

**ENVIRONMENTAL PROTECTION AGENCY****40 CFR Part 265****[FRL 1447-1]****Hazardous Waste Management: Interim Status Requirements for Underground Injection****AGENCY:** Environmental Protection Agency.**ACTION:** Proposed rule.

**SUMMARY:** The Environmental Protection Agency (EPA) is proposing specific requirements for disposal of hazardous waste by underground injection under § 3004 of the Resource Conservation and Recovery Act, 42 U.S.C. § 6901, *et seq.*, as amended. These proposed requirements would amend Subpart R of the interim status regulations applicable to hazardous waste treatment, storage and disposal facilities. The proposed amendment includes requirements concerning general operating practices, waste analysis, monitoring and response, closure and post-closure care, financial responsibility and special handling of ignitable, reactive or incompatible waste. A public hearing will be held to receive public comment on the amendment as well as on issues raised in the Preamble to the regulations issued under Part 122 of this Chapter concerning regulation of Class IV wells.

**DATES:** EPA will accept written comments on the proposed amendment until on or before July 18, 1980.

A public hearing will be held from 9 a.m. to 5:00 p.m. on July 8, 1980.

**ADDRESSES:** Comments should be addressed to Docket Clerk, Office of Solid Waste [WH-562], U.S. Environmental Protection Agency. Communications should identify the regulatory docket number "Section 3004".

The hearing will be held on July 8, 1980 at the H.E.W. Auditorium at 330 Independence Avenue, S.W. Washington, D.C. from 9:00 am to 5:00 pm.

The official docket for this proposed rulemaking is located in Room 2711, U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460, and is available for viewing from 9:00 am to 4:00 pm, Monday through Friday, excluding holidays.

**FOR FURTHER INFORMATION CONTACT:** Mr. Bernard J. Stoll, Office of Solid Waste [WH-564], U.S. Environmental Protection Agency, 401 M Street, S.W., Washington, D.C. 20460. (202) 755-9116.

**SUPPLEMENTARY INFORMATION:** Underground injection of hazardous

waste is under the jurisdiction of both the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6901 *et seq.*, which creates a "cradle to grave" management program for all hazardous waste, and the Safe Drinking Water Act (SDWA), 42 U.S.C. § 300f *et seq.* which creates an Underground Injection Control (UIC) program. After examining the goals and policies of these two programs, EPA has concluded that the disposal of hazardous waste by underground injection in each State will be regulated under RCRA until a UIC program has been established in that State.

The hazardous waste management program, under Subtitle C of RCRA, provides a system for tracking and managing those solid wastes which are deemed "hazardous" according to the criteria established under Section 3001 of RCRA. A manifest system is employed to assure that hazardous waste is properly transported from its point of generation to facilities that store, treat or dispose of the waste.

Under Section 3004 of RCRA, EPA is to establish standards, applicable to owners and operators of hazardous waste treatment, storage or disposal facilities which protect human health and the environment. Eventually all such facilities will be subject to permits, issued pursuant to Section 3005 of RCRA, which implement the Section 3004 standards and other appropriate requirements. Under Section 3005, all treatment, storage or disposal of hazardous waste is prohibited, except in accordance with a permit under that section, six months after the promulgation of the Section 3004 standards.

The Congress recognized that it would not be possible for EPA to issue all permits within six months of the promulgation of Section 3004 standards. Therefore it created an "interim status" period during which existing facilities which have applied for a permit may be treated as having been issued a permit while the Agency reviews and processes the facility's permit application. In keeping with the philosophy that facilities are to be treated as having been issued a permit during the interim status period, EPA believes it is appropriate to impose certain basic requirements on those facilities during the interim status period. The Agency has promulgated such interim status regulations for hazardous waste treatment, storage and disposal in a separate section of today's Federal Register.

Part C of the SDWA creates a program for the protection of underground sources of drinking water.

