B A C K G R O U N D D O C U M E N T NO. 7

HAZARDOUS WASTE MANAGEMENT SYSTEM: GENERAL; STANDARDS APPLICABLE TO OWNERS AND OPERATORS OF HAZARDOUS WASTE TREATMENT, STORAGE, AND DISPOSAL FACILITIES; AND HAZARDOUS WASTE PERMIT PROGRAM (40 CFR 260, 264, and 122)

Permitting of Land Disposal Facilities: Ground-Water Protection Standards

This document (ms. 1941.40) provides background information on EPA's proposed regulations for land disposal of hazardous waste

U.S. ENVIRONMENTAL PROTECTION AGENCY
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INTRODUCTION

The agency proposed Human Health and Environmental Standards for hazardous waste treatment, storage, and disposal facilities on 18 December 1978. It subsequently reconsidered that proposal, and on 8 October 1980 issued a supplemental notice of proposed rulemaking stating its intent to proceed with the development of an alternate standard to that which it had proposed. The focus of the supplemental notice was standards for the protection of ground water applicable to hazardous waste land disposal facilities.

The standards applicable to land disposal facilities proposed on 18 December 1978 were facility design requirements supplemented by an override provision when human health or the environment would not be adequately protected by compliance with design requirements.

The supplemental notice indicated that the agency intended to combine elements of various types of standards to protect ground water. Four types of standards were described in the notice: (A) Facility Design Requirements, (B) Containment Strategies, (C) Specific Ambient Health and Environmental Performance Standards, and (D) Non-numerical Health and Environmetal Standards.

The 5 February 1981 reproposal implements "EPA's intended approach" described in the notice taking into consideration comments received on both the original proposal and the supplemental notice.

The specific standard under discussion herein is the Ground-water Protection Standard which is a non-numerical health and environmental standard proposed as a primary standard for the protection of ground water. Specific discussion of the other types of standards embodied in the reproposed regulations can be found in companion background

documents. General discussion of those standards will be included in this document as appropiate to promote an understanding of their relationship to the Ground-water Protection Standard and among the various other types of standards.

I. NEED FOR REGULATION

The files of the agency are replete with instances of adverse human health and enviromental effects caused by discharges to ground water from hazardous waste land disposal facilities. Reference should be made to companion background documents for an enumeration and discussion of those records. They unquestionably establish the need for regulation of discharges to the ground water to achieve the objectives of the Resource Recovery and Conservation Act (RCRA).

II. ANALYSIS OF STANDARDS

ISSUE: Human health and environmental standard

(Ground-water endangerment standard)

A. Proposed Regulation and Rationale

In the preamble to the 18 December 1978 proposed regulations for hazardous waste management facilities at 43 FR 58983, the agency expressed it's intention to protect ground water by relying on required design and operating standards, subject to and overriding human health and environmental standard (HHES) which would apply when design and operating standards alone did not achieve the objectives of the Act. The override mechanism would have required stricter facility design and operating criteria for purposes of ground-water protection if it was determined that a given facility was not located, designed, constructed or operated to prevent

"endangerment" of an "underground source of drinking water" (USDW) beyond the facility property boundary; or of a sole source aquifer, as designated pursuant to the Safe Drinking Water Act (SDWA) of 1974, at any point. Endangerment was defined as the introduction of a substance into ground water which would cause the maximum allowable contaminant levels (MCL's) established in the National Interim Primary Drinking Water Regulations (NIPDWR) to be exceeded or, if concentrations in ground water already exceeded the MCL's, would require additional treatment so as not to exceed the MCL's. Other constituents could be added to the endangerment definition when deemed appropriate. Implementation of the override mechanism would have been determined by the "permit writer" who would incorporate additional design and operating requirements as enforceable conditions of the permit.

B. Summary of Comments

- A containment policy is necessary to protect priority aquifers, since ground water moves slowly and undergoes little mixing.
- Design and operating (containment) standards should not apply to facilities located over a non-drinking water source.
- The proposed design and operating standards may well not protect human health or the environment; therefore ground water quality standards are needed.
- Facilities overlying aquifers which are not hydraulically connected to USDW's or sole source aquifers should be exempt from the HHES.
- Support the HHES and design and operating standards as a way to assist the regulated community.
- Support HHES as a means of protecting a USDW, but not if it is interpreted (as it appears to be) as a means of preventing any discharge to ground water.
- The HHES does not integrate ground water and surface water protection requirements.

- MCL's are not a sufficient standard since ground water is surface water base flow and MCL's are not adequate for surface water protection.

- Allowing degradation of ground water up to the NIPDWR levels is contrary to environmental protection policy.

- The MCL's are not sufficient even to protect the public since they are not representative of hazardous wastes.

- The HHES assumes that protection of ground water means the protection of human drinking water; this is wrong, and RCRA requires protection of human health and the environment.

- The ground-water HHES is inadequate since it is based on "endangerment". The mandate of RCRA is far broader than the SDWA.

- EPA should add numerical standards based on drinking water Water Quality Criteria published under §304 of the Clean Water Act to the ground water HHES.

- EPA should include as part of the ground water HHES those chemicals regulated under [§303] §304 (Water Quality Criteria) and and §311 (Hazardous Substance Discharge Limits) of the Clean Water Act.

- EPA should include as part of the HHES a listing of known carcinogens, mutagens, and teratogens.

- Ground water contamination when it occurs is essentially irreversible.

- EPA should abandon "endangerment" and adopt non-degradation as a basic program concept.

- Protection requirements should be geared to end use or present quality and quantity of ground-water resources.

- Suggest that permit writers be required to justify use of the HHES override and that an appeal provision be included to avoid arbitrary use.

