BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)	
	)	
REVISIONS TO RADIUM WATER QUALITY	)	
STANDARDS: PROPOSED NEW 35 ILL.ADM.	)	R04-21
CODE 302.307 and AMENDMENTS TO	)	(Rulemaking – Water)
35 ILL.ADM. CODE 302.207 and 302.525	)	
	)	

NOTICE OF FILING

TO: SEE ATTACHED SERVICE LIST

PLEASE TAKE NOTICE that on November 24, 2004 the undersigned filed the **METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO'S SUPPLEMENTAL COMMENTS TO PROPOSED ADDITIONS AND REVISIONS TO RADIUM WATER QUALITY STANDARDS** with the Illinois Pollution Control Board. A copy of the filing accompanies this notice.

METROPOLITAN WATER RECLAMATION
DISTRICT OF GREATER CHICAGO

Michael G. Rosenberg, Its Attorney

Michael G. Rosenberg by
Ronald M. Hill
Metropolitan Water Reclamation
District of Greater Chicago
100 East Erie Street
Chicago, Illinois 60611
(312)751-6583

RMH:jp

STATE OF ILLINOIS)
) SS .
COUNTY OF COOK)

CERTIFICATE OF SERVICE

I, Judith A. Pappalardo, being duly sworn on oath, certify that I caused a copy of the attached **Metropolitan Water Reclamation District of Greater Chicago's Supplemental Comments To Proposed Additions And Revisions To Radium Water Quality Standards** to be served by First Class U. S. Mail to the below named persons at their addresses as shown on the attached Service List, with proper postage prepaid, from 100 E. Erie Street, Chicago, Illinois, at or near the hour of 4:00 p.m., on November 24, 2004:

TO: **SEE ATTACHED SERVICE LIST**

Judith A. Pappalardo

SUBSCRIBED and SWORN to
before me on November 24, 2004.

OFFICIAL SEAL
MARGARET T CONWAY
NOTARY PUBLIC - STATE OF ILLINOIS
MY COMMISSION EXPIRES: 12-07-06

Margaret T. Conway
Notary Public

RMH:jp

Party Name	Role	City & State	Phone/Fax
Metropolitan Water Reclamation District Interested Party Richard Lanyon, Director of Research and Development	100 East Erie Street	Chicago IL 60611	312/751-6583 312/751-6598
IEPA Petitioner Deborah J. Williams Stefanie N. Diers, Assistant Counsel	1021 North Grand Avenue East P.O. Box 19276	Springfield IL 62794-9276	217/782-5544 217/782-9807
Gardner Carton & Douglas Interested Party Roy M. Harsch Sasha M. Engle	191 N. Wacker Drive Suite 3700	Chicago IL 60606-1698	312/569/1000 312/569-3000
Sonnenschein Nath & Rosenthal Interested Party Jeffrey C. Fort Letissa Carver Reid	8000 Sears Tower 233 South Wacker Drive	Chicago IL 60606-6404	312/876-8000 312/876-7934
Environmental Law and Policy Center Interested Party Albert F. Ettinger	35 East Wacker Drive Suite 1300	Chicago IL 60601	312/673-6500 312/795-3730
Office of the Attorney General Petitioner Joel J. Sternstein, Assistant Attorney General Matthew J. Dunn, Division Chief	Environmental Bureau 188 West Randolph, 20th Floor	Chicago IL 60601	312/814-2550 312/814-2347
Wilkie & McMahon Interested Party John McMahon	1 East Main Street #214	Champaign IL 61820-3615	217/359-2115 217/359-2754
Illinois Pollution Control Board Interested Party Dorothy M. Gunn, Clerk of the Board Amy Antoniolli, Hearing Officer	100 W. Randolph St. Suite 11-500	Chicago IL 60601	3128143956
City of Joliet, Department of Public Works and Utilities Interested Party Dennis L. Duffield, Director of Public Works and Utilities	921 E. Washington Street	Joliet IL 60431	815-724-4230
Posegate & Denes Interested Party Claire A. Manning	111 N. Sixth Street	Springfield IL 62701	217-522-6152
Illinois Department of Natural Resources Interested Party Stanley Yonkauski, Acting General Counsel	One Natural Resources Way	Springfield IL 62702-1271	217/782-1809 217/524-9640
CICI Interested Party Lisa Frede	2250 E. Devon Ave. Suite 239	Des Plaines IL 60018	847-544-5995
Total Environmental Solutions Interested Party William D. Seith	631 E. Butterfield Rd. Suite 315	Lombard IL 60148	6309693300 6309693303
Metropolitan Water Reclamation District of Greater			

