

ILLINOIS POLLUTION CONTROL BOARD  
May 21, 1992

IN THE MATTER OF: )  
 )  
THE ILLINOIS DEPARTMENT OF ) R89-15  
ENERGY AND NATURAL RESOURCES )  
EVALUATION OF UNDERGROUND )  
INJECTION CONTROL )

OPINION AND ORDER OF THE BOARD (by M. Nardulli)

This matter is before the Board pursuant to Section 6.2 of the Environmental Protection Act (Act). (Ill. Rev. Stat. 1989, ch. 111 1/2, par. 1006.2.) Section 6.2 of the Act requires the Illinois Department of Energy and Natural Resources (DENR) to conduct a study of underground injection of hazardous wastes and whether underground injection is an appropriate method of disposal. Section 6.2 of the Act directs DENR to report the results of the study to the General Assembly and the Board no later than July 1, 1985. On October 4, 1989, DENR submitted its report to the Board. The Act directs the Board to hold public hearings within 90 days of the filing of the study. On May 17, 1990 a hearing was held in Springfield, Illinois and on June 5, 1990 a hearing was held in Chicago, Illinois. The Act also directs the Board to publish its findings and conclusions on the areas covered by DENR's study and the testimony received at hearing and to specifically determine whether any Board regulations should be modified or eliminated.<sup>1</sup>

DENR'S STUDY

Underground injection is the controlled placement of fluids into selected, deeply buried geologic formations through specially designed and monitored wells. (DENR Study at ES-1.) Nine Class I wells, or deep wells, are operated at seven Illinois industrial sites. (Id.) Class I wells are wells into which hazardous and nonhazardous industrial and municipal wastes are injected below Underground Sources of Drinking Water (USDW). (Id.) The United States Environmental Protection Agency (USEPA) delegated authority to Illinois in 1984 to implement the federal Underground Injection control (UIC) program. (Id.) Pursuant to Sections 7.2 and 13(c) of the Act, the Board has adopted rules that are identical-in-substance to the federal regulations. (R89-2; R89-11; R90-14; R91-4 (dismissed 2-28-91); R91-16 (dismissed 12-6-91).) DENR's study "focused on the geological, technical and environmental feasibility of deep well injection, the adequacy of current regulations and regulatory practices, the ultimate fate of the injected waste in the disposal system and

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<sup>1</sup> The Board expresses its appreciation to Anand Rao of the Board's Scientific and Technical Section for his assistance in this proceeding.

the comparative risks, benefits and costs of deep well injection and alternative disposal options." (Id.) After reviewing: (1) UIC regulations and regulatory practices; (2) geologic and hydrogeologic conditions critical to deep well injection and hydrogeologic principles governing fluid flow in geologic materials; (3) test results obtained during well construction and operation; (4) limited (in-well) monitoring data; and (5) information and experience acquired during more than 20 years of disposal practice, DENR supports the continued "practice of deep well injection under very strict compliance with the UIC regulations." (Id. at 8-1.) DENR's study finds that "[t]he current regulations--designed specifically to protect underground sources of drinking water and the near-surface environment--are adequate in basic concept and scope but deficient to varying degrees ... ." (Id. at 8-1-8-2.) DENR recommends 19 changes in regulations and regulatory practices. (Id. at 8-5-8-6.)

#### PUBLIC COMMENTS

Three public comments were received after the final hearing. DENR filed a comment responding to the Illinois Environmental Regulatory Group's (IERG) position that modifications to the existing regulations are unnecessary. (P.C. #1.) DENR's public comment reviewed each recommendation made in the study in an attempt to determine if the recommendations were still valid in light of changes to the UIC regulation which occurred after the study was completed and in light of proposed federal regulations. IERG filed a public comment summarizing its position stated at hearing that some of the recommendations in DENR's study are no longer valid in light of changes to the existing regulations adopted after the DENR study was completed. (P.C. #2.) IERG states that the recent changes in the UIC regulations address DENR's concerns and urges the Board not to take any further action to amend its UIC regulations. (P.C. #2.) Allied Signal, Inc. also submitted a public comment stating that many of the changes suggested by the DENR study have already been implemented or are mooted by current regulations. (P.C. #3.)

