

Groundwater Permit Correspondence (EDMS)

September 22, 2008

Mark Boggs, WT 9D-K

KINGSTON GROUNDWATER MONITORING – SEPTEMBER 2008

On September 17 and 18, Bill Nichols and I conducted field-monitoring activities specified for Kingston Groundwater Monitoring. Groundwater samples were collected from Wells G1B, G3A, G3B, G4B, G5A, G5B, and G6B in the Gypsum Disposal Area. Wells G3A and G3B were evacuated. They were allowed to recharge overnight before collecting the samples. This was due to high turbidity and the slow recharge rate. Well G1B was collected in a cubitainer to allow settlement before samples were poured into bottles. Routine samples (mineral, metal, nutrient, and TIC) were collected from all wells and a dissolved metals was collected from Well G6B. Equipment blanks were collected after Well G6B and before Well G5B. Duplicate samples were collected from Well G5A. A portable Grundfos Rediflo 2 centrifugal pump was used for purging and sampling all wells.

Sample readings of Hydrolab parameters (temperature, pH, dissolved oxygen, conductivity, and oxidation-reduction potential) were determined utilizing a flow-through cell to eliminate groundwater-to-air contact for all wells. Alkalinity and acidity were determined by potentiometric titration using an Orion 250A+ pH meter. Standardization of instruments showed minimal drift on most parameters.

Samples were hand delivered by Bill Nichols to the Knoxville mailroom and mailed to the laboratory via TVA mail courier on September 18.

Attached are seven Groundwater Data Field Worksheets (TVA 30066A (9-1999)), two Acidity and Alkalinity Field Worksheets (TVA 30533 (RD-BUS 4-92)), three Instrument Standardization forms (TVA 30035 (RG-ES-8-93)), one spreadsheet of water surface elevations, and one Environmental Science Corporation chain-of-custody form with attachment.

If you have any questions or comments, please call me at (865) 673-2374 in Knoxville.

Samuel A. Grindstaff
Environmental Engineering Services East
GRN 2E-K

SAG:ELD
Attachments

cc (Attachments):

Daryl R. Armentrout, GRN 2E-K
Cynthia W. McCowan, KFP 1A-KST
Matthew D. Williams, WT 9D-K (orig.)
EDMS. CEB 1B-M

Project/Site Kingston Groundwater	Well Number G1B	84068	Purge Date	Year 2008	Month 09	Day 18
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Depth to Water (m) 35.02 4195	Bottom of Well (m) 39.19 4194	Well Diameter (mm) 153	4188	Survey Leader SAG	Field Crew WFN
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<input type="checkbox"/> Depth of Screen <input checked="" type="checkbox"/> Open Bore Hole		Sample Label KIF-G1B-0908	<input checked="" type="checkbox"/> Unfiltered <input type="checkbox"/> Filtered <input type="checkbox"/> Both
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NA 4191	To	NA 4190	Well Volume	Target Purge Volume	Actual Purge Volume
$[(39.19) \text{ m} - (35.02) \text{ m}] \times (18.228) \text{ L/m} = 76.01 \text{ (L)}$			152.02 (L)	225.5 (L)	4186

Purge Pump: Bladder Centrifugal Peristaltic Dedicated
 Sample Pump: Bladder Centrifugal Peristaltic Dedicated

220.42
 250.42
 280.42
 245.42

Notes and WQ Observations	Time ET CT	Pump Rate (L/min)	Depth to Water (m)	Pump Depth (m)	Temp °C	pH (s.u.)	DO (mg/L)	COND (umhos/cm)	(+/-) ORP (mV)	Turbidity (NTU)
Begin Purge →	0949	—	35.02	38.0	—	—	—	—	—	—
6.0L	0950	6.0	35.50	38.0	15.5	7.2	8.1	405	321	—
36.0L	0955	6.0	35.85	38.0	15.9	7.3	8.6	382	308	—
66.0L	1000	6.0	—	38.0	15.8	7.3	8.9	376	317	—
96.0L	1005	6.0	36.18	38.0	15.9	7.3	8.5	383	322	—
126.0L	1010	6.0	—	38.0	15.9	7.3	8.5	393	323	—
138.5L	1015	2.5	36.00	38.0	17.2	7.4	8.4	406	316	—
151.0L	1020	2.5	35.91	38.0	17.1	7.4	8.1	414	299	—
163.5L	1025	2.5	35.76	38.0	16.9	7.4	8.2	413	297	—
179.5L	1033	2.0	35.64	38.0	17.3	7.3	8.2	418	304	—
199.5L	1043	2.0	35.52	38.0	17.4	7.3	8.3	422	322	—
* 225.5L	1056	2.0	35.51	38.0	17.4	7.3	8.3	425	330	—

Remarks: *COLLECTED SAMPLE IN CONTAINER TO LET SETTLE. SAMPLED, Poured UP IN LAB @ 1314.

Reviewed By: [Signature] 09/18/08 Date
 Project Leader: [Signature] 09/20/08 Date

Sample Collector: WFN
Sample Date: 08/09/08 1056 (ET) CT
Pump Duration: 67 min 72604
"999" = 2 days

Sample Readings	
1056 2.0	38.0 17.4 7.3 8.3 425 330 —
4193	4192 10 400 300 94 90
Analysis Time (ET) CT	Pump Rate (L/min)
	Pump Depth (m) Temp °C (EPA 170.1) pH (s.u.) (EPA 150.1) DO (mg/L) (EPA 360.1) COND (umhos/cm) (EPA 120.1) (+/-) ORP (mv) (SM 2580B) Turbidity (NTU) (EPA 180.1)