As part of that program, EPA is to establish regulations containing minimum requirements for effective State underground injection control (UIC) programs and the Administrator is to list in the Federal Register each State for which, in his judgment, a State UIC program may be necessary to assure that underground injection will not endanger drinking water sources. The Administrator has listed a total of 57 States, territories and the District of Columbia as needing a UIC program. Once EPA has established the minimum requirements, each listed State shall apply for and may receive approval for primary enforcement responsibility over underground injection in their State. If the State does not seek such responsibility, or if EPA determines that State authority is inadequate to implement the minimum requirements, EPA shall establish a UIC program for the State.

Thus the UIC program does not have an equivalent of the "interim status" period under RCRA. To accommodate the RCRA goal that disposal of hazardous waste (including underground injection) be subject to control during that period, EPA has decided to regulate underground injection under the RCRA interim status regulations. Accordingly, owners and operators of underground injection wells used to dispose of hazardous waste will be subject to the same general requirements applicable to all treatment, storage and disposal facilities. These are set forth in Subparts A-E of Part 265, which is published in today's Federal Register. In addition the interim status regulations of Part 265 include a Subpart R, which will contain specific requirements applicable to underground injection.

The proposed hazardous waste management regulations of December 18, 1978 (43 Fed Reg 58946) did not specifically address underground injection. The Agency has decided to propose the specific requirements applicable to underground injection to gain the benefit of public comment.

**Rulemaking Strategy**

EPA recognizes that the regulation of underground injection under RCRA must be coordinated with the UIC program. EPA anticipates that when State UIC programs become effective, underground injection of hazardous waste which falls under the jurisdiction of the UIC program will be regulated under that program. Thus the RCRA and UIC programs must be structured to allow for such a shift without unnecessary confusion.

EPA plans to develop this portion of the RCRA regulations in tandem with the UIC program. Certain portions of the UIC program regarding Class IV wells are being re-proposed today. For a discussion of those re-proposed elements commenters should see the Preamble to Subpart C of the Part 122 regulations published in today's Federal Register. The hearing dates which have been established in this proposed regulation also match those for the re-proposed elements of Part 122. EPA anticipates that commenters may want to address their written comments and any statements at the hearing to both the Part 122 proposal and this proposed amendment to Part 265.

The technological requirements specified in these proposed regulations apply to both Class I and Class IV underground injection wells, unless identified as applying only to one or the other. All Class I wells have similar characteristics so that these applications should be easily understood. In the case of Class IV wells, however, this may not be the case.

Underground injection wells for disposal of hazardous waste are classified as either Class I or Class IV. Class I wells are those which inject waste beneath the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water. However, the Class IV wells can be subdivided into two types. The first type is those Class IV wells which discharge hazardous waste directly into underground sources of drinking water. The other type is those Class IV wells which discharge hazardous waste above underground sources of drinking water.

One of the key issues concerning underground injection is the approach that should be taken under RCRA and the SDWA toward Class IV wells that involve the direct injection of hazardous wastes into underground sources of drinking water. For a more detailed description of this issue, commenters should see the Preamble to Subpart C of Part 122, which is published in today's Federal Register.

Commenters should be aware that EPA is considering implementing some of the options discussed in Part 122 under RCRA and may incorporate one of those options in these interim status regulations. Under § 122.36 of the UIC program proposal, all injection of hazardous waste directly into an underground source of drinking water through a Class IV well would be prohibited six months after approval of a State program. EPA is considering a similar ban under RCRA. Such a ban

might be instituted on the effective date of the interim status regulation implementing the ban or at some time after the effective date. Commenters should also be aware that EPA is considering incorporating such a ban into its Part 264 regulations to address direct injection while UIC programs are being developed.

The Agency has not made a decision at this time concerning whether Class IV wells discharging hazardous waste above underground sources of drinking water should be banned. However, the Agency believes that in the event it decides to allow such wells to continue to operate, that it should alert the public to the kinds of technical controls it is considering imposing so that the public can meaningfully comment on them.