#### DISCUSSION

At the first hearing<sup>2</sup>, the question was posed to DENR as to whether its study reflected USEPA's 1988 amendments to the UIC program. (Tr.1 at 53.) At the second hearing DENR responded that the study included information through June of 1987 and, therefore, does not reflect the Board's identical-in-substance adoption of the federal regulations on January 25, 1990 (R89-2). (Tr.2 at 65-66; see also, DENR Study Acknowledgments.) Both IERG and Allied Signal testified that the regulations have changed

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<sup>2</sup> "Tr.1" refers to the May 17, 1990 hearing and "Tr.2" refers to the June 5, 1990 hearing.

significantly since the study was completed and that some of the conclusions may not be valid in light of subsequently adopted modifications to the UIC regulations which could not have been considered at the time the study was prepared. (Tr.2 at 79-82, 99-101.) As noted above, DENR's public comment addresses the regulations adopted on January 25, 1990 (R89-2) and their effect on the study's recommendations. (P.C. #1.) The Board notes that in reviewing DENR's study to determine if any regulatory changes are needed, the Board has also considered UIC identical-in-substance regulations adopted on May 24, 1990 (R89-11) and May 23, 1991 (R90-14) so that the review is as up to date as possible.

As a preliminary matter, the Board also notes that all Board UIC regulations have been adopted pursuant to Sections 7.2 and 13(c) of the Act which require that the Board adopt regulations which are "identical-in-substance" to the federal regulations promulgated by USEPA. (Ill. Rev. Stat. 1991, ch 111 1/2, pars. 1007.2, 1013(c).) Hence, any modification or deletion of any UIC regulation carries with it the risk that the regulations would no longer be "identical-in-substance" to the federal regulations thereby jeopardizing federal authorization.<sup>3</sup>

The remainder of this opinion reviews DENR's recommendations in light of regulations adopted subsequent to the completion of the study. (See R89-2; R89-11; R90-14.) The Board concludes that many of DENR's concerns have been addressed by these recent amendments to the Board's regulations. However, some changes may be needed to address the remaining concerns expressed by DENR's study. For example, the recent regulatory changes do not address the underground injection of radioactive wastes. (DENR Study at 1-7, 8-5.)

Recommendation 1. Delete 35 Ill. Adm. Code 704.193(b)(3). (DENR Study at 8-5.) Section 704.193(b)(3) provides:

The Agency may require as a permit condition that injection pressure be so limited that pressure in the injection zone does not exceed hydrostatic pressure at the site of any improperly completed or abandoned well within the area of review. This pressure limitation shall satisfy the corrective action requirement. Alternatively, such injection pressure limitation can be part of a compliance schedule and last until all other required corrective action has been taken.

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<sup>3</sup> Of course, the Board can adopt UIC regulations which are more stringent than their federal counterpart and still be consistent with the mandate to adopt regulations "identical-in-substance".

DENR's public comment states that the above recommendation is still valid in light of the changes to the Board's UIC regulations. (P.C. #1 at 1.) DENR's study states that injection cannot be practiced under this permit condition because injection of any significant quantity of waste into an injection zone instantaneously causes a pressure front to move rapidly in a radial direction from the well toward the margins of the area of review. (DENR Study at 8-5.) According to DENR, the only appropriate corrective action that may be undertaken to deal with improperly sealed, completed or abandoned wells that penetrate the disposal zone in the area of review is to perform the proper sealing, completion or abandonment procedures set out at 35 Ill. Adm. Code 704.193(a).

Section 704.193(a) provides that the Agency may limit injection pressure consistent with the corrective action requirement only if it finds that the plan for preventing movement of fluid into an USDW, submitted in accordance with 35 Ill. Adm. Code 704.193(a), is inadequate. If injection pressure cannot be limited in accordance with Section 704.193(b)(3) to less than the hydrostatic pressure at any improperly completed or abandoned well based on the site specific operative conditions, the owner or operator can demonstrate compliance with the corrective action requirements of Section 704.193(a) by implementing other measures such as sealing of abandoned or improperly sealed or completed wells. In view of the optional nature of the requirement, there appears to be no need to eliminate 35 Ill. Adm. Code 704.193(b)(3).

