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C/007/011 Incoming  
#3927  
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**HIAWATHA COAL COMPANY**

**P.O. Box 1240  
Huntington, UT 84528**

**(435) 637-1778  
FAX (435) 687-5057**

**December 1, 2011**

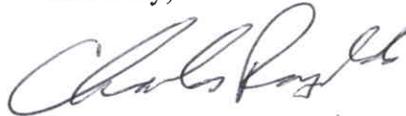
Steve Christiansen  
Utah Division of Oil, Gas & Mining  
1954 West North Temple, Suite 1210  
P.O. Box 145801  
Salt Lake City, UT 84114-5801

Re: Suspended Subsidence & Spring Quality Monitoring, Hiawatha Coal  
Company, Hiawatha Mine, C/007/0011, Task #3927

Dear Mr. Christiansen:

Enclosed are 8 clean copies of the above-referenced amendment. If you have any further questions, please feel free to contact me at (801) 857-0399.

Sincerely,



Charles Reynolds, PE  
Mine Manager

Enclosure(s)

**RECEIVED**  
**DEC 09 2011**  
**DIV. OF OIL, GAS & MINING**

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Exhibit 5-3 shows the location of ground control monuments and elevation monitoring points in the vicinity of current mining operations. Monitoring data and a current copy of Exhibit 5-3 is submitted to the Division with Hiawatha's annual report. In the steep canyons the slope is great enough that subsidence would not be noticeable, it would also be difficult to select a point in these areas that would be representative of the entire area. The main concern is in areas where the topography is relatively flat and where roads and fences are in the subsidence zone. Because of this most of the points have been established in these areas. Additional points have been established around the edges of the subsidence zone, and in areas of maximum subsidence to be used in evaluating the accuracy of our model. There are currently 22 subsidence points being monitored as shown on Exhibit 5-3. They will be monitored using a survey grade GPS. In areas of good satellite visibility we will insure an accuracy of at least 0.1 feet. It should be noted that in these areas it will typically be more accurate than that. In areas of steep canyons and heavy vegetation where satellite coverage is not as good we will insure an accuracy of at least 1 foot. This is more accurate than results from an aerial survey.

Currently, no underground mining is taking place or scheduled to take place for several years which will result in possible subsidence. Appendix V-17 includes an analysis which demonstrates that no significant subsidence has taken place since 2000. Based on this information, Hiawatha proposes that subsidence monitoring be suspended until underground mining activities resume. Prior to any underground mining resuming, Hiawatha commits to collect updated survey information on all subsidence monitoring points to establish a baseline from which to compare. After underground mining commences, the annual subsidence monitoring will resume and a comparison made to the baseline data each year in the annual report.

Results of subsidence could have effects on renewable resource lands. However, during the 80 years of mining in this area there has been no evidence of any effects to existing water patterns. Nonetheless, it is conceivable that fractures resulting from subsidence could someday contribute to changes in the water patterns. Although highly unlikely, it is possible that springs, seeps and/or stream flows could be affected. The diminution of existing surface and ground water sources could affect some livestock and wildlife watering sites at higher elevations. Water presently being used for industrial and irrigation purposes should not be diminished to any great extent since water diverted into the ground would most likely return to mine openings, springs and streams near the top of the Star Point sandstone formation. No mining will be done below this horizon which is well above municipal, industrial and irrigation points of use. The effect of mining on the water supply is discussed in greater depth in chapter 7.

All surface lands above existing and proposed mining operations are owned by either ANR Inc.

**Appendix V-17**

**SUBSIDENCE DATA ANALYSIS**

## **Introduction**

For the purpose of demonstrating that no subsidence is occurring at the Hiawatha Mine, and to allow for the removal of the commitment within the MRP to perform annual subsidence studies, a 10 year (2000-2009) subsidence analysis was conducted. In accordance with the Division's request, the analysis focused on five of the most accurate years of data collected from within the 10 year period. The five years selected for analysis were 2000, 2002, 2005, 2006 and 2008.

