ILLINOIS POLLUTION CONTROL BOARD
January 24, 1985

IN THE MATTER OF:	)	
	)	
TITLE 35: ENVIRONMENTAL PROTECTION	)	R82-2
SUBTITLE I: ATOMIC RADIATION	)	
CHAPTER I: POLLUTION CONTROL BOARD	)	
PART 1000: RADIATION HAZARDS	)	

PROPOSED RULE. FIRST NOTICE.

PROPOSED OPINION AND ORDER OF THE BOARD (by J. D. Dumelle):

This matter comes before the Board upon the January 27, 1982, petition to adopt regulations concerning radiation hazards filed on behalf of the Department of Nuclear Safety (DNS) by the Attorney General's Office. The DNS submitted a revised proposal on March 5, 1982, which codified the proposed rules. Hearings were held to consider the proposal on May 11, 1982, in Chicago and May 14, 1982, in Springfield. The DNS filed a second revision of the proposed rules on August 26, 1982. The Department of Energy and Natural Resources (DENR) filed its Economic Impact Study (EcIS) on October 28, 1983. Hearings were held to consider that study on January 24, 1984, and February 17, 1984. The comment period closed on March 26, 1984.

The DNS proposal, Subtitle I, Part 1000, would establish standards and limitations governing radiological air pollution from NRC-licensed facilities and materials which substantially duplicate portions of current regulations of the United States Nuclear Regulatory Commission (NRC). (See 10 C.F.R. 20 and 45 Fed. Reg. 65521ff, October 3, 1980). Under Ill. Rev. Stat. ch. 127, par. 63617 the DNS is the executive agency responsible for enforcing and implementing radiological air pollution regulations promulgated pursuant to Section 25(b) of the Environmental Protection Act (Act). DNS will assure compliance with the requirements of Subtitle I by means of the monitoring, testing, record-keeping, and reporting provisions.

While DNS presently regulates non-NRC-licensed materials and facilities under statutes other than the Act, neither DNS nor any other Illinois agency regulates NRC-licensed materials and facilities for radiation protection purposes. The effect of proposed Subtitle I is to provide DNS with the authority and the means to protect the public from radiation hazards associated with the large number of NRC-licensed activities in Illinois.

History of Atomic Radiation Regulations

In 1971 the Attorney General's Office submitted a proposal to the Board (R71-9) pursuant to Section 25(a) of the Act to develop radiation protection standards for nuclear power plants in Illinois is subject to regulation and licensing by the NRC under the Atomic Energy Act. However, Section 25(a) [now Section 25(b)] was subsequently declared unconstitutional by an Illinois appellate court which found that regulation of the radiation hazards of nuclear power plants is preempted by the Atomic Energy Act. Commonwealth Edison Co. v. Pollution Control Board, 5 Ill. App.3d 800, 284 N.E.2d 432 (3d Dist. 1972), citing Northern States Power Co v. State of Minnesota, 447 F.2d 1143 (6th Cir. 1971), sum.aff'd 405 U.S. 1035 (1972).

No further action was taken on R71-9 until the Attorney General moved the Board in 1980 to institute hearings on the Board's powers under Section 25(a) in light of new developments in federal law. The Board docketed the State's motion as R80-1, consolidated R80-1 with R71-9, and, after a motion by Commonwealth Edison Company to dismiss the consolidated proceedings, considered briefs on the question of the Board's authority to regulate airborne radiation hazards following the federal Clean Air Act Amendments of 1977. In an Opinion and Order of August 7, 1980 (39 PCB 307) the Board determined that it has jurisdiction under Section 25(a) to regulate airborne radiation hazards from materials and activities licensed by the NRC.

R71-9 and R80-1 were, however, dismissed by that same order since the original proposal was nine years old by that time and the Board felt that it was outdated. The petition filed in this matter contains the first subsequent proposal filed which addresses atomic radiation issues.

Board Authority

The Board's authority to promulgate these regulations has again been called into question. In a comment filed on May 14, 1982, Kerr-McGee Chemical Corporation requests the Board to reconsider whether the adoption of the proposed rules is preempted "by the federal government through the regulatory, licensing and enforcement authority of the NRC" (KM Comment, p. 21).

The Board has considered Kerr-McGee's arguments, but finds in them no reason to depart from the holding or reasoning of its August 7, 1980 Opinion and Order in R71-9, R80-1 consolidated. The Board notes in this regard that its position has been strongly supported by John-Mark Stensvaag who states, after lengthy analysis, that "the power of individual states to regulate radioactive air emissions from NRC licensed facilities is indisputable" [Stensvaag, "State Regulations of Nuclear Generating Plants Under the Clean Air Act Amendments of 1977," 55 S. Cal. L.Rev. 511, 536 (March, 1982)].

The Proposal

DNS has proposed rules which would regulate radiological air pollutants emitted from NRC regulated facilities. They establish permissible levels of radiation exposure to persons in unrestricted areas (areas in which access is not controlled by the NRC licensee); maximum concentrations of radiological air emissions; record keeping and environmental monitoring requirements; and notification requirements. The provisions are very similar to those found in existing federal regulations.

The proposed regulations also establish permissible levels of radiation exposure to individuals in unrestricted areas which are the same in current NRC regulations (10 CFR 20.105): 500 millirems in any one year, 100 millirems in any seven consecutive days, and 2 millirems in any one hour. They also limit annual exposure in unrestricted areas from commercial power reactor operations and nuclear fuel reprocessing to 75 millirems to the thyroid and 25 millirems to the whole body and other organs. These limitations are identical to U.S. EPA regulation 40 CFR 190.10.

Limits on radioactive air emissions to unrestricted areas, set forth in Appendix A of the proposal, are identical to the limits in Appendix B of 10 CFR 20.

The record keeping requirements set forth in the proposal are the same as those in existing NRC regulations. However, the proposal also allows DNS to require reports in addition to those provided the NRC, and requires all licensees to maintain such environmental monitoring equipment as may be required. DNS has not yet established any such requirements.

Finally, the proposed rules require NRC licensees to notify DNS "of incidents or conditions arising from the use or possession of [NRC-] licensed materials or facilities which may have caused or threaten to cause emissions of radiation levels in excess of those allowed" under the proposal (8/26/82 proposal, p. 14). The notification requirement is the same as in existing NRC regulations.

Need For The Proposed Regulations

The proposed rules are intended to provide a legal basis for DNS enforcement authority under the Act. Dr. John W. Cooper, a radiation biologist and Assistant to the Director of DNS, who was previously employed by the NRC, testified regarding the necessity for the proposed rules. He explained that the NRC lacks independent environmental monitoring and, therefore, must rely on licensee data for information about licensee performance. Dr. Cooper concluded that NRC's limited resources for monitoring and its non-environmental focus result in a limited ability to assess licensee performance and enforce air emission standards.

Dr. Cooper described the DNS program as one which

> is designed to independently evaluate licensee emissions and radiation levels in unrestricted areas. The program is heavily oriented toward environmental monitoring and includes primarily equipment designed to measure levels in the environmental area (5/11 R. 18).*

Dr. Cooper contrasted the NRC's environmental effort, which is "primarily involved with auditing licensee performance", to DNS's, which is "primarily involved with direct field measurements of licensee performance" (5/11 R. 20 and 5/14 R. 11). Dr. Cooper stated that "in the area of environmental surveillance ... DNS has the higher capacity," with its staff of five health physicists, three nuclear engineers, a radiochemist, a radiation biologist, and an industrial hygienist, most of whom are involved with environmental radiation exposure and environmental measurements (5/11 R. 20).

Dr. Cooper further testified that independent assessment of licensee environmental performance is valuable in protecting the public from airborne radioactive materials (5/14 R. 18), and that the major benefit of the proposed rules is to focus attention on licensee environmental performance rather than on reactor design and operation and to give DNS the power to make efficient use of its independently obtained environmental data (5/14 R. 22-23). Dr. Cooper further indicated that if DNS's monitoring teams detected a radiation safety hazard and reported the situation to NRC, NRC would take such report "as information only" and would do an independent assessment before proceeding to any enforcement action (5/11 R. 25-26).

The testimony of Commonwealth Edison's witnesses corroborated Dr. Cooper's testimony regarding the absence of independent NRC environmental assessment. John Golden described Commonwealth Edison's activities and its reporting to NRC and indicated that there is nearly no independent monitoring by NRC, nor does NRC sample air, gases released from the stack, and liquids, and it does not perform any remote monitoring of site releases. (See 5/11 R. 195-208).