Recommendation 2. Request the Board to conduct a study evaluating the UIC regulations from the viewpoint of the Agency and establish a mechanism to ensure that the Agency reviews proposed/needed changes, deletions and additions to the regulations. (DENR Study at 8-5.) The intent of this recommendation is to require the Board to continue to periodically review the UIC regulations. (P.C. #1 at 1.)

DENR's concerns regarding periodic review of the UIC regulations are addressed by the current UIC program because the state regulations are evaluated on an annual basis by USEPA. (Ex. 7.) Pursuant to this review, USEPA also provides recommendations for improving the management of the UIC program. (Id.) Therefore, additional evaluation of Illinois' UIC program does not appear necessary.

Recommendation 3. More narrowly define the term "radioactive waste" in Sections 730.105(d) and 730.105(e)(11) to specify clearly what levels or limits of radioactivity are intended and determine what levels of radioactivity in process wastestreams constitute a hazardous waste. (DENR Study at 1-6, 8-5.) DENR states that changes in regulations since the study was prepared do not negate the need for clarification. (P.C. #1

at 2.) According to DENR, a determination is needed as to what minimum level of radioactivity makes a waste a defined "radioactive waste." (DENR Study at 1-6; P.C. #1 at 2.)

Radioactive wastes have not been, and currently are not, injected into Class I wells in Illinois. (DENR Study at 1-6.) However, the current regulations allow the injection of radioactive wastes that are not classified as hazardous waste<sup>4</sup> into Class V wells (*i.e.*, shallow injection wells (Tr.2 at 106)). (35 Ill. Adm. Code 730.105(e)(11).)<sup>5</sup> "The term 'radioactive waste' as used in the definition of Class V wells is assumed to represent low-level radioactive wastes, but no intensity levels are identified." (DENR Study at 1-6.)

DENR's concerns regarding radioactive waste injection are valid given that the current regulations do not specify: (1) any construction, operation or monitoring requirements for Class V wells into which such wastes may be injected; and (2) any upper limits on the concentration of radioactive constituents that may be injected.<sup>6</sup> The Board's review of the record leads it to conclude that the regulations may need to be modified to specify the concentration levels of radioactive material that would be acceptable for injection into Class V wells and prescribing construction, operation and monitoring requirements for such wells.

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<sup>4</sup> Radioactivity is not a hazardous characteristic under RCRA. However, any waste containing a RCRA hazardous waste as defined in Part 721 and a radioactive waste which is not a "source, special nuclear or byproduct material" as defined by the Atomic Energy Act is considered as a radioactive mixed waste and is subject to RCRA regulations regardless of further subclassification of the radioactive waste constituent as high-level, low-level etc.

<sup>5</sup> While the definition of Class IV wells includes those wells receiving radioactive wastes (35 Ill. adm. Code 730.105(d)), Class IV wells are banned in Illinois (DENR Study at 1-6).

<sup>6</sup> "Radioactive waste" is defined at 35 Ill. Adm. Code 730.103 as any waste which contains radioactive material concentrations which exceed those listed in 10 CFR 20 Appendix B, Table II, Column 2, incorporated by reference at 35 Ill. Adm. Code 720.111. The concentration levels in 10 CFR 20 have been proscribed by the Nuclear Regulatory Commission as the concentration limits of radioactive constituents in effluents that are discharged into municipal sewers.

Recommendation 4. Restrict injection of low-level radioactive wastes to Class I wells only, specifying the radiation intensity level, and regulate under Class I regulations. (DENR Study at 1-6-1-7, 8-5.) Similar to the above recommendation, DENR states that clarification is still needed. (P.C. #1 at 2.)

DENR's concerns regarding the injection of radioactive wastes may be addressed either as suggested above under Recommendation 3, or by modifying the regulations to restrict the injection of all radioactive wastes to Class I hazardous waste wells.