## **Analysis for 2000 and 2002 Subsidence**

In 2000 and 2002, subsidence data was collected and reported using aerial survey methods (elevation reading from photography). The work was contracted to Olympus Aerial Survey's Inc. For both years, 112 different subsidence monitoring stations (300 to 412) were measured. The change in subsidence for both 2000 and 2002 were compared to baseline data from 1988. The accuracy of the readings was based on ground control and photo-scale. A margin of error within aerial survey data is found to be acceptable for course scale analyses such as subsidence monitoring. For 2000, the vertical displacement range for all 112 points was measured with the greatest decreased being -2.77 ft. and the greatest increase being +1.40. For 2002, the vertical displacement range for all 112 points was measured with the greatest decreased being -5.39 ft. and the greatest increase being +1.88.

A side-by-side comparison of select points within the 2000 and 2002 data was done to allow for single point analysis. Notable is the fact that certain points demonstrate a decrease in elevation one year and an increase in the other year. Point 343 was shown to uplift 0.67 feet in 2000 and was then shown to subside 1.84 feet in 2002. Point 365 was shown to uplift by 0.20 feet in 2000 and then shown to subside 1.98 feet in 2002. The opposite case is also present. For example, point 336 was shown to subside 0.22 feet in 2000, and then was shown to uplift by 0.18 feet in 2002. These discrepancies demonstrate that the subsidence measured is either; based on constant up and downward motions of small scale subsidence and uplift (unlikely at this stage for residual subsidence) within a margin of error, or that the data is erroneous. To supplement the aerial surveying conducted in 2000, all areas were walked in August of 2000 during the control survey. No significant changes to the surface or new fracturing were noted. Also, control point SUB 4 was not visible to aerial surveying instruments, therefore, the margin of error expected in the data was expected to expand. Our contention is that the subsidence recorded is within an expected margin of error based survey methods used and that no significant subsidence occurred in either year.

## **Analysis for 2005 Subsidence**

In 2005, subsidence data was collected and measured using a Leica GPS surveying system on the State Plane NAD 86 Coordinate System. Fifteen different subsidence monitoring stations were measured. For all 15 points, the greatest decrease was measured as -2.31 ft. and the greatest increase was +1.13ft. For single point analysis, Point 399 was chosen for elevation comparison between 2000, 2002, and 2005. The point was shown to subside by 0.01 and 0.10 feet in 2000 and 2002 respectively, and then was shown to uplift by 1.54 feet in 2005. We contend that the difference is due to margin of error and that no subsidence is taking place. The subsidence report for 2005 is significant in that it reports that surface disturbance due to logging activities removed/destroyed/covered 40% of the subsidence points that were previously monitored via aerial survey methods. Anticipated logging activities were expected to cause additional disturbance. Due to this fact, there would be fewer points from which to collect subsidence data.

#### **Analysis for 2006 & 2008 Subsidence**

In 2006 & 2008, subsidence data was collected and measured using a Leica GPS surveying system on the State Plane NAD 86 Coordinate System. As part of the 2006 report, 6 subsidence control stations were compared to the baseline data for the points. Data collected in 2006 was compared to data collected in 2004. The greatest decrease in elevation was shown to be 0.49ft, while the greatest increase was shown to be 0.44 feet. This information allowed an updated accuracy estimate to be placed in the range of 0.93-1.00 feet. Another 8 points were monitored for subsidence. No points demonstrated an increase or decrease of more than 0.5 feet. This demonstrates that no significant subsidence occurred during 2006. In 2008, 23 subsidence monitoring stations were measured and compared to data collected in 2007. No subsidence was detected.

#### **Summary**

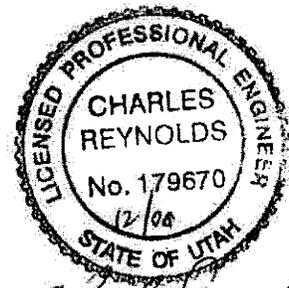
After conducting analysis of subsidence data collected and reported in years 2000, 2002, 2005, 2006 and 2008, we have concluded that any subsidence detected can be justified as being within the expected margin of error based on the survey methods used and that no significant subsidence occurred from 2000 to the present. Raw subsidence data that was submitted with past annual reports is included with this report for the years that were analyzed.

Hiawatha - 2000 Raw Subsidence Data

HIAWATHA COAL COMPANY  
2000 HIAWATHA SUBSIDENCE STUDY

USING 2000 REVISED CONTROL.