In sum, DNS demonstrated that the proposed rules do not duplicate the NRC's regulatory efforts but, rather, complement them. As Board Member Goodman suggested, DNS should not have to depend on the good will of licensees in order to conduct monitoring activities (5/11 R. 66). Further, neither DNS nor the general public should be obliged to rely on the NRC's limited capacity to enforce compliance with its standards. Because the radiological

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*References to the May 11, 1984, transcript will be cited as (5/11 R.___), the May 14, 1984, transcript will be cited as (5/14 R.___), and the February 17, 1984, transcript will be cited as (2/17 R.___).

air pollutants associated with NRC licensees present dangers to public health and safety, licensees should be treated like other air pollution sources in Illinois and be made subject to Board regulation under the Act.

The NRC regulates and licenses possession and use of certain materials and facilities under the Atomic Energy Act: (1) source material (the naturally occurring radioactive elements, uranium and thorium, from which nuclear fuel is made), (2) special nuclear material (nuclear fuel or fissionable material), (3) byproduct material (material produced by fission or irradiated during fission, and uranium and thorium mill tailings), (4) production facilities (facilities for producing nuclear fuel), (5) utilization facilities (facilities which utilize nuclear fuel--i.e., reactors, both commercial and research) (42 U.S.C. 2092, 2111, 2073, 2131, and 2201). Under some circumstances the NRC holds a public adjudicatory hearing in connection with the granting of licenses and permits. On applications for permits to construct a utilization or production facility, the NRC must hold a hearing; on applications for licenses to operate a utilization or production facility and on other license applications, the NRC must hold a hearing only if one is requested (42 U.S.C. 2239). In either case, a person may be admitted as a party to a hearing only if he can put forward at least one contention which the NRC determines to be sufficiently specific and supported [10 C.F.R. 2.714(a)(b)]. When a final order is entered following the hearing, an appeal may be taken to the Circuit Court of Appeals (28 U.S.C. 2341).

Under the NRC's procedural rules, one may bring a complaint against a licensee only by requesting the NRC to institute a "show-cause" proceeding (10 C.F.R. 2.202, 2.206), which will not be instituted unless the NRC determines that circumstances so warrant. DNS contends that no court has ever reversed an NRC decision refusing to institute a show-cause proceeding and that the NRC very rarely grants such proceedings. Further a complainant before the NRC is entitled to judicial review under the "abuse of discretion" standard as opposed to Illinois' "manifest weight of the evidence" standard. Thus, the ability of States or private citizens to enforce federal radiation standards is limited.

Economic Impact Study

Commonwealth Edison stated in its March 26, 1984, comments that:

> The proposed regulation is unnecessary. An effective state and federal regulatory scheme already exists which accomplishes all of the objectives of the proposed regulation. Moreover, the Illinois Department of Energy and Natural Resources' statutorily mandated study of the economic impact of R82-2 shows that its cost to the State, the regulated industry and the public would outweigh any benefits it may provide.

Also, near the close of hearings, counsel for Illinois Power stated that he believed this to be "the one regulatory proposal [he had] ever seen that is unwarranted, on the sole basis of economics" (2/17 R. 169). The DNS, unsurprisingly, disagrees with both of these assessments.

The Economic Impact Study (EcIs), which was filed as Exhibit No. 8 in this proceeding on February 17, 1984, reached the following conclusions:

1. Administrative costs would increase $135,000 annually;

2. Increased litigation and plant shutdowns would cost zero to $3.375 million annually; and

3. Reducing nuclear power plant emissions by 10% would cost $130,000 annually but would result in a health benefit of $12,600 per year.

The first component of increased administrative costs is $60,000 per year to the DNS resulting from hiring two additional employees to inspect DNS-monitoring devices, collect samples of air, water, and vegetation, and process reports from NRC licensees. An additional component is equipment costs resulting from installation of radiation monitoring devices around major NRC licensees in the state, considered to be negligible by DNS. The final component is added management supervision and overhead costs related to the employment of two additional nuclear engineers, estimated by DNS at $75,000 per year (EcIS, pp. 37-38).

During the May 11 and 14, 1982 hearings, representatives of Commonwealth Edison and Illinois Power indicated concern about the potential effect of the regulation on the amount of litigation for the companies and on the frequency of shutdown of their nuclear facilities. The law firm of Martin, Craig, Chester and Sonnenschein investigated and commented on the potential for increased litigation as an appendix to the EcIS. The cost estimate appears to be based solely upon the 1982 costs to Commonwealth Edison in connection with a lawsuit concerning its LaSalle County nuclear power plant which totalled $639,380 (EcIS, pp. 45-46). While admitting that "the estimate of the costs resulting from increased litigation and frequency of nuclear power plant shutdowns due to R82-2 is difficult to make because of the many uncertainties involved," the authors of the EcIS estimate a range of zero to $1.0 million per year (EcIS, p. 49). The authors go on to explain that "the latter estimate reflects a substantial increase in litigation for the industry and was chosen in order to represent an upper bound on the increased litigation expenses. This estimate exceeds the costs associated with the legal action connected with the LaSalle County facility since this previous legal action was only presented for illustrative purposes and consequently does not necessarily represent an upper bound on increased litigation for the nuclear power industry due to R82-2" (EcIS, pp. 49-50).

The increase in the average frequency of nuclear power plant shutdowns is estimated to range between zero to 5 days per year based upon the fact that the previously-discussed legal action against the LaSalle County facility resulted in a delay in the start-up of 17 days, which, if such a shutdown is presumed to occur every three years results in an average annual increase in shutdowns of approximately 5 days, which, in turn, translates into an increase in costs for the utility industry of $1.725 million to $2.375 million annually (EcIS, p. 50).

In considering the costs to the nuclear industry of reducing emissions, the authors of the EcIS conclude that "the range of estimates for the annual costs associated with increased direct litigation costs along with the resulting greater frequency of plant shutdowns is zero to $3.375 million" (EcIS, p. 50).

The authors of the EcIS indicated that:

> increases in equipment, personnel, and other costs for nuclear power plant operators resulting from R82-2 would be relatively minor or nonexistent insofar as the utilities's representatives understood the manner in which R82-2 would be implemented. For example, it was indicated that no changes in equipment or design of Commonwealth Edison's nuclear power plants would result from R82-2. In addition, reporting requirements were not expected to increase since all emission reports currently filed with the NRC are sent to DNS as a courtesy. The major reason for concluding that R82-2 will not result in increases in equipment, personnel, and operating expenses is that the R82-2 requirements are very similar to those in NRC regulations, with which the utilities are currently complying (EcIS, p. 39).

Despite those findings, the authors of the study proceeded to calculate the cost to nuclear power plants to reduce emissions 10 percent, that cost being $130,000 per year (EcIS, pp. 40-42).

The only potential beneficial effect noted by the authors of the study is the public health benefit of reducing emissions 10 percent (EcIS, pp. 66-72). The summary of beneficial effects states that there would be a very slight reduction in death rate as cancer fatalities are reduced by roughly one every 100 years. This benefit results from a 10 percent reduction in emissions of radiological air pollutants from major NRC licensees in Illinois. The monetary value associated with the reduction in death rate was estimated to be $12,600 per year. This estimate is based on studies of people's willingness to pay for measures affecting safety and survival.

DNS takes the position that DENR should have declared "that the economic impact of R82-2 is so difficult to measure that a formal study would not generate useful information, or that the cost of making a formal study outweighs its value in determining economic impact" (DNS Memo., 3/26/84, p. 2). Since that did not occur, however, DNS presented testimony demonstrating that "the EcIS has limited usefulness, providing at most a rough guide to some of the economic issues raised by regulation of radiological pollutants" (ibid, p. 2).

DNS' major concern is that the EcIS does not identify all of the costs and benefits of R82-2 and does not explain its methodology. DNS states that the EcIS did not address the social and institutional benefits of reduced uncertainty about licensee performance which would result from authorized independent state monitoring and enforcement capability, and it failed to consider the suffering and sickness associated with nonfatal cancers and the medical and disability costs. DNS also points out that the authors of the EcIS made a number of arbitrary choices of cost and benefit estimates which it continually failed to acknowledge (ibid, p. 4).

More specifically, DNS finds it hard to understand why potential litigation was considered in the economic impact. All Board regulations can lead to litigation and, if industry is fully in compliance with the federal limitations, enforcement actions are unlikely; if it is not, enforcement may well be necessary. Thus, DNS concludes that litigation costs to industry are directly associated with health and other benefits due to reduced radiation exposure. DNS noted at the February 17, 1984, hearing, that the authors relied on a "sample of one" in determining litigation costs, and the EcIS does not even indicate whether the expenditures are typical of expected expenditures. The same considerations apply to the analysis of Board ordered shutdowns.

