

The background of the slide is a gradient of blue, transitioning from a lighter blue on the left to a darker blue on the right. On the left side, there are several vertical streams and individual droplets of water, some appearing to fall from the top. The main title is centered in the upper half of the slide.

Drinking Water Uranium

City of Grand Island
Utilities Department
January 18, 2011

Safe Drinking Water Act



- **Original Act in 1974**
- **Amended in 1986 and 1996**
- **87 Regulated Contaminants**
- **Over 120 Tested Contaminants**

2000 Uranium Rule



- **Maximum Contaminant Level (MCL)- 30 ug/L (ppb)**
- **Based on rolling average of 4 quarterly samples**
- **Samples must be taken at each Point of Entry (POE) to the water distribution system**



NebGuide



University of Nebraska–Lincoln Extension, Institute of Agriculture and Natural Resources

Know how. Know **now**.

G1569

(Revised November 2008)

Drinking Water: Uranium

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University of Nebraska–Lincoln Extension and the Nebraska Department of Health and Human Services place a high priority on water quality and jointly sponsor this series of educational publications.

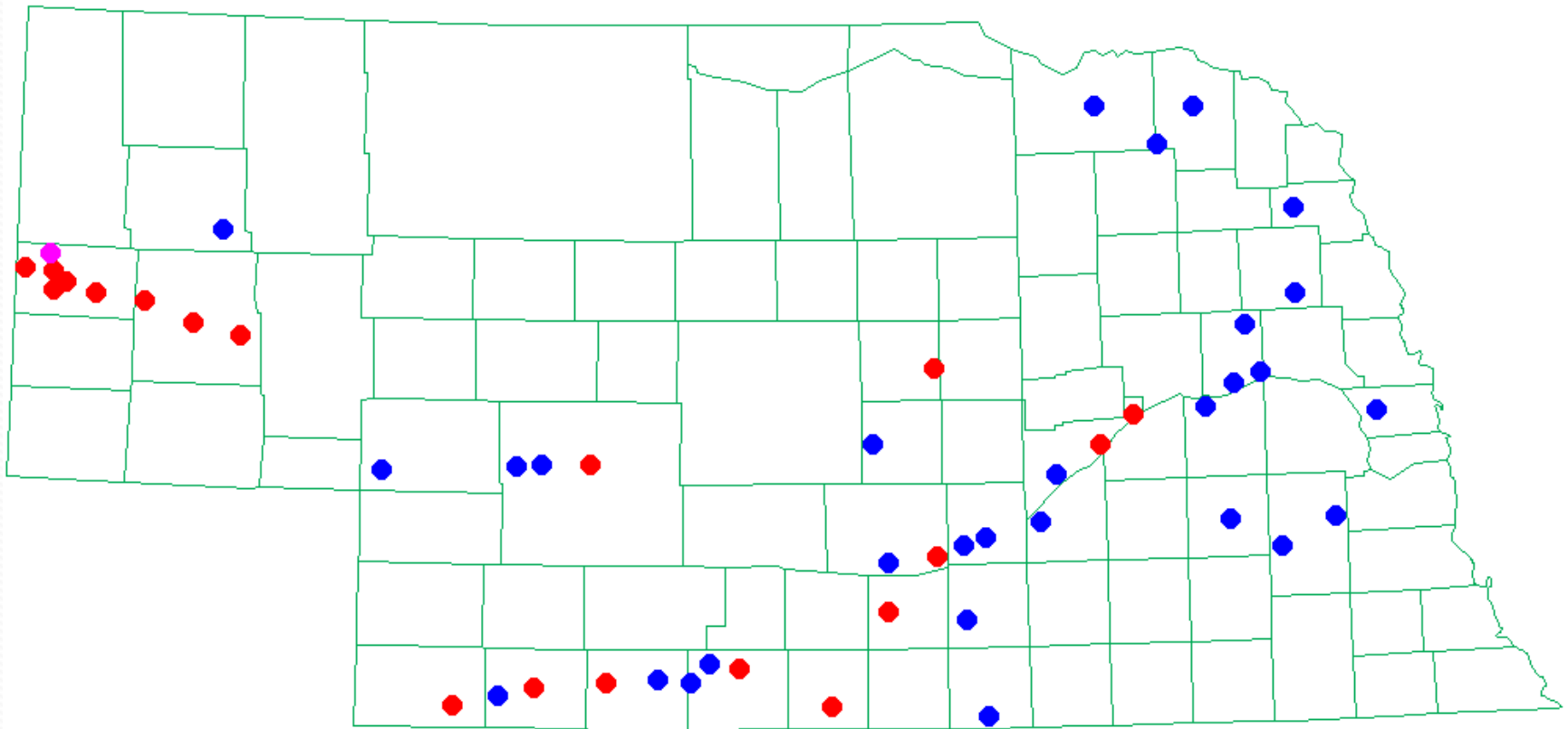


“Studies suggest that ingesting of high levels of uranium may be associated with an increased risk of kidney damage. Exposure to soluble uranium in drinking water has not been shown to increase the risk of developing cancer.”

