	☐	☐
d. Unknown	☐	☐	☐	☐	☐
9. Additional Information (for tanks permanently taken out of service)					
a. Estimated date last used (mo/yr)	/	/	/	/	/
b. Estimated quantity of substance remaining (gal.)	_____	_____	_____	_____	_____
c. Mark box ☒ if tank was filled with inert material (e.g., sand, concrete)	☐	☐	☐	☐	☐

BILLING CODE 6560-50-C

VII. CERTIFICATION OF COMPLIANCE (COMPLETE FOR EACH LOCATION)

	Tank Identification No. (e.g., ABC-123)				
	Tank No.	Tank No.	Tank No.	Tank No.	Tank No.
10. Installation (mark all that apply):					
1. The tank and piping installer was certified by the tank and piping manufacturers	☐	☐	☐	☐	☐
2. The installer showed proof of certification by state or local regulatory agencies	☐	☐	☐	☐	☐
3. The installation was inspected by a registerd professional engineer	☐	☐	☐	☐	☐
4. The installation was inspected by state or local agencies	☐	☐	☐	☐	☐
5. Manufacture-supplied checklists of installation procedures were completed	☐	☐	☐	☐	☐
6. The tank and piping were tested for leaks during and after installation	☐	☐	☐	☐	☐
7. Other Specify:	___	___	___	___	___
. Release Detection (mark all that apply):					
(a) Vapor monitoring	☐	☐	☐	☐	☐
(b) Groundwater monitoring	☐	☐	☐	☐	☐
(c) Monitoring above an impermeable barrier	☐	☐	☐	☐	☐
(d) Automatic in-tank monitoring and inventory control	☐	☐	☐	☐	☐
(e) Secondary containment with interstitial monitoring	☐	☐	☐	☐	☐
(f) Tank Testing: product inventory	☐	☐	☐	☐	☐
(g) Another method approved by the implementing agency. Specify:	___	___	___	___	___
12. Corrosion Protection (if applicable):					
As specified for factory-installed cathodic protection for steel tanks	☐	☐	☐	☐	☐
As specified for field-installed cathodic protection for steel tanks	☐	☐	☐	☐	☐
As specified for steel piping	☐	☐	☐	☐	☐
Another method approved by the implementing agency Specify:	___	___	___	___	___
13. I have financial responsibility in accordance with Subpart I:					
Method	___	___	___	___	___
Insurer	___	___	___	___	___
Policy #	___	___	___	___	___
14. *OATH:* I certify that the information concerning installation provided in item 10 is true, to the best of my belief and knowledge.	___	___	___	___	___
Installer:					
NAME					
POSITION					
COMPANY					

Appendix II to § 280.22—List of Agencies Designated to Receive Notifications

Alabama (EPA Form)

Alabama Department of Environmental Mgmt.
Ground Water Section/Water Division
1751 Federal Drive
Montgomery, Alabama 36130

Alaska (EPA Form)

Department of Environmental Conservation
Pouch O
Juneau, Alaska 99811
907/465–2653

American Samoa (EPA Form)

Executive Secretary
Environmental Quality Commission
Office of the Governor
American Samoan Government
Pago Pago, American Samoa 96799
Attention: UST Notification

Arizona (EPA Form)

Attention: UST Coordinator
Arizona Department of Health Services
Environmental Health Services
2005 N. Central
Phoenix, Arizona 85004

Arkansas (EPA Form)

Arkansas Department of Pollution Control and Ecology
P.O. Box 9583
Little Rock, Arkansas 72219
501/562–7444

California (State Form)

Ed Anton
California Water Resources Control Board
P.O. Box 100
Sacramento, California 95801
916/445–9552

Colorado (EPA Form)

Kenneth Mesch, Section Chief
Colorado Department of Health
Waste Management Division
Underground Tank Program
4210 East 11th Avenue
Denver, Colorado 80220
303/320–8333 Ext. 4364

Connecticut (State Form)

Hazardous Materials Management Unit
Department of Environmental Protection
State Office Building
165 Capitol Avenue
Hartford, Connecticut 06106

Delaware (State Form)

Division of Air and Waste Management
Department of Natural Resources and Environmental Control
P.O. Box 1401
89 Kings Highway
Dover, Delaware 19903
302/736–5409

District of Columbia (EPA Form)

Attention: UST Notification Form
Department of Consumer and Regulatory Affairs
Pesticides and Hazardous Waste Management Branch
Room 114
5010 Overlook Avenue, S.W.
Washington, D.C. 20032

Florida (State Form)

Florida Department of Environmental Regulation
Solid Waste Section
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301
904/487–4398

Georgia (EPA Form)

Georgia Department of Natural Resources
Environmental Protection Division
Underground Storage Tank Program
3420 Normal Berry Drive
Hapeville, Georgia 30354

Guam (State Form)

James B. Branch, Administrator
Guam Environmental Protection Agency
P.O. Box 2999
Agana, Guam 96910
Overseas Operator (Commercial Call 646–8863)

Hawaii (EPA Form)

Chief, Noise and Radiation Branch
Hawaii Department of Health
591 Ala Moana Boulevard Honolulu, Hawaii 96801
808/548–4129

Idaho (EPA Form)

Underground Storage Tank Coordinator
Water Quality Bureau
Idaho Department of Health & Welfare
Division of Environment
450 W. State Street
Boise, Idaho 83720
208/334–4251

Illinois (EPA Form)

Underground Storage Tank Coordinator
Division of Fire Prevention
Office of State Fire Marshal
3150 Executive Park Drive
Springfield, Illinois 62703–4599

Indiana (EPA Form)

Division of Land Pollution Control, UST Program
Indiana State Board of Health
P.O. Box 7015
Indianapolis, Indiana 46207
317/243–5060

Iowa (State Form)

Iowa Department of Water, Air and Waste Management
900 East Grand
Des Moines, Iowa 50319
515/281–8692

Kansas (EPA Form)

Office of Environmental Geology
Kansas Department of Health & Environment
Forbes Field, Building 740
Topeka, Kansas 66620
913/862–9360 Ext. 221

Kentucky (State Form)

Natural Resources Cabinet
Division of Waste Management, Attention: Vicki Pettus
18 Reilly Road
Frankfort, Kentucky 40601
502/564–6716

Louisians (State Form)

Patricia L. Norton, Secretary
Louisiana Department of Environmental Quality
P.O. Box 44066
Baton Rouge, Louisiana 70804
504/342–1265

Maine (State Form)

Attention: Underground Tanks Program
Bureau of Oil & Hazardous Material Control
Department of Environmental Protection
State House—Station 17
Augusta, Maine 04333
207/289–2651

Maryland (EPA Form)

Science and Health Advisory Group
Office of Environmental Programs
201 West Preston Street
Baltimore, Maryland 21201