The Board accepts the uncontested administrative cost figure of $135,000 as reasonable, but has serious reservations about the other cost figures. As DNS pointed out, there is nearly no indication in the EcIS whether the costs would more likely be near the low end of the range (zero) or the high end ($3.5 million). Furthermore, there is the barest support for the high end figures, and several important considerations have been ignored.

A particular issue was made about enforcement against "threatened" releases. Section 9(a) of the Act prohibits causing or threatening air pollution; and concern was expressed that any citizen could file a judicial complaint asserting on hypothetical grounds that an accident or release in excess of applicable standards may occur which will result in air pollution (5/11 R. 130-131). The Board sees no reason to believe that claims of threatened radiation pollution, whether characterized as a statutory violation under Section 9(a) or a prospective common law nuisance, will be treated by the Board or the courts any differently than other

claims of threatened pollution. The mere hypothetical possibility of pollution is insufficient to warrant injunctive relief. There must rather be a "definite danger" or "very definite danger" [Allaert Rendering, Inc. v. Pollution Control Board, 91 Ill. App.3d, 46 Ill.Dec. 608, 414 N.E.2d 492 (3d Dist. 1980); Rocke v. Pollution Control Board, 78 Ill.App.3d, 33 Ill.Dec. 717, 397, N.E.2d 51 (4th Dist. 1979)]. For a prospective nuisance, an activity will not be enjoined unless it is "highly probable" that it will result in a nuisance [Village of Wilsonville v. SCA Services, Inc., 86 Ill.2d 1, 55 Ill.Dec. 499, 426 N.E.2d, 824 (1981)].

Commonwealth Edison also expressed concern that the enforcement power which would result from the proposed regulations would enable people with anti-nuclear sentiments to harrass the company through a "flood of litigation" (5/11 R. 94-95). Counsel stated his concern that "in a statutory system" any citizen can file a complaint and that "we are at the mercy of the most radical and obdurate of our opponents" (5/11 R. 101), implying that the enforcement mechanism will result in a great deal of factually baseless litigation. However, the possibility that some citizens will file complaints which are found to be factually baseless should be of little concern, as should its fear of multiple lawsuits in different forums. Under Section 31(b) of the Act the Board can not allow enforcement actions to proceed if they are frivolous (without a legal or factual basis) or duplicitous (already filed before the Board or some other forum). Further, citizen suits have been available under the Act since its inception and there has never been a "flood of litigation" despite recurring concerns that there would be.

The Board believes that consideration of the costs and benefits of potential litigation is not appropriate in reaching a decision in this regulatory proceeding. The cost of litigation in enforcing fair and reasonable substantive regulations promulgated to protect the public interest and welfare must be presumed justified. Indeed, that proposition goes to the heart of our legal system. The Board, therefore, finds no net cost of litigation. The Board notes that the Economic Technical Advisory Committee which reviewed the EcIS also questioned the inclusion of litigation costs (Ex. 8, ETAC Opinion, p. 2).

Similarly, the Board seriously questions the cost associated with potential shutdowns. Industry expressed concern during the hearings that an increase of reactor shutdowns can be expected as a result of state enforcement power. However, the proposed regulations are no different than the Board's other regulations, except that DNS rather than the Agency will be the implementing agency. The Board presumes that DNS will exercise its prosecutional discretion in a manner much like the Agency's. Furthermore, the Board will certainly be aware of the cost of a shutdown when it considers whether such an order should be entered, and if it finds that the cost of a shutdown outweighs the public health

benefit, no shutdown will be ordered. The Board, therefore, finds no net cost of shutdowns.

The Board finds the cost of reducing emissions by 10 percent and the related health benefits interesting, but not particularly useful. Industry indicates that it is presently in substantial compliance with the proposed limitations, indicating that the cost of compliance is little or nothing. The proposed regulations would not require a 10 percent reduction, or any reduction at all. There is, in fact, no evidence in the record to suggest that such a reduction would result from the proposed regulation. Therefore, the Board finds compliance costs to be negligible, as well as the health benefits associated with them.

Based on the EcIS, then, the Board is led to the conclusion that the cost of the proposed regulation is about $135,000 annually with no associated health benefits. However, this ignores the possibility that the proposed regulations will result in greater oversight of the nuclear industry and that potential, or real, problems may be uncovered and remedied which would not be absent the regulations. That such benefits are expected to follow from these regulations is demonstrated by Governor Thompson's amendatory veto statement issued September 18, 1980, regarding the creation of DNS. The Governor stated that DNS' regulatory function insures

> greater accountability to the State and safer operation and handling of radiological facilities and materials. This legislation represents an enormous step forward for Illinois nuclear safety... In addition, the [DNS] will participate with the federal government both on the regulatory and legislative levels to ensure state input into the questions which so significantly affect us... This state, which is more dependent on nuclear power than any other state in the nation, must be first in nuclear safety as well.

The hearing record demonstrates that the proposed regulations should help fulfill the expectations that state oversight of nuclear materials and facilities can and should complement federal oversight, and the Board finds that the $135,000 cost of administration is a reasonable expense for the added protection which will result from these regulations.

General Provisions and Definitions

The Board proposes to adopt proposed Sections 1000.101, 1000.102, 1000.103 and 1000.201 (Authority, Purpose and Policy, Scope and Definitions, respectively) as proposed with minor changes and proposes to delete proposed Section 1000.104 (Duties of the Department) as unnecessary. Since DNS' enabling act sets out these duties, the Board finds no reason to set them out here.

Kerr-McGee was the only participant to attack these proposed sections (KM Comment, pp. 3-4). It points out that proposed section 1000.102(b), adapted from 10 C.F.R. 20.1(c), contains two significant changes: the word "should" in the NRC's regulation which states that affected persons "should" make every reasonable effort to maintain radiation exposures to unrestricted areas as low as is reasonably achievable, has been changed "shall," and the definition of "as low as is reasonably achievable" has been changed to delete the word "reasonably." It believes that these changes limit the Board's discretion and result in "significantly more stringent standards -- at significantly greater cost -- than the NRC" standards (KM Comment, p. 4).

DNS responds that the words "should" and "shall" are equally mandatory. It further states that it deleted the word "reasonably" from the definition of "ALARA"* because it is "surplussage" used to define itself in the federal definition (DNS 8/26/82 Memo., p. 4).

While the Board agrees with the changes made by DNS and the reasons for those changes, the Board will propose the federal language rather than the DNS language simply to avoid any possible arguments that the changes result in substantive differences.

Standards and Limitations

No one has commented adversely on Sections 1000.301, 1000.302 or 1000.303 (Permissible Levels of Radiation in Unrestricted Areas, Radioactive Emissions to Unrestricted Areas, and Additional Requirements, respectively) in their present form, and the Board will propose Sections 1000.301 and 1000.302 as requested by DNS. The Board will not, however, propose Section 1000.303 as requested. As proposed by DNS, that section simply incorporates 40 CFR 90 by reference. Since Part 90 is only two pages long, the Board sees no reason not to set forth those provisions rather than incorporate by reference, and the Board will do so as Subpart D and the originally proposed Subpart D will be redesignated as Subpart E. Also, the Board will not propose the sections on variances or the effective date provisions contained in Part 90. The latter are unnecessary and the former are being deleted for the same reasons as Section 1000.304, as discussed below. These rules reflect the federal rules with which affected facilities must already comply and with which those facilities are apparently in compliance. The Board will not, however, propose Section 1000.304 regarding variances. That section includes information that the Board "shall consider" in reviewing variance petitions under Subtitle I.

*The term "as low as is reasonably achievable" (ALARA) means as low as is reasonably achievable taking into account the state of technology, and the economics of improvement...(10 C.F.R. 20.3)

Kerr-McGee objects that while the Board is only required to consider that information, the NRC must grant the variance if all the listed conditions are satisfied. [See 10 C.F.R. 20.106(b)]. DNS states that the reason Section 1000.304 differs from the federal rule is that the Board's variance authority is circumscribed by the Act which allows the Board to grant variance only upon "presentation of adequate proof that compliance with any rule or regulation, request or order of the Board would impose an arbitrary or unreasonable hardship." (See Section 35 of the Act). Thus, satisfaction of the Section 1000.304 factors will not necessarily be sufficient to obtain a variance.