Class IV wells discharge hazardous waste into or above underground sources of drinking water through a variety of underground injection devices. As already discussed in this Preamble, no technical requirements are included in these regulations for Class IV wells which discharge directly into underground sources of drinking water. Requirements are included in these regulations, however, for those Class IV wells which discharge hazardous waste above underground sources of drinking water. Because of the variety of devices classified as Class IV wells which discharge above underground sources of drinking water, the Agency recognizes that difficulties arise in developing requirements that would apply to all such injection devices.

There are essentially four groups or types of these Class IV devices. They are best described by expressing them in comparison to other devices and techniques. The first type are those normally called wells, which are similar to the usual dug or drilled well, with or without well casing or other fabricated side walls. They are always considerably deeper than they are wide. The second type is similar to the first but usually much shallower than the first. They are usually referred to as pits and are similar in most aspects to surface impoundments. They are usually open at the top and constructed to allow liquid to seep through the bottom and sides into surrounding soil. The third type is more a treatment device than an injection device. They are usually buried rigid vessels designed to contain waste for chemical, physical or biological treatment and equipped with distinct influent and effluent pipes. Septic tanks, devices which are designed to treat waste biologically under anaerobic conditions, are an example of this type. The fourth and final type are those that

are designed to distribute fluids beneath the ground surface over a relatively large area and usually involve buried lateral pipes or trenches. An example of this type is a leaching field which distributes effluent from a septic tank.

As can be seen from this discussion a given requirement for one type of device may not be appropriately applied to the other three devices. For this reason the Agency has directed the requirements in these proposed regulations primarily to those Class IV underground injection devices which are normally thought of as wells.

In addition to, or instead of, the requirements specified in these proposed regulations for Class IV underground injection devices, the Agency is considering the specification of other more appropriate requirements for those Class IV underground injection devices which do not typify wells.

In particular, the Agency is considering the requirements specified in Part 265-Subpart K. Surface Impoundments, or similar requirements for application to the second type described above (i.e., pits). The requirements specified in Part 265-Subpart Q, Chemical, Physical, and Biological Treatment or similar requirements are being considered for application to the third type (e.g., septic tanks) and the requirements in Part 265-Subpart M. Land Treatment, or similar requirements for the fourth or remaining type. The Agency specifically invites comment on the appropriateness of applying these requirements to Class IV underground injection devices.

Because of the similarity between these latter three types of injection devices and those hazardous waste management techniques to be controlled by regulation in accordance with the Part 265 requirements under RCRA, the Agency is also considering regulating these injection techniques under RCRA only, now and in the future. The UIC program would still assume regulatory responsibility for those of these injection techniques which are generally considered as wells (i.e., the first type) when such programs go into effect. The Agency invites specific comments on this concept.

These proposed regulations include a limited number of definitions, used throughout the regulations. These definitions also appear in § 122.3 of the Part 122 regulations published in today's Federal Register. The Agency will be developing additional appropriate definitions for this proposed regulation in conjunction with the Part 146 regulations which are now under development.

The various requirements included in these proposed regulations are discussed as follows:

#### *General Operating Requirements*

These proposed regulations include specific operational requirements for Class I wells which dispose of hazardous waste beneath the lowermost formation containing, within one quarter mile of the well bore, an underground source of drinking water. Such wells typically pass through overlying aquifers which are to be protected as underground sources of drinking water. This protection involves requirements that injections only occur through properly designed and constructed wells. The injection of hazardous waste must be accomplished through tubing inside of a well casing which is cemented to the well bore. Furthermore, the annular space between the tubing and casing must be filled with a suitable fluid. As will be discussed later, the integrity of these seals is to be demonstrated by a monitoring program. A final requirement for protecting aquifers overlying the injection formation is the prohibition of injection of hazardous waste between the outermost casing and the well bore. Additional operational controls include limitations placed on injection pressure based on conditions in the injection zone. These limits are set to prevent the migration of hazardous waste, hazardous waste constituents, or formation fluids from the injection zone into underground sources of drinking water. This migration could occur either through fractures in the injection zone and the confining zone, or through improperly completed or plugged wells penetrating the injection zone. To prevent migration by the first of these pathways the pressure in the injection formation must remain below a calculated maximum known as fracture pressure. The injection pressure must at all times remain less than the fracture pressure. To prevent contamination by the second pathway, the owner or operator can either correct the problems in these wells or inject at a reduced pressure such that the injected fluids will not reach the improperly plugged or completed wells. Facilities under interim status are existing facilities for which proper injection pressures have already been determined. The regulations require that the owner or operator control and monitor his injection pressure to prevent migration of hazardous waste or hazardous waste constituents out of the injection zone by either pathway.