Chicago
Interested Party
Abdul Khalique, Radiation Chemist

6001 W. Pershing Road

Cicero
IL 60804

708-588-4071

Total number of participants: 19

BEFORE THE ILLINOIS POLLUTION CONTROL BOARD

IN THE MATTER OF:	)
	)
REVISIONS TO RADIUM WATER QUALITY STANDARDS: PROPOSED NEW 35 ILL. ADM. CODE 302.307 and AMENDMENTS TO 35 ILL. ADM. CODE 302.207 and 302.525	) R04-21) (Rulemaking - Water))))

METROPOLITAN WATER RECLAMATION DISTRICT OF GREATER CHICAGO'S SUPPLEMENTAL COMMENTS TO PROPOSED ADDITIONS AND REVISIONS TO RADIUM WATER QUALITY STANDARDS

The Metropolitan Water Reclamation District of Greater Chicago ("District"), submits the following comments in support of the proposed addition of 35 Ill. Adm. Code Part 302.307, and amendments to 35 Ill. Adm. Code 302.207 and 302.525.

My name is Abdul Khalique. I am a Radiation Chemist at the Metropolitan Water Reclamation District of Greater Chicago. I am submitting the following addition to my verbal testimony of October 22, 2004 at the public hearing on the above subject.

The existing General Use Water Quality Standard, and the Lake Michigan Basin Standard for radium-226 (radium-226 shall not exceed 1pCi/L) is excessively stringent. We agree with the Illinois Environmental Protection Agency's (IEPA) proposal of regulating combined radium-226 and radium-228 at Public and Food Processing water supply intakes at a concentration of 5 pCi/L.

The current U.S. EPA maximum contaminant level for radium-226 and radium-228 in drinking water is 5 pCi/L, and for beta particles and photon radioactivity it is less than or equal to 4 mrem per year (40 CFR Parts 9, 141 and 142, December 7, 2000). It is our understanding from the regulations that a combined radium-226 and radium-228 concentration of 5 pCi/L in drinking water will result in a dose equivalent of 4 mrem per year for humans.

Available data indicate that dose rates below 1 rad per day for aquatic animals and terrestrial plants cause no measurable adverse effects to population of plants and animals (U. S. Department of Energy, DOE-STD-1153-2002, July 2002, Attachment 1).

To convert the absorbed dose (rad) to dose equivalent (rem) the following calculations are being submitted:

The dose equivalent is equal to absorbed dose multiplied by the quality factor (Q) (Handbook of Health Physics and Radiological Health, Third Edition, 1998).

1 rem = 1 rad x Q

Absorbed dose due to beta particles and gamma rays:

1 rad = 1 rem ÷ Q

1 rad per day = (1 rem ÷ Q) per day

= 1 rem per day (where Q = 1 for beta particles and gamma rays)

= 1000 mrem per day

= (1000 mrem per day) x (365 day per year)

= 365,000 mrem per year

Absorbed dose due to alpha particles:

1 rad per day = (1 rem ÷ 20) per day (where Q = 20 for alpha particles)

= (1000 mrem ÷ 20) per day

= 50 mrem per day

= (50 mrem per day) x (365 day per year)

= 18,250 mrem per year

The above calculations show that the U.S. EPA maximum contaminant level for drinking water for radioactivity (4 mrem per year) is 4,562 to 91,250 times more stringent than the safe level for aquatic animals and terrestrial plants.

