BEFORE THE POLLUTION CONTROL BOARD
OF THE STATE OF ILLINOIS

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

PC 1

NOTICE OF FILING

To: See Attached Service list

PLEASE TAKE NOTICE that on June 2, 2004, we filed the Illinois Pollution Control Board the attached **COMMENTS SUBMITTED ON BEHALF OF WRT ENVIRONMENTAL (ILLINOIS) LLC** with the Pollution Control Board of the State of Illinois.

WRT Environmental (Illinois) LLC

By: ______________________
One of Its Attorneys

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

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BEFORE THE POLLUTION CONTROL BOARD
OF THE STATE OF ILLINOIS

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JUN 0 2 2004

STATE OF ILLINOIS
Pollution Control Board

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COMMENTS SUBMITTED ON BEHALF OF
WRT ENVIRONMENTAL (ILLINOIS) LLC

These comments are submitted by Sonnenschein, Nath & Rosenthal LLP on behalf of WRT Environmental (Illinois) LLC and its related companies ("WRT") pursuant to the schedule for submitting public comments. WRT also requests for a further merit hearing before the Board considers this matter for second notice. At the close of the public hearing on May 6, 2004, the Hearing Officer stated that the record would close on June 3, 2004, and that any public comments or request for further hearing should be made by that time.

WRT was established to aid municipalities in their efforts to provide safe drinking water, particularly with respect to the removal of radium and uranium as required by U.S.EPA's Radionuclide Rule. All radium or uranium removal processes generate radioactive residuals, but many communities do not have the expertise for the safe handling, transportation and disposal of these residuals. WRT's goal is to provide for the safe removal of the contaminate from the raw water supply, and to ensure the final disposal into a safe, secure licensed disposal site.

To that end, WRT contacted IEPA and the then IDNS in early 2002, and commenced its first pilot plant that summer. The pilot plant was run for approximately a year and led to the issuance of a permit for the Village of Oswego in the fall of 2003. At about that time WRT met with representatives of the Board and the Agency, as well as the Illinois Emergency Management Agency, and continued discussions with IEPA and IEMA through the winter and spring of 2004. The purpose of these meetings was to advise the relevant agencies of the benefits of the WRT System, as it applied to the removal of radium from drinking water supplies in Illinois. However, WRT was not notified of the filing of this petition, and learned of this proceeding only last Thursday, May 27, 2004. WRT has now had the opportunity to review the transcripts of the hearings held, and was surprised to find no reference to the existence of technology, such as the WRT System, that would allow the existing water quality standard for radium to be maintained. Nor does the record appear to contain any general review of the available technology or economic costs associated with compliance technology were the existing standard to be relaxed. And we were very concerned to see that there is no information presented concerning the effect on sewers from backwash activities nor on accumulated radium levels in sludge that could become land applied.

Some of the information that we believe relevant to this proceeding is contained in the exhibits to this comment. Exhibit A hereto is a copy of a letter dated September 15, 2003, sent by WRT to Chairman Johnson which sets forth WRT's perspective on the issues raised by this proceeding. A similar letter was sent to IEPA and other relevant agencies. Exhibit B is a report entitled "Illinois Summary of Radium Removal Methods and Disposal Issues as they Relate to Radium Removal from Drinking

Water," dated May 2004. And Exhibit C is a copy of the permit issued by IEPA to the Village of Oswego for use of the WRT System to treat for radium in its public water supply.

The WRT System can achieve treated water quality that meets the existing radium standard, which the Agency now proposes to delete. It can achieve those levels due to its approach of removing radium from the raw water supply and separating it into a separate solid waste medium, which is then disposed in a low level radioactive waste landfill. By this approach, the WRT System avoids the need for filter backwash into the sewers at a POTW. This system, which was originally developed in mining operations, is technologically feasible and costs no more to build and operate than other technologies for treatment of radium from drinking water supplies.

Flushing the backwash of radium residuals into public sewers poses adverse effects. **The concentration of radium in backwashes from radium removal systems can be in the thousands of picocuries per gram on a dry weight basis,** and any radium removal system will concentrate the radium from the raw water supply. Flushing the residuals down a sewer, threatens sewer workers with an excessive exposure of elevated radium levels. [Indeed, it is quite likely that these residuals may exceed 50 picocuries per gram, and hence be classified as low level radioactive waste]. Flushing the residuals down a sewer also results in the land application of sludge with elevated radium levels, which may cause the receiving land - and its crops - to exceed criteria for safe land application.

It appears that there has not been any testimony on the available technologies to meet public water supply requirements for radium. WRT is aware of two existing technologies which could provide appropriate radium treatment without the need for sewer backwash of the concentrated residuals from that treatment. WRT believes that most of the other existing technologies could be modified to avoid using the sanitary sewers for disposal of the radioactive materials extracted from the raw water. But absent the present regulatory structure, there may be no regulatory impediment to such practices in Illinois.

There also appears to be no testimony about the longer term trends relating to use of deep aquifers, which tend to have elevated radium concentrations in northern Illinois. The coming further restrictions on use of Lake Michigan water, and the growth of communities to the south and west of Cook County, would indicate that more radium-containing groundwater will need to be treated, rather than less. Clearly, the radium is not going away any time soon, it cannot be broken down into a less harmful form and, as the Agency admits, it is a human carcinogen. Merely transferring radium to another medium, whether by discharging it to surface waters or land–applying the sludge to cropland, is not environmentally sound. And the record is incomplete as to the environmental effects of the proposed rule. Indeed, we believe that there is information on the adverse affects of radium on biota and other potential receptors.

Given the directions of the Environmental Protection Act to prevent or reduce pollution at the source wherever feasible, and of the Low-Level Radioactive Waste Management Act to use, to the greatest extent possible, alternatives to land disposal, we submit that the proposed regulatory change is not appropriate.

We therefore urge the Board to accept these comments of WRT, and to schedule another merit hearing on the proposed rule-change. WRT would be prepared to participate in such a hearing and to share its knowledge concerning the environmental and engineering issues relating to the proposed rule. WRT did not receive notice of the proposed rule, nor was the information that WRT already had presented to IEPA placed into the record. Without this information, we respectfully submit that the Board cannot meet its obligations under section 27 of the Act.

Respectfully submitted,
Sonnenschein, Nath & Rosenthal LLP
Attorneys for WRT Environmental (Illinois), LLC

By Jeffrey C. Fort

June 2, 2004

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

CERTIFICATE OF SERVICE

The undersigned, an attorney, certify that I have served upon the individuals named on the attached Notice of Filing true and correct copies of the **COMMENTS SUBMITTED ON BEHALF OF WRT ENVIRONMENTAL [ILLINOIS] LLC** by First Class Mail, postage prepaid on June 2, 2004 .