POINT	EASTING	NORTHING	1988 ELEVATION	2000 DIFFERENCE	POINT NOTES
300	-16154.8	9455.11	9145.1	-0.13	300
301	-19121.59	10685.80	9834.34	-1.05	301
302	-19173.85	10300.36	9820.79	-0.68	302
303	-18869.74	10206.93	9700.41	0.02	303
304	-18581.35	10303.30	9654.68	-0.67	304
305	-18087.10	10234.14	9506.03	0.27	305
306	-17709.81	10335.41	9565.75	-0.48	306
307	-17396.29	10215.50	9578.39	-0.22	307
308	-17026.86	10492.97	9421.05	-0.53	308
309	-16470.54	10432.95	9107.78	-0.45	309
310	-16010.34	10379.94	8892.65	-0.96	310
311	-15534.40	10214.41	8658.30	0.01	311
312	-15030.53	10279.77	8555.36	-0.10	312
313	-19120.31	10030.57	9726.74	0.12	313
314	-19065.12	9847.59	9637.45	-0.32	314
315	-18832.77	9843.37	9572.86	-0.49	315
316	-18533.30	9941.48	9495.16	-1.65	316
317	-18093.93	9870.18	9353.92	-0.01	317
318	-17723.28	9760.03	9359.17	-0.17	318
319	-17264.65	9925.78	9502.48	-0.56	319
320	-17237.77	9502.10	9325.44	0.32	320
321	-17043.07	9835.38	9468.03	0.48	321
322	-16863.19	9375.28	9410.64	-1.36	322
323	-16408.10	9639.15	9323.66	-0.35	323
324	-16022.31	9703.75	8994.83	-0.05	324
325	-15800.08	9592.11	8894.32	-0.84	325
326	-15439.18	9670.87	8702.31	-1.04	326 Pt obscure
327	-14529.34	9520.17	8629.18	0.11	327
328	-14098.13	9468.10	8680.60	-0.11	328
329	-13724.82	9466.06	8644.11	1.00	329
331	-19057.24	9390.63	9480.81	-1.19	331
332	-18771.19	9358.94	9450.32	-0.73	332
333	-18429.75	9256.83	9293.85	-0.60	333
334	-17992.74	9296.12	9004.63	-0.61	334
335	-17505.83	9482.54	9272.66	0.05	335
336	-17290.42	8829.29	8940.62	-0.22	336
337	-17042.64	9167.67	9216.47	0.50	337
338	-16634.76	8974.17	9327.09	-0.28	338
339	-16314.81	9041.05	9307.09	-0.01	339



*Charles Reynolds*

340	-16079.12	9068.77	9303.68	0.00	340
341	-15915.26	9013.40	9190.97	-0.20	341
342	-15592.84	8946.68	9109.82	-0.39	342
343	-15148.09	8843.97	9083.49	0.67	343
344	-14876.56	8741.88	9076.67	-0.07	344
345	-14506.87	8799.79	9019.29	-0.56	345
346	-14038.72	8845.22	8830.35	0.02	346
347	-13740.63	8785.27	8694.09	0.29	347
348	-13309.70	8655.70	8500.94	0.42	348
349	-19033.12	8822.29	9267.53	-0.44	349
350	-18890.82	8447.55	9009.19	-0.04	350
351	-19344.28	8372.53	9011.03	0.15	351
352	-19439.16	7927.91	9252.92	-0.60	352
353	-18802.18	7864.43	8831.27	-0.36	353
354	-18818.63	7465.64	8863.47	-0.19	354
355	-19385.86	7463.43	9253.96	0.68	355
356	-19380.67	7271.07	9182.23	-0.15	356
357	-19063.39	6496.12	9430.72	1.32	357
358	-19224.54	6288.24	9473.18	-0.08	358
359	-19198.98	5878.10	9389.51	1.40	359
360	-18883.84	5414.38	9434.91	0.25	360
361	-19002.92	5175.54	9524.31	0.18	361
362	-18942.09	4764.81	9554.81	-0.01	362
363	-18853.71	3778.42	9634.85	-0.02	363
364	-19168.45	3300.66	9776.17	0.19	364
365	-19130.53	3130.86	9769.47	0.20	365
366	-19053.73	2638.47	9737.63	-1.16	366
367	-18969.16	2264.18	9728.72	-0.24	367
368	-18935.65	1853.96	9723.52	-1.08	368
369	-20166.28	9321.90	9569.49	-2.31	369 2
370	-19830.14	9318.36	9648.96	-1.55	370 2
371	-21681.13	9106.98	9826.11	-0.66	371
372	-21299.13	9057.08	9817.86	-0.03	372
373	-20819.94	8986.88	9754.46	-0.74	373
374	-20367.73	9121.52	9580.80	-2.02	374 2
375	-20036.82	8969.18	9460.34	-2.01	375 2
376	-19816.19	8907.58	9470.75	-1.75	376 2
377	-19451.83	9064.17	9436.42	0.00	377 Unable to read
378	-21666.24	8764.28	9801.38	0.25	378
379	-21356.64	8757.05	9813.17	0.09	379
380	-20916.70	8591.22	9783.94	-0.84	380 2
381	-20319.10	8603.66	9606.75	-3.39	381 2
382	-20069.35	8380.79	9533.03	-1.84	382 2
383	-19860.16	8756.37	9385.83	-3.55	383 2
384	-19459.87	8502.21	9136.19	-0.51	384
385	-21704.89	8452.24	9791.02	0.09	385

