

RADIUM REMOVAL FROM DRINKING WATER

清除饮用水中镭

Model - RAD-CLEAN SYSTEM-600

FEATURES: 特点

- BRINGS RADIUM-226, 228 TO 2.5 pCi/l
将镭-226,228降到2.5pCi/L
- REDUCES HARDNESS OF WATER
减少水硬度
- LOW LIFECYCLE COST
低维护
- CHANGE MEDIA EVERY 8 TO 10 YEARS
每8-10年更换介质
- NO WORRY ABOUT TOXIC WASTE DISPOSAL
Periodic Back-flush to Waste Water Treatment Plant.
无需担心废物处理 (定期冲洗到废水处理厂)
- URANIUM REMOVAL ALSO AVAILABLE
可选镭清除
- SMALL SYSTEMS EXPERTS
系统小巧功能性强
- INSTALLATION AND SERVICE ANYWHERE IN USA
可在任意地方安装使用



PROBLEM: 问题

The **USEPA** regulates drinking water quality and has set the standard for Radium 226 and Radium 228 in drinking water of no more than 5 pCi/l.

In recent years the presence of radium in drinking water above this limit is a common occurrence. USEPA规定饮用水中镭226和228标准不高于5pCi/l, 但近年来饮用水中镭超过这个限值的情况时有发生。

SOLUTION: 解决方案

- **Dilution** of the drinking water with radium-free water 用无镭水稀释饮用水
- **Reverse Osmosis** 逆渗透法
- **Ion Exchange** 离子交换

Technical Associates evaluated the above potential solutions using the following parameters:

TA公司对以上方案使用以下参数进行评估:

- Maintenance requirements 维护要求
- Life cycle costs 维护费用
- Installation 安装
- Feasibility of service calls 电话服务可行性
- Disposal of radium contaminated material 镭污染材料处理



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Divisions of  US NUCLEAR CORP

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RADIUM SPRINGS, WYOMING

EVALUATION OF THREE METHODS: 三种方式评估

DILUTION: The expression “Dilution is not the solution for pollution” is a true statement regarding radium removal.

稀释法：“稀释不是解决污染的方法”的说法对于除镭来说更为确切

- Radium is not removed but diluted in concentration.
这种方法不是清除镭而是稀释了浓度
- Using a water source radium free is required.
必须使用无镭的水源
- Piping and delivery of uncontaminated water is required.
必须用管路运输未污染水

REVERS OSMOSIS: Would remove radium and other dissolved minerals and salts.

反渗透法:

- Requires significant energy to maintain process.
运转需要大量能量
- Technical process.
工艺流程
- High costs of initial set up, maintenance, and life cycle,
初始安装阶段花费高，维护费高，经济周期费用大



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ION EXCHANGE: Cost effective and most Waste Water Treatment Plants receive and treat the waste stream from the Ion Exchange process.

离子交换：经济，大多数废水处理厂使用离子交换工艺接受并处理废水

- Available nation-wide. 遍布全国
- Wide variation of flow volume 各种流量
- Small space requirement 需要空间小

DISCUSSION OF ION EXCHANGE PROCESS: 离子交换工艺:

Radium ions are cations, ions with positive charges, as are calcium, magnesium and several other metal ions. These ions are very strongly attracted to the media utilized in the RAD-CLEAN SYSTEM 600, even more so than Calcium, Magnesium, and other cations representative of hardness in water.

镭离子是阳离子，带正电，如钙、镁及其它几种金属离子一样。RAD-CLEAN SYSTEM 600系统中使用的媒介对这些离子用很强的吸附力，甚至优于硬水中的典型的钙、镁和其它阳离子。

Back-flushing & Regeneration: When the tanks are back-flushed and the Ion Exchange capability is regenerated, the hardness ions will become unattached to the media and be flushed out of the system to a drain. During regeneration, most of the radium is also pulled off the media and flushed out of the system.

反冲与再生：当水箱反冲之后，则回复了离子交换能力，硬离子与媒介分离并冲洗出来进入排水系统。再生过程中，绝大多数镭也会从媒介上脱落从而被冲洗到系统外。

Typically the local Wastewater Treatment Plant(s) (WWTP) receive and treat the waste stream from the ion exchange process.