Massachusetts (EPA Form)

UST Registry, Department of Public Safety
1010 Commonwealth Avenue
Boston, Massachusetts 02215
617/566–4500

Michigan (EPA Form)

Ground Water Quality Division
Department of Natural Resources
Box 30157
Lansing, Michigan 48909

Minnesota (State Form)

Underground Storage Tank Program
Division of Solid and Hazardous Wastes
Minnesota Pollution Control Agency
1935 West County Road, B–2
Roseville, Minnesota 55113

Mississippi (EPA Form)

Department of Natural Resources
Bureau of Pollution Control
P.O. Box 10385
Jackson, Mississippi 39209

Missouri (EPA Form)

Gordon Ackley, UST Coordinator
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, Missouri 65102

Montana (EPA Form)

Solid and Hazardous Waste Bureau
Department of Health and Environmental Science
Cogswell Building, Room B–201
Helena, Montana 59620

Nebraska (EPA Form)

Nebraska State Fire Marshall
P.O. Box 94677
Lincoln, Nebraska 68509–4677

Nevada (EPA Form)

Attention: Underground Storage Tanks
Division of Environmental Protection
Department of Conservation and Natural Resources
Capitol Complex
201 S. Fall Street
Carson City, Nevada 89710
800/992–0900 Ext. 4670

New Hampshire (EPA Form)

Water Supply and Pollution Control Commission
Hazen Drive
P.O. Box 95
Concord, New Hampshire 03301
Attention: UST Registration
603/271–3503

New Jersey (State Form)

Underground Storage Tank Coordinator
Department of Environmental Protection
Division of Water Resources (CN–029)
Trenton, New Jersey 08625
609/292–0424

New Mexico (EPA Form)

New Mexico Environmental Improvement Division
Ground Water/Hazardous Waste Bureau
P.O. Box 968
Sante Fe, New Mexico 87504
505/827–2933 or 505/827–2918

New York (EPA Form)

Bulk Storage Section
Division of Water
Department of Environmental Conservation
50 Wolf Road, Room 326
Albany, New York 12233–0001
518/457–4351

North Carolina (EPA Form)

Division of Environmental Mgmt./Ground Water Section
Dept. of Natural Resources & Community Development
P.O. Box 27687
Raleigh, North Carolina 27611
919/733–5083

North Dakota (State Form)

Division of Hazardous Mgmt. and Special Studies
North Dakota Department of Health
Box 5520
Bismarck, North Dakota 58502–5520

Northern Mariana Islands (EPA Form)

Chief
Division of Environmental Quality
P.O. Box 1304
Commonwealth of Northern Mariana Islands
Saipan, CM 96950
Overseas Operator: 6984
Cable Address: Gov. NMI Saipan

Ohio (State Form)

State Fire Marshal's Office, UTN
Department of Commerce
8895 E. Main Street
Reynoldsburg, Ohio 43068
State Hotline 800/282–1927

Oklahoma (EPA Form)

Underground Storage Tank Program
Oklahoma Corporation Comm.
Jim Thorpe Building
Oklahoma City, Oklahoma 73105

Oregon*

Underground Storage Tank Program
Hazardous and Solid Waste Division
Department of Environmental Quality
P.O. Box 1760
Portland, Oregon 97207
503/229–5788

Pennsylvania (EPA Form)

Pennsylvania Department of Environmental Resources
Bureau of Water Quality Management/Ground Water Unit
9th Floor, Fulton Building
P.O. Box 2063
Harrisburg, Pennsylvania 17120

Puerto Rico (EPA Form)

Director, Water Quality Control Area
Environmental Quality Board
Commonwealth of Puerto Rico
Santurce, Puerto Rico 00910
809/725–0717

Rhode Island (EPA Form)

UST Registration
Department of Environmental Management
204 Cannon Building
75 Davis Street
Providence, Rhode Island 02908
401/277–2234

South Carolina (State Form)

Attention: Susana Workman
Groundwater Protection Division
South Carolina Dept. of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201
803/758–5213

South Dakota (EPA Form)

Office of Water Quality
Department of Water and Natural Resources
Joe Foss Building
Pierre, South Dakota 57501

*May be using a State form. Owners should consult EPA to determine whether such form is in compliance with Section 9002.

Tennessee (EPA Form)

Terry K. Cothron, Director
Division of Ground Water Protection
Tennessee Department of Health and Environment
150 Ninth Avenue, North
Nashville, Tennessee 37219–5404
615/741–7206

Texas (EPA Form)

Underground Storage Tank Program
Texas Water Commission
P.O. Box 13087
Austin, Texas 78711

Utah (EPA Form)

Kenneth L. Alkema
Division of Environmental Health
P.O. Box 45500
Salt Lake City, Utah 84145–0500

Vermont (State Form)

Underground Storage Tank Program
Vermont AEC/Waste Management Division
State Office Building
Montpelier, Vermont 05602
802/828–3395

Virginia (EPA Form)

Russell P. Ellison, III, P.G.
Virginia Water Control Board
P.O. Box 11143
Richmond, Virginia 23230–1143
804/257–6685

Virgin Islands (EPA Form)

205(j) Coordinator
Division of Natural Resources Management
14 F Building 111, Watergut Homes
Christianstead, St. Croix, Virgin Islands 00820

Washington (State Form)

Earl W. Tower, Supervisor
Department of Ecology, M/S PV–11
Management Division, Solid and Hazardous Waste
Olympia, Washington 98504–8711
206/459–6316

West Virginia (EPA Form)

Attention: UST Notification
Solid and Hazardous Waste/Ground Water Branch
West Virginia Department of Natural Resources
1201 Greenbriar Street
Charleston, West Virginia 25311

Wisconsin (State Form)

Bureau of Petroleum Inspection
P.O. Box 7969
Madison, Wisconsin 53707
608/266–7605

Wyoming (EPA Form)

Water Quality Division
Department of Environmental Quality
Herschler Building, 4th Floor West
122 West 25th Street
Cheyenne, Wyoming 82002
307/777–7781

Appendix III to § 280.22—Statement for Shipping Tickets and Invoices

Note.—A new Federal law (the Resource Conservation and Recovery Act (RCRA), as amended (Pub. L. 98–616)) requires owners of certain underground storage tanks to notify designated State or local agencies by May 8, 1986 of the existence of their tanks. Notifications for tanks brought into use after May 8, 1986 must be made within 30 days. Consult EPA's regulations, issued on ____, 1985, to determine if you are affected by this law.

One-Time Notification Letter

Dear Customer: A new Federal law directs the Environmental Protection Agency (EPA) to develop a comprehensive regulatory program for underground storage tanks. As part of the new law, owners of certain underground tanks used to store petroleum or hazardous substances must notify designated State or local agencies of the existence of their tanks by May 8, 1986. This includes owners of tanks currently used to store such substances and owners of tanks taken out of operation after January 1, 1974, but still in the ground. Owners who bring tanks into use after May 8, 1986, must notify within 30 days.