386	-21286.26	8301.75	9845.25	-0.23	386
387	-20935.36	8329.74	9807.50	-0.14	387
388	-20678.42	8266.42	9743.70	-0.22	388
389	-20437.19	8163.26	9686.88	-0.81	389
390	-20045.64	8071.42	9565.09	-1.71	390 2
391	-19591.56	7908.10	9329.55	-2.77	391 2
392	-20940.37	8042.87	9830.70	-0.34	392
393	-20514.77	7860.31	9765.89	-0.06	393
394	-20298.22	7698.64	9712.01	-0.01	394
395	-19343.98	7458.34	9226.76	-0.08	395
396	-20545.27	7554.42	9819.35	0.33	396
397	-20715.24	7300.77	9871.54	0.21	397
398	-20203.05	7270.05	9630.36	0.13	398
399	-18623.10	8438.53	8962.74	-0.10	399
400	-18300.56	8438.86	8935.10	-0.02	400
401	-18085.67	8396.12	8872.62	-0.01	401
402	-17712.05	8476.90	8659.57	-0.26	402
403	-17465.94	8461.25	8713.42	-0.04	403
404	-17162.72	8423.47	8801.87	-0.17	404
405	-16856.17	8485.74	8941.97	0.05	405
406	-16533.80	8458.64	8995.07	-0.07	406
407	-16223.30	8454.41	9084.35	-0.15	407
408	-15915.85	8443.88	8937.60	-0.70	408
409	-15606.06	8430.98	8867.10	-0.41	409
410	-15291.41	8442.89	8872.42	-0.72	410
411	-15000.02	8436.97	8899.24	-0.35	411
412	-14697.00	8451.37	8974.20	0.09	412

NOTE 1: All areas were walked in August, 2000, during the control survey. No significant changes to the surface or new fracturing was noted during the 2000 survey.

NOTE 2: Control point SUB 4 could not be seen during the aerial survey. Therefore, this data may be unreliable. No changes in elevation were observed in control point SUB 4.

Hiawatha - 2002 Raw Subsidence Data

**Olympus Aerial Surveys, Inc.**  
**2002 Subsidence Study Report**  
 using elevation readings from photography dated  
**October 12, 2002 versus those of September 28, 1988**  
 Using new control information  
 For  
**HIAWATHA COAL COMPANY**