Additional Sample Data						
Analyst: SAG	415	431	436	437	Well Diameter (mm)	Vol. Factor (L/m)
Date Analyzed: 08/09/08	Phenol Alkalinity mg/L (EPA 310.1)	Total Alk. mg/L (EPA 310.1)	Mineral Acidity mg/L (EPA 305.1)	CO ₂ Acidity mg/L (EPA 305.1)	12.7 (0.5 in)	0.127
Turbidity 1350 <input type="checkbox"/> Clear <input type="checkbox"/> Slightly Turbid <input checked="" type="checkbox"/> Turbid <input type="checkbox"/> Highly Turbid	Time: 1326 Initial: 167	Time: 1326 Initial: 167	Time: 1326 Initial: 167	Time: 1326 Initial: 167	51 (2 in)	2.027
Color: TAN	Bottles Required <input type="checkbox"/> BOD <input type="checkbox"/> COD <input checked="" type="checkbox"/> TIC	<input checked="" type="checkbox"/> Ferrous <input type="checkbox"/> Metals <input type="checkbox"/> Dis. Metals	<input checked="" type="checkbox"/> Mineral <input type="checkbox"/> Dis. Mineral <input checked="" type="checkbox"/> Nutrient	<input type="checkbox"/> Phenol <input type="checkbox"/> Filtration TIC <input checked="" type="checkbox"/> TSS/TDS	76 (3 in)	4.560
Odor: NONE	Others (list): FQ				102 (4 in)	8.107
					127 (5 in)	12.668
					153 (6 in)	18.228

Preliminary Groundwater Data Field Worksheet

Sheet 1 of 2

Project/Site Kingston Groundwater	Well Number G3A	84068	Purge Date	Year 2008	Month 09	Day 17
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Depth to Water (m) 2.87 4195	Bottom of Well (m) 9.74 4194	Well Diameter (mm) 51 4188	Survey Leader SAG	Field Crew WFN
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Depth of Screen Open Bore Hole

(m)	To	(m)	Sample Label KIF-G3A-0908	<input checked="" type="checkbox"/> Unfiltered <input type="checkbox"/> Filtered <input type="checkbox"/> Both Filter Type and Size:
6.6	4191	9.6	4190	

[Bottom of Well - Depth to Water]	x	Volume Factor	=	Well Volume	Target Purge Volume	Actual Purge Volume
[(9.74) m - (2.87) m]	x	(2.027) L/m	=	13.93 (L)	27.86 (L)	54.0 4186

Purge Pump: Bladder Centrifugal Peristaltic Dedicated Other (list):

Sample Pump: Bladder Centrifugal Peristaltic Dedicated Other (list):

20042
202
STOP
11.542
10.542
202

Notes and WQ Observations	Time ET CT	Pump Rate (L/min)	Depth to Water (m)	Pump Depth (m)	Temp °C	pH (s.u.)	DO (mg/L)	COND (umhos/cm)	(+/-) ORP (mV)	Turbidity (NTU)
Begin Purge →	0936	—	2.87	9.0	—	—	—	—	—	—
7L	0937	7.0	5.73	9.0	16.6	6.3	0.9	253	302	—
18L	0939	5.5	9.0	9.0	18.0	6.2	1.7	244	283	—
21L	0940	3.0	9.0	9.0	OUT OF WATER - RECHARGE					
Restart →	0900	—	2.87	7.0	—	—	—	—	—	—
3.5L	0901	3.5	—	7.0	16.7	6.4	2.8	300	337	—
8.5L	0903	2.75	3.67	7.0	16.6	6.5	2.6	345	342	—
15.0L	0905	3.25	3.69	7.0	16.6	6.7	3.0	365	343	—
19.0L	0907	2.00	3.71	7.0	16.6	6.7	3.0	356	345	—
23.0L	0909	2.00	—	7.0	16.6	6.7	2.7	359	347	—
28.0L	0911	2.50	3.65	7.0	16.6	6.7	3.0	360	348	—
33.0L	0913	2.5	3.64	7.0	16.7	6.7	2.9	358	351	—

Remarks:

Reviewed By: [Signature] Date: 09/18/08 Project Leader: [Signature] Date: 09/20/08

Sample Collector: WFN

Sample Date	Time
Year 08 Month 09 Day 18	0913 (ET) CT
Pump Duration: 999 min	72604

"999" = 2 days

Sample Readings		7.0	16.7	6.7	2.9	358	351	—
4192	10	400	300	94	90			
Pump Depth (m)	Temp °C EPA 170.1	pH (s.u.) EPA 150.1	DO (mg/L) EPA 360.1	COND (umhos/cm) EPA 120.1	(+/-) ORP (mv) SM 2580B	Turbidity (NTU) EPA 180.1		

Additional Sample Data

Analyst: SAG	415	160	436	41	Well Diameter (mm)	Vol. Factor (L/m)
Date Analyzed: Year 08 Month 09 Day 18	415	431	436	437	12.7 (0.5 in)	0.127
Turbidity 1350 <input type="checkbox"/> Clear <input checked="" type="checkbox"/> Slightly Turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Highly Turbid	Phenol Alkalinity mg/L (EPA 310.1)	Total Alk. mg/L (EPA 310.1)	Mineral Acidity mg/L (EPA 305.1)	CO ₂ Acidity mg/L (EPA 305.1)	51 (2 in)	2.027
	Time: 1314	Time: 1314	Time: 1333	Time: 1333	76 (3 in)	4.560
	Initial: [Signature]	Initial: [Signature]	Initial: [Signature]	Initial: [Signature]	102 (4 in)	8.107
					127 (5 in)	12.668
Color: CLOUDY	Bottles Required <input type="checkbox"/> BOD <input type="checkbox"/> COD <input type="checkbox"/> Ferrous <input type="checkbox"/> Metals <input type="checkbox"/> Dis. Metals <input checked="" type="checkbox"/> Mineral <input checked="" type="checkbox"/> Dis. Mineral <input checked="" type="checkbox"/> Nutrient <input type="checkbox"/> Phenol <input type="checkbox"/> Filtration <input checked="" type="checkbox"/> TSS/TDS				Others (list):	
Odor: NONE					FQ	

Project/Site Kingston Groundwater	Well Number G38	Purge Date 84068	Year 2008	Month 09	Day 17
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Depth to Water (m) 3.08 4195	Bottom of Well (m) 19.19 4194	Well Diameter (mm) 51 4188	Survey Leader SAG	Field Crew WFN
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Depth of Screen Open Bore Hole

(m)	To	(m)
12.8	4191	18.9 4190

Sample Label: KIF-G38-0908

Unfiltered Filtered Both
Filter Type and Size:

[Bottom of Well - Depth to Water]	x	Volume Factor	=	Well Volume	Target Purge Volume	Actual Purge Volume
[(19.19) m - (3.08) m]	x	(2.027) L/m	=	32.65(L)	65.3 (L)	81.5 (L) 4186

Purge Pump: Bladder Centrifugal Peristaltic Dedicated Other (list):