The Board agrees with DNS that it cannot adopt the federal language. Absent superceding statutory authority, the Board's power to grant variances must be constrained by Section 35 of the Act. Further, in accordance with that section the Board has adopted procedures for obtaining variance relief at 35 Ill. Adm. Code 104. The Board has found those provisions to be adequate for all other variances, and there is nothing in this record that convinces the Board that different procedures are necessary under these proposed rules. The information which would be required under DNS' proposal is information which would be expected to be supplied to the Board by a variance petitioner under the current rules*. Therefore, the Board will delete Section 1000.304 from its first proposal.

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*The proposed rule is as follows:

Section 1000.304: Variances From Limitations of Appendix A

(a) (1) In reviewing petitions for variances from the limitations specified in Appendix A, the Board shall consider generally:

(A) The petitioner's efforts to minimize the radioactivity contained in releases to unrestricted areas; and

(B) The possibility that radioactive material released might result in the exposure of an individual to concentrations of radioactive material in air exceeding the limits specified in Appendix A of this Part.

(2) In reviewing petitions for variances from the limitations specified in Appendix A, the Board shall consider specifically:

(A) Information as to flow rates, total quantity of releases, peak concentration of each radionuclide in the releases averaged over a period of one year at the point where the emission leaves a stack, tube, pipe, or similar conduit.

(B) The properties of the releases, including:
(continued on next page)

Records and Other Requirements

Subpart D of the DNS proposal establishes requirements for the submission of records, monitoring, and notification of incidents. It also establishes procedures under which the DNS can adopt rules requiring additional records to be submitted and to establish monitoring requirements.

The only information in this record adverse to the proposal of these rules is that included in Commonwealth Edison's March 26, 1984, comments. Edison argues that the proposed rules give the DNS the authority to impose equipment requirements and standards on regulated facilities without limitation: a redelegation of authority which the Act gives to the Board. Section 1000.403(a)(1) of the proposed regulation states that "all persons subject to this Part shall maintain such environmental monitoring instruments as may be required in procedures adopted by the Department." Those procedural requirements involve minimal public comment and no provision for required hearings. DNS could point to nothing in the proposed rules or the record guiding DNS' ability to require equipment (2/17 R. 92).

(i) Chemical composition;
(ii) Physical characteristics and nature of the gas or aerosol; and
(iii) The size range of particulates in releases in air.

(C) The anticipated human occupancy in the unrestricted area where the highest concentration of radioactive material from the releases is expected.

(D) Information as to the highest concentration of each radionuclide in an unrestricted area at any point of human occupancy including anticipated concentrations averaged over a period of one year.

(E) The environmental monitoring equipment and procedures and calculations to determine concentrations of radionuclides in the unrestricted area and possible reconcentrations of radionuclides.

(F) The waste treatment facilities and procedures used to reduce the concentration of radionuclides prior to their release.

When the state legislature created the DNS, it gave the DNS the authority to "exercise, administer, and enforce all rights, powers and duties vested in the Environmental Protection Agency" under Section 4 of the Act. This section does not give DNS any authority to adopt standards or requirements for monitoring equipment at regulated facilities. On the contrary, as Commonwealth Edison points out, the Act places exclusive responsibility for the development of such regulations with the Board under Section 10(g) of the Act which states that the Board may prescribe "requirements and standards for equipment and procedures for monitoring contaminant discharges at their sources, the collection of samples and the collection, reporting and retention of data resulting from such monitoring." The adoption of such regulations involves specific procedures to insure a fully developed record. (See Sections 26-29 of the Act).

Thus, Commonwealth Edison argues that the legislature obviously intended the Board to regulate this aspect of its pollution control program, and when the legislature delegates authority to an agency, that agency, absent words in the Act sanctioning such horizontal redelegation, may not redelegate, since redelegation of a discretionary power by an administrative agency to another agency is void. Commonwealth Edison Co. v. Pollution Control Board, 25 Ill. App. 3d 271, 280 (1st Dist. 1974), rev'd on other grounds, 62 Ill. 2d 494 (1976).

The Board agrees with Edison and, in fact, believes that the same argument applies to the adoption of the establishment of reporting requirements by DNS. Nothing in Section 4 of the Act grants DNS the power to adopt substantive rules: it may only propose them to the Board for the Board's adoption. Therefore, the Board declines the proposal of subsection 1000.402(b) and Section 1000.403. Further, the definition of "environmental monitoring" of Section 1000.401 will be incorporated into 1000.402(a)(6), which is the only place the term is used in the Board's proposal. Finally, these sections will be redesignated as Subpart E and appropriately renumbered as 1000.501 et seq. Otherwise, the Board will propose the adoption of these sections for first notice as requested.

That Board notes that the Wall Street Journal dated Friday, January 18, 1985, indicates that USEPA has "promulgated regulations governing certain releases of low-level radiation...from Energy Department facilities and other items regulated by the Nuclear Regulatory Commission." The Board has not, however, had an opportunity to examine those regulations. It may be that the Board will have to amend this proposal to insure that any adopted regulations are no less stringent that the USEPA rules. Therefore, while the Board will proceed to first notice, it invites comment on the effect of the new USEPA rules on this proceeding.

ORDER

The Board hereby proposes for first notice the following amendments to:

TITLE 35: ENVIRONMENTAL PROTECTION
SUBTITLE I: ATOMIC RADIATION
CHAPTER I: POLLUTION CONTROL BOARD
PART 1000: RADIATION HAZARDS

SUBPART A: GENERAL PROVISIONS

Section 1000.101: Authority

The Pollution Control Board adopts the rules and regulations contained in this title pursuant to the authority of Title VI-A of the Illinois Environmental Protection Act.

Section 1000.102: Purpose and Policy

(a) The regulations in this Part establish standards for protection against radiological air pollutants associated with materials and activities under licenses issued by the United States Nuclear Regulatory Commission pursuant to the Atomic Energy Act of 1954, as amended, and the Energy Reorganization Act of 1974.

(b) It is the policy of the Pollution Control Board that persons subject to this Part shall, in addition to complying with the requirements of this Part, make every reasonable effort to maintain radiation exposures in, and releases of radioactive materials to, unrestricted areas as low as is reasonably achievable. The term "as low as is reasonably achievable" means as low as is reasonably achievable taking into account the state of technology, the economics of improvements in relation to benefits to the public health and safety, and other societal and socioeconomic considerations, in relation to the utilization of atomic energy in the public interest. Persons licensed by the United States Nuclear Regulatory Commission to operate light-water-cooled nuclear power reactors shall be deemed to satisfy the requirements of this subsection if they achieve the design objectives and limiting conditions for operation set out in 10 C.F.R. 50, Appendix I.

Section 1000.103: Scope

The requirements of this Part apply to all persons who receive, possess, use, or transfer material licensed pursuant to Parts 30 through 35, 40, or 70, or who are licensed to operate a production or utilization facility pursuant to Part 50 of the regulations of the United States Nuclear Regulatory Commission codified in Title 10 of the Code of Federal Regulations.

SUBPART B: DEFINITIONS

Section 1000.201: Definitions

As used in this Part:

"Act" means the Illinois Environmental Protection Act, ch. 111-1/2 Ill.Rev.Stat., §§1001 et seq.

"Board" means the Illinois Pollution Control Board.

"Department" means the Illinois Department of Nuclear Safety.

"Dose" means the quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body. When these regulations specify a dose during a period of time, the dose means the total quantity of radiation absorbed, per unit of mass, by the body or by any portion of the body during such period of time. Several different units of dose are in current use. Definitions of units as used in these regulations are set forth in the definitions of "Rad" and "Rem" in this Section.

"Individual" means any human being.

"Licensed activity" means any activity engaged in under a general or specific license issued by the NRC.

"Licensed facility" means any facility constructed or operated under a permit or a general or specific license issued by the NRC.

"Licensed material" means any material received, possessed, used, or transferred under a general or specific license issued by the NRC.

"Licensee" means any person to whom a permit or a general or specific license has been issued by the NRC.

"NRC" means the United States Nuclear Regulatory Commission.

"Rad" means a measure of the dose of any radiation to body tissues in terms of the energy absorbed per unit mass of the tissue. One rad is the dose corresponding to the absorption of 100 ergs per gram of tissue. (One millirad (mrad) = 0.001 rad).

"Radiation" means any or all of the following: alpha rays, beta rays, gamma rays, X-rays, neutrons, highspeed electrons, high-speed protons, and other atomic particles; but not sound or radio waves, or visible, infrared, or ultraviolet light.

"Radioactive material" and "radioactive emissions" means any radioactive material in the form of dusts, particulates, fumes, mists, vapors, or gases.

