Issues Associated with URI's Kingsville Dome In-situ Leach Uranium Mine Kleberg County, Texas

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1) Baseline water quality biased

Uranium production area baseline water quality is determined from samples collected from baseline wells. However, most baseline wells are screened in or near uranium ore bodies. Thus, concentrations of hazardous constituents such as uranium and radium are higher in baseline wells than they are in the bulk of groundwater at the mine.

This bias can be seen when pre-mining concentrations in baseline wells are compared with pre-mining concentrations in monitor wells. Like baseline wells, monitor wells are on mine property and they are screened in the same aquifer as the baseline wells (see figure 1). However, monitor wells are usually not screened in or near an ore body. As shown in table 1, groundwater from baseline wells is much more likely to contain high concentrations of uranium and radium than is groundwater from monitor wells.

Table 1[1]
Comparison of Pre-mining Uranium and Radium Concentrations
Baseline Wells VS Monitor Wells

Constituent	Percentage of baseline wells with concentrations greater than drinking water standard	Percentage of monitor wells with concentrations greater than drinking water standard
Uranium (std = 30 µg/L)	38/43 = 88%	46/117 = 39%
Radium (std = 5 pCi/L)	49/58 = 84%	22/89 = 25%

2) Time required to restore groundwater quality unknown

URI began mining production authorization area one (PAA-1) in 1988 and stopped mining in 1999.[2] However, URI has not restored groundwater in PAA-1 to the levels required by the Texas Commission on Environmental Quality. Currently, concentrations of uranium, calcium, bicarbonate, sulfate, and molybdenum are higher than the concentrations required by the State of Texas.[3]

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[1] Data sources: URI, 1987a, 1989a, and 1997a.
[2] URI, 2005a. In 2006 URI began limited re-mining in the northern portion of PAA-1. Mining at the Kingsville Dome mine ceased in June 2009 (personal communication with URI representative Jo Ellen Hewins).
[3] Latest samples collected September 2011 (URI, 2011a). Current concentrations of radium are unknown. URI does not regularly analyze samples for radium.

3) Time to reestablish reducing conditions unknown

Although mining stopped in most of PAA-1 over a decade ago, reducing conditions have not been reestablished. That is, geochemical conditions in the aquifer have not reverted to their pre-mining state where uranium existed primarily in its reduced (less soluble) state. Instead, much of the uranium at PAA-1 appears to exist in an oxidized (more soluble) state. This can be seen by comparing pre-mining uranium concentrations in baseline wells with current concentrations. These concentrations are presented in table 2. On average, current uranium concentrations exceed pre-mining concentrations by a factor of more than 30. Current concentrations are lower than pre-mining concentrations in only one well (BL-I-6).

Table 2[4]
Uranium Concentrations in PAA-1 Baseline Wells, Pre-mining VS current

Well ID	Pre-mining concentration (µg/L U3O8)	Current (September 2011) concentration (µg/L U3O8)	Ratio current/pre-mining
BL-EX-1	0.06	0.18	3.0
BL-EX-2	0.116	0.79	6.8
BL-EX-3	0.927	1.80	1.9
BL-I-1	0.018	0.41	2.3
BL-I-2	0.043	0.12	2.8
BL-I-3	0.021	3.60	171
BL-I-4	0.077	0.10	1.3
BL-I-5	0.03	2.40	77
BL-I-6	0.68	0.64	0.94
BL-I-7	0.077	0.10	1.3
BL-I-8	0.18	0.77	4.3
BL-I-9	0.13	1.20	27
BL-I-10	0.009	0.55	61
BL-I-11A[5]	0.008	1.20	150
BL-I-12	0.016	0.06	3.8
BL-I-13	0.156	2.40	15.4
		Average	**33.1**
		Median	**~ 4**

[4] Pre-mining concentrations from URI, 1987a, 1989a, and 1997a. Current concentrations (September 2011) from URI, 2011a.
[5] BL-I-11A replaced original well BL-I-11. Pre-mining concentration for BL-I-11.

4) Potential for off-mine migration after groundwater restoration stops

If restoration is stopped while high concentrations of contaminants remain in the aquifer, the contaminants may migrate beyond the mine boundary.