Recommendation 5. Require applicants for Class I well permits to submit a "well completion report" for evaluation by the Agency before injection is allowed to begin. (DENR Study at 8-5.) In its public comment updating the study's recommendations, DENR states that the recommendation has been implemented by the Agency such that no changes to the Board's regulations are needed. (P.C. # 1 at 2.)

Applicants are currently required to submit a well completion report for Agency review. (35 Ill. Adm. Code 704.181.) According to the permit condition requirements of Section 704.181, a new well may not commence injection until construction is complete and a notice of completion has been submitted for the Agency's review. Therefore, no regulatory changes are needed.

Recommendation 6. Require that the area of review be enlarged for some proposed well sites at which it can be demonstrated that the larger area may be necessary to protect USDW. (DENR Study at 1-7, 6-9-6-11, 8-5.) DENR states in its updated comment that "[o]ur recommendation was that the regulations be changed to require a 2.5 mile radius minimum area of review. This had already become the practice of IEPA for most Class I wells." (P.C. 31 at 2.) DENR recognizes that current regulations for Class I hazardous wells now require a minimum area of review of 2 miles. (35 Ill. Adm. Code 730.163.) Therefore, DENR recommends that a provision be added that would allow the Agency to require a larger area of review where non-uniform geologic conditions may significantly alter radial flow of the injected waste. (P.C. #1 at 2.)

Section 704.191 governing permit requirements provides that the Agency may impose additional conditions if necessary to prevent the migration of fluids into USDW. (35 Ill. Adm. Code 704.191.) Hence, under existing regulations the Agency may prescribe a larger area of review where site-specific geologic conditions may alter radial flow and affect USDW. Consequently, the Board finds that no regulatory changes are needed.

Recommendation 7. Require a comprehensive inorganic and organic chemical analysis of the injected wastes at the time of permitting and whenever the composition of the wastestream changes, and annually thereafter. (DENR Study at 8-5-8-6.) DENR states that since the completion of its study, the Board regulations have been modified to require complete physical and chemical characterization of the waste to be injected. (P.C. #1 at 2.) However, DENR recommends the inclusion of a requirement that specifies a minimum frequency of analysis of the injected wastes. (Id.) DENR suggests that an updated analysis be performed at least annually and every time the wastestream is modified substantially. (Id. at 2-3.)

Sections 730.113 (Class I nonhazardous waste wells), 730.133 (Class III mineral extraction wells) and 730.168 (Class I nonhazardous wells) set forth requirements for the chemical analysis of injected wastes.<sup>7</sup> These regulations require a detailed characterization of the injection fluids and specify the frequency of analysis. Although the current regulations do not set forth a minimum frequency of analysis, they do prescribe a performance standard that requires the selection of a frequency of analysis that will yield representative data of the waste characteristics. Additionally, the regulations require the Agency to consider such analytical information in authorizing injection wells. Therefore, the existing regulations adequately address DENR's concerns such that no changes are needed.

Recommendation 8. Require consideration of spill containment at the wellhead and any adjacent well components covered by UIC permits in areas where moderate-permeability and high-permeability deposits overlie shallow aquifers or are adjacent to public water supplies. (DENR Study at 8-6.) DENR comments that there have been some Class I well spills related to malfunctioning that indicate the storage capacity to contain waste materials may need to be increased. (P.C. #1 at 3.) DENR recommends that the regulations be modified to require spill containment capacity for malfunctioning of the well itself (RCRA covers spill containment for malfunctioning of the generating facility and pipelines to the well). (Id.)

The study notes that most above-ground spillage of hazardous wastes is covered under the Board's RCRA regulations. (DENR Study at 3-23.) However, leakage from the actual wellhead due to repairs or backflow are not covered by such regulations. (Id.) Although DENR states that there have been some spills related to

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Monitoring requirements for Class V wells are not specified in Board regulations, the Department of Mines and Minerals adopts standards for Class II wells and, as noted previously, Class IV wells are banned in Illinois.

malfunctioning of Class I wells, the study does not document the size of such spills or their impact on groundwater. The study does state that wellhead spillage or leakage is not expected to be large in volume or frequent in occurrence. (*Id.*) Therefore, the Board cannot conclude that spill containment for Class I wells is necessary without additional information regarding wellhead spillage or leakage.