The above discussion applies only to Class I wells disposing of hazardous

waste. The regulations do not include any general operating requirements for Class IV wells which inject above underground sources of drinking water. Since these wells are intended to introduce injection fluids above underground sources of drinking water, requirements to prevent leakage from the well are not pertinent. As will be discussed later, however, the regulations do specify ground-water monitoring requirements for these wells.

#### *Special Handling Requirements*

Facilities which dispose of hazardous waste by underground injection must comply with the § 265.13 General Waste Analysis requirements. In addition, in the case of underground injection, the owner or operator must ascertain that the waste is compatible with the components of the well and the injection formation. Trial tests are required when a well is used to inject a different hazardous waste to ensure that the new waste will not react with previously injected fluids, the injection formation or components of the well and form gases which could cause a threat to public health or the environment, or otherwise damage the well or the receiving formation. Test results must demonstrate compliance with the requirements of § 265.17(b). If the owner or operator has on hand information demonstrating the compatibility of various hazardous wastes with the well components and the injection formation the trial tests need not be performed.

In § 265.437 of the proposed regulations the underground injection of ignitable, reactive, and incompatible waste is prohibited unless such injection complies with § 265.17(b).

#### *Monitoring and Response*

As discussed earlier in the discussion of general operating requirements, for Class I wells both the mechanical integrity and the injection zone pressure are to be monitored.

Monitoring to assure the mechanical integrity of the well is to be accomplished by applying a selected pressure to the material placed in the annular space between the tubing and the well casing, and then monitoring the pressure for changes. Any abrupt change in the measured pressure indicates that the tubing is leaking into the annular space. In determining the pressure to be applied to the annular space the owner or operator must establish an allowable range based on generally accepted engineering practices. A sudden leak or fracture in the tubing or casing would cause an abrupt change in the annular pressure. If a significant change in the annular

pressure is detected, the owner or operator is required to take appropriate corrective action to restore mechanical integrity. This action may include replacing or repairing tubing, casing, seals or other appurtenances.

These proposed regulations do not specify appropriate annular pressures or the means to restore mechanical integrity. The regulations do require the owner or operator to implement a monitoring program to demonstrate mechanical integrity of Class I wells based upon a plan prepared and submitted to the Regional Administrator, all on the effective date of these regulations. Continuous monitoring of annular pressure is commonly employed at Class I facilities and therefore the Agency is requiring continuous monitoring and recording. In addition to the annual report that the Agency is considering requiring notice within a specified period (e.g., 24 hours) any readings falling outside the allowable range.

Monitoring of the injection pressure is also required, for Class I wells. As discussed earlier in this document, injection at too high a pressure can cause hazardous waste, hazardous waste constituents, or formation fluids to migrate from the injection zone. To guard against this possibility, the owner or operator must measure the injection pressure to assure that it does not exceed the allowable pressure in the injection zone. Since the pressure is measured at the well head and not in the injection zone itself, he must calculate, based upon generally accepted engineering principles, the maximum allowable pressure at the well head based on the characteristics of both the fluid being injected and the injection well apparatus. If the well head pressure exceeds the allowable limit, the owner or operator must modify his injection process to restore the injection pressure to within allowable limits. For more information on this subject see "An Introduction to the Technology of Subsurface Wastewater Injection," EPA-600/2-77-240, December 1977.

As with the mechanical integrity monitoring program, the owner or operator must, on the effective date of these regulations, develop and submit to the Regional Administrator a plan for injection pressure monitoring and then implement it. This plan must include a specification of continuous monitoring and recording. The Agency is considering, in addition to the annual report, requiring periodic or episodic reporting.