The purpose of the notification program is to assist EPA and the States in locating and evaluating underground storage tanks. Enclosed is a copy of EPA's regulations concerning owners of underground storage tanks, and a notification form.

Please review the regulations to determine if you are affected by the notification requirements. A list of the addresses of the State or local agencies designated to receive the notification is contained in the discussion to the regulations.

Subpart C—General Operating Requirements

§ 280.30 Spill and overfill control.

(a) All owners and operators must ensure that releases due to spills or overfills do not occur. The owner and operator must ensure that the volume available in the tank is greater than the volume of product to be transferred to the tank before the transfer is made and that a person is physically present at all times during transfer to observe the transfer.

Note.—The transfer procedures described in NFPA 385 may be used as guidelines for compliance with paragraph (a) of this section. API publication 1621, "Recommended Practice for Bulk Liquid Stock Control at Retail Outlets" and NFPA 30 provide further guidance on the matter of spill and overfill control.

(b) All new UST systems, as well as all existing UST systems using a method of external release detection specified under § 280.41(d) through (f) or (i), must use one or more of the following spill or overfill prevention devices:

(1) A sensor for measuring the level of product in the tank, equipped with an audible or visual alarm that is triggered when the tank is 95% full;

(2) A device designed to cause flow into the tank to shut off automatically when the tank is 95% full;

(3) A spill catchment basin around the fill pipe large enough to contain the volume of the hose; or

(4) An equivalent device designed to prevent releases due to spills and overfills that has been approved by the implementing agency.

(c) All owners and operators of existing UST systems must use one or more of the spill or overfill prevention devices specified in paragraph (b) for each tank no later than (insert date 10 years from the effective date of the final regulations).

§ 280.31 Operation and maintenance of corrosion protection.

All owners and operators of steel UST systems with corrosion protection must comply with the following requirements to assure that releases due to corrosion are prevented for as long as the UST system is used to store regulated substances:

(a) All corrosion protection systems must be operated and maintained to continuously provide corrosion protection to the metal components of the UST system.

(b) All UST systems equipped with cathodic protection systems must be inspected by an independent corrosion expert in accordance with the following minimum inspection schedule:

(1) The proper operation of field installed cathodic protection systems must be tested within six months of installation and at least annually thereafter;

(2) The proper operation of factory installed cathodic protection systems must be tested within six months of installation and at least every five years thereafter; or

(3) All sources of impressed current must be inspected and/or tested, as appropriate, at least annually.

(c) All UST systems with impressed current cathodic protection systems must also be inspected every sixty days to ensure the equipment is running properly.

(d) For all UST systems using corrosion protection measures, records must be maintained (in accordance with § 280.34) of the operation of these systems capable of demonstrating compliance with the performance standards in this section. These records must provide the following:

(1) The results of the last three inspections required on a bi-monthly basis;

(2) The results of testing from the last two service checks required annually; and

(3) The results of the last service check if required less frequently than on an annual basis.

(e) One or more of the following criteria must be used in performing such tests as required in the paragraph (b) of this section to determine that cathodic protection is adequate:

(1) A negative (cathodic) potential of at least 0.85 volts as measured between the structure and a saturated copper-copper-sulfate (Cu-Cu-SO_4) reference electrode contacting the soil; or

(2) A negative (cathodic potential) shift of at least 300 mv as measured between the structure and a Cu-Cu-SO_4 reference electrode contacting the soil. This shift is the difference between the unprotected potential and the potential with the protective current applied; or

(3) A negative (cathodic) polarization potential shift of at least 100 mv as measured between the structure and a Cu-Cu-SO_4 reference electrode contacting the soil. This shift is the polarization decay which is determined immediately after the protective current is interrupted.

(f) All UST system owners and operators of new underground tanks and connected piping must certify compliance with corrosion protection requirements on the notification form submitted pursuant to § 280.22.

§ 280.32 Compatibility.

Owners and operators must use an UST system made of or lined with materials that are compatible with the substance stored in such system.

§ 280.33 Repairs allowed.

(a) A tank may be repaired and relined if the owner and operator receives a certification in writing either by the person performing the repairs or an independent registered professional engineer, that:

(1) The vacuum test required in paragraph (d) of this section was conducted and was held with no adverse impacts on the relined material as determined by an internal inspection.

(2) The lining material is compatible with the regulated substance stored;

(3) The tank was inspected internally and ultrasonically tested and determined to be structurally sound; and

(4) The tank has not been repaired or relined previously.

Note.—The lining/repair procedures described in API 1631 may be used as guidelines for compliance with paragraph (a) of this section;

(b) All steel tanks with corrosion holes that are subsequently repaired must be retrofitted with a cathodic protection system that is designed by an independent corrosion expert and operated and maintained in accordance with § 280.31.

(c) Repairs to fiberglass reinforced plastic tanks may be made only by the manufacturer's authorized representatives.

(d) A vacuum test (at 5.3 in. Hg) must be performed on the tank by the tank repairer after the repair/relining is completed and before the UST system is put back into service.

(e) The owner and operator may not repair holes in piping and fittings, but must replace any piece of such piping or fittings from which a release has occurred. Replacement piping and fittings must meet the requirements of § 280.20(b) and (c), and § 280.32. Loose fittings and joints in piping that have been tightened to eliminate leakage may be put back into service.

(f) The owner and operator must have a tank tightness test (in accordance with § 280.41(c)(1)) performed within one year of the repair of all UST systems that are without interstitial monitoring or other release detection that is sampled at least every 30 days.

(g) All UST system owners and operators with a repaired tank must maintain records capable of demonstrating compliance with requirements of this section for the remaining operating life of the UST system. A signed certification in accordance with paragraph (a) of this section and a record of the results of all performance tests required under this section would satisfy this requirement.

§ 280.34 Maintenance and availability of records.

All UST system owners and operators shall cooperate fully with inspections, monitoring. and testing conducted by the implementing agency, as well as requests for document submission, testing, and monitoring by the owner or operator pursuant to section 9005 of Subtitle I of the Resource Conservation and Recovery Act, as amended. All records required in this part must be maintained:

(a) On-site and be immediately available for inspection; or

(b) At a readily available alternative site and be provided for inspection within 24 hours to the implementing agency.

Subpart D—Release Detection

§ 280.40 General requirements for all UST systems.