Sample Pump: Bladder Centrifugal Peristaltic Dedicated Other (list):

Notes and WQ Observations	Time ET CT	Pump Rate (L/min)	Depth to Water (m)	Pump Depth (m)	Temp °C	pH (s.u.)	DO (mg/L)	COND (umhos/cm)	(+/-) ORP (mV)	Turbidity (NTU)	
Begin Purge →	0912	—	3.08	18.5	—	—	—	—	—	—	
7L	0913	7.0	6.59	18.5	15.8	7.3	1.7	455	305	—	
18L	0915	5.5	10.00	18.5	16.3	7.5	2.9	422	301	—	
28L	0917	5.0	13.12	18.5	17.3	7.6	3.1	422	302	—	
36L	0919	4.0	13.57	18.5	17.4	7.6	2.9	427	305	—	
57L	0924	4.2	16.50	18.5	16.6	7.3	1.0	514	314	—	
70L	0929	2.6	—	18.5	17.7	7.4	0.7	521	285	—	
STOP 72L	0930	2.0	OUT OF WATER				—	—	—	RECHARGE	—
RESTART →	0838	—	3.15	10.0	—	—	—	—	—	—	
3.5L	0839	3.5	—	10.0	16.3	9.1	9.5	431	246	—	
7.0L	0841	3.5	6.20	10.0	16.9	9.1	9.1	432	242	—	
9.5L	0843	2.5	7.19	10.0	17.2	9.1	8.9	433	241	—	

Remarks: _____

Reviewed By: [Signature] Date: 09/18/08 Project Leader: [Signature] Date: 09/20/08

Sample Collector: WFN	Sample Readings								
Sample Date: 08/09/08	0843	2.5	10.0	17.2	9.1	8.9	433	241	—
Year: 08, Month: 09, Day: 18	4193	4192	10	400	300	94	90		
Pump: 999 min	Analysis Time ET/CT	Pump Rate (L/min)	Pump Depth (m)	Temp °C EPA 170.1	pH (s.u.) EPA 150.1	DO (mg/L) EPA 360.1	COND (umhos/cm) EPA 120.1	(+/-) ORP (mv) SM 2580B	Turbidity (NTU) EPA 180.1
Duration: 72004									

"999" = 2 days

Additional Sample Data					Well Diameter (mm)	Vol. Factor (L/m)
Analyst: SAG	20	91	436	437	12.7 (0.5 in)	0.127
Date Analyzed: 08/09/08	415	431			51 (2 in)	2.027
Phenol Alkalinity mg/L (EPA 310.1)	Total Alk. mg/L (EPA 310.1)	Mineral Acidity mg/L (EPA 305.1)	CO ₂ Acidity mg/L (EPA 305.1)		76 (3 in)	4.560
Turbidity 1350 <input type="checkbox"/> Clear <input checked="" type="checkbox"/> Slightly Turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Highly Turbid	Time: 1318	Time: 1322	Time:	Time:	102 (4 in)	8.107
Color: CLOUDY	Initial: 102	Initial: 102	Initial:	Initial:	127 (5 in)	12.668
Odor: NONE	Bottles Required <input type="checkbox"/> BOD <input type="checkbox"/> COD <input type="checkbox"/> TOC <input checked="" type="checkbox"/> TIC	<input type="checkbox"/> Ferrous <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Dis. Metals	<input checked="" type="checkbox"/> Mineral <input type="checkbox"/> Dis. Mineral <input checked="" type="checkbox"/> Nutrient	<input type="checkbox"/> Phenol <input type="checkbox"/> Filtration <input checked="" type="checkbox"/> TSS/TDS	153 (6 in)	18.228
	Others (list):					
	FQ					

Project/Site Kingston Groundwater	Well Number G4B	84068	Purge Date	Year 2008	Month 09	Day 17
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Depth to Water (m) 8.16 4195	Bottom of Well (m) 25.02 4194	Well Diameter (mm) 51 4188	Survey Leader SAG	Field Crew WFN
<input checked="" type="checkbox"/> Depth of Screen <input type="checkbox"/> Open Bore Hole				

(m) 18.8 4191	To	(m) 24.9 4190	Sample Label KIF-G4B-0908	<input checked="" type="checkbox"/> Unfiltered <input type="checkbox"/> Filtered <input type="checkbox"/> Both Filter Type and Size:
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[Bottom of Well - Depth to Water]	x	Volume Factor	=	Well Volume	Target Purge Volume	Actual Purge Volume
[(25.02) m - (8.16) m]	x	(2.027) L/m	=	34.18 (L)	68.36 (L)	76.00 (L) 4186

Purge Pump: Bladder Centrifugal Peristaltic Dedicated Other (list):
 Sample Pump: Bladder Centrifugal Peristaltic Dedicated Other (list):

Notes and WQ Observations	Time ET CT	Pump Rate (L/min)	Depth to Water (m)	Pump Depth (m)	Temp °C	pH (s.u.)	DO (mg/L)	COND (umhos/cm)	(+/-) ORP (mV)	Turbidity (NTU)
Begin Purge →	1002	—	8.16	24.5	—	—	—	—	—	—
7L	1003	7.0	10.70	24.5	16.2	7.0	0.4	729	0	—
16L	1005	4.5	12.80	24.5	16.3	7.0	0.3	726	-6	—
38L	1010	4.4	15.94	24.5	16.9	7.0	0.3	754	26	—
55L	1015	3.4	18.94	24.5	17.1	7.0	0.3	776	45	—
60L	1017	2.5	18.98	24.5	17.3	7.0	0.3	782	51	—
68L	1019	4.0	18.98	24.5	17.3	7.0	0.3	789	46	—
76L	1021	4.0	18.98	24.5	17.3	7.0	0.3	790	45	—

Remarks: _____

Reviewed By: [Signature] Survey Leader Date: 09/18/08 [Signature] Project Leader Date: 09/20/08

Sample Collector: WFN
Sample Date: 08/09/17
Time: 1021 ET CT
Pump Duration: 19 min
72804
"999" = 2 days

Sample Readings									
1021	4.0	24.5	17.3	7.0	0.3	790	45	—	—
4192	10	400	300	94	90				
Analysis Time ET CT	Pump Rate (L/min)	Pump Depth (m)	Temp °C EPA 170.1	pH (s.u.) EPA 150.1	DO (mg/L) EPA 360.1	COND (umhos/cm) EPA 120.1	(+/-) ORP (mv) SM 2580B	Turbidity (NTU) EPA 180.1	