The owner or operator is required to keep records of monitoring data and

evaluations throughout the active life of the facility. He must also submit to the Regional Administrator an annual report on his mechanical integrity and injection pressure monitoring programs. The report must contain a description of any corrective actions instituted during the year and the circumstances which necessitated the corrective actions.

In the case of Class IV wells used to dispose of hazardous waste by injection above an underground source of drinking water, these proposed regulations require compliance with the requirements of Part 265 Subpart F—Ground-Water Monitoring.

The Agency believes that wells injecting hazardous waste above an underground source of drinking water are very similar to surface impoundments used for the storage, treatment or disposal of hazardous waste in terms of potential ground-water contamination. This is especially true if the surface impoundment leaks. Because of this similarity, the proposed regulations specify the same ground-water monitoring requirements for these wells as those which apply to surface impoundments, including the recordkeeping and reporting requirements of Subpart F.

Subpart F requires indicator monitoring which may lead to a ground-water quality assessment program. For those facilities where no hazardous waste or hazardous waste constituents are thought to be entering the ground water, an indicator monitoring program to detect leaks is described. For those facilities where ground-water contamination by hazardous waste or hazardous waste constituents from the facility is known or assumed to exist, the Subpart F regulations describe a ground-water quality assessment program to establish the magnitude of the impact on the ground water. Since most Class IV wells may already have contributed hazardous waste or hazardous waste constituents to the ground water, the Agency anticipates that a ground-water quality assessment program will be implemented at most Class IV injection well facilities.

#### *Closure and Post-Closure*

The regulations require an owner or operator to close his injection well in such a way that migration of hazardous waste or hazardous waste constituents into or between underground sources of drinking water is prevented. Furthermore, the need for maintenance to protect human health and the environment is to be minimized. On the effective date of these regulations the owner or operator is required to have a written plan for closure of his injection

well at the end of its intended life or, for that matter, at any other time that closure would be necessary. The closure plan must describe the steps which will need to be taken to close the injection well.

These proposed regulations specify requirements for closure plan amendments, plan approval, and notification which are very similar to the facility closure requirements specified in Part 265—Subpart G, Closure and Post-Closure. Commenters may wish to review these proposed requirements in consideration of Subpart G.

In the case of Class I wells, these regulations specify that closure must be accomplished by plugging. Common plugging techniques include: the Balance Method; the Dump Bailer Method; and the Two-Plug Method. Each of these techniques requires that the well be brought into a state of static equilibrium, either by circulating the mud in the well at least once or a comparable method, prior to placement of the cement plug(s). For more information see "Cementing" by Dwight K. Smith, Chapter 10, Monograph Volume 4, Henry L. Doherty Series, SPE of AIME, 1976.

In the case of Class IV wells which are used to dispose of hazardous waste by injection above underground sources of drinking water, the owner or operator must remove remaining hazardous waste from the injection well and then close the well, in accordance with the facility closure plan to satisfy § 265.435(a). One method of meeting this objective is to preclude the injection of additional fluids, even those which are not hazardous waste, which could result in mobilization of hazardous waste remaining in the aeration zone and introduction of these substances into the ground water.

A "Comment" included in the proposed regulations reminds the owner or operator that any waste removed from the injection well during closure must be managed as a hazardous waste, unless he demonstrates that the waste is not hazardous.

Following closure, the owner or operator of a Class IV well must implement his post-closure plan. These proposed regulations impose the post-closure requirements specified in Subpart G, which, in the case of underground injection, involve post-closure monitoring of the ground water in accordance with Subpart F. EPA believes that such post-closure monitoring is appropriate since hazardous waste may remain in the soil adjacent to the injection well. This monitoring will determine whether the waste migrates to ground water and, if

such migration occurs, what degree of contamination occurs. The latter determination must, at a minimum, include a prediction of the rate of migration of the contaminants in the saturated zone. If the well is contaminating ground water the assessment of contamination in the ground water must continue as long as waste is being injected (i.e., until closure of the facility). This is necessary to account for differences in the waste injected (e.g., volume, constituents).

