Public Comment #29

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
REVISIONS TO RADIUM QUALITY STANDARDS: PROPOSED NEW 35 ILL. ADM CODE 302.307 and AMENDMENTS TO 35 ILL. ADM. CODE 302.207 and 302.525	)	R 04-21 (Rulemaking—Water)

NOTICE

TO: Dorothy Gunn, Clerk
Illinois Pollution Control Board
James R. Thompson Center
100 W. Randolph Street, Suite 11-500
Chicago, Illinois 60601

SEE ATTACHED SERVICE LIST

PLEASE TAKE NOTICE that I have today filed with the Office of the Clerk of the Pollution Control Board the POST-HEARING COMMENTS, a copy of which is herewith served upon you.

CITY OF JOLIET

By: _____
One of it's Attorneys

Dated: December 8, 2004

GARDNER, CARTON & DOUGLAS
Roy M. Harsch
Gardner Carton & Douglas LLP
191 North Wacker Drive
Suite 3700
Chicago, Illinois 60606
(312) 569-1441

THIS FILING IS SUBMITTED ON RECYCLED PAPER

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
REVISIONS TO RADIUM QUALITY STANDARDS: PROPOSED NEW 35 ILL. ADM CODE 302.307 and AMENDMENTS TO 35 ILL. ADM. CODE 302.207 and 302.525	)	R 04-21 (Rulemaking—Water)

POST-HEARING COMMENTS OF CITY OF JOLIET

Mr. Dennis Duffield, the Director of Public Works and Utilities of the City of Joliet, participated in the rulemaking process because of the importance of this rulemaking. This rulemaking will determine the costs to Joliet and other members of the regulated community to comply with a water quality standard for combined radium 226 and radium 228. Joliet and other municipalities are already facing the costs of drinking water treatment, and there may be additional costs to be placed on the public for compliance with a radium water quality standard. The Illinois Environmental Protection Agency's proposal for a water quality standard has resulted in a large volume of information to review.

The original intent of the rule proposed by the Illinois Environmental Protection Agency was to maintain the current situation, which has existed since the first deep wells were placed into service. Radium originating in well water is currently distributed to customers, collected in the sanitary sewer system, treated at the wastewater treatment plant and discharged to the receiving stream. The quantity of radium discharged to the stream was to be unaltered by elimination of the present 1.0 picocurie per liter radium 226 water quality standard.

During the rulemaking process, issues unrelated to the water quality standard were presented to the Illinois Pollution Control Board. Worker safety was presented as an issue although it has no impact on water quality. The disposal of wastewater treatment sludge was

also presented as an element to be considered. Joliet, after pointing out that these issues were unrelated to water quality, presented information demonstrating that worker safety and sludge disposal are not problems that could not be easily solved by wastewater treatment operators. See Transcript 392-98 (Oct. 22, 2004), and attachments 1 through 4 of Supplemental Information filed by the City of Joliet on November 24, 2004.

The United States Environmental Protection Agency is required to review the water quality standards to be proposed by the Illinois Environmental Protection Agency and adopted by the Illinois Pollution Control Board. The United States Environmental Protection Agency approved the proposed standard and has not has not provided any basis or guidance for the Illinois Environmental Protection Agency to use for purposes of development of a numeric radium water quality standard as an alternative to its proposal, consistent with the 1986 guidance document which provides the methodology for deriving water quality standards from aquatic life toxicity data or the subsequent methodology to protect wildlife. Transcript 311-13, 382-85 (October 22, 2004). The Illinois Environmental Protection Agency properly advised the Illinois Pollution Control Board that its research had not found studies of the quality normally used for the development of water quality standards. Therefore, if the Board intends to develop a numeric water quality standard for radium, the lack of reliable research and guidance makes this task very difficult and unnecessary as the expected radium levels would be below any appropriate standard. Transcript 287-99 (October 22, 2004).

1. UNITED STATES NUCLEAR REGULATORY COMMISSION LIMIT.

Standards exist that the Illinois Pollution Control Board may consider. While not addressed at the hearing, the Illinois Division of Nuclear Safety of the Illinois Department of Emergency Management has standards for the discharge to sanitary sewers. The standard for

combined radium 226 and radium 228 is 600 picocuries per liter. This is the limit determined by the United States Nuclear Regulatory Commission and adopted by states for implementation. The City of Joliet requested Mr. Eli Port of RSSI, a health physicist engaged by the City, and he addressed this issue in a letter to Dennis Duffield attached as Exhibit 1 to these comments. NRC Regulations Title 10, Code of Federal Regulations Part 20 Standards for Protection Against Radiation Subpart K--Waste Disposal 20.2003 Disposal by Release into Sanitary Sewerage. Appendix B to Part 20--Annual Limits on Intake (ALIs) and Derived Air Concentrations (DACs) of Radionuclides for Occupational Exposure; Effluent Concentrations; Concentrations for Release to Sewerage is the source of the limits. The state provisions are attached to this comment as Exhibit 2. This source also provides the limits for discharge of effluent to streams at a level of 60 picocuries per liter. This value appears in Appendix B, but was not included in the Illinois regulations.