- The HHES override should allow both more or less stringent controls (reflected in earlier drafts) rather that just more stringent.

- Object to the inference to the authority of the "permit writer" versus the Regional Administrator.

C. Discussion

The Agency analyzed the comments received on the 18 December 1978 proposed ground-water endangerment standard while also conducting further analysis on its own. During the same time frame, the Agency was in the process of developing a comprehensive ground-water protection strategy as a guide to many of its programs. As a result of those analyses, the Agency decided to propose a substantially different type of standard than had been proposed on 18 December 1978. Therefore on 8 October 1980 the Agency published in the Federal Register at 45 FR 666817-823 a Supplemental Notice of Proposed Rulemaking outlining its intended approach for protecting ground water resources from the adverse effects of hazardous waste land disposal facilities to the extent necessary to protect public health and the environment.

A summary of the comments recieved on the discussion of "EPA's intended approach" contained in the notice is presented under the issue heading "Nonnumerical health and environmental standard (Ground-water protection standard)". Although all of the comments are not specifically germane to the ground-water protection standard, they are recorded in one location for the convenience of the reader. The various comments received on the ground-water endangerment standard in the 18 December 1978 proposed regulations and the comments received on the discussion of "EPA's intended approach" are discussed in the preamble to the 5 February 1981 re-proposal, and in a number of the background documents of this series. That discussion which is particularly pertinent to the ground-water protection standard proposed on 5 February 1981 as

§264.2 will be found in this document in the discussion under the issue heading "Nonnumerical health and environmental standard (ground-water protection standard)".

D. Regulatory Language

N/A

ISSUE: Nonnumerical health and environmental standard (ground-water protection standard)

A. Proposed Regulation and Rationale

The approach proposed in the Notice starts from a presumption that it is unacceptable to allow the facility to affect a downgradient water supply used for any purpose (domestic, agricultural, industrial, commercial etc.). This standard would be applied at all points where water is or may be withdrawn for water supply purposes. The approach would provide a variance mechanism to allow some discharge into ground water below and beyond the facility, but only where the permit applicant could demonstrate that such controlled release of waste constituents or by-products would not adversely affect current or future water uses. The variance procedure would enable the permitting authority to recognize that in some circumstances, limited, defined discharge to points of use will not adversely affect public health or the environment. However, the burden would be on the permittee to make this demonstration. The approach would also require that the facility owner or operator employ certain management practices and certain design features that would control adverse effects on ground water and surface water, as well as prevent or minimize other surface environmental effects.

B. Summary of Comments

(1) Overall Approach

(i) General vs. Specific Performance Standards

- Prefer general performance standards and few, if any design requirements.
- Prefer non-numerical health and environmental standard supplemented by technical design standards.
- Prefer total reliance on specific performance standards.
- Prefer total reliance on specific design requirements.
- Prefer combination of specific design and performance standards.
- Technical design requirements should be articulated in terms of the performance they were intended to produce, thereby allowing the permittee to substitute different but equivalent designs.
- It appears to us that a properly designed and operated hazardous waste landfill can provide 100% containment (i.e. no uncontrolled permeation of leachate from the confines of the landfill) and that such a design is subject to analysis and supporting field inspection during construction and operations.
- A containment strategy is the best approach to ground water protection.
- A better alternative to the proposed approach would be the classification of waste types and facilities to account for degree of hazard.
- Total waste containment should be allowed as an option to the no adverse impact demonstration.
- EPA should consider an approach that requires containment within property boundries during the operating life of the site. Once the facility ceased operations, closure and post-closure care plans would provide adequate assurances against further contamination.
- RCRA requires EPA (rather that the permittee) to assess health and environmental risks before adopting protective measures.
- The standard should be containment until ambient health and environmental criteria can be developed for state implementation.

(ii) Burden on Permittee

- The proposed approach imposes an undue burden on the permit applicant in terms of the costs of generating the information required to justify a variance and/or the technical feasibility of producing the required data.

- Limits must be placed on the permit writer's ability to demand additional data and analysis.

- How will EPA keep its approach from ballooning into a never-ending quest for zero-risk data?

- The burden of proof for protecting groundwater quality and securing permission for limited groundwater degradation should rest with the owner or operator.

- The proposal appears to be less stringent than is necessary to protect water quality. Increasing the burden on permittees to demonstrate the acceptability of facility procedures..... ...is an acceptable approach only when coupled with regulatory control to assure the quality of information developed.

- EPA should establish a tiered set of data requirements so that some findings or predictions may trigger the need to produce greater detail but others will not.

- Laboratory and field techniques to estimate potential hazardous waste behavior do exist. However, EPA should recognize that, in many cases, information which can be assembled at the present time, will not be absolutely conclusive.

(iii) Permitting Discretion

- Vague, non-numerical standard leaves too much descretion to the permitting authority and leaves the permit applicant in the untenable position of investing in expensive geological, hydrological and biological testing without any assurance that the data generated will be sufficient.

Suggested solutions:

Specific quidance to the permitting authority on the use of non-numerical standards;

More specific guidance to permit seeker on analytical tests, risk evaluation procedures and acceptance criteria;

Reduced informational requirements on permit applicant;

Providing permit seekers with the alternative of complying with specific design requirements rather than making the required demonstration.

- The amount of discretion left to the permit reviewers will lead to inconsistant results and excessive litigation.

- The combination of permitting descretion left to Agency and public opposition to siting of hazardous waste facilities will create the situation of few, if any, permits being issued.

- The burden on permittees, particularly small, single waste, land disposal operations, is such that there will be very few new land disposal sites (which we urgently need) established.