Contaminate Distribution in NE

Red dot - Definite Problem

Blue dot - Potential Problem



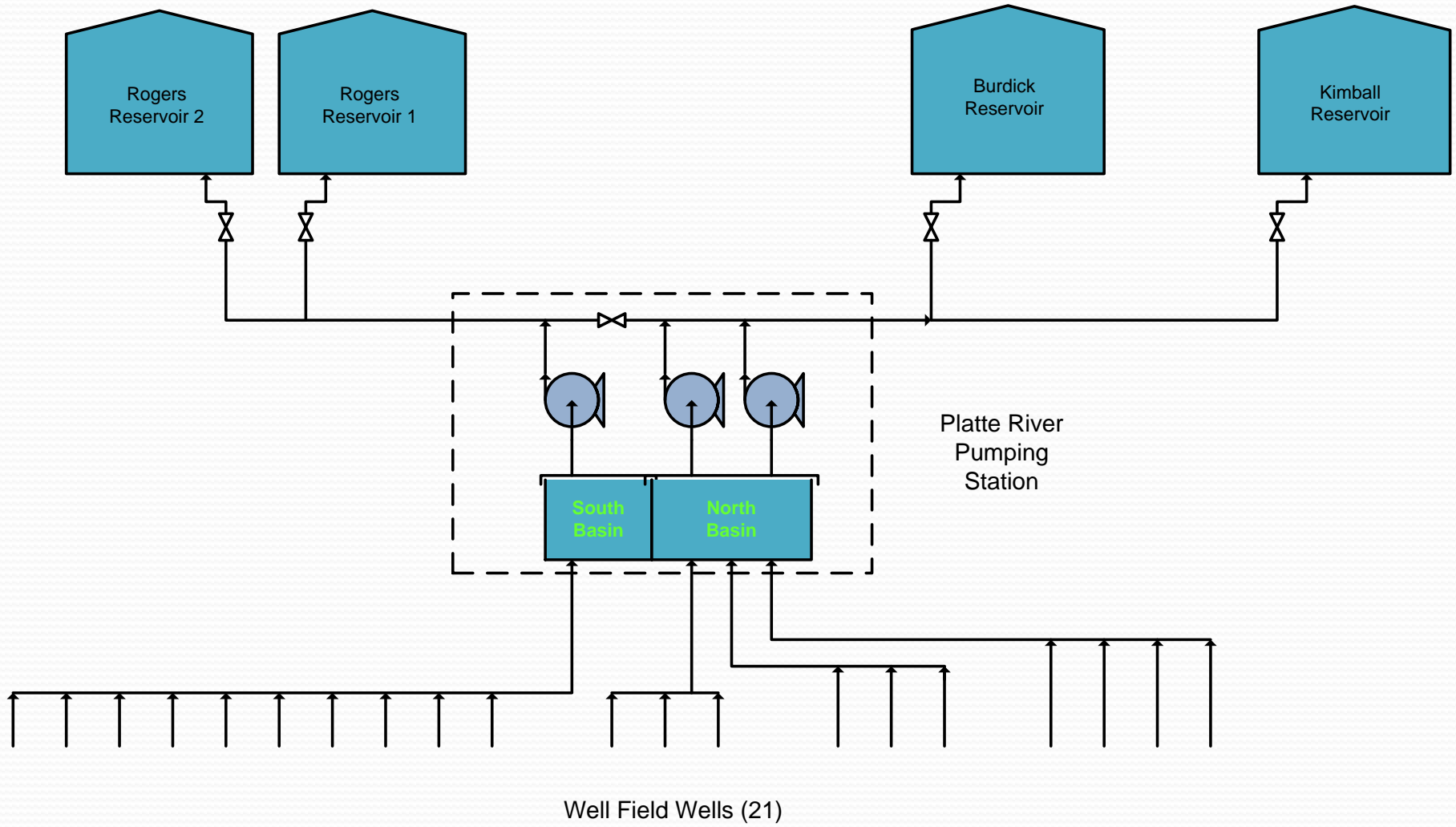