2. **RESRAD BIOTA.** Information provided to the Illinois Pollution Control Board proposed the use of the Department of Energy "A GRADED APPROACH FOR EVALUATING RADIATION DOSES TO AQUATIC AND TERRESTRIAL BIOTA". This approach is not appropriate for determining water quality by its own terms. Item 3 of the Foreword to this document is shown below:

> These methods (and the Biota Concentration Guides contained in them) are not intended to be used as design criteria, indicators of the severity of accidental releases of radioactive materials, or guides for mitigating the consequences of accidental releases. Furthermore, this technical standard does not apply to the irradiation of biota for experimental purposes, nor to research or experimental studies.

Water quality standards are design criteria for the stream. This document has been proposed as the only available approach to protecting biota. If this model is to be used, it is necessary to examine how it should correctly be used. Mr. Eli Port of RSSI, consulting health

physicist to the City of Joliet, addressed this issue by letter to Dennis Duffield, which is attached as Exhibit 1 to these comments.

Mr. Port points out that when proper inputs to the RESRAD program are used to meet the requirements of the International Commission on Radiation Protection, the radium concentration that is protective of riparian animals is 64 picocuries per liter for Radium 226 and 67.6 picocuries per liter for Radium 228. This is considerably higher than the 3.75 picocuries per liter limit previously provided to the Board.

The International Commission on Radiological Protection has proposed a standard of 1.0 rads per day for aquatic animals and 0.1 rads per day for terrestrial animals. This is the criteria used in the tiered approach of the Department of Energy. Although the tiered approach is not applicable to determination of discharge standards, it is based on the information of a recognized standard setting organization for impact to the environment. The DOE tiered approach uses a program named RESRAD BIOTA as the method of relating dose to concentration of radiation sources in the environment. There is very limited experience with the use of the program and it appears to provide very conservative results.

Since the exposure of an animal to radiation is a result of long term exposure, the 7 day 10 year low flow normally used for the development of water quality standards is not appropriate. The harmonic mean flow has been the stream flow of choice for carcinogenic compounds. Radiation is carcinogenic. The harmonic mean flow better represents the average flow experienced in the stream.

Joliet has previously provided testimony that upon start up after an idle period, wells containing radium are routinely pumped directly to storm sewers or ditches for a short time

period. These storm sewers or ditches will have a harmonic mean flow of zero (0). If the duration annual discharge to these storm sewers or ditches is limited to 800 hours per year, this is approximately 10% of a year

3. **IMPACTS OF A NUMERIC WATER QUALITY STANDARD.** The water quality standard ultimately adopted by the Board will have an impact the regulated community, whether it's the 60 picocuries per liter from the US Nuclear Regulatory Commission Regulations, or the 3.75 picocuries per liter in the testimony from Water Remediation Technologies. These examples provide a wide range of options for the water quality standard. None of these examples have an adequate scientific basis concerning biota to provide compelling evidence for the selection of a specific alternative.

The water quality standard approved will impact wastewater treatment plants. Since the highest reported radium concentration from a deep well in Illinois is less than 40 picocuries combined radium 226 and radium 228, the selection of 60 picocuries per liter combined radium 226 and radium 228 will allow the continuation of existing practices.

The selection of 3.75 picocuries per liter combined radium 226 and radium 228 will require modifications of the operations of many water supplies and wastewater treatment plants to modify their operations. For wastewater treatment plant removing 50% of the radium in their influent and discharging to a stream with a harmonic flow of 0, the maximum influent radium concentration to the wastewater plant is 7.5 picocuries per liter.

Most communities will not be able to continue operations in the current methods. Compliance will depend upon the method of disposal of the water treatment waste, the influent concentration to the wastewater treatment plant, the removal efficiency of the wastewater treatment plant and the harmonic flow of the receiving stream. It may be necessary to decrease

the influent concentration to the wastewater treatment plant by disposing of water treatment wastes separately from the sanitary sewer or increasing the radium removal efficiency of the wastewater treatment plant. All of these options will increase the costs of the projects that communities are required to implement to obtain compliance with the drinking water standard

4. **WET PERFORMANCE ISSUES.** The use of a water treatment method that does not discharge the radium removed from the drinking water to the sanitary sewer has been recommended by a vendor of this type of equipment. The vendor has indicated the use of a radium select media has advantages. The vendor admitted that the technology would not comply with existing standards in zero low flow streams.