(a) Subject to paragraph (b) of this section, all owners and operators of new and existing UST systems must provide a method, or combination of methods, of release detection that is:

(1) Capable of detecting a release from any portion of the UST system;

(2) Installed, calibrated, operated, and maintained in accordance with the manufacturer's instructions, including routine maintenance and service checks for operability or running condition;

(3) Capable of meeting the performance requirements for that method in § 280.41, with any performance claims and their manner of determination described in writing by the equipment manufacturer or installer;

(4) Sampled, tested, or checked for releases at a minimum frequency of at least once every 30 days, except as provided for tank testing in § 280.41(c)(1).

(b) If a method is planned for detecting releases outside of the tank, the owner or operator must perform a site assessment prior to installation of the detection system to assure compliance with the requirements in § 280.41 (d) through (f) or (i).

(c) All existing UST systems must comply with the release detection requirements of paragraphs (a) and (b) of this section and § 280.41 according to the following schedule:

(1) For any existing UST system that is not protected from corrosion and not constructed of non-corrodible materials: no later than (insert date three years after the effective date of the final regulations).

(2) For any existing UST system that is protected from corrosion or constructed of non-corrodible materials: no later than (insert date five years after the effective date of final regulations).

(3) Any existing UST system that cannot apply a method of release detection that complies with paragraphs (a) and (b) of this section and § 280.41 must permanently close in accordance with § 280.80 within (insert date 3 years after the effective date of the final regulations) if the UST system is not protected from corrosion or not constructed of non-corrodible materials, or within (insert date 5 years after the effective date of the regulation) if the UST system is protected from corrosion or constructed of non-corrodible materials.

§ 280.41 Requirements for new UST systems.

(a) Except as provided in paragraph (b) of this section, each owner and operator of a new UST system must use one of the following release detection methods specified in paragraphs (c) through (i) of this section in accordance with the requirements listed for each method, and must specify the method of release detection to be used on a

notification form in accordance with § 280.22 within 30 days of bringing the tank into use.

(b) Each owner and operator of a new hazardous substance UST system must use the method specified in paragraph (h) of this section unless the owner or operator has demonstrated compliance with another method specified in this section, along with the requirements of § 280.40, and has received approval from the implementing agency.

(1) The implementing agency must be notified in writing by the owner and operator of the intention to conduct and submit a demonstration for a variance.

(2) The notification of the implementing agency in paragraph (a)(1) of this section must:

(i) Describe the steps for conducting the demonstration and the time table for completing them; and

(ii) Address how each of the general requirements in § 280.40(a), as well as the requirements in § 280.41 (c) through (g) for the release detection method that is selected (or is being compared to), will be met at the site.

(c) A combination of tank system tightness testing and product inventory reconciliation (or another test of equivalent performance) may be used, but only if:

(1) Except as provided under paragraph (c)(3) of this section, the tightness test method(s) is conducted semi-annually and is capable of detecting a 0.1 gallon per hour leak rate with a probability of detection of 0.99 and a probability of false alarm of 0.01 from any portion of the UST system; and

(2) Inventory reconciliation (or another test of equivalent performance) is conducted weekly to detect a release of at least 5 percent of flow-through on a weekly basis, and monthly to detect a release of at least 0.5 percent of flow-through on a monthly basis in the following manner:

(i) Inventory volume measurements for regulated substance inputs, withdrawals, and the amount still remaining in the tank are recorded each operating day;

(ii) The equipment used is capable of measuring the level of product over the full range of the tank's height to the nearest ⅛ of an inch;

(iii) The regulated substance inputs are reconciled with delivery receipts by measurement of the tank inventory volume prior to and after delivery;

(iv) Deliveries are made through a drop tube that extends to within one foot of the tank bottom;

(v) Product dispensing is metered and recorded within an accuracy of 5 cubic inches for every 5 gallons of product withdrawn; and

(vi) The measurement of any water level in the bottom of the tank is made to the nearest ⅛ of an inch at least once a month when any portion of the tank is located within the water table.

Note.—Practices described in the American Petroleum Institute (API) Publication 1621, "Recommended Practice for Bulk Liquid Stock Control at Retail Outlets," may be used, where applicable as guidelines in meeting the requirement of paragraph (c)(2) of this section.

(3) At existing tank systems, prior to (insert date 10 years after the effective date of the final regulations), the tightness test must be conducted no less often than every five years for steel UST systems protected from corrosion or constructed of non-corrodible materials, and no less often than every three years for all other UST systems.

(d) Testing or monitoring for vapors within the soil gas of the excavation area may be used, but only if:

(1) The materials used as backfill are sufficiently porous (e.g., gravel, sand, crushed rock) to readily allow diffusion of vapors from releases into the excavation area;

(2) The stored regulated substance is sufficiently volatile (e.g., gasoline) to result in a vapor level that is detectable by the monitoring devices located in the excavation area in the event of a release from the UST system;

(3) The measurement of vapors by the monitoring device is not rendered inoperative by the ground water, rainfall, or soil moisture so that a release could go undetected for more than 30 days;

(4) The level of background contamination in the excavation area will not interfere with detection of releases from the UST system and, when measured in the soil gas, is no greater than 500 ppm of total hydrocarbons;

(5) The vapor monitors are designed and operated to allow the threshold level to be preset specifically for the type of regulated substance stored in the tank system and are capable of detecting any significant increase in concentration of total hydrocarbons above background levels;

(6) In the UST excavation area, the site is assessed to assure compliance with the requirements in paragraphs (d)(1) through (5) of this section and to establish the number and positioning of monitoring wells that will detect releases within the excavation area from any portion of the UST system; and

(7) Monitoring wells are clearly marked and secured to avoid unauthorized access and tampering.

(e) Testing or monitoring for liquids on the ground water can be used, but only if:

(1) The regulated substance stored is immiscible in water and has a specific gravity of less than one;

(2) Ground water is never more than 20 feet from the ground surface and the hydraulic conductivity of the soil(s) between the UST system and the monitoring wells or devices is not less than 0.01 cm/sec (e.g., the soil should consist of gravels, coarse to medium sands, course silts or other permeable materials);

(3) All the monitoring wells or devices intercept the excavation area and the continuous monitoring devices or manual methods that are used are able to detect the presence of at least ⅛ of an inch of free product on top of the ground water in the monitoring wells;

(4) Within and immediately below the UST system excavation area, the site is assessed to ensure that the number and positioning of the monitoring wells or devices in the excavation area will detect releases from any portion of the UST system; and

(5) Monitoring wells are clearly marked and secured to avoid unauthorized access and tampering.

