UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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OFFICE OF WATER

MEMORANDUM

SUBJECT: Follow-up to Loss of Mechanical Integrity for Class II Wells -- Underground Injection Control Program Guidance #76

FROM: James R. Elder, Director (WH-550)
Office of Ground Water and Drinking Water

TO: Water Management Division Directors
Regions II - X

BACKGROUND

One of the primary requirements of the Underground Injection Control (UIC) regulations is that all wells periodically undergo a mechanical integrity test (MIT) to ensure that there is no potential endangerment of underground sources of drinking water (USDW) through fluid movement. Whether authorized by rule or permit, all Class II (oil and gas related) injection wells must be tested at lease once every five years and pass either a standard or approved alternative MIT [40 CFR 144.28 (g)(2)(iv)(A)]

The Mid-Course Evaluation (MCE) effort considered the issue of what actions are taken pursuant to mechanical integrity failure as part of the overall assessment of Class II Program activities. The final report of the MCE Workgroup (issued on August 22, 1989) cited a significant potential for environmental damage through inconsistent follow-up on wells that had failed an MIT. Virtually all UIC programs require that a well be shut in at some point in time following a mechanical integrity failure.

The Agency developed a draft guidance to address a certain lack of consistency. The language and emphasis of this guidance has been reworked by the Class II well Advisory Committee chartered on June 6, 1991. In particular, the Committee decided to expand the guidance to make it applicable to any Class II well which loses mechanical integrity, regardless of how or when the failure is detected. This guidance has been endorsed by the Advisory Committee.

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PURPOSE

The purpose of this guidance is to lay out a procedural framework that will ensure more consistent follow-up for wells which fail a MIT or otherwise are discovered to lack mechanical integrity and still permit UIC Directors the necessary discretion to manage their programs based upon specific or unique regional geology/hydrology and policy issues.

Procedures presented in this guidance are intended for Class II wells which do not have mechanical integrity because there is a significant leak in the casing, tubing or packer. These types of failures are the ones most likely to occur during the operating life of a well. Further, a leak in one of these elements does not necessarily translate into a loss of fluid into a USDW or even from the well; therefore, some flexibility in addressing these types of failures is appropriate. However, the procedures outlined in Section III would be applicable to a well which lacks mechanical integrity because there is significant fluid movement into a USDW. In cases where State regulations are more stringent, then those regulations will take precedence over these guidelines.

GUIDANCE

I. Notification and Shut-in of the Well

The regulations specify a 24-hour time frame for notifying the Director of any non-compliance or malfunction of the injection system which may cause fluid migration into or between USDWs [40 CFR 144.24 (b)(2) and 144.51 (k)(6)(ii)]. These requirements should also be applied to any wells that are "pre-tested" prior to initiating a formal MIT procedure. Further, EPA has proposed [40 CFR 144.21 (c)(6)] that injection must cease within 48 hours following a determination by the Director that a well lacks mechanical integrity. In order to comply with these provisions an operator should:

(1) verbally notify the UIC Director of any mechanical integrity failure and technical details surrounding it within 24 hours. Even in cases where the failure is detected during a MIT witnessed by a UIC inspector, the operator has the legal responsibility to formally notify the Director of the test failure.

(2) cease injection and shut in the well as rapidly as feasible. In cases of obvious and imminent endangerment to a USDW (e.g., salt water flowing out around the surface casing at the wellhead) the well should be immediately shut-in. In no case should a well remain in operation beyond the 48-hour limit **except** under rates, time limits and other conditions

established by the Director solely to obtain injection data to determine the nature and extent of the failure and whether a USDW is endangered or has been contaminated.

(3) within five days, submit a follow-up written report documenting test results, repairs effected or a proposed remedial action and those limits established by the Director on appropriate volume or time for continued injection operations [40 CFR 144.28 (b)(2)]. The Director may grant additional time for filing this report if mitigating circumstances warrant such a delay.