SERVICE LIST

R04-21

Dorothy Gunn Clerk of the Board Illinois Pollution Control Board 100 West Randolph Street Suite 11-500 Chicago, IL 60601	Amy Antoniolli Hearing Officer Illinois Pollution Control Board 100 West Randolph Street Suite 11-500 Chicago, IL 60601
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Jonathan Furr, General Counsel Illinois Department of Natural Resources One Natural Resources Way Springfield, IL 62701	Abdul Khalique, Radiation Chemist Richard Lanyon Metropolitan Water Reclamation District Of Greater Chicago 6001 West Pershing Road Cicero, IL 60804
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Exhibit A

September 15, 2003

Mr. Thomas E. Johnson
Chairman
Illinois Pollution Control Board
1021 North Grand Ave. East
Springfield, IL 62794

Dear Chairman Johnson:

We are very grateful for the opportunity to meet with you and your staff this Wednesday. We are looking forward to meeting because we are concerned that in the rush to meet a federally mandated deadline on the removal of radium from their drinking water, many communities in Illinois may be making decisions on radium waste disposal that may have an adverse impact on future land use and produce costly long-term health and financial liabilities.

More than 100 municipalities across Illinois are required to reduce the radium in their drinking water supply to EPA mandated levels by December 8, 2003. These Illinois cities and towns must decide on which radium removal system they will obtain. Failure to meet the deadline means that residents are being exposed to the health hazards associated with consuming this radioactive element and to financial consequences which could include fines of $10,000 for each day of non-compliance. These are multi-million dollar taxpayer-financed decisions and we would hope that the decisions taken will lead to a permanent total solution and not create an additional set of problems.

The "scramble to dig new wells, install expensive water treatment systems or buy water from neighboring towns" reported by the Chicago Tribune last week has raised a number of important questions with respect to radium removal. One of the most important issues, and one which has not received sufficient attention, is the disposal of radium-filled sludge.

Most if not all of the radium removal systems, other than the WRT System, involve discharging the radium removed from the drinking water directly into the municipal sewer system. This radium is retained in the sewer sludge. Cities and towns using these systems may well be burdened, on an ongoing basis, with the costly, hazardous aftermath of dealing with this radium-filled sewer sludge and many may decide to dispose of the radium sludge within the boundaries of the State, either by placing it in Illinois landfills or by spreading it on Illinois fields.

-more-

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email: info@wrtnet.com · web: www.wrtnet.com

Nearly 20 years ago, the Illinois Department of Nuclear Safety (IDNS) and the Illinois Environmental Protection Agency (IEPA) moved to govern the management of water treatment plant sludge containing elevated levels of radium. A memorandum of agreement between the two agencies sets standards to limit the level of radioactivity in soil where radium contaminated sludge is applied.

To give you an idea of the practical impact of that memorandum of agreement, we understand that a City the size of Joliet would have to find more than 700 acres of Illinois farmland – each year – to dispose of the sludge containing radium it would remove from its drinking water. Once the sludge is applied, of course, the land may become environmentally tainted – radium has a half life of some 1600 years and as it deteriorates it creates radon gas.

There is at least one alternative, however, an environmentally progressive radium removal system that addresses this disposal issue. Our system, the WRT System, not only removes radium from drinking water, it also removes the radium from the entire State of Illinois. Our company offers a long-term contract to municipalities with no up front capital payment, we provide a performance guarantee of radium removal, we do not expose utility workers to radioactive waste and there is no discharge to the sewer system. Our Z-88™ Media absorbs the radium and is then removed and disposed of in fully licensed disposal facilities authorized to accept this radioactive waste, and our terms are financially competitive.

We have enclosed a description of our technology. It has been piloted successfully by several municipalities in Illinois. We have also included some information on our company and a copy of the Chicago Tribune story that appeared earlier this week.

We look forward to meeting with you and your staff to discuss these issues and answer any questions you may have.

Sincerely,

Charles S. Williams
President

Cc: Mike Garretson

Exhibit B

Illinois

Summary of Radium Removal Methods and Disposal Issues as they Relate to Radium Removal from Drinking Water

May, 2004

WATER REMEDIATION TECHNOLOGY, LLC

Summary of Radium Removal Methods and Disposal Issues as they Relate to Radium Removal from Drinking Water

The U.S. EPA has set a radium maximum contaminate level (MCL) of 5 picocuries (pCi/L) per liter of drinking water. Over 500 communities nationwide do not meet this drinking water standard. The Illinois EPA has the responsibility to insure that the drinking water in Illinois meets all drinking water standards under the Safe Drinking Water Act. The Illinois Emergency Management Agency has the responsibility of insuring safe handling and disposal of all radioactive materials. In Illinois over 100 communities currently do not meet this standard for radium. The EPA and the State are requiring the non-compliant communities to come into compliance. After the deadline for compliance (December 8, 2003), the State can impose fines for non-compliance. Most of the communities have signed compliance consent decrees promising to meet the MCL by a certain date. Currently the communities are conducting pilot plants and engineering studies to bring their community into compliance.

To bring the water systems into compliance the municipalities are investigating five different types of radium-removal systems that can be divided into three categories of waste disposal methods.

1. Systems that dispose of the radioactive water-treatment residues into the sewer system
2. Systems that dispose of the radioactive water-treatment residues directly on the land.
3. Systems that dispose of the radioactive water-treatment residues into landfills/disposal facilities licensed to accept radium-bearing byproducts.

Systems that dispose of the radioactive byproducts into the sewer system

Hydrous Manganese Oxide (HMO)
This process uses the addition of specialty chemicals or manufactured particles to promote the precipitation of radium and iron as insoluble particulates. The precipitated iron, radium, and manganese are then filtered out in a conventional sand filtration system. This sand filter is then backwashed periodically, sending the radioactive filter solids with the backwash water to the sanitary sewer. The system has been used effectively for iron removal for years. Because not all of the precipitant is removed during backwash, the filter media becomes radioactive over a period of time, quite possibly to a concentration that would require disposal to a low level radioactive site. An advantage of this system is that it removes iron as well as radium in the same operation, if both are a concern to a municipality (similar to hardness improvement and radium correction with lime softening).

The principal disadvantage is that the system requires the discharge of radioactive solids down the sewer where they may collect as residue in the collection system. These solids may well be in excess of a radium concentration of 10,000 pCi/g. Because of the high concentration of radium in the solids and the fact that these are discrete particles, disposal down the sewer results in sludge containing discrete particles containing radium in excess of that allowed for disposal at the U.S. Ecology LLRW site in Hanford, Washington and at the Envirocare of Utah site in Utah. Because of the high iron and magnesium content, the density of these particles is greater than typical sludge and segregation/settling of these particles may occur in the sewer system.

Illinois radiation protection regulations, 32 Ill Adm. Code 340.1030 prohibits a licensee from discharging radioactive solids down the sewer. The HMO solids are very high in radioactivity, and these individual particles have the potential for two types of exposure problems – 1) the settling of these radioactive solids in areas of the sewer collection system, resulting in sources of high radiation and exposure; and 2) the periodic backwash and release of a "slug" of highly- radioactive solids may remain as discrete radioactive "hot spots" within the sewage sludge.

This process requires constant chemical feed to maintain the effectiveness of the process. If the chemical feed stops, the radium removal is reduced. The system requires daily operator interaction and frequent expensive radium monitoring to insure compliance. The frequent backwash of the sand- filter waste consumes two to four percent of the water treated. Significant amounts of land will be required for land spreading to meet the maximum increase of 0.1 picocurie per gram on land where sludge will be applied (per IEPA – IDNS MOA, 1984). Local municipal workers are responsible for the maintenance, reagent handling and ultimate disposal.

Additional occupational training and monitoring for radiation exposure of sewer workers in contact with the sludge may be warranted.

