

APPLICATION TO SRBC FOR AQUIFER TEST PLAN WAIVER
FOR
USE OF RUSHTON MINE FOR CONSUMPTIVE WATER USE MITIGATION

NOVEMBER 2011

APPENDIX B

RUSHTON MINE – REPORT OF 2005 DRAWDOWN TEST

Results of Pump Test of the Rushton Mine Pool as a Source of Stream Flow Augmentation Water

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Results of Pump Test of the Rushton Mine Pool as a Source of Stream Flow Augmentation Water

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Results of Pump Test and Evaluation of the Rushton Mine Pool as a Source of Stream Flow Augmentation Water

EXECUTIVE SUMMARY

- A pumping test of the Rushton Mine was completed in the fall of 2005.
 - The test involved drawdown of the mine pool from an elevation of 1409 to 1380 feet msl over a period of 39 days.
 - Total water pumped was 278.3 million gallons at an average rate of 7.15 million gallons per day (MGD). The estimated recharge rate during the pumping period (excluding sludge injection) was 3.75 MGD.
 - Monitoring of mine pool and groundwater levels, flow in Moshannon Creek, and relevant water quality was conducted prior to, during, and following the pumping period.
- The Moshannon Creek monitoring data indicates that the discharge from the Rushton treatment plant has a beneficial impact on the stream water quality.
- The ground water level monitoring data demonstrates that the pumping of the Rushton Mine did not have any impact on the overlying ground water levels.
- Monitoring data from mine pools overlying the Rushton Mine did not show any impact on other mine pools.
- The lowering of the mine pool below normal operating levels resulted in a change in the mine water quality.
- The test verified the previous estimate for the dry period mine pool recharge rate of 2.9 MGD and showed that lowering of the mine pool does not appreciably increase the recharge rate.

INTRODUCTION

Moody and Associates, Inc. (Moody) is assisting PPL Generation, LLC to evaluate the Pennsylvania Mine Corporation's Rushton Mine pool to determine the feasibility of using the pool for flow augmentation during low flow conditions in the Susquehanna River Basin. The evaluation includes characterization of the potential environmental and hydrologic effects of this use. A pumping test was conducted the fall of 2005 to determine the potential effects to local groundwater levels to streamflow quantity and quality of drawdown of the mine pool to a level approximating the minimum level attainable with the present pump configuration. The location of the Rushton Mine is shown on FIGURE 1.

RUSHTON MINE – BACKGROUND

The Rushton Mine is located in Clearfield and Centre counties Pennsylvania approximately two miles southeast of the Borough of Philipsburg. Mining ceased in 1991. Water is pumped from the mine pool to control pool level, and is treated before discharge to the Moshannon Creek, a tributary to the West Branch Susquehanna River. The mine water treatment plant and discharge point are located in Rush Township, Centre County. Current operations are conducted under

Pennsylvania Department of Environmental Protection (PADEP) Mining Activity Permit
14831301.

The coal mined at Rushton is the Lower Kittanning Coal Seam. FIGURE 2 is a map of the Rushton Mine that includes the structure contours of the Lower Kittanning Coal Seam. Combined with the mine pool elevation data, the coal contours can be used to define the "beach line" of the mine pool and the area of the mine which is flooded at any given elevation.

The volume of mine void was calculated at ten-foot intervals between the elevation of 1420 and 1310 feet msl based on coal seam thickness and the percentage of the coal removed. This method of determining a mine void volume is typical of the coal mining industry. The interval mine void volumes are shown in the table on FIGURE 2.

The mine water treatment system currently has a maximum capacity of 7.6 MGD or 228 million gallons/month. The treatment system consists of two mine pool pumps, (a primary and a back up pump), a hydrated lime silo and delivery system, a mixing component, several treatment, settling and polishing ponds, a sludge management system and a discharge channel to Moshannon Creek. Between January 1997 and December 2005 an average of 150 million gallons of mine water a month was pumped from the mine and treated. The average daily discharge during this time period was 5.0 MGD.

Sludge is collected from the treatment ponds and returned to the mine at location away from the pumping shaft at an average rate of approximately 0.72 MGD when the system is operated. Flow from the ponds reaches the creek via a system of open channels and culverts, and is measured by weirs at the two outfall points.

Pumping of the Rushton Mine pool is currently controlled by three criteria.

1. Maintaining the mine pool below an elevation of 1420 feet msl.

The Rushton Mine pool is maintained the below an elevation of 1420 feet msl to prevent seeps of poor quality water from developing on the surface.

2. Preventing the treatment ponds from freezing

During the months of December to February, the mine pool is pumped 24 hours a day for 7 days a week to maintain a flow of warm mine water though the treatment ponds and prevent freezing. If the ponds freeze over, the sludge pumps, which remove the buildup of sludge from the ponds, cannot be operated. The pumping rate during this winter pumping period is generally 4.0 to 5.0 MGD.

3. Treatment plant staffing

When the treatment plant and mine pumps are in operation, the facility must be monitored on a daily basis. This requires an operator either to be on site or on call. The plant is equipped with an automatic call system which pages the operator if events, such as a pump shut down, occur over night or on a weekend. Also the plant and pump must be manually checked every day the plant is in operation including weekends and holidays. The plant operators share the on call and weekend monitoring responsibilities. During the winter and at times of high mine pool levels the pump is

normally operated 24/7. During the summer months the pumps are normally operated continuously from Monday morning to Friday afternoon to allow the operator to have the weekends off.

POSSIBLE EFFECTS FROM FLOW AUGEMENTATION PUMPING OF THE MINE POOLS

The utilization of the mine pool for flow augmentation will require changes in the current operating practices and seasonal changes in the mine pool level. The mine pool level will be maintained at higher than normal levels during the winter and spring such that the pool is a maximum capacity prior to the start of flow augmentation pumping. During any potential summer flow augmentation pumping, the pool levels will be lower than normal. The pump would also be operated continuously which would eliminate the weekly fluctuation caused by shutting off the pump over the weekends. The mine pool level will still fluctuate within the historical range of pool levels controlled by the pump intake elevation and the 1420 foot maximum elevation. These changes in pumping procedure could affect the mine water quality and alter the impact the mine pumping currently has on the hydrologic system over the mines. The potential impacts are outlined below:

Quality of the mine water

The use of the mine pools for flow augmentation water would require the lowering and maintaining the pool at lower than normal elevations and then allowing the pool level to recover following an augmentation period. The lowering of the level would dewater sections of the mine and expose to air, rock strata which are normally saturated. The exposure to the air would allow the iron minerals to be oxidized. When the pool level is allowed to recover, the oxidized iron would be dissolved. The dissolved iron could cause fluctuation of the current quality of the mine water. Degrading of the mine water quality could impact the operation of the treatment plant.

Flow of surface springs and streams

Lowering of the mine pool may also lower the ground water levels in the rock strata over the mine. This could reduce ground water discharges to surface springs and streams or potentially affect well systems, if any, in the area of influence.

RUSHTON MINE – PUMP TEST PLAN

The test of the Rushton Mine pool was designed to address the following items:

- Quantify the amount of water which can be pumped from the mine pool within the interval from approximately 1380 to 1420 feet msl.
- Determine the rate at which the mine pool level will decline during pumping at a specific rate.
- Determine the rate at which the mine pool level will recover after pumping is stopped.
- Quantify the changes in the mine water quality during a prolonged pumping cycle of weeks to months.
- Determine the changes in mine water quality after the mine pool level has recovered.
- Determine the impacts to overlying surface water streams and ground water supply wells in the area.

The Pennsylvania Department of Environmental Protection (PADEP) reviewed and approved the Rushton Mine test plan. PADEP representative visited the mine to observe the pumping test and monitoring during the pumping phase of the test.

In order to evaluate the items above, data were acquired from the Rushton mine pool, Moshannon Creek, monitoring wells over the mine and abandoned mines above the Rushton mine. The existing monitoring data and monitoring points at the Rushton Mine were evaluated to determine if any of these points could be utilized during the test. The monitoring of the existing points is required by the PADEP mine permit. A total of eleven monitoring points were selected for the test. A description of the monitoring points and the monitoring frequency is presented in TABLE 1. The locations of the monitoring points are shown on FIGURE 3. All of the monitoring points except three additional points on Moshannon Creek are existing mine monitoring points. Monitoring of most of the points started on September 29, 2005 and ended on December 12, 2005. Monitoring of the Moshannon Creek Upstream B and Downstream C started on October 5, 2005. These two stream points were added after the start of monitoring at the request of the PADEP. The mine pool elevation at the Rushton Mine shaft has been monitored on every day that the pump is in operation since 1997. The mine water quality has been sampled monthly at the pump discharge since 1997.

The pumping test of the Rushton Mine consisted of four phases.

PHASE 1 – Non-pumping

Phase 1 was a non-pumping phase which started on September 27, 2005 and ended on October 10, 2005. During Phase 1 the mine water pump was shut off and the mine pool level was allowed to rise. Phase 1 was 13 days long during which the mine pool elevation increased by 11.25 feet from 1397.95 to 1409.2 feet. This was the longest time period since 1997 that the mine was not pumped. Prior to this test the longest non pumping period had been six days.

PHASE 2 – Pumping

Phase 2 was a pumping phase which started on October 10, 2005 and ended on November 18, 2005. During this phase the mine was pumped at the maximum capacity of the pump (5,300 gpm / 7.6 MGD) in order to draw the mine pool level down. Phase 2 was 39 days long and the mine pool elevation decreased by 29.42 feet from 1409.20 to 1379.78 feet.MGD

PHASE 3 – Non-pumping

Phase 3 was a non-pumping phase which started on November 18, 2005 and ended on December 5, 2005. During Phase 3 the mine pool was allowed to rise from 1379.78 to 1396.51 feet. This phase lasted for 18 days which is the longest non pumping interval to date. The initial test plan had indicated that Phase 3 would continue until the mine pool elevation was at or near an elevation of 1410 feet. Phase 3 was shortened due to the onset of freezing weather in early December. During the winter, the mine pump needs to be operated continuously to prevent the treatment ponds from freezing.

PHASE 4 – Resumption of normal mine pumping operation

Normal mine pumping operations resumed on December 5, 2005. Monitoring continued until January 6, 2006.

DISCUSSION OF PUMP TEST RESULTS

Precipitation Data

The 2005 precipitation data from the Philipsburg, Pennsylvania weather station was reviewed to determine the amount of rainfall for the year and if 2005 had been a drought or normal rainfall year. The annual rainfall will have an impact on the amount of mine pool recharge which occurred during the test. The 2005 data were compared to the previous evaluation completed as part of earlier study. TABLE 2 is an updated summary of precipitation data for 1995 to 2005. The rainfall for 2005 was in the range of a below normal precipitation year. A comparison of the average monthly rainfalls for a below normal, normal to above normal precipitation years, the 30 year normal and 2005 is shown on FIGURE 4.

Mine Pool Elevation and Recharge

The Rushton Mine pool elevation was monitored at the mine shaft and at the Sleepy Hollow Bore Hole. The pool level data from the mine shaft is shown on FIGURE 5, and TABLE 3 is a listing of the data. Prior to the start of the pump test on September 27, 2005, the pool elevations fluctuated weekly as the pump was operated during the week and shut off over the weekend. The mine pump was shut off on September 27, 2005 at an approximate pool elevation of 1397 feet MSL. The pump was off for 13 days and was restarted on October 10, 2005. The pool elevation was approximately 1409 feet MSL at the time the pump was restarted. The mine pool elevation rose 12 feet in the 13 days at an average rate of 0.92 feet / day. Based on the estimated mine void volume, an estimated 52 million gallons recharged to the mine pool at an average rate of 4.0 MGD during this time period.

The mine pump was pumped at the maximum capacity of the pump for 39 days until November 18, 2005. The initial pumping rate for the test was 5,300 gpm (7.63 MGD) which is the maximum rate of the pump. As the mine pool level dropped the pumping rate declined due to the increased head on the pump. Near the conclusion of the test, the pumping rate was 4,635 gpm (6.67 MGD). An estimated 278.3 million gallons was pumped from the mine over the 39 days of the test, at an average pumping rate of 4,970 gpm (7.15 MGD) and an estimated 12 million gallons of sludge was injected back into the mine. Based on the estimated mine void volume of 142 mg, an estimated 124 million gallons recharged to the mine pool at an average rate of 3.2 MGD during this time period.

The mine pump was shut off for 18 days from November 18, 2005 to December 5, 2005. During this time period, the mine pool level rose from 1380 to 1396.5 feet MSL. The volume of the sludge injection was 12 MG during this phase. Based on the estimated mine void volume, the estimated recharge to the mine pool was 64 MG at an average rate of 3.6 MGD during this interval.

The pump was restarted and normal operation of the mine water treatment plant resumed on December 5, 2006. From December 14 to December 24, the mine was pumped at 4.75 MGD and the mine pool elevation was stable at 1396 feet MSL. After allowing for the sludge injection of 0.72 MGD, the estimated recharge to the mine during this interval was approximately 4.0 MGD.

Mine Water Quality

The mine water is normally sampled monthly at the pump discharge. During the mine pump test, the mine water was sampled daily. The mine water quality data from for 2005 is listed on TABLE 4.

The chemical parameters, iron, sulfate and acidity are characteristic of mine water or acid mine drainage resulting from the oxidation of iron containing minerals such as pyrite. These minerals naturally occur in the coal and rocks associated with the coal seam.

The pH data from the mine water is summarized on FIGURE 6. Prior to the test and from February to September 2005 the average mine water pH was 5.9. During the pumping phase of the test, the average pH was also approximately 5.9. After the test and resumption of normal pumping operation of December 5, 2005 through January 4, 2006, the average pH was 3.9. The acidity data from the mine water is summarized on FIGURE 7. Prior to the test from February to September 2005 the average mine water acidity was 183.63 mg/l. During the test, the average acidity was 181.29 mg/l. After the resumption of normal pumping operation of December 5, 2005, the average acidity was 438.18 mg/l.

The concentrations of ferric and ferrous iron varied during the test but the total iron concentrations did not change significantly. FIGURES 8 and 8A are graphs showing the ferric and ferrous iron concentrations. During the pumping phase of the test the ferrous iron concentrations decreased slightly and the ferric iron increased. After the resumption of normal pumping operations, the ferrous and ferric iron concentrations were comparable to the pre test conditions. The total iron (ferrous + ferric) concentrations are shown on FIGURES 9 and 9A. The data shown on FIGURE 9 indicates that there was not a significant change in the total iron levels during or after the test.

The sulfate data is presented on FIGURE 10. The sulfate concentrations dropped slightly during the pumping phase. At the resumption of normal pumping operations, the sulfate levels increased briefly and then returned to normal pre test levels.

The aluminum and manganese concentrations are shown on FIGURE 11. The aluminum increased after the test and the manganese decreased.

The drop in pH and rise in acidity indicates that the lowering of the mine pool exposed the iron containing minerals to air which oxidized additional iron minerals. As the pool level rose the dissolved iron and sulfate entered the mine water which caused the changes in pH and acidity.

Lime, which is used to reduce the mine water acidity, is a major component in the treatment costs. The lime usage varies seasonally from approximately 1.5 tons / MG of water treated during the winter to 1.9 tons/MG during the summer. The variation in lime usage is due to seasonal variations in the acidity of the mine water. When mine water treatment was resumed at the conclusion of the test in December 2005, the treatment plant operators did not notice a change in the lime usage. Based on this information, the drawdown and recovery of the mine pool did not have a noticeable impact on the treatment operations or costs. Drawdown of the

mine pool level for longer durations or to lower levels is expected to have a greater impact on treatment costs.

Effects on Moshannon Creek

The water in Moshannon Creek was monitored at five monitoring points, two upstream and three downstream of the mine water discharge point. The locations of the monitoring points are shown of FIGURE 3. The monitoring data from the five stream points is summarized in TABLES 5 to 9. The water quality in Moshannon Creek has been impacted by mine discharges upstream of the Rushton Mine discharge. The data from the Upstream A and B monitoring points indicate the quality of the stream water prior to the Rushton Mine discharge. A series of graphs showing the stream water quality on five dates were prepared to illustrate the changes in stream water quality.

The five dates are:

October 10, 2005 – These samples were collected just prior to the start of the pump test

October 19, 2005 – The mine was discharging water on this date

November 16 and 23, 2005 – No mine discharge on these dates

December 7, 2005 – Mine discharging under normal operating conditions

The graphs are as follows:

FIGURE 12 Moshannon Creek - pH graph

FIGURE 13 Moshannon Creek - Total iron concentration graph

FIGURE 14 Moshannon Creek - Sulfate concentration graph

FIGURE 15 Moshannon Creek - Aluminum concentration graph

FIGURE 16 Moshannon Creek - Manganese concentration graph

The stream data indicates that with the exception of sulfate the Rushton Mine discharge improves the stream water quality. Below the mine discharge, the pH increased and iron, aluminum and manganese all decreased. The alkalinity data (see TABLES 5 to 9) shows that Moshannon Creek has no alkalinity other than the alkalinity introduced by the mine discharge.

Impact on the overlying ground water system

The ground water elevations in the two monitoring wells at the Rushton Mine refuse pile were monitored to determine the impact of the mine pool on the overlying ground water system. The locations of the monitoring wells are shown on FIGURE 3. The ground water elevation data from the wells are shown on FIGURE 17. The monitoring well data shows that the pumping of the mine pool did not have an effect on the overlying ground water elevations. The water level in the up gradient well appears to fluctuate naturally with no relationship to the pumping of the mine pool. The water levels in the down gradient well were relatively stable throughout the entire test and did not show any response to the pumping of the mine pool.

Potential impact on overlying mine pools

The water quality and flow of the discharge from two mine pools in coal mines above the Rushton Mine were monitored to determine if there were any impacts on the overlying mines. The locations of the two overlying mine pool monitoring points are shown on FIGURE 3. The Moshannon Mine #1 Seep is a discharge into a road side drainage ditch. No indications of previous mining activities are visible at this monitoring point. The Bigelow Run Mine Airshaft is

an airshaft into an abandoned mine. The shaft is partially collapsed and blocked with debris. TABLE 10 is the monitoring data from the Moshannon Mine # 1 seep. The data from the mine seep does not indicate any effects from the pumping of the Rushton Mine pool. The Bigelow Airshaft data is shown on TABLE 11. The water level in the airshaft was below the ground level and there was no discharge from the airshaft at the start of the test. The water level in the shaft dropped at the beginning of the test then rose through the end of the test. At the end of the pumping period, water was flowing from the air shaft. The water level data from the Bigelow Airshaft indicates that the pumping of the Rushton Mine pool did not have any effect on the water level in this mine pool.