Additional Sample Data									
Analyst: SAG	415	402	436	52	Well Diameter (mm)	Vol. Factor (L/m)			
Date Analyzed: 08/09/18	Phenol Alkalinity (EPA 310.1)	Total Alk. (EPA 310.1)	Mineral Acidity (EPA 305.1)	CO ₂ Acidity (EPA 305.1)	12.7 (0.5 in)	0.127			
Turbidity 1350: <input checked="" type="checkbox"/> Slightly Turbid	Time: 1548	Time: 1548	Time: 1608	Time: 1608	51 (2 in)	2.027			
Color: LIGHT TAN	Initial: 110	Initial: 110	Initial: 110	Initial: 110	76 (3 in)	4.550			
Odor: NONE	Initial: 110	Initial: 110	Initial: 110	Initial: 110	102 (4 in)	8.107			
	Initial: 110	Initial: 110	Initial: 110	Initial: 110	127 (5 in)	12.668			
	Initial: 110	Initial: 110	Initial: 110	Initial: 110	153 (6 in)	18.228			
Bottles Required: <input type="checkbox"/> BOD, <input type="checkbox"/> COD, <input checked="" type="checkbox"/> TIC	<input type="checkbox"/> Ferrous, <input checked="" type="checkbox"/> Metals, <input type="checkbox"/> Dis. Metals	<input checked="" type="checkbox"/> Mineral, <input checked="" type="checkbox"/> Dis. Mineral, <input checked="" type="checkbox"/> Nutrient	<input type="checkbox"/> Phenol, <input type="checkbox"/> Filtration, <input checked="" type="checkbox"/> TSS/TDS	Others (list): FQ					

Preliminary Groundwater Data Field Worksheet

Sheet 1 of 1

Project/Site Kingston Groundwater	Well Number G5A	84068	Purge Date 2008	Year 2008	Month 09	Day 17
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Depth to Water (m) 5.76 4195	Bottom of Well (m) 8.57 4194	Well Diameter (mm) 51 4188	Survey Leader SAG	Field Crew WFN
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<input checked="" type="checkbox"/> Depth of Screen	<input type="checkbox"/> Open Bore Hole	Sample Label KIF-G5A-0908 / KIF-G5A-0908-DUP	<input checked="" type="checkbox"/> Unfiltered	<input type="checkbox"/> Filtered	<input type="checkbox"/> Both
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(m) 5.7	To 4191	(m) 8.7	4190	Well Volume 5.70 (L)	Target Purge Volume 11.4 (L)	Actual Purge Volume 23.00 (L) 4186
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Purge Pump: Bladder Centrifugal Peristaltic Dedicated Other (list):
 Sample Pump: Bladder Centrifugal Peristaltic Dedicated Other (list):

12042

Notes and WQ Observations	Time (ET) CT	Pump Rate (L/min)	Depth to Water (m)	Pump Depth (m)	Temp (°C)	pH (s.u.)	DO (mg/L)	COND (umhos/cm)	(+/-) ORP (mV)	Turbidity (NTU)
Begin Purge →	1341	—	5.76	7.5	—	—	—	—	—	—
3L	1342	3.0	5.76	7.5	16.9	6.2	3.0	304	359	—
8L	1344	2.5	5.76	7.5	17.0	6.7	3.3	311	357	—
13L	1346	2.5	5.76	7.5	17.1	6.7	4.1	315	356	—
18L	1348	2.5	5.76	7.5	17.1	6.7	4.6	319	355	—
23L	1350	2.5	5.76	7.5	17.2	6.8	4.7	320	355	—

Remarks:

Reviewed By: [Signature] Date 09/18/08 Project Leader [Signature] Date 09/20/08

Sample Collector: WFN	Sample Date	Time
Year 08	Month 09	Day 17 (ET) CT
Pump Duration: 9 min	72604	

"999" = 2 days

Sample Readings		7.5	17.2	6.8	4.7	320	355	—
4192	4193	10	400	300	94	90		
Pump Depth (m)	Pump Rate (L/min)	Temp (°C)	pH (s.u.)	DO (mg/L)	COND (umhos/cm)	(+/-) ORP (mV)	Turbidity (NTU)	
7.5	2.5	17.0	6.7	3.0	304	359	—	

Additional Sample Data									
Analyst: SAG	415	431	436	437	Well Diameter (mm)	Vol. Factor (L/m)			
Date Analyzed: 08/09/18	155	155	32	31	12.7 (0.5 in)	0.127			
Phenol Alkalinity (mg/L) (EPA 310.1)	Total Alk. (mg/L) (EPA 310.1)	Mineral Acidity (mg/L) (EPA 305.1)	CO ₂ Acidity (mg/L) (EPA 305.1)	51 (2 in)	2.027				
Turbidity 1350 <input checked="" type="checkbox"/> Clear	Time: 1552/1555	Time: 1614/1616	Time: 1614/1616	76 (3 in)	4.560				
<input type="checkbox"/> Slightly Turbid	Initial: 155	Initial: 1614	Initial: 1616	102 (4 in)	8.107				
<input type="checkbox"/> Turbid	Bottles Required	<input type="checkbox"/> Ferrous	<input checked="" type="checkbox"/> Mineral	<input type="checkbox"/> Phenol	Others (list):				
<input type="checkbox"/> Highly Turbid	<input type="checkbox"/> BOD	<input checked="" type="checkbox"/> TOC	<input checked="" type="checkbox"/> Metals	<input type="checkbox"/> Filtration	FQ				
Color: NONE	<input type="checkbox"/> COD	<input checked="" type="checkbox"/> TIC	<input type="checkbox"/> Dis. Metals	<input checked="" type="checkbox"/> TSS/TDS					
Odor: NONE			<input checked="" type="checkbox"/> Nutrient						

Project/Site Kingston Groundwater	Well Number G5B	84068	Purge Date	Year 2008	Month 09	Day 17
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Depth to Water (m) 5.62 4195	Bottom of Well (m) 18.36 4194	Well Diameter (mm) 51 4188	Survey Leader SAG	Field Crew WFN
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Depth of Screen Open Bore Hole