Ion Exchange
This process removes radium by exchanging sodium for calcium, magnesium and radium on a resin. When the calcium is no longer effectively removed, the resin is then stripped of the collected elements by exposing the resin to a sodium chloride brine. The resin is then rinsed and reused. The sodium chloride brine bearing the radium, calcium, and magnesium is then discharged to the sewer followed by disposal of the rinse water. When the resin is no longer efficient at removing the radium the resin is replaced. The life of the resin is determined by the water chemistry but can be expected to be between two and seven years. When replaced, the spent resin, even after a final stripping operation, will likely contain radium in a concentration well above the limit for surface land application, requiring it to be disposed of in an appropriate landfill or Low Level Radioactive Waste (LLRW) disposal site. Advantages to the system include softening of the water while removing radium and a relatively low capital cost.

Disadvantages to the system include the addition of sodium and chlorides to both the drinking water and the sewer system. Increase in the corrosivity of the water may lead to the need to bypass and blend with untreated water to avoid dissolution of heavy metals and corrosion of the distribution system. This bypass of untreated water will raise the level of radium in the potable water, and communities with high radium may find that this bypass prohibits the use of the ion-exchange system. The discharge of the rinse water and the eluant brine to the sewer can result in scale formation with significant radium content in the sewer pipeline. Within the sewer plant, it is expected that the majority of the radium will end up concentrated in the sewage sludge. In communities where all or most of the drinking water that reports to a wastewater treatment plant is above the MCL, some level of training and monitoring for radiation exposure of sewer workers in contact with the sludge may be warranted.

Significant amounts of land will be required for land spreading to meet the maximum allowable increase of 0.1 picocurie per gram on land with sludge applied. The anticipated level of radium in the eluant water will be dependent on the frequency of regenerations and the original level of radium in the feed water but can be expected to be between 3,000 PCi/L to 6,000 pCi/L (based on recent analysis of eluant brine at an ion-exchange treatment plant in New Jersey). Dilution with rinse water may reduce this concentration to several hundred pCi/L. On a dry-weight basis, the concentration will be in excess of 100,000 pCi/g. Local municipal workers are responsible for the maintenance, reagent handling, and ultimate disposal. Calculations of radium content in the brine and eluant may be performed using the SPARRC Program [1]

Reverse Osmosis
Reverse osmosis is a very fine filter system where water containing contaminates is pressurized and pushed through a permeable membrane sized to prohibit passage of the undesirable elements. The process produces approximately 80 percent of the feed water as finished water. The 20 percent reject water contains the majority of the contaminants and is then disposed of as a liquid waste to the sanitary sewer. Since the concentration ratio of reject water to feed water is 5:1, the radium concentration in the reject water will be 5 times that of the original feed water, e.g., a feed concentration of 15 pCi/L would result in 75 pCi/L discharged to the wastewater treatment facility. The advantage of this system is that very high quality water is produced.

Disadvantages include high capital and operating costs, perhaps $1.50 to $2.50 per 1,000 gallons produced. The loss of 20 percent of the feed water will be a problem for some communities. Within the sewer plant it is expected that the majority of the radium will end up concentrated in the sludge. Significant amounts of land will be required for land spreading to meet the maximum increase of 0.1 picocurie per gram on land with sludge applied. Local municipal workers are responsible for the maintenance, reagent handling and ultimate disposal. In communities where all or most of the drinking water that reports to a wastewater treatment plant is above the MCL, some level of training and monitoring for radiation exposure of sewer workers in contact with the sewage sludge may be warranted.

Systems that dispose of the radioactive byproducts directly on the land

Lime Softening
The addition of chemicals such as lime and soda ash causes the calcium, magnesium and also radium to precipitate as carbonate compounds, thereby softening the water and removing radium in the same operation. The sludge generated by this process is usually sent to dewatering lagoons and later removed for land application. An advantage to this system is that, if the municipality wants to soften the water, this will occur at the same time the radium is removed, and the treatment residue generated by this process is often used on low-pH soils for soil conditioning.

Disadvantages to this system include high capital and operating costs. Significant amounts of land will be required for land spreading to meet the maximum allowable increase of 0.1 picocurie per gram on land where sludge is applied. Radon exposure levels of lime softening workers may need to be monitored. It is anticipated that the radium activity or concentration of the treatment residue on a dry weight basis would be less than 25 picocuries/g. Local municipal workers would be responsible for the maintenance, reagent handling and ultimate disposal.

Systems that dispose of the radioactive byproducts into landfills licensed to accept radium bearing waste.

Adsorptive media
The radium is collected on a disposable long-lived media that requires changing every one to several years. Because backwashing is not required, there is no water wasted. Chemical addition is not required. The media is exchanged when it no longer removes sufficient radium to meet the MCL. The exchange and transportation is contracted to experienced personnel. In addition, the spent media will be exchanged while the concentration of radium is low enough to permit safe and economic transportation and disposal.

One advantage is the simple operation of the system (no backwashing or chemical additions); only operational monitoring of the equipment is required of the utility operators. This simpler operation results in these workers having little exposure to radiation, estimated at less than 10 mrem/year. The radium-bearing media is disposed of in a licensed disposal site with long term maintenance and monitoring plans.

What are the repercussions of radium being disposed of into the sewer system?

Radium removal systems that discharge into the sewer either discharge the radium as a liquid (Ion Exchange or Reverse Osmosis) or as a solid (Hydrous Manganese Oxide). When discharged as a liquid the biological treatment concentrates the radium into the sewage sludge. The degree of concentration in the solids is not well documented but has been estimated by the New Jersey EPA to be in excess of 90 percent.

The discharge by a licensee of radioactive solids into the sewer system is not allowed by Illinois law but is being pursued by some municipalities. Virtually 100 percent of these solids would end up in the sewer system or the sewage sludge.

Discharge of solids or liquids into a sewer system introduces some potential impacts that need to be investigated. Some of these are:

1. What is the possibility of contaminating the sewer collection system, specifically considering the probability of the scale buildup within the piping and the possible settling out of radioactive solids in areas of low flows? Even Ion Exchange and Reverse Osmosis has the potential for radioactive solids to be precipitated within the collection system as scale when the water is mixed with air (CO_2 forming radium carbonates) and water (forming both radium sulfates and radium carbonates).
2. What is the potential for sewer worker exposure throughout the sewer system? The ISCORS[2] report indicates a reasonable expectation that sludge handlers could be exposed to levels that would require training as radiation workers and monitoring even if the radioactivity of the sludge is at relatively low levels. The exposure to these workers could exceed that of a nuclear power plant worker, at wastewater treatment facilities that accept water with radium concentrations above the MCL. (See ARS Report[3])
3. What is the long term impact of the decay of radium and the release of radon gas on land where houses may be built in the future? Who will bear the cost if radon mitigation is needed?
4. What is the impact of radium on the flora and fauna of the area where the sludge is being spread especially in the case of HMO where discrete highly radioactive particles are being spread?
5. What are the possibilities of the radium being spread on the farmland leaching into the near surface aquifer endangering aquifers that currently have no radium?
6. What precautions are being taken to ensure that runoff from land application is not endangering waterways?
7. Who is going to be responsible for the long term monitoring of sites where radium contaminated sludge is spread? Is there a mechanism so that future land owners will be informed that radium has been spread on the land.
8. How many communities have enough land available for land application at application rates far below what is currently practiced?