When questioned about the accumulation of radon in this vendor's treatment vessel, representatives indicated that their experience had shown no radium accumulations. Transcript 157 (October 22, 2004). The vendor also testified that it has no experience with full scale units and only data from short term pilot plants. Transcript 123, (October 21, 2004); Transcript 156 (October 22, 2004). Joliet has just completed a pilot test of the radium select media system provided by Water Remediation Technologies, LLC of Arvada, CO. During the course of a six month pilot test, it was determined that radon from the treatment vessel may have been initially discharged to the atmosphere and was not being found in the water being tested for radon. On September 27, 2004, the test mechanism was regulated to assure that any radon developed from decay of radium removed and retained in the media would be found in water samples. Radon samples collected on November 29, 2004 indicate that there is a buildup of radon in the system. The influent radon to the treatment system was measured as 160 +/- 20 picocuries per liter. The water leaving the treatment system was measured as 220 +/- 20 picocuries per liter. This indicates an increase in the radon that will be delivered to customers of the water system if this

treatment method was employed. It is anticipated that there would continue to be an increase in radon over time as the radium levels increase in the medium. This is consistent with the information provided to Joliet by Layne Christensen, the supplier of an alternate radium select media treatment system. This is a critical issue, since radon is more dangerous to humans because of inhalation. In addition, technology would have to comply with radium and radon standards. A radon standard of 300 picocuries per liter has been proposed by U.S. EPA for adoption as a primary drinking water standard, and if radon levels have already tested at approximately 220, compliance with any standard adopted is questionable.

Conclusion. The science to support a specific water quality standard is not available. There is sufficient information to select a protective and workable standard. Joliet would recommend that the results of the RESRAD BIOTA program be considered extremely conservative and not selected as the water quality standard. Adequate protection of the environment will result from the US Nuclear Regulatory Commission regulation of 60 picocuries per liter. To maintain the protection to the environment, Joliet recommends the following:

1. The water quality standard for combined radium 226 and radium 228 in streams used as water supply or food processing intakes shall be 5.0 picocuries per liter.
2. The water quality standard for combined radium 226 and radium 228 for all other streams shall be 60 picocuries per liter.

Should the Board choose to be more conservative in their determination of a standard, Joliet would recommend a safety factor of 2.0 be applied which results in the following:

1. The water quality standard for combined radium 226 and radium 228 in streams used as water supply or food processing intakes shall be 5.0 picocuries per liter.\
2. The water quality standard for combined radium 226 and radium 228 for all other streams shall be 30 picocuries per liter.
3. The water quality standard for combined radium 226 and radium 228 for discharges limited to a duration of less than 800 hours per year shall 36 picocuries per liter.

Thank you for the opportunity to participate in this important rulemaking

RESPECTFULLY SUBMITTED
CITY OF JOLIET

By: Roy M Harsch/SHD
One of its Attorneys

Roy M. Harsch
Gardner Carton & Douglas LLP
191 North Wacker Drive
Suite 3700
Chicago, Illinois 60606
(312) 569-1441

RSSI

6312 West Oakton Street
Morton Grove, IL 60053-2723
847-965-1999
Fax 847-965-1991

December 8, 2004

Dennis Duffield, P.E., Director
Department of Public Works and Utilities
City of Joliet
921 Washington Street
Joliet, IL 60431

RE: Concentration Release Limits for Ra-226 and Ra-228

Dear Mr Duffield:

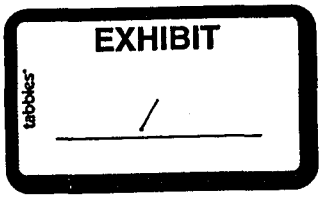
The following summarizes and explains the information that I presented at the meeting with the Illinois Environmental Protection Agency on November 30, 2004. At the meeting, I discussed the role of two advisory bodies, the National Council on Radiation Protection and Measurements and the International Commission of Radiological Protection. This letter constitutes my comments, which I request that you file with the Illinios Pollution Control Board.

An understanding of several units is useful in following various standards.

One curie is the quantity of material that undergoes 3.7×10^{10} disintegrations per second or 2.22×10^{12} disintegrations per minute.

The rad is the unit of absorbed dose. One rad is equal to an absorbed dose of 100 ergs/gram.

The rem is the unit of any of the quantities expressed as dose equivalent. The rem is an administrative unit used for compliance purposes and as a measure of risk to human populations. The dose equivalent in rems is equal to the absorbed dose in rads multiplied by the Relative Biological Effectiveness (RBE) quality factor (Q). The rem is used only for low doses, it is not used to predict injury or damage, and it applies only to man.



The International Commission on Radiological Protection (ICRP) is an advisory body providing recommendations and guidance on radiation protection. The ICRP is an independent international network of specialists in various fields of radiological protection. About one hundred scientists are actively involved in its work.

The ICRP considers the fundamental principles and quantitative bases upon which appropriate radiation protection measures can be established. It offers its recommendations to regulatory and advisory agencies and provides advice intended to be of help to management and professional staff. Legislation in most countries adheres closely to ICRP recommendations.

Paragraph 14 of ICRP Publication 26 states that although the principle objective of radiation protection is the achievement and maintenance of appropriately safe conditions for activities involving human exposure, the level of safety required for the protection of all human individuals is thought likely to be adequate to protect other species, although not necessarily individual members of those species. The Commission therefore believes that if man is adequately protected then other living things are also likely to be sufficiently protected.