If contamination first appears during the post-closure period a single ground-water quality assessment (including a prediction of the rate of migration) should be sufficient to characterize likely future contamination. While the Agency believes that the post-closure monitoring requirements of Subpart F are applicable to Class IV wells that inject above an underground source of drinking water, the Agency does not expect that most Class IV wells will be engaging in extensive post-closure monitoring. Many Class IV wells will have triggered the ground-water quality assessment program of Subpart F during the active life of the facility. Such facilities would only monitor until final closure. Those that are using the indicator monitoring system during the post-closure period are likely to discover an impact on ground water. Under Subpart F, such facilities need only complete and report on a single ground-water quality assessment.

#### *Financial Requirements*

In imposing financial requirements on the owners or operators of underground injection facilities, these proposed regulations draw a distinction between the closure and post-closure requirements. Since closure is accomplished essentially through plugging, it is appropriate to use financial requirements similar to those in § 122.42(g), which seem appropriate for such techniques. Since the post-closure requirements of this Subpart are based on the requirements of Subpart G of this Part, it is appropriate to use financial responsibility requirements similar to those in Subpart H of this Part.

The Agency is also considering distinguishing between Class I and Class IV wells for purposes of financial responsibility. Under this alternative approach, requirements for Class I wells (which do not have post-closure requirements) would be based on those in § 122.42(g). The requirements for Class IV wells (which would include requirements during the post-closure period) would be based on Subpart H. The Agency is also considering imposing

either all of Subpart H or requirements similar to those in § 122.42(g) on all underground injection facilities disposing of hazardous waste above underground sources of drinking water.

The Agency has decided to repropose financial responsibility requirements for owners or operators of hazardous waste management facilities. To the extent appropriate, the Agency may decide to promulgate such requirements for owners or operators of wells used to dispose of hazardous waste, at the time it promulgates such requirements for other hazardous waste management facilities.

Dated: May 2, 1980.

Douglas M. Costle,  
Administrator.

It is proposed to further amend Title 40 CFR, Part 265, by adding §§ 265.431–265.437 to Subpart R, which has been promulgated in today's Federal Register as follows:

#### § 265.431 Definitions.

The following definitions promulgated in § 122.3 of this Chapter apply:

*Formation* means a body of rock characterized by a degree of lithologic homogeneity; which is prevailing, but not necessarily, tabular and mappable on the earth's surface or traceable in the subsurface.

*Formation fluid* means "fluid" present in a "formation" under natural conditions as opposed to introduced fluids, such as drilling mud.

*Injection well* means a "well" into which "fluids" are being injected.

*Injection zone* means a geological "formation", group of formations, or part of a formation receiving fluids through a well.

*Plugging* means the act or process of stopping the flow of water, oil, or gas in formations penetrated by a borehole or well.

*Underground source of drinking water ("USDW")* means an aquifer or its portion: (a) which supplies drinking water for human consumption; or (b) in which the ground water contains fewer than 10,000 mg/l "total dissolved solids".

#### § 265.432 General operating requirements.

The owner or operator of a Class I well for disposal of hazardous waste must prevent migration of hazardous waste or hazardous waste constituents into or between underground sources of drinking water as follows:

(a) Wells must be cased and cemented between the well bore and casing;

(b) Hazardous waste must be injected through tubing, with a packer set

immediately above the injection zone and with the annulus between the tubing and the long string of casings filled with fluid, or by another equally effective technique for which the owner or operator has a written demonstration, available for review by the Regional Administrator, indicating that it provides a comparable level of protection to underground sources of drinking water.

(c) Injection of hazardous waste between the outermost casing and the well bore is prohibited; and

(d) Injection pressure at the well head must not exceed a maximum pressure which must be calculated so as to assure that the pressure in the injection zone during injection does not initiate new fractures or propagate existing fractures in the injection zone, initiate fractures in the confining zone or otherwise cause the migration of hazardous waste, hazardous waste constituents, or formation fluids into an underground source of drinking water.