Wellfield Area



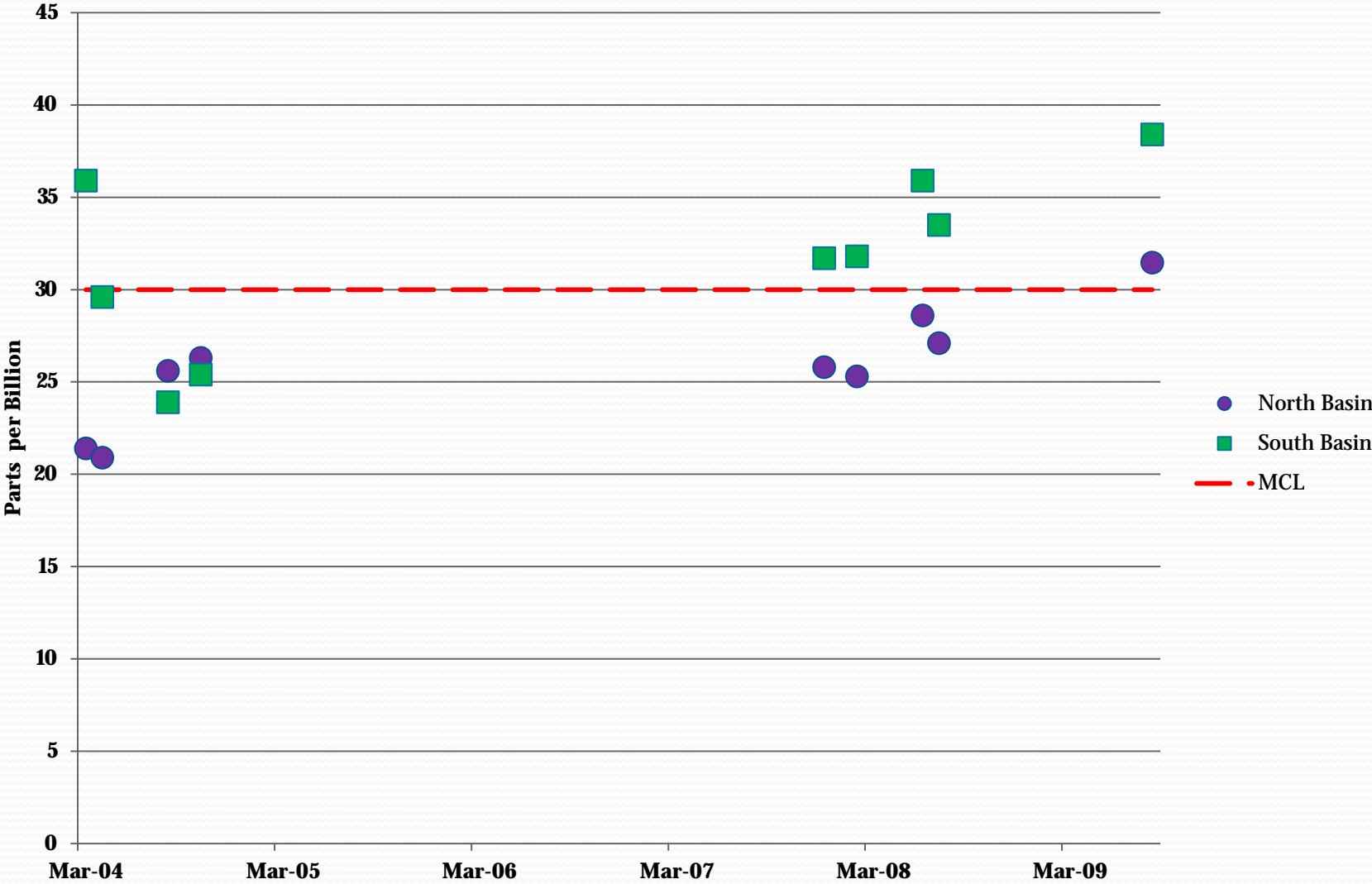
Platte River Pumping Station



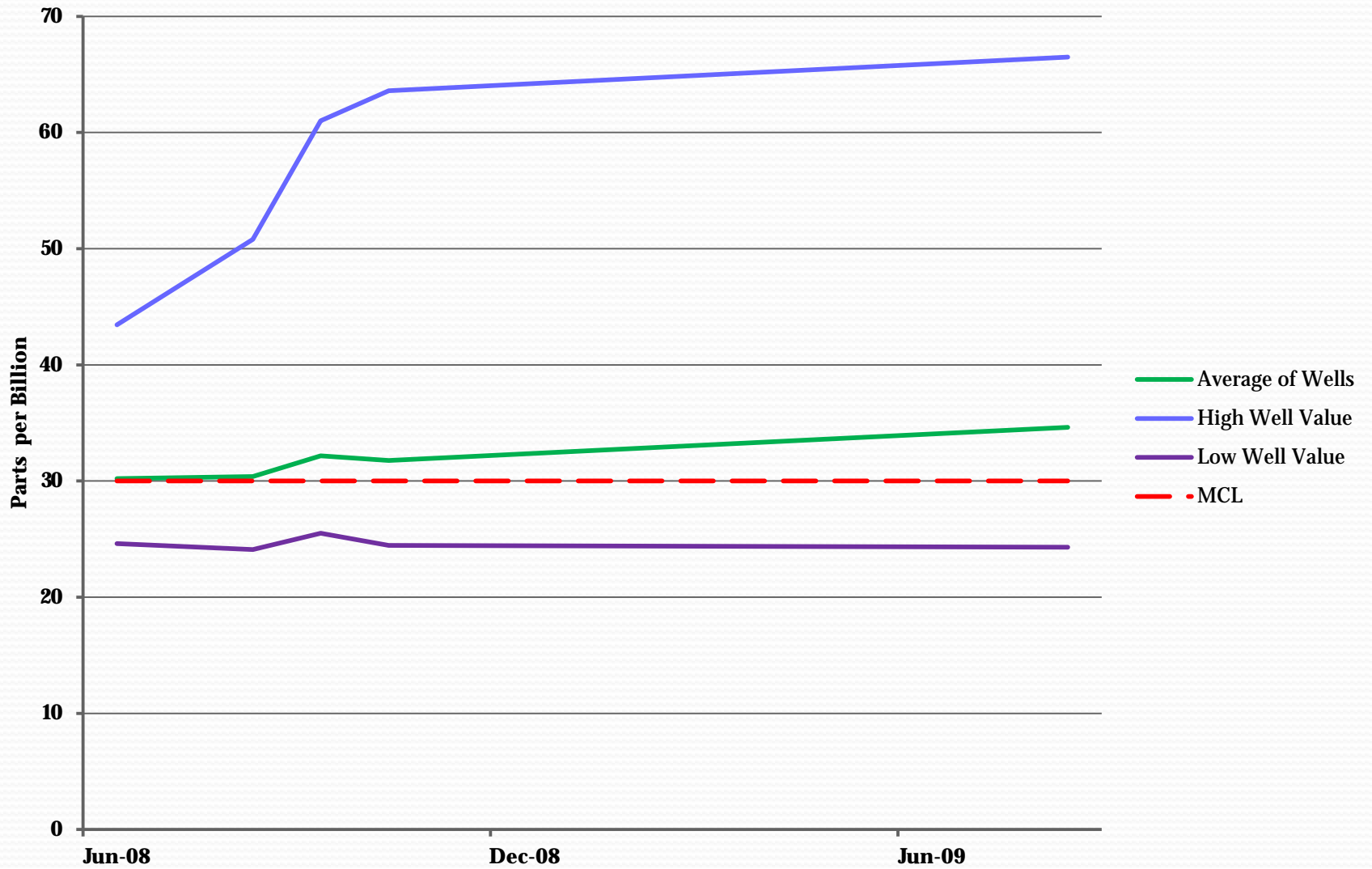