During active restoration, groundwater flows toward pumping wells in the production area. This condition is schematically illustrated in figure 2. However, once pumping (restoration) stops, the prevailing hydraulic gradient in the vicinity of the mine will be reestablished in the production area. Then, groundwater in the production area, and the contaminants it contains, will flow beyond the mine boundary. This is schematically illustrated in figure 3.

It might be argued that reducing conditions will prevent contaminants from migrating beyond the mine boundary. However, this assumes that reducing conditions are present beyond the boundary. That may not be the case. Even if reducing conditions do exist beyond the boundary, there is no guarantee that the reducing conditions will be strong enough to prevent oxidized groundwater from migrating a significant distance beyond the mine. Finally, some contaminants, such as radium, are not affected by reducing conditions.[6]

References

Demuth, H., and J. Schramke, 2006, *Fate and Transport of Post-Restoration Groundwater Constituents at In-Situ Uranium Leach Facilities*, prepared for Uranium Resources Inc., May 10, 2006.

URI, 1987a, *Application for Production Area Authorization, PAA-1*, November 27, 1987.

URI, 1989a, *Application for Production Area Authorization 2*, July7,1989.

URI, 1997a, *Application for Production Area Authorization URO2827-031*, (PAA-3) June 25, 1997, revised April 9, 2002.

URI, 2005a, *Memorandum from Mark Pelizza to George Rice*, September 27, 2005.

URI, 2011a, *Quarterly Restoration Progress Report, Kingsville Dome Property*, October, 13 2011.

[6] Demuth and Schramke, 2006, page ii.

