

WATER QUALITY MEMORANDUM

Utah Coal Regulatory Program

August 26, 2005

TO: Internal File

THRU: D. Wayne Hedberg, Permit Supervisor

FROM: Dana Dean, P.E., Senior Reclamation Hydrologist

RE: 2004 Fourth Quarter Water Monitoring, Nevada Electric Investment Company, Wellington Preparation Plant, C/007/0012, Task #2165

The Wellington Preparation Plant is currently idle. No mining or coal processing activities currently take place there, nor is the site in active reclamation.

Pertinent water monitoring requirement information is in the MRP in Sections 7.23, 7.31.2-22, and tables 7.24-2, and 7.24-5.

1. Was data submitted for all of the MRP required sites? YES NO

Springs –

The Permittee is not required to monitor any springs at the Wellington Preparation Plant.

Streams –

The Permittee is required to sample SW-1, SW-2A, SW-3, SW-4, SW-5, SW-6, SW-7, and SW-8 for flow, and the laboratory parameters outlined in Table 7.24-5 each quarter. They are to sample SW-2 for flow-only each quarter.

The Permittee monitored and reported the essential data for all streams as required during this quarter.

Wells–

The Permittee is required to sample GW-1, GW-3, GW-4, GW-6, GW-7, GW-8, GW-9, GW-9B, GW-10, GW-12, GW-13, GW-14, GW-15A, GW-15B, GW-16, and GW-17 for depth, and the laboratory parameters outlined in Table 7.24-2 each quarter. They are to sample GW-2 for depth-only each quarter.

The Permittee monitored and reported the essential data for all wells as required during

this quarter.

UPDES–

There are six active UPDES sites at the Wellington Preparation Plant. They are all under the permit #UTG040010, and include outfalls 003, 004, 005, 006, 007, and 008. The Permittee is required to monitor each UPDES site monthly.

The Permittee monitored and reported the essential data for all UPDES sites as required during this quarter. None of the UPDES sites recorded any flow during the period.

2. Were all required parameters reported for each site? YES NO

There was not enough water at GW-3 or GW-13 to properly purge/sample. For this reason, the Permittee was unable to sample the water, and only recorded depth information.

3. Were any irregularities found in the data? YES NO

Several parameters fell outside of 2 standard deviations from the mean encountered at the respective sites. They were:

Site	Parameter	Value	Standard Deviations from Mean	Mean
GW-1	Dissolved Calcium	399mg/L	2.48	435.15 mg/L
GW-1	Total Cations	64.6 meq/L	2.67	70.36 meq/L
GW-1	Dissolved Magnesium	218 mg/L	2.67	254 mg/L
GW-1	Total Hardness	1894 mg/L	2.94	2132.6 mg/L
GW-4	Dissolved Magnesium	230 mg/L	2.22	258.06 mg/L
GW-6	Dissolved Magnesium	238 mg/L	2.35	263.94 mg/L
GW-7	Total Iron	96.3 mg/L	2.24	28.12 mg/L
GW-9	Dissolved Potassium	17.4 mg/L	2.16	10.68 mg/L
GW-9B	Dissolved Potassium	10.8 mg/L	2.22	7.07 mg/L
GW-12	Dissolved Calcium	441 mg/L	2.19	326.14 mg/L
GW-12	Dissolved Potassium	19.3 mg/L	4.05	10.70 mg/L
GW-15A	Depth	11.64 feet	2.22	7.36 feet
GW-15A	Dissolved Potassium	6.4 mg/L	3.12	4.78 mg/L
GW-16	Total Iron	12.6 mg/L	2.14	3.76 mg/L

The dissolved calcium levels have fluctuated at GW-1 and 12, but have an overall upward trend at GW-12, and a downward trend at GW-1. There is a very weak correlation to water level for each of the sites ($R^2=0.0967$ and 0.163 , respectively). There are no criteria for

this metal, but it does contribute to water hardness. The hardness at each of these sites has always fallen into the hard (150-300 mg/l) to very hard (>300 mg/l) classifications, with most samples over 1000 mg/l (all samples at GW-1 and 17 of 71 samples at GW-12 were above 1000 mg/l total hardness). It is not clear why the calcium level has been changing, but this does not represent a degradation of water quality.

The dissolved magnesium at GW-1 had been steadily dropping since monitoring began at the site until this sample ($R^2 = 0.70$). The sample represents a jump in the dissolved magnesium of 42 mg/L from last quarter, but it is not outside of previously measured levels. The level has been at or above 262 mg/L for 9 of the 22 reported samples. At GW-4 and GW-6 the downward trend is very slight. There is a strong correlation to water level at GW-1 ($R^2 = 0.51$), but not at the other two sites. There are no criteria for this metal, but it contributes to water hardness, which also has an overall downward trend at these sites. A drop in magnesium and hardness levels is a positive change in water quality.

The total iron at GW-7 and GW-16 has fluctuated widely with a sharp increasing trend at GW-7, and a lesser increasing trend at GW-16. The dissolved iron does not correlate at all to level. The secondary water quality standard for iron (based on taste and appearance only) is 0.3 mg/l, and for industrial use, the limit is 0.2 mg/l. The aquatic life standard (warm water fisheries) is 1.0 mg/l. Since the groundwater at the Wellington Preparation Plant does not support aquatic life, and has usually been above 0.2 mg/l, the rise in total iron does not represent a degradation of water quality.

The dissolved potassium at GW-9, GW-9B, GW-12, and GW-15A has a slight upward trend. The potassium levels do not correlate to well elevation. There are no water quality standards for potassium and the highest recorded potassium numbers at these wells (19.3, 10.86, 20.4, and 5.85 mg/L, respectively) are still relatively low.

The water level at GW-15A has been steadily trending downward since the Permittee began monitoring ($R^2=0.74$), however the overall pattern follows the PHDI for the area quite closely.

Several routine Reliability Checks were outside of standard values. They were:

Site	Reliability Check	Value Should Be...	Value is...
SW-1	TDS/Conductivity	>0.55 & <0.75	0.81
SW-1	Conductivity/Cations	> 90 & < 110	86
SW-1	Mg/(Ca + Mg)	< 40 %	51%
SW-1	Ca/ (Ca + SO4)	> 50 %	30%
SW-2A	TDS/Conductivity	>0.55 & <0.75	0.81
SW-2A	Conductivity/Cations	> 90 & < 110	85
SW-2A	Mg/(Ca + Mg)	< 40 %	51%

SW-2A	Ca/ (Ca + SO4)	> 50 %	29%
GW-1	TDS/Conductivity	>0.55 & <0.75	1.11
GW-1	Conductivity/Cations	> 90 & < 110	67
GW-1	Mg/(Ca + Mg)	< 40 %	48%
GW-1	Ca/ (Ca + SO4)	> 50 %	26%
GW-4	TDS/Conductivity	>0.55 & <0.75	1.05
GW-4	Conductivity/Cations	> 90 & < 110	68
GW-4	Mg/(Ca + Mg)	< 40 %	53%
GW-4	Ca/ (Ca + SO4)	> 50 %	25%
GW-6	TDS/Conductivity	>0.55 & <0.75	1.08
GW-6	Conductivity/Cations	> 90 & < 110	67
GW-6	Mg/(Ca + Mg)	< 40 %	56%
GW-6	Ca/ (Ca + SO4)	> 50 %	24%
GW-7	Cation/Anion Balance	<5%	5.2%
GW-7	Mg/(Ca + Mg)	< 40 %	59%
GW-7	Ca/ (Ca + SO4)	> 50 %	18%
GW-8	TDS/Conductivity	>0.55 & <0.75	1.03
GW-8	Conductivity/Cations	> 90 & < 110	70
GW-8	Mg/(Ca + Mg)	< 40 %	76%
GW-8	Ca/ (Ca + SO4)	> 50 %	12%
GW-9	TDS/Conductivity	>0.55 & <0.75	1.25
GW-9	Conductivity/Cations	> 90 & < 110	56
GW-9	Mg/(Ca + Mg)	< 40 %	77%
GW-9	Ca/ (Ca + SO4)	> 50 %	11%
GW-9B	TDS/Conductivity	>0.55 & <0.75	1.11
GW-9B	Conductivity/Cations	> 90 & < 110	66
GW-9B	Mg/(Ca + Mg)	< 40 %	69%
GW-9B	Ca/ (Ca + SO4)	> 50 %	16%
GW-10	TDS/Conductivity	>0.55 & <0.75	1.35
GW-10	Conductivity/Cations	> 90 & < 110	54
GW-10	Mg/(Ca + Mg)	< 40 %	74%
GW-10	Ca/ (Ca + SO4)	> 50 %	12%
GW-12	TDS/Conductivity	>0.55 & <0.75	1.45
GW-12	Conductivity/Cations	> 90 & < 110	49
GW-12	Mg/(Ca + Mg)	< 40 %	79%
GW-12	Ca/ (Ca + SO4)	> 50 %	10%
GW-14	TDS/Conductivity	>0.55 & <0.75	1.37
GW-14	Conductivity/Cations	> 90 & < 110	51
GW-14	Mg/(Ca + Mg)	< 40 %	71%
GW-14	Ca/ (Ca + SO4)	> 50 %	15%
GW-15A	Cation/Anion Balance	<5%	5.5%

GW-15A	TDS/Conductivity	>0.55 & <0.75	1.08
GW-15A	Conductivity/Cations	> 90 & < 110	71
GW-15A	Mg/(Ca + Mg)	< 40 %	42%
GW-15A	Ca/ (Ca + SO4)	> 50 %	32%
GW-15B	TDS/Conductivity	>0.55 & <0.75	0.96
GW-15B	Conductivity/Cations	> 90 & < 110	75
GW-15B	Ca/ (Ca + SO4)	> 50 %	36%
GW-16	TDS/Conductivity	>0.55 & <0.75	1.03
GW-16	Conductivity/Cations	> 90 & < 110	72
GW-16	Mg/(Ca + Mg)	< 40 %	54%
GW-16	Ca/ (Ca + SO4)	> 50 %	26%
GW-17	TDS/Conductivity	>0.55 & <0.75	0.53
GW-17	Mg/(Ca + Mg)	< 40 %	50%
GW-17	Ca/ (Ca + SO4)	> 50 %	44%

The Permittee should work with the lab to make sure that samples pass all quality checks so that the reliability of the samples does not come into question. These inconsistencies do not necessarily mean that a sample is wrong, but it does indicate that something is unusual. An analysis and explanation of the inconsistencies by the Permittee would help to increase the Division's confidence in the samples. The Permittee can learn more about these reliability checks and some of the geological and other factors that could influence them by reading Chapter 4 of *Water Quality Data: Analysis and Interpretation* by Arthur W. Hounslow.

4. On what date does the MRP require a five-year resampling of baseline water data.

December 10, 2009

5. Based on your review, what further actions, if any, do you recommend?

No further actions are required at this time.

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