"Rem" means a measure of the dose of any ionizing radiation to body tissue in terms of its estimated biological effect relative to a dose received from an exposure to one roentgen of X-rays. (One millirem (mrem) = 0.001 rem). The relation of rem to other dose units depends upon the biological effect under consideration and upon the condition of irradiation. For the purpose of this Part, any of the following is considered to be equivalent to a dose of one rem:

(a) An exposure to one roentgen of X- or gamma radiation;

(b) A dose of one rad due to X-, gamma, or beta radiation;

(c) A dose of 0.1 rad due to neutrons or high energy protons;

(d) A dose of 0.05 rad due to particles heavier than protons and with sufficient energy to reach the lens of the eye. If it is more convenient to measure the neutron flux, or equivalent, than to determine the neutron dose in rads, one rem of neutron radiation may for purposes of this Part be assumed to be equivalent to 14 million neutrons per square centimeter incident upon the body; or, if there exists sufficient information to estimate with reasonable accuracy the approximate distribution in energy of neutrons, the incident number of neutrons per square centimeter equivalent to one rem may be estimated from the following table.

Neutron Flux Dose Equivalents

Neutron energy (Mev)	Number of neutrons per square centimeter equivalent to a dose of 1 rem (neutrons/cm^2)	Average flux to deliver 100 millirem in 40 hours (neutrons/cm^2 per second)
Thermal	970×10^6	670
0.0001	720×10^6	500
0.005	820×10^6	570
0.02	400×10^6	280
0.1	120×10^6	80
0.5	43×10^6	30
1.0	26×10^6	18
2.5	29×10^6	20
5.0	26×10^6	18
7.5	24×10^6	17
10.0	24×10^6	17
10 to 30	14×10^6	10

"Restricted area" means any area access to which is controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials. "Restricted area" shall not include any areas used as residential quarters, although a separate room or rooms in a residential building may be set apart as a restricted area.

"Unrestricted area" means any area access to which is not controlled by the licensee for purposes of protection of individuals from exposure to radiation and radioactive materials, and any area used for residential quarters.

SUBPART C: STANDARDS AND LIMITATIONS

Section 1000.301: Permissible Levels of Radiation in Unrestricted Areas

No person shall possess, use, receive, or transfer licensed material or engage in licensed activities in such manner as to create in any unrestricted area:

(a) Radiation levels in air such that any individual would be likely, when all radioactive emissions by the licensee are taken into account, to receive a dose to the whole body in excess of 0.5 rem in any one year;

(b) Radiation levels in air which, if an individual were continuously present in the area, could result, when all radioactive emissions by the licensee are taken into account, in his receiving a dose in excess of 2 millirems in any one hour; or

(c) Radiation levels in air which, if an individual were continously present in the area, could result, when all radioactive emissions by the licensee are taken into account, in his receiving a dose in excess of 100 millirems in any seven consecutive days.

Section 1000.302: Radioactive Emissions to Unrestricted Areas

(a) No person shall possess, use, receive, or transfer licensed material or engage in licensed activities so as to release to air in an unrestricted area radioactive material in concentrations which exceed the limits specified in Appendix A of this Part. For purposes of this section concentrations may be averaged over a period not greater than one year.

(b) For the purpose of this section the concentration limits in Appendix A of this Part shall apply at the boundary of the restricted area. The concentration of radioactive material discharged through a stack, pipe or similar conduit may be determined with respect to the point where the material leaves the conduit. If the conduit discharges within the restricted area, the concentration at the boundary may be determined by applying established factors for dilution, dispersion, or decay betweeen the point of discharge and the boundary.

SUPBART D: ADDITIONAL REQUIREMENTS

Section 1000.401: Applicability

The provisions of this part apply to radiation doses received by members of the public in the general environment and to radioactive materials introduced into the general environment as the result of operations which are part of a nuclear fuel cycle.

Section 1000.402: Definitions

As used in this Subpart:

"Curie" (Ci) means that quantity of radioactive material producing 37 billion nuclear transformations per second. (One millicurie (mCi)=0.001 Ci.)

"Dose equivalent" means the product of absorbed dose and appropriate factors to account for differencies in biological effectiveness due to the quality of radiation and its spatial distribution in the body. The unit of dose equivalent is the "rem." (One millirem (mrem)=0.001 rem.)

"General environment" means the total terrestrial, atmospheric and aquatic environments outside sites upon which any operation which is part of a nuclear fuel cycle is conducted.

"Gigawatt-year" refers to the quantity of electrical energy produced at the busbar of a generating station. A gigawatt is equal to one billion watts. A gigawatt-year is equivalent to the amount of energy output represented by an average electric power level of one gigawatt sustained for one year.

"Member of the public" means any individual that can receive a radiation dose in the general environment, whether he may or may not also be exposed to radiation in an occupation associated with a nuclear fuel cycle. However, an individual is not considered a member of the public during any period in which he is engaged in carrying out any operation which is part of a nuclear fuel cycle.

"Nuclear fuel cycle" means the operations defined to be associated with the production of electrical power for public use by any fuel cycle through utilization of nuclear energy.

"Organ" means any human organ exclusive of the dermis, the epidermis, or the cornea.

"Radiation" means any or all of the following: Alpha, beta, gamma, or X-rays; neutrons; and high-energy electrons, protons, or other atomic particles; but not sound or radio waves, nor visible, infrared, or ultra-violet light.

"Radioactive material" means any material which spontaneously emits radiation.

"Site" means the area contained within the boundary of a location under the control of persons possessing or using radioactive material on which is conducted one or more operations covered by this part.

"Uranium fuel cycle" means the operations of milling of uranium ore, chemical conversion of uranium, isotopic enrichment of uranium, fabrication of uranium fuel, generation of electricity by a light-water-cooled nuclear power plant using uranium fuel, and reprocessing of spent uranium fuel, to the extent that these directly support the production of electrical power for public use utilizing nuclear energy, but excludes mining operations, operations at waste disposal sites, transportation of any radioactive material in support of these operations, and the reuse of recovered nonuranium special nuclear and by-product materials from the cycle.

Section 1000.403: Environmental Standards for the Uranium Fuel Cycle

Operations covered by this Subpart shall be conducted in such a manner as to provide reasonable assurance that:

(a) The annual dose equivalent does not exceed 25 millirems to the whole body, 75 millirems to the thyroid, and 25 millirems to any other organ of any member of the public as the result of exposures to planned discharges of radioactive materials, radon and its daughters excepted, to the general environment from uranium fuel cycle operations and to radiation from these operations.

(b) The total quantity of radioactive materials entering the general environment from the entire uranium fuel cycle, per gigawatt-year of electrical energy produced by the fuel cycle, contains less than 50,000 curies of krypton-85, 5 millicuries of iodine-129, and 0.5 millicuries combined of plutonium-239 and other alpha-emitting transuranic radionuclides with halflives greater than one year.

SUBPART E: RECORDS

Section 1000.501: Records

(a) All persons subject to this Part shall submit to the Department, with respect to any material or facility permitted or licensed by the NRC or for which an NRC permit or license is sought:

(1) Preliminary Safety Analysis Report and Final Safety Analysis Report, as described in 10 C.F.R. 50.34

(2) Application for Construction Permit and for all amendments thereto, including information required by 10 C.F.R. 50.34a, 50.36, and 51.20

(3) Environmental Impact Appraisal, Draft and Final Environmental Impact Statement, Negative Declaration, or other document prepared by the NRC under 10 C.F.R. 51.5.

(4) Operating Permit and all amendments thereto, including Technical Specifications under 10 C.F.R. 50.36a.

(5) Application for Amendment to Operating License

(6) All data, records, and reports submitted to the NRC in commection with determining or predicting radiation levels in air in unrestricted areas or the type or amount of radioactive materials emitted into air conducted by or for such persons.

(b) All records, reports, and data received by the Department pursuant to this Subpart shall be available for public inspection at reasonable times and upon reasonable notice.

Section 1000.502: Notification of Incidents

All person subject to this Part shall immediately notify by telephone and telegraph, mailgram, or facsimile, the Manager of the Office of Nuclear Facility Safety of the Illinois Department of Nuclear Safety, 1035 Outer Park Drive, Springfield, Illinois 62704, of any incident or condition arising from the

use or possession of licensed materials or facilities or the conducting of licensed activities which may have caused or threatens to cause emissions or radiation levels in excess of those allowed under this Part.

Section 1000.503: Other Provisions

(a) The definitions set out in Subtitle B, Part 201.102 apply to this Part.

(b) All persons subject to this Part are subject to the requirements and provisions 35 Ill. Adm. Code 201,122, 201,123, 201.124, 201.125, 201.126, 201.141, 201.150 and 201.151.