(m)	To	(m)	Sample Label KIF-G5B-0908	<input checked="" type="checkbox"/> Unfiltered <input type="checkbox"/> Filtered <input type="checkbox"/> Both Filter Type and Size:
12.0	4191	18.1	4190	

[Bottom of Well - Depth to Water]	x	Volume Factor	=	Well Volume	Target Purge Volume	Actual Purge Volume
[(18.36) m - (5.62) m]	x	(2.027) L/m	=	25.82 (L)	51.64 (L)	64.00 (L) 4186

Purge Pump: Bladder Centrifugal Peristaltic Dedicated Other (list):
 Sample Pump: Bladder Centrifugal Peristaltic Dedicated Other (list):

Notes and WQ Observations	Time ET CT	Pump Rate (L/min)	Depth to Water (m)	Pump Depth (m)	Temp °C	pH (s.u.)	DO (mg/L)	COND (umhos/cm)	(+/-) ORP (mV)	Turbidity (NTU)
Begin Purge →	1305	—	5.62	15	—	—	—	—	—	—
2 L	1306	2.0	—	15	17.2	7.4	0.8	508	326	—
7 L	1308	2.5	7.44	15	17.2	7.4	2.0	481	315	—
20 L	1313	2.6	7.46	15	17.1	7.3	1.8	481	480	—
38 L	1318	2.6	7.41	15	17.1	7.3	3.5	415	312	—
47 L	1323	2.8	7.44	15	17.1	7.2	5.2	373	326	—
52 L	1325	2.5	—	15	17.2	7.2	5.4	364	333	—
56 L	1327	2.0	7.21	15	17.2	7.2	5.6	364	336	—
60 L	1329	2.0	—	15	17.2	7.2	5.6	367	337	—
64 L	1331	2.0	7.29	15	17.2	7.2	5.7	369	340	—

Remarks: KIF - GYPEG BLANK - 0908 COLLECTED AFTER SAMPLING WELL G5B @ 1330. BEFORE WELL G5B.

Reviewed By: [Signature] 09/18/08 [Signature] 09/18/08
 Survey Leader Date Project Leader Date

Sample Collector: WFN

Sample Date			Time
Year	Month	Day	1331
08	09	17	ET CT

Pump Duration: 26 min 72004
 "999" = 2 days

Sample Readings								
1331	2.0	15	17.2	7.2	5.7	369	340	
	4193	4192	10	400	300	94	90	
Analysis Time ET/CT	Pump Rate (L/min)	Pump Depth (m)	Temp °C EPA 170.1	pH (s.u.) EPA 150.1	DO (mg/L) EPA 360.1	COND (umhos/cm) EPA 120.1	(+/-) ORP (mv) SM 2580B	Turbidity (NTU) EPA 180.1

Additional Sample Data										
Analyst: <u>SAG</u>	Date Analyzed		415	431	436	437	Well Diameter (mm)	Vol. Factor (L/m)		
Year: <u>08</u>	Month: <u>09</u>	Day: <u>18</u>	Phenol Alkalinity mg/L (EPA 310.1)	Total Alk. mg/L (EPA 310.1)	Mineral Acidity mg/L (EPA 305.1)	CO ₂ Acidity mg/L (EPA 305.1)	12.7 (0.5 in)	0.127		
Turbidity 1350 <input type="checkbox"/> Clear <input checked="" type="checkbox"/> Slightly Turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Highly Turbid			Time: <u>1559</u>	Time: <u>1559</u>	Time: <u>1618</u>	Time: <u>1618</u>	51 (2 in)	2.027		
Color: <u>MILKY</u>			Initial: <u>[Signature]</u>	Initial: <u>[Signature]</u>	Initial: <u>[Signature]</u>	Initial: <u>[Signature]</u>	76 (3 in)	4.560		
Odor: <u>NONE</u>			Bottles Required <input type="checkbox"/> BOD <input type="checkbox"/> COD <input checked="" type="checkbox"/> TOC <input checked="" type="checkbox"/> TIC <input type="checkbox"/> Ferrous <input checked="" type="checkbox"/> Metals <input type="checkbox"/> Dis. Metals <input checked="" type="checkbox"/> Mineral <input checked="" type="checkbox"/> Dis. Mineral <input checked="" type="checkbox"/> Nutrient <input type="checkbox"/> Phenol <input type="checkbox"/> FIT TIC <input checked="" type="checkbox"/> TSS/TDS	Others (list):		FQ				

Project/Site: Kingston Groundwater
 Well Number: G6B
 Purge Date: 09/17/2008
 Month: 09
 Day: 17

Depth to Water (m): 10.22 (4195)
 Bottom of Well (m): 18.19 (4194)
 Well Diameter (mm): 51 (4188)
 Survey Leader: SAG
 Field Crew: WFN

Depth of Screen Open Bore Hole
 Sample Label: KIF-G6B-0908
 Filter Type and Size: Unfiltered Filtered Both
 IN-LINE 0.45 um

Well Volume: 16.16 (L)
 Target Purge Volume: 32.32 (L)
 Actual Purge Volume: 34.00 (L) @ 4186

Purge Pump: Bladder Centrifugal Peristaltic Dedicated
 Sample Pump: Bladder Centrifugal Peristaltic Dedicated

140Hz
20L

Notes and WQ Observations	Time (ET CT)	Pump Rate (L/min)	Depth to Water (m)	Pump Depth (m)	Temp (°C)	pH (s.u.)	DO (mg/L)	COND (umhos/cm)	(+/-) ORP (mV)	Turbidity (NTU)
Begin Purge →	1049	—	10.22	15	—	—	—	—	—	—
3L	1050	3.0	10.24	15	16.4	6.9	6.2	552	337	—
7L	1052	2.0	10.24	15	16.7	6.9	6.0	552	338	—
16L	1057	1.8	10.24	15	17.1	6.9	5.9	552	337	—
25L	1102	1.8	10.24	15	17.2	6.9	5.8	549	337	—
34L	1107	1.8	10.24	15	17.2	7.0	5.7	549	335	—

Remarks:

Reviewed By: [Signature] Date: 09/18/08
 Project Leader: [Signature] Date: 09/20/08

Sample Collector: WFN
 Sample Date: 08/09/17
 Time: 1107
 Pump Duration: 18 min
 "999" = 2 days