What are the potential repercussions of landfill disposal?

While all removal systems remove roughly the same amount of radium in a year, adsorptive media has a longer life between disposals than other methods dictating that more radium is held on site prior to disposal. The concentration of radium, however, on a dry weight basis (picocuries / gram) is less than any other method other than lime softening. Transportation of radioactive materials is completed under established Department of Transportation regulations. Because of the granular nature of the media and the low level of radiation contained within the loaded media, clean up in the event of a spill consists of collecting/vacuuming and repackaging any spilled media. The media, by its very nature, removes radium from water and does not allow it to leach back into the water, making the possibility of water contamination very minimal. Disposal occurs in a licensed landfill appropriate for the level of radium contained. Each of these landfills has long term care plans, maintenance plans and funding in place. Long term contracts for disposal are in place for the Water Remediation Technology System insuring a disposal site until 2040. Removal, transportation, and disposal of the media are performed by workers specifically trained in the handling of radioactive material. Municipal workers are not required to perform any of the servicing or maintenance of the equipment.

Decommissioning of sites

Each of the radium removal processes are intended for long term use but there will come a time when every system must be decommissioned. Each system will require an in-depth evaluation of decommissioning requirements, but some general observations can be made for each system.

Hydrous Manganese Oxide

The filter media will have to be disposed of in an appropriate landfill or disposal site and the equipment will have to be decontaminated. The sewer line will have to be surveyed and appropriate clean up undertaken. Elevated levels of radium in the pipe scale should be expected. Special care should be given to the surveying and decommissioning of the sewer line.

Ion Exchange

The ion exchange media will have to be disposed of in an appropriate disposal site. The vessels and pipelines will have to be surveyed and decommissioned if needed. The sewer line will have to be surveyed and appropriate clean up undertaken. Elevated levels of radium in the pipe scale should be expected.

Reverse Osmosis

The equipment and sewer line will have to be surveyed and decontaminated if necessary.

Lime Softening

The vessels and pipelines will need to be decommissioned. The most problematic area for decommissioning will be to reclaim the drying lagoons, which may be extensive. Depending on the allowed level of radium in soil underlying the lagoons, they may have to be over-excavated and the soil hauled to an appropriate disposal site. This system has the largest footprint of any system.

Adsorptive Media

The filter media will have to be disposed of in an appropriate landfill or disposal site and the equipment will have to be surveyed and decontaminated if necessary. The equipment is stainless steel.

Notes/References:

1. SPARRC Program Version 1 (Software Program to Ascertain Residuals Radionuclide Concentrations July 2003 – website location for downloading the software application Website www.npdespermits.com.sparrc. This is also available directly from WRT.
2. ISCORS Technical Report 2003-03 – *ISCORS Assessment of Radioactivity in Sewage Sludge: Modeling to Assess Radiation Doses*, Nov 2003. This is also available directly from WRT.
3. American Radiation Services, Inc. report – *Total Effective Dose Equivalent (TEDE) Calculations for Radium-Bearing Sewage Sludge Under Various Exposure Scenarios*, Jan 26, 2004. This report describes potential radiation exposure for sewer workers. It is available directly from WRT.

Reference #1

SPARRC - **Software Program to Ascertain Residual Radionuclide Concentrations**

Download and comments su

HOME | **Download SP/**

Welcome to the SPARRC Download and Comments Submission Site

What is SPARRC?

Several radionuclides such as radon, radium, alpha emitters, and beta and photon emitters are regulated by the US Environmental Protection Agency under the Safe Drinking Water Act. When water treatment plants remove these contaminants from drinking water sources, the contaminants are transferred from feed water to other media including treatment plant process residuals such as backwash water, brine, and sludge. The presence of radionuclides in treatment plant wastes, depending on the concentration and or load specified in allowable limits, may restrict the use of inexpensive disposal options for those residuals, increasing treatment costs. Residuals may be classified as hazardous under RCRA depending on the concentration of co-contaminants present. The cost of residuals disposal is also a function of the volume and/or mass of the residuals. Therefore, it is important to estimate the quantities as well as the concentrations of radionuclides and co-contaminants in residuals generated by water treatment plants.

SPARRC is a desktop software application that enables users to analyze the potential concentrations of radionuclides in residuals from drinking water process streams.

Distribution of SPARRC

SPARRC Version 1.0 is in the public domain and may be copied and distributed freely. We ask that you:

1.Report any errors or bugs or provide comments.

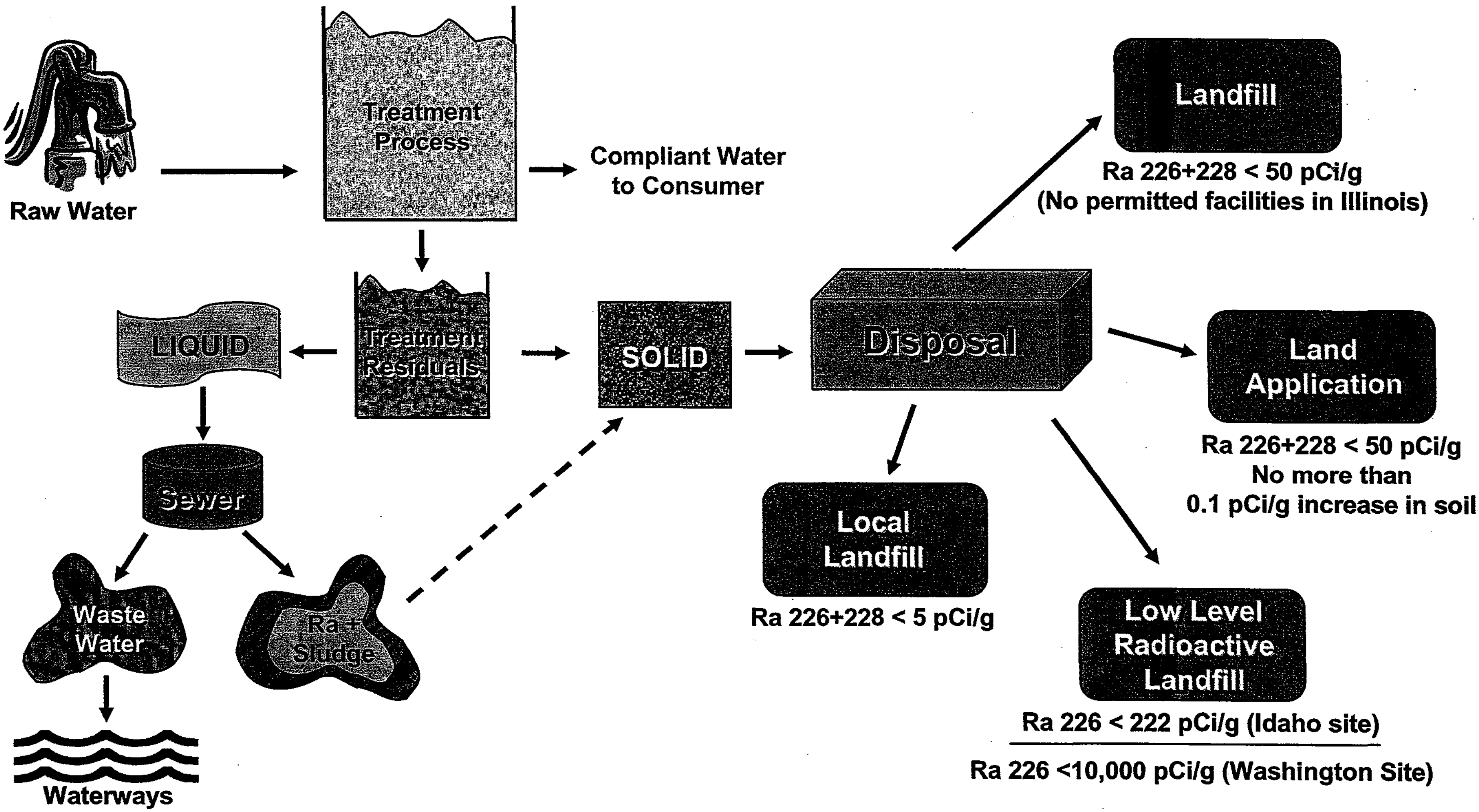
2.When distributing this program, make sure that all documentation files are included.