Estimated mine pool recharge rates

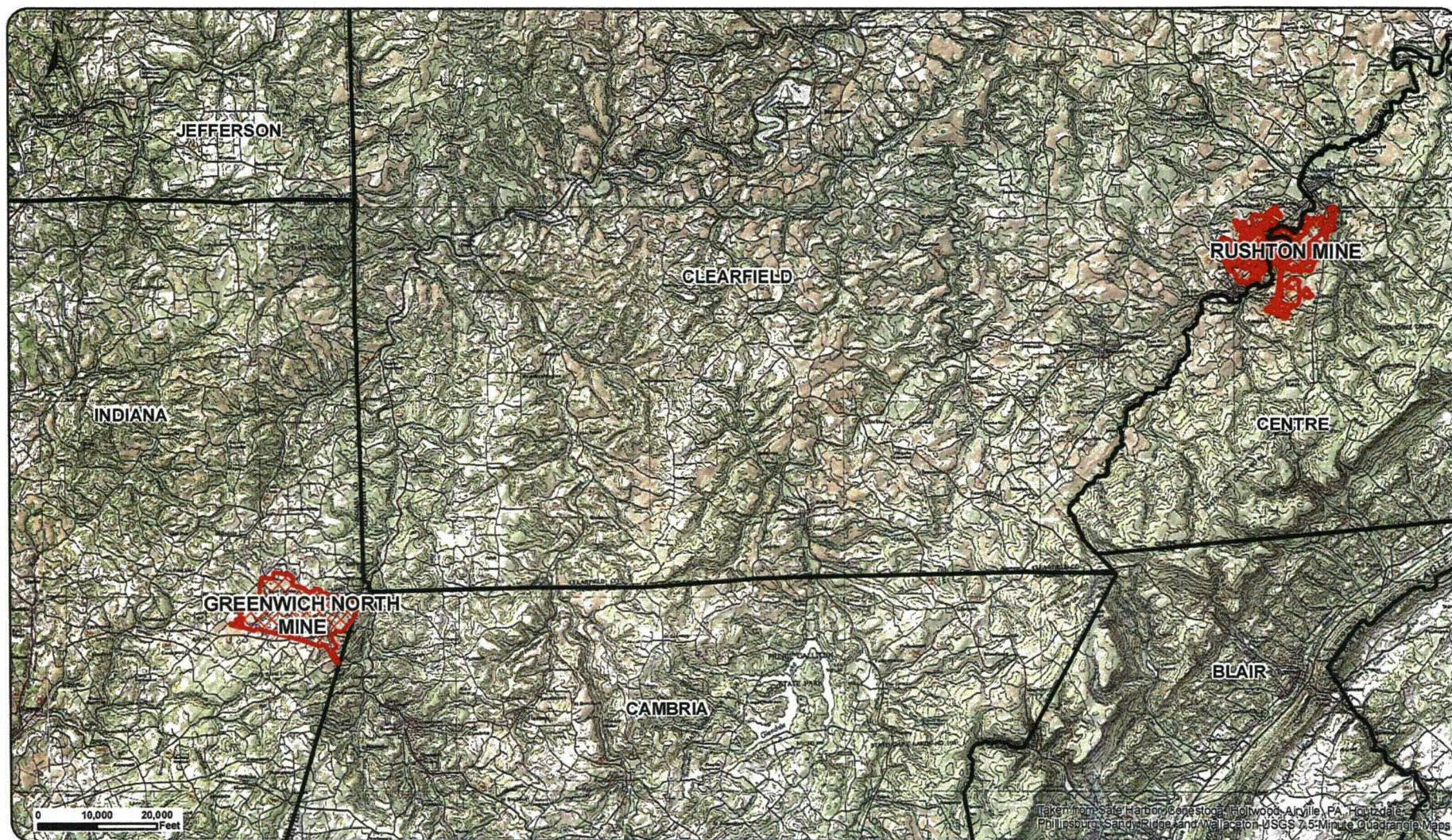
An estimated 278.3 million gallons was pumped from the mine at an average rate of 4,970 gpm (7.15 MGD) over the 39 days of the pumping phase of the test (PHASE 2), with approximately 28 million gallons (average 0.72 MGD) of sludge returned to the mine. The actual average discharge to Moshannon Creek during the test was 6.44 MGD. [was this measured by weirs?] The mine pool elevation was drawn down from 1409 to 1380 feet MSL. Based on the estimated mine void volume an estimated 139 million gallons was removed from storage in the mine pool. Thus, an estimated 111.3 MG of water recharged to the mine during the pumping phase of the test at an average rate of 2.85 MGD.

(111.3 MG mine recharge = 278.3 MG pumped less 129 MG removed from storage less 28 MG of sludge injected into mine. 111.3 MG / 39 days = estimated average 2.85 MGD recharge.)

The precipitation data shows that the total precipitation was 37.73 inches for 2005, which is 4.1 inches below the normal annual amount. Prior study had determined that the recharge rate during a below normal precipitation year was 2.9 MGD. The recharge rate during the pumping phase of the test is estimated to be 2.9 MGD, which agrees with the previous estimate.

The estimated recharge rate for the other phases of the test was 3.75 to 4.0 MGD. Also the recharge rate after normal operations were resumed in December was 4.0 MGD (December 24, 2005 through January 4, 2006). An examination of the monthly data shows that September 2005 had 1.89 inches of rain, which is the lowest amount for September in ten years. The months of October and November had the highest rainfalls for those months, at a total of 10.62 inches, for the previous ten years. The very high rainfalls occurring during the normal fall ground water recharge period maybe the cause of the high mine recharge during November and December 2005. The recharge from these months is consistent with the previously estimated recharge rate of 4.5 MGD.

FIGURE 1



MINE LOCATION MAP

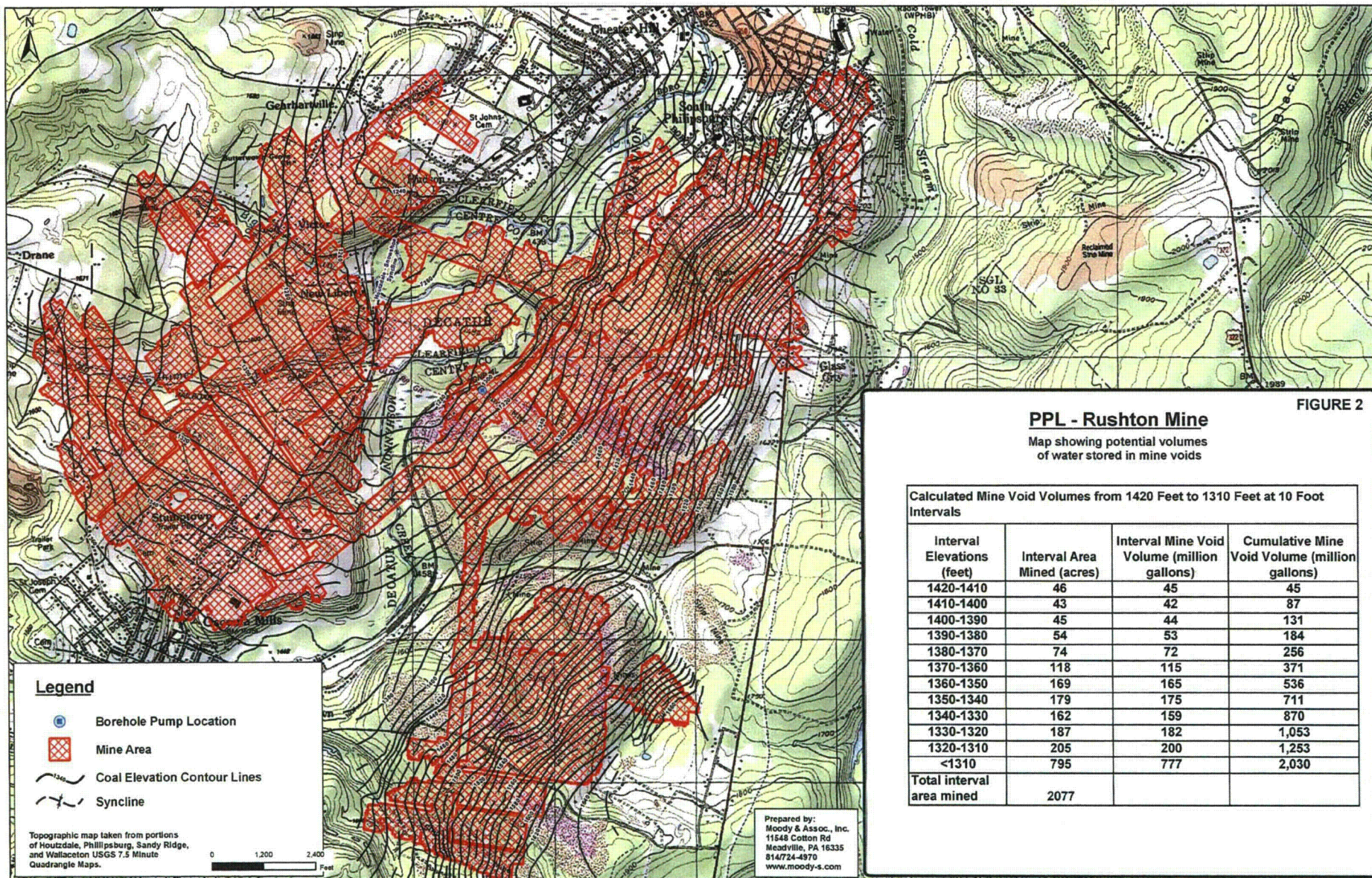
Map showing the locations of Rushton
and Greenwich North mines

Legend

-  Mine Area
-  County Boundary



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Rushton Mine Draw Down Test Monitoring Points

Prepared by: Moody and Associates, Inc.

FIGURE 4
PPL - Rushton Mine

Comparison of the 30 year Normal monthly rainfall to the monthly averages for the below normal period from 1999 to 2001, the above normal period from 2002 to 2004 and the 2005 data

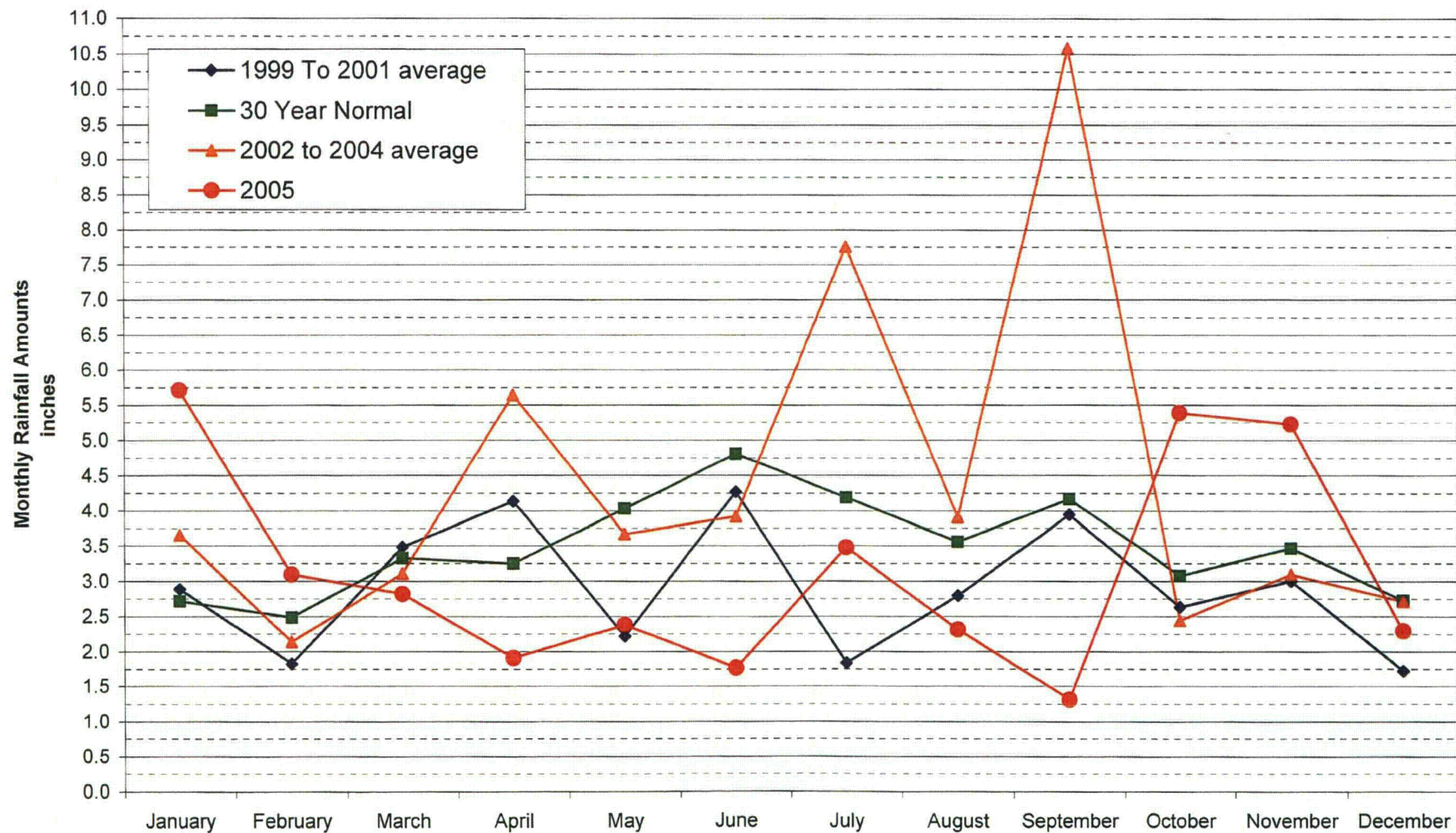


TABLE 2 is a listing of the data used to prepare this graph

Prepared by: Moody and Associates, Inc.

FIGURE 5
PPL - Rushton Mine Pump Test
Graph showing the mine pool elevation

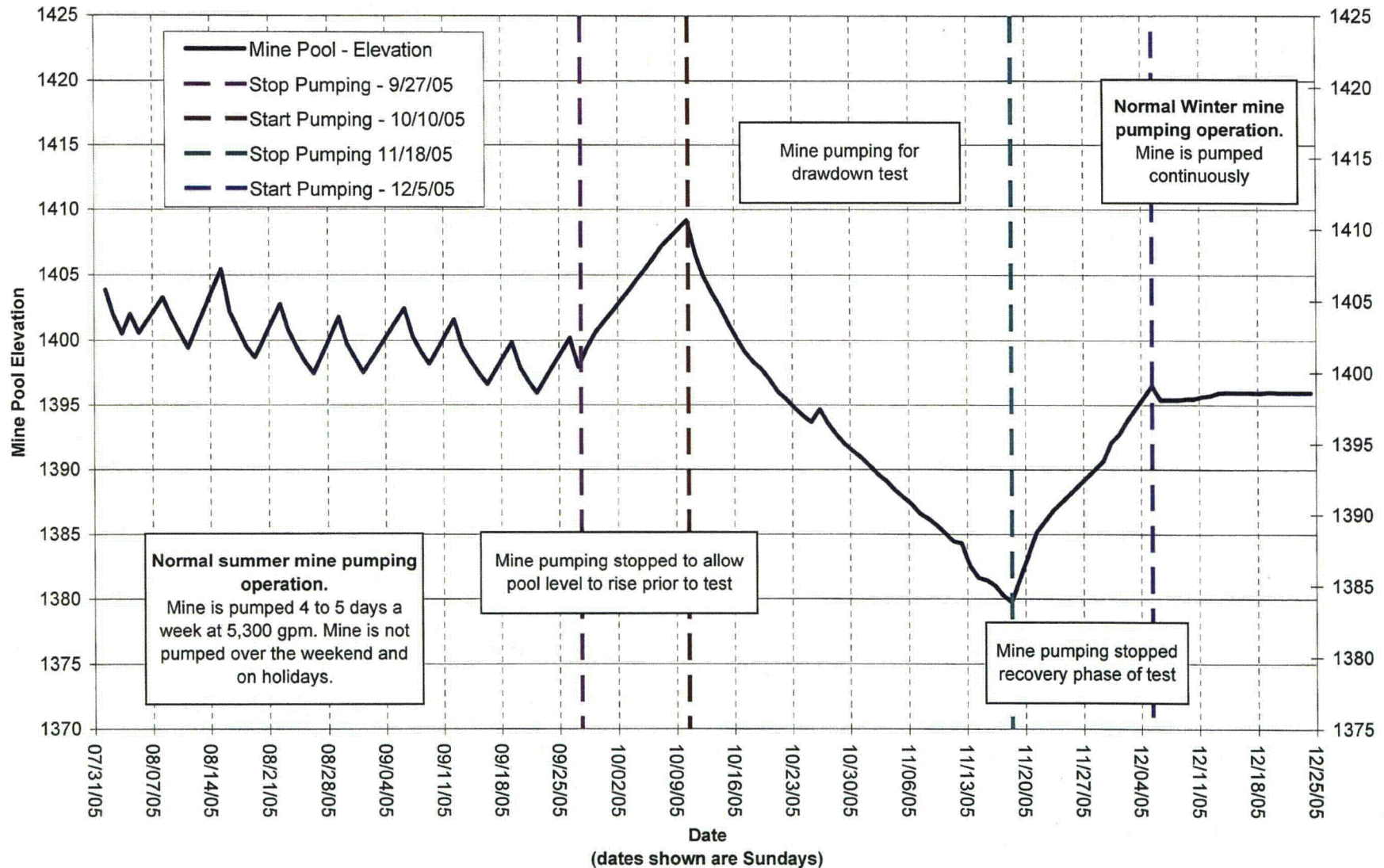
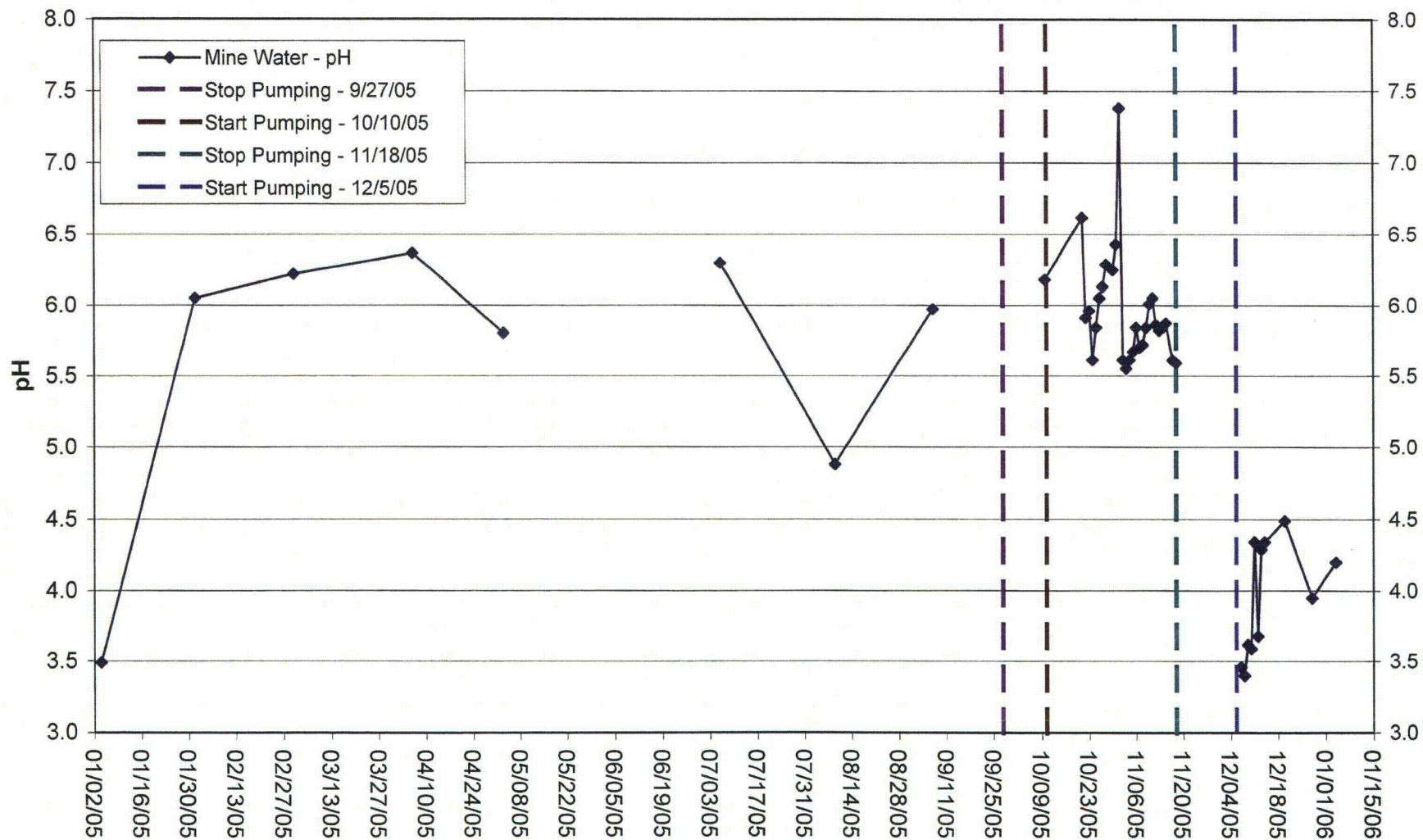


TABLE 3 is a listing of the data shown in this graph

Prepared by: Moody and Associates, Inc.