#### § 265.433 Waste analysis.

For disposal of hazardous waste by underground injection the owner or operator must, in addition to the waste analyses required by § 265.13:

(a) Conduct waste analyses and trial tests; or

(b) Present written, documented information from his or similar disposal operations to show that this disposal will comply with § 265.17(b) and for Class I wells, that the waste is compatible with fluids in the injection zone and minerals in both the injection zone and the confining zone and will not damage the mechanical integrity of the well.

#### § 265.434 Monitoring and response.

(a) The owner or operator of a facility which disposes of hazardous waste by underground injection into a Class I well must:

(1) On the effective date of these regulations develop and submit to the Regional Administrator a plan for a monitoring program capable of determining compliance with § 265.432, by:

(i) Demonstrating the mechanical integrity of the injection well to satisfy § 265.432(a) and (b); and

(ii) Demonstrating that the pressure of the injected fluids remains within allowable limits to satisfy § 265.432(d).

(2) The plan to be submitted under paragraph (a) of this section must specify:

(i) For demonstrating mechanical integrity:

(A) The annual pressure range to be maintained and basis for determining it

for the specific well tubing, packer and casing characteristics and for the anticipated injection fluid temperatures;

(B) The devices and procedures for continuous monitoring and recording of the annular pressure, and evaluation of that information; and

(C) Procedures for immediate response to changes in the annular pressure outside the allowable range, and for restoration of mechanical integrity;

(ii) For demonstrating that injection fluid pressure remains within allowable limits:

(A) The calculated fracture pressure and the basis for determining it for the specific formation and zone of injection;

(B) The calculated allowable injection pressure to be measured at the well head and the basis for determining it for specific injection fluid characteristics (i.e., specific gravity, viscosity and temperature);

(C) The techniques and procedures for continuous monitoring and recording of the injection pressure at the well head, for evaluation of that information; and,

(D) Procedures for immediate response to an increase in the well head pressure above the allowable limit, to restore pressure to within allowable limits.

(3) On the effective date of these regulations the owner or operator must implement the monitoring plan which satisfies paragraph (a)(2) of this section and determine the mechanical integrity of the well and the injection zone pressure.

(4) The owner or operator must keep records of the monitoring data and evaluations specified in paragraphs (a)(2) (i) and (ii) of this section throughout the active life of the facility.

(5) The owner or operator must submit an annual report to the Regional Administrator which assures compliance with § 265.432. He must separately identify in the annual report those corrective actions, specified in paragraphs (a)(2)(i) (C) and (a)(2)(ii)(D) of this section which were implemented during the reporting period, and an explanation of the circumstances which required corrective action.

(b) The owner or operator of a facility which disposes of hazardous waste by underground injection into a Class IV well which discharges above an underground source of drinking water must monitor the ground water in accordance with the requirements of Subpart F of this Part.

#### § 265.435 Closure and post-closure.

(a) The owner or operator must close his facility in a manner that:

(1) Will prevent the migration of hazardous waste or hazardous waste constituents into or between underground sources of drinking water via the well structure; and

(2) Will minimize the need for further maintenance to protect human health and the environment.

(b) On the effective date of these regulations, the owner or operator must have a written closure plan. He must keep this plan at the facility. This plan must identify the steps necessary to completely close the facility. The closure plan must:

(1) Identify the techniques to be used to close the well in accordance with paragraphs (c) and (d) of this Section;

(2) Describe the steps which are necessary to decontaminate facility equipment during closure; and

(3) Include a schedule for final closure which specifies the anticipated date when wastes will no longer be received, the anticipated date when final closure will be completed, and intervening milestone dates for tracking the progress of closure.

(c) The owner or operator may amend his closure plan at any time during the active life of the facility. The owner or operator must amend his plan any time changes in operating plans or facility design affect the closure plan.