System Diagram



Well Field Basin Uranium Sampling Results



Well Field Well Uranium Sampling Results

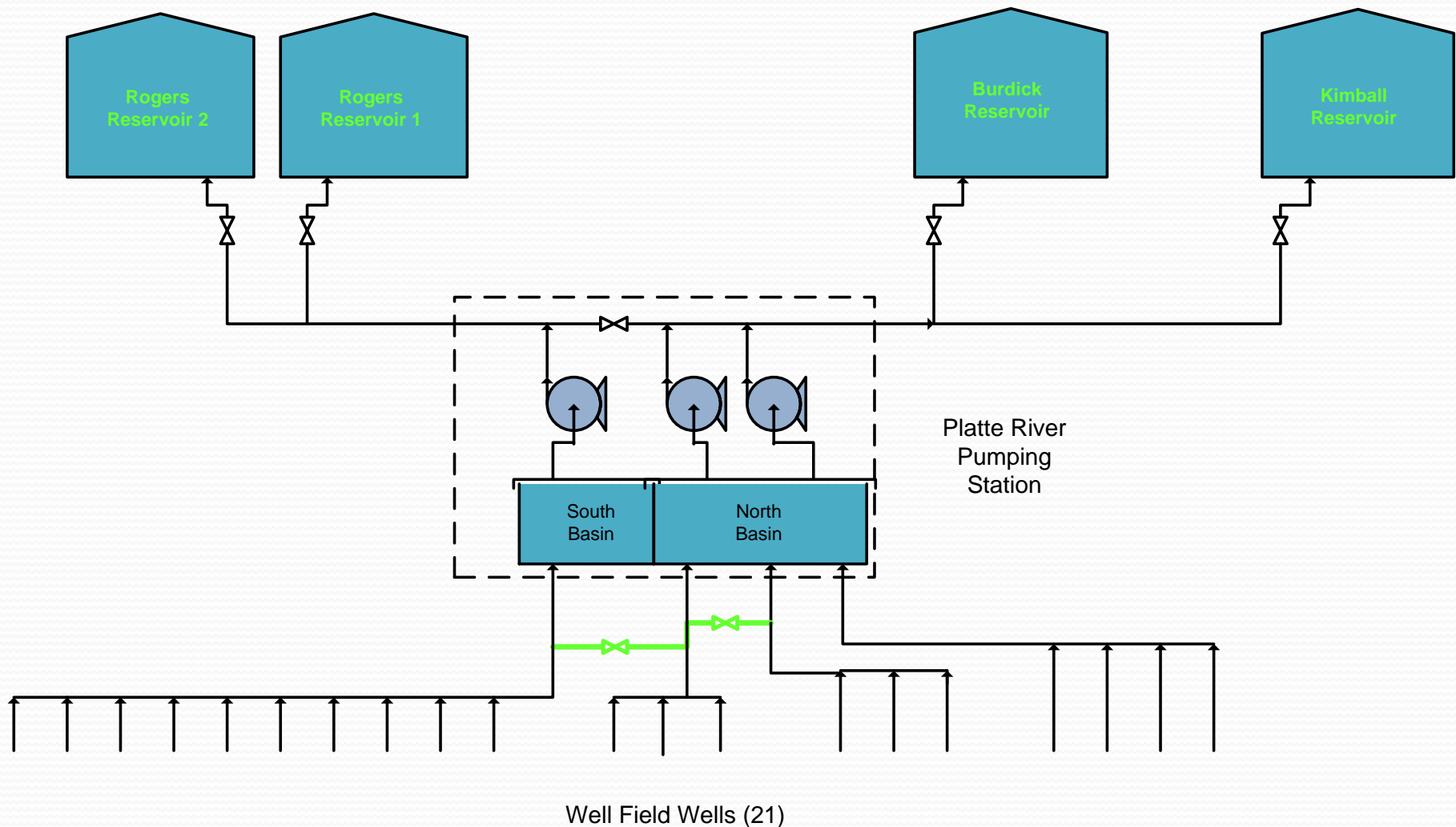