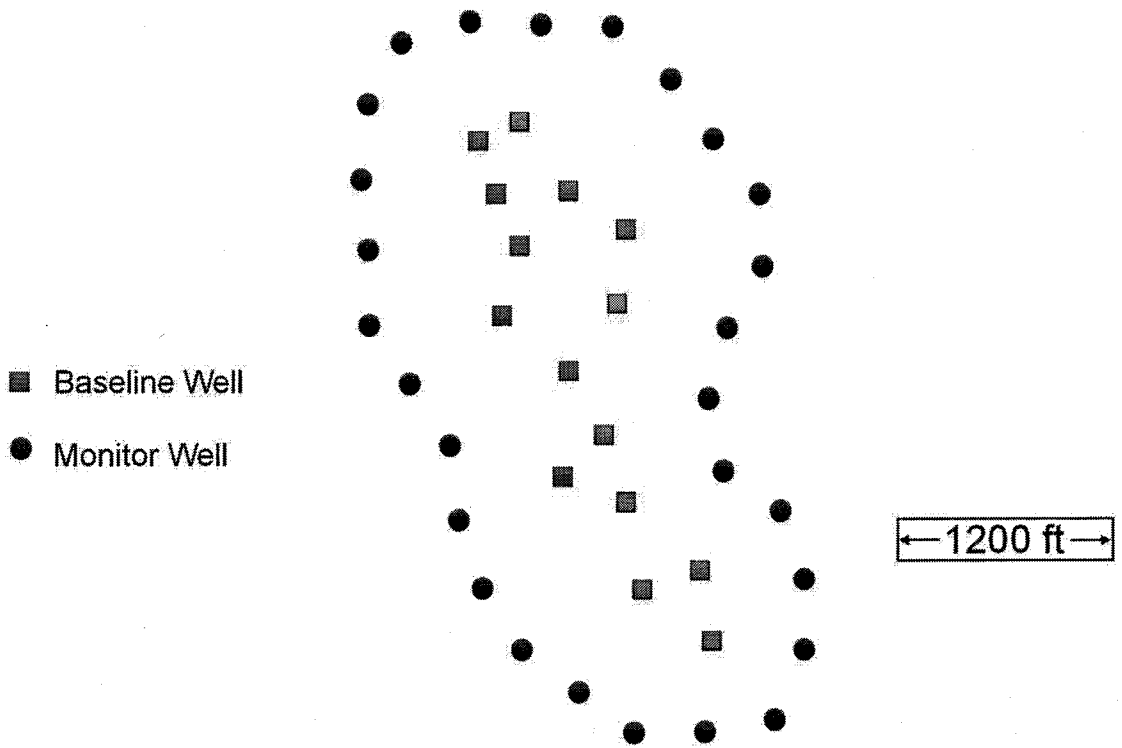

Figure 1
Schematic Representation of PAA-1
Kingsville Dome Mine

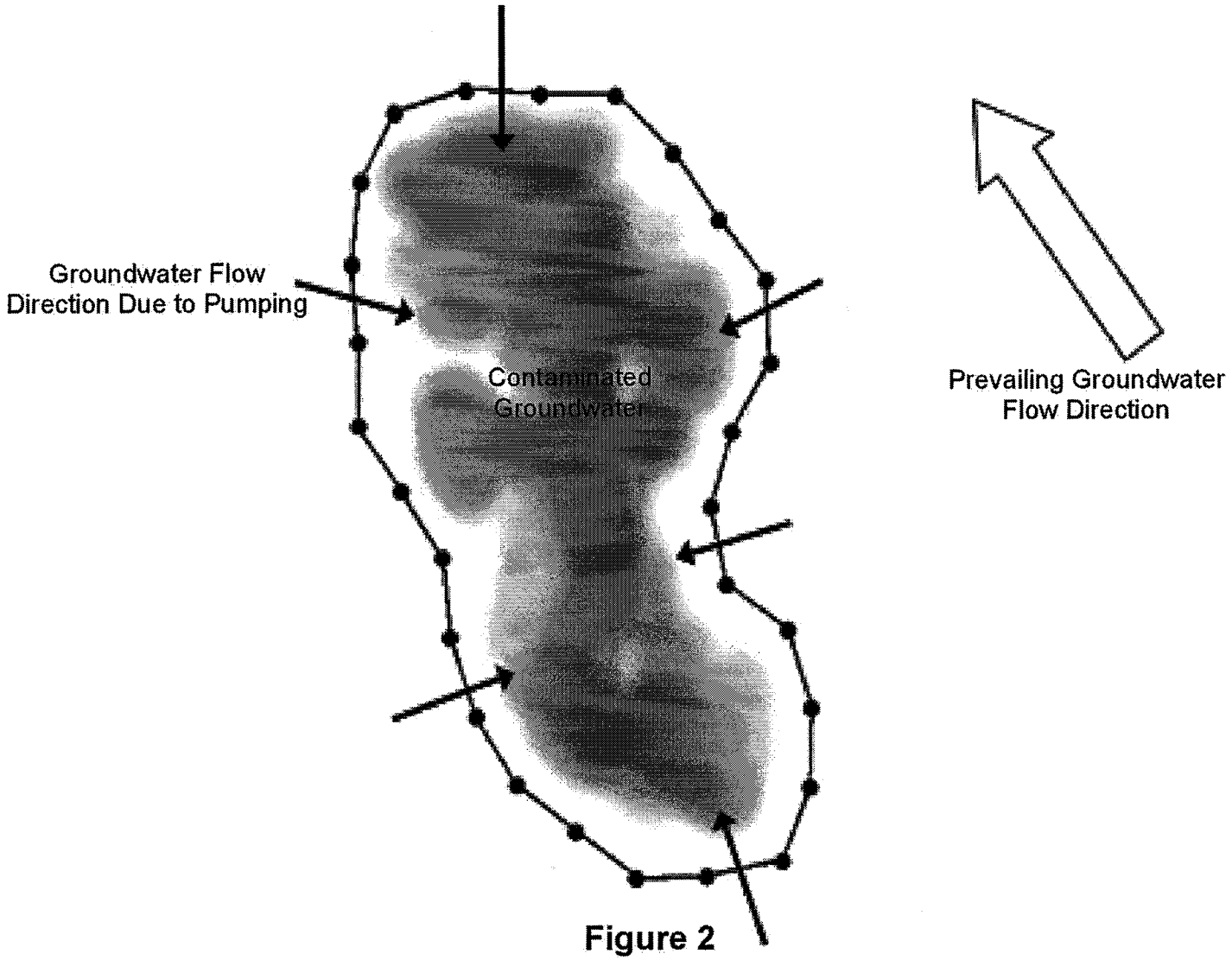