The National Council on Radiation Protection and Measurements (NCRP) report No. 109 entitled "Effects of Ionizing Radiation on Aquatic Organism", Chapter 7 "Dose to Aquatic Organism and Man from Environmental Radioactivity" (Attachment 2) reads as follows:

Radiation protection standards have been expressly developed for the protection of human health; however, it has been generally accepted and adopted by those involved with radiation standards that by "protecting humans we are protecting the environment." Statements for general acceptance of this philosophy are found in the BEIR (Biological Effects of Ionizing Radiation) Report, (National Academy of Sciences, 1972), which states that: "Evidence to-date indicates that probably no other living organisms are very much more radiosensitive than man so that if man as an individual is protected, then other organisms as populations would be most unlikely to suffer harm."

A similar statement can be found in the recommendations of the International Commission on Radiological Protection (ICRP, 1991), as quoted in the NCRP report, "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 as 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."

Based on the above calculations and statements, we believe that the proposed rule, will not have any adverse effects on the aquatic environment and relieve publicly owned treatment

works (POTW) of an unnecessary burden of being subjected to possible effluent limitations on radium-226 in General Use water.

We also believe that the technical criteria contained in the Memorandum of Agreement between IEPA and Illinois Department of Nuclear Safety (IDNS) (now a division of Illinois Emergency Management Agency) of December 1, 1984 (Attachment 3) for agriculture use of sludge containing radium from water treatment plants is extremely conservative. The criteria for the level of radium in the sludge is such that after the sludge is mixed with soil (for agriculture use) the incremental increase of the radium concentration in the soil does not exceed 0.1 picocurie per gram (dry weight). However, the Nuclear Regulatory Commission (NRC) has established a level of 25 mrem per year to designate a decommissioned facility suitable for unrestricted use. The Association of Metropolitan Sewerage Agencies believe that this level is more appropriate as a screening level for biosolids operations.

The Interagency Steering Committee on Radiation Standards (ISCORS) believes that if the annual dose from all radionuclides detected in sludge or ash samples is 10 mrem or less, no further steps are warranted. When the estimated annual dose from all radionuclides exceeds 10 mrem, ISCORS recommends that the POTW operators consult with the State Radiation Protection Regulatory Agency. Using the ISCORS document screening calculations, it is estimated that 10 pCi of radium-226 per gram dry weight of sludge or ash will give a radiation dose from the non-radon pathway of 10 mrem per year to POTW workers and to individuals outside the POTW.

The IDNS has set a decontamination guideline of 5 pCi/g dry soil for radium-226 (32 IL Adm. Code: Chapter II, Section 340. Appendix A, January 2001).

Based on the above reasons we believe that a guidance limit of 0.1 pCi/g dry weight of radium-226 in sludge is overly stringent, and needs to be re-evaluated.

Respectfully submitted,

Metropolitan Water Reclamation District
of Greater Chicago

By:

Abdul Khalique, Radiation Chemist

November 24, 2004

Metropolitan Water Reclamation
District of Greater Chicago
Lue-Hing R&D Complex
6001 W. Pershing Road
Cicero, Illinois 60804-4112
708-588-4071

Attachment 1

NOT MEASUREMENT SENSITIVE

DOE-STD-1153-2002
July 2002

DOE STANDARD

A GRADED APPROACH FOR EVALUATING RADIATION DOSES TO AQUATIC AND TERRESTRIAL BIOTA

U.S. Department of Energy
Washington, D.C. 20585

AREA ENVR

Scope, Purpose and Organization

This technical standard provides methods, models, and guidance within a graded approach that the U.S. Department of Energy (DOE) and its contractors may use to evaluate doses of ionizing radiation to populations of aquatic animals, terrestrial plants, and terrestrial animals from DOE activities for the purpose of demonstrating protection relative to Dose Rate Guidelines. It provides dose evaluation methods that can be used to meet the requirements of DOE Order 5400.5, "Radiation Protection of the Public and the Environment" (1990a) and DOE Order 5400.1, "General Environmental Protection Program" (1990b). The technical standard assumes a threshold of protection for plants and animals at the following doses: for aquatic animals, 1 rad/d (10 mGy/d); for terrestrial plants, 1 rad/d (10 mGy/d); and for terrestrial animals, 0.1 rad/d (1 mGy/d). Available data indicate that dose rates below these limits cause no measurable adverse effects to populations of plants and animals.