(f) Testing or monitoring for liquids using at least one monitoring well or device in the unsaturated zone between the UST system and an impermeable barrier immediately below it may be used, but only if:

(1) The barrier underneath the UST system consists of either native soils or artificially-constructed material that is sufficiently thick and impermeable (at least 10–6 cm/sec) to permit interception and detection of a release from the UST system;

(2) The barrier is designed to intercept any release from the UST system and ensure its detection by the monitoring well or device;

(3) The barrier is compatible with the regulated substance stored so that a release from the UST system will not cause deterioration of the barrier;

(4) The ground water, soil moisture, or rainfall will not render the testing or sampling method that is used inoperative so that a release could go undetected for more than 30 days;

(5) The site is assessed to ensure that the interception barrier is always above the ground water and the UST system is not in a twenty-five year flood plain, unless the barrier and monitor designs are intended for use under such conditions; and

(6) Monitoring wells are clearly marked and secured to avoid unauthorized access and tampering.

(g) Equipment for automatic in-tank monitoring that tests for the loss of product and conducts automatic

inventory reconciliation may be used, but only if:

(1) The automatic product level monitor test is conducted at a minimum frequency of at least once every 30 days when the tank is at least eighty percent full, and is capable of detecting 0.2 gallon per hour leak rate with a probability of detection of 0.99 and a probability of false alarm of 0.01; and

(2) Automatic inventory reconciliation (or another test of equivalent performance) is conducted in accordance with the requirements of § 280.41(c)(2).

(h) Interstitial monitoring between the UST system and a secondary barrier immediately around it may be used, but only if:

(1) The secondary barrier is designed, constructed and installed to ensure detection of any release from the UST system so that corrective action can be taken in accordance with Subpart F and G.

Note.—The provisions outlined in the Steel Tank Institute's (STI) "Standard for Dual Wall Underground Storage Tanks" may be used as guidelines for aspects of the design and construction of underground steel double-walled tanks.

(2) For double-walled UST systems, the sampling or testing method is capable of detecting a release through the inner wall;

(3) For UST systems with a secondary barrier within the excavation area, the sampling or testing method used is capable of detecting any release within the area between the UST system and the secondary barrier:

(i) The secondary barrier around the UST system consists of native soils or artifically-constructed material that is sufficiently thick and impermeable (at least 10-6 cm/sec) to permit containment and detection of a release;

(ii) The liner or barrier is compatible with the regulated substance stored so that a release from the UST system will not cause a deterioration of the barrier;

(iii) The ground water, soil moisture or rainfall will not render the testing or sampling method that is used inoperative so that a release could go undetected for more than 30 days;

(iv) The site is assessed to ensure that the secondary barrier is always above the ground water and not in a 25-year flood plain, unless the barrier and monitoring designs are for use under such conditions; and

(v) Monitoring wells are clearly marked and secured to avoid unauthorized access and tampering.

(4) For tanks with an internally-fitted liner, an automated device can detect a release between the inner wall of the tank and the liner, and the liner is compatible with the substance stored.

(i) Any other type of release detection method, or combination of methods, can be used if it has been approved by the implementing agency. The implementing agency may approve such method if the owner and operator can demonstrate that the method is capable of detecting a release before it migrates beyond the excavation area as well as any of the methods allowed in paragraphs (c) through (h) of this section. If approved, the agency may impose any conditions on the use of the method that are necessary to protect human health and the environment.

§ 280.42 Additional requirements for piping.

(a) Except as provided in paragraph (c) of this section, each owner and operator of a new UST system must have release detection for the underground piping connected to each tank that meets the requirements in §§ 280.40 and 280.41.

(b) In addition to the requirements in paragraph (a) of this section, owners and operators of new UST systems with underground piping that conveys a regulated substance under pressure must also use a method of continuous release detection for such piping that is capable of automatically detecting and shutting off a release of at least 2 gallons per hour, unless the piping is provided with:

(1) Interstitial monitoring in accordance with § 280.41(h); or

(2) Continuous monitoring in accordance with § 280.41 (d) through (f) or (i).

(c) Owners and operators of new petroleum UST systems with underground piping that conveys petroleum under suction need not comply with the requirements in §§ 280.40 and 280.41 provided that:

(1) The below-grade piping operates at less than atmospheric pressure;

(2) The piping is sloped such that the contents of the pipe will drain back into the storage tank if the suction is released;

(3) Only one check valve is included in each suction line;

(4) The check valve is located directly below, and as close as practical to, the suction pump;

(5) The suction piping run is installed with a minimum slope of 2 percent back to the connecting tank; and

(6) the piping run does not have a foot valve that maintains regulated substances in the pipe for the purpose of priming the pump.

§ 280.43 Recordkeeping.

All UST system owners and operators must maintain records in accordance with § 280.34 demonstrating compliance with all applicable requirements of this Subpart. These records must include the following:

(a) All written performance claims pertaining to any release detection system used, and the manner in which these claims have been justified or tested by the equipment manufacturer or installer, must be maintained for five years from the date of installation;

(b) The results of any sampling, testing or monitoring must be maintained for at least one year, except that the results of tank tightness testing conducted in accordance with § 280.41(c)(1) must be retained until the next test is conducted as required under that Subsection; and

(c) Written documentation of all calibration, maintenance and repair of release detection equipment must be maintained for at least one year after the servicing work is completed.

Subpart E—Release Reporting and Investigation

§ 280.50 Reporting of suspected releases and spills.

(a) *Suspected releases requiring reporting.* All UST owners and operators must report within 24 hours to the implementing agency any of the following conditions:

(1) Test, sampling, or monitoring results from a release detection method specified under § 280.41 that indicate a release may have occurred.

(2) Unusual operating conditions such as the erratic behavior of product dispensing equipment, the sudden loss of product from the UST system, an unexplained presence of water in the tank, or the physical presence of the regulated substance or an unusual level of vapors on the site that are of unknown origin;

(3) Impacts in the surrounding area, such as evidence of regulated substances or resulting vapors in soils, basements, sewer and utility lines, and nearby surface water; and

(4) An indication from a gas chromatography or equivalent method that there is a concentration of at least 100 parts per million of total hydrocarbons in a soil sample.

(b) *Spill and overfill reporting.* Any spill or overfill of a regulated substance that exceeds its reportable quantity under CERCLA (40 CFR 302) and any spill or overfill of petroleum that exceeds 25 gallons or causes a sheen on surface water shall be reported to the

implementing agency within 24 hours. Any spill or overfill of petroleum of 25 gallons or less must be contained and cleaned up immediately, and if such clean up cannot be accomplished within 24 hours, the implementing agency must be notified within 24 hours.

Note.—A release of a hazardous substance equal to or in excess of its reportable quantity must also be reported to the National Response Center *immediately* (not within 24 hours) under CERCLA Section 103. These reporting provisions (under CERCLA and RCRA Subtitle I) do not relieve the owner or operator of responsibility to take corrective action as necessary to protect human health and the environment, including containment and clean-up of spills that are not required to be reported.

§ 280.51 Release investigation and confirmation.