POINT	EASTING	NORTHING	1988 ELEVATION	2002 DIFFERENCE	2002 New ELEVATION	POINT	COMMENTS
300	-16154.84	9455.11	9145.11	-1.84	9143.275	300	
301	-19121.59	10685.80	9834.34	-1.49	9832.850	301	
302	-19173.85	10300.36	9820.79	-1.4	9819.388	302	
303	-18869.74	10206.93	9700.41	-1.27	9699.139	303	
304	-18581.35	10303.30	9654.68	-1.97	9652.707	304	
305	-18087.10	10234.14	9506.03	1.88	9507.914	305	
306	-17709.81	10335.41	9565.75	-0.6	9565.150	306	
307	-17396.29	10215.50	9578.39	-1.4	9576.987	307	Obscure
308	-17026.86	10492.97	9421.05	-0.5	9420.548	308	Obscure
309	-16470.54	10432.95	9107.78	-0.7	9107.080	309	
310	-16010.34	10379.94	8892.65	-0.15	8892.505	310	
311	-15534.40	10214.41	8658.30	0.28	8658.582	311	
312	-15030.53	10279.77	8555.36	0.53	8555.887	312	
313	-19120.31	10030.57	9726.74	-0.7	9726.039	313	
314	-19065.12	9847.59	9637.45	-1.18	9636.268	314	
315	-18832.77	9843.37	9572.86	-0.92	9571.939	315	
316	-18533.30	9941.48	9495.16	-1.24	9493.918	316	
317	-18093.93	9870.18	9353.92	-1.66	9352.257	317	On boulder
318	-17723.28	9760.03	9359.17	-0.14	9359.030	318	On rock face
319	-17264.65	9925.78	9502.48	-0.21	9502.270	319	
320	-17237.77	9502.10	9325.44	-0.39	9325.048	320	
321	-17043.07	9835.38	9468.03	-0.44	9467.589	321	Obscure
322	-16863.19	9375.28	9410.64	-0.08	9410.560	322	
323	-16408.10	9639.15	9323.86	-0.76	9322.897	323	On boulder
324	-16022.31	9703.75	8994.83	-0.85	8993.979	324	Obscure
325	-15800.08	9592.11	8894.32	-2.57	8891.750	325	
326	-15439.18	9670.87	8702.31	-2.14	8700.173	326	
327	-14529.34	9520.17	8629.18	-0.04	8629.139	327	
328	-14098.13	9468.10	8680.60	-0.35	8680.248	328	
329	-13724.82	9466.06	8644.11	-0.39	8643.719	329	On boulder
331	-19057.24	9390.63	9480.81	-1.86	9478.949	331	
332	-18771.19	9358.94	9450.32	-2.25	9448.069	332	
333	-18429.75	9256.83	9293.85	-2.58	9291.267	333	
334	-17992.74	9296.12	9004.63	-0.24	9004.389	334	
335	-17505.83	9482.54	9272.66	0.59	9273.249	335	On rock face
336	-17290.42	8829.29	8940.62	0.18	8940.797	336	
337	-17042.64	9167.67	9216.47	0.79	9217.260	337	On rock face
338	-16634.76	8974.17	9327.09	-0.96	9326.128	338	On rock face
339	-16314.81	9041.05	9307.09	-1.38	9305.708	339	Obscure
340	-16079.12	9068.77	9303.68	-1.72	9301.962	340	On boulder
341	-15915.26	9013.40	9190.97	-2.66	9188.307	341	
342	-15592.84	8946.68	9109.82	0.43	9110.249	342	