当地污水处理厂一般通过离子交换工艺处理废水

Because of the strong attraction the radium ions have for the media, not all the radium will be removed from the resins. Over time, the resins become saturated with radium ions that have not been removed during regeneration.

因为镭对交换树脂吸附力强，镭不能全部从交换剂中被清除掉，随着时间积累，交换树脂由于在再生期间镭离子不能完全清除而达到饱和

Replacement of Media 8-10 years: Once this condition occurs, the media must be removed and disposed of properly. New media is loaded into the tanks. This replacement of the media will only need to be replaced after eight to ten years.

8-10年更换交换媒介：当发生这种情况时，必须更换掉这些交换媒介并正确处理，新的交换媒介重新装入储水箱，8-10年后则需更换

Service of RAD-CLEAN SYSTEM 600: Another advantage of using ion exchange systems is that service is readily available nationwide. TA regional and local support system will ensure the system is maintained properly and that the exchange media will be disposed of properly.

RAD-CLEAN SYSTEM 600: 使用离子交换优势还有其服务遍布全国。TA本地服务系统确保系统正确维护，用过的交换介质正确处理



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Cost Effective: The ion exchange method is cost-effective both in start up and during life cycle maintenance.

经济效益：离子交换方法从系统建立到终生维护非常经济

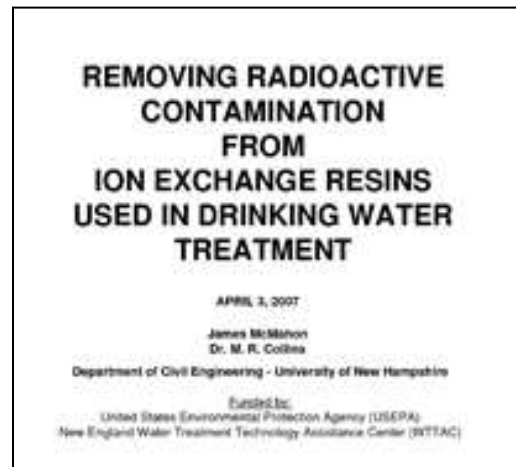
Flow Volume: Because of the wide variation of flow volumes, the typical system operates with one module during times of low-flow. During high-flow conditions the second module automatically is brought on line.

流量：由于多种流量可选择，低流时一个模块处于工作状态，大流量时第二块模块自动介入。

System Footprint: The floor space needed for the typical small system user is about 20 ft².

系统占地：小型系统用户需要大约20平方英尺

Old School
Radium
Removal
传统的镭
清除方法



2007

SPECIFICATIONS: 规格

One TADR-M-150-2 progressive flow water Softener with meter controlled regeneration.

一套带控制再生功能的TADR-M-150-2水软化系统

Includes: 包括

- Qty 2 – 5 cubic foot steel resin tank 二个5立方英尺不锈钢树脂储水箱
- Qty 2 – MVP control 二个MVP控制
- Qty 2 – Meter assembly and cable 二个仪表组件及线缆
- Qty 1 - Brine (salt storage tank) 24 x 50 一个盐储物罐
- Qty 1 - Initial salt fill (400 lbs/ten 40 lb bags) 首次盐加入量 400磅

Flow Rate: Typical 500 GPM 典型流量500 GPM

Total Flow: 7,500 gallons per day 总流量每天7500加仑



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SYSTEM COSTS: Purchase, Installation, and Maintenance 系统费用：购买，安装，维护

*System Price	Base Price 系统价格
**Set up, Startup	Labor 人工费
Total Cost	Total 总价
Annual Salt costs Contractor will provide details	Annual 每年耗盐量
Annual Single Unit Costs	Request Pricing 每年每个单元费用

* The prices listed are for the equipment and components listed as standard with the equipment specified above.

上述价格为设备与组件标准价格

Does not include chemicals or other parts or associated systems unless otherwise listed. This does not include piping of any kind.

不包括化学剂及其它与系统有关件儿的费用，不包括管路等

** Load & Set includes loading of mineral into resin tank, installation of hub and distributor, mounting of control head, and setting in place to be plumbed to.

安装调试包括：将盐装入树脂储水池中，集线与布线，安装控制头，设置就位。

Prices will be computed on one visit. Additional service visits will be charged.

以上为首次服务价格，再次服务将收费



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