Recommendation 9. Limit acid (HCl) waste concentration injected into carbonate disposal zones to a maximum absolute concentration, not a maximum average concentration, or neutralize the acid in the wastestream prior to injection to render it chemically inert. The Board's current regulations require an injected waste's pH to be above 2. (35 Ill. Adm. Code 738.112(b)(3).) DENR comments that while this limit is acceptable for injection into silica rock formation, a stricter limit is needed for carbonate disposal zones to ensure that excess gas is not formed. (DENR Study at 8-6; P.C. #1 at 3.)

DENR admits in its study that existing information relating to chemical interactions of injected waste components with various types of formation fluids and formations is not adequate and that further research is needed to determine the pH limits that would provide protection against excess gas formation. (DENR Study at 4-3; P.C. #1 at 3.) Therefore, until further research in the area of injected waste formation interactions reveals optimal pH ranges for injecting wastes into carbonate formations, the Board finds that a regulatory change specifying additional pH limitations is not warranted. The Board notes, however, that the existing operating requirements in Section 730.167(e) require owners and operators of Class I hazardous waste wells injecting wastes having the potential to react with the injection formation and generate gases to limit pH or acidity of the injected wastes.

Recommendation 10. Require that all injection pressures and the pressure exerted by fluids in the well not exceed design specifications for well testing, injection, stimulation and repair operations. (DENR Study at 8-6.) DENR states in its updated comments that existing regulations allow high injection pressure levels during well stimulation (35 Ill. Adm. Code 730.103) or mechanical integrity testing that may compromise the integrity of the well. DENR also notes that in practice, the Agency does not allow the use of excessive pressures. (P.C. #1 at 3-4.)

Sections 730.113, 730.133 and 730.167 applicable to Class I nonhazardous wells, Class III wells and Class I hazardous wells respectively allow the injection pressure to exceed a maximum level only during well stimulation. Since the Agency has made it a practice to not allow excessive pressures to be used during well stimulation by hydraulic fracturing, the exception to the

injection pressure requirement in the above-cited sections may be deleted to address the concerns expressed by DENR.

Recommendation 11. Maintain an adequate pressure differential between the annulus and tubing under all possible operational conditions. (DENR Study at 1-5, 8-6.) DENR notes in its comments that this recommendation is similar to recommendation 10 and that the regulations do not specify the differential that must be maintained between the annulus and tubing during operating conditions to maintain the integrity of the well. (P.C # 1 at 4.)

The annulus pressure will usually be maintained, in practice, at a higher level than the tubing pressure to prevent the movement of injected wastes into the surrounding formations and to monitor the performance of the well. (DENR Study at 1-5.) Section 730.167(c) requires the annulus pressure to be maintained at a higher level than the tubing pressure. (35 Ill. Adm. Code 730.167(c).) However, the regulations do not prescribe such a requirement for Class I nonhazardous wells or Class III wells, nor do the regulations specify any minimum differential that must be maintained between the annulus pressure and tubing pressure. The pressure differential plays an important role in assessment of well performance and integrity. Therefore, regulatory change may be warranted to specify a minimum pressure differential between the annulus pressure and tubing pressure. At a minimum, a requirement similar to Section 730.167(c) requiring the annulus pressure be maintained at a higher level than tubing pressure should be included for both Class I nonhazardous wells and Class III wells to ensure the integrity of the well.

Recommendation 12. Require mechanical integrity testing to be conducted more frequently than every five years on wells more than 15 years old. (DENR Study at 1-5, 8-6.) DENR's updated comments note that Section 703.113(b)(3) requires mechanical testing at least every 5 years. DENR maintains that more frequent testing is needed for older wells. (P.C. #1 at 4.)

Mechanical testing is performed to ensure that: (1) there are no significant leaks in the casing, tubing and packer; and (2) there is no significant fluid movement into USDW. Sections 730.113 and 730.133 require Class I nonhazardous wells and Class III wells to be tested for mechanical integrity at least once every five years. (35 Ill. Adm. Code 730.113, 730.133.) Because large volumes of fluids are injected into these wells, the well casing and tubing will be subject to operating pressures in the range of 50 to 400 psi over long periods of time having a significant impact on the injection system, particularly as the system ages. Therefore, to ensure the protection of USDW, the Board finds that DENR's concerns regarding more frequent testing of older wells (*i.e.*, wells that have been in service for more

than 15 years) has merit and that an appropriate interval would be in the range of one to two years.