- Reservations were expressed over whether EPA has or will be able to procure permit reviewers with the expertise required to evaluate the type and amount of data required of permit applicants.

- States do not have and will not be able to procure enough qualified engineers to make the permitting decisions required by these regulations. Additionally, there is no way to ensure uniformity in decisionmaking.

- As permit writers are prone to do, the non-numerical standards will be converted into numerical guidelines for use in evaluating an application. These "guidelines" are indeed regulations without benefit of the public participation process.

(iv) Miscellaneous

- Either no sites will be permitted because applicants will not be able to prove "no adverse risk" or permit writers will loosely interpret this approach and gloss over technical inadequacies in the application.

- Policy making will likely be done without effective public participation because of the way EPA designed its approach. It will be extremely difficult for citizens to actively engage in these highly technical proceedings.

- If the proposed strategy is adopted, the closure and post-closure reserve should be dropped from the regulations. The burden of aquiring funds for the required research as well as the closure and post-closure reserves would be excessive and the integrity of the landfill well be so well documented beforehand that there would be little need for the reserves.

- EPA should clearly address the subject of facilities that handle only a specific hazardous waste, where that particular hazardous waste is under investigation for possible de-listing.

- EPA should include at least a policy statement on the storage of hazardous wastes that serves to deter the creation of facilities that only function as storage sites.

(2) Non-degradation

(i) General Non-degradation Strategy

- A non-degradation standard is overly rigid and unrealistic.
- A non-degradation standard exceeds the statutory mandate of RCRA and is therefore legally unjustifiable.
- Any attempt by EPA to regulate groundwater prior to promulgation of the final National Groundwater Protection Strategy is premature.
- Ground water protection is a state responsibilty. We must voice serious objections to EPA's use of RCRA as its primary vehicle in attemping to establish what it calls a "ground water protection" scheme.
- A non-degradation policy is inconsistant with the Safe Drinking Water Act and/or other RCRA regulations.
- Regulation of groundwater should be done under the Federal Water Pollution Control Act, not RCRA.
- The groundwater strategy advanced by the concept paper failed to give proper deference to state and local designation of groundwater uses.
- How are future water supply withdrawal points to be determined; i.e., how many years into the future must be considered?
- Any policy EPA should propose for the preservation of drinking water should be in the form of guidance to the states rather than mandatory regulations.
- It is up to the states, not the permittee, to determine future ground-water usage.
- The proposed concept does not sufficiently take into consideration existing groundwater contamination and background levels or existing ground-water uses.
- The non-degradation standard should be modified to require no adverse effects on water quality at the nearest downstream water supply intake.
- Any land disposal will cause some impact on groundwater and EPA must recognize this. It would be more realistic to say that environmental degradation should be minimized, consistent with available technology.

- We support the "presumption against any degradation". However, the proposal to apply such a standard to all points of future potential use appears to be unworkable. Further, the granting of any variance to allow limited degradation should be subject to either a time limitation or limited by a clear performance standard.

- Because the nondegradation standard is impossible to successfully meet, permissable demonstrations will become the rule rather than the exception, causing unreasonable delays in the permitting process.

- A rigid, non-degradation policy must be relaxed to take into account multiple groundwater uses as well as the particular hazardous wastes involved.

- Ambient ground-water quality must be included as an informational requirement.

- Without established contaminant levels determined to provide acceptable risk levels, or without sufficient environmental and health risk evaluation data, we agree the only safe approach to ground water protection is non-degradation.

(ii) Definition of "Contamination" and "Degradation"

- EPA should clearly define "contamination" and "degradation" to recognize the distinction between the two terms.

- Degradation means adding certain materials to the groundwater. In contrast, contamination means making the groundwater unfit for certain uses. Thus, to some extent, degradation may be an unavoidable result of industrial development, acceptable so long as significant contamination does not result.

- The regulations should adopt the definition of contaminant used in the Sept. 13, 1979 Subtitle D regulations.

- The definitions of contamination and degradation should or must take into account existing groundwater contamination and natural environmental contamination.

(iii) Miscellaneous

- The regulations should address drilling and sampling techniques to assure that sampling programs established to protect ground water do not result in additional ground-water degradation.

- The drinking water standards are not adequate to protect human health and the environment. They are too weak and too limited in scope.

- It will be very difficult, if not impossible to set groundwater quality limits as has been done with surface waters.

- Where degradation of ground water is permitted, then biological tests (e.g., the Ames test and the acute fish toxicity test) ahould be specified as part of the ongoing monitoring of groundwater downstream from the facility.

(3) New vs. Existing Facilities

(i) Basic Approach

- In agreement with basic approach to new vs. existing facilities.

- It is inappropriate to apply design standards, which would require retrofitting, to existing facilities.

- Retro-fitting existing facilities with liners or similar equipment may not only be more costly than ground-water purification plans but retrofitting liners poses potential safety hazards to the installers.

- In the absense of identified threats to existing water supplies, any remedial measures imposed upon existing facilities should be consistant with likely future development and use of groundwater resources.

- At existing sites regardless of the importance of the ground water resource, EPA will not move to protect it until it has been damaged. The extent of the damage will be entirely dependent upon the efficacy of three monitoring wells in detecting the presence of contaminants in the aquifer. EPA should propose regulations to regulate all existing facilities.

- To acheive a permit, an applicant should be required to clean up those dangerous cell or landfills contiguous to or on the same site as the facility for which a permit is sought.

- All existing hazardous waste facilities should generally be required to use the ground water protection approach that new facilities will be required to use. Further, EPA should continue to its efforts on development of interim Suggested No Adverse Response Levels(SNARLS) which can be used in evaluating the ground water quality at existing sites.