The DOE graded approach includes a screening method and three more detailed levels of analysis for demonstrating compliance with applicable dose limits for protection of biota. The general screening method provides appropriately conservative limiting concentrations of radionuclides in environmental media (termed "Biota Concentration Guides" or BCGs). Radionuclide concentrations in samples of environmental media are easily compared with the BCGs to evaluate compliance with biota dose limits. The three more detailed analysis methods require more effort, but yield more accurate and realistic biota dose evaluations.

This technical standard is designed to be user-friendly, and is organized into three principal Modules for ease of implementation. Material in each Module is cross-referenced to pertinent sections in other Modules. There is some duplication of material across Modules by design, in order to allow each to be used separately, if desired. Module 1 serves as the principal users guide for step-by-step implementation of the graded approach to biota dose evaluation. Module 2 serves as a resource guide, providing detailed guidance for implementing key elements of the graded approach identified in Module 1, and providing a "primer" on technical issues to be considered when evaluating radiation as a stressor to the environment. Module 3 serves as a technical reference source, providing the technical basis for the derivation of dose models, screening values, and selection of default assumptions and parameters applied in the graded approach. The organization and content of the technical standard are provided in Figure 1.

Attachment 2

NCRP REPORT No. 109

EFFECTS OF IONIZING RADIATION ON AQUATIC ORGANISMS

NCRP

National Council on Radiation Protection and Measurements

Attachment 2 (Continued)

NCRP REPORT No. 109

EFFECTS OF IONIZING RADIATION ON AQUATIC ORGANISMS

Recommendations of the
NATIONAL COUNCIL ON RADIATION
PROTECTION AND MEASUREMENTS

Issued August 30, 1991

National Council on Radiation Protection and Measurements
7910 WOODMONT AVENUE / Bethesda, MD 20814

7. Dose to Aquatic Organisms and Man from Environmental Radioactivity

Radiation protection standards have been expressly developed for the protection of human health; however, it has been generally accepted and adopted by those involved with radiation standards that by *"protecting humans we are protecting the environment."* Statements for general acceptance of this philosophy are found in the 1972 BEIR (Biological Effects of Ionizing Radiation) Report (National Academy of Sciences, 1972) which states that:

> *"Evidence to-date indicates that probably no other living organisms are very much more radiosensitive than man so that if man as an individual is protected, then other organisms as populations would be most unlikely to suffer harm."*

A similar statement can be found in the recommendations of the International Commission on Radiological Protection, (ICRP, 1977):

> *"Although the principal 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 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."*

Although this viewpoint has been generally accepted, it has not previously been seriously challenged nor formally defended.[2]

[2]More recently the ICRP has modified its statement on the subject as follows: *"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 (ICRP, 1991)."*

It is well documented that radionuclides in th
be expected to produce similar or even substanti
certain organisms than to people inhabiting and d
from the same environment. Therefore, the risk
(discounting variations in radiosensitivity, lif
appear as high or higher for natural biota than for
there is a basic difference in how we perceive
compared to other species. For humans, a great
an individual member, and the loss of one or
from radiation exposure is viewed as a catastro
contrary, most other species are viewed more as
as identifiable individuals, and the loss of a few
the case of many aquatic organisms, thousands
be accepted without producing a noticeable or de
the population (Section 3). This philosophy is ex
not clearly, in the previous statements from the E
1972) and ICRP-26 (ICRP, 1977) and perhaps ex
acceptance of the statement that if *"humans are pr*
tion then the environment is protected."