(a) Unless corrective action is initiated by the owner or operator under Subparts F and G, or is otherwise directed by the implementing agency, all suspected releases requiring reporting under § 280.50 (a)(1), (a)(2), or (a)(4) must be immediately investigated by the owner or operator using one of the following applicable procedures of this section. Confirmation of a release by one of these methods will require the owner and operator to comply with the requirements for corrective action under Subparts F and G.

(1) A site-specific investigation, under the direction of the implementing agency, of the suspected release incident to determine if a release has occurred and reached soils outside of the excavation zone or ground water;

(2) In the case of an UST system having secondary containment, an investigation of a possible release into the interstitial area between the UST and the secondary barrier using procedures that will determine if the interstitial monitoring is working properly;

(3) In the case of a failed tank or piping tightness test, an investigation in the following manner:

(i) A check of inventory records to detect a discrepancy that indicates a release may have occurred in accordance with the requirements in § 280.41(c)(2);

(ii) Isolation from the tank and retesting of the piping within seven days of the initial reporting to the implementing agency to determine if a release may have occurred in accordance with the requirements in § 280.41(c)(1);

(iii) Isolation from the piping and retesting of the tank within seven days of the initial reporting to the implementing agency to determine if a release may have occurred in accordance with the requirements in § 280.41(c)(1), (after the top of the tank has been excavated and all loose fitting, vent pipes or other equipment has been checked, replaced or tightened); and

(iv) Analysis of soil core samples for hydrocarbon and/or chemical contamination in the unsaturated zone under the UST system.

(4) In the case of a discrepancy during inventory reconciliation in accordance with § 280.41(c)(2), or any other suspected release, an investigation conducted in the following manner:

(i) A tightness test of the tanks and piping that is conducted within seven days of the initial reporting to the implementing agency to determine if a release may have occurred in accordance with the requirements in § 280.41(c)(1); and

(ii) Analysis of soil core samples for hydrocarbon and/or chemical contamination in the unsaturated zone under the UST system.

(5) Any other investigation procedure that is no less stringent than any of the procedures in paragraphs (a)(1) through (a)(4) of this section and is approved for that UST system by the implementing agency.

§ 280.52 Off-site impacts and source investigation.

As required by the implementing agency, all suspected releases requiring reporting under § 280.50(a)(3) must be investigated and confirmed or disproved by the owner and operator to establish whether corrective action requirements must be followed under Subparts F and G. When a release of a regulated substance is suspected, the implementing agency may require the owner or operator to test the tanks and piping for tightness or structural soundness, or require a site investigation to ascertain the location, magnitude, and effect of the leaking UST system.

Subpart F—Corrective Action for UST Systems Containing Petroleum

§ 280.60 General.

Each owner and operator of an UST system containing petroleum shall, in response to a suspected or confirmed release from the UST system, comply with the requirements of this subpart. These requirements apply to all UST systems containing petroleum except USTs excluded under § 280.10(b).

§ 280.61 Initial abatement requirements and procedures.

(a) Upon confirmation of an actual release in accordance with Subpart E or discovery of a release in any other manner, the owners and operators shall:

(1) Report the release to the implementing agency within 24 hours in accordance with § 280.50;

(2) Stop any further release from the UST system;

(3) Mitigate fire and safety hazards;

(4) Remove and properly dispose of visibly contaminated soil from the excavation zone;

(5) Report initial corrective action taken, including a verification of tank repair or closure if appropriate, to the implementing agency within 20 days of confirmation or discovery of the release; and

(6) Conduct an investigation to determine the possible presence of free product and initiate free product removal as soon as practicable.

(b) The owners and operators must assemble from investigations of the site and the release, or from other sources (e.g., USGS maps, state and local agencies, SCS soil maps), such information as deemed necessary by the implementing agency for completing the corrective action measures required in paragraph (a) of this section. This information may include, but is not necessarily limited to, the following:

(1) Data on the nature and estimated quantity of the release;

(2) Data from surface and subsurface soil sampling and analyses;

(3) Data from ground water and/or surface water sampling and analyses; and

(4) Data from available sources and/or site investigations concerning surrounding populations, water quality and use, well locations, subsurface soil conditions, climatological conditions, and land usage.

(c) The information collected by the owners and operators during the course of the investigation under paragraph(a)(6) of this section must be submitted to the implementing agency according to the schedule established by the implementing agency under § 280.63. The implementing agency may request the collection and submission of additional information and/or a corrective action plan for additional soil and/or ground water cleanup.

§ 280.62 Free product removal.

At sites where an owner or operator's investigations under § 280.61(a)(6) indicate the presence of free product, the owner or operator must remove free floating product to the maximum extent practicable while continuing, as necessary, any actions initiated under § 280.61, and while preparing for subsequent actions required under § 280.63. In meeting the requirements of this section, the owner or operator shall:

(a) Conduct free product recovery in such a manner that such actions do not spread contamination into previously uncontaminated areas through untreated discharge or improper disposal techniques,

(b) Handle any flammable products in a safe and competent manner to prevent fires or explosions,

(c) Unless directed to do otherwise by the implementing agency, prepare and submit, within 30 days, a free product removal report to the implementing agency that provides at least the following information:

(1) The name of the person(s) responsible for implementing the plan;

(2) The estimated quantity and type of product on site and the product thickness in wells, boreholes, and excavations;

(3) Details of the product recovery system;

(4) Whether any discharge will take place on or off site during the recovery operation;

(5) The type of treatment and expected effluent quality from any discharge; and

(6) The disposition of the recovered product.

§ 280.63 Additional site investigation.

(a) Whenever an investigation under § 280.61(b) indicates that there may be additional remaining soil contamination from the release, or a removal in compliance with § 280.61(a)(4) indicates that the released product or product from contaminated soil may have reached ground water, or as directed by the implementing agency, the owners and operators shall:

(1) Conduct additional investigations of the release, the release site, and the surrounding area possibly affected by the release, to determine the full extent and location of soils contaminated by the release; and

(2) Conduct additional investigations of the release, the release site, and the surrounding area possibly affected by the release to determine the presence of dissolved contamination due to the release in the ground water.

(b) The information collected by the owners and operators during the course of the investigations under paragraph (a) of this section must be submitted in accordance with a schedule established by the implementing agency.

(c) The implementing agency may request the submission of a corrective action plan for additional soil and/or ground-water cleanup.

§ 280.64 Soil and ground-water clean-up.

(a) Owners and operators required by the implementing agency under § 280.61 (b) or (c) or § 280.63(c) to develop and submit a corrective action plan for responding to any contaminated soils or ground water shall submit such a plan according to a schedule established by the implementing agency.

(b) The implementing agency shall approve the corrective action plan only if it assures that implementation of the plan will provide adequate protection of human health, safety, and the environment. In making this determination, the implementing agency shall consider:

(1) The physical and chemical characteristics of the regulated substance, including its toxicity, persistence, and potential for migration;

(2) The hydrogeologic characteristics of the facility and the surrounding land;

(3) The proximity, quality, and current and future uses of ground water;

(4) An exposure assessment; and

(5) The proximity, quality, and current and future uses of surface waters.