Paragraph 16 of ICRP Publication 60 states that the Commission believes that the standard of environmental control needed to protect man to the degree currently thought desirable will ensure that other species are not put at risk. Occasionally, individual members of non-human species might be harmed, but not to the extent of endangering whole species or creating imbalance between species. At the present time, the Commission concerns itself with mankind's environment only with regard to the transfer of radionuclides through the environment, since this directly affects the radiological protection of man.

The recommendations in ICRP publications 26 and 30 are the basis for the derived standards in 32 IAC 340, IEMA's Standards for Protection Against Radiation. 32 IAC 340 incorporates by reference the regulations of the U.S. Nuclear Regulatory Commission in 10 CFR 20, the NRC's Standards for Protection Against Radiation. The limits on releases of radioactive material to the environment and to sewage are in Appendix B to

RSSI

10 CFR 20. Table 2 Effluent Concentrations Col.2 of Appendix B, lists the concentration limits in water released to unrestricted areas to which the public has access and which may be ingested, that will result in a dose of 50 mrem in a year. 50 mrem is one-half the 100 mrem per year limit recommended by the ICRP, NCRP and IEMA's annual public dose limit. Table 3 lists the concentrations converted to pCi/l that may be released to sewage. These values are:

32 IAC LIMITS

	Table 2 Col 2 (pCi/l)	Table 3 (pCi/l)
Ra-226	60	600
Ra-228	60	600

The US Department of Energy (DOE) has similar requirements for operations of the DOE with respect to protection of members of the public and the environment against undue risk from radiation. These requirements in DOE Order 5400.5, adopt as appropriate recommendations by authoritative organizations e.g., the NCRP and the ICRP. DOE 5400.5 contains derived concentration guides for ingestible water that will result in 0.1 rem/year.

Doe 5400.5 states that based on cost and benefit considerations, radioactive waste streams that contain radionuclide concentrations of not more than the derived concentration guide (DCG) reference values at the point of discharge to a surface waterway normally will not require treatment to further reduce the concentration. DOE requires that the best available technology selection process be applied to the treatment of liquid wastes released to sanitary sewerage when concentrations of radionuclides would otherwise exceed five times the DCG reference values. For Ra-226 and Ra-228, these values are below.

RSSI

DOE 5400.5 LIMITS

	Ingested Water DCG (pCi/l)	Release to Sanitary Sewerage (pCi/l)
Ra-226	100	500
Ra-228	100	500

The National Council on Radiation Protection and Measurements (NCRP) formulates and disseminates information, guidance and recommendations on radiation protection and measurements representing the consensus of scientific thinking. The NCRP was chartered by the U.S. Congress in 1964 as the National Council on Radiation Protection and Measurements. The Charter, Public Law 88-376, recognizes the importance and the national character of the NCRP.

The recommendations published by the Council provide the scientific basis for radiation protection efforts throughout the country. Governmental organizations, including the Nuclear Regulatory Commission, the Public Health Service, the Environmental Protection Agency and state governments utilize the NCRP's recommendations as the scientific basis of their radiation protection activities.

Section 5 of NCRP Report 109 states that studies of contaminated environments have shown that point discharges of radionuclides generate a varying dose field in the receiving environment and that the mean population exposure is less than the exposure at the point of discharge either because the population of sedentary organisms exist throughout the varying dose field, or because mobile organisms experience a time-varying dose rate as they migrate within the environment.

Thus, as the dose rate standard is applied to the organisms subjected to the maximum dose rate in the contaminated environment, then the average exposure of any population, or sub-population of organisms will be less, and often much less than the standard. For this reason it is suggested that a maximum dose rate of 0.04 rad/h (0.96 rad/d) would provide protection for endemic populations of aquatic organisms in environments receiving discharges of radioactive effluent.

There is an indication that a limit of 0.57 mrem/h equivalent to 5 rem/y has been adopted in the USSR to provide protection for fish populations. However, in considering the environmental effects of the Chernobyl accident, studies have shown that chronic exposures of 0.04 rad/h to aquatic biota, while causing some fractional changes, maintains ecological stability at the population and organism level.

Adoption of a reference level of 0.04 rad/h appears to represent a reasonable compromise based on current information, i.e., considering both the nature of the effects observed at this dose rate and the limited amount of information on effects of radiation in natural populations, including interactions between ionizing radiation and ecological conditions. Population exposed to dose rates approaching 0.04 rad/h may also be at risk from other factors such as overexploitation or environmental stressors which might, in combination, result in an undesirable impact.

In such circumstances, it would seem highly desirable to conduct comprehensive ecological evaluation of the radiation exposure regime along with the other factors in order to determine the potential consequences. Thus, it is suggested that where the results of radiological modeling and/or dosimeteric measurements indicate that a radiation dose of 0.01 rad/h (0.24 rad/d) will be exceeded, such an evaluation should be considered.