In Sections 2, 3, and 4 we have reviewed the e
on aquatic organisms from the cellular level to th
and in Section 5 we have made recommendation
protect the environment. Therefore, by calculati
aquatic biota in a contaminated environment fro
receive a limiting dose of 1 mSv a^{-1}, the potential e
on aquatic organisms and populations can be ass
radiation standards established for the protection

A number of approaches have been taken in calc
to aquatic organisms in the environment. These a
cussed in Section 6 of this report. For the pres
BIORAD computer code (Trubey and Kaye, 197
calculate the internal and external dose rate t
assumptions of the models used in BIORAD, only
of the individual radionuclides in water is requi
dose rate to the biota.

It is assumed that the concentrations of radio
sediment and biota are at equilibrium and that th
radioactivity in the water is constant. The effecti
to humans from this environment is assumed t
limiting value of 1 mSv a^{-1}. The question is whet
tion of radioactivity in the tissue of the fish an
environment is sufficient to produce a radiation d
result in a detrimental effect on the fish populat

MEMORANDUM OF AGREEMENT

This Memorandum of Agreement is entered into by and between the Illinois Environmental Protection Agency (IEPA) and the Illinois Department of Nuclear Safety (IDNS). This Memorandum of Agreement is entered into for the purpose of delineating certain responsibilities of IEPA and IDNS regarding the disposal of sludge resulting from treatment of water or sewage and containing radium occurring naturally from ground waters.

WHEREAS, many public water supplies in the State of Illinois draw their raw water from deep wells which contain naturally occurring radium, and

WHEREAS, such radium is removed from the raw water during treatment thereby concentrating it in sludge, and

WHEREAS, IEPA has authority to regulate the management and disposal of said sludge under the Environmental Protection Act, Ill. Rev. Stat., 1983, ch. 111 1/2, pars. 1001 et. seq., and Regulations adopted thereunder, and

WHEREAS, IDNS has authority to require registration of certain installations storing radioactive material under the provisions of Ill. Rev. Stat., 1983, ch. 111 1/2, pars. 194 et seq., and

WHEREAS, IDNS has authority to require the licensure of certain sources of radiation and has authority to promulgate regulations to govern the possession and use of any radiation source under the Radiation Protection Act, Ill. Rev. Stat., 1983, ch. 111 1/2, pars. 211 et seq..

THEREFORE, it is agreed by and between IEPA and IDNS as follows:

1) Pursuant to Ill. Rev. Stat., 1983, ch. 111 1/2, par. 194 et seq. which provides that every operator of a radiation installation must register with IDNS, the following individuals or entities must register directly with IDNS and must comply with the requirements of that statute and implementing regulations:

   a) Owners and operators of facilities or plants which produce sludge resulting from the treatment of water or sewage and containing radium occurring naturally from ground water; and

   b) Owners and operators of IEPA permitted landfills if the sludge is disposed of in such landfills; and

c) Any other person or entity that IDNS determines is required to register under the provisions of Ill. Rev. Stat., 1983, ch. 111 1/2, pars. 194 et seq.

2) Sludge resulting from the treatment of water and sewage and containing radium occurring naturally from ground water will be exempt from the licensure and fee requirements of the Radiation Protection Act (Ill. Rev. Stat., 1983, ch. 111 1/2, pars. 211 et seq.) based on IDNS' finding that such exemption will not constitute a significant risk to the health and safety of the public.

3) Sludge resulting from the treatment of water and sewage and containing naturally occurring radium from ground water may be disposed of in accordance with the provisions of this Memorandum of Agreement and the requirements of IEPA and the Rules and Regulations of the Illinois Pollution Control Board, as implemented by IEPA. Any permit issued by the IEPA pursuant to this Agreement shall contain conditions based on the technical criteria contained herein and in any regulations which IEPA and DNS agree to adopt pursuant to this Agreement.