APPENDIX A--CONCENTRATIONS IN AIR ABOVE NATURAL BACKGROUND

Element (atomic number)	Isotope[1]		pCi/ml
Actinium (89)	Ac 227	S	8×10^{-14}
		I	9×10^{-13}
	Ac 228	S	3×10^{-9}
		I	6×10^{-10}
Americium (95)	Am 241	S	2×10^{-13}
		I	4×10^{-12}
	Am 242m	S	2×10^{-13}
		I	9×10^{-12}
	Am 242	S	1×10^{-9}
		I	2×10^{-9}
	Am 243	S	2×10^{-13}
		I	4×10^{-12}
	Am 244	S	1×10^{-7}
		I	8×10^{-7}
Antimony	Sb 122	S	6×10^{-9}
		I	5×10^{-9}
	Sb 124	S	5×10^{-9}
		I	7×10^{-10}
	Sb 125	S	2×10^{-8}
		I	9×10^{-10}
Argon (18)	A 37	Sub[2]	1×10^{-4}
	A 41	Sub	4×10^{-8}
Arsenic (33)	As 73	S	7×10^{-8}
		I	1×10^{-8}
	As 74	S	1×10^{-8}
		I	4×10^{-9}
	As 76	S	4×10^{-9}
		I	3×10^{-9}
	As 77	S	2×10^{-8}
		I	1×10^{-8}

Astatine (85)	At 211	S	2×10^{-10}
		I	1×10^{-9}
Barium (56)	Ba 131	S	4×10^{-8}
		I	1×10^{-8}
	Ba 140	S	4×10^{-9}
		I	1×10^{-9}
Berkelium (97)	Bk 249	S	3×10^{-11}
		I	4×10^{-9}
	Bk 250	S	5×10^{-9}
		I	4×10^{-8}
Berylium (4)	Be 7	S	2×10^{-7}
		I	4×10^{-8}
Bismuth (83)	Bi 206	S	6×10^{-9}
		I	5×10^{-9}
	Bi 207	S	6×10^{-9}
		I	5×10^{-10}
	Bi 210	S	2×10^{-10}
		I	2×10^{-10}
	Bi 212	S	3×10^{-9}
		I	7×10^{-9}
Bromine (35)	Br 82	S	4×10^{-8}
		I	6×10^{-9}
Cadmium (48)	Cd 109	S	2×10^{-9}
		I	3×10^{-9}
	Cd 115m	S	1×10^{-9}
		I	1×10^{-9}
	Cd 115	S	8×10^{-9}
		I	6×10^{-9}
Calcium (20)	Ca 45	S	1×10^{-9}
		I	4×10^{-9}
	Ca 47	S	6×10^{-9}
		I	6×10^{-9}
Californium (98)	Cf 249	S	5×10^{-14}
		I	3×10^{-12}
	Cf 250	S	2×10^{-13}
		I	3×10^{-12}
	Cf 251	S	6×10^{-14}
		I	3×10^{-12}

		Cf 252.....S	2×10^{-13}
		I	1×10^{-12}
		Cf 253.....S	3×10^{-11}
		I	3×10^{-11}
		Cf 254.....S	2×10^{-13}
		I	2×10^{-13}
Carbon (6)	C 14.....S		1×10^{-7}
	(CO_2).....Sub		1×10^{-6}
Cerium (58)	Ce 141.....S		2×10^{-8}
	I		5×10^{-9}
	Ce 143.....S		9×10^{-9}
	I		7×10^{-9}
	Ce 144.....S		3×10^{-10}
	I		2×10^{-10}
Cesium (55)	Cs 131.....S		4×10^{-7}
	I		1×10^{-7}
	Cs 134m....S		1×10^{-6}
	I		2×10^{-7}
	Cs 134.....S		1×10^{-9}
	I		4×10^{-10}
	Cs 135.....S		2×10^{-8}
	I		3×10^{-9}
	Cs 136.....S		1×10^{-8}
	I		6×10^{-9}
	Cs 137.....S		2×10^{-9}
	I		5×10^{-10}
Chlorine (17)	Cl 36.....S		1×10^{-8}
	I		8×10^{-10}
	Cl 38.....S		9×10^{-8}
	I		7×10^{-8}
Chromium (24)	Cr 51.....S		4×10^{-7}
	I		8×10^{-8}
Cobalt (27)	Co 57.....S		1×10^{-7}
	I		6×10^{-9}
	Co 58m.....S		6×10^{-7}
	I		3×10^{-7}

	Co 58	S	3×10^{-8}
		I	2×10^{-9}
	Co 60	S	1×10^{-8}
		I	3×10^{-10}
Copper (29)	Cu 64	S	7×10^{-8}
		I	4×10^{-8}
Curium (96)	Cm 242	S	4×10^{-12}
		I	6×10^{-12}
	Cm 243	S	2×10^{-13}
		I	3×10^{-12}
	Cm 244	S	3×10^{-13}
		I	3×10^{-12}
	Cm 245	S	2×10^{-13}
		I	4×10^{-12}
	Cm 246	S	2×10^{-13}
		I	4×10^{-12}
	Cm 247	S	2×10^{-13}
		I	4×10^{-12}
	Cm 248	S	2×10^{-14}
		I	4×10^{-13}
	Cm 249	S	4×10^{-7}
		I	4×10^{-7}
Dysprosium (66)	Dy 165	S	9×10^{-8}
		I	7×10^{-8}
	Dy 166	S	8×10^{-9}
		I	7×10^{-9}
Einsteinium (99)	Es 253	S	3×10^{-11}
		I	2×10^{-11}
	Es 254m	S	2×10^{-10}
		I	2×10^{-10}
	Es 254	S	6×10^{-13}
		I	4×10^{-12}
	Es 255	S	2×10^{-11}
		I	1×10^{-11}

Erbium (68)	Er 169	S	2×10^{-8}
		I	1×10^{-8}
	Er 171	S	2×10^{-8}
		I	2×10^{-8}
Europium (63)	Eu 152	S	1×10^{-8}
	(T/2=9.2 hrs)	I	1×10^{-8}
	Eu 152	S	4×10^{-10}
	(T/2=13 yrs)	I	6×10^{-10}
	Eu 154	S	1×10^{-10}
		I	2×10^{-10}
	Eu 155	S	3×10^{-9}
		I	3×10^{-9}
Fermium (100)	Fm 254	S	2×10^{-9}
		I	2×10^{-9}
	Fm 255	S	6×10^{-10}
		I	4×10^{-10}
	Fm 256	S	1×10^{-10}
		I	6×10^{-11}
Fluorine (9)	F 18	S	2×10^{-7}
		I	9×10^{-8}
Gadolinium (64)	Gd 153	S	8×10^{-9}
		I	3×10^{-9}
	Gd 159	S	2×10^{-8}
		I	1×10^{-8}
Gallium (31)	Ga 72	S	8×10^{-9}
		I	6×10^{-9}
Germanium (32)	Ge 71	S	4×10^{-7}
		I	2×10^{-7}
Gold (79)	Au 196	S	4×10^{-8}
		I	2×10^{-8}
	Au 198	S	1×10^{-8}
		I	8×10^{-9}
	Au 199	S	4×10^{-8}
		I	3×10^{-8}

Hafnium (72)	Hf 181	S	1×10^{-9}
		I	3×10^{-9}
Holmium (67)	Ho 166	S	7×10^{-9}
		I	6×10^{-9}
Hydrogen (1)	H3	S	2×10^{-7}
		I	2×10^{-7}
		Sub	4×10^{-5}
Indium (49)	In 113m	S	3×10^{-7}
		I	2×10^{-7}
	In 114m	S	4×10^{-9}
		I	7×10^{-10}
	In 115m	S	8×10^{-8}
		I	6×10^{-8}
	In 115	S	9×10^{-9}
		I	1×10^{-9}
Iodine (53)	I 125	S	8×10^{-11}
		I	6×10^{-9}
	I 126	S	9×10^{-11}
		I	1×10^{-8}
	I 129	S	2×10^{-11}
		I	2×10^{-9}
	I 131	S	1×10^{-10}
		I	1×10^{-8}
	I 132	S	3×10^{-9}
		I	3×10^{-8}
	I 133	S	4×10^{-10}
		I	7×10^{-9}
	I 134	S	6×10^{-9}
		I	1×10^{-7}
	I 135	S	1×10^{-9}
		I	1×10^{-8}
Iridium (77)	Ir 190	S	4×10^{-8}
		I	1×10^{-8}
	Ir 192	S	4×10^{-9}
		I	9×10^{-10}