(ii) Major Expansions

- The definition of major expansion is overly broad.

- Where an interim status facility does not cause the presence of hazardous constituents in the underlying ground water, the owner or operator should be permitted to expand the facility without making the proof required by the Agency.

- An expansion of an existing site within the scope of its original design should not be regulated as a new facility.

- The opening of a new cell at an existing facility should not be treated as a major expansion.

- The term "significantly expanded" as it is used in the definition of major expansion, needs clarification in that periodic construction of separate landfill trenches, areas or impoundments may be a routine operation at an existing facility.

- We request that you exempt major expansions of any state licensed facilities, whether or not the state has acheived Interm Authorization, from your intended policy. If not, a shortage of capacity will be created in the Northwest United States.

- It should be made very clear that in no case can an existing facility expand its operation in any way (either quantity received or surface area) without first receiving a permit.

(iii) Monitoring Requirements for Existing Facilities

- How will EPA determine, for existing facilities, whether an aquifer is contaminated based on recent groundwater monitoring data?

- Current groundwater monitoring requirements are insufficient to detect all ground-water contamination, thereby allowing existing sites to continue operating while contaminating a water supply source. To remedy this, an expanded range of parameters should be required for monitoring, as well as quarterly, as opposed to annual, sample collections.

- Regulations must protect groundwater quality from all sites which have a known potential impact on usuable water. How will existing facilities, where little or inadequate data is available to ascertain whether groundwater degradation is occuring, be regulated?

- It is unreasonable to require an owner/operator of an existing site to perform an exhaustive demonstration if only trace or insignificant contamination entered an aquifer.

(4) Other Issues

- It is virtually impossible to design surface impoundments that will not leak during their active life.

- Surface impoundments should be subject to the same non-degradation requirements as landfills

- Groundwater regulations must adequately address groundwater contamination resulting vertical migration of leachate from surface impoundments.

- We support the separation of surface impoundment requirements from those of landfills. There is no reason to impede regulations on one management method simply because less is known about another.

- Surface impoundments often pose a more serious threat of polluting drinking water sources and the air, than do many landfills. Therefore they should be subject to similar technical design features.

- Inasmuch as most facilities, including lined surface impoundments, will eventually leak, will EPA exempt all surface impoundments with liners that it finds acceptable from the extensive review process, or only those impoundments that have not yet leaked?

- At a minimum, new landfills should not be sited on active fault zone, on important recharge area, over existing water supplies, on 100 year flood plains, or near the critical habitat of an endangered species.

- EPA should place an outright ban on the locating of facilities: in wetlands; within 300 feet of a 100 year flood plain; within one mile upgradient of any public drinking water supply; within the recharge area of a sand or gravel aquifer; within the confines of a state or federal park; within the confines of a designated wildlife santuary.

- How will previously enacted State standards regarding ground water protection from hazardous waste disposal facilities (be they more or less stringent) relate to the proposed approach?

- EPA should allow the States to maintain more stringent regulations regarding the management of hazardous waste disposal.

- Although we do not oppose the use of a non-numerical health and environmental standard, individual states should be allowed to establish technical design standards and ambient health and environmental standards, taking into account local physical conditions and local groundwater quality. States should be allowed to adopt standards less stringent than Federal.

- We request that the rulemaking endorse state registration programs for professional geologists, who will play an important role in the success of EPA's ground water program.

Note: Comments received on issues not directly or generically related to "EPA's intended approach" have been omitted.

C. Discussion

The regulatory approach to ground-water protection embodied in the proposed regulations is basically consistant with that proposed in the 8 October 1980 supplemental notice of proposed rulemaking. In the notice, the standard was described under the heading "Presumption against any degradation", and it was furthur referred to as a "nondegradation standard". The comments in the preceding summary that are most pertinent to this discussion of the ground-water protection standard may therefore be found under the heading "Non-degradation".

The ground-water protection standard and the associated performance standards and demonstrations of performance in §§264.20 and 264.21 referenced in the ground-water protection standard as proposed in §264.2 of the regulations are responsive to many of the comments received on the ground-water endangerment standard proposed on 18 December 1978 as a human health and environmental standard. Therefore, in this discussion and in the discussions of the performance standards and demonstrations of performance in Background Document No. 9 - Performance Standards for Land Disposal Facilities, reference will be made to those comments as well as the comments received on the 8 October 1980 notice.

As stated in the notice, the regulations start from a presumption that it is unacceptable to allow [a land disposal facility] to cause any contamination of a downgradient water supply used for any purpose (drinking water, agricultural, industrial, etc.); and the standard would applied at all points where [ground] water is or may be withdrawn for water supply purposes. The Agency

has chosen this approach, in part, because it recognizes, based on public comments and its own analysis, that containment of wastes disposed of into or on the land is achievable for only a limited period of time. Moreover, in many cases containment does not represent the most efficient, protective, and effective control achievable. Ultimately, containment designs [and locations] act only as a control on the rate of release. As a result, the Agency has chosen to control the adverse human health and environmental effects which can occur through the ground-water medium by a combination of design, operating, and locational standards. This approach relies principally on maintaining a physical separation of the ground water affected by disposal or discharge and ground-water withdrawn or collected for use. Separation from and control of exposure to users of affected ground water is possible because not all ground water is used, usable, or needed for any use and because ground water returns to the surface in a definable way.

The basic goal embodied in the proposed regulations for the protection of human health and the environment from ground-water contamination is to rigorously protect all ground water, which is now or will in the future be used, from the effects which will result from hazardous waste disposal. Furthermore, the regulations ensure that the natural re-entry of ground water into the surface environment does not cause unacceptable effects.