POINT	EASTING	NORTHING	1988 ELEVATION	2002 DIFFERENCE	2002 New ELEVATION	POINT	COMMENTS
343	-15148.09	8843.97	9083.49	-1.84	9081.648	343	
344	-14876.56	8741.88	9076.67	-0.8	9075.870	344	
345	-14506.87	8799.79	9019.29	-2.38	9016.913	345	
346	-14038.72	8845.22	8830.35	-1.2	8829.145	346	
347	-13740.63	8785.27	8694.09	-0.57	8693.516	347	
348	-13309.70	8655.70	8500.94	-0.29	8500.649	348	
349	-19033.12	8822.29	9267.53	-2.28	9265.246	349	
350	-18890.82	8447.55	9009.19	-1.05	9008.136	350	
351	-19344.28	8372.53	9011.03	-1.77	9009.259	351	
352	-19439.16	7927.91	9252.92	-1.69	9251.230	352	On boulder
353	-18802.18	7864.43	8831.27	-0.86	8830.407	353	
354	-18818.63	7465.64	8863.47	-1.33	8862.135	354	
355	-19385.86	7463.43	9253.96	-2.13	9251.835	355	
356	-19380.67	7271.07	9182.23	-0.8	9181.430	356	
357	-19063.39	6496.12	9430.72	-1.33	9429.394	357	
358	-19224.54	6288.24	9473.18	-0.61	9472.572	358	
359	-19198.98	5878.10	9389.51	0.02	9389.531	359	
360	-18883.84	5414.38	9434.91	-1.01	9433.904	360	
361	-19002.92	5175.54	9524.31	-1.81	9522.496	361	
362	-18942.09	4764.81	9554.81	-0.37	9554.439	362	
363	-18853.71	3778.42	9634.85	-1.17	9633.683	363	Obscure
364	-19168.45	3300.66	9776.17	-1.45	9774.718	364	
365	-19130.53	3130.86	9769.47	-1.98	9767.492	365	
366	-19053.73	2638.47	9737.63	-1.58	9736.046	366	
367	-18969.16	2264.18	9728.72	-1.77	9726.954	367	
368	-18935.65	1853.96	9723.52	-2.74	9720.777	368	
369	-20166.28	9321.90	9569.49	-3.07	9566.425	369	
370	-19830.14	9318.36	9648.96	-2.56	9646.400	370	
371	-21681.13	9106.98	9826.11	-2.33	9823.782	371	
372	-21299.13	9057.08	9817.86	-1.8	9816.056	372	
373	-20819.94	8986.88	9754.46	-2.99	9751.472	373	
374	-20367.73	9121.52	9580.80	-3.01	9577.792	374	
375	-20036.82	8969.18	9460.34	-3.85	9456.494	375	
376	-19816.19	8907.58	9470.75	-4.09	9466.656	376	
377	-19451.83	9064.17	9436.42	4.09	9440.507	377	Obscure
378	-21666.24	8764.28	9801.38	-1.23	9800.154	378	
379	-21356.64	8757.05	9813.17	-1.49	9811.685	379	
380	-20916.70	8591.22	9783.94	-2.78	9781.162	380	
381	-20319.10	8603.66	9606.75	-5.39	9601.360	381	
382	-20069.35	8380.79	9533.03	-4.6	9528.429	382	
383	-19860.16	8756.37	9385.83	-4.84	9380.985	383	
384	-19459.87	8502.21	9136.19	-4.71	9131.476	384	
385	-21704.89	8452.24	9791.02	-2.4	9788.623	385	
386	-21286.26	8301.75	9845.25	-3.14	9842.110	386	
387	-20935.36	8329.74	9807.50	-2.44	9805.061	387	
388	-20678.42	8266.42	9743.70	-3.06	9740.638	388	
389	-20437.19	8163.26	9686.88	-3.65	9683.226	389	
390	-20045.64	8071.42	9565.09	-3.7	9561.389	390	
391	-19591.56	7908.10	9329.55	-5.31	9324.241	391	
392	-20940.37	8042.87	9830.70	-2.95	9827.755	392	
393	-20514.77	7860.31	9765.89	-3.93	9761.960	393	Obscure

POINT	EASTING	NORTHING	1988 ELEVATION	2002 DIFFERENCE	2002 New ELEVATION	POINT	COMMENTS
394	-20298.22	7698.64	9712.01	-3.48	9708.535	394	
395	-19343.98	7458.34	9226.76	-3.81	9222.952	395	
396	-20545.27	7554.42	9819.35	-3.34	9816.008	396	
397	-20715.24	7300.77	9871.54	-2.91	9868.627	397	
398	-20203.05	7270.05	9630.36	-4.24	9626.121	398	
399	-18623.10	8438.53	8962.74	-0.56	8962.178	399	
400	-18300.56	8438.86	8935.10	-2.44	8932.664	400	Obscure
401	-18085.67	8396.12	8872.62	-0.73	8871.887	401	
402	-17712.05	8476.90	8659.57	-0.68	8658.891	402	
403	-17465.94	8461.25	8713.42	-0.68	8712.736	403	
404	-17162.72	8423.47	8801.87	-0.35	8801.516	404	
405	-16856.17	8485.74	8941.97	-4.56	8937.409	405	On boulder
406	-16533.80	8458.64	8995.07	-4.14	8990.930	406	
407	-16223.30	8454.41	9084.35	-2.98	9081.367	407	
408	-15915.85	8443.88	8937.60	-3.18	8934.423	408	
409	-15606.06	8430.98	8867.10	-4.45	8862.647	409	
410	-15291.41	8442.89	8872.42	-3.37	8869.049	410	On boulder
411	-15000.02	8436.97	8899.24	-3.32	8895.918	411	
412	-14697.00	8451.37	8974.20	-1.67	8972.526	412	