What would you like to do?

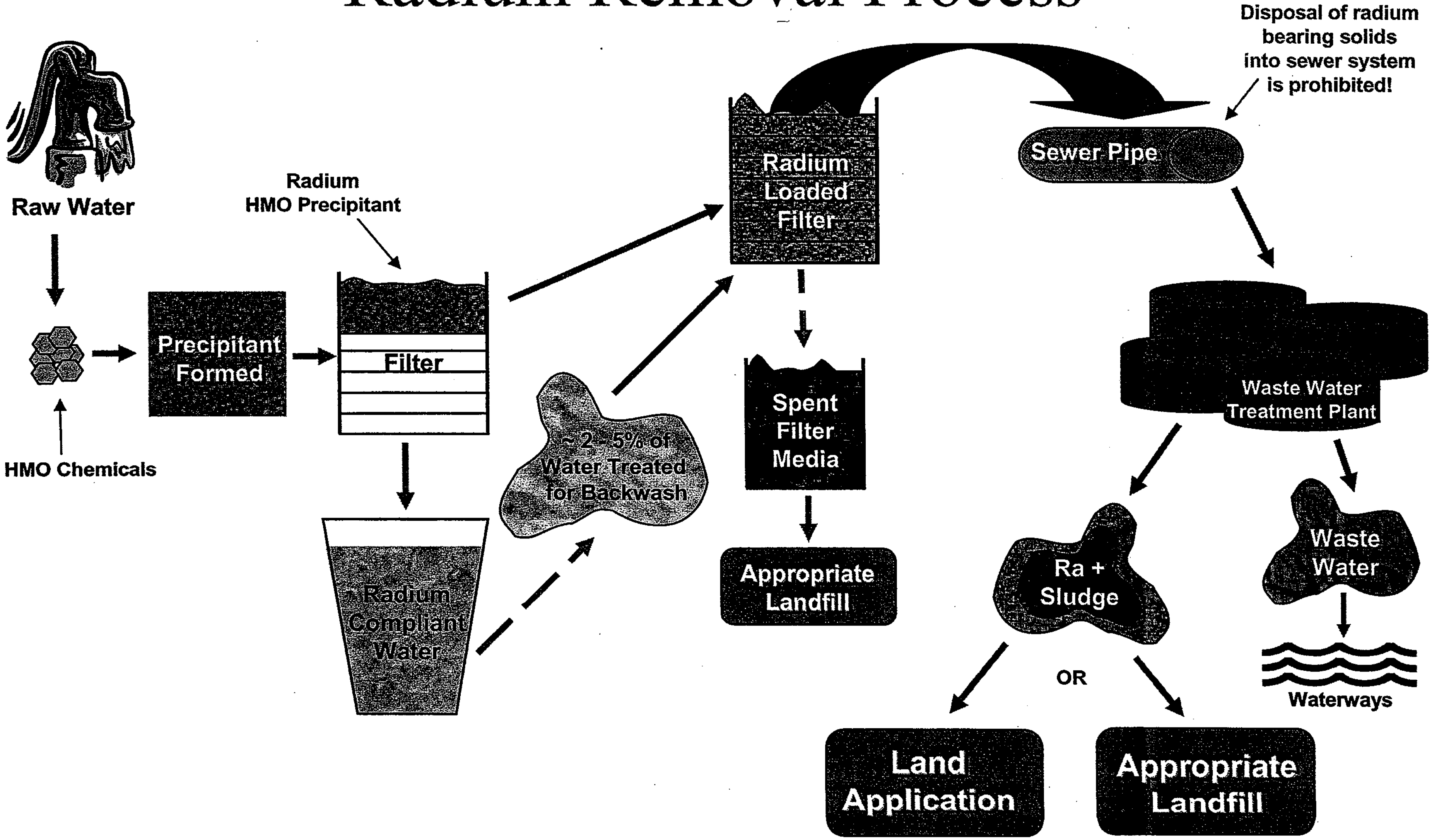
Download and Install SPARRC

Submit comments on SPARRC

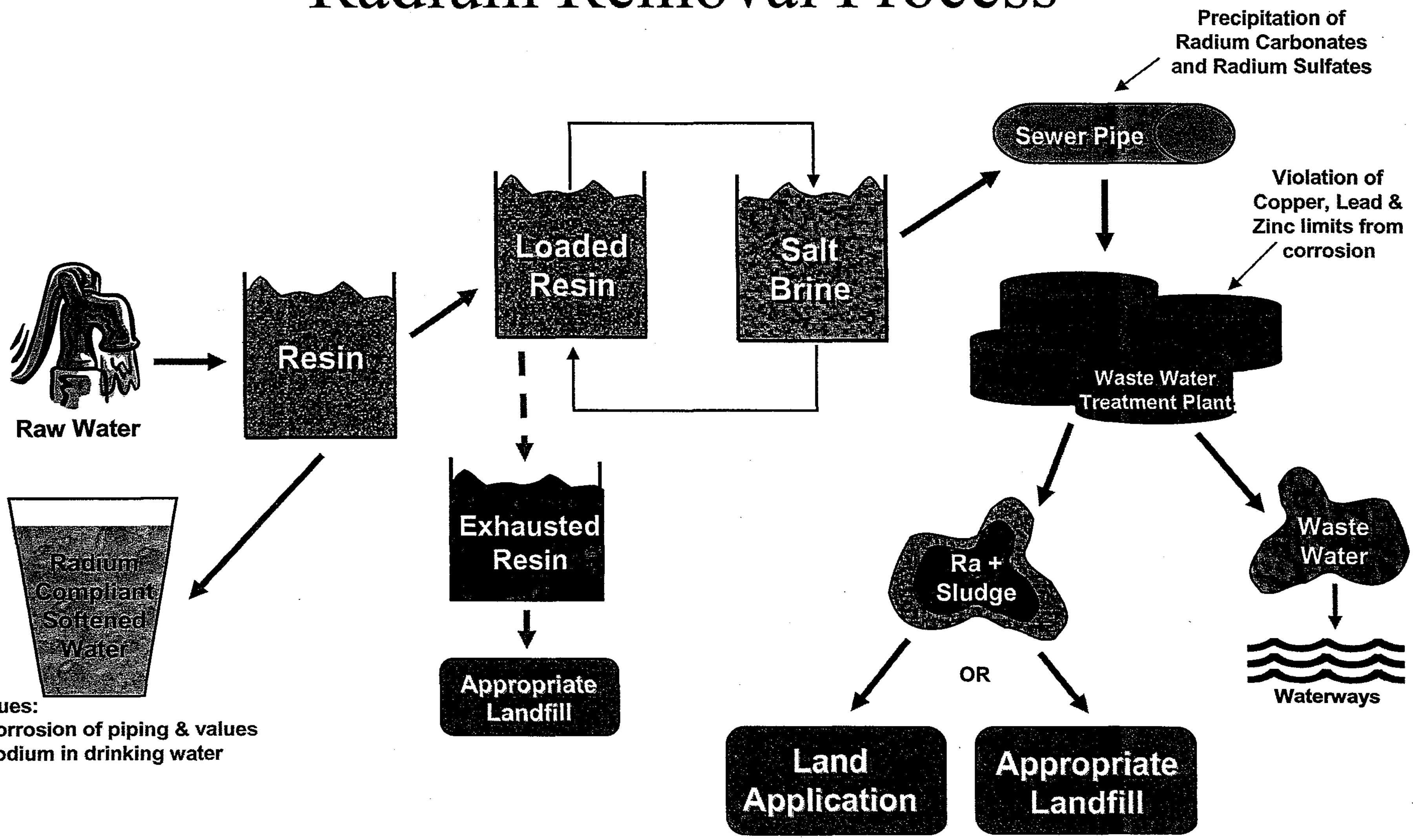
Radium Disposal Options in Illinois



Hydrous Manganese Oxide Radium Removal Process

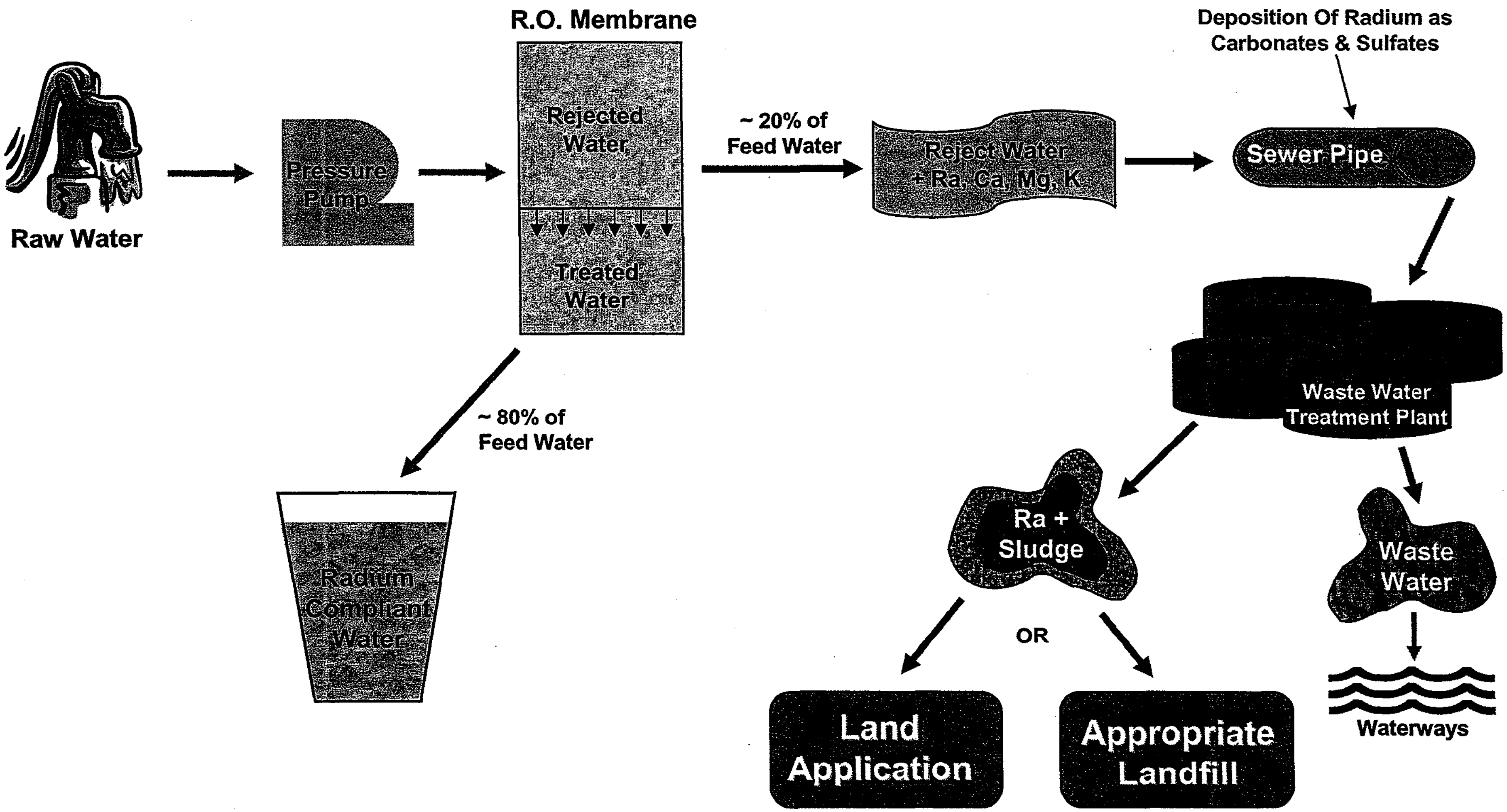


Ion Exchange
Radium Removal Process

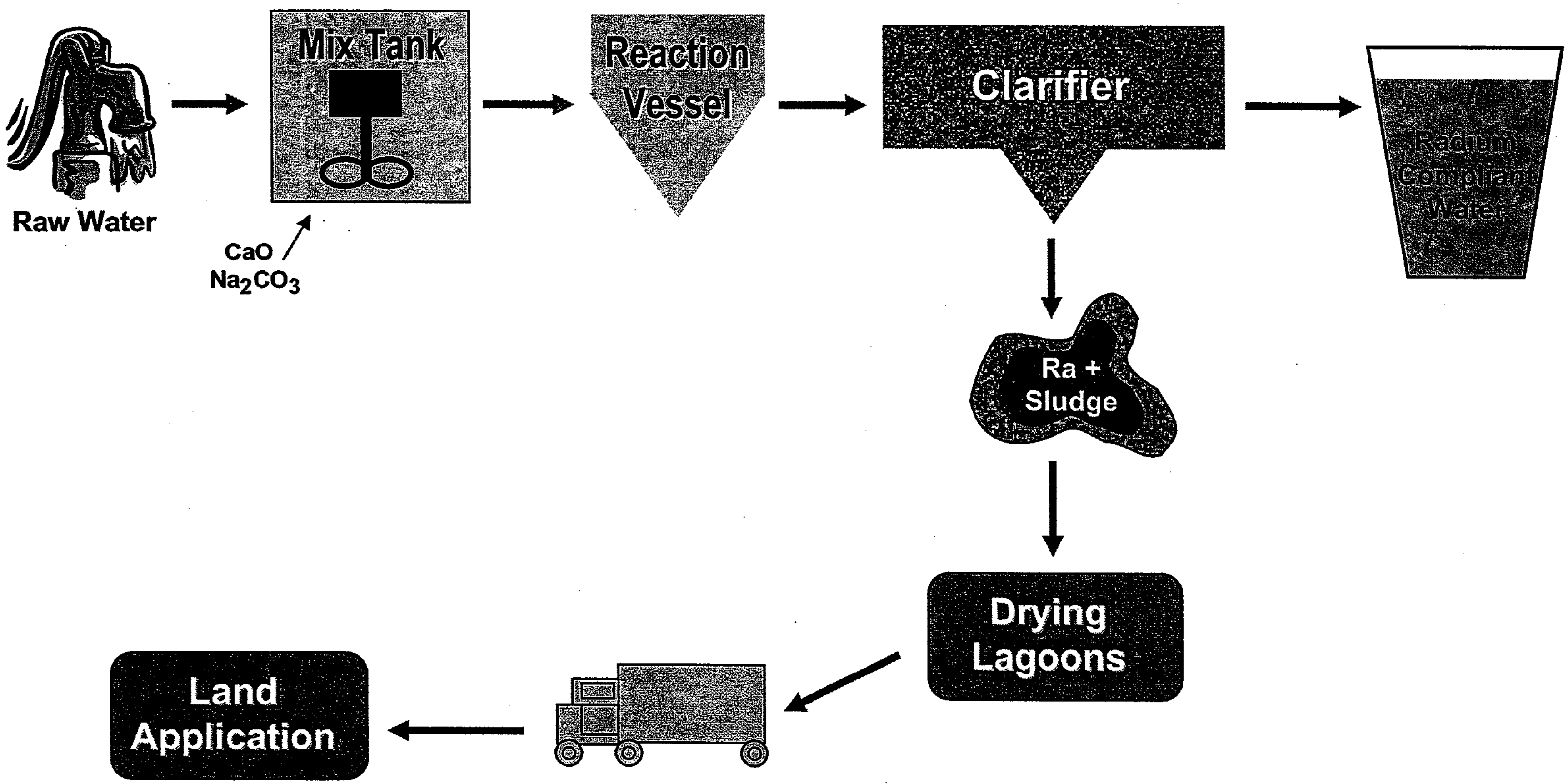