Section 7 of NCRP 109 states that a problem with calculating alpha dose to aquatic biota is the differential response to equal absorbed doses of different radiations. Qs have been determined to account for the differences in RBE for α-, β-, and γ-radiation; however, these are currently defined only for the purpose of human radiation protection. Factors equivalent to Q for aquatic organisms are required in order to modify the calculated absorbed dose and thus give a measure of the biologically effective dose in aquatic organisms.

Because the soft tissue compositions of humans and other organisms are generally similar in water content and basic cell structure, similar values for RBE would be expected for the different radiation types. However, because of the conservatism

RSSI

built into RESRAD Biota's predecessor, BIORAD computer code, quality factors were not considered.

RESRAD Biota was developed through the DOE's Biota Dose Assessment Committee (BDAC), an approved committee organized through the DOE Technical Standards Program. The BDAC is sponsored and chaired by the Office of Environmental Policy and Guidance, Air, Water and Radiation Division. RESRAD-BIOTA is for use in demonstrating compliance with DOE and internationally-recommended dose limits for biota, and for conducting ecological assessments of radiological impact. The principal application of RESRAD Biota's graded approach is to demonstrate that routine DOE operations, such as the Hanford Site, 586 square miles, and the Oak Ridge National Laboratory, 94 square miles, are in compliance with the biota dose limits for protecting populations of plants and animals. It could also be used for mixing zones but may not be suitable for determining local discharge standards effecting a limited area.

RESRAD Biota appears to contain a significant conceptual error. The results are reported as the concentration that will produce a dose of 0.1 rads/d to a riparian animal. However, the doses in rads in calculations incorporate RBE's, a practice inconsistent with the system of units used in radiation protection. To properly use the dose limits in RESRAD Biota so that they are comparable with the dose limits in NCRP Report 109, the RBE's must be set to unity. When used with dose limits in units consistent with NCRP Report 109, RESRAD Biota calculates the limiting concentrations to which a riparian animal may be exposed 100% of its life as:

CONCENTRATION LIMITS CALCULATED BY RESRAD BIOTA

	Concentration in Water (pCi/l)	Concentration in Sediment (pCi/l)
Ra-226	64	685
Ra-228	67.6	673

Several limits for releases of Ra-226 and Ra-228 in water to unrestricted areas exist.

RSSI

SUMMARY OF CURRENT LIMITS FOR RELEASE TO WATER

	To the Environment		To Sewage	
	IEMA	DOE	IEMA	DOE*
Ra-226	60	100	600	500
Ra-228	60	100	600	500

*with the use of BAT

It would be prudent to consider the most restrictive limit, 60 pCi/l, the IEMA limit for releases to the environment. This value is slightly lower than the values generated by RESRAD Biota when the RBE's are set to units consistent with the dose limit recommendations of the NCRP.

Creating a new limit for any radionuclides may require that IEMA reexamine the release limits for other radionuclides and would require a lengthy process of stakeholder involvement and, unless the NRC first changed its regulations, could result in a finding of incompatibility with 10 CFR 20.

As explained above, regulatory and scientific considerations strongly argue for consistent limits among state agencies for releases of radioactive material to the environment. Thank you for forwarding this to the Illinois Pollution Control Board.

Sincerely,

Signature Valid

Digitally signed by Eli A. Port
DN: cn=Eli A. Port, c=US
Date: 2004.12.08 12:16:38 -06'00'
Location: Morton Grove, Illinois

Eli A. Port, CHP, CIH, P.E.

H:\HOME\400001 Health Physics\Joliet\Summary of Presentation.pdf

Rules | Statutes

ILLINOIS ADMINISTRATIVE CODE
TITLE 32: ENERGY
CHAPTER II: Division of Nuclear Safety
SUBCHAPTER b: RADIATION PROTECTION

PART 340
STANDARDS FOR PROTECTION AGAINST RADIATION

SUBPART A: GENERAL PROVISIONS

Section

SUBPART B: RADIATION PROTECTION PROGRAMS

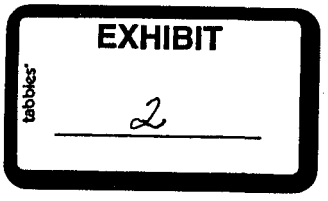
Section

SUBPART C: OCCUPATIONAL DOSE LIMITS

Section

SUBPART D: RADIATION DOSE LIMITS FOR INDIVIDUAL MEMBERS OF THE PUBLIC

Section



SUBPART E: TESTING FOR LEAKAGE OR CONTAMINATION OF SEALED SOURCES

Section

SUBPART F: SURVEYS AND MONITORING

Section

SUBPART G: CONTROL OF EXPOSURE FROM EXTERNAL SOURCES IN RESTRICTED AREAS

Section

SUBPART H: RESPIRATORY PROTECTION AND CONTROLS TO RESTRICT INTERNAL EXPOSURE IN RESTRICTED AREAS

Section

SUBPART I: STORAGE AND CONTROL OF LICENSED OR REGISTERED SOURCES OF RADIATION

Section

SUBPART J: PRECAUTIONARY PROCEDURES

Section

SUBPART K: WASTE DISPOSAL

Section

Section 340.1030 Disposal by Release into Sanitary Sewerage

a) A licensee may discharge licensed material into sanitary sewerage if each of the following conditions is satisfied:

1) The material is readily soluble, or is readily dispersible biological material, in water;

2) The quantity of licensed radioactive material that the licensee releases into the sewer in 1 month divided by the average monthly volume of water released into the sewer by the licensee does not exceed the concentration listed in Table 3 of Appendix B to 10 CFR 20.1001 - 20.2401, effective January 1, 1994, exclusive of subsequent amendments or editions;

3) If more than one radionuclide is released, the following conditions must also be satisfied:

A) The licensee shall determine the fraction of the limit in Table 3 of Appendix B to 10 CFR 20.1001 - 20.2401, effective January 1, 1994, exclusive of subsequent amendments or editions, represented by discharges into sanitary sewerage by dividing the actual monthly average concentration of each radionuclide released by the licensee into the sewer by the concentration of that radionuclide listed in Table 3 of Appendix B to 10 CFR 20.1001 - 20.2401, effective January 1, 1994, exclusive of subsequent amendments or editions; and

B) The sum of the fractions for each radionuclide required by subsection (a)(3)(A) above does not exceed unity;

4) The total quantity of licensed radioactive material that the licensee releases into sanitary sewerage in a year does not exceed 185 GBq (5 Ci) of hydrogen-3, 37 GBq (1 Ci) of carbon-14, and 37 GBq (1 Ci) of all other radioactive materials combined; and

5) In determining compliance with subsections (a)(1), (a)(2), (a)(3) and (a)(4) above, the licensee shall not include the activity from radioactive material excluded by subsection (b) below.

b) Excreta from individuals undergoing medical diagnosis or therapy with radioactive material are not subject to the limitations contained in subsection (a) above.

Section 340.1040 Treatment or Disposal by Incineration

A licensee may treat or dispose of licensed material by incineration only in the amounts and forms specified in Section 340.1050 or as specifically approved by the Department pursuant to Section 340.1020.

Section 340.1050 Disposal of Specific Wastes

a) A licensee may dispose of the following licensed material as if it were not

Atomic No.	Radionuclide	Class	Table 1 Occupational Values			Table 2 Effluent Concentrations		Table 3 Releases to Sewers
			Col. 1 Oral Ingestion ALI (μCi)	Col. 2 Inhalation ALI (μCi)	Col. 3 Inhalation DAC (μCi/ml)	Col. 1 Air (μCi/ml)	Col. 2 Water (μCi/ml)	Monthly Average Concentration (μCi/ml)
86	Radon-222	With daughters removed	-	1E+4	4E-6	1E-8	-	-
		With daughters present	-	1E+2 (or 4 working level months)	3E-8 (or 0.33 working level)	1E-10	-	-
87	Francium-222[2]	D, all compounds	2E+3	5E+2	2E-7	6E-10	3E-5	3E-4
87	Francium-223[2]	D, all compounds	6E+2	8E+2	3E-7	1E-9	8E-6	8E-5
88	Radium-223	W, all compounds	5E+0 Bone surf (9E+0)	7E-1	3E-10	9E-13	-	-
				-	-	-	1E-7	1E-6
88	Radium-224	W, all compounds	8E+0 Bone surf (2E+1)	2E+0	7E-10	2E-12	-	-
				-	-	-	2E-7	2E-6
88	Radium-225	W, all compounds	8E+0 Bone surf (2E+1)	7E-1	3E-10	9E-13	-	-
				-	-	-	2E-7	2E-6
88	Radium-226	W, all compounds	2E+0 Bone surf (5E+0)	6E-1	3E-10	9E-13	-	-
				-	-	-	6E-8	6E-7
88	Radium-227[2]	W, all compounds	2E+4 Bone surf (2E+4)	1E+4 Bone surf (2E+4)	6E-6	-	-	-
					-	3E-8	3E-4	3E-3
8	Radium-228	W, all compounds	2E+0 Bone surf (4E+0)	1E+0	5E-10	2E-12	-	-
				-	-	-	6E-8	6E-7
89	Actinium-224	D, all compounds except those given for W and Y	2E+3 LLI wall (2E+3)	3E+1 Bone surf (4E+1)	1E-8	-	-	-
					-	5E-11	3E-5	3E-4
		W, halides and nitrates	-	5E+1	2E-8	7E-11	-	-
		Y, oxides and hydroxides	-	5E+1	2E-8	6E-11	-	-
89	Actinium-225	D, see ^{224}Ac	5E+1 LLI wall (5E+1)	3E+1 Bone surf (5E+1)	1E-10	-	-	-
					-	7E-13	7E-7	7E-6
		W, see ^{224}Ac	-	6E+1	3E-10	9E-13	-	-
		Y, see ^{224}Ac	-	6E+1	3E-10	9E-13	-	-
89	Actinium-226	D, see ^{224}Ac	1E+2 LLI wall (1E+2)	3E+0 Bone surf (4E+0)	1E-9	-	-	-
					-	5E-12	2E-6	2E-5
		W, see ^{224}Ac	-	5E+0	2E-9	7E-12	-	-
		Y, see ^{224}Ac	-	5E+0	2E-9	6E-12	-	-
89	Actinium-227	D, see ^{224}Ac	2E-1 Bone surf (4E-1)	4E-4 Bone surf (8E-4)	2E-13	-	-	-
					-	1E-15	5E-9	5E-8
		W, see ^{224}Ac	-	2E-3 Bone surf (3E-3)	7E-13	-	-	-
					-	4E-15	-	-
		Y, see ^{224}Ac	-	4E-3	2E-12	6E-15	-	-