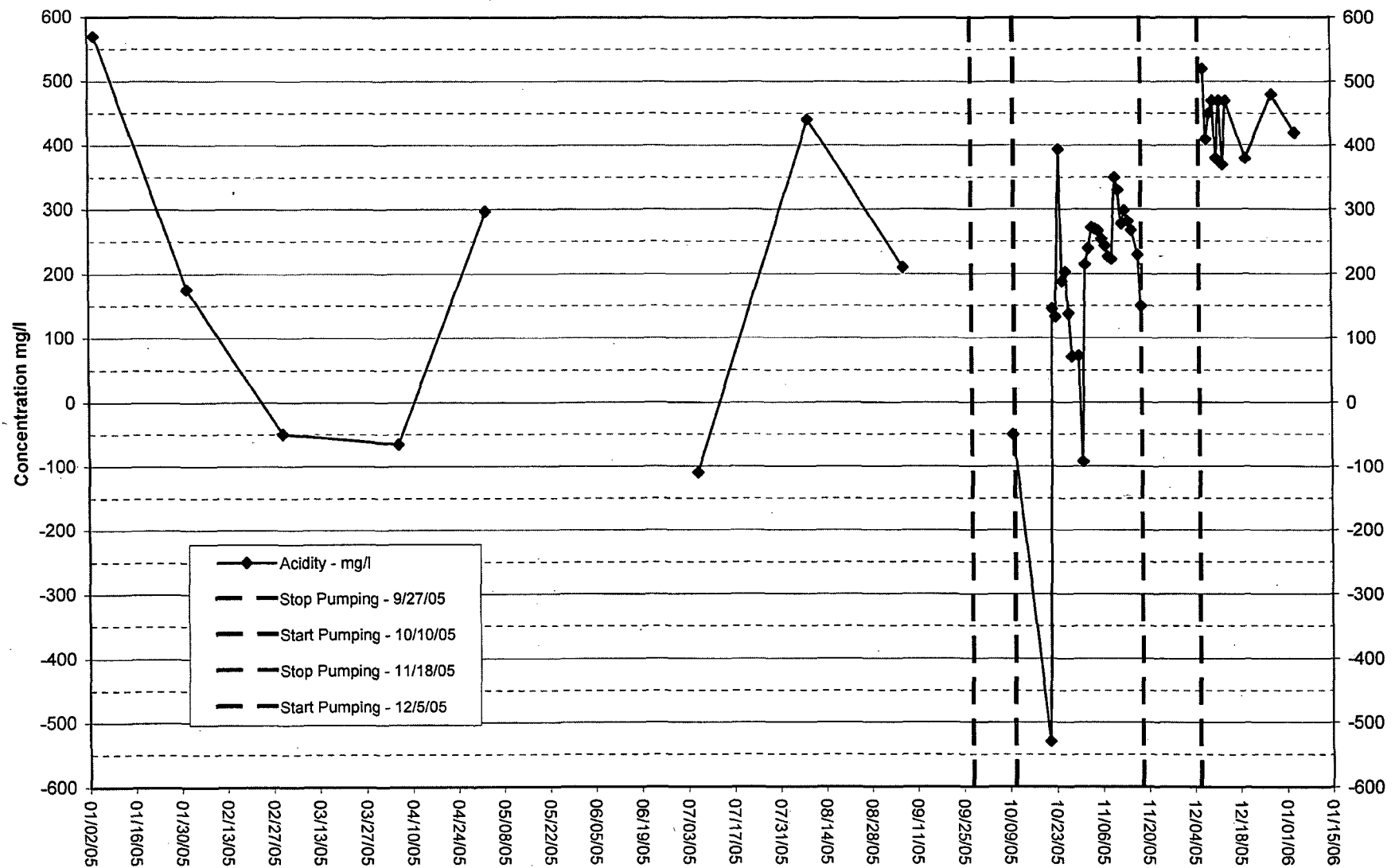
FIGURE 6
PPL - Rushton Mine
Mine Water - pH Levels



The location of the raw water monitoring point is shown on FIGURE 3.
 The data shown on this graph is listed in TABLE 4.

Prepared By: Moody and Associates, Inc.

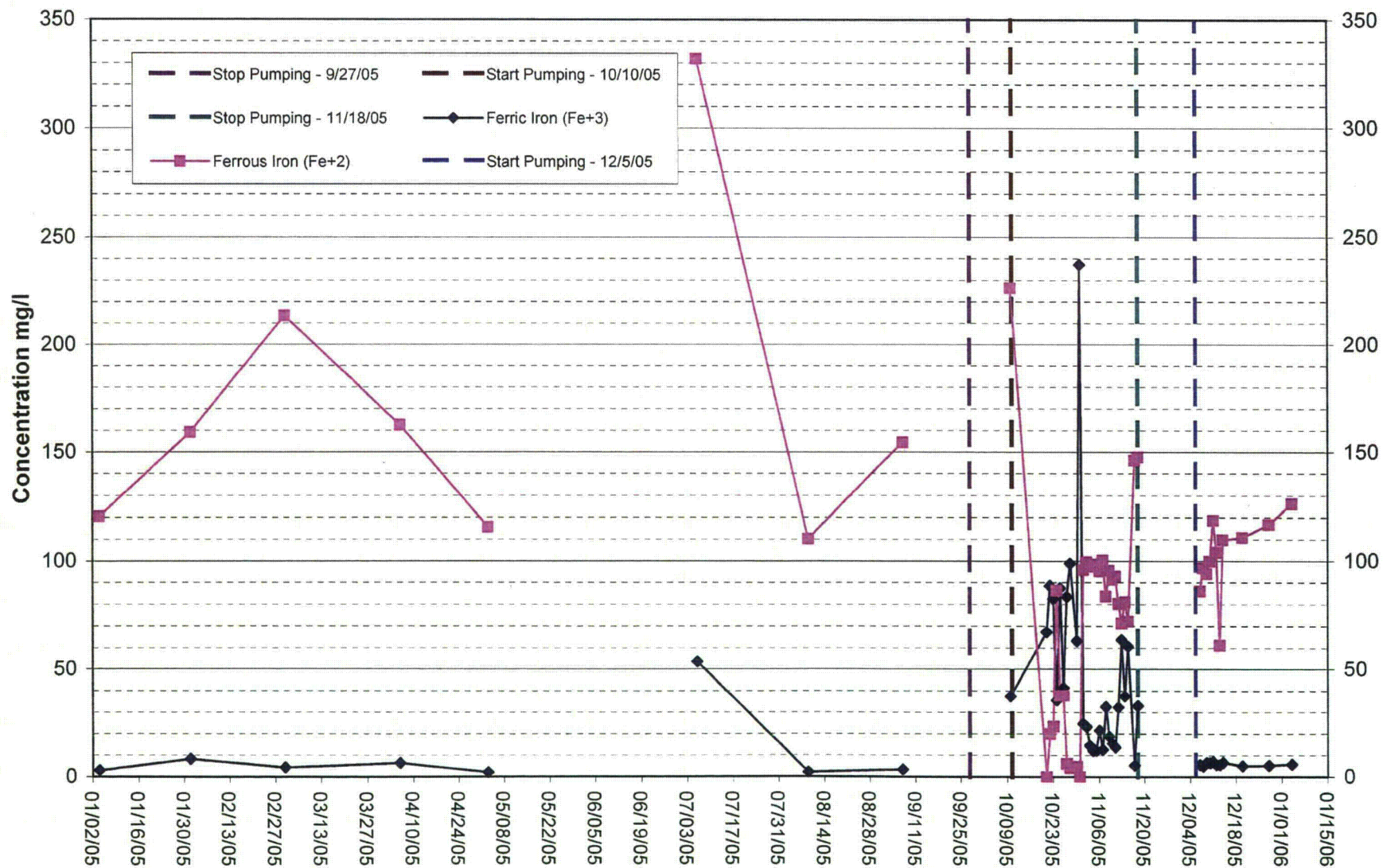
FIGURE 7
PPL - Rushton Mine
Mine Water - Acidity



The location of the raw water monitoring point is shown on FIGURE 3. The data shown on this graph is listed in TABLE 4.

- Prepared By: Moody and Associates, Inc.

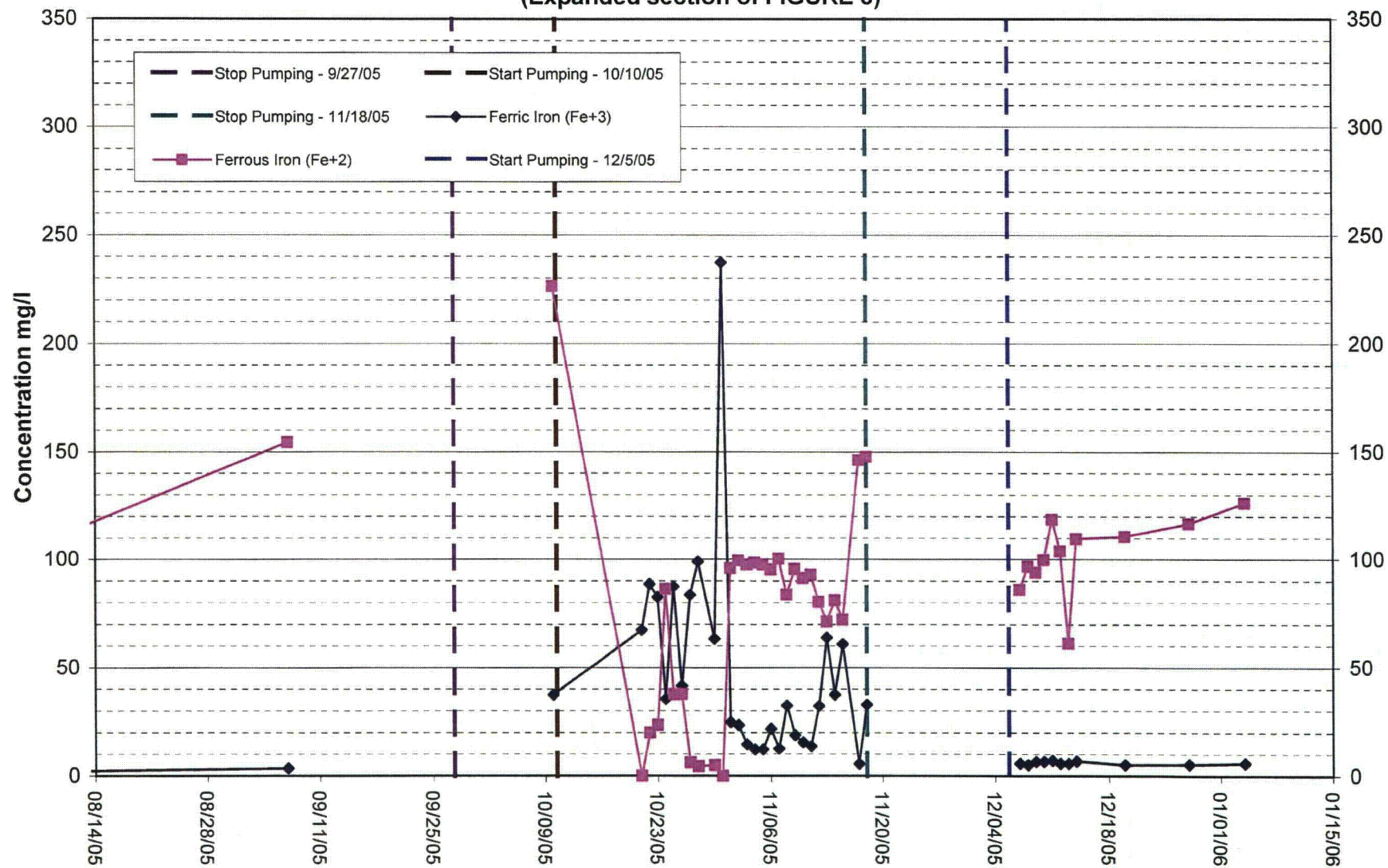
FIGURE 8
PPL - Rushton Mine
Mine Water - Iron concentrations



The location of the raw water monitoring point is shown on FIGURE 3. The data shown on this graph is listed in TABLE 4.

Prepared By: Moody and Associates, Inc.

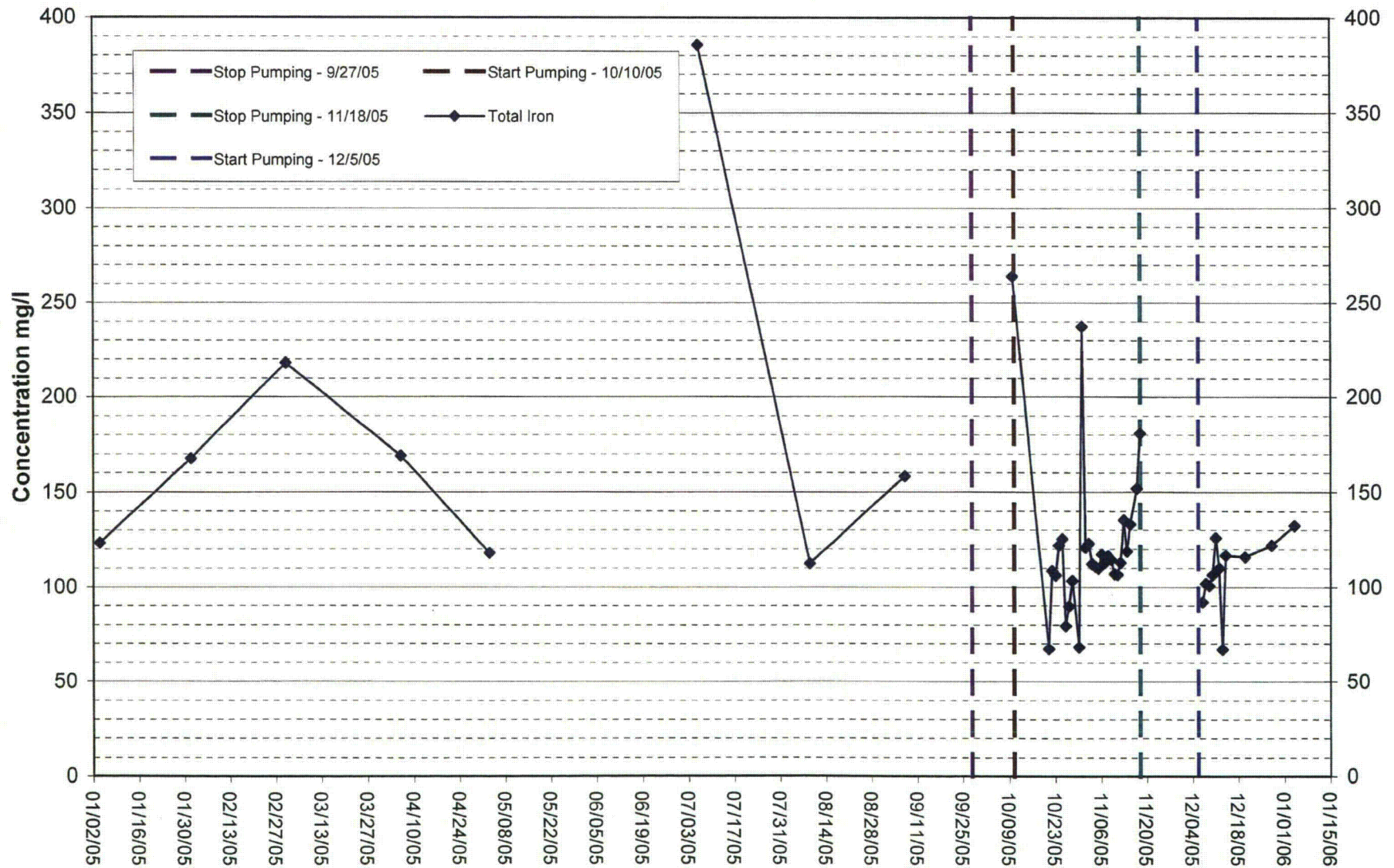
FIGURE 8A
PPL - Rushton Mine
Mine Water - Iron concentrations
(Expanded section of FIGURE 8)



The location of the raw water monitoring point is shown on FIGURE 3. The data shown on this graph is listed in TABLE 4.

Prepared By: Moody and Associates, Inc.