Recommendation 13. Require all new Class I wells in Illinois to use packer well design rather than a packerless well design, except for certain narrowly defined geologic, operational and waste type conditions. (DENR Study at 6-4-6-7, 8-6.)

DENR recognizes in its updated comments that this recommendation has been implemented at 35 Ill. Adm. Code 730.112. Therefore, no regulatory changes are needed.

Recommendation 14. Use batch mode injection to generate a more uniform wastestream where contributing streams vary significantly in chemical character and volume. (DENR Study at 8-6.)

DENR states in its comments that the Agency has accepted on-site batch mode injection to generate a more uniform wastestreams and that no regulatory changes are needed. (P.C. #1 at 4.) However, to ensure consistent enforcement, it may be desirable to include such a requirement as part of the Board regulations.

Recommendation 15. Draft regulatory practices to specifically cover the commercial operation of Class I wells, including mandatory compatibility testing of all wastes prior to injection and adequate recording of all wastes injected. (DENR Study at 8-6.) DENR notes in its comments that there are currently no commercial wells in Illinois. (P.C. #1 at 4.) However, DENR maintains that regulations be developed to cover the special problems commercial wells can pose. In particular, DENR recommends regulations governing procedures or implementation practices for batch mode operations, analysis of the waste, injection practices, injection zone testing and treatability and compatibility of the wastes. (P.C. #1 at 4-5.)

The Board believes that existing regulations for Class I wells cover most of the items specified by DENR as additional requirements. (35 Ill. Adm. Code 730.) However, if a commercial well operation is proposed needing special requirements, these needs may be addressed through the use of permit conditions. Therefore, no regulatory changes are needed.

Recommendation 16. Limit injection parameters for wells utilizing geologic formations in which the natural hydrostatic head is either above that of the overlying USDW or above the land surface. (DENR Study at 6-7-6-9, 8-6.)

DENR comments that this concern has been addressed by Section 730.112. (35 Ill. Adm. Code 730.112.) Therefore, no regulatory changes are needed.

Recommendation 17. Require new Class I well applicants to include plans for appropriate tests and data collection, to conduct modeling of pressure distribution and solute transport of injected wastes. (DENR Study at 8-6.) DENR's updated comments note that current regulations for Class I hazardous wells cover data collection and monitoring requirements. (P.C. #1 at 5.) However, regarding Class I nonhazardous wells, DENR concurs with the Agency's testimony recommending that the Class I hazardous well requirements be extended to cover Class I nonhazardous wells. (P.C. #1 at 5; Tr.2 at 75.)

The Agency testified that certain modifications relating to the disparity between construction, operation and monitoring requirements for Class I hazardous and nonhazardous wells are warranted. (Tr.2 at 74.) According to the Agency, under the pressure of injection, the movement of nonhazardous-waste fluids can have as significant effect on underground sources of drinking water as fluids containing hazardous wastes. (Tr. 2 at 75.) Therefore, the Agency recommends that the stricter rules for Class I hazardous waste wells be applied to Class I nonhazardous waste wells to ensure the protection of USDW. (Tr.2 at 75.) The Board finds that the record indicates that this recommendation has merit and that regulatory changes in this regard may be warranted.

Recommendation 18. Recommend the following procedures for selecting a disposal option for industrial waste; (1) make a comprehensive identification/evaluation of all significant risks; (2) establish guidelines for acceptable risk; and (3) determine the costs/benefits and environmental impacts associated with each disposal option or level of pretreatment. (DENR Study at 8-6.)

DENR's updated comments state that these concerns are addressed by USEPA's proposed regulations. (P.C. #1 at 5.) Since DENR filed its comments, the Board has adopted the federal regulations identical-in-substance. (R89-2; R89-11.)