A variance may be authorized where an absolute separation from ground-water use cannot be achieved; however, the permit applicant carries a heavy burden of proof to show that the effects which will result from his disposal or discharge activities will

not adversely affect human health or the environment. In all cases it must be shown that affected ground water will not adversely effect the use of overlying land outside of the land disposal facility for residential, agricultural, industrial, or commercial purposes or otherwise adversely affect public health or the environment [through exposure to affected land]; and it must be shown that discharges of affected ground waters to surface waters will not adversely affect existing or potential future uses of such surface waters or otherwise adversely affect public health or the environment [through exposure to affected surface waters]. The means by which a permit applicant would make a showing of compliance with the ground-water protection standard would be by complying with the informational requirements of §122.25; and by showing through the informational requirements that compliance with the performance standards and demonstrations of performance required in §§264.20 and 264.21 would be achieved. These sections of the proposed regulations are discussed in Background Document No. 6 - Information Requirements for Permitting Discharges and Background Document No. 9 - Performance Standards for Land Disposal Facilities. The Agency believes that the approach in these proposed regulations provides the flexibility to protect ground-water uses without curtailing needed hazardous waste land disposal activities.

Many commenters interpreted the "intended approach" described in the 8 October 1980 notice as an absolute non-degradation standard and, as such, felt that it was overly rigid and unworkable. Others claimed that a non-degradation standard exceeded the statuatory mandate of the RCRA and was legally unjustifiable. Other commenters

requested clarification of the terms "degradation" and "contamination" as they were used in the Notice.

The Agency realizes that the terms "degradation" and "contamination" are subject to a variety of interpretations and inherently cause confusion when used as a regulatory standard. Therefore, neither term was used in the proposed regulatory language. The concept expressed in the notice and adopted in the proposed regulations for the protection of ground water is that no effect should be allowed at any existing or potential point of use unless and until the effect is determined or predicted, evaluated, and found to be acceptable. The standard for measuring acceptability is the statutory standard of the Act, i.e., that no adverse effect on human health or the environment will result from the disposal activities; and the means is by demonstrating compliance as mentioned above and discussed in Background Document No. 9.

For ground waters which are not currently used or potentially usable, degradation (i.e., effects which would be adverse to use) would not be precluded. Additionally, effects may even be allowable at points of use, where that use is not interfered with and the effect is not adverse (i.e., does not degrade the ground water with respect to the use). Where ground water is used for drinking or any other use requiring high quality water, allowable effects will, of course, be severely limited.

The Agency agrees that an absolute non-degradation (i.e., no effect) approach is neither feasible nor practical, absent a total ban on land disposal of hazardous wastes. The intent of the proposed regulation is not to create such a ban. On the other hand, the

Agency belives that discharges from land disposal facilities should not be permitted without adequate knowledge of the likely effects. Hence, the proposed approach requires a permit applicant for a facility with a discharge which will migrate to points of ground water use to submit extensive information upon which decisions as to the acceptability of the effects can be based. The choice of the term nondegradation to describe the "intended approach" for the protection of ground water was probably an unfortunate choice. The term has however taken on a common meaning by its use with respect to water pollution control, and it is normally considered (e.g. in Water Quality Standards) to represent a "lowering" of water quality affecting use (or use class).

Some commenters felt that the intended approach described in the notice was unworkable or that the standard could not be met. Concern was expressed primarily over the cost of generating the information required to justify a variance and the technical feasibility of producing the required data. Some of this concern may have been generated by the inference in the notice that a variance rather than surface water quality standards established under the Clean Water Act would apply to hydrologically-connected surface waters when there was downstream water supply use. The proposed regulations do not establish such a variance requirement.

A variance from the ground-water protection standard is only required under two senarios. A variance is required first in those cases where the discharge from the hazardous waste land disposal facility will migrate to a well or a collection device actively used to withdraw ground water for use; and second if it

cannot be established that the ground water affected by the discharge will not be used for water supply. The Agency believes that there are a large number of facilities which are not presently discharging to actively used ground-water sources of supply, and that for those that are the required demonstrations are proper, appropiate, and necessary.

One commenter on the 18 December 1978 proposed regulations expressed the opinion that when ground water becomes contaminated, it is essentially irreversible. The Agency concurs, especially with respect to aquifers that are slow moving. Therefore where discharges from hazardous waste land disposal facilities are affecting ground water that may in the future be used for water supply, it is extremely important that the fact and character of the effects which would result be known. The practical result of such knowledge may well be a recognition that the aquifer is no longer usable, and when that situation prevails such use should be restricted. As will be dicussed in Background Document No. 9, the Agency must assume, unless there is a positive showing that affected ground water will not be used in the future, that all potentially usable ground water may be used.

Assuming that it is known whether or not an aquifer affected by dicharge from a land disposal facility is or will be used, the primary demonstration required of a permit applicant to establish compliance with the ground-water protection standard is a showing on the location of the migrating discharge plume. If it is shown that the plume does not and will not migrate to a point of actual or future use, compliance with part of the standard is achieved.

Additional demonstations require showings that land use and surface waters will not be adversely affected. The information and types of demonstations required to make these showings are discussed in Background Document No. 6 and Background Document No. 9; and the means of verifying performance within permit limits is dicussed in Background Document No. 8 - Ground-water and Air Emission Monitoring.

D. Regulatory Language

§264.2 Non-numerical health and environmental standard (Ground-water protection standard).