(c) Upon approval of the corrective action plan, the owners and operators shall implement the plan and monitor, evaluate, and report the results of implementation, as required by the implementing agency.

§ 280.65 Reporting.

(a) For purposes of reporting under § 280.61(a)(1), the owners and operators of an UST system containing petroleum shall report—

(1) All below ground releases from the UST system in any quantity,

(2) All above ground releases to land from the UST system in excess of 25 gallons, or less than 25 gallons if the owners and operators are unable to contain or clean up the release within 24 hours; and

(3) All above ground releases to water which result in a sheen on the water.

(b) The owners and operators shall provide any additional information on corrective action beyond the initial notification required under § 280.61(a)(5) requested by the implementing agency.

§ 280.66 Public participation.

(a) For each corrective action plan submitted under § 280.63 and prior to the approval of that plan, the implementing agency shall provide an opportunity for public review and comment on the plan. The implementing agency shall provide notice to the public by means designed to reach those members of the public most directly affected by the release and the planned corrective action. Public notice shall provide adequate time for the review of the submitted plan by the affected public. Such notice may include, but is not limited to, public notice in local newspapers, including block advertisements, public service announcements, state register, or letters to individual households.

(b) If there is sufficient public interest, or for any other reason, the implementing agency may hold a public meeting to consider comments on the corrective action plan. The implementing agency shall hold a public meeting in any case where implementation of an approved corrective action plan does not achieve the established cleanup levels and termination of that plan is under consideration by the implementing agency.

(c) In deciding whether to approve or modify the corrective action plan, the implementing agency shall consider and respond to the comments from the public.

Subpart G—Corrective Action for UST Systems Containing Hazardous Substances

§ 280.70 General.

Each owner and operator of an UST system containing a hazardous substance shall, in response to a confirmed or actual release from the UST system, comply with the requirements of this subpart. These requirements apply to all UST systems containing hazardous substances (including UST systems containing mixtures of hazardous substances and petroleum) except UST systems excluded under § 280.10(b).

§ 280.71 Initial abatement requirements and procedures.

(a) Upon confirmation of a release in accordance with Subpart E, or the discovery of an above ground release in any other manner, the owners and operators shall comply with the following:

(1) *Cessation of use: prevent flow or addition of hazardous substances.* The owner or operator must immediately stop the flow of the hazardous substance into the tank system or secondary containment system and inspect the system to determine the cause of the release.

(2) *Removal of hazardous substances from the tank system or secondary containment system.* (i) If the release was from the tank system, the owners and operators must, within 24 hours after detection of the leak or, if the owners and operators demonstrate to the implementing agency that it is not possible, at the earliest practicable time, remove as much of the hazardous substance as is necessary to prevent

further release of hazardous substances to the environment and to allow inspection and repair of the tank system to be performed.

(ii) If the material was released to a secondary containment system, all released materials must be removed within 24 hours or in a timely manner as determined by the implementing agency.

(3) *Containment of visible releases to the environment.* The owner and operator must immediately conduct a visual inspection of any above ground release and, based upon that inspection:

(i) Prevent further migration of the release to soils or surface water;

(ii) Remove, and properly dispose of, any visible contamination of the soil or surface water; and

(iii) Conduct an investigation to determine the possible presence of free product.

(b) In accordance with the reporting requirements of § 280.74, the owners and operators must assemble from investigation of the site and the release, or from other sources (e.g., USGS maps, state and local agencies, SCS soil maps), such information as deemed necessary by the implementing agency for completing the corrective action measures required in paragraph (a) of this section. This information may include, but is not necessarily limited to, the following:

(1) Data on the nature and estimated quantity of the release;

(2) Data from surface and subsurface soil sampling and analyses;

(3) Data from ground-water and/or surface water sampling and analyses; and

(4) Data from available sources and/or site investigations concerning surrounding populations, water quality and use, well locations, subsurface soil conditions, climatological conditions, and land usage.

§ 280.72 Additional site investigation.

(a) Whenever an investigation under § 280.71(b) indicates that there may be additional remaining soil contamination from the release, or a removal in compliance with § 280.71(a)(2) indicates that the released product or contaminated soil may have reached ground water, or as directed by the implementing agency, the owners and operators shall:

(1) Conduct additional investigations of the release, the release site, and the surrounding area possibly affected by the release to determine the full extent and location of soils contaminated by the release; and

(2) Conduct additional investigations of the release, the release site, and the surrrounding area possibly affected by the release to determine the presence of dissolved contamination due to the release in ground water.

(b) The information collected by the owners and operators during the course of the investigations under paragraph (a) of this section must be submitted in accordance with a schedule established by the implementing agency.

(c) The implementing agency may request the submission of a corrective action plan for additional soil and/or ground-water cleanup.

§ 280.73 Soil and ground-water cleanup.

(a) The owners and operators required by the implementing agency under § 280.72(c) to develop and submit a corrective action plan for cleanup of any remaining contaminated soils or ground water shall submit such a plan in accordance with a schedule established by the implementing agency.

(b) Upon approval of the corrective action plan the owners and operators shall implement and monitor, evaluate and report the results of implementation to the implementing agency.

§ 280.74 Reporting.

(a) For purposes of reporting under § 280.71 the owners and operators of an UST containing hazardous substances shall report—

(1) All below ground releases in any quantity; and

(2) All above ground releases to land or surface waters in excess of the reportable quantity established under 40 CFR 302 for the released substance.

(b) Within 30 days of confirmation or discovery of a release to the environment, a report containing the following information must be submitted to the implementing agency:

(1) Likely route of migration of the release to the extent known from available information;

(2) Characteristics of the surrounding soil (soil composition, geology, hydrogeology, climate);

(3) Results of any monitoring or sampling conducted in connection with the release (if available). If sampling or monitoring data relating to the release are not available within 30 days, these data must be submitted to the implementing agency as soon as they become available.

(4) Proximity to downgradient drinking water, surface water, and population areas; and

(5) Description of response actions taken or planned.

(c) The owners and operators shall provide any additional information on corrective action beyond the initial notification required under 280.81 requested by the implementing agency.

§ 280.75 Public participation.

(a) For each corrective action plan submitted under § 280.73 and prior to the approval of such plan, the implementing agency shall provide an opportunity for the public review and comment on the plan. The implementing agency shall provide notice to the public by means designed to reach those members of the public most directly affected by the release and the planned corrective action. Public notice shall provide adequate time for the review of the submitted plan by the affected public. Such notice may include, but is not limited to, public notice in local newspapers, block advertisements, public service announcements, state register, or letters to individual households.