II. Determination of Compliance Status

Based on the information submitted by the operator the Director must determine whether the well is in Significant Non-Compliance (SNC) status as a result of the mechanical integrity failure. The procedures for this determination are outlined in UIC Guidance #58 (Procedure for Interpreting Whether or Not An MIT Failure or Excess Injection Pressure is Reported as A Significant Non-compliance, September 9, 1987). The determination is based on 1) the presence or absence of a USDW, 2) the extent of the failure (i.e., are there no, one or more layers of protection remaining intact), and 3) whether the leak is sufficiently isolated vertically from a USDW by thick confining layers and cement.

In the absence of adequate data to the contrary, a well which lacks mechanical integrity must be considered to be in significant non-compliance status.

III. Requirements for SNC Failures

In addition to the requirements that all facilities must be properly operated and maintained at all times [144.51(e)], the regulations require that a permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from non-compliance with a permit [40 CFR 144.51(d)].

In order to comply with these requirements, whenever a mechanical integrity failure is considered to be in significant non-compliance, two distinct sets of action should take place simultaneously; the well must be expeditiously repaired or properly plugged and abandoned, and the potential impact of the failure on USDWs addressed.

The first step in either case is a determination of the nature and location of the failure. This may include additional pressure testing and logging to determine which element of the well is leaking, and whether and at what depth fluid is exiting the well. If there was **no** loss of fluid, only Section A must be

completed. If there was a loss of fluid the requirements of both Sections A and B apply.

A. Remediation of the Well Failure

A well classified as being in significant non-compliance must remain shut-in until it is repaired or permanently plugged and abandoned. Repairs or plugging and abandonment should be initiated within 90 days of the failure date. These conditions should be made an integral component of every injection well permit. Analagous operating requirements should be imposed on wells authorized by rule under provisions of 40 CFR 144.28 (f)(2). However, under special circumstances where accessibility to the well location is restricted due to weather or field conditions, the UIC Director may extend the deadline for up to six months following the date of failure. Absent such an approved extension, enforcement action should be taken against owner/operators who delay repairs or plugging and abandonment action. Conversely, nothing in this guidance precludes the Director from acting on a more expedited basis than described in the above discussion. The Director must provide a written determination as to what remedial action was taken and why. This determination should document his/her decision and be included in files accessible to EPA.

In cases where the wells are repaired, they should pass an MIT before injection can resume. This requirement should be incorporated into every Class II injection well permit. Wells authorized by rule should be required to conduct MITs under authority provided in 40 CFR 144.28 (c)(2)(iv)(A&B) and 40 CFR 144.28 (g)(2)(iv)(A,B,&C). These tests should be witnessed by UIC inspectors.

B. USDW Remediation

If data indicates that the failure led to a loss of fluid outside the well, the Director should prescribe appropriate steps for the operator to undertake in order to assess whether these fluids could have endangered a USDW. This determination will be based on:

-- the quantity and quality of the fluids involved

-- the depth of the formation in which the loss took place and its relationship to the base of USDWs

-- whether the loss was into a USDW, the quality of that USDW and its relationship to other USDWs.

The Director should document and report to EPA any instances of fluid loss.

If the Director determines that there is a potential for adverse impact to a USDW, he should request that the operator:

(1) update the inventory of drinking water wells within a 1/4 mile radius of the well and sample these wells for selected indicator parameters (e.g., TDS, chlorides, conductivity and pH). Any information showing the presence of contaminants in any drinking water well shall be reported to the Director immediately. Results of the sampling should be provided to the well owners.

(2) prepare a work plan for a formal study to determine the extent of the contamination. The plan shall include a timetable for conducting a ground-water quality investigation, which may include the drilling and sampling of an adequate number of monitoring wells and/or other geophysical assessment techniques. The sampling timetable should take into account the slow movement of ground water and require that several samples from each well be taken over time. The work plan should be submitted to the UIC Director for review and approval within 90 days of the Director's request.

(3) upon receiving approval, immediately initiate the study and report any results of the initial ground-water sample analyses to the UIC Director.