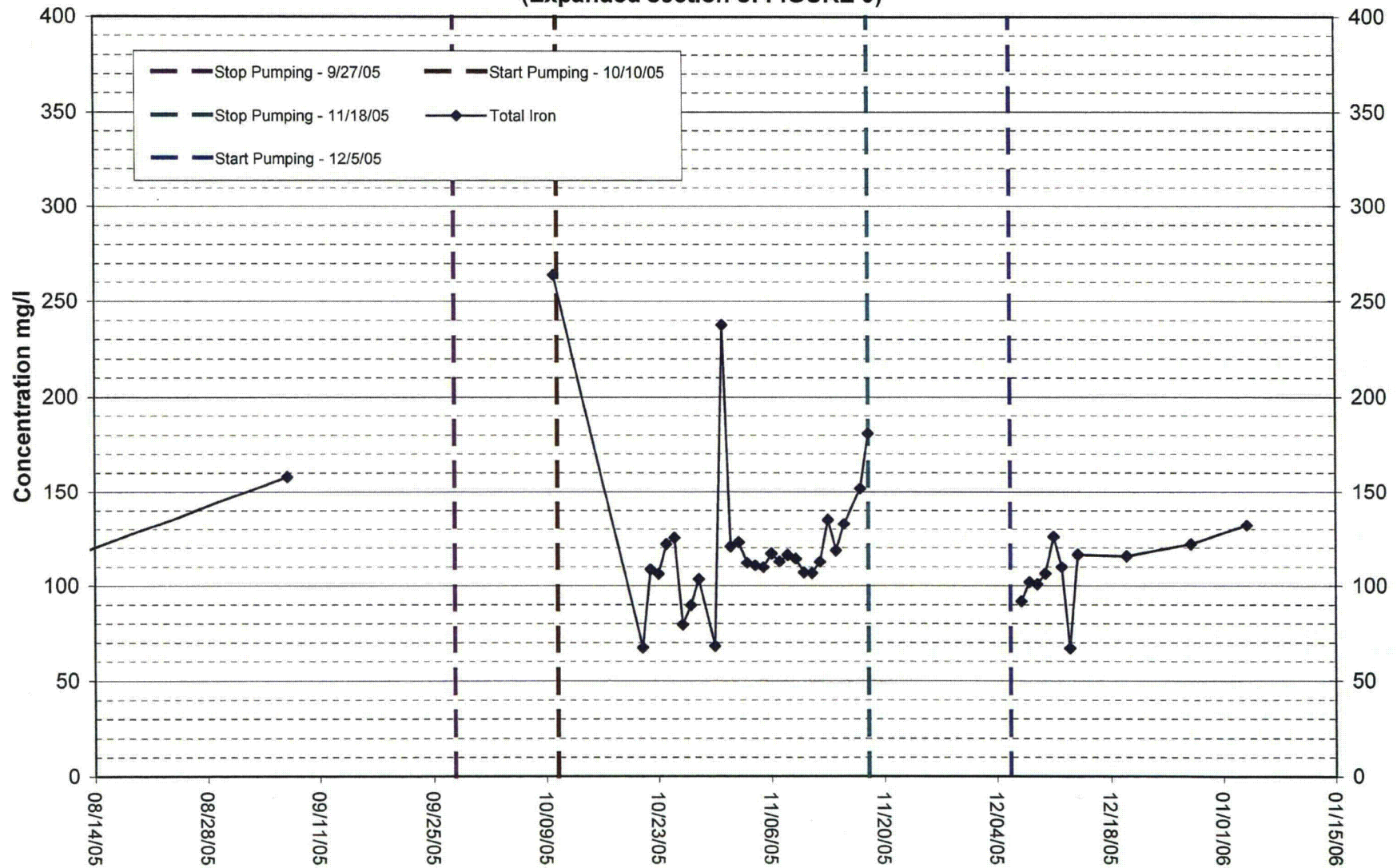
FIGURE 9
PPL - Rushton Mine
Mine Water - Total Iron concentrations



The location of the raw water monitoring point is shown on FIGURE 3. The data shown on this graph is listed in TABLE 4.

Prepared By: Moody and Associates, Inc.

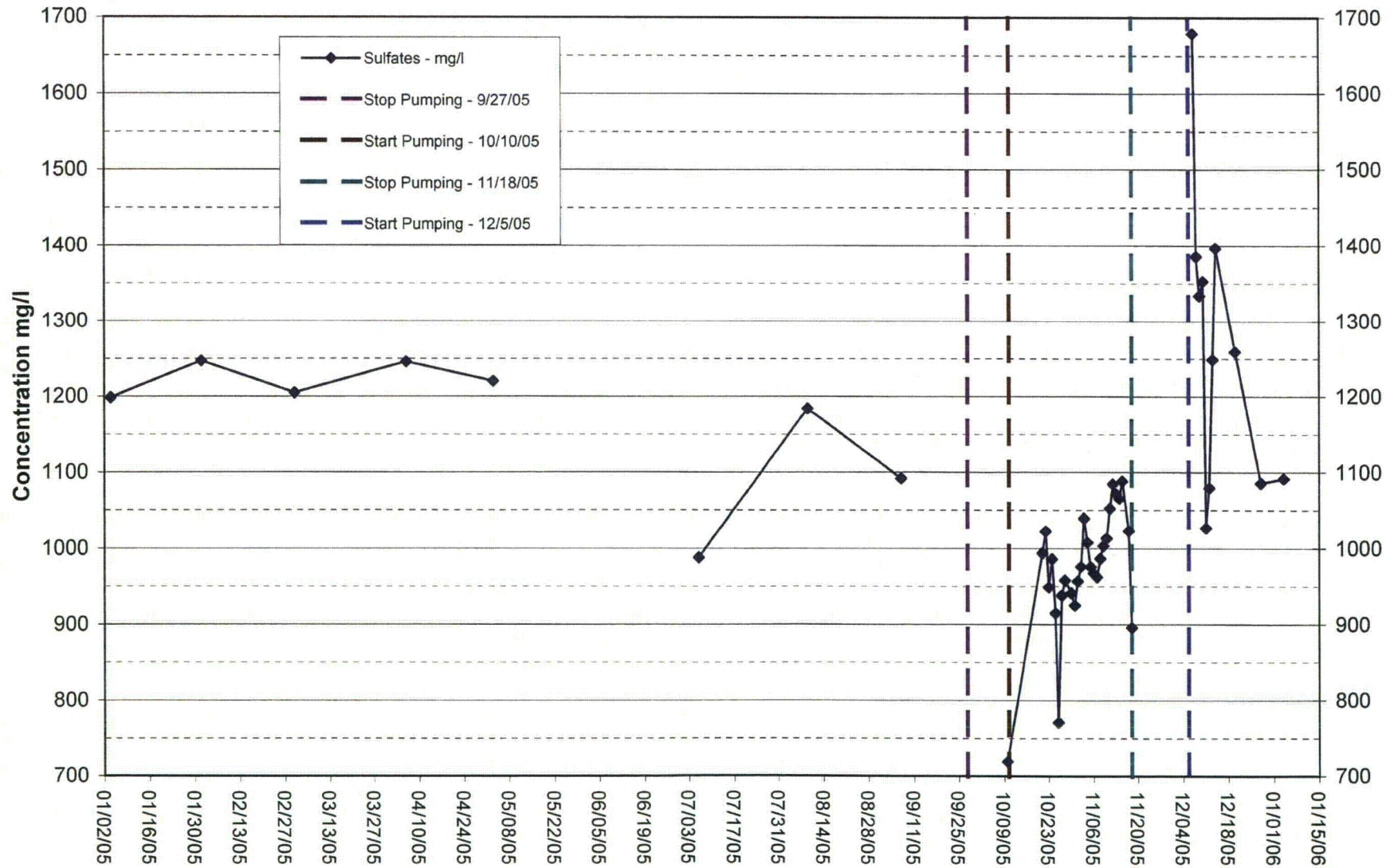
FIGURE 9A
PPL - Rushton Mine
Mine Water - Total Iron concentrations
(Expanded section of FIGURE 9)



The location of the raw water monitoring point is shown on FIGURE 3. The data shown on this graph is listed in TABLE 4.

Prepared By: Moody and Associates, Inc.

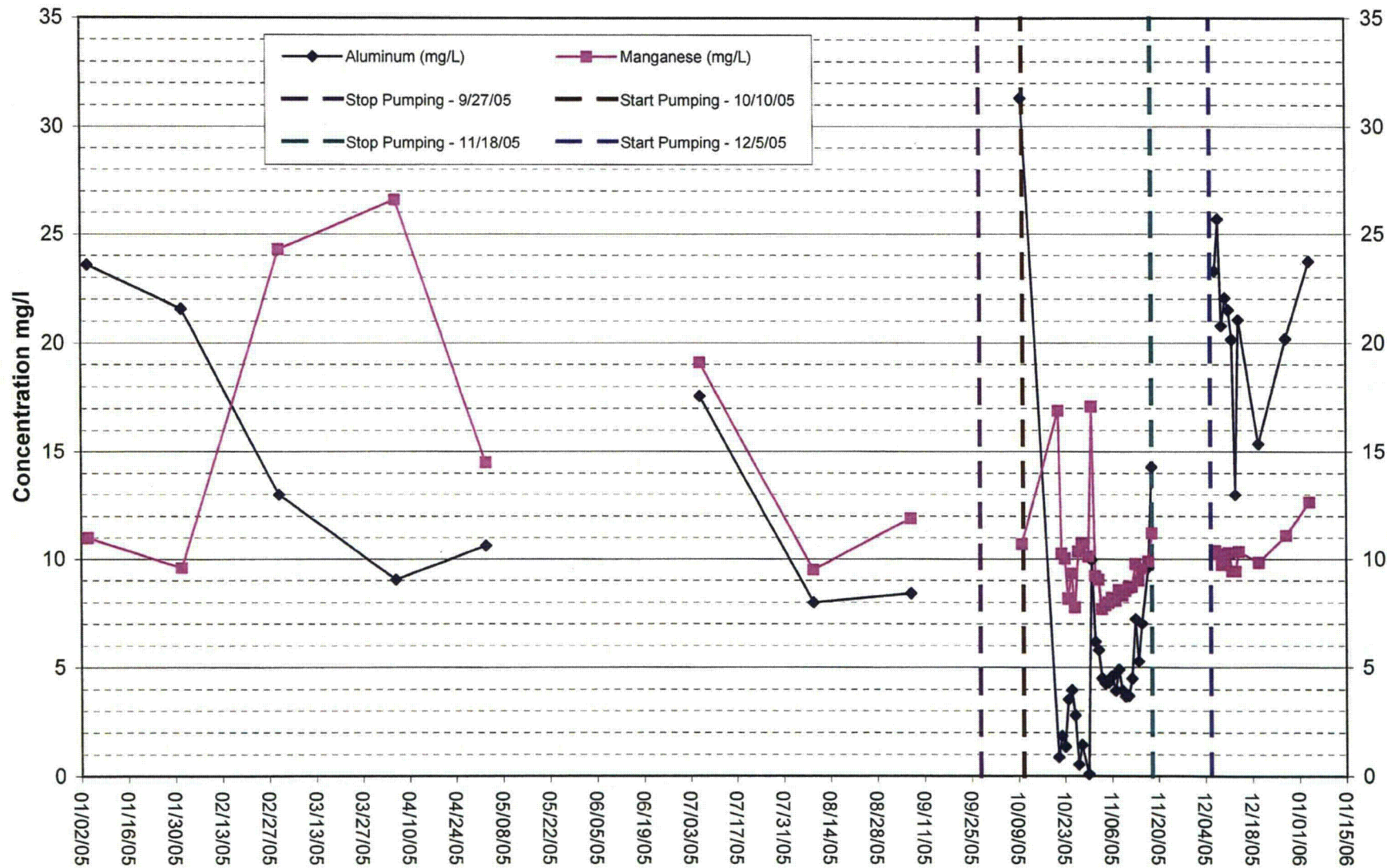
FIGURE 10
PPL - Rushton Mine
Mine Water - Sulfate concentration



The location of the raw water monitoring point is shown on FIGURE 3. The data shown on this graph is listed in TABLE 4.

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FIGURE 11
PPL - Rushton Mine
Mine Water Aluminum and Manganese concentrations

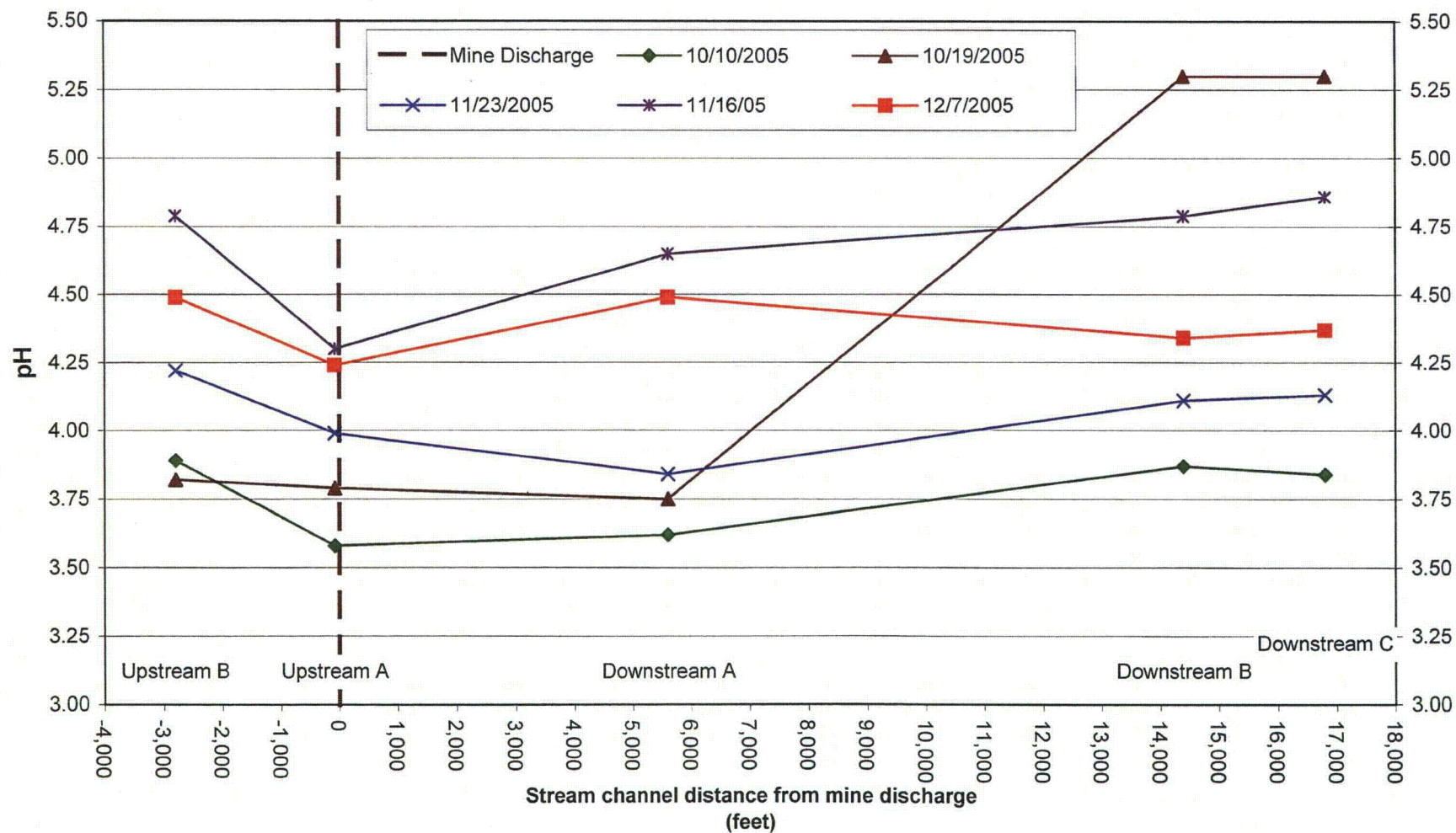


The location of the raw water monitoring point is shown on FIGURE 3. The data shown on this graph is listed in TABLE 4.

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FIGURE 12
PPL - Rushton Mine

Comparison of pH in Moshannon Creek at monitoring points upstream and downstream from the treated mine water discharge point.



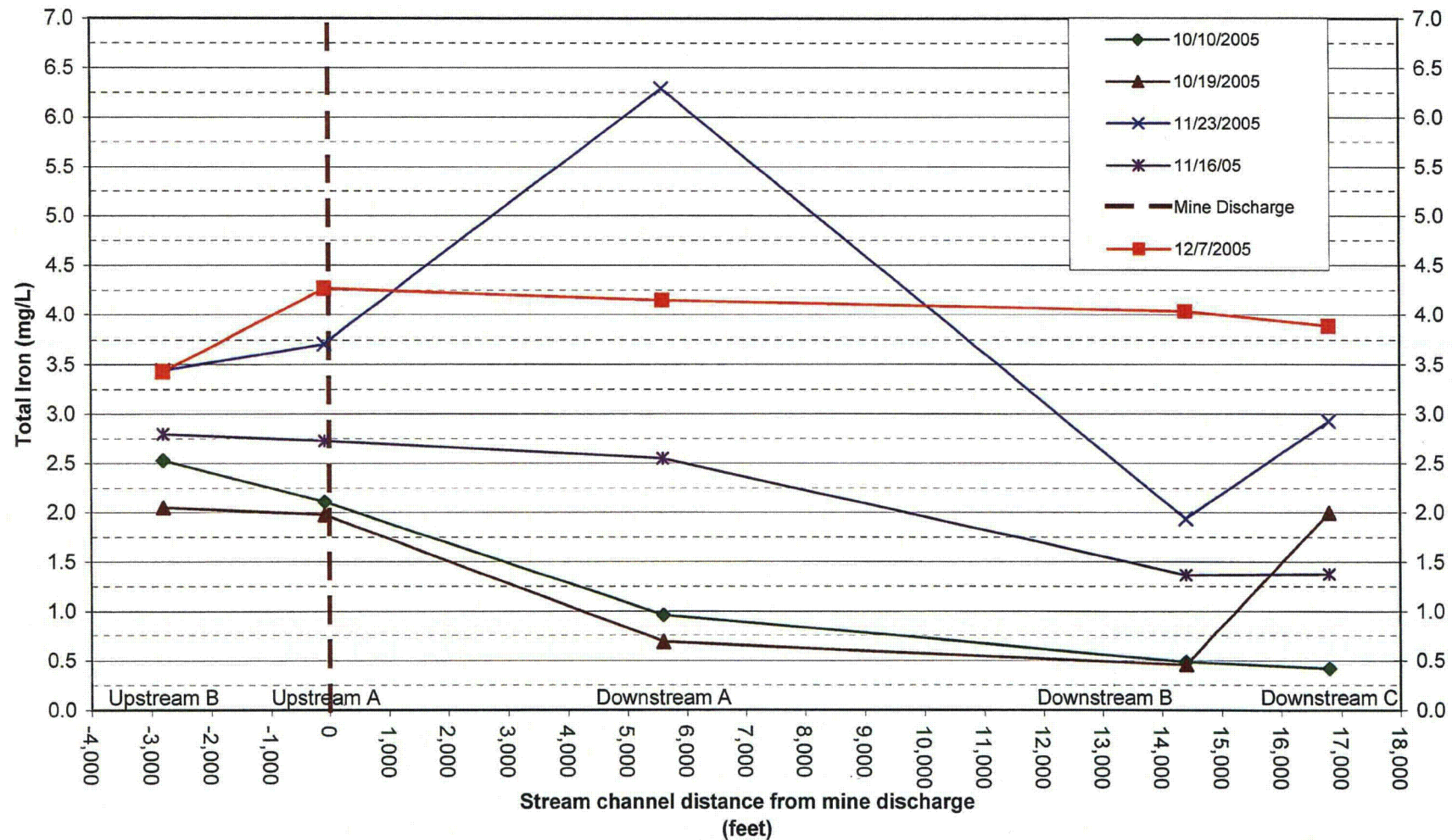
The location of the stream monitoring points are shown on FIGURE 3.
The data shown on this graph is listed in TABLES 5 to 9.

Prepared By: Moody and Associates, Inc.

FIGURE 13

PPL - Rushton Mine

Comparison of Total Iron in Moshannon Creek at monitoring points upstream and downstream from the treated mine water discharge point.



