EPA Rad. Compliance Program

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Radionuclides in NH Wells

- Sand And Gravel Wells Dug, Point, Springs?
 - Frequency of Occurrence

•	Radon;	Approx. upper bound of results	4,000 pCi/L
•	Others		<1%

- Bedrock wells
 - Frequency of Occurrence

Radon >4,000 pCi/L	35%
 Uranium >30 ug/L 	8%
• Radium 226/228	1%
Compliance Gross alpha	1%

Highest radon 1,100,000 pCi/L

Hierarchy of DES Compliance Recommendations

- 1. Alternative Water Supply
 - Interconnection to another Compliant PWS
 - 25% DES Grant
 - Sand and Gravel Well Development
- 2. Centralized Treatment
- 3. Point of Use if very, very small

Introduction

- Approximately 40 systems in violation of Rad. MCLs
 - 30 systems exceeded uranium
 - 5 systems exceeded radiums
 - 5 systems exceeded Compliance Gross Alpha
- Solutions to Radionuclides Approximate
 - Interconnection with other systemsNew Wells
 - Central Treatment with on site disposal
 - Central Treatment with off site disposal
 - Action Pending10

Rad Disposal From Centralize Treatment

- Domestic waste goes to many individual leachfields
 - Off site disposal
 - Rad treatment tanks in series configuration
 - Lead tank hauled away once saturated
- Domestic waste goes to a central onsite leachfield
 - Rad waste can be disposed of into the same central disposal leach field.
- Domestic Waste to Municipal Sewer
 - If rad waste to sewer; no sewer would accept a planned long term condition

Case Study: Country Lane Manor Candia

- 34 MHP units; well yield = pump output = 25 gpm
- Single well
- 5,000 gallon hydropneumatic
- Individual septic tank leach fields
- Unsuccessful sand and gravel well effort
- Possible POU; could not get resident app.

Country Lane Manor, Candia

- Approx. Capital Costs Rad Treatment
 - New Pump station

Equipment

= \$20,000

= 25,000

- Annualize Cost Rad Treatment
- Approximately once every 5 years lead tank would be disposed of by a rad. broker. Cost for broker services \$7,000/7 years; approximately \$3,000 for new anion resin.
 - Rad disposal cost annualized

\$ 1,500

Chase Environmental, Lexington, KY

Mr. John O'Neil, tel. 1-865-584-0833. www.chaseenv.com

Case Study: Melody Pines, Conway

- 50 unit condominiums, many seasonal users
- Two bedrock wells
- Storage Tanks –

Atmospheric

- Pneumatic

15,000 gallons

2,250 "

- Problems
 - Fluoride above 4.0 mg/L (Average 4.4 mg/L)
 - Uranium above 30 ug/L (Average 60 ug/L)

Melody Pines, Conway

- Initial sand and gravel well location effort
 - Unsuccessful
- Second round of sand and gravel exploration
 - Difficulty in developing well but eventually successful
- Use
 - New additional well

Melody Pines, Conway

Capital Cost

•	2.5" Test wells	\$ 7,500
•	Gravel Pack well	10,000
•	DES Approval w pump test	7,500
	 SDWA Water quality 	1,100
•	Pump Install/controls	<u>12,500</u>
	Total	\$38,600+

Operational Costs

Savings due to lower pumping cost \$500

Definition of Gross Alpha

AGA - U = CGA

AGA = Analytical Gross Alpha; Lab test results, no MCL

U = Uranium

CGA = Compliance Gross alpha; MCL= 15 pCi/L

- Flow Mix
 - Mix one compliance test from all active wells
 - Maximize flow from new well
 - Preferred: 90% new well: 10% old well

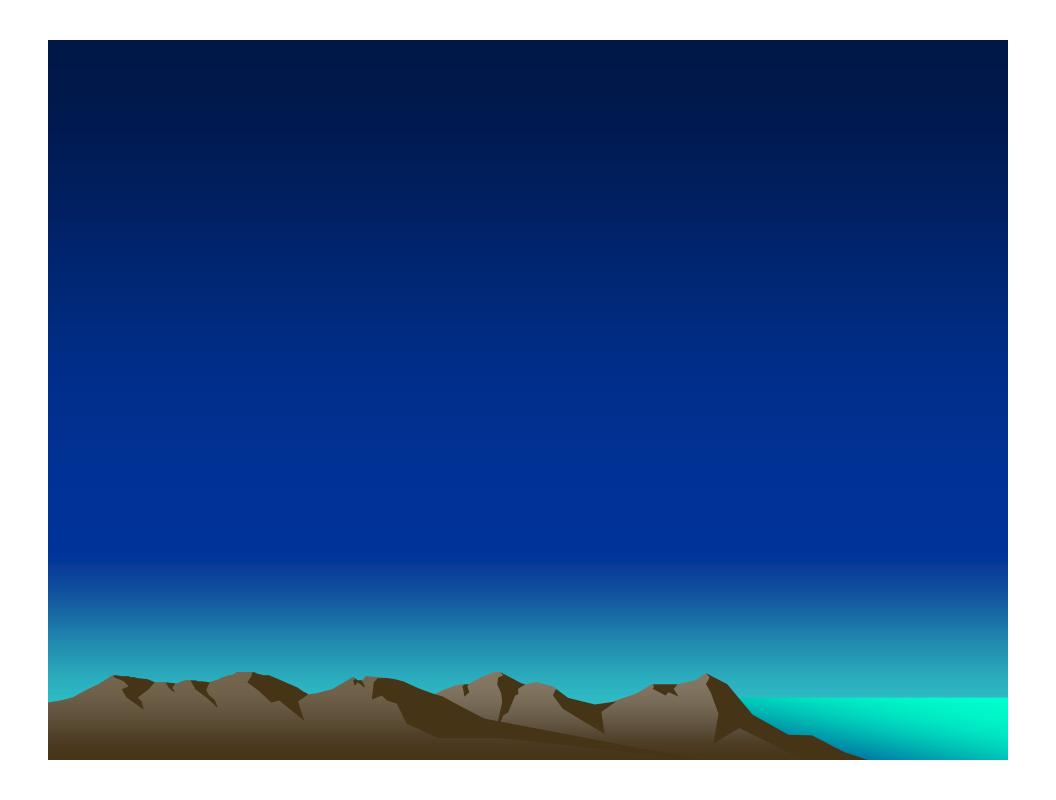
Speciation of Gross Alpha MCL

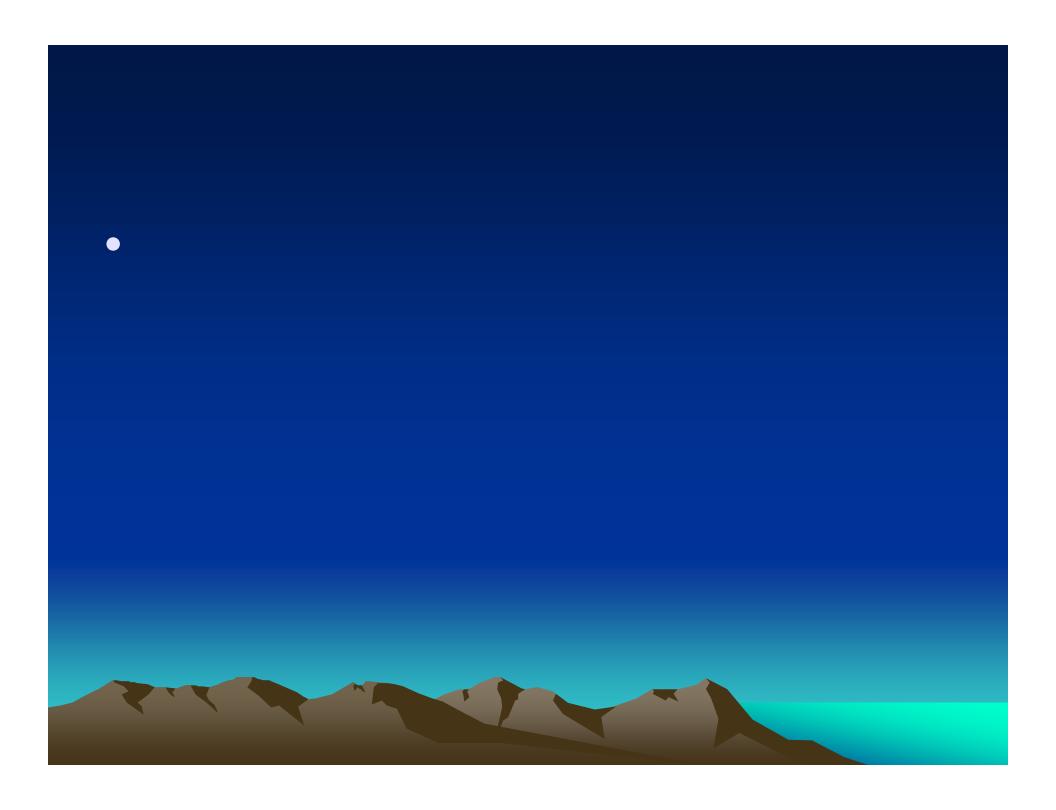
Obtain separate 3"x10" exchange resin cartridge - 1 for cation, 1 for anion. Collect a "treated" sample after the resin pilot treatment and measure the Gross Alpha in water from each cartridge. Determine if one or both exchange treatments will be need to be installed.

- Worker Safety
 - Baseline radionuclide measurements needed from pump house area. Taken at treatment startup
- Coordination of Rad Disposal Brokers
 - DES will coordinate the approximately 5 systems that will accumulate uranium in treatment tanks to assure proper disposal and reduce costs.

 DES is considering a policy to require developers to explore all water supply options before a development water system is approved even if additional wells need to be drilled in other areas of the development.

 i.e. Future owners will not inherit a complex expensive treatment process that could have been avoided.





Melody Pines, Conway

Approx Capital Cost – Rad response

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- Test well I = $10,000
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$$-$$
 Test well II = $x,000$

$$-$$
 Well installation = $7,000$

- Sustained pump test & services = 20,000
- Pump installation / connection = 8,000
- Approx. Annual Cost Rad response
 - No additional Cost

List of Existing Rad Systems

Pelham Kirlin Place

Sump

Candia Country lane Manor

Haul off 10 year life

Freedom Freedom Village Condos

Shoreline well; lower risk; not snactioned