In the event that these investigations confirm that a USDW has been adversely affected, the UIC Director, working with other involved State or Federal agencies, should require the operator to develop a corrective action program to remediate the affected USDWs. Nothing in this guidance precludes the Director from acting on a more expedited basis.

In cases where remediation of a significant non-compliance well is undertaken, a well may be required to pass an internal and external MIT prior to resumption of injection operations. Specific requirements will be determined by the Director on a case-by-case basis, depending upon the severity of the significant non-compliance status and threat to the USDW. All MITs should be witnessed by UIC inspectors.

IV. Requirements for Failures Which Do Not Constitute a SNC

Wells which lack mechanical integrity but are not in significant non-compliance status should be repaired or permanently plugged and abandoned within 270 days of the failure. In general, these wells should remain shut-in during that period; however, under provisions set forth in [40 CFR 144.28 (f)(4)],

the Director can allow operations to resume if the operator can demonstrate that there is and will be no movement of fluids into a USDW. Under certain conditions, the Director may also allow wells to be temporarily abandoned rather than plugged and abandoned.

Temporary operation or abandonment of wells without mechanical integrity should be limited to the following cases:

A. Absence of USDWs

The regulations [40 CFR 144.16] allow the Director to waive requirements for mechanical integrity when injection does not occur into, through or above an underground source of drinking water. If the operator can demonstrate that there is no USDW within the zone of endangering influence of the well, or if aquifers have been exempted under the provisions of 40 CFR 144.7, the Director may allow continued operation or temporary abandonment of the well without additional monitoring of the injection operations.

B. Ability to Monitor the Well to Preclude Fluid Movement into USDWs

In cases where a failure only affects one of the elements in the well, and the well is constructed in such a way that at least two layers of protection remain intact and can be monitored in a manner that is satisfactory to the Director, wells could be allowed to operate until repairs are effected. Similarly, the operator could be allowed to temporarily abandon the well if he can demonstrate through a monitoring program that there would be no movement of fluids into a USDW.

In either case, the Director should prescribe a rigorous and enforceable monitoring program which should remain in effect until the well is repaired and passes an MIT or is properly plugged and abandoned. This requirement should be incorporated into every Class II injection well permit. Wells authorized by rule should be required to initiate a monitoring program under the broad authority prescribed in 40 CFR 144.28 (g)(2)(i).

(1) For an operating well, the monitoring can consist of pressure or fluid level monitoring. It must be designed to give advance warning before any further deterioration of the well could lead to fluid loss into a USDW. It should include criteria which would direct the operator to stop injection when certain parameters are reached or exceeded.

(2) Monitoring programs for temporarily abandoned

wells must also be tailored to site-specific circumstances. In those areas where formation water is known to be particularly corrosive, the UIC Director should take additional precautions to monitor temporarily abandoned wells. For example, the Director might require flooding of the tubing and/or casing string with fresh water to reduce corrosion, or require that corrosion or microbiological inhibiting additives be mixed with the water present in the casing or casing/tubing annulus.

Monitoring programs, however, are an administrative burden on the Program Directors. They imply additional inspections to verify that the program is in place and functioning properly, and additional scrutiny of monitoring data. In cases where these burdens cannot be readily assumed, the Director should require that the wells be repaired before operations can resume or be plugged and abandoned within the 270 days specified above.

IMPLEMENTATION

This document provides guidance to both primacy State and direct implementation UIC Directors on procedures to be followed after a Class II well fails mechanical integrity. The guidance is a general statement of policy. It does not establish or affect legal rights or obligations. It is not finally determinative of any or all of the issues addressed. Agency decisions in any particular case will be made on the basis of specific facts and actions required to prohibit endangerment of USDWs.

Regional UIC Directors should take immediate action to incorporate this guidance into their programs. They should also transmit this guidance to State Program Directors. Implementation of the recommendations of this guidance will be discussed during the FY 1992 evaluations of State and Regional programs.

Questions relative to this guidance should be addressed to Françoise Brasier, Chief, Underground Injection Control Branch or Jeff Smith, UIC staff. They may be reached at (202) 260-7077 and (202) 260-5586 respectively.