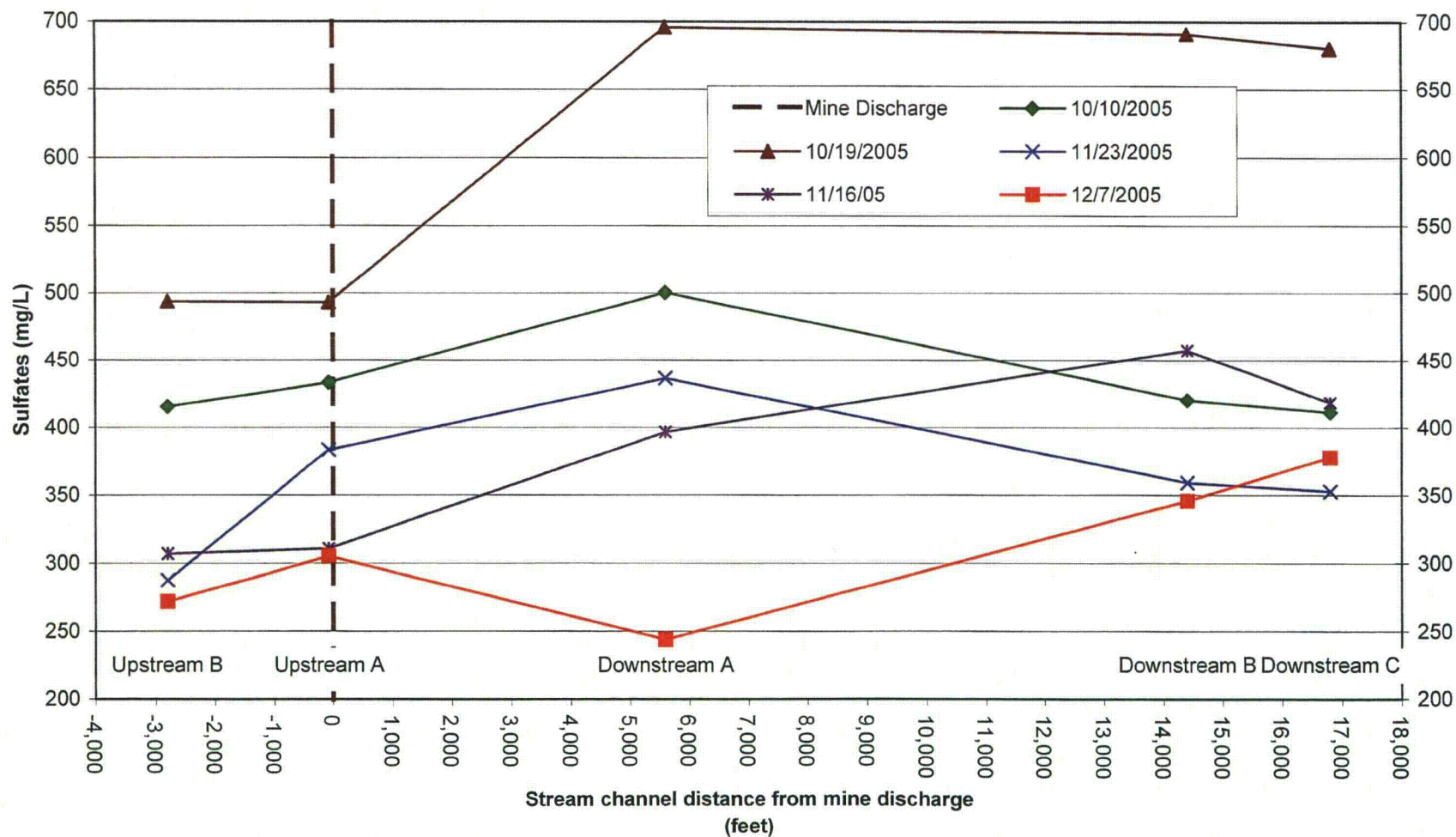
The location of the stream monitoring points are shown on FIGURE 3.
The data shown on this graph is listed in TABLES 5 to 9

Prepared By: Moody and Associates, Inc.

FIGURE 14

PPL - Rushton Mine

Comparison of Sulfates in Moshannon Creek at monitoring points upstream and downstream from the treated mine water discharge point.



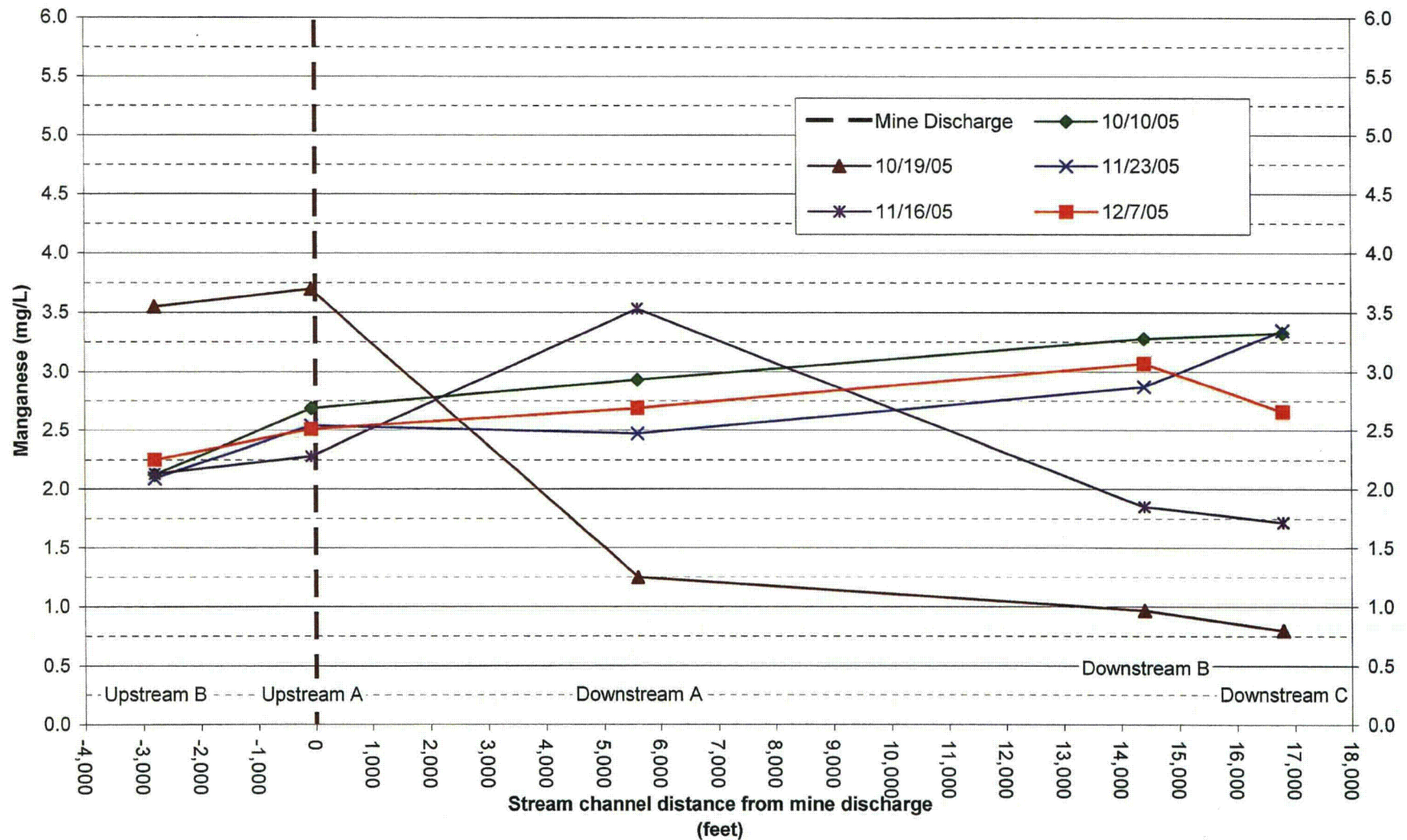
The location of the stream monitoring points are shown on FIGURE 3
The data shown on this graph is listed in TABLES 5 to 9.

Prepared By: Moody and Associates, Inc.

FIGURE 15

PPL - Rushton Mine

Comparison of aluminum in Moshannon Creek at monitoring points upstream and downstream from the treated mine water discharge point.

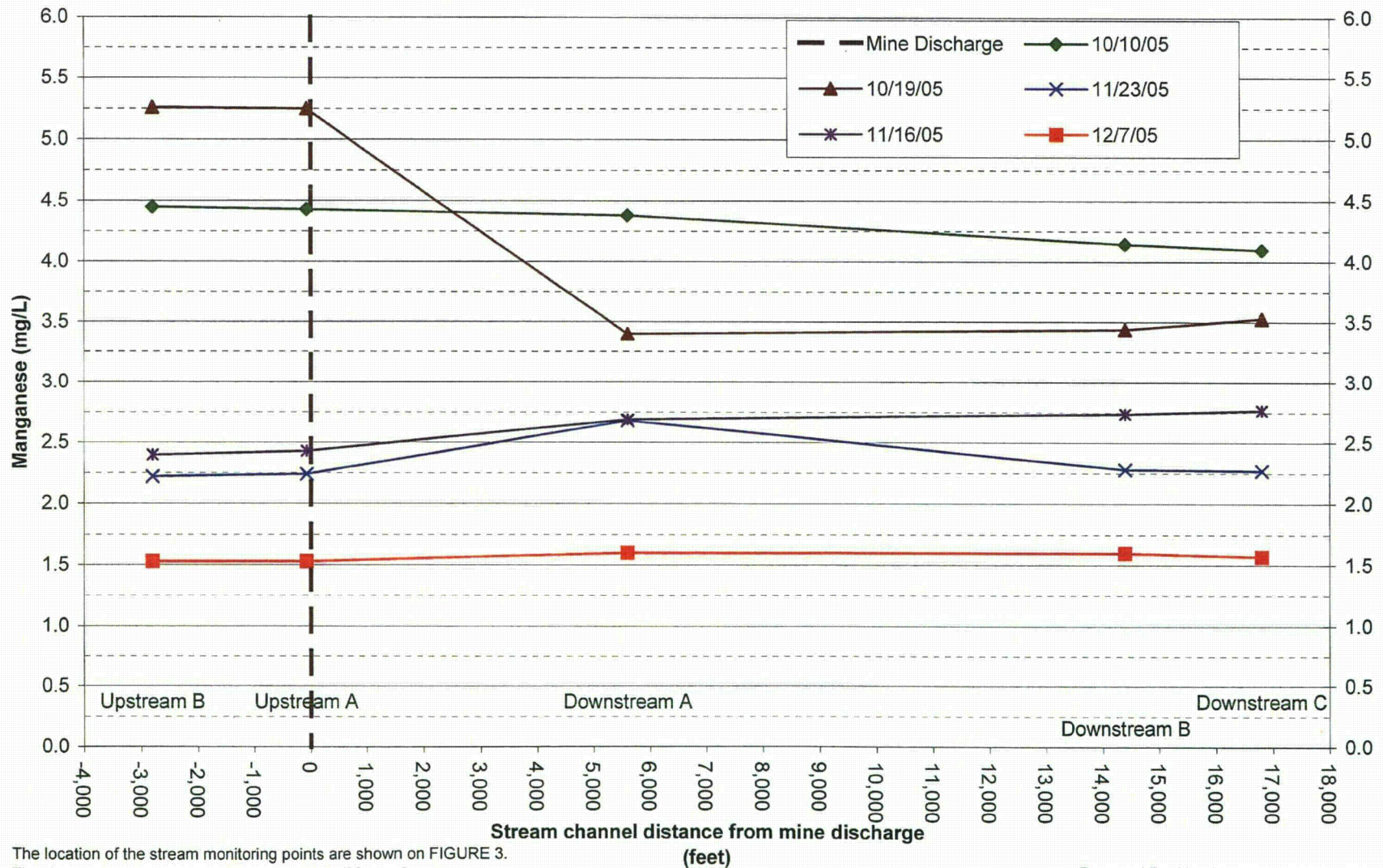


The location of the stream monitoring points are shown on FIGURE 3.
The data shown on this graph is listed in TABLES 5 to 9.

Prepared By: Moody and Associates, Inc.

FIGURE 16
PPL - Rushton Mine

Comparison of Manganese in Moshannon Creek at monitoring points upstream and downstream from the treated mine water discharge point.



The location of the stream monitoring points are shown on FIGURE 3.
The data shown on this graph is listed in TABLES 5 to 9.

Prepared By: Moody and Associates, Inc.

FIGURE 17

PPL - Rushton Mine

Graph showing the changes in the ground water elevation in the refuse pile ground water monitoring wells

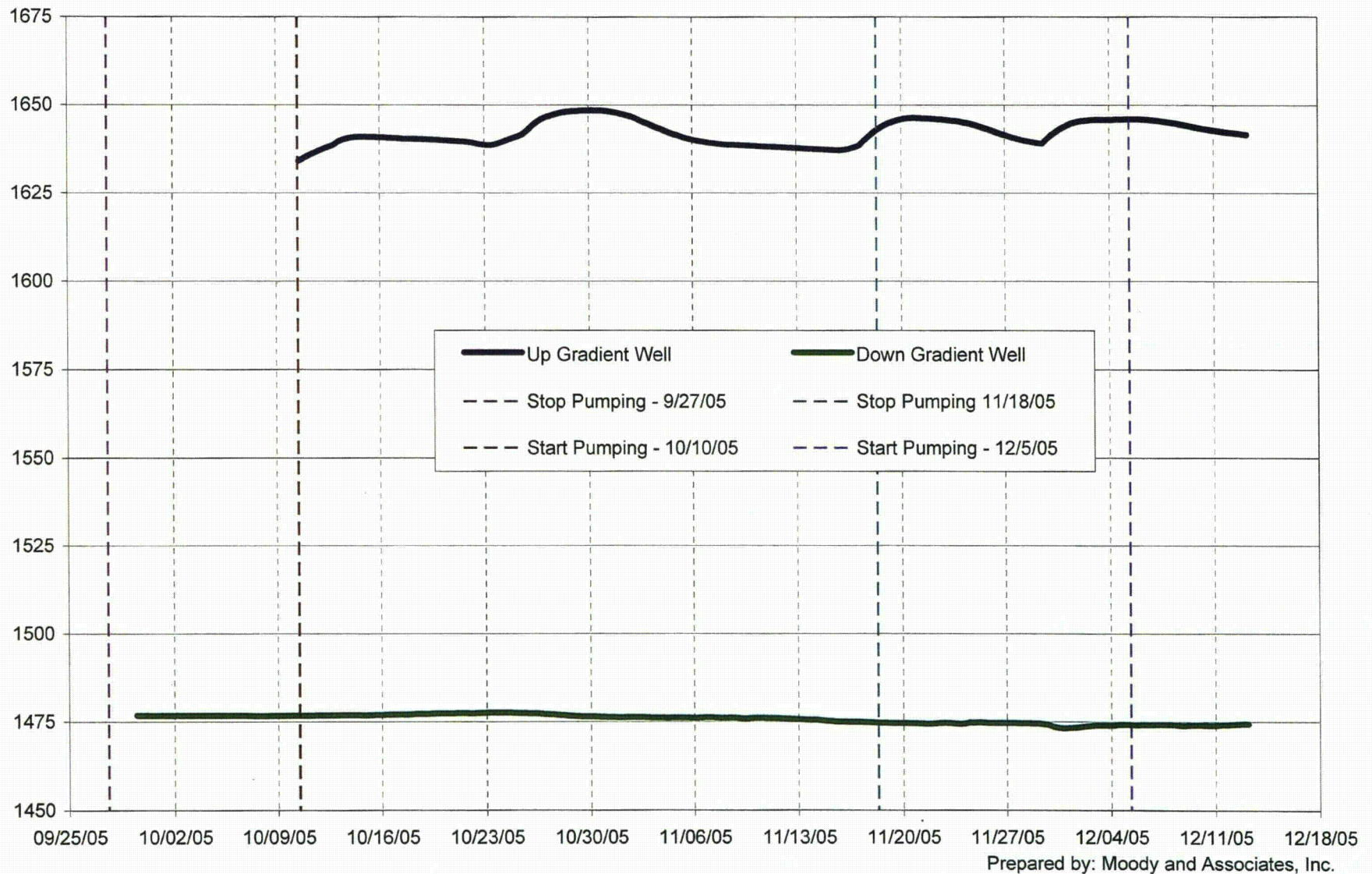


TABLE 1

PPL – Rushton Mine
Monitoring points utilized during the mine pump test

Monitoring Point ID	Type of monitoring point	Frequency of monitoring & Monitoring period	Description
Rushton Mine			
Rushton Mine shaft	Rushton Mine pool elevation and water quality	Pool elevation was monitored continuously using a pressure transducer and data logger and the mine water quality was monitored during pumping phase	Mine shaft in which pumps are located. Point at which mine pool is currently monitored
Sleepy Hollow Bore Hole	Rushton Mine pool elevation	Continuously using a pressure transducer and data logger	Existing mine pool elevation monitoring point
Moshannon Creek			
Upstream A	Stream flow and water quality	Stream flow and water quality were monitored weekly.	Existing stream flow point
Upstream B			New stream flow point
Downstream A			Existing stream flow point
Downstream B			New stream flow point
Downstream C			New stream flow point
Overlying Abandoned Mines			
Bigelow Mine Air Shaft	Mine pool elevation and discharge quality	Pool elevation was monitored continuously using a pressure transducer and data logger. Discharge quality was monitored weekly	Mine pool elevation in mine overlying the Rushton Mine
Moshannon Mine #1 Seep	Mine discharge	The mine seep flow and quality were monitored weekly	Mine discharge from mine overlying the Rushton Mine
Ground Water Monitoring Points			
Refuse Pile Up gradient well	Ground water elevation	Continuously using a pressure transducer and data logger	Existing ground water monitoring point at Rushton Mine refuse disposal area.
Refuse Pile Down gradient well	Ground water elevation	Continuously using a pressure transducer and data logger	Existing ground water monitoring point at Rushton Mine refuse disposal area.