Section 340.1030 Disposal by Release into Sanitary Sewerage

a) A licensee may discharge licensed material into sanitary sewerage if each of the following conditions is satisfied:

1) The material is readily soluble, or is readily dispersible biological material, in water;

2) The quantity of licensed radioactive material that the licensee releases into the sewer in 1 month divided by the average monthly volume of water released into the sewer by the licensee does not exceed the concentration listed in Table 3 of Appendix B to 10 CFR 20.1001 - 20.2401, effective January 1, 1994, exclusive of subsequent amendments or editions;

3) If more than one radionuclide is released, the following conditions must also be satisfied:

A) The licensee shall determine the fraction of the limit in Table 3 of Appendix B to 10 CFR 20.1001 - 20.2401, effective January 1, 1994, exclusive of subsequent amendments or editions, represented by discharges into sanitary sewerage by dividing the actual monthly average concentration of each radionuclide released by the licensee into the sewer by the concentration of that radionuclide listed in Table 3 of Appendix B to 10 CFR 20.1001 - 20.2401, effective January 1, 1994, exclusive of subsequent amendments or editions; and

B) The sum of the fractions for each radionuclide required by subsection (a)(3)(A) above does not exceed unity;

4) The total quantity of licensed radioactive material that the licensee releases into sanitary sewerage in a year does not exceed 185 GBq (5 Ci) of hydrogen-3, 37 GBq (1 Ci) of carbon-14, and 37 GBq (1 Ci) of all other radioactive materials combined; and

5) In determining compliance with subsections (a)(1), (a)(2), (a)(3) and (a)(4) above, the licensee shall not include the activity from radioactive material excluded by subsection (b) below.

b) Excreta from individuals undergoing medical diagnosis or therapy with radioactive material are not subject to the limitations contained in subsection (a) above.

Section 340.1040 Treatment or Disposal by Incineration

A licensee may treat or dispose of licensed material by incineration only in the amounts and forms specified in Section 340.1050 or as specifically approved by the Department pursuant to Section 340.1020.