Recommendation 19. Recommend that consideration be given to requiring monitoring outside the well (*i.e.*, beyond well casing and borehole) because making this type of monitoring mandatory would increase public confidence in deep well injection. (DENR Study at 8-6.)

DENR admits in its comments that more study is needed to determine exactly what type of monitoring would be appropriate. Therefore, no regulatory changes are suggested at this time.

In addition to the above recommendations regarding regulatory changes, DENR's study also recommends certain changes geared toward improving management of the UIC program. (DENR Study at 8-7.) While these recommendations do not relate to changes in any Board regulations, the Board will summarize the

recommendations. The recommendations include: (1) provide opportunities for regulatory and scientific advisory personnel associated with the UIC program to maintain contacts with UIC staff in other states and with federal agencies; (2) retain a UIC program manager with a broad technical background in deep well injection technology to enable this person to manage technical aspects of the program effectively and coordinate staff efforts; and (3) enter analytical results from monthly monitoring reports into a computerized central database.

Regarding the first recommendation, the Agency testified that this goal is being met and that there is a high degree of contact between the Agency and USEPA and other agencies. (Tr.2 at 71.) Therefore, DENR recognizes in its updated comments that this suggested has been implemented. (P.C. #1 at 6.) As to the second recommendation, the Agency testified that given the small number of underground wells in Illinois, designation of a manager having responsibility solely for the UIC program and expenditure of funds for such a position is not warranted. (Tr.2 at 72.) DENR responds in its comments that it was not suggesting a full time assignment to this position, but only that the Agency needs technical expertise in underground injection to carry out its UIC functions. (P.C. #1 at 6.) Regarding the third recommendation, DENR comments that it has set up a database for the Agency which needs to be fully utilized by Agency personnel and that the state should provide the needed personnel for this function. (P.C. #1 at 6.)

Lastly, DENR's study sets forth six recommendations for research. (DENR Study at 8-7.) These recommendations do not fall within the purview of changes to Board regulations. However, as noted above in the discussion of proposed regulatory changes, DENR has admitted the need for more research. DENR states that there is a need to study: (1) chemical interactions of industrial waste components with various formation fluids and formation rocks under in situ disposal conditions; (2) permeability changes in the rocks of the disposal and confining zones resulting from various chemical reactions; (3) developing methods and equipment for sampling and testing formation fluids under subsurface temperature and pressure conditions; (4) the nature of fluid and solute transport to quantify the magnitude and character of fluid movement in confining beds; (5) developing a monitoring strategy for Class I injection operations that includes determining the position of monitoring sites in the disposal system, parameters to be tested and frequency of testing; and (6) developing a methodology to improve monitoring of waste movement and behavior in the subsurface in order to collect data required for testing models of subsurface disposal systems and verifying results from model studies. (DENR Study at 8-7.)

Regarding DENR's research recommendations, the Board notes that such information is certainly desirable to the extent that this information is related to the areas noted above where the Board has found that regulatory changes may be warranted.

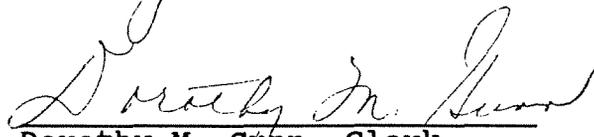
In summary, the Board finds that many of the recommendations set forth in DENR's study have been mooted by the subsequent identical-in-substance adoption of federal regulations by the Board. However, the Board does find that certain concerns expressed by DENR may warrant regulatory changes. Therefore, the Board invites a regulatory proposal consistent with the findings set forth above.

ORDER

For the reasons given above, the Board finds that many regulatory changes suggested by DENR's study have become mooted by the passage of subsequent Board regulations governing UIC. However, some regulatory changes may be warranted. This docket is hereby closed and any regulatory proposal submitted consistent with this opinion will receive a new docket number.

IT IS SO ORDERED.

I, Dorothy M. Gunn, Clerk of the Illinois Pollution Control Board, hereby certify that the above opinion and order was adopted on the 21<sup>st</sup> day of May, 1992 by a vote of 7-0.

  
 Dorothy M. Gunn, Clerk  
 Illinois Pollution Control Board