	Ir 194	S	8×10^{-9}
		I	5×10^{-9}
Iron (26)	Fe 55	S	3×10^{-8}
		I	3×10^{-8}
	Fe 59	S	5×10^{-9}
		I	2×10^{-9}
Krypton (36)	Kr 85m	Sub	1×10^{-7}
	Kr 85	Sub	3×10^{-7}
	Kr 87	Sub	2×10^{-8}
	Kr 88	Sub	2×10^{-8}
Lanthanum (57)	La 140	S	5×10^{-9}
		I	4×10^{-9}
Lead (82)	Pb 203	S	9×10^{-8}
		I	6×10^{-8}
	Pb 210	S	4×10^{-12}
		I	8×10^{-12}
	Pb 212	S	6×10^{-10}
		I	7×10^{-10}
Lutetium (71)	Lu 177	S	2×10^{-8}
		I	2×10^{-8}
Manganese (25)	Mn 52	S	7×10^{-9}
		I	5×10^{-9}
	Mn 54	S	1×10^{-8}
		I	1×10^{-9}
	Mn 56	S	3×10^{-8}
		I	2×10^{-8}
Mercury (80)	Hg 197m	S	3×10^{-8}
		I	3×10^{-8}
	Hg 197	S	4×10^{-8}
		I	9×10^{-8}
	Hg 203	S	2×10^{-9}
		I	4×10^{-9}
Molybdenum (42)	Mo 99	S	3×10^{-8}
		I	7×10^{-9}

Neodymium (60)	Nd 144	S	3×10^{-12}
		I	1×10^{-11}
	Nd 147	S	1×10^{-8}
		I	8×10^{-9}
	Nd 149	S	6×10^{-8}
		I	5×10^{-8}
Neptunium (93)	Np 237	S	1×10^{-13}
		I	4×10^{-12}
	Np 239	S	3×10^{-8}
		I	2×10^{-8}
Nickel (28)	Ni 59	S	2×10^{-8}
		I	3×10^{-8}
	Ni 63	S	2×10^{-9}
		I	1×10^{-8}
	Ni 65	S	3×10^{-8}
		I	2×10^{-8}
Niobium (Columbium) (41)	Nb 93m	S	4×10^{-9}
		I	5×10^{-9}
	Nb 95	S	2×10^{-8}
		I	3×10^{-9}
	Nb 97	S	2×10^{-7}
		I	2×10^{-7}
Osmium (76)	Os 185	S	2×10^{-8}
		I	2×10^{-9}
	Os 191m	S	6×10^{-7}
		I	3×10^{-7}
	Os 191	S	4×10^{-8}
		I	1×10^{-8}
	Os 193	S	1×10^{-8}
		I	9×10^{-9}
Palladium (46)	Pd 103	S	5×10^{-8}
		I	3×10^{-8}
	Pd 109	S	2×10^{-8}
		I	1×10^{-8}

Phosphorus (15)	P 32	S	2×10^{-9}
		I	3×10^{-9}
Platinum (78)	Pt 191	S	3×10^{-8}
		I	2×10^{-8}
	Pt 193m	S	2×10^{-7}
		I	2×10^{-7}
	Pt 193	S	4×10^{-8}
		I	1×10^{-8}
	Pt 197m	S	2×10^{-7}
		I	2×10^{-7}
	Pt 197	S	3×10^{-8}
		I	2×10^{-8}
Plutonium (94)	Pu 238	S	7×10^{-14}
		I	1×10^{-12}
	Pu 239	S	6×10^{-14}
		I	1×10^{-12}
	Pu 240	S	6×10^{-14}
		I	1×10^{-12}
	Pu 241	S	3×10^{-12}
		I	1×10^{-9}
	Pu 242	S	6×10^{-14}
		I	1×10^{-12}
	Pu 243	S	6×10^{-8}
		I	8×10^{-8}
	Pu 244	S	6×10^{-14}
		I	1×10^{-12}
Polonium (84)	Po 210	S	2×10^{-11}
		I	7×10^{-12}
Potassium (19)	K 42	S	7×10^{-8}
		I	4×10^{-9}
Praseodymium (59)	Pr 142	S	7×10^{-9}
		I	5×10^{-9}
	Pr 143	S	1×10^{-8}
		I	6×10^{-9}

Promethium (61)	**Pm 147**	**S**	2×10^{-9}
		I	3×10^{-9}
	Pm 149	**S**	1×10^{-8}
		I	8×10^{-9}
Protoactinium (91)	**Pa 230**	**S**	6×10^{-11}
		I	3×10^{-11}
	Pa 231	**S**	4×10^{-14}
		I	4×10^{-12}
	Pa 233	**S**	2×10^{-8}
		I	6×10^{-9}
Radium (88)	**Ra 223**	**S**	6×10^{-11}
		I	8×10^{-12}
	Ra 224	**S**	2×10^{-10}
		I	2×10^{-11}
	Ra 226	**S**	3×10^{-12}
		I	2×10^{-12}
	Ra 228	**S**	2×10^{-12}
		I	1×10^{-12}
Radon (86)	Rn 220	S	1×10^{-8}
	Rn 222[3]		3×10^{-9}
Rhenium (75)	Re 183	S	9×10^{-8}
		I	5×10^{-9}
	Re 186	**S**	2×10^{-8}
		I	8×10^{-9}
	Re 187	**S**	3×10^{-7}
		I	2×10^{-8}
	Re 188	**S**	1×10^{-8}
		I	6×10^{-9}
Rhodium (45)	**Rh 103m**	**S**	3×10^{-6}
		I	2×10^{-6}
	Rh 105	**S**	3×10^{-8}
		I	2×10^{-8}
Rubidium (37)	**Rb 86**	**S**	1×10^{-8}
		I	2×10^{-9}
	Rb 87	**S**	2×10^{-8}
		I	2×10^{-9}

Ruthenium (44)	Ru 97	S	8×10^{-8}
		I	6×10^{-8}
	Ru 103	S	2×10^{-8}
		I	3×10^{-9}
	Ru 105	S	2×10^{-8}
		I	2×10^{-8}
	Ru 106	S	3×10^{-9}
		I	2×10^{-10}
Samarium (62)	Sm 147	S	2×10^{-12}
		I	9×10^{-12}
	Sm 151	S	2×10^{-9}
		I	5×10^{-9}
	Sm 153	S	2×10^{-8}
		I	1×10^{-8}
Scandium (21)	Sc 46	S	8×10^{-9}
		I	8×10^{-10}
	Sc 47	S	2×10^{-8}
		I	2×10^{-8}
	Sc 48	S	6×10^{-9}
		I	5×10^{-9}
Selenium (34)	Se 75	S	4×10^{-8}
		I	4×10^{-9}
Silicon (14)	Si 31	S	2×10^{-7}
		I	3×10^{-8}
Silver (47)	Ag 105	S	2×10^{-8}
		I	3×10^{-9}
	Ag 110m	S	7×10^{-9}
		I	3×10^{-10}
	Ag 111	S	1×10^{-8}
		I	8×10^{-9}
Sodium (11)	Na 22	S	6×10^{-9}
		I	3×10^{-10}
	Na 24	S	4×10^{-8}
		I	5×10^{-9}

Strontium (38)	Sr 85m	S	1×10^{-6}
		I	1×10^{-6}
	Sr 85	S	8×10^{-9}
		I	4×10^{-9}
	Sr 89	S	3×10^{-10}
		I	1×10^{-9}
	Sr 90	S	3×10^{-11}
		I	2×10^{-10}
	Sr 91	S	2×10^{-8}
		I	9×10^{-9}
	Sr 92	S	2×10^{-8}
		I	1×10^{-8}
Sulfur (16)	S 35	S	9×10^{-9}
		I	9×10^{-9}
Tantalum (73)	Ta 182	S	1×10^{-9}
		I	7×10^{-10}
Technetium (43)	Tc 96m	S	3×10^{-6}
		I	1×10^{-6}
	Tc 96	S	2×10^{-8}
		I	8×10^{-9}
	Tc 97m	S	8×10^{-8}
		I	5×10^{-9}
	Tc 97	S	4×10^{-7}
		I	1×10^{-8}
	Tc 99m	S	1×10^{-6}
		I	5×10^{-7}
	Tc 99	S	7×10^{-8}
		I	2×10^{-9}
Tellurium (52)	Te 125m	S	1×10^{-8}
		I	4×10^{-9}
	Te 127m	S	5×10^{-9}
		1	1×10^{-9}
	Te 127	S	6×10^{-8}
		I	3×10^{-8}
	Te 129m	S	3×10^{-9}
		I	1×10^{-9}