TABLE 2
PPL - Rushton Mine

Summary of monthly rainfall amounts for Phillipsburg, Pennsylvania

	30 year Normal	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
January	2.72	3.45	5.45	2.5		5.38	1.45	1.83	1.84	2.36	3.66	5.71
February	2.49	2.21	2	1.95		1.49	2.83	1.16	1.37	2.99	2.14	3.1
March	3.33	1.51	2.8			3.62	2.72	4.11	4.62	2.88	3.11	2.82
April	3.25	3.5	5.4		6.9	4.18	5.06	3.17	2.98	3.02	5.64	1.91
May	4.03	5.14	4.55		3.67	1.27	3.36	2.02	6.42	5.12	3.67	2.38
June	4.81	3.57	5.35		3.56	3.43	5.51	3.88	8.27	4.46	3.92	1.77
July	4.19	2.97	4.53		2.36	1.77	1.4	2.33	1.33	6.05	7.76	3.48
August	3.56	1.19			2.8	3.25	3.25	1.89	1.24	10.08	3.91	2.32
September	4.17	1.98	11.07		1.58	5.36	3.18	3.3	3.31	8.37	10.59	1.32
October	3.08	4.33	4.55		2.28	1.91	3.41	2.58	4.27	3.59	2.45	5.39
November	3.47	5.3	4.05		1.01	4.1	2.48	2.44	2.63	5.05	3.1	5.23
December	2.73	2.05	5.25		1.7	1.59	1.75	1.84	3.01	4.16	2.72	2.3
Total	41.83	37.2	55			37.35	36.4	30.55	41.29	58.13	52.67	37.73

	30 year Normal	Low precipitation or drought years				Normal to above average years				
		1999	2000	2001	Average	2002	2003	2004	Average	
January	2.72	5.38	1.45	1.83	2.89	1.84	2.36	3.66	2.62	5.71
February	2.49	1.49	2.83	1.16	1.83	1.37	2.99	2.14	2.17	3.1
March	3.33	3.62	2.72	4.11	3.48	4.62	2.88	3.11	3.54	2.82
April	3.25	4.18	5.06	3.17	4.14	2.98	3.02	5.64	3.88	1.91
May	4.03	1.27	3.36	2.02	2.22	6.42	5.12	3.67	5.07	2.38
June	4.81	3.43	5.51	3.88	4.27	8.27	4.46	3.92	5.55	1.77
July	4.19	1.77	1.4	2.33	1.83	1.33	6.05	7.76	5.05	3.48
August	3.56	3.25	3.25	1.89	2.80	1.24	10.08	3.91	5.08	2.32
September	4.17	5.36	3.18	3.3	3.95	3.31	8.37	10.59	7.42	1.32
October	3.08	1.91	3.41	2.58	2.63	4.27	3.59	2.45	3.44	5.39
November	3.47	4.1	2.48	2.44	3.01	2.63	5.05	3.1	3.59	5.23
December	2.73	1.59	1.75	1.84	1.73	3.01	4.16	2.72	3.30	2.3
Total	41.83	37.35	36.4	30.55	34.77	41.29	41.29	58.13	46.90	37.73

The 30 year normal is calculated by the US National Oceanic & Atmospheric Administration for the time period from 1971 to 2000.

FIGURE 4 is a graph of the precipitation data

Prepared by: Moody and Associates, Inc.

TABLE 3
PPL - Rushton Mine
Mine Pool Elevation Data

Date / Time	Elevation ft MSL	Change feet	Date / Time	Elevation ft MSL	Change feet	Date / Time	Elevation ft MSL	Change feet
Pump on during the week and off on the week end			9/27/05 7:30	1397.95	2.25	11/8/05 8:00	1386.20	0.38
			Pump off - 9/27/05 15:00			11/9/05 8:05	1385.70	0.50
8/1/05 8:40	1403.87		9/28/05 7:40	1399.45	-1.50	11/10/05 7:30	1385.12	0.58
8/2/05 7:45	1401.95	1.92	9/29/05 8:00	1400.62	-1.17	11/11/05 7:15	1384.45	0.67
8/3/05 8:20	1400.53	1.42	9/30/05 7:10	1401.37	-0.75	11/12/05 7:40	1384.28	0.17
8/4/05 8:05	1402.03	-1.50	10/3/05 7:20	1403.78	-2.42	11/13/05 8:40	1382.53	1.75
8/5/05 9:20	1400.58	1.46	10/4/05 7:15	1404.62	-0.83	11/14/05 8:10	1381.66	0.88
8/8/05 6:00	1403.28	-2.71	10/6/05 7:05	1406.28	-1.67	11/15/05 8:45	1381.45	0.21
8/9/05 7:40	1401.78	1.50	10/7/05 7:20	1407.20	-0.92	11/16/05 8:05	1381.03	0.42
8/10/05 7:30	1400.62	1.17	10/10/05 6:40	1409.20	-2.00	11/17/05 7:40	1380.28	0.75
8/11/05 7:40	1399.45	1.17	Pump on - 10/10/05 10:45			11/18/05 7:10	1379.78	0.50
8/15/05 7:10	1405.45	-6.00	10/11/05 7:30	1406.62	2.58	Pump off - 11/18/05		
8/16/05 7:40	1402.20	3.25	10/12/05 7:45	1404.87	1.75	11/21/05 7:15	1385.16	-5.38
8/17/05 8:00	1400.83	1.38	10/13/05 7:30	1403.62	1.25	11/23/05 7:20	1386.83	-1.67
8/18/05 7:40	1399.53	1.29	10/14/05 8:05	1402.53	1.08	11/29/05 9:30	1390.68	-3.86
8/19/05 7:30	1398.70	0.83	10/15/05 8:30	1401.24	1.29	11/30/05 7:30	1392.10	-1.42
8/22/05 8:15	1402.78	-4.08	10/16/05 9:15	1400.12	1.13	12/1/05 7:40	1392.76	-0.66
8/23/05 7:40	1400.78	2.00	10/17/05 8:05	1399.12	1.00	12/2/05 7:10	1393.79	-1.03
8/24/05 8:45	1399.45	1.33	10/18/05 9:00	1398.33	0.79	12/5/05 7:30	1396.51	-2.72
8/25/05 7:20	1398.37	1.08	10/19/05 7:30	1397.78	0.54	Pump on 12/5/05		
8/26/05 7:40	1397.45	0.92	10/20/05 7:30	1396.95	0.83	12/6/05 8:00	1395.43	1.08
8/29/05 8:00	1401.78	-4.33	10/21/05 7:30	1396.03	0.92	12/7/05 7:30	1395.43	0.00
8/30/05 7:40	1399.78	2.00	10/22/05 7:45	1395.45	0.58	12/8/05 7:40	1395.43	0.00
8/31/05 8:10	1398.62	1.17	10/23/05 7:30	1394.78	0.67	12/9/05 11:40	1395.51	-0.08
9/1/05 7:40	1397.53	1.08	10/24/05 8:45	1394.16	0.63	12/10/05 7:15	1395.51	0.00
9/6/05 6:40	1402.45	-4.92	10/25/05 8:00	1393.70	0.46	12/11/05 8:20	1395.68	-0.17
9/7/05 7:30	1400.28	2.17	10/26/05 8:15	1394.70	-1.00	12/12/05 8:15	1395.76	-0.08
9/8/05 7:30	1399.12	1.17	10/27/05 7:45	1393.62	1.08	12/13/05 8:20	1395.97	-0.21
9/9/05 6:50	1398.20	0.92	10/28/05 8:10	1392.78	0.83	12/14/05 7:45	1396.01	-0.04
9/12/05 7:00	1401.62	-3.42	10/29/05 8:05	1392.03	0.75	12/15/05 7:45	1396.01	0.00
9/13/05 7:30	1399.53	2.08	10/30/05 8:25	1391.45	0.58	12/16/05 8:45	1396.01	0.00
9/14/05 7:15	1398.45	1.08	10/31/05 7:30	1390.95	0.50	12/17/05 7:45	1396.00	0.01
9/15/05 7:35	1397.45	1.00	11/1/05 7:55	1390.28	0.67	12/18/05 8:20	1395.97	0.03
9/16/05 7:40	1396.62	0.83	11/2/05 8:00	1389.62	0.67	12/19/05 7:40	1396.05	-0.08
9/19/05 7:15	1399.87	-3.25	11/3/05 7:45	1389.12	0.50	12/20/05 7:30	1396.01	0.04
9/20/05 7:40	1397.87	2.00	11/4/05 7:00	1388.45	0.67	12/21/05 7:40	1396.01	0.00
9/21/05 7:20	1396.87	1.00	11/5/05 7:30	1387.87	0.58	12/24/05 7:45	1396.01	0.00
9/22/05 7:30	1395.95	0.92	11/6/05 8:05	1387.33	0.54			
9/26/05 7:10	1400.20	-4.25	11/7/05 8:05	1386.58	0.75			

Negative numbers indicate a drop in pool elevations and positive numbers are a rise in elevation

FIGURE 5 is a graph of this data.

Prepared by: Moody and Associates, Inc.

TABLE 4
PPL - Ruston Mine
Ruston Mine discharge water quality data

Parameters	pH	Specific Conductance	Aluminum	Acidity	Alkalinity	Sulfates	Suspended Solids	Dissolved Solids	Manganese	Ferrous Iron (Fe ⁺²)	Ferric Iron (Fe ⁺³)	Total Iron
1/4/2005	3.49	1770.00	23.60	570.00	0.00	1198.60	18.00	NA	11.00	120.40	3.00	123.40
2/1/2005	6.05	2000.00	21.58	176.00	10.00	1247.30	370.00	NA	9.60	159.20	8.40	167.60
3/2/2005	6.22	1850.00	12.99	-49.00	119.00	1205.10	451.00	NA	24.30	213.50	4.50	218.00
4/6/2005	6.37	1680.00	9.04	-65.00	169.00	1246.10	170.00	NA	26.60	162.50	6.50	169.00
5/3/2005	5.80	1710.00	10.62	297.00	25.00	1220.10	105.60	NA	14.50	115.60	2.20	117.80
6/2/2005												
7/6/2005	6.30	1480.00	17.56	-110.00	140.00	988.30	550.00	NA	19.10	332.00	53.50	385.50
8/9/2005	4.88	1550.00	8.00	440.00	7.00	1184.20	28.00	NA	9.50	110.20	2.20	112.40
9/7/2005	5.97	1470.00	8.41	210.00	18.00	1092.40	181.00	NA	11.90	154.50	3.50	158.00
10/10/2005	6.18	1160.00	31.33	-50.00	64.00	719.21	642.00	NA	10.70	226.50	37.50	264.00
10/21/2005	6.62	1450.00	0.89	-529.00	589.00	994.63	1270.00	NA	16.90	0.08	67.32	67.40
10/22/2005	5.91	1500.00	1.86	146.00	24.00	1022.70	248.00	NA	10.26	20.04	88.56	108.60
10/23/2005	5.96	1400	1.37	134	24	949.04	220.4	NA	10.04	23.65	82.55	106.20
10/24/2005	5.61	1430.00	3.54	394.00	24.00	986.68	30.40	NA	8.18	86.40	35.60	122.00
10/25/2005	5.84	1380.00	3.98	189.00	19.00	915.09	175.00	1263.00	9.34	37.85	87.55	125.40
10/26/2005	6.05	1180.00	2.81	203.00	13.00	771.34	56.80	1148.00	7.78	37.95	41.55	79.50
10/27/2005	6.13	1380.00	0.54	138.00	62.00	938.02	304.00	1385.00	10.35	6.23	83.57	89.80
10/28/2005	6.29	1390.00	1.45	72.00	92.00	957.98	560.00	1428.00	10.75	4.50	98.90	103.40
10/30/2005	6.25	1395.00	0.10	73.00	65.00	941.19	330.00	1412.00	10.15	5.02	63.28	68.30
10/31/2005	6.43	1600.00	9.98	-92.00	158.00	925.46	522.00	NA	17.10	0.13	237.37	237.50
11/1/2005	7.38	1420.00	6.20	215.00	14.00	956.81	96.00	NA	9.22	96.00	24.80	120.80
11/2/2005	5.61	1380.00	5.82	240.00	7.00	976.88	93.60	NA	9.06	99.60	23.40	123.00
11/3/2005	5.55	1280.00	4.52	272.00	14.00	1039.66	64.00	NA	7.70	97.60	14.60	112.20
11/4/2005	5.61	1290.00	4.29	270.00	24.00	1008.10	64.00	NA	7.88	98.60	12.20	110.80
11/5/2005	5.67	1340.00	4.34	267.00	23.00	976.44	58.00	NA	8.00	97.60	12.20	109.80
11/6/2005	5.84	1390.00	4.61	254.00	28.00	967.72	82.00	NA	8.22	95.40	21.80	117.20
11/7/2005	5.70	1310.00	3.96	244.00	30.00	962.30	62.00	NA	8.10	100.40	12.60	113.00
11/8/2005	5.72	1305.00	4.90	227.00	19.00	987.46	127.00	NA	8.56	83.80	32.60	116.40
11/9/2005	5.84	1300.00	3.97	223.00	31.00	1003.90	73.00	NA	8.34	95.60	18.80	114.40
11/10/2005	6.01	1265	3.68	350	0	1013.5	48	NA	8.54	91.4	15.6	107.00
11/11/2005	6.05	1250	3.7	330	0	1052.4	41.2	NA	8.7	92.9	13.7	106.60
11/12/2005	5.86	1280	4.51	278	40	1085	75	NA	8.72	80.4	32.4	112.80
11/13/2005	5.82	1480	7.24	298	34	1072	154	NA	9.78	71.4	63.8	135.20
11/14/2005	5.84	1400	5.28	282	40	1065.5	90	NA	9.02	81.2	37.6	118.80
11/15/2005	5.87	1500	7.03	268	36	1088.8	147	NA	9.58	72.2	60.8	133.00
11/17/2005	5.61	1280.00	9.63	230.00	4.00	1023.50	171.00	NA	9.90	146.20	5.60	151.80
11/18/2005	5.59	1320.00	14.30	150.00	4.00	895.76	261.00	NA	11.20	147.80	33.00	180.80
12/7/2005	3.46	1630.00	23.30	520.00	0.00	1679.00	28.00	NA	10.40	86.20	5.80	92.00
12/8/2005	3.40	1660.00	25.69	410.00	0.00	1385.55	59.80	NA	10.25	96.90	5.10	102.00
12/9/2005	3.62	1620.00	20.78	450.00	0.00	1333.61	59.20	NA	9.75	94.20	6.70	100.90
12/10/2005	3.59	1580.00	22.05	470.00	0.00	1353.33	49.60	NA	9.75	99.90	6.60	106.50
12/11/2005	4.34	1520.00	21.52	380.00	0.00	1027.40	99.00	NA	10.30	118.80	7.20	126.00
12/12/2005	3.68	1500.00	20.16	470.00	0.00	1080.10	52.00	NA	9.45	104.20	5.80	110.00
12/13/2005	4.29	1420.00	13.00	370.00	0.00	1249.48	30.80	NA	9.45	81.30	5.80	67.10
12/14/2005	4.34	1480.00	21.06	470.00	0.00	1396.79	82.00	NA	10.35	109.80	6.90	116.70
12/20/2005	4.49	1550.00	15.38	380.00	0.00	1260.00	55.00	NA	9.85	110.80	5.20	116.00
12/28/2005	3.95	1300.00	20.19	480.00	0.00	1086.30	65.00	NA	11.10	116.80	5.40	122.20
1/4/2006	4.20	1460.00	23.74	420.00	0.00	1092.20	74.00	NA	12.65	126.40	6.00	132.40

Results - mg/l

Prepared by: Moody and Associates, Inc.

TABLE 5
PPL - Ruston Mine
Moshannon Creek
Upstream A - Monitoring Point Stream water quality data

Field Parameters	09/29/05	10/05/05	10/10/05	10/19/05	10/25/05	11/01/05	11/10/05	11/16/05	11/23/05	11/30/05	12/07/05	12/13/05
Flow (gpm)	6463.79	4020.29	7497.39	3728.05	US	12328.9	US	US	US	FS	US	US
pH	3.87	3.58	3.86	3.68	4.02	4.18	4.16	4.32	4.56		4.47	4.70
Temperature (°C)	14.4	16.4	13.2	11.2	6.6	8.0	8.6	9.9	1.7		1.4	0.0
Conductivity (mS)	0.81	0.93	0.77	0.87	0.69	0.62	0.61	0.49	0.45		0.34	0.42
Dissolved Oxygen	9.4	6.9	5.2	5.0	4.8	NA	NA	NA	NA		NA	NA
ORP (mv)	483	475	434	446	362	378	376	351	328		343	307
Gauge Reading	0.42	0.2	0.51	0.53	DI	1.07	1.45	DI	DI		DI	DI

Lab Parameters

pH	3.50	3.58	3.79	3.68	5.63	3.84	3.92	4.30	3.99	FS	4.24	4.82
Specific Conductance	940.00	1000.00	980.00	820.00	740.00	620.00	595.00	520.00	470.00		355.00	420.00
Suspended Solids (mg)	3.60	3.20	1.60	2.40	15.60	9.60	6.80	11.60	11.60		5.60	13.20
Dissolved Solids (mg/l)	680.00	753.00	587.00	337.00	540.00	446.00	446.00	348.00	358.00		269.00	336.00
Acidity (mg/l)	54.00	58.00	84.00	72.00	60.00	64.00	32.00	40.00	48.00		10.00	10.00
Alkalinity (mg/l)	0.00	0.00	0.00	0.00	2.00	0.00	0.00	0.00	0.00		0.00	2.00
Total Iron (mg/l)	2.62	1.21	2.11	1.98	4.25	3.54	3.09	2.73	3.71		4.27	5.72
Sulfates (mg/l)	471.83	502.55	433.37	493.31	409.04	369.92	391.98	310.95	383.41		305.32	256.92
Manganese (mg/l)	5.66	5.21	4.43	5.25	4.11	3.52	3.25	2.43	2.24		1.53	2.01
Aluminum (mg/l)	3.90	3.44	2.69	3.70	3.81	2.79	2.94	2.28	2.54		2.51	3.07
Dissolved Iron (mg/l)	1.50	1.08	1.86	1.87	1.67	2.44	1.86	1.58	2.66		2.91	3.72
Fe +2 (mg/l)	0.66	0.73	0.72	1.19	1.01	2.09	1.45	1.44	2.66		2.73	3.60
Calcium (mg/l)	79.60	77.10	75.20	81.50	68.50	59.30	55.70	44.00	47.00		28.20	39.00
Magnesium (mg/l)	31.14	34.82	30.28	36.85	30.25	26.25	23.30	18.62	20.60		17.74	14.76
Potassium (mg/l)	3.05	2.80	4.05	3.55	3.15	2.68	2.43	8.50	2.18		1.58	1.82
Sodium (mg/l)	9.80	9.40	10.40	9.20	10.20	8.00	9.70	2.62	6.40		4.70	5.70
Nitrates (mg/l)	0.18	0.20	0.38	0.23	0.30	0.44	0.27	0.30	0.27		0.26	0.25

IW : Samples weren't taken due to inclement weather conditions (Ice storm)

FS: Stream was past flood stage and unsafe to sample

US: Stream not measured due to high flow

DI : Debris impeded reading stream gauge

TABLE 6
PPL - Ruston Mine
Moshannon Creek
Upstream B - Monitoring Point Stream water quality data

Field Parameters	10/05/05	10/10/05	10/19/05	10/25/05	11/01/05	11/10/05	11/16/05	11/23/05	11/30/05	12/07/05	12/13/05
Flow (gpm)	4071.48	7317.95	3770.75	IW	11609.84	US	US	US	FS	US	US
pH	3.66	4.11	3.72		4.42	4.43	4.85	5.06		5.01	5.59
Temperature °C	16.6	13.2	11.3		8.5	8.2	9.8	1.4		1.5	0.0
Conductivity (mS)	0.92	0.76	0.83		0.60	0.57	0.42	0.4		0.3	0.40
Dissolved Oxygen	6.8	5.3	5.2		6.4	NA	NA	NA		NA	NA
ORP (mv)	462	390	425		321	314	295	188		273	282