Issues:
Corrosion of piping & values
Sodium in drinking water

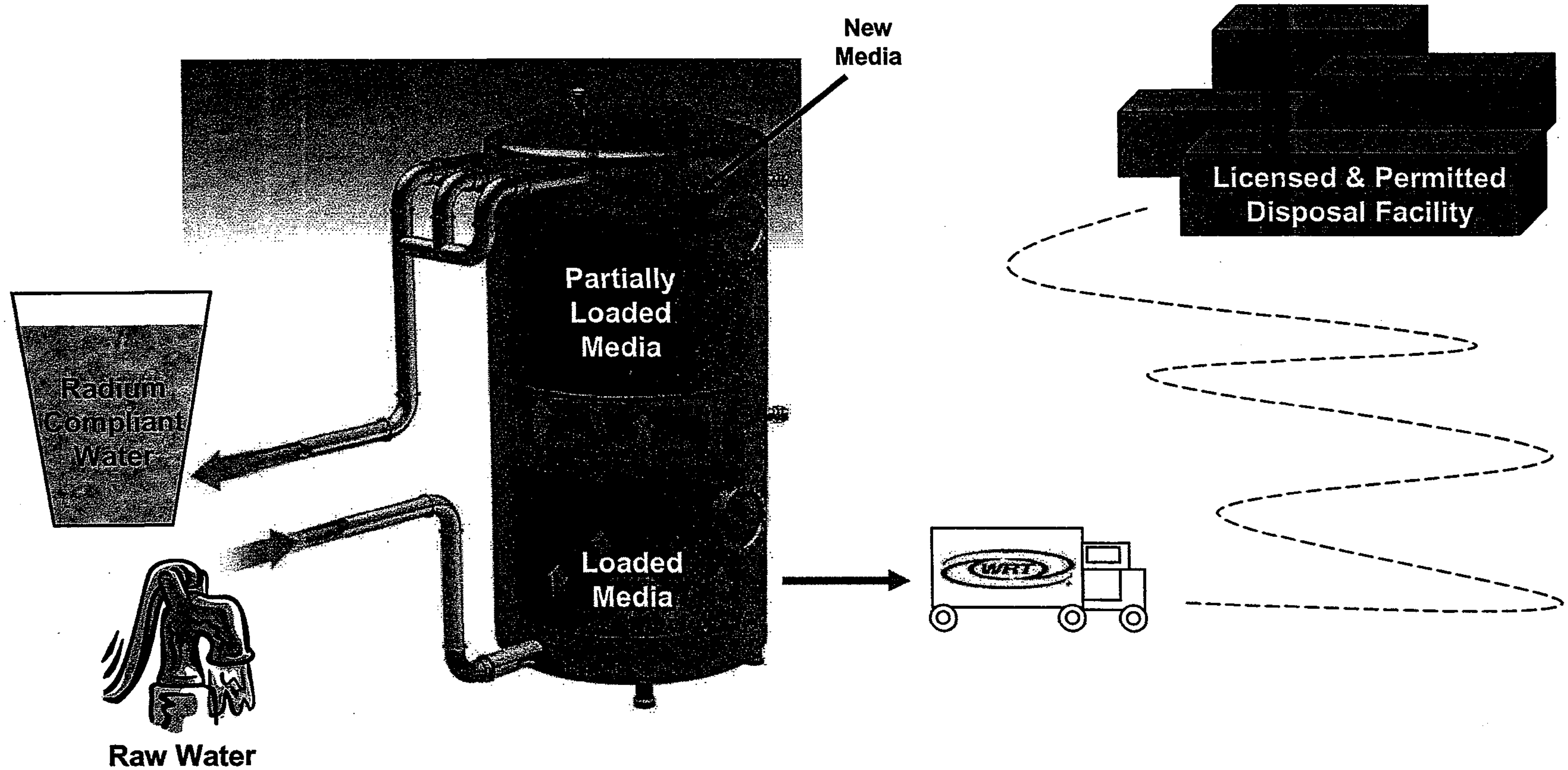
Reverse Osmosis Radium Removal Process



Lime Softening
Radium Removal Process



Absorbent Media
Radium Removal Process



Summary of Memorandum of Agreement between IEPA and IDNS

1. If sludge is less than 50 pCi/g then land application is permitted.
2. If sludge is land applied it may not increase the radioactivity of the soil by more than 0.1 pCi/g
3. If sludge is > 5pCi/g but<50 pCi/g sludge may go to a IEPA landfill with a minimum of 10 foot of cover being placed over the radium bearing material.
4. If sludge is above 50 pCi/g then IDNS must approve disposal method and site.