Solutions

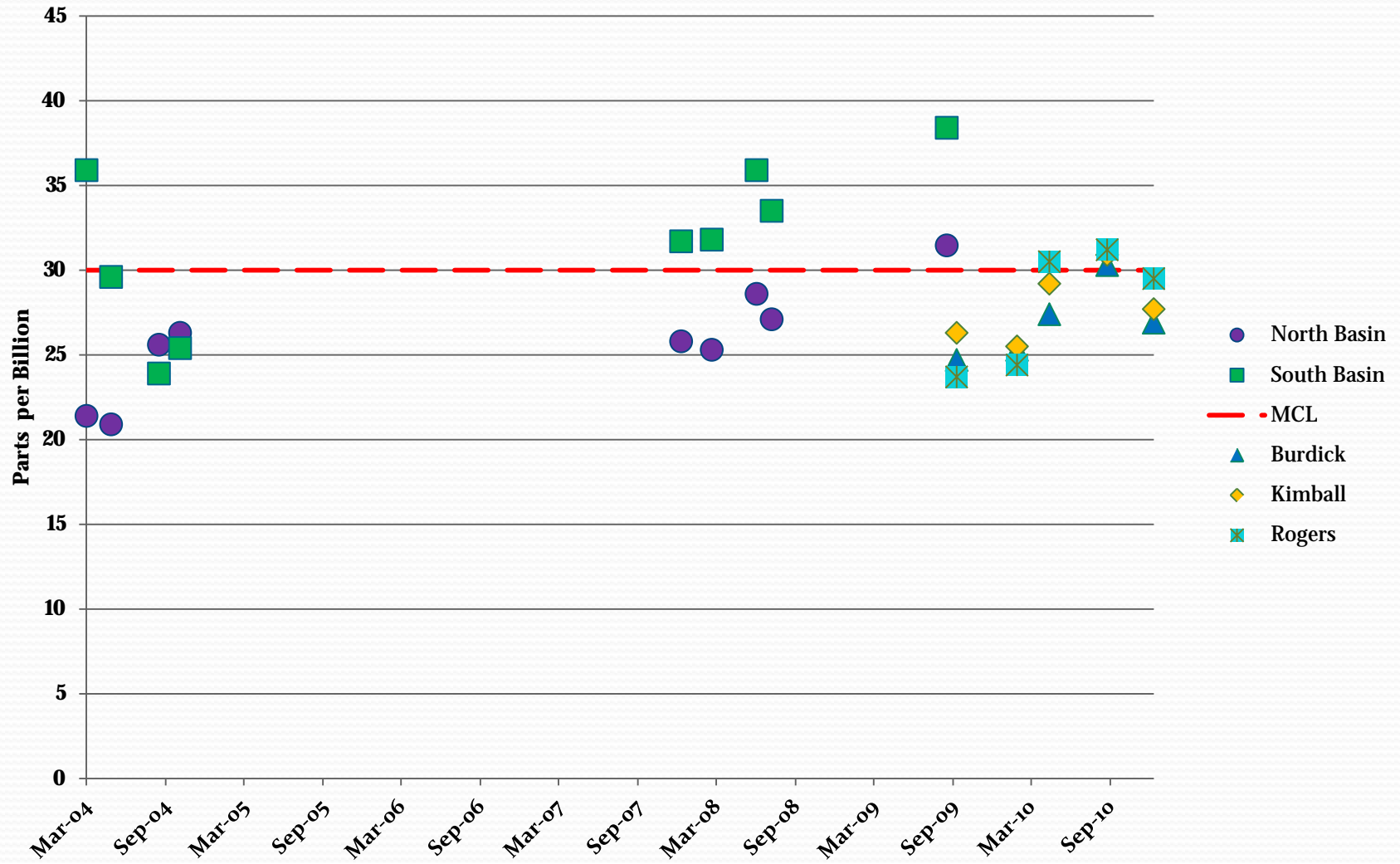
- **Blend water sources**
- Treatment
- Look for other sources