Figure 2
Groundwater Flow Directions During Restoration

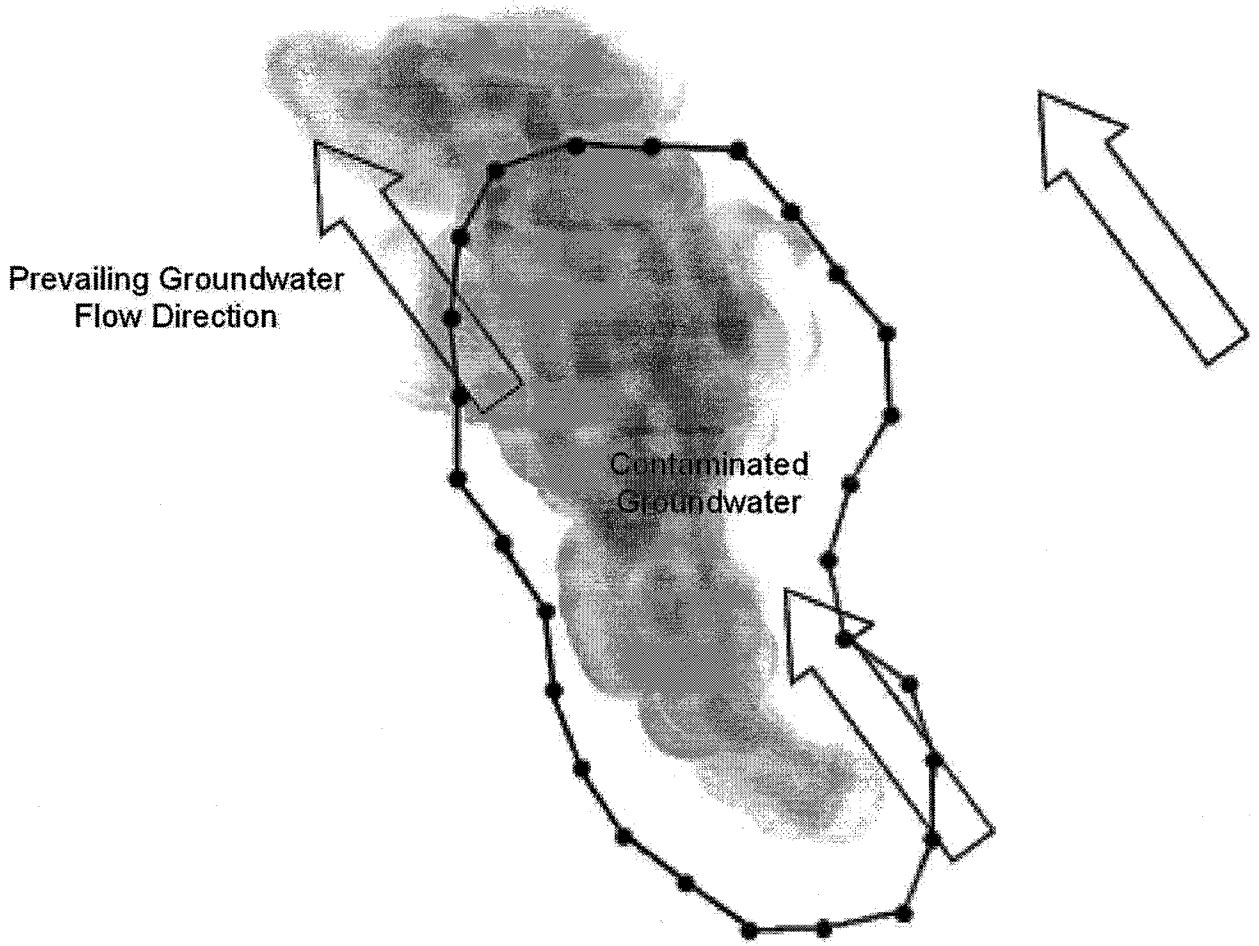

Figure 3
Groundwater Flow Direction After Restoration Stops