4) If the level of radium in the sludge is 5 picocuries per gram or less (dry weight):

a) the sludge may be disposed of in a landfill permitted by IEPA to accept such sludge;

b) the sludge may be used for soil conditioning purposes on agricultural crop land (e.g., corn, soy beans) but only if:

(1) such use is in accordance with IEPA procedures; and

(2) the level of radium in the sludge is such that after the sludge is mixed with soil (for agricultural use) the incremental increase of the radium concentration in the soil does not exceed 0.1 picocurie per gram (dry weight). The concentration of the radium in the sludge (dry weight) shall be determined by laboratory analysis. The incremental increase of the radium concentration in the soil may be determined by calculations using the previously determined concentration of radium in the sludge and the estimated amount of mixture with soil during application.

5) If the level of radium in the sludge is greater than 5 picocuries per gram (dry weight) but less than 50 picocuries per gram (dry weight):

   a) the sludge may be disposed of in an IEPA permitted landfill provided that there is at least ten feet of non-contaminated overburden between the sludge and grade level in order to provide:

      (1) reasonable assurance that the exhalation rate of radon to the atmosphere, or into a dwelling, will not exceed an average rate of 5 picocuries per square meter per second; and

      (2) reasonable assurance against accidental intrusion into the sludge in the future.

   b) the sludge may be used for soil conditioning, subject to the restrictions provided in paragraph 4(b);

6) If the level of radium in the sludge exceeds 50 picocuries per gram (dry weight):

   a) the method of disposal of such wastes must be reviewed and a determination must be made in advance by IDNS (pursuant to procedures set forth in Paragraph 8) that there is reasonable assurance that the exhalation rate of radon to the atmosphere or into a dwelling will not exceed an average rate of 5 picocuries per square meter per second and reasonable assurance against accidential intrusion into the sludge in the future.

   b) the sludge may be used for soil conditioning, subject to the restrictions provided in paragraph 4(b) and only if a determination is made in advance by IDNS (pursuant to procedures set forth in Paragraph 8) that there is reasonable assurance that the exhalation rate of radon to the atmosphere or into a dwelling will not exceed an average rate of 5 picocuries per square meter per second and reasonable assurance against accidential intrusion into the sludge in the future.

7) Alternative methods of sludge disposal may be utilized in emergency situations or where it is technologically or economically impracticable to dispose of sludge in accordance with Paragraphs 4 through 6. Such alternative methods may be used only if a determination is made in advance by IDNS (pursuant to

procedures set forth in Paragraph 8) that there is reasonable assurance that the exhalation rate of radon to the atmosphere or into a dwelling will not exceed an average rate of 5 picocuries per square meter per second and reasonable assurance against accidential intrusion into the sludge in the future.

8) a) In those cases where a prior determination is needed from IDNS, IEPA will provide IDNS with a copy of the pertinent permit application. IDNS will provide comments to IEPA regarding these permit applications, including its written determination as to whether there is reasonable assurance that the exhalation rate of radon to the atmosphere or into a dwelling will not exceed an average rate of 5 picocuries per square meter per second and reasonable assurance against accidential intrusion into the sludge in the future.

b) In emergencies IEPA and IDNS may meet to discuss the situation and determine acceptable alternatives for temporary resolution of the emergency. IDNS must approve the alternative chosen for temporary resolution. Approval or denial of the method of final disposal of the sludge will be in accordance with procedures described in subparagraph 8(a).

9) All analysis of sludge shall be conducted by a laboratory certified by the United States Environmental Protection Agency to perform radiological analysis, and concentrations of radium will be determined by a method approved by IDNS.

10) Copies of all permits issued by IEPA relating to disposal of sludge containing radium occurring naturally from ground water will be forwarded to IDNS.

11) IDNS agrees to provide IEPA with technical support in any proceeding in which the technical criteria contained in this Memorandum are at issue.

Dated: September 21, 1984

Director
Illinois Environmental
Protection Agency

Dated: September 13, 1984

Director
Illinois Department of Nuclear Safety