Sample Readings		15	17.2	7.0	5.7	549	335	—
4192	4193	10	400	300	94	90		
Pump Depth (m)	Pump Rate (L/min)	Temp (°C) EPA 170.1	pH (s.u.) EPA 150.1	DO (mg/L) EPA 360.1	COND (umhos/cm) EPA 120.1	(+/-) ORP (mV) SM 2580B	Turbidity (NTU) EPA 180.1	

Additional Sample Data

Analyst: SAG	415	431	436	437	Well Diameter (mm)	Vol. Factor (L/m)
Date Analyzed: 08/09/18	415	431	436	437	12.7 (0.5 in)	0.127
Turbidity 1350 <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Slightly Turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Highly Turbid	Phenol Alkalinity (mg/L) (EPA 310.1)	Total Alk. (mg/L) (EPA 310.1)	Mineral Acidity (mg/L) (EPA 305.1)	CO ₂ Acidity (mg/L) (EPA 305.1)	51 (2 in)	2.027
	Time: 1603	Time: 1603	Time: 1620	Time: 1620	76 (3 in)	4.560
	Initial: 100	Initial: 100	Initial: 100	Initial: 100	102 (4 in)	8.107
					127 (5 in)	12.668
Color: NONE Odor: NONE	Bottles Required: <input type="checkbox"/> BOD <input type="checkbox"/> TOC <input type="checkbox"/> COD <input checked="" type="checkbox"/> TIC <input type="checkbox"/> Ferrous <input type="checkbox"/> Metals <input checked="" type="checkbox"/> Dis. Metals <input type="checkbox"/> Mineral <input type="checkbox"/> Dis. Mineral <input checked="" type="checkbox"/> Nutrient <input type="checkbox"/> Phenol <input type="checkbox"/> Filtration <input checked="" type="checkbox"/> TSS/TDS				Others (list):	

ACIDITY AND ALKALINITY FIELD WORKSHEET

PRELIMINARY DATA

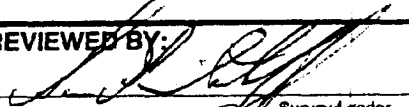

PROJECT/SITE KINGSTON G.W.	COLLECTION DATE 09-17-08
SURVEY LEADER S. GRINDSTAFF	
FIELD CREW B. NICHOLS	

NORMALITY
ACID 0.02
BASE 0.02

SAMPLE TAG NO.	INITIAL pH	SAMPLE VOL TITRATED (ml)	FAC-TOR	ALKALINITY TITRATION(S)				ACIDITY TITRATION(S)			
				ml ACID TO pH 8.3	PHENOL ALK (mg/L) (Ca CO ₃)	TOTAL ml ACID TO pH 4.5	TOTAL ALK (mg/L) (Ca CO ₃)	ml BASE TO pH 3.7	MINERAL ACIDITY (mg/L) (Ca CO ₃)	TOTAL ml BASE TO pH 8.3	CO ₂ ACIDITY (mg/L) (Ca CO ₃)
KIF-G48-0908	7.2	100	10			40.2	402			5.2	52
KIF-G5A-0908	6.9	100	10			15.5	155			3.2	32
KIF-G5A-0908-DP	6.9	100	10			15.5	155			3.1	31
KF-G5B-0908	7.3	100	10			17.0	170			1.4	14
KIF-G6B-0908	7.1	100	10			28.1	281			4.0	40

$$\text{ALKALINITY OR ACIDITY (mg/L CaCO}_3\text{)} = \frac{A \times N \times 50,000}{V}$$
 A = ml TITRANT
 N = TITRANT NORMALITY
 V = SAMPLE VOLUME

NORMALITY	SAMPLE VOL TITRATED	FACTOR
0.02N	100 ml	10
0.02N	50 ml	20

REVIEWED BY:  Survey Leader	09/18/08 Date
 FE Proj. Eng.	09/20/08 Date

TVA 30533 (RD-BUS 4-92)

DISTRIBUTION: (1) Original - Data Management (2) Pink - Lab with samples (3) Blue - Unit Leader (Office Notebook) (4) Green - survey Leader (Field Notebook) (5) Yellow - F.E. Project Engineer (AJDMDS)

ACIDITY AND ALKALINITY FIELD WORKSHEET

PRELIMINARY DATA

PROJECT/SITE KINGSTON G.W.	COLLECTION DATE 9-18-08
SURVEY LEADER S. GRINSTAFF	
FIELD CREW B. NICHOLS	

NORMALITY
ACID 0.02
BASE 0.02

SAMPLE TAG NO.	INITIAL pH	SAMPLE VOL TITRATED (ml)	FAC-TOR	ALKALINITY TITRATION(S)				ACIDITY TITRATION(S)			
				ml ACID TO pH 8.3	PHENOL ALK (mg/L) (Ca CO ₃)	TOTAL ml ACID TO pH 4.5	TOTAL ALK. (mg/L) (Ca CO ₃)	ml BASE TO pH 3.7	MINERAL ACIDITY (mg/L) (Ca CO ₃)	TOTAL ml BASE TO pH 8.3	CO ₂ ACIDITY (mg/L) (Ca CO ₃)
KIF-G3A-0908	6.7	100	10	—	—	16.0	160	—	—	4.1	41
KIF-G3B-0908	9.0	100	10	2.0	20	9.1	91	—	—	0	0
KIF-G1B-0968	7.3	100	10	—	—	21.0	210	—	—	1.9	19

ALKALINITY OR ACIDITY (mg/L CaCO₃) = $\frac{A \times N \times 50,000}{V}$

A = ml TITRANT
 N = TITRANT NORMALITY
 V = SAMPLE VOLUME

NORMALITY	SAMPLE VOL TITRATED	FACTOR
0.02N	100 ml	10
0.02N	50 ml	20

REVIEWED BY	09/18/08
<i>[Signature]</i> Survey Leader	Date
<i>[Signature]</i> FE Proj. Eng.	09/20/08 Date

DISTRIBUTION: (1) Original - Data Management (2) Pink - Lab with samples (3) Blue - Unit Leader (Office Notebook) (4) Green - survey Leader (Field Notebook) (5) Yellow - F.E. Project Engineer (AJDMDS)

Instrument Standardization
Field Standardization of Instruments

Survey KIF GW

	As Found	Check Final
Standardized By	<u>u/h</u>	<u>u/h</u>
Date/Time-Begin & End	<u>9/17/08 @ 0535</u>	<u>9/18/08 @ 1200</u>
Elevation (m)		
Air Temp (°C)		
Barometric Pressure (BP'mmHg)	<u>737</u>	<u>740</u>