Section 340.1050 Disposal of Specific Wastes

a) A licensee may dispose of the following licensed material as if it were not

Atomic No.	Radionuclide	Class	Table 1 Occupational Values			Table 2 Effluent Concentrations		Table 3 Releases to Sewers
			Col. 1	Col. 2	Col. 3	Col. 1	Col. 2	
			Oral Ingestion	Inhalation				Monthly Average
			ALI (μCi)	ALI (μCi)	DAC (μCi/ml)	Air (μCi/ml)	Water (μCi/ml)	Concentration (μCi/ml)
86	Radon-222	With daughters removed	-	1E+4	4E-6	1E-8	-	-
		With daughters present	-	1E+2 (or 4 working level months)	3E-8 (or 0.33 working level)	1E-10	-	-
87	Francium-222[2]	D, all compounds	2E+3	5E+2	2E-7	6E-10	3E-5	3E-4
87	Francium-223[2]	D, all compounds	6E+2	8E+2	3E-7	1E-9	8E-6	8E-5
88	Radium-223	W, all compounds	5E+0	7E-1	3E-10	9E-13	-	-
			Bone surf (9E+0)	-	-	-	1E-7	1E-6
88	Radium-224	W, all compounds	8E+0	2E+0	7E-10	2E-12	-	-
			Bone surf (2E+1)	-	-	-	2E-7	2E-6
88	Radium-225	W, all compounds	8E+0	7E-1	3E-10	9E-13	-	-
			Bone surf (2E+1)	-	-	-	2E-7	2E-6
88	Radium-226	W, all compounds	2E+0	6E-1	3E-10	9E-13	-	-
			Bone surf (5E+0)	-	-	-	6E-8	6E-7
88	Radium-227[2]	W, all compounds	2E+4	1E+4	6E-6	-	-	-
			Bone surf (2E+4)	Bone surf (2E+4)	-	3E-8	3E-4	3E-3
88	Radium-228	W, all compounds	2E+0	1E+0	5E-10	2E-12	-	-
			Bone surf (4E+0)	-	-	-	6E-8	6E-7
89	Actinium-224	D, all compounds except those given for W and Y	2E+3	3E+1	1E-8	-	-	-
			LLI wall (2E+3)	Bone surf (4E+1)	-	5E-11	3E-5	3E-4
		W, halides and nitrates	-	5E+1	2E-8	7E-11	-	-
		Y, oxides and hydroxides	-	5E+1	2E-8	6E-11	-	-
89	Actinium-225	D, see ^{224}Ac	5E+1	3E-1	1E-10	-	-	-
			LLI wall (5E+1)	Bone surf (5E-1)	-	7E-13	7E-7	7E-6
		W, see ^{224}Ac	-	6E-1	3E-10	9E-13	-	-
		Y, see ^{224}Ac	-	6E-1	3E-10	9E-13	-	-
89	Actinium-226	D, see ^{224}Ac	1E+2	3E+0	1E-9	-	-	-
			LLI wall (1E+2)	Bone surf (4E+0)	-	5E-12	2E-6	2E-5
		W, see ^{224}Ac	-	5E+0	2E-9	7E-12	-	-
		Y, see ^{224}Ac	-	5E+0	2E-9	6E-12	-	-
89	Actinium-227	D, see ^{224}Ac	2E-1	4E-4	2E-13	-	-	-
			Bone surf (4E-1)	Bone surf (8E-4)	-	1E-15	5E-9	5E-8
		W, see ^{224}Ac	-	2E-3	7E-13	-	-	-
			-	Bone surf (3E-3)	-	4E-15	-	-
		Y, see ^{224}Ac	-	4E-3	2E-12	6E-15	-	-

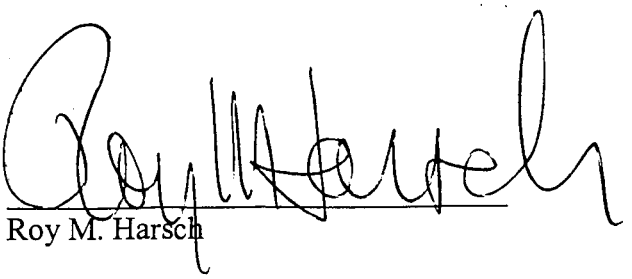
CERTIFICATE OF SERVICE

It is hereby certified that true copies of the foregoing **POST-HEARING COMMENTS**, were hand delivered to the following:

Dorothy M. Gunn, Clerk
Illinois Pollution Control Board
James R. Thompson Center
100 West Randolph Street, Suite 11-600
Chicago, Illinois 60601

and mailed via First-Class Mail on December 8, 2004 to the following:

SEE ATTACHED SERVICE LIST



Roy M. Harsch

THIS FILING IS SUBMITTED ON RECYCLED PAPER

R 04-21 SERVICE LIST

Deborah J. Williams
Assistant Counsel
Illinois Environmental Protection Agency
P.O. Box 19276
Springfield, IL 62794-9226

Albert F. Ettinger
Environmental Law & Policy Center
35 East Wacker Drive, Suite 1300
Chicago, Illinois 60601

Matthew J. Dunn
Office of the Attorney General
Environmental Bureau
188 West Randolph, 20th Floor
Chicago, Illinois 60601

Amy Antoniolli
Illinois Pollution Control Board
100 West Randolph Street, Suite 11-500
Chicago, Illinois 60601

Claire A. Manning
Posegate & Denes
111 N. Sixth Street
Springfield, Illinois 62701

Richard Lanyon
Metropolitan Water Reclamation District
100 East Erie Street
Chicago, Illinois 60611

Abdul Khalique
Metropolitan Water Reclamation District
Of Greater Chicago
6001 W. Pershing Road
Cicero, Illinois 60804

Dennis L. Duffield
City of Joliet
Department of Public Works & Utilities
921 E. Washington Street
Joliet, Illinois 60431

Stanley Yonkauski
Illinois Department of Natural Resources
One Natural Resources Way
Springfield, Illinois 62702-1271

Joel C. Sternstein
Office of the Attorney General
Environmental Bureau
188 West Randolph, 20th Floor
Chicago, Illinois 60601

William Seith
Total Environmental Solutions
631 E. Butterfield Road, Suite 315
Lombard, Illinois 60148

John McMahon
Wilkie & McMahon
8 East Main Street
Champaign, Illinois 61820

Lisa Frede
CICI
2250 E. Devon Avenue, Suite 239
Des Plaines, Illinois 60018

Jeffrey C. Fort
Letissa Carver Reid
Sonnenschein Nath & Rosenthal
8000 Sears Tower
233 South Wacker Drive
Chicago, Illinois 60606-6404