The owner or operator of a land disposal facility shall not dispose of hazardous waste into or on any land unless:

(a)(1) Leachate and other subsurface discharges that will enter into and migrate within a ground water aquifer will not mingle with and thereby affect any ground water which is being or may in the future be collected or withdrawn for domestic, agricultural, industrial, commercial or other uses, or

(2) A variance is authorized in accordance with the procedures of Subpart A of Part 124 based on a showing by the owner or operator as required in this section and §§264.20, 264.21, and 122.25; and a finding by the Regional Administrator; that any ground water which is being or may in the future be collected or withdrawn for domestic, agricultural, industrial, commercial or other uses will not be adversely affected for such uses and that public health and the environment will not be adversely affected; and

(b) Affected ground water will not adversely affect the use of the overlying land outside of the land disposal facility for residential, agricultural, industrial, or commercial purposes or

otherwise adversely affect public health or the environment; and

(c) Discharges of affected ground waters to surface waters will not adversely affect existing or potential future uses of such surface waters or otherwise adversely affect public health or the environment.

ISSUE: Ground Water Protection Strategy

A. Proposed Regulation and Rationale

N/A

B. Summary of Comments

See the Summary of Comments under the issue heading "Non-numerical health and environmental standard (Ground-water protection standard)".

C. Discussion

Several commenters felt that promulgation of a ground-water protection standard pursuant to RCRA was premature prior to EPA's publication of its National Ground-Water Protection Strategy. This Strategy, which appeared as a proposal in the 18 November 1980 Federal Register (after the deadline date for comments on the October 8 Notice), is the product of Ground-Water Strategy Meetings sponsored by the Agency with the participation of representatives from State and local governments, business and industry, environmental, academic and public interest groups. The Strategy, as proposed, was intended to serve as EPA's policy framework for the protection of ground water.

The proposed Strategy recognized that the ground-water system should be segmented with respect to all of its legitimate uses while continuing to give priority to its use for drinking and irrigation

to support life. At the strategy meetings, participants recognized that portions of the ground-water system would have to continue to be used for waste disposal and other uses which would result in ground water quality impairment. There was nearly universal agreement that the actual segmenting of the ground water system should not be carried out by the federal government, and the proposed strategy comtemplates that the major responsibility for ground-water protection, evaluation and segmentation will be at the State and local level. The recommended approach, which evolved from the meetings, involves ground-water protection strategies, developed by each State and implemented through state ground-water classification schemes. Federal responsibilities would include the development of minimum national requirements for selected high priority problems through existing vehicles such as the Underground Injection Control Program and the RCRA hazardous waste regulations. The Agency would also coordinate and bring consistency among existing EPA and other federal programs with ground-water protection authorities, increase research and development, and provide technical assistance where possible.

The proposed Strategy directs EPA to continue its efforts with respect to federal regulatory programs which affect ground water. Additionally, pending the adoption of a ground-water classification system, all ground water currently of drinking water quality would be presumed to be a drinking water source and protected to ensure that its utility for that purpose is preserved. The ground-water protection standard in §264.2 does not depend on the implementation of the proposed Strategy on a nationwide or statewide basis. It

is based on factual determinations in the permit issuance process that the ground-water affected or to be affected is not available or useable as water supply.

If the proposed Strategy were to be followed, State classifications of ground-water uses, provided they are implemented to preclude the use of ground water which would be adversely affected with respect to the specific use designations, and binding on federal as well as state and local actions, could be recognized in the permitting program set forth in these proposed regulations. In the interim, EPA cannot neglect its responsibility to develop the regulatory mechanism needed to protect ground water resources from the adverse affects of hazardous waste disposal.

D. Regulatory Language

N/A

ISSUE: Facility design requirements

A. Proposed Regulation and Rationale

The regulations proposed on 18 December 1978 were based, in part, on facility design requirements for specific types of land disposal facilities; notably landfills and surface impoundments. As noted in the 8 October 1980 advanced notice of proposed rulemaking, the agency has decided not to rely on such standards as a means of ground-water protection. As proposed, the regulations would have imposed minimum design requirements with respect to facility liner systems, leachate collection and removal systems, and infiltration control covers. The requirements, in substance, established a facility containment requirement which by definition was temporal in character.

B. Summary of Comments

Commenters oppposed the proposed standards as inflexible; and, noting the temporal nature of the requirements, insufficient to protect ground water. For a detailed summary of the comments received on the proposed design standards, reference should be made to Background Document No. 1 - Surface Impoundments and Background Document No. 4 - Landfills.

Some commenters on the 8 October 1980 advanced notice of proposed rulemaking continued to advocate facility containment requirements expressing a preference for either partial or total reliance on specific design requirements as a means of protecting ground water. One commenter even asserted that 100% containment could be achieved in a landfill, but qualified the meaning of 100% containment to exclude consideration of controlled releases. A full summary of the comments received on the 8 October 1980 advanced notice of proposed rulemaking may be found under the issue heading "Non-numerical health and environmental standard (Ground-water Protection Standard)". That form of standard was expressed in the notice as the key means that the agency intended to employ to protect ground water, supplemented as appropiate by technical design requirements and specific ambient health and environmental performance standards.

C. Discussion

Based on comments received and its own analysis, the Agency has decided not to rely primarily on technical facility design requirements to protect ground water. Commenters who assert that facility design requirements are adequate or sufficient for that

purpose invariably presume specific prerequisite site conditions and limit their analysis to specific types of land disposal facilities (usually landfills or surface impoundments) ignoring the full range of land disposal activities which must be evaluated for permit issuance. The Agency has decided not to rely on technical design standards since no generally applicable technical design requirements have been identified which can be appropiately applied to more than limited subsets of types of land disposal facilities and often only to subsets so restricted by design and location as to limit the commonly understood meaning of the terms which describe the types of facilities they identify.