Instrument(s)		TVA Tag Number(s) or SN	Calibration Date
Type			<u>10/24/09</u>
Model	<u>D55X</u>	<u>42671</u>	Calibration Due Date <u>10/24/08</u>

Field Measurements		Instrument Readings			Remarks & Additional Information
		As Found	Adjusted To	Check Final	
Temp. (°C)	Instrument	<u>22.2</u>		<u>21.3</u>	
	* Hand Thermometer	<u>21.9</u>		<u>20.9</u>	* Annual Ice Pt Ck Date
	ID # <u>95M100599</u>				
Dissolved Oxygen (mg/l)	Water Temp/Oxy Sol.	<u>22.842</u>		<u>21.864</u>	% Sat = <u>98.5</u> % <u>100.6</u>
	Instrument	<u>8.25</u>	<u>8.42</u>	<u>8.64</u>	
Conductivity (umhos/cm) (uS/cm)	Instrument	<u>106</u>	<u>100</u>	<u>117</u>	Date Expires <u>28/09</u>
	Low Range	Conc of STD = <u>100</u>			Lot # <u>180655 0115JDD</u>
	Instrument	<u>1274</u>	<u>1413</u>	<u>1413</u>	Date Expires <u>12/03</u>
	High Range	Conc of STD = <u>1413</u>			Lot # <u>180785 1207HDD</u>
pH (std units) % slope of probe	Buffers Temp	<u>23.9 24.4</u>		<u>23.6 23.7</u>	Date Expires Lot #
	Instrument @ 7.0	<u>7.06</u>	<u>7.00</u>	<u>7.0</u>	<u>6/10 0530JBB</u>
	Instrument @ 10.0 or	<u>10.00</u>	<u>—</u>	<u>—</u>	<u>3/10 0304JAA</u>
	Instrument @ 4.0	<u>3.92</u>	<u>4.0</u>	<u>4.0</u>	<u>2/10 0206JAA</u>
pH Probe Response to Tap Water	After 30 sec				
	After 30 min				
	Temp				
<input checked="" type="checkbox"/> ORP <input type="checkbox"/> Sulfide	Instrument pH 7	<u>272</u>	<u>287</u>	<u>285</u>	Date Std Prepared <u>9/17</u>
	STD Temp/Conc.	<u>24 281</u>		<u>24 287</u>	
	Instrument pH 4	<u>458</u>	<u>464</u>	<u>463</u>	Date Std Prepared <u>9/17</u>
	STD Temp/Conc.	<u>24 464</u>		<u>24 464</u>	
Turbidity	Instrument				Date Expires
	Low Range	Conc of STD =			Lot #
	Instrument				Date Expires
	High Range	Conc of STD =			Lot #
Depth (m)	Instrument (0.0)				

Comments _____

Reviewed By: [Signature]

NOTE: Return Instrument to calibration facility if out of tolerance (see QA manual).

Instrument Standardization Field Standardization of Instruments

Survey KINGSTON GW.

	As Found	Check Final
Standardized By	<u>SAG</u>	<u>SAG</u>
Date/Time-Begin & End	<u>09/17/08 @ 1532</u>	<u>09/17/08 @ 1622</u>
Elevation (m)	_____	_____
Air Temp (°C)	_____	_____
Barometric Pressure (BP'mmHg)	_____	_____

Instrument(s)	TVA Tag Number(s) or SN	Calibration Date
Type Model	<u>ORION</u> <u>Z50 A+</u>	<u>2/11/08</u>
	<u>E 36635</u>	Calibration Due Date <u>2/11/09</u>

Field Measurements		Instrument Readings			Remarks & Additional Information
		As Found	Adjusted To	Check Final	
Temp. (°C)	Instrument				
	* Hand Thermometer				* Annual Ice Pt Ck Date
	ID #				
Dissolved Oxygen (mg/l)	Water Temp/Oxy Sol.				% Sat = %
	Instrument				
Conductivity (umhos/cm) (uS/cm)	Instrument				Date Expires
	Low Range		Conc of STD =		Lot #
	Instrument				Date Expires
	High Range		Conc of STD =		Lot #
pH (std units)	Buffers Temp	<u>23.4</u> <u>22.9</u>		<u>22.3</u> <u>22.5</u>	Date Expires Lot #
% slope of probe <u>98.3</u>	Instrument @ 7.0	<u>6.98</u>	<u>7.00</u>	<u>7.05</u>	<u>02/10</u> <u>0122 JAA</u>
	Instrument @ 10.0 or	<u>9.72</u>	<u>10.00</u>	<u>10.02</u>	<u>02/09</u> <u>0206 HWW</u>
	Instrument @ 4.0	<u>3.85</u>	<u>4.00</u>	<u>4.04</u>	<u>02/10</u> <u>0206 JAA</u>
pH Probe Response to Tap Water	After 30 sec				
	After 30 min				
	Tempo				
<input type="checkbox"/> ORP <input type="checkbox"/> Sulfide	Instrument				Date Std Prepared
	STD Temp/Conc.				
	Instrument				Date Std Prepared
	STD Temp/Conc.				
Turbidity	Instrument				Date Expires
	Low Range		Conc of STD =		Lot #
	Instrument				Date Expires
	High Range		Conc of STD =		Lot #
Depth (m)	Instrument (0.0)				

Comments _____

Reviewed By: [Signature]

NOTE: Return Instrument to calibration facility if out of tolerance (see QA manual).

Instrument Standardization
Field Standardization of Instruments


Survey KINGSTON C.W.

	As Found	Check Final
Standardized By	<u>SAG</u>	<u>SAG</u>
Date/Time-Begin & End	<u>09 11 08 @ 1303</u>	<u>09 11 08 @ 1340</u>
Elevation (m)		
Air Temp (°C)		
Barometric Pressure (BP'mmHg)		

Instrument(s)		TVA Tag Number(s) or SN	Calibration Date	Calibration Due Date
Type	<u>ORION</u>	<u>E36635</u>	<u>2/11/08</u>	<u>2/11/09</u>
Model	<u>Z50AT</u>			

Field Measurements		Instrument Readings			Remarks & Additional Information	
		As Found	Adjusted To	Check Final		
Temp. (°C)	Instrument					
	* Hand Thermometer				* Annual Ice Pt Ck Date	
	ID #					
Dissolved Oxygen (mg/l)	Water Temp/Oxy Sol.				% Sat = %	
	Instrument					
Conductivity (umhos/cm) (uS/cm)	Instrument				Date Expires	
	Low Range	Conc of STD =			Lot #	
	Instrument				Date Expires	
	High Range	Conc of STD =			Lot #	
pH (std units)	Buffers Temp	<u>22.9 23.0</u>		<u>21.4 21.5</u>	Date Expires	Lot #
% slope of probe <u>99.0</u>	Instrument @ 7.0	<u>7.15</u>	<u>7.00</u>	<u>7.00</u>	<u>02/10</u>	<u>C122 JAA</u>
	Instrument @ 10.0 or	<u>10.17</u>	<u>10.00</u>	<u>9.96</u>	<u>02/09</u>	<u>0206 HWJW</u>
	Instrument @ 4.0	<u>4.12</u>	<u>4.00</u>	<u>3.99</u>	<u>02/10</u>	<u>C206 JAA</u>
pH Probe Response to Tap Water	After 30 sec					
	After 30 min					
	Temp					
<input type="checkbox"/> ORP <input type="checkbox"/> Sulfide	Instrument				Date Std Prepared	
	STD Temp/Conc.					
	Instrument				Date Std Prepared	
	STD Temp/Conc.					
Turbidity	Instrument				Date Expires	
	Low Range	Conc of STD =			Lot #	
	Instrument				Date Expires	
	High Range	Conc of STD =			Lot #	
Depth (m)	Instrument (0.0)					

Comments _____

Reviewed By: 

NOTE: Return Instrument to calibration facility if out of tolerance (see QA manual).

GROUNDWATER LEVEL MEASUREMENTS - KINGSTON PENINSULA

Date: 09/17/2008		Survey Leader: SAG		Measured By: WFN			
Location Identifier (PB4068)	Reference Point Description	Ref Point Elev (m)	Dist to Wtr Surface (m) (4195)	Calc Water Surf El (m) (4189)	Bottom Depth (m) (4194)	Remarks	
KIF-G1B	Top of 153mm casing	261.61	35.02	226.59		Open borehole	
KIF-G3A	Top of 51mm casing	228.49	2.87	225.62	9.74		
KIF-G3B	Top of 51mm casing	228.71	3.08	225.63	19.19		
KIF-G4B	Top of 51mm casing	233.75	8.16	225.59	25.02		
KIF-G5A	Top of 51mm casing	231.37	5.76	225.61	8.57		
KIF-G5B	Top of 51mm casing	231.23	5.62	225.61	18.36		
KIF-G6A	Top of 51mm casing	235.82	10.22	225.60	18.19		

Company Name/Address

TVA - ENVAFF
(Environmental Affairs)

Alternate Billing

Cynthia Anderson
cmanders@tva.gov

Report to: J. Mark Boggs
E-mail to: jmboggs@tva.gov

Project Description: Kingston Fossil Groundwater

PHONE 865-632 6941

FAX: 865-632 8212

Collected by: Sam Grandstaff

Collected by (signature):

Flush? (Lab MUST be Notified)
Same Day 200%
Next Day 100%
Two Day 50%

Immediately Packed on Ice N Y

Client Project No. Kingston

Site/Facility ID# 0014D0M

P.O.#

Kingston, TN

Lab Project #

Date Results Needed
STANDARD
Email? No X Yes
FAX? X No Yes

Comp/Grab Matrix Depth

Grab GW

Grab GW

Grab GW

Grab GW

Grab GW

Grab GW

Grab GW

Grab GW

Grab GW

Grab GW

Date

9/18/08

9/18/08

9/18/08

9/17/08

9/17/08

9/17/08

9/17/08

9/17/08

9/17/08

9/17/08

Time

10:56

9:13

8:43

10:21

13:50

13:50

13:31

11:07

11:30

Cntrs

6

6

6

6

6

6

6

7

7

Analysis/Container/Preservative

Disolved Metals, filtered thru 0.45 micron in-line Filter (See Attached)

Nutrients (See Attached)

Minerals (See Attached)

Metals (See Attached)

TIC (See Attached)

X

X

X

X

X

X

X

X

X

X

X

X

X

X

CoCode (lab use only)

Template/Prelogin

Shipped Via

Remarks/contaminant

EDD

EDD

EDD

EDD

EDD

EDD

EDD

EDD

EDD

pH

Matrix: SS-Soil/Solid GW-Groundwater WW-Wastewater DW-Drinking Water OT-Other

Remarks:

Flow Other

Relinquisher by (Signature)
Date: 09/18/08 Time: 1454

Received by (Signature)
Date: Time:

Temp: Bottles Received:

Date: Time:

Samples returned via: FedEx UPS Other

Condition

(lab use only)

Relinquisher by (Signature)

Date: Time:

Date: Time:

Received for lab by (Signature)

Date: Time:

Date: Time:

Temp

CCC Seals Intact

Y N NA

pH Checked: NCF

Laboratory Analyses Requested (KIF Groundwater)

For samples:

*KIF-G1B, KIF-G3A, KIF-G3B, KIF-G4B, KIF-G5A,
KIF-G5B, KIF-G6B, KIF-GYPEQ BLANK*

Aluminum, Total	Copper, Total	Non-Filterable Residue (TSS)
Ammonia as N	Filterable Residue (TDS)	Potassium, Total
Antimony, Total	Fluoride, Total	Selenium, Total
Arsenic, Total	Inorganic Carbon, Total	Silver, Total
Barium, Total	Iron, Total	Sodium, Total
Beryllium, Total	Lead, Total	Strontium, Total
Boron, Total	Magnesium, Total	Sulfate, Total
Cadmium, Total	Manganese, Total	Thallium, Total
Calcium, Total	Mercury, Total	Total Kjeldahl Nitrogen
Chloride, Total	Molybdenum, Total	Vanadium, Total
Chromium, Total	Nickel, Total	Zinc, Total
Cobalt, Total	Nitrate-Nitrite as N, Total	

NOTE:

KIF-G6B-0908 and KIF-GYPEQ BLANK-0908 collected a filtered sample to be analyzed for dissolved metals for the constituents above.