Lab Parameters

pH	3.69	3.89	3.82	IW	3.87	4.13	4.79	4.22	FS	4.49	4.93
Specific Conductance	880.00	700.00	880.00		620.00	530.00	490.00	420.00		319.00	400.00
Suspended Solids (mg/l)	3.20	4.00	4.40		10.80	7.20	14.00	2.80		8.40	12.40
Dissolved Solids (mg/l)	736.00	576.00	613.00		476.00	414.00	333.00	263.00		250.00	304.00
Acidity (mg/l)	52.00	62.00	58.00		62.00	26.00	78.00	8.00		44.00	11.00
Alkalinity (mg/l)	0.00	0.00	0.00		0.00	0.00	2.00	0.00		0.00	3.00
Total Iron (mg/l)	1.05	2.53	2.05		3.78	3.32	2.80	3.44		3.43	4.77
Sulfates (mg/l)	494.95	415.32	493.92		336.90	366.47	307.01	287.61		271.92	280.81
Manganese (mg/l)	5.45	4.45	5.26		3.55	3.11	2.40	2.22		1.53	2.07
Aluminum (mg/l)	3.72	2.12	3.55		2.49	2.42	2.13	2.09		2.25	2.33
Dissolved Iron (mg/l)	0.97	0.46	1.88		2.39	1.75	1.44	2.38		2.29	4.39
Fe +2 (mg/l)	0.67	0.79	1.20		2.25	1.48	1.41	2.36		2.23	3.45
Calcium (mg/l)	83.00	75.40	75.00		57.30	54.20	41.80	31.60		2.67	38.50
Magnesium (mg/l)	33.74	31.04	33.00		25.10	23.06	18.18	18.44		12.98	14.63
Potassium (mg/l)	2.90	4.08	3.57		2.47	2.40	8.70	2.00		1.50	2.00
Sodium (mg/l)	10.00	13.90	9.90		9.00	10.20	2.56	6.50		4.50	8.20
Nitrates (mg/l)	0.24	0.31	0.24		0.43	0.28	0.33	0.27		0.25	0.24

IW : Samples weren't taken due to inclement weather conditions (Ice stor US: Stream not measured due to high flow

FS: Stream was past flood stage and unsafe to sample

DI : Debris impeded reading stream gauge

TABLE 7

**PPL - Ruston Mine
Moshannon Creek**

Downstream A - Monitoring Point Stream water quality data

Field Parameters	09/29/05	10/05/05	10/10/05	10/19/05	10/25/05	11/01/05	11/10/05	11/16/05	11/23/05	11/30/05	12/07/05	12/13/05
Flow (gpm)	6624.59	4086.87	9034.35	8578.81	US	17896.7	US	US	US	FS	US	US
pH	3.89	3.57	3.78	6.08	3.84	5.24	4.94	4.74	3.75		5.03	5.16
Temperature (°C)	14.3	16.4	13.2	11.2	5.9	7.9	9.6	9.8	2.0		1.2	0.0
Conductivity (mS)	0.83	0.96	0.78	1.14	0.95	0.81	0.71	0.71	0.56		0.43	0.55
Dissolved Oxygen	14.7	6.1	4.8	5.0	3.8	NA	NA	NA	NA		NA	NA
ORP (mv)	495	488	466	179	454	248	284	408	440		266	242
Gauge Reading	0.52	0.4	0.72	0.84	1.7	1.28	1.72	1.82	n/m		DI	DI

Lab Parameters

pH	3.62	3.62	3.75	6.01	3.99	4.75	4.53	4.65	3.84	FS	4.49	4.94
Specific Conductance	740.00	960.00	1180.00	1040.00	860.00	780.00	700.00	700.00	440.00		410.00	540.00
Suspended Solids (mg)	2.80	2.80	2.00	4.40	13.20	8.00	4.40	11.20	8.40		7.60	13.20
Dissolved Solids (mg/l)	706.00	786.00	610.00	936.00	706.00	659.00	553.00	479.00	353.00		339.00	410.00
Acidity (mg/l)	86.00	86.00	60.00	-7.00	66.00	29.00	42.00	102.00	38.00		52.00	16.00
Alkalinity (mg/l)	0.00	0.00	0.00	13.00	0.00	5.00	2.00	2.00	0.00		0.00	2.00
Total Iron (mg/l)	1.06	0.86	0.96	0.69	3.95	2.03	2.47	2.55	6.29		4.15	4.87
Sulfates (mg/l)	486.55	523.07	500.54	696.02	536.80	486.41	408.64	396.48	436.32		243.91	322.74
Manganese (mg/l)	5.26	5.35	4.38	3.40	3.92	2.96	3.13	2.69	2.68		1.60	1.95
Aluminum (mg/l)	4.61	4.73	2.93	1.25	5.81	2.00	2.64	3.53	13.47		2.69	3.39
Dissolved Iron (mg/l)	0.86	0.86	0.86	0.26	0.55	1.11	0.85	1.11	5.05		2.44	3.37
Fe +2 (mg/l)	0.47	0.61	0.35	0.24	0.50	1.10	0.75	1.02	2.34		2.41	3.27
Calcium (mg/l)	86.50	88.50	74.90	144.60	113.30	113.10	81.13	74.10	50.80		43.70	63.00
Magnesium (mg/l)	33.48	34.82	29.26	47.55	34.50	33.90	26.84	23.24	22.78		16.02	17.85
Potassium (mg/l)	3.25	2.95	3.88	4.53	3.50	3.33	2.85	8.20	1.92		1.80	2.02
Sodium (mg/l)	8.80	9.20	11.00	9.00	8.80	7.70	8.40	3.02	6.50		4.60	7.20
Nitrates (mg/l)	0.27	0.24	0.33	0.17	0.22	0.30	0.20	0.24	0.27		0.25	0.20

IW : Samples weren't taken due to inclement weather conditions (Ice storm)
FS: Stream was past flood stage and unsafe to sample

US: Stream not measured due to high flow
DI : Debris impeded reading stream gauge

TABLE 8
PPL - Ruston Mine
Moshannon Creek
Downstream B - Monitoring Point Stream water quality data

Field Parameters	09/29/05	10/05/05	10/10/05	10/19/05	10/25/05	11/01/05	11/10/05	11/16/05	11/23/05	11/30/05	12/07/05	12/13/05
Flow (gpm)	4286.09	2615.38	7858.88	6210.99	IW	14713.09	US	US	US	FS	US	US
pH	4.14	3.62	3.78	5.58		5.08	4.99	5.14	4.33		4.91	4.60
Temperature (°C)	14.4	15.3	12.9	11.2		7.8	8.6	9.9	2.4		1.6	0.0
Conductivity (mS)	0.83	0.92	0.78	1.13		0.79	0.75	0.64	0.49		0.43	0.46
Dissolved Oxygen	19.9	4.9	5.0	4.6		6.1	NA	NA	NA		NA	NA
ORP (mv)	220	465	490	240		272	315	221	354		271	294
Gauge Reading	0.05	0.0	0.29	0.3		0.6	1.0	1.12	0.65		DI	DI
Lab Parameters												
pH	3.80	3.69	3.87	5.30	IW	4.99	4.73	4.79	4.11	FS	4.34	4.47
Specific Conductance	920.00	1020.00	700.00	1140.00		800.00	680.00	690.00	480.00		468.00	480.00
Suspended Solids (mg)	4.80	2.80	0.80	5.60		7.20	3.00	24.00	5.20		4.00	13.60
Dissolved Solids (mg/l)	751.00	752.00	610.00	693.00		645.00	569.00	469.00	263.00		344.00	346.00
Acidity (mg/l)	54.00	64.00	66.00	-2.00		23.00	3.00	90.00	10.00		44.00	25.00
Alkalinity (mg/l)	0.00	0.00	0.00	10.00		7.00	2.00	2.00	0.00		0.00	0.00
Total Iron (mg/l)	1.68	0.45	0.49	0.46		1.34	1.97	1.37	1.94		4.04	5.40
Sulfates (mg/l)	509.92	502.08	420.39	691.08		480.53	453.84	457.37	359.12		345.88	223.60
Manganese (mg/l)	5.18	4.93	4.15	3.44		2.93	2.59	2.74	2.28		1.60	2.04
Aluminum (mg/l)	6.69	4.64	3.28	0.97		2.09	1.71	1.85	2.87		3.07	3.63
Dissolved Iron (mg/l)	0.43	0.43	2.08	0.11		0.53	0.12	0.60	1.57		2.29	3.16
Fe +2 (mg/l)	0.33	0.42	0.18	0.10		0.51	0.06	0.56	1.55		2.27	3.06
Calcium (mg/l)	90.80	84.80	74.70	159.00		107.30	88.75	70.70	45.00		45.60	46.00
Magnesium (mg/l)	33.66	33.64	28.52	47.50		33.10	26.66	23.22	20.18		16.46	15.46
Potassium (mg/l)	3.25	3.20	4.07	4.37		3.27	3.03	9.20	2.18		1.80	1.80
Sodium (mg/l)	8.40	9.40	10.30	8.30		8.20	10.80	2.98	6.80		4.70	6.60
Nitrates (mg/l)	0.26	0.23	0.29	0.35		0.27	0.24	0.25	0.27		0.26	0.23

IW : Samples weren't taken due to inclement weather conditions (Ice storm)
FS: Stream was past flood stage and unsafe to sample

US: Stream not measured due to high flow
DI : Debris impeded reading stream gauge

TABLE 9
PPL - Ruston Mine
Moshannon Creek
Downstream C - Monitoring Point Stream water quality data

Field Parameters	10/05/05	10/10/05	10/19/05	10/25/05	11/01/05	11/10/05	11/16/05	11/23/05	11/30/05	12/07/05	12/13/05
Flow (gpm)	4538.46	10383.81	9595.28	IW	18187.32	US	US	US	FS	US	US
pH	3.50	3.84	5.52		5.09	5.0	5.15	4.35		4.95	4.78
Temperature (°C)	16.8	12.7	11.1		7.9	9.0	10.5	2.7		1.8	0
Conductivity (mS)	0.92	0.77	1.10		0.8	0.75	0.63	0.49		0.42	0.48
Dissolved Oxygen	7.6	5.4	3.4		5.9	NA	NA	NA		NA	NA
ORP (mv)	467	492	240		270	318	191	348		261	285

Lab Parameters

pH	3.69	3.84	5.3	IW	4.42	4.44	4.86	4.13	FS	4.37	4.61
Specific Conductance	960.00	900.00	1030.00		750.00	744.00	640.00	520.00		490.00	540.00
Suspended Solids (mg)	2.80	0.80	4.00		6.40	9.20	10.00	7.20		5.60	22.00
Dissolved Solids (mg/l)	743.00	593.00	873.00		677.00	578.00	463.00	365.00		333.00	340.00
Acidity (mg/l)	32.00	38.00	7.00		28.00	38.00	72.00	10.00		80.00	28.00
Alkalinity (mg/l)	0.00	0.00	10.00		6.00	0.00	2.00	0.00		0.00	2.00
Total Iron (mg/l)	0.46	0.42	2.00		1.22	1.94	1.38	2.93		3.89	5.32
Sulfates (mg/l)	479.37	411.30	680.27		444.05	474.50	418.71	352.91		378.07	289.43
Manganese (mg/l)	4.98	4.10	3.53		2.92	2.61	2.77	2.27		1.57	1.91
Aluminum (mg/l)	5.09	3.33	0.80		2.22	1.94	1.72	3.35		2.66	4.01
Dissolved Iron (mg/l)	0.36	0.34	0.38		0.43	0.14	0.59	1.40		2.07	3.01
Fe +2 (mg/l)	0.34	0.14	0.38		0.40	0.06	0.54	1.36		2.01	2.92
Calcium (mg/l)	83.50	72.10	136.60		105.00	91.63	71.80	46.90		44.20	47.10
Magnesium (mg/l)	33.66	29.26	45.95		32.95	27.44	24.06	19.42		16.52	15.61
Potassium (mg/l)	3.10	3.60	4.05		3.30	3.05	9.70	2.06		1.86	1.88
Sodium (mg/l)	11.80	11.30	8.60		7.80	8.10	2.96	7.20		4.80	8.30
Nitrates (mg/l)	0.24	0.29	0.19		0.24	0.24	0.30	0.26		0.27	0.24

IW : Samples weren't taken due to inclement weather conditions (Ice storm)

FS: Stream was past flood stage and unsafe to sample

US: Stream not measured due to high flow

TABLE 10
PPL - Ruston Mine
Moshannon Mine # 1 Seep
Mine discharge water quality data

Field Parameters	09/29/05	10/05/05	10/10/05	10/19/05	10/25/05	11/01/05	11/10/05	11/16/05	11/23/05	11/30/05	12/07/05	12/13/05
Flow (gpm)	0.08	0.08	12.59	2.00	IW	21.33	4.05	18.74	9.37	47.68	19.00	15.08
pH	NM	4.29	4.33	4.36		4.34	4.5	4.72	4.41	4.64	4.25	4.31
Temperature (°C)	NM	20.5	11.0	11.3		10.5	9.7	9.3	8.4	9.6	8.0	7.3
Conductivity (mS)	NM	0.6	1.6	1.58		1.54	1.35	1.26	1.18	0.8	1.02	1.07
Dissolved Oxygen	NM	NM	5.5	NM		5.4	Broken	Broken	Broken	Broken	Broken	Broken
ORP (mv)	NM	405	434	433		399	387	338	355	334	392	415

Lab Parameters

pH	4.57	4.32	4.35	4.58	IW	4.32	4.46	4.65	4.3	4.43	4.13	4.24
Specific Conductance	860.00	680.00	1380.00	1600.00		1380.00	1340.00	1240.00	1080.00	760.00	860.00	970.00
Suspended Solids (mg/l)	26.80	4.80	1.20	2.00		2.40	0.80	5.60	1.20	0.80	2.40	2.40
Dissolved Solids (mg/l)	582.00	485.00	1418.00	1362.00		1293.00	1132.00	1053.00	1005.00	633.00	837.00	846.00
Acidity (mg/l)	38.00	64.00	23.00	9.00		66.00	34.00	24.00	24.00	56.00	40.00	26.00
Alkalinity (mg/l)	2.00	0.00	5.00	7.00		0.00	0.00	2.00	0.00	0.00	0.00	0.00
Total Iron (mg/l)	1.37	0.04	0.04	0.09		0.05	0.05	0.08	0.06	0.06	0.08	0.15
Sulfates (mg/l)	388.05	343.79	866.90	1023.82		937.65	970.31	792.24	608.18	622.39	795.23	651.59
Manganese (mg/l)	5.38	4.45	5.62	7.44		8.28	7.52	6.88	6.36	3.84	7.20	6.34
Aluminum (mg/l)	12.50	7.87	1.49	1.69		2.47	2.31	1.45	3.35	7.52	6.96	3.55
Dissolved Iron (mg/l)	0.04	0.02	0.04	0.06		0.02	0.04	0.08	0.05	0.05	0.07	0.13
Fe +2 (mg/l)	0.03	0.02	0.04	0.06		0.02	0.04	0.08	0.05	0.05	0.07	0.10
Calcium (mg/l)	82.80	58.40	276.30	272.70		236.30	199.00	190.40	158.80	87.00	127.60	76.90
Magnesium (mg/l)	18.59	19.23	53.60	49.05		65.70	45.60	40.20	44.70	31.66	38.00	32.32
Potassium (mg/l)	2.90	2.75	13.70	10.70		11.80	10.20	2.10	5.80	3.80	6.05	5.05
Sodium (mg/l)	6.80	1.30	4.60	1.95		2.85	2.85	6.90	1.80	3.10	1.76	1.46
Nitrates (mg/l)	1.07	0.89	61.07	14.36		0.01	13.84	5.62	2.42	1.56	4.32	1.00

IW : Samples weren't taken due to inclement weather conditions (Ice storm)
FS: Stream was past flood stage and unsafe to sample

US: Stream not measured due to high flow
DI : Debris impeded reading stream gauge
NM: No meter

TABLE 11
PPL - Ruston Mine
Bigelow Airshaft
Overlying mine pool monitoring point

Field Parameters	09/29/05	10/05/05	10/10/05	10/19/05	10/25/05	11/01/05	11/10/05	11/16/05	11/23/05	11/30/05	12/07/05	12/13/05
SWL (ft.)	16.55	17.13	17.9	18.02	IW	17.08	16.35	16.13	14.88	11.1	7.87 (flowing)	7.97
Flow (gpm)	NF	NF	NF	NF		NF	NF	NF	NF	NF	NS	11.45
pH												2.53
Temperature °C												8.7
Conductivity (mS)												1.97
Dissolved Oxygen												Broken
ORP (mv)												528

Lab Parameters

pH	NF	NF	NF	NF	IW	NF	NF	NF	NF	NF	NS	2.74
Specific Conductance												1340
Suspended Solids (mg/l)												1.2
Dissolved Solids (mg/l)												840
Acidity (mg/l)												600
Alkalinity (mg/l)												0
Total Iron (mg/l)												5.45
Sulfates (mg/l)												1099
Manganese (mg/l)												1.82
Aluminum (mg/l)												25.44
Dissolved Iron (mg/l)												5.39
Fe +2 (mg/l)												1.67
Calcium (mg/l)												42.8
Magnesium (mg/l)												14.1
Potassium (mg/l)												1.17
Sodium (mg/l)												16.2
Nitrates (mg/l)												0.24

IW : Samples weren't taken due to inclement weather conditions (Ice storm)
FS: Stream was past flood stage and unsafe to sample
US: Stream not measured due to high flow

DI : Debris impeded reading stream gauge
NM: No meter
NF: Not flowing
NS: Not sampled

APPLICATION TO SRBC FOR AQUIFER TEST PLAN WAIVER
FOR
USE OF RUSHTON MINE FOR CONSUMPTIVE WATER USE MITIGATION

NOVEMBER 2011

APPENDIX C-1

RUSHTON MINE PERMIT – PA DEP No. 14831301, MARCH 2010

SEE APPENDIX C-2 for JANUARY 2011 revision



pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION
CALIFORNIA DISTRICT OFFICE

March 16, 2010

Certified Mail #7006 2150 0002 5177 3716

Mr. A. Michael Vargo
Pennsylvania Mines, LLC
Two North Ninth Street
Allentown, PA 18101

Re: Operation Name: Rushton Mine
Permit No.: 14831301
Rush Township, Centre County

Ladies and Gentlemen:

We have enclosed a renewed permit for the above operation. This proposal was accepted for technical review on February 12, 2007.

The permit has been revised to renew CMAP No. 14831301 and update the bonds.

Please refer to Page D-1 and E-3 Special Condition Nos. 9 and 14, Revision No. 19, which identifies the approved changes.

The enclosed information supersedes the original issued permit and should be incorporated on a page-by-page basis.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, PO Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 1-800-654-5984. Appeals must be filed with the Environmental Hearing Board within thirty (30) days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in Braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

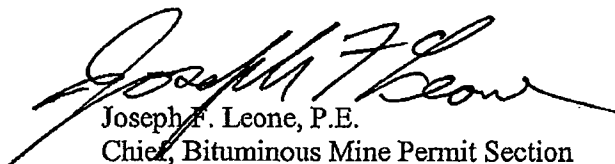
March 16, 2010

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717-787-3483) FOR MORE INFORMATION.

If you have any questions about the permit, please contact me at the above number.

Sincerely,

A handwritten signature in black ink, appearing to read "Joseph F. Leone". The signature is fluid and cursive, with the first name "Joseph" and last name "Leone" clearly distinguishable.