Hiawatha - 2005 Raw Subsidence Data

Sheet1

2005 Hiawatha Subsidence Study

Point ID	Northing	Easting	Elevation	Accuracy
SUB363	6985887.53	1759296.56	9802.27	0.08
SUB365	6984815.83	1760134.69	9730.5	0.05
SUB350	6990623.25	1760279.87	9005.31	3.42
SUB353	6990015.03	1760378.03	8809.22	2.49
SUB354	6989613.95	1760335.83	8853.46	2.74
SUB355	6989637.13	1759846.72	9206.5	0.25
SUB356	6989437.14	1759785.11	9168.3	0.2
SUB357	6988622.11	1760028.87	9455.22	0.14
SUB358	6988439.62	1759939.66	9459.76	0.1
SUB359	6988057.59	1759993.78	9396.03	17.71
SUB364	6985477.45	1760014.34	9768.81	0.07
SUB366	6984815.37	1760129.07	9730.82	0.07
SUB367	6984441.1	1760213.61	9721.69	0.05
SUB368	6984030.87	1760249.13	9715.43	0.06
SUB399	6990600.1	1760553.21	8964.28	2.69

The coordinates were measured using a Leica GPS on the State Plane NAD 86 Coordinate System\*\* After surveying these points the subsidence survey was abandoned for the following reasons.

1. There didn't appear to be a standard correlation between the old U. S. Fuel coordinate system and the State Plane coordinate system.
2. There was surface disturbance in the location of over 40% of the subsidence points due to logging.
3. The anticipated logging activities for 2006 and 2007 would disturb another 40% of the points.
4. The over 90% of the subsidence points were over areas mined out over 30 year ago.
5. Less than 5% of the subsidence points were over areas of future mining and some areas had no points over them.

Hiawatha Coal Company will do the following in the Spring of 2006

1. An amendment will be submitted moving Hiawatha onto the State Plane Coordinate System.
2. A study will be submitted showing all historic subsidence data proving that no new subsidence is taking place.
3. Hiawatha will establish a new subsidence study plan in cooperation with the Division that will effectively monitor the areas of proposed mining and any areas still of concern.

\*\* Some of the subsidence points not shown on this table were surveyed on the old system using a total station. The results of that survey show no subsidence from those points.

Hiawatha - 2006 Raw Subsidence Data

Hiawatha 2006 Subsidence

Name	Easting	Northing	2006 Elevation	2004 Elevation	Difference
WP 1	-14839.01	-257.58	9380.72	9380.72	0.00
.77	-17237.38	3912.52	9454.14	9454.14	0.00
.76	-18117.08	10839.36	9792.28	9792.77	-0.49
Sub 22	-15920.98	15494.06	9641.68	9641.78	-0.10
Sub 1	-20230.86	13840.85	9941.64	9941.52	0.12
Pin 2	-20855.13	13664.17	9990.14	9989.92	0.22
RF-1	-19363.15	10696.94	9843.81	9843.37	0.44
Sub 4	-20102.80	7822.41	9603.31	9603.09	0.22
.76 A	-20392.92	6019.71	9881.31	9881.65	-0.34
Pin 5A	-21541.16	9021.01	9819.29	9819.06	0.23
Sub 2	-22031.92	13668.21	10059.99	10059.99	-0.00
Sub 5A	-21937.80	8324.83	9762.65	9762.31	0.34
Pin 21	-20620.50	4735.61	9855.35	9855.68	-0.33
Sub 21	-19801.92	3787.72	9807.18	9807.277993	-0.10



HIAWATHA  
CONTROL POINT  
GROUND  
ELEVATIONS

Station	Latitude	Departure	Gnd Elevation	Elevation Changes
SUB 4	N 7822.35	W 20102.73	9604.7	0
A 76	N 10839.25	W 18116.60	9793.74	0
SUB 1	N 13841.05	W 20229.81	9942.51	0
SUB 2	N 13668.57	W 22030.94	10061.94	0
SUB 22	N 15497.07	W 15927.03	9643.77	0
SUB 5A	N 8325.48	W 21937.41	9764.63	0