D. Regulatory Language

N/A

ISSUE: Containment strategies

A. Proposed Regulation and Rationale

N/A

B. Summary of Comments

In the 8 October 1980 advanced notice of proposed rulemaking, the agency discussed two types of "containment strategies". The first type, namely facility containment, is almost synonymous with the design objective normally assumed applicable by those who advocate reliance on facility design requirements. The essential difference is that advocates of facility design requirements usually seek to avoid any consideration of leakage from the facility to the land whereas advocates of a facility containment strategies do acknowledge the fact of leakage and suggest that the amount of leakage will be small and can be ignored.

The second type, containment within a defined zone beyond the facility itself is more commonly meant when the term "containment" is used. As used in the 8 October 1980 advanced notice of proposed rulemaking, it was used in a more limited sense. The type of "containment strategy" described in the notice was based on the assumption that the containment zone would be described with respect to time rather than some fixed boundary.

In the notice it was stated that the agency did not intend to use a containment strategy. That statement was accurate only to the extent than the "containment stategy" concept was defined exclusively by the two forms considered in the notice as will be discussed below.

There were commenters on the notice who supported the use of containment strategies, however, they were not constrained in their advocacy by the limitations of the term as used. A number of commenters expressed a preference for total waste containment and one recommended a containment standard until ambient health and environmental criteria could be developed. One commenter suggested containment within property boundaries during only the active life of a facility thereby expressing another form of containment boundary limitation in addition to the time constraint discussed in the notice.

C. Discussion

As noted above, the "containment strategies" discussed in the notice were limited to two specific forms and it was stated that the agency did not intent to use either. In fact, the ground-water protection standard which has been proposed is a form of containment

wherein the containment boundary is defined by the limits of the migratory pathway that discharge (leachate) from the facility will follow; or more accurately the lateral and vertical extent of the partway in the unsaturated and saturated zones within which the discharge will be contained as a condition of the permit issued for the facility.

Therefore the agency has adopted a form of a "containment strategy" which, although not explicitly described as such in the notice, is implicit to the "intended approach". In the notice, this intent was described under the heading "presumption against any degradation". The "presumption against degradation" was explicitly described as "a presumption that it is unacceptable to allow the facility to cause any contamination of a downgradient water supply used for any purpose (drinking water, agricultural, industrial, etc.)". This "containment strategy" is more fully discussed under the issue heading "Non-numerical health and environmental standards (Ground-water Protection Standard)" and in Background Document No. 9 - Performance Standards for Land Disposal Facilities.

D. Regulatory Language

N/A

ISSUE: Specific ambient health and environmental performance standards

A. Proposed Regulation and Rationale

In the 18 December 1978 proposal, the agency included a provision that ground water which was an "underground source of drinking water" would not be "endangered" beyond the property

boundary of a facility; and that, without reference to property boundaries, "sole or principal source aquifers" would not be "endagered". The terms shown above in quotes were terms with specific meanings established in regulations proposed to implement the Safe Drinking Water Act. The concepts embodied in those terms included some specific performance standards expressed as maximum contaminant concentration limits. The concept of "endangerment" has been been abandon as a regulatory element of the agency's programs under the Safe Drinking Water Act and is not employed in these reproposed hazardous waste land disposal regulations. The nature of this previously proposed ambient health performance standard is discussed more fully under the issue heading "Human health and environmental standard (Ground-water protection standard)

The 18 December 1978 proposal is significant with respect to this issue because by referencing the maximum concentration limits of the Interim Primary Drinking Water Regulations, it would have established specific numerical performance standards.

B. Summary of Comments

Many commenters on the 8 October 1978 advanced notice of proposed rulemaking expressed a strong preference for performance standards, but not necessarily for specific performance standards of the type described in the notice. The discussion in the notice was limited to specific performance standards expressed as concentration limits whereas commenters tended to use the term (performance standards) in a much broader sense. A number of commenters expressed their preference for general performance standards or performance standards in combination with or in lieu

of technical design requirements. Commenters indicated that it would be difficult, if not impossible to set ground-water quality limits as has been done with surface waters, and one commenter emphasized that the drinking water standards are not adequate to protect human health and the environnment noting that they are too weak and too limited in scope.

Commenters on the 18 December 1978 proposal expressed similar views with respect to the use of the drinking water standards as a basis for regulatory control of hazardous waste land disposal facilities. Comments were received objecting the apparent assumption by EPA that the protection of ground water means the protection of human drinking water, as was reflected by the Agency's reliance on "endangerment". It was strongly asserted that this was the wrong approach and it was noted that the mandate of the RCRA was broader than the protection of drinking water requiring protection of both human health and the environment. It was noted that the proposed standard did not integrate ground water and surface water protection and that ground water is surface water base flow. It was asserted that the drinking water standards were not adequate (i.e., not sufficiently protective even with respect to the contaminants listed) for surface water protection or even sufficient to protect the public health since they are not representative of hazardous wastes. It was furthur asserted that allowing degradation up to the contaminant limits of the National Interim Primary Drinking Water Regulations (limit beyond which water is not considered usable as public drinking water) is contrary to environmental protection policy. Commenters suggested that EPA add numerical standards to the ground-water

endangerment standard based on drinking water Water Quality Criteria published under §304 of the Clean Water Act, and that the coverage of standards should include chemicals listed in both the Water Quality Criteria publications and the chemicals listed with respect to Hazardous Substance Discharge (Notification) Limits under §311 of the Clean Water Act. One commenter suggested that EPA should include a listing of known carcinogens, mutagens, and teratogens as part of the standard. Finally one commenter suggested that EPA abandon the "endangerment" approach, and adopt non-degradation as a basic program concept.