(d) The owner or operator must submit his closure plan to the Regional Administrator at least 180 days before the date he expects to begin closure. The Regional Administrator will modify, approve, or disapprove the plan within 90 days of receipt and after providing the owner or operator and the affected public (through a newspaper notice) the opportunity to submit written comments. If an owner or operator plans to begin closure within 180 days after the effective date of these regulations, he must submit the necessary plans on the effective date of these regulations.

(e) Within 90 days after receiving the final volume of hazardous wastes, the owner or operator must treat all hazardous wastes in storage or in treatment, or remove them from the site, or dispose of them on-site, in accordance with the approved closure plan.

(f) The owner or operator must complete closure activities in accordance with the approved closure plan and within six months after receiving the final volume of wastes. The Regional Administrator may approve a longer closure period under paragraph (d) of this section if the owner or operator can demonstrate that:

(1) The required or planned closure activities will, of necessity, take him longer than six months to complete, and

(2) That he has taken all steps to eliminate any significant threat to human health and the environment from the unclosed but inactive facility.

(g) The owner or operator of a Class I well must close by plugging to satisfy paragraph (a) of this section.

(h) At closure, the owner or operator of a Class IV well which discharges above an underground source of drinking water must:

(1) Remove the hazardous waste remaining in the well; and

(2) Close the well in a manner which satisfies paragraph (a) of this section.

[*Comment:* At closure, as throughout the operating period, unless the owner or operator can demonstrate, in accordance with § 261.3 (c) or (d) of this Chapter, that any solid waste removed from the injection well is not a hazardous waste, he becomes a generator of hazardous waste and must manage it in accordance with all applicable requirements of Parts 262, 263, and 265 of this Chapter.]

(i) When closure is completed, the owner or operator must submit to the Regional Administrator certification both by the owner or operator and by an independent registered professional engineer that the facility has been closed in accordance with the specifications in the approved closure plan.

(j) The owner or operator of a Class IV well which discharges above an underground source of drinking water must provide post-closure care in accordance with the applicable requirements of §§ 265.117-265.120 (see Subpart G of this Part).

#### § 265.436 Financial requirements.

(a) On the effective date of these regulations, the owner or operator of a facility which disposes of hazardous waste by underground injection must have a written estimate of the cost of closing the facility in accordance with the requirements in § 265.435. The owner or operator must keep this estimate, and all subsequent estimates required in this Section, at the facility.

(b) The owner or operator must prepare a new closure cost estimate whenever a change in the closure plan affects the cost of closure.

(c) The owner or operator must maintain financial responsibility in the form of performance bonds or other equivalent form of financial assurance to close a facility which disposes of hazardous waste by underground injection. In lieu of individual performance bonds, owners or operators may furnish a bond or other equivalent form of financial guarantee covering all

facilities which dispose of hazardous waste by underground injection in any one State.

(d) On the effective date of these regulations an owner or operator of a facility which disposes of hazardous waste by underground injection in a Class IV well which discharges above underground sources of drinking water must have a written estimate of the annual cost of post-closure monitoring and maintenance in accordance with the applicable post-closure requirements in §§ 265.117-265.120. This estimate, and all subsequent estimates, must be kept at the facility.

(e) The cost estimate required in paragraph (d) of this section must be revised whenever a change in the post-closure care plan affects the cost of post-closure care (see § 265.118(b)). The latest post-closure cost estimate is calculated by multiplying the latest annual post-closure cost estimate by 30.

(f) On each anniversary of the effective date of these regulations, the owner or operator must adjust the latest post-closure cost estimate using an inflation factor derived from the annual Implicit Price Deflator for Gross National Product as published by the U.S. Department of Commerce in its *Survey of Current Business*. The inflation factor must be calculated by dividing the latest annual published Deflator by the Deflator for the previous year. The result is the inflation factor. The adjusted post-closure cost estimate must equal the latest post-closure cost estimate times the inflation factor.

#### § 265.437 Special requirements for ignitable, reactive or incompatible wastes.

Ignitable, reactive or incompatible wastes (see Appendix V for examples) must not be disposed by underground injection unless § 265.17(b) is satisfied.

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