Sewer Sludge Application Parameters

Coding:
required input numbers:
numbers that are calculated but should be input if available:
comments:

Drinking water parameters		
Level of total radium in water	15	pCi/L
gallons per day pumped	500,000	Typical well pumped at 1000 gpm 35% of the time
gallons per year pumped	182,500,000	gallons/ year
Picocuries radium in water per year	10,402,500,000	pCi/ Year
Sludge recovery parameters		
Dilution factor	1.6	Adjustment for infiltration
Gallons of water / day treated in waste water facility	800,000	This number is higher than pumped to allow for infiltration
Radium in sewer influent	9.38	Reflects dilution of radium in raw water from infiltration
gallons of water / year	292,000,000	
grams of sludge/ gallon of effluent	0.40	(Low of .23 High is .8)
Tons of sludge produced per year dry weight	129	From sewage treatment plant reports
Grams sludge produced / year	116,800,000	grams
Picocuries radium in sewage influent / year	10,402,500,000	
% radium reporting to sludge	95%	
% radium remaining in water	5%	
Anticipated radium content in sludge (Picocurie/ gram)	84.6	Per MOU limit is 50 pCi/g
Anticipated radium content of water effluent	0.47	Picocuries / liter
Land Application Parameters		
Allowed radium increase in soil (picocuries/ gram)	0.1	Per MOU
grams of soil needed for mixture	98,823,750,000	grams of soil
Pounds dry weight per cubic foot of soil	59.25	(based on Cateplilar Performance Handbook 1977)
grams of soil / cubic ftsoil	26,899.50	g/ cubic ft.
cubic ft of soil needed / year	3,673,814	cubic ft.
Acres / year if mixed in top 6 inches	168.7	acres needed / year
Application rate (tons/ acre)	0.76	tons / acre

Exhibit C

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY

1021 N. Grand Avenue East, P.O. Box 19276
Springfield, IL 62794-9276

Division of Public Water Supplies Telephone 217/782-1724

PUBLIC WATER SUPPLY CONSTRUCTION PERMIT

RECEIVED
AUG 4 2003

SUBJECT: OSWEGO (Kendall County-0930150)

Permit Issued to:
Village President and Board of Trustees
113 Main Street
Oswego, IL 60543

PERMIT NUMBER: 1999-FY2003
Proposed Improvement

DATE ISSUED: July 31, 2003
PROJECT LOG NUMBER: 2003-1999

The issuance of this permit is based on plans and specifications prepared by the engineers/architects indicated, and are identified as follows:

FIRM: Smith Engineering Consulting, Inc.
NUMBER OF PLAN SHEETS: 101
TITLE OF PLANS: "Well House Addition Radionuclide Compliance **SR**"

PROPOSED IMPROVEMENTS:

***Install radium removal equipment in five well houses for Wells No. 3, No. 4, No. 6, No.7 & No. 8.

The radium removal equipment to be installed within well house No. 3 will be eleven feet in diameter with a side shell height of approximately 20 feet. The unit will have a capacity of approximately 950 gallons per minute (a surface area of 95 square feet and loading rate of ten gallons per minute-square foot). The unit shall have two compartments and shall be complete with underdrain, piping, controls and necessary appurtenances.

The radium removal equipment to be installed within the well house for Well No. 4 will be 9 feet in diameter with a side shell height of approximately 20 feet. The unit will have a capacity of approximately 700 gallons per minute (a surface area of 64 square feet and a loading rate of eleven gallons per minute-square foot). The unit shall have two compartments and shall be complete with underdrain, piping, controls and necessary appurtenances. Well house No. 4 shall also house two low service pumps (capacity of 750 gpm @ 26 feet TDH) complete with variable speed drive, motor (7.5hp), valving, piping, controls and necessary appurtenances.

This permit is issued for the construction and/or installation of the public water supply improvements described above, in accordance with the provisions of the "Environmental Protection Act," Title IV, Sections 14 through 17, and Title X, Sections 39 and 40, and is subject to the conditions printed on the reverse side of this page and the ADDITIONAL CONDITIONS printed above.

Jerry H. Kuhn, P.E.
Manager, Permit Section
Division of Public Water Supplies

IL 532-0168
PWS 065 Rev. 12/01

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
1021 N. Grand Avenue East, P.O. Box 19276
Springfield, IL 62794-9276

Division of Public Water Supplies — Telephone 217/782-1724

PUBLIC WATER SUPPLY CONSTRUCTION PERMIT

SUBJECT: OSWEGO (Kendall County-0930190)

Permit Issued to:
Village President and Board of Trustees
113 Main Street
Oswego, IL 60543

PERMIT NUMBER: 1999-FY2003 DATE ISSUED: July 31, 2003
Proposed Improvement PROJECT LOG NUMBER: 2003-1999

The radium removal equipment to be installed within the well house for Well No. 6 will be eleven feet in diameter with a side shell height of approximately 20 feet. The unit will have a capacity of approximately 1,050 gallons per minute (a surface area of 95 square feet and a loading rate of approximately eleven gallons per minute-square foot). The unit shall have two compartments and shall be complete with underdrain, piping, controls and necessary appurtenances.

The radium removal equipment to be installed within the well house for Well No. 7 will be eleven feet in diameter with a side shell height of approximately 20 feet. The unit will have a capacity of approximately 1,050 gallons per minute (a surface area of 95 square feet and a loading rate of approximately eleven gallons per minute-square foot). The unit shall have two compartments and shall be compete with underdrain, piping, controls and necessary appurtenances.

The radium removal to be installed within the well house for Well No.8 will be eleven feet in diameter with a side shell height of approximately 20 feet. The unit will have a capacity of approximately 1,050 gallons per minute (a surface area of 95 square feet and a loading rate of approximately eleven gallons per minute-square foot). The unit shall have two compartments and shall be compete with underdrain, piping, controls and necessary appurtenances.***

This permit is issued for the construction and/or installation of the public water supply improvements described above, in accordance with the provisions of the "Environmental Protection Act," Title IV, Sections 14 through 17, and Title X, Sections 39 and 40, and is subject to the conditions printed on the reverse side of this page and the ADDITIONAL CONDITIONS printed above.

Jerry H. Kuhn, P.E.
Manager, Permit Section
Division of Public Water Supplies

IL 532-0168
PWS 068 Rev. 12/01

ILLINOIS ENVIRONMENTAL PROTECTION AGENCY
1021 N. Grand Avenue East, P.O. Box 19276
Springfield, IL 62794-9276

Division of Public Water Supplies Telephone 217/782-1724

PUBLIC WATER SUPPLY CONSTRUCTION PERMIT

SUBJECT: OSWEGO (Kendall County-0930150)

Permit Issued to:
Village President and Board of Trustees
113 Main Street
Oswego, IL 60543

PERMIT NUMBER: 1999-FY2003 **DATE ISSUED: July 31, 2003**
Proposed Improvement **PROJECT LOG NUMBER: 2003-1999**

ADDITIONAL CONDITIONS:

1. **The Agency will require a copy of the contract between the Village of Oswego and the Supplier of radium specific media within 90 days after the date of this permit. This contract shall include information on the supply of media, media and radium monitoring, and expended media disposal.**

2. **There are no further conditions to this permit.**

JHK:CK:dav

CC: **Smith Engineering Consulting, Inc.**
Elgin Regional Office

This permit is issued for the construction and/or installation of the public water supply improvements described above, in accordance with the provisions of the "Environmental Protection Act," Title IV, Sections 14 through 17, and Title X, Sections 39 and 40, and is subject to the conditions printed on the reverse side of this page and the ADDITIONAL CONDITIONS printed above.

Jerry H. Kuhn, P.E.
Manager, Permit Section
Division of Public Water Supplies

IL 532-0168
PWS 065 Rev. 12/01