	Te 129.....S	2×10^{-7}
	I	1×10^{-7}
	Te 131m....S	1×10^{-8}
	I	6×10^{-9}
	Te 132.....S	7×10^{-9}
	I	4×10^{-9}
Terbium (65).....	Tb 160.....S	3×10^{-9}
	I	1×10^{-9}
Thallium (81).....	Tl 200.....S	9×10^{-8}
	I	4×10^{-8}
	Tl 201.....S	7×10^{-8}
	I	3×10^{-8}
	Tl 202.....S	3×10^{-8}
	I	8×10^{-9}
	Tl 204.....S	2×10^{-8}
	I	9×10^{-10}
Thorium (90).....	Th 227.....S	1×10^{-11}
	I	6×10^{-12}
	Th 228.....S	3×10^{-13}
	I	2×10^{-13}
	Th 230.....S	8×10^{-14}
	I	3×10^{-13}
	Th 231.....S	5×10^{-8}
	I	4×10^{-8}
	Th 232.....S	1×10^{-12}
	I	1×10^{-12}
	Th natural.S	2×10^{-12}
	I	2×10^{-12}
	Th 234.....S	2×10^{-9}
	I	1×10^{-9}
Thulium (69).....	Tm 170.....S	1×10^{-9}
	I	1×10^{-9}
	Tm 171.....S	4×10^{-9}
	I	8×10^{-9}

Tin (50)	Sn 113	S	1×10^{-8}
		I	2×10^{-9}
	Sn 125	S	4×10^{-9}
		I	3×10^{-9}
Tungsten (Wolfram) (74)	W 181	S	8×10^{-8}
		I	4×10^{-9}
	W 185	S	3×10^{-8}
		I	4×10^{-9}
	W 187	S	2×10^{-8}
		I	1×10^{-8}
Uranium (92)	U 230	S	1×10^{-11}
		I	4×10^{-12}
	U 232	S	3×10^{-12}
		I	9×10^{-13}
	U 233	S	2×10^{-11}
		I	4×10^{-12}
	U 234	S[4]	2×10^{-11}
		I	4×10^{-12}
	U 235	S[4]	2×10^{-11}
		I	4×10^{-12}
	U 236	S	2×10^{-11}
		I	4×10^{-12}
	U 238	S[4]	3×10^{-12}
		I	5×10^{-12}
	U 240	S	8×10^{-9}
		I	6×10^{-9}
	U-natural	S[4]	5×10^{-12}
		I	5×10^{-12}
Vanadium (23)	V 48	S	6×10^{-9}
		I	2×10^{-9}
Xenon (54)	Xe 131m	Sub	4×10^{-7}
	Xe 133	Sub	3×10^{-7}
	Xe 133m	Sub	3×10^{-7}
	Xe 135	Sub	1×10^{-7}

Ytterbium (70)	Yb 175	S	2×10^{-8}
		I	2×10^{-8}
Yttrium (39)	Y 90	S	4×10^{-9}
		I	3×10^{-9}
	Y 91m	S	8×10^{-7}
		I	6×10^{-7}
	Y 91	S	1×10^{-9}
		I	1×10^{-9}
	Y 92	S	1×10^{-8}
		I	1×10^{-8}
	Y 93	S	6×10^{-9}
		I	5×10^{-9}
Zinc (30)	Zn 65	S	4×10^{-9}
		I	2×10^{-9}
	Zn 69m	S	1×10^{-8}
		I	1×10^{-8}
	Zn 69	S	2×10^{-7}
		I	3×10^{-7}
Zirconium (40)	Zr 93	S	4×10^{-9}
		I	1×10^{-8}
	Zr 95	S	4×10^{-9}
		I	1×10^{-9}
	Zr 97	S	4×10^{-9}
		I	3×10^{-9}
Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life less than 2 hours.		Sub	3×10^{-6}
Any single radionuclide not listed above with decay mode other than alpha emission or spontaneous fission and with radioactive half-life greater than 2 hours.			1×10^{-10}

Any single radionuclide not listed above, which decays by alpha emission or spontaneous fission.	2×10^{-14}

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[1]Soluble (S); Insoluble (I).

[2]"Sub" means that values given are for submersion in a semispherical infinite cloud of airborne material.

[3]These radon concentrations are appropriate for protection from radon-222 combined with its short-lived daughters. The value may be replaced by one-thirtieth (1/30) of a "working level." (A "working level" is defined as any combination of short-lived radon-222 daughters, polonium-218, lead-214, bismuth-214 and polonium-214, in one liter of air, without regard to the degree of equilibrium, that will result in the ultimate emission of 1.3×10^5 MeV of alpha particle energy.)

[4]For soluble mixtures of U-238, U-234 and U-235 in air chemical toxicity may be the limiting factor. The concentration value is 0.007 milligrams uranium per cubic meter of air. The specific activity for natural uranium is 6.77×10^{-7} curies per gram U. The specific activity for other mixtures of U-238, U-235 and U-234, if not known, shall be:

$SA = 3.6 \times 10^{-7}$ curies/gram U U-depleted

$SA = (0.4 + 0.38\,E + 0.0034\,E^2)\,10^{-6}$ $E \geq 0.72$

where E is the percentage by weight of U-235, expressed as percent.

NOTE: In any case where there is a mixture in air of more than one radionuclide, the limiting values for purposes of this Appendix should be determined as follows:

1. If the identity and concentration of each radionuclide in the mixture are known, the limiting values should be derived as follows: Determine, for each radionuclide in the mixture, the ratio between the quantity present in the mixture and the limit otherwise established in Appendix A for the specific radionuclide when not in a mixture. The sum of such ratios for all the radionuclides in the mixture may not exceed "1" (i.e., "unity")

EXAMPLE: If radionuclides A, B, and C are present in concentrations C_A, C_B, C_C, and if the applicable MPC's are MPC_A, and MPC_B, and MPC_C respectively, then the concentrations shall be limited so that the following relationship exists:

$$(C_A/MPC_A) + (C_B/MPC_B) + (C_C/MPC_C) \leq 1$$

2. If either the identity or the concentration of any radionuclide in the mixture is not known, the limiting values for purposes of Appendix A shall be 2×10^{-14}.

3. If any of the conditions specified below are met, the corresponding values specified below may be used in lieu of those specified in paragraph 2 above.

a. If the identity of each radionuclide in the mixture is known but the concentration of one or more of the radionuclides in the mixture is not known the concentration limit for the mixture is the limit specified in Appendix A for the radionuclide in the mixture having the lowest concentration limit; or

b. If the identity of each radionuclide in the mixture is not known, but it is known that certain radionuclides specified in Appendix A are not present in the mixture, the concentration limit for the mixture is the lowest concentration limit specified in Appendix A for any radionuclide which is not known to be absent from the misture; or

c. Element (atomic number) and isotope	pCi/ml
If it is known that alpha-emitters and Sr 90, I 129, Pb 210, Ac 227, Ra 228, Pa 230, Pu 241, and Bk 249 are not present.	1×10^{-10}
If it is known that alpha-emitters and Pb 210, Ac 227, Ra 228, and Pu 241 are not present.	1×10^{-11}
If it is known that alpha-emitters and Ac 227 are not present.	1×10^{-12}
If it is known that Ac 227, Th 230, Pa 231, Pu 238, Pu 239, Pu 240, Pu 242, Pu 244, Cm 248, Cf 249 and Cf 251 are not present.	1×10^{-13}

4. If a mixture of radionuclides consists of uranium and its daughters in ore dust prior to chemical separation of the uranium from the ore, the following values may be used for uranium and its daughters through radium-226, instead of those from paragraphs 1, 2, or 3 above:

3×10^{-12} pCi/ml gross alpha activity; 2×10^{-12} pCi/ml natural uranium; or 3 micrograms per cubic meter of air natural uranium.

For purposes of this note, a radionuclide may be considered as not present in a mixture if (a) the ratio of the concentration of that radionuclide in the mixture (C_A) to the concentration limit for that radionuclide specified in Appendix A (MPC_A) does not exceed 1/10 (i.e. $C_A/MPC_A \leq 1/10$), and (b) the sum of such ratios for all the radionuclides considered as not present in the mixture does not exceed 1/4, i.e.

$(C_A/MPC_A + C_B/MPC_B \ldots + \leq 1/4)$.

IT IS SO ORDERED.

Board Member J. Theodore Meyer concurred.

I, Dorothy M. Gunn, Clerk of the Illinois Pollution Control Board, hereby certify that the above Opinion and Order was adopted on the 24th day of January, 1985 by a vote of 5-0.

Dorothy M. Gunn

Dorothy M. Gunn, Clerk
Illinois Pollution Control Board