(b) If there is sufficient public interest, or for any other reason, the implementing agency may hold a public meeting to consider comments on the corrective action plan. The implementing agency shall hold a public meeting in any case where implementation of an approved corrective action plan does not achieve the established clean-up levels and termination of that plan is under consideration by the implementing agency. In deciding to approve or modify the corrective action plan, the implementing agency shall consider and respond to the comments from the public.

Subpart H—Out-of-Service UST Systems and Closure

§ 280.80 Temporary removal from use, temporary closure, and permanent closure.

(a) When an UST system is taken out of service for less than 3 months and for regulated substances are left in the tank, the owner or operator must continue operation and maintenance as required in § 280.31, release detection as required in § 280.41, and must comply with Subparts E, F, and G if a release is suspected or confirmed.

(b) When an UST system is taken out of service for 3 months or more but less than 24 months, and regulated substances are left in the tank, the owner and operator must comply with paragraph (a) of this section and meet the following additional requirements:

(1) Leave vent lines open and functioning; and

(2) Cap and secure all other lines, pumps, manways, and ancillary equipment.

(c) When an UST system is taken out of service for longer than 24 months, it must be permanently closed.

(d) At least 30 days prior to permanent closure, the owner or operator must notify the implementing agency and assess the excavation area around the UST system for releases. This requirement is satisfied if one of the external monitoring release detection methods allowed under § 280.41 is in use at the site at the time of closure, or if the owner or operator uses:

(1) Portable gas chromatograph mapping;

(2) Analysis of soil core samples for hydrocarbon and/or chemical contamination in the unsaturated zone;

(3) Analysis of groundwater surrounding the tank for released product; or

(4) Another site assessment method that has been approved by the implementing agency.

This provision applies to all UST system closures that took place before the effective date of these regulations and did not conform with paragraph (f) of this section.

(e) If a release is discovered as a result of the activities under paragraphs (a) through (d) of this section, or by any other manner, the owner or operator must comply with the corrective action requirements of Subparts F and G.

(f) All tanks that are taken out of service permanently must be emptied and either removed from the ground or be filled with an inert solid material.

[Note.—The closure procedures described in API 1604 "Recommended Practice for Abandonment or Removal of Used Underground Service Station Tanks" may be used as guidelines for compliance with paragraph (f).]

(g) All UST system owners and operators must maintain records in accordance with § 280.34 which are capable of demonstrating compliance with closure procedures required under this section. These records must:

(1) Be maintained in accordance with § 280.43 when release detection is conducted in accordance with the temporary closure requirements of § 280.80 (a) and (b); and

(2) Provide the results of the excavation area assessment required in § 280.80(d). Such results must be maintained for at least three years after permanent closure in one of the following ways:

(i) By the owner and operator who took the UST system out of service;

(ii) By the current owner and operator of the UST system; or

(iii) By mailing these records to the implementing agency if they cannot be maintained at the closed facility.

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40 CFR Part 280

[FRL-3154-7]

Underground Storage Tanks Containing Petroleum; Financial Responsibility Requirements

AGENCY: Environmental Protection Agency.

ACTION: Proposed rule.

SUMMARY: The Environmental Protection Agency (EPA) is proposing financial responsibility requirements applicable to owners and operators of underground storage tanks containing petroleum under section 9003 (c) and (d) of the Resource Conservation and Recovery Act (RCRA) as amended by the Hazardous and Solid Waste Amendments of 1984 (HSWA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). This proposal would establish requirements for demonstrating financial responsibility for taking corrective action and compensating third parties for bodily injury and property damage caused by sudden and nonsudden accidental releases arising from operating an underground storage tank containing petroleum.

DATES: The Agency will consider all comments received by June 6, 1987 before taking final action on the proposed rule. Three public hearings will be held on the following dates: (1) May 28 (and 29, if necessary), 1987—Washington, DC; (2) June 1 (and 2, if necessary), 1987—Dallas, Texas; and (3) June 4 (and 5, if necessary), 1987—San Francisco, California.

ADDRESSES: Comments may be mailed to the Docket Clerk (Docket No. UST-3), Office of Underground Storage Tanks [WH-562A], U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460. Comments received by EPA, and all references used in this document, may be inspected in the public docket, located in Room LG-100, U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460, from 9:00 a.m. to 4:00 p.m., Monday through Friday, excluding Federal holidays.

The Agency will hold public hearings on today's proposal at three different locations indicated below:

1. The Westin Hotel, 2401 M Street NW., Washington, DC 20037
2. The Registry Hotel, 15201 Dallas Parkway, Dallas, TX 75248
3. Miyako Hotel, 1625 Post Street, San Francisco, CA 94015.

The hearings will begin at 9:30 a.m., with registration at 9:00 a.m. The hearings will end at 4:30 p.m., unless concluded earlier. Anyone wishing to make a statement at a hearing should notify, in writing, Ms. Gerri Wyer, Hearings Coordinator, Office of Underground Storage Tanks [WH-562A], U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC 20460, (800) 424-9346 (toll free) or (202) 382-3000 in Washington, DC.

Oral and written statements may be submitted at the public hearing. Persons who wish to make oral presentations must restrict them to 15 minutes and are encouraged to have written copies of their complete comments for inclusion in the official record.

FOR FURTHER INFORMATION CONTACT: The RCRA/Superfund Hotline at (800) 424-9346 (toll free) or (202) 382-3000 in Washington, DC.

SUPPLEMENTARY INFORMATION: The contents of today's preamble are listed in the following outline:

I. Authority
II. Background
  A. Legislative and Regulatory Overview
    1. RCRA Subtitle I
    2. CERCLA Reauthorization
    3. Leaking Underground Storage Tank Trust Fund
  B. Key Provisions of Today's Proposal
  C. Rationale for the Agency's Approach
  D. Amount of Required Coverage
  E. Description of the Regulated Community
    1. Background
    2. Owners and Operators in Retail Motor Fuel Marketing
    3. Owners and Operators in Other Sectors
  F. Overview of Proposed Rule
III. Section-by-Section Analysis
  A. Applicability (§ 280.90)
    1. Owner or Operator
    2. New Tanks
    3. Tanks Taken Out of Operation
    4. State and Federal Government Entities
    5. Exemptions
    6. Deferrals
  B. Definition of Terms (§ 280.91)
    1. Accidental Release
    2. Bodily Injury
    3. Controlling Interest
    4. Legal Defense Costs
    5. Occurrence
    6. Property Damage
    7. Provider of Financial Assurance
    8. Substantial Business Relationship
    9. Tangible Net Worth
  C. Amount and Scope of Required Coverage (§ 280.92)
    1. Per-Occurrence Amount
    2. Aggregate Amounts
    3. Apportionment of Costs