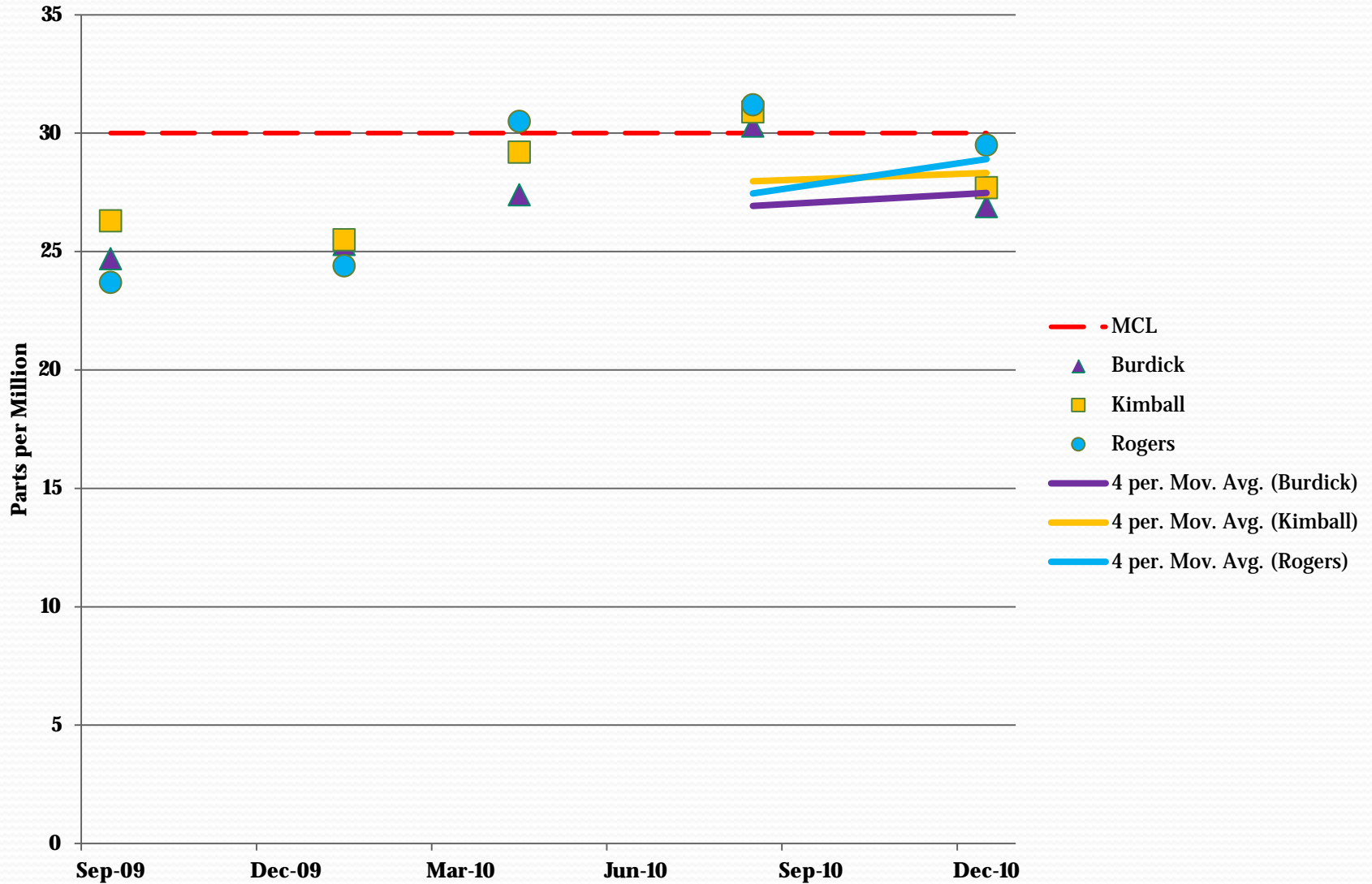
Basin Project – Blending / POE



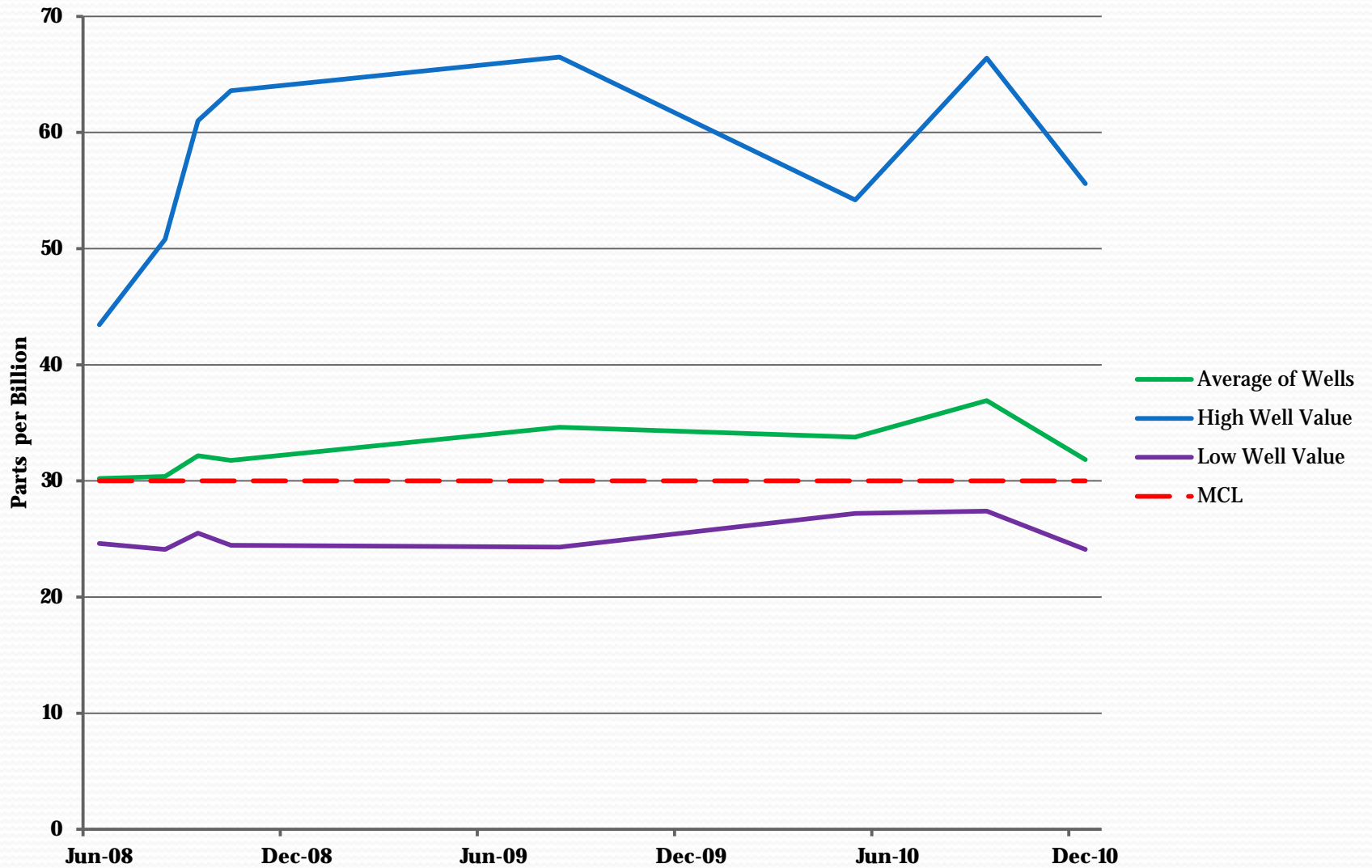
Point of Entry Uranium Sampling Results



Point of Entry Uranium Sampling Results



Well Field Well Uranium Sampling Results

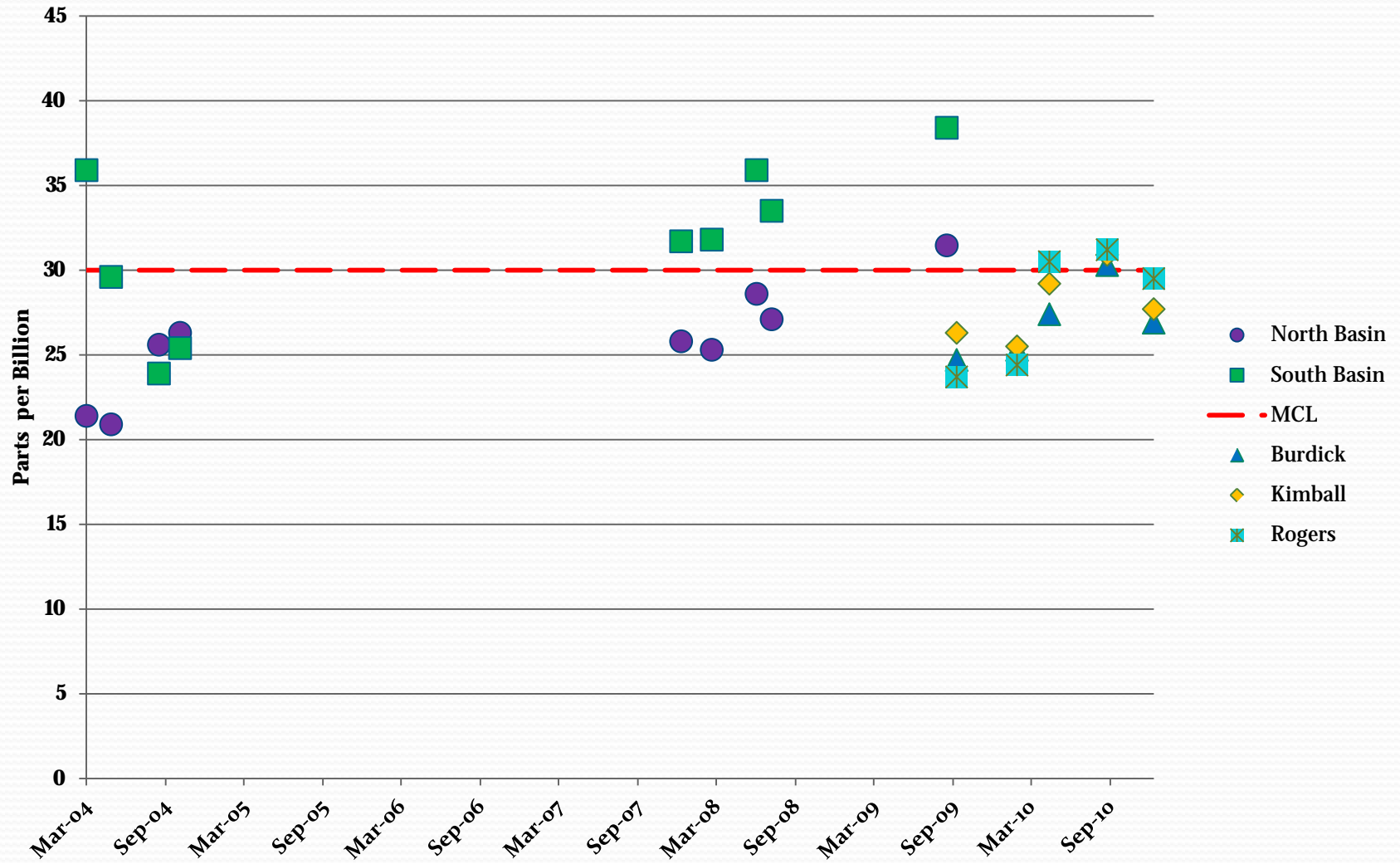


Solutions

- Blend water sources
- **Treatment**
- Look for other sources

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Point of Entry Uranium Sampling Results



Treatment

- Council Meeting October 27, 2009, Contract Award
Uranium Treatment System Engineering Evaluation
HDR Engineering
- Technology Screening
- Treatment Process Selection
- Implementation Plan

Technology Screening

- **Treatment Locations**
 - Platte River Well Field
 - In-Town Reservoirs
- **System Configurations**
 - Individual Wellhead
 - Distribution System Entry Points
 - Centralized Treatment Facility
- **Treatment Technologies**
 - Reverse Osmosis
 - Coagulation/Filtration
 - Ion Exchange
 - Lime Softening
 - Adsorptive Media

Technology Screening

- *Coagulation/Filtration* – Conventional treatment by feeding coagulants such as alum or ferric chloride causing flocs to capture contaminants such as uranium. Solid and liquid waste streams. A centralized, full-capacity plant is required.
- *Ion Exchange* – Raw water passes through granular resins which absorb contaminants such as uranium. Brine solution used to regenerate the resins. Liquid waste stream. Modular construction allows phased implementation.
- *Adsorptive Media* – Similar to ion-exchange, uranium absorbs to the media and removed from the water. Exhausted media is typically disposed of to a landfill or specialty processing center. Modular construction allows phased implementation.