Hiawatha - 2008 Raw Subsidence Data

2008 Annual Report

Hiawatha Subsidence

Station	Northing	Easting	07 Elevation	08 Elevation	Change
H101	6976314	1761557	9,750.9	9,750.9	0.0
H102	6975423	1765581	9,483.2	9,483.2	0.0
H103	6979665	1766645	8,318.8	8,318.8	0.0
H104	6981393	1765812	9,455.8	9,455.8	0.0
H105	6981879	1764390	9,544.9	9,544.9	0.0
H106	6981585	1762677	9,668.8	9,668.8	0.0
H107	6983893	1762882	9,330.3	9,330.3	0.0
H108	6986308	1760176	9,838.2	9,838.2	0.0
H109	6988959	1764289	8,431.6	8,431.6	0.0
H110	6988963	1764287	8,440.0	8,440.0	0.0
H111	6991691	1759759	9,924.5	9,924.5	0.0
H112	6988722	1758519	10,111.6	10,111.6	0.0
H113	6985488	1760560	9,914.2	9,914.2	0.0
H114	6983838	1760705	9,885.8	9,885.8	0.0
H115	6981746	1760967	9,873.0	9,873.0	0.0
H116	6980685	1758694	9,880.8	9,880.8	0.0
H117	6980793	1760659	9,847.6	9,847.6	0.0
H118	6979289	1760544	9,831.3	9,831.3	0.0
H119	6978225	1759515	9,831.7	9,831.7	0.0
H120	6977775	1758804	9,842.0	9,842.0	0.0
H121	6976799	1758299	9,819.0	9,819.0	0.0
H122	6975964	1758025	9,814.2	9,814.2	0.0
H123	6977447	1762425	9,765.3	9,765.3	0.0

An examination of subsidence monitoring data collected above the King 4 mine in 1990 and compared with baseline monitoring data established in 1988 substantiates the foregoing discussion. A fully extracted area (except for barrier pillars) in the King 4 mine averaging 800 ft. wide by 2,000 ft. long was mined in late 1988 and 1989. Overburden above this area is approximately 1,300 feet and the surface formation is the North Horn. Monitoring data show that the surface has subsided from 0.5 ft. to a maximum of 2.17 ft. over a broad area. No visible subsidence effects have been detected. An examination of subsidence data from 2000 to 2009 also verifies that no active subsidence has occurred during this time period.

Exhibit 7-7 shows two springs (91-974 & 91-978) located just north of Hiawatha Coal Companies permit boundary in Section 13, T.15S., R.8E. These springs are within the zone of potential subsidence projected from Hiawatha's most northerly mine workings. Based on the previous discussion, recent field investigations and the following considerations, no material damage should occur to these springs from subsidence effects of Hiawatha coal Companies mine workings:

Mining was last conducted in the near vicinity of the springs in 1982. There are no longer any recoverable coal reserves in Hiawatha's property in this area and there is no access to mine workings closer than 3,000 feet from the springs. The reservoirs in the King 4 mine have been exhausted and the mine has been sealed. No future mining is projected. If any form of mining occurs in the area, adequate barriers along the proposed borders will be left to protect these  
springs.

Table 7-17

Water Monitoring Matrix

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
ST-1				Operational	Field	Field	Field	Field	Operational	Field		
ST-2				Operational	Field	Field	Field	Field	Operational	Field		
ST-2B				Operational	Field	Field	Field	Field	Operational	Field		
ST-3				Operational	Field	Field	Field	Field	Operational	Field		
ST-3A				Operational	Field	Field	Field	Field	Operational	Field		
ST-3B				Operational	Field	Field	Field	Field	Operational	Field		
ST-4				Operational	Field	Field	Field	Field	Operational	Field		
ST-4A				Operational	Field	Field	Field	Field	Operational	Field		
ST-4B				Operational	Field	Field	Field	Field	Operational	Field		
ST-5				Operational	Field	Field	Field	Field	Operational	Field		
SP-2						Operational				Operational		
SP-4						Operational				Operational		
SP-5						Operational				Operational		
SP-11						Operational				Operational		
SP-12						Operational				Operational		
SP-13						Operational				Operational		
D001*	Field	Operational	Field	Field	Operational	Field	Field	Operational	Field	Operational	Field	Field
D002*	Field	Operational	Field	Field	Operational	Field	Field	Operational	Field	Operational	Field	Field

\*D001 and D002 Operational samples will be tested for the parameters in Table 7-13. All others will be tested according to Table 7-16.

Currently, no underground mining is scheduled to occur at the Hiawatha Mine Complex for 3 to 12 years. Since there is no potential for subsidence, monitoring of points SP-2, SP-4, SP-5, SP-11, SP-12 and SP-13 will be suspended until 2 years prior to any underground mining occurring. Hiawatha will notify the Division 2 years prior to any underground mining when mining will begin and collect baseline samples for 2 years prior to any underground mining occurring. Monitoring will continue on all stream and mine discharge points to monitor for any impacts due to the surface activities which are occurring at the Hiawatha Complex.