Certain comments on the 18 December 1978 proposal, although directed primarily to the issue of design and operations standards, are significant the the issues to be discussed in the section. Commenters suggested that the standard (i.e., design and operating standards with the "endangement" override) should not apply to facilites located over non-drinking water sources or aquifers not hydraulically connected to drinking water sources. One commenter suggested support for the concept of the "endangerment" standard, but not if it was interpreted (suggesting that the Agency was doing doing just that) as a means of preventing (i.e., not allowing) any discharge to ground water. Comment was also made to the effect that design and operating standards could not be relied upon, and that, therefore, ground water quality standards were needed. Also along the same lines as the attitude expressed above with respect to the need for the standard when the affect ground water was not a drinking water source was the comment that protection requirements should be geared to the use or importance of the ground water.

C. Discussion

The above summary of comments repeats nearly all of the comments listed in the summary of comments under the issue heading "Human health and environmental standard (Ground-water endangerment standard)". Those comments are particularly germane to the issue of this discussion, i.e., specific ambient health and environmental performance standards. In Section IV of the preamble to the reproposed regulations it is noted that the Agency had considered such standards and described the approach as having involved establishing specific, often numerical ambient quality standards for ground and surface waters .... which could not be exceeded as a result of waste migration out of a land disposal facility. Although the Agency concluded that it is not able, at this time, to exclusively use this approach to assure adequate health and environmental protection, it should be noted that the effort was serious, detailed, and based on technical conclusions that were extremely consistant with the referenced comments.

The effort involved a complete listing of all the hazardous wastes listed in §§261.24 and 261.33, and the hazardous constituents listed in Appendix VIII to Part 261 published at 45 FR 33122-133; and an attempt to identify criteria and standards applicable to ground and surface water on the basis of which numerical standards could be proposed. Use was made of the background work done to list the specific wastes as hazardous and especially the background work referenced in that effort. Extensive work has been done to establish Water Quality Criteria for the "65 Toxic Pollutants" listed in Table I of Committee Print No. 95-30 of the Committee on Public

Works and Transportation of the House of Representatives; and the related "129 Priority Pollutants" studied by the Agency. Water Quality Criteria based on that effort were proposed on 15 March 1979 at 44 FR 16926, 25 July 1979 at 44 FR 43660, and 1 October 1979 at 44 FR 56628; and published on 28 November 1980 at 45 FR 79318. These criteria supplement the earlier publications of Water Quality Criteria by the Agency (or its predecessor the FWPCA) in 1968 - the "Green" book, in 1973 - the "Blue" book, and in 1976 - the "Red" book; all of which were also used. Other available agency secondary reference sources including; referenced background documents to support the proposed Water Quality Criteria and the Agency report "Water-Related Environmental Fate of 129 Priority Pollutants" (EPA-440/4-79-029) were also used, and the conclusions of EPA's Cancer Assessment Group (CAG) were referred to. Reference was also made to the National Interim Primary Drinking Water Regulations and the Agency report (EPA-570/9-76-003) of the same title; the National Academy of Sciences Report "Drinking Water and Health" dated 1977 prepared for the Office of Drinking Water in accordance with the provisions of the Safe Drinking Water Act; and to the proposed Secondary Drinking Water Regulations and background reference documents. Based on these reference data, ground water quality concentration limits were derived and listed with respect to seven designated water uses as follows:

- At any point of actual or potential collection or withdrawal for use as human drinking water, for domestic (household) uses other than drinking or closed system heat exchange, for livestock drinking use, for contact use food processing, and any ground water which is exposed at the ground surface which is not a surface water classified in accordance with Title III of the Clean Water Act;

- At any point where the ground water affected by the discharge will contact structures occupied by persons or where gases released from such ground waters may migrate into such structures;
- At any point of actual or potential collection or withdrawal for use as irrigation water on food chain crops and ground water available to the roots of food chain crops;
- At any point of actual or potential collection or withdrawal for use as irrigation water on non-food chain crops and ground water available to the roots of nonfood chain crops or endigenous plants;
- At any point of actual or potential collection or withdrawal for industrial and/or commercial use which includes direct contact by persons working in such industrial or commercial firms;
- At any point of actual or potential collection or withdrawal for industrial and/or commericial process use which does not involve direct contact by persons working in such industrial or commercial firms;
- At any point of actual or potential collection or withdrawal for industrial, commercial, or private use in closed system heat exchange.

There was a paucity of data to support all but the first designated water use, i.e., drinking water. The majority of the information from which ground water qualtity limits might be proposed is that information available from published Water Quality Criteria. The charge of the Agency under §304(a)(1) of the Clean Water Act is to periodically review and publish criteria for water quality reflecting the latest scientific evidence. Data applicable to ground water are to be included in the criteria. Although, to date, the Agency has not often specifically identified ground water as a category of water for which criteria have been proposed, many of the published criteria are applicable to ground water, especially that criteria published with reference to health effects associated with drinking water use. The criteria are therefore

directly applicable to many judgements that might have to be made with respect to ground water use.

A draft regulation specifying the derived limits was prepared and circulated for internal review in August of 1980. It was on the basis of this review of the capacity of the Agency to propose limits which it could support as regulatory standards that the above referenced decision was made.

Many features of the draft regulations served as a basis for the Agency's furthur considerations and are reflected in the proposed regulations. Although the Agency chose not to promulgate regulatory limits, it does intend that the Water Quality Criteria publications be used as appropiate in the permit issuance process.

Certain of the limits derived in the above referenced effort have been included in the reproposed regulations as minimum standards applicable to a variance from the ground-water protection standard for ground water used for drinking. These requirements are discussed in Background Document No. 9.

D. Regulatory Language

N/A