Joseph F. Leone, P.E.
Chief, Bituminous Mine Permit Section
District Mining Operations

Enclosure

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

No. 14831301

BITUMINOUS COAL MINING ACTIVITY PERMIT

Permittee Name: Pennsylvania Mines, LLC
and Address: Two North Ninth Street
Allentown, PA 18101
Operation Name: Rushton Mine

Location of Operation
Municipality: Rush Township
County: Centre

This permit approves the following activities as indicated by an "X":

☒ Operation of an Underground Coal Mine ☐ Coal Preparation ☐ Coal Refuse Disposal
☒ Other: Stream Encroachment & Reclamation Activities Only (See Section E.9)
☒ Discharge of Wastewater as Specified in Part A ☐ Subsidence Control Plan

This permit is for 121.1 acres of surface area and 5.912 acres of subsurface area.

This approval (as indicated by an "X") is subject to the attached LIMITS OF AUTHORIZATION and:

☒ PART A - EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS
☒ PART B - MANDATED NPDES PERMIT CONDITIONS AND REQUIREMENTS
☒ PART C - MANDATED COAL MINING ACTIVITY PERMIT CONDITIONS AND REQUIREMENTS
☒ PART D - BOND DESCRIPTIONS
☒ PART E - SPECIAL CONDITIONS REGARDING OPERATION AND RECLAMATION
☐ PART F - SPECIAL CONDITIONS REGARDING SUBSIDENCE CONTROL

This permit is hereby issued in accordance with the provisions of the Surface Mining Conservation and Reclamation Act, Act of May 31, 1945 (P.L. 1198, No. 418), as amended, 52 P.S. §§1396.1 et seq., the Clean Streams Law, Act of June 22, 1937 (P.L. 1987, No. 394), as amended, 35 P.S. §§691.1 et seq., and the Air Pollution Control Act, Act of January 8, 1960 (1959) (P.L. 2119, No. 787), as amended, 35 P.S. §§4001 et seq., and the regulations promulgated pursuant to these Acts. This permit is also issued in accordance with the following statutes and regulations promulgated pursuant to these statutes, as indicated by an "X":

☒ Bituminous Mine Subsidence and Land Conservation Act, Act of April 27, 1966 (P.L. 31, as amended, 52 P.S. §§1406.1 et seq.), and the regulations promulgated pursuant to this Act.
☐ Coal Refuse Disposal Control Act, Act of September 24, 1968 (P.L. 1040, No. 318), as amended, 52 P.S. §§30.51 et seq., and the regulations promulgated pursuant to this Act.
☒ Dam Safety and Encroachments Act, Act of November 26, 1978 (P.L. 1375, No. 325), as amended, 32 P.S. §§693.1 et seq., and the regulations promulgated pursuant to this Act.
☐ Solid Waste Management Act, Act of July 7, 1980 (P.L. 380, No. 97), 35 P.S. §§6018.101 et seq., and the regulations promulgated pursuant to this Act.

The permittee is hereby authorized to conduct coal mining activities as described in the approved permit application numbered 14831301 and approved revisions, and in accordance with, the laws and regulations and terms and conditions referenced above. A violation of any provision of the referenced laws, regulations, terms and conditions is a violation of this permit. Any modifications to the permitted facilities necessary to meet the terms and conditions of this permit require the prior written approval of the Department.

Original Permit Issuance Date: April 24, 1985
Latest Permit Renewal Date: January 12, 2004
Latest Permit Revision Date: March 16, 2010
Permit Expiration Date: July 22, 2012

By Wm. S. Plassio
William S. Plassio
Title District Mining Manager

LIMITS OF AUTHORIZATION

1. The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights.
2. Nothing herein contained shall be construed to be an intent on the part of the Department to approve any act made or to be made by the permittee which is inconsistent with the permittee's lawful powers or with existing laws of the Commonwealth regulating coal mining activities and the practice of professional engineering. This permit shall not be construed to sanction any act otherwise forbidden by federal or state law or regulation, or by local ordinance, nor to pre-empt any duty to obtain state or local assent required by law for the coal mining activity.
3. The permittee's failure to comply with the laws of the Commonwealth and the rules and regulations of the Department regarding coal mining activities or failure to comply with the terms and conditions of this permit, may result in an enforcement action, in permit termination, suspension, revocation and reissuance, or modification, or in denial of a permit renewal application. Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee of any responsibilities, liabilities, or penalties to which this permit is issued or any other applicable provision of law.
4. The permittee is responsible for complying with local ordinances adopted pursuant to the Municipalities Planning Code, and all zoning ordinances in existence before January 1, 1972. Nothing in this permit shall be construed to relieve the permittee from any responsibilities, liabilities, or penalties to which the permittee may be subject under any Federal, State, or Local laws.

PART A
EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

CMAP # 14831301

NPDES # PA008966

1. MINE DRAINAGE TREATMENT FACILITIES

- a. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR OUTFALL 001

DISCHARGE TO: Moshannon Creek

FROM: #2 Mine Water Settling Basin located between railroad tracks and sludge pumphouse

LAT: 40° 51' 59"

LONG: 78° 14' 50"

Based on the hydrologic data and anticipated wastewater characteristics and flows described in the permit application and its supporting document and/or revisions, the following effluent limitations and monitoring requirements apply to the subject outfall:

<u>Discharge Parameter</u>	<u>DISCHARGE LIMITATIONS¹</u>			<u>MONITORING REQUIREMENTS</u>	
	<u>Average Monthly</u>	<u>Maximum Daily</u>	<u>Instant Maximum</u>	<u>Measurement Frequency</u>	<u>Sample Type</u>
Flow (mgd)				2/month	estimated
Iron	3.0	6.0	7.0	2/month	grab
Suspended Solids	35	70	90	2/month	grab
Manganese	2.0	4.0	5.0	2/month	grab
Aluminum	2.0	4.0	5.0	2/month	grab
Sulfates				1/quarter	grab
Specific Conductance (umho)				1/quarter	grab

pH not less than 6.0 nor greater than 9.5 standard units at all times.

Alkalinity must exceed acidity at all times.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

- b. PARAMETERS SUBJECT TO 24-HOUR, NON-COMPLIANCE REPORTING FOR "MAXIMUM DAILY" LIMITATIONS UNDER B.3.c(1) (b) OF THIS PERMIT ARE: N/A

- c. SAMPLES TAKEN IN COMPLIANCE WITH THE MONITORING REQUIREMENTS SPECIFIED ABOVE SHALL BE TAKEN AT THE FOLLOWING LOCATION(S): _____

the basin overflow weir

Note: ¹Unless otherwise indicated, discharge limitations are concentrations expressed in mg/l, and the total (dissolved plus suspended fractions) is applicable for each parameter.

PART A
EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

CMAQ # 14831301

NPDES # PA008966

1. MINE DRAINAGE TREATMENT FACILITIES

a. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR OUTFALL 003

DISCHARGE TO: Moshannon Creek

FROM: 7 Sludge thickening ponds and 2 Decant ponds east of the main complex

LAT: 40° 52' 02"

LONG: 78° 13' 53"

Based on the hydrologic data and anticipated wastewater characteristics and flows described in the permit application and its supporting document and/or revisions, the following effluent limitations and monitoring requirements apply to the subject outfall:

<u>Discharge Parameter</u>	<u>DISCHARGE LIMITATIONS¹</u>			<u>MONITORING REQUIREMENTS</u>	
	<u>Average Monthly</u>	<u>Maximum Daily</u>	<u>Instant Maximum</u>	<u>Measurement Frequency</u>	<u>Sample Type</u>
Flow (mgd)				2/month	estimated
Iron	3.0	6.0	7.0	2/month	grab
Suspended Solids	35	70	90	2/month	grab
Manganese	2.0	4.0	5.0	2/month	grab
Aluminum	2.0	4.0	5.0	2/month	grab
Sulfates				1/quarter	grab
Specific Conductance (umho)				1/quarter	grab

pH not less than 6.0 nor greater than 9.5 standard units at all times.

Alkalinity must exceed acidity at all times.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

b. PARAMETERS SUBJECT TO 24-HOUR, NON-COMPLIANCE REPORTING FOR "MAXIMUM DAILY" LIMITATIONS UNDER B.3.c(1) (b) OF THIS PERMIT ARE: N/A

c. SAMPLES TAKEN IN COMPLIANCE WITH THE MONITORING REQUIREMENTS SPECIFIED ABOVE SHALL BE TAKEN AT THE FOLLOWING LOCATION(S): _____

the weir in the open ditch

Note: ¹Unless otherwise indicated, discharge limitations are concentrations expressed in mg/l, and the total (dissolved plus suspended fractions) is applicable for each parameter.

PART A
EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

CMAP # 14831301

NPDES # PA008966

1. MINE DRAINAGE TREATMENT FACILITIES

a. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR OUTFALL 004

DISCHARGE TO: Moshannon Creek

FROM: Runoff ponds near the preparation plant

LAT: 40° 52' 13" LONG: 78° 14' 35"

Based on the hydrologic data and anticipated wastewater characteristics and flows described in the permit application and its supporting document and/or revisions, the following effluent limitations and monitoring requirements apply to the subject outfall:

Discharge Parameter	DISCHARGE LIMITATIONS ¹			MONITORING REQUIREMENTS	
	Average Monthly	Maximum Daily	Instant Maximum	Measurement Frequency	Sample Type
Flow (mgd)				2/month	estimated
Iron	3.0	6.0	7.0	2/month	grab
Suspended Solids	35	70	90	2/month	grab
Manganese	2.0	4.0	5.0	2/month	grab
Aluminum				2/month	grab
Sulfates				1/quarter	grab
Specific Conductance (umho)				1/quarter	grab

pH not less than 6.0 nor greater than 9.5 standard units at all times.

Alkalinity must exceed acidity at all times.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

b. PARAMETERS SUBJECT TO 24-HOUR, NON-COMPLIANCE REPORTING FOR "MAXIMUM DAILY" LIMITATIONS UNDER B.3.c(1) (b) OF THIS PERMIT ARE: N/A

c. SAMPLES TAKEN IN COMPLIANCE WITH THE MONITORING REQUIREMENTS SPECIFIED ABOVE SHALL BE TAKEN AT THE FOLLOWING LOCATION(S): _____

discharge pipe at the final sedimentation basin

Note: ¹Unless otherwise indicated, discharge limitations are concentrations expressed in mg/l, and the total (dissolved plus suspended fractions) is applicable for each parameter.

PART A
EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

CMAP # 14831301

NPDES # PA008966

I. MINE DRAINAGE TREATMENT FACILITIES

- a. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR OUTFALL 005

DISCHARGE TO: Moshannon Creek

FROM: New Mine Water Treatment Plant

LAT: 40° 51' 59" LONG: 78° 14' 42"

Based on the hydrologic data and anticipated wastewater characteristics and flows described in the permit application and its supporting document and/or revisions, the following effluent limitations and monitoring requirements apply to the subject outfall:

<u>Discharge Parameter</u>	<u>DISCHARGE LIMITATIONS¹</u>			<u>MONITORING REQUIREMENTS</u>	
	<u>Average Monthly</u>	<u>Maximum Daily</u>	<u>Instant Maximum</u>	<u>Measurement Frequency</u>	<u>Sample Type</u>
Flow (mgd)				2/month	estimated
Iron	3.0	6.0	7.0	2/month	grab
Suspended Solids	35	70	90	2/month	grab
Manganese	2.0	4.0	5.0	2/month	grab
Aluminum	2.0	3.0	5.0	2/month	grab
Sulfates				1/quarter	grab
Specific Conductance (umho)				1/quarter	grab

pH not less than 6.0 nor greater than 9.5 standard units at all times.

Alkalinity must exceed acidity at all times.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

- b. PARAMETERS SUBJECT TO 24-HOUR, NON-COMPLIANCE REPORTING FOR "MAXIMUM DAILY" LIMITATIONS UNDER B.3.c(1) (b) OF THIS PERMIT ARE: N/A

- c. SAMPLES TAKEN IN COMPLIANCE WITH THE MONITORING REQUIREMENTS SPECIFIED ABOVE SHALL BE TAKEN AT THE FOLLOWING LOCATION(S): _____

discharge pipe at the final settling basin

Note: ¹Unless otherwise indicated, discharge limitations are concentrations expressed in mg/l, and the total (dissolved plus suspended fractions) is applicable for each parameter.

SECTION B. MANDATED NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM PERMIT CONDITIONS AND REQUIREMENTS

1. CONDITIONS RELATING TO NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM REGULATIONS

The following permit conditions implement mandatory Federal National Pollutant Discharge Elimination System (NPDES) requirements of 40 C.F.R. Part 122 and also the mandatory state requirements of 25 Pa. Code §§89.52(g), 9231(g), and 95.1(a).

2. DEFINITIONS

- a. "Bypass" means the intentional diversion of waste streams from any portion of a treatment facility. 122.41(m)(1)(i)
- b. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production. 122.41(m)(1)(ii)
- c. "Average monthly" discharge limitation means the highest allowable average of "daily discharges" over a calendar month, calculated as the sum of all "daily discharges" measured during a calendar month divided by the number of "daily discharges" measured during that month. 122.2
- d. "Maximum daily" discharge limitation means the highest allowable "daily discharge." 122.2
- e. "Daily discharge" means the discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. For pollutants with limitations expressed in units of mass, the "daily discharge" is calculated as the total mass of the pollutant discharged over the day. For pollutants with limitations expressed in other units of measurement, the "daily discharge" is calculated as the average measurement of the pollutant over the day. 122.2
- f. "Average" refers to the use of an arithmetic mean, unless otherwise specified in this permit. 122.41(l)(4)(iii)
- g. "Instantaneous Maximum" means the level not to be exceeded at any time in any grab sample.
- h. "Composite Sample" means a combination of individual samples obtained at regular intervals over a time period. Either the volume of each individual sample is proportional to discharge flow rates, or the sampling interval (for constant volume samples) is proportional to the flow rates, over the time period used to produce the composite.

The maximum time period between individual samples shall not exceed two hours, except that for wastes of a uniform nature the samples may be collected on a frequency of at least twice per working shift and shall be equally spaced over a 24-hour period (or over the operating day if flows are of a shorter duration).

(4) Test Procedures 122.41(i)(4)

Unless otherwise specified in this permit, the test procedures for the analysis of pollutants shall be those contained in 40 CFS, Part 136, or alternate test procedures approved pursuant to that part.

b. Reporting of Monitoring Results

- (1) Monitoring results obtained each month shall be summarized for that month and reported on a Discharge Monitoring Report (DMR). 122.41(l)(4)(i)

The DMR shall be submitted quarterly within 28 days after the end of the quarter to the Department office indicated in Section E of this permit. 122.41(l)(4)

- (2) The completed DMR Form shall be signed and certified either by the following applicable person (as defined in 40 CFS 122.22(b)):

- for a Corporation - by a responsible corporate officer;
- for a Partnership or Sole Proprietorship - by a general partner of the proprietor, respectively;
- for a Municipality, State, Federal or other public agency - by a principle executive officer or ranking elected official.

Written notification of delegation of DMR signatory authority must be submitted to the Department. 122.41(k)

- (3) If the permittee monitors any pollutant, using analytical methods described in B.3.a(4) above, more frequently than the permit requires, the results of this monitoring shall be incorporated, as appropriate, into the calculations used to report self-monitoring data on the DMR. 122.41(l)(4)(ii)

c. Non-Compliance Reporting

- (1) 24-Hour Reporting - The permittee shall orally report to the Department within 24 hours of becoming aware of the following:

- (a) Actual or anticipated non-compliance with any term or condition of this permit which may endanger health or the environment. 122.41(l)(6)(i)
- (b) Actual or anticipated non-compliance with any "maximum daily" discharge limitation which is identified in Part A of this permit as being either: 122.41(l)(6)(ii)(A), 122.41(l)(6)(ii)(C)
 - (i) A toxic pollutant effluent standard established by EPA pursuant to Section 307(a) of the Clean Water Act,
 - (ii) A toxic or hazardous pollutant which, if not adequately treated, could constitute a threat to human health, welfare, or the environment, or
 - (iii) Any pollutant identified as the method to control a toxic pollutant or hazardous substance (i.e. indicator pollutant).

- (2) That any activity has occurred or will occur which would result in any discharge, on a non-routine or infrequent basis, of a toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels": 122.42(a)(2)
- (a) Five hundred micrograms per liter;
 - (b) One milligram per liter for antimony;
 - (c) Ten (10) times the maximum concentration value reported for that pollutant in the permit application;
 - (d) Any other notification level established by the Department.

4. MANAGEMENT REQUIREMENTS

a. Compliance Schedules - 122.47(a), 122.41(l)(5)

- (1) Where applicable, the permittee will comply with the schedule identified in this permit relative to NPDE discharge requirements.
- (2) The permittee shall submit reports of compliance or non-compliance with, or progress reports as applicable, any interim and final requirements contained in this permit. Such reports shall be submitted no later than 14 days following the applicable schedule date or compliance deadline. 122.47(a)(4)

b. Permit Modification, Termination, or Revocation and Reissuance

- (1) This permit may be modified, terminated, or revoked and reissued during its term for any of the causes specified in 25 Pa. Code, Chapter 92. 122.41(f)
- (2) The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or a notification of planned changes or anticipated non-compliance, does not stay any permit condition. 122.41(f)
- (3) The permittee shall comply with effluent standards or prohibitions established under Section 307(a) of the Clean Water Act for toxic pollutants within the time specified in the regulations that establish those standards or prohibitions. 122.41(a)(1)

c. Duty to Provide Information

- (1) The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. 122.41(h)
- (2) The permittee shall furnish to the Department, upon request, copies of records required to be kept by this permit. 122.41(h)
- (3) Other Information - Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information to the Department. 122.41(l)(8)

5. PENALTIES AND LIABILITY

a. Duty to Comply 122.41(a), (a)(2), (a)(3)

Failure to comply with the terms or conditions of this NPDES permit is grounds for enforcement action; for permit termination, revocation and reissuance, or modification; or for denial of a permit renewal application.

- (1) The Clean Water Act provides that any person who violates Section 301, 302, 306, 307, 308, 318, or 405 of the Act, or any permit condition or limitation implementing any such sections in a permit issued under Section 402, or any requirement imposed in a pretreatment program approved under Sections 402(a)(3) or 402(b)(8) of the Act, is subject to a civil penalty not to exceed \$25,000 per day for each violation. The Clean Water Act provides that any person who negligently violates Sections 301, 302, 306, 307, 308, 318 or 405 of the Act, or any condition or limitation implementing any of such sections in a permit issued under Section 402 of the Act, or any requirement imposed in a pretreatment program approved under Section 402(a)(3) or 402(b)(8) of the Act, is subject to criminal penalties of \$2,500 to \$25,000 per day of violation, or imprisonment of not more than 1 year, or both. In the case of a second or subsequent conviction for a negligent violation, a person shall be subject to criminal penalties of not more than \$50,000 per day of violation, or by imprisonment of not more than 2 years, or both. Any person who knowingly violates such sections, or such conditions or limitations is subject to criminal penalties of \$5,000 to \$50,000 per day of violation, or imprisonment for not more than 3 years, or both. In the case of a second or subsequent conviction for a knowing violation, a person shall be subject to criminal penalties of not more than \$100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates Section 301, 302, 303, 306, 307, 308, 318, or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall, upon conviction, be subject to a fine of not more than \$250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to criminal penalