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 systems 5
  – New Wells 15
  – Central Treatment with on site disposal 5
  – Central Treatment with off site disposal 5
  – Action Pending 10
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 = $20,000
  • Equipment = 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 15,000 gallons
  - Pneumatic 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 12,500
  - 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
Notes

• 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.
Notes

• 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
  – Test well I = $10,000
  – 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 sanctioned