Treatment Process Selection

Alternative	Capital Cost	O&M cost per 1000 Gallons	Annual Gallons (Thousand)	Annual O&M	20-yr Life Cycle Costs
Coagulation /Filtration	\$ 18,274,000	\$0.60	3,175,500	\$1,905,000	\$42,000,000
Ion Exchange	\$27,295,000	\$0.90	3,175,500	\$2,858,000	\$63,000,000
Adsorptive Media	\$17,941,000	\$0.75	3,175,500	\$2,382,000	\$47,000,000

Cost Analysis

- Capital Cost = \$18,000,000
- Financed for 20 years @ 2.5%
- Annual Debt Service = \$1,144,590
- Annual Operating Costs = \$2,400,000

- Annual Total Cost = **\$3,544,590**

- Annual Water Sales (2010) = **\$4,102,915**

Cost Analysis - Phased

- Capital Cost = \$3,000,000
- Financed for 20 years @ 2.5%
- Annual Debt Service = \$190,765
- Annual Operating Costs = \$1,000,000

- Annual Total Cost = **\$1,190,765**

- Annual Water Sales (2010) = **\$4,102,915**

Treatment Process Selection

Coagulation/Filtration

– Pros

- Established technology/process
- Flexibility for future quality issues

– Cons

- Centralized facility – large financial impact, complex construction planning
- Pilot study to determine optimal design
- Liquid and solid waste disposal by the City

Treatment Process Selection

Adsorptive Media

– Pros

- Phased construction – lower financial impact
- System design by supplier
- Waste disposal and radioactive licensing by supplier

– Cons

- Limited operational background
- Minimal supplier competition
- Uncertain long-term supplier reliability

Implementation Plan

- Adsorptive media system recommended
 - Phased construction
 - Procurement through performance specification
 - Residual management and radioactive licensing responsibility of manufacturer

Project Status

- **Multiple Phase Project Agreement for Professional Services - HDR Engineering**
 - **Phase 1 – Equipment Procurement**
 - Phase 1 Engineering Authorization, Prepare System Specifications - Council Meeting, August 10, 2010
 - Issue System Specifications for Bids – February 2011
 - Award System Contract – May 2011

Project Status

- Phase 2 – Detailed Engineering/Construction Specifications
 - Phase 2 Engineering Authorization, Prepare Construction Specifications – May 2011
 - Issue Construction Specifications for Bids – August 2011
 - Award Construction Contract – October 2011
 - Construction Complete - December 2011

Capital Funding

- Evaluation of Capital Funding Options
 - Long-term bonding
 - Short-term debt
 - Cash reserves

Revenue

- Evaluation of Annual Operating Cost Revenue Stream
 - Volumetric/Flat Rate - \$0.23 / 100 cf
 - Flat Percentage - 29%
 - Rate Study (User Block format)

Current Rate Structure

Cubic Feet Per Month

Rate Per 100 Cubic Feet

First 500

\$1.496

Next 500

\$0.700

Next 500

\$0.692

Next 2,500

\$0.767

Next 6,000

\$0.713

Next 90,000

\$0.654

Next 100,000

\$0.574

Over 200,000

\$0.535

Monthly Minimum (500 cubic feet) \$7.480

Flat Rate Increase (\$0.23 100cf)

Cubic Feet	Units	Gallons	Current Amount	Increased Amount	% Increase
500	5	3,740	\$7.48	\$8.63	15%
5,000	50	37,403	\$41.10	\$52.60	28%
10,000	100	74,805	\$76.75	\$99.75	30%
50,000	500	374,026	\$338.35	\$453.35	34%
800,000	8,000	5,984,416	\$4,449.35	\$6,289.35	41%
6,842,200	68,422	51,183,210	\$36,775.12	\$52,512.18	43%
7,648,400	76,484	57,214,005	\$41,088.29	\$58,679.61	43%

Percentage Rate Increase (29%)

Cubic Feet	Units	Gallons	Current Amount	Increase	Increased Amount
500	5	3,740	\$7.48	\$2.17	\$9.65
5,000	50	37,403	\$41.10	\$11.93	\$53.03
10,000	100	74,805	\$76.75	\$22.27	\$99.02
50,000	500	374,026	\$338.35	\$98.20	\$436.55
800,000	8,000	5,984,416	\$4,449.35	\$1,291.31	\$5,740.66
6,842,200	68,422	51,183,210	\$36,775.12	\$10,673.03	\$47,448.15
7,648,400	76,484	57,214,005	\$41,088.29	\$11,924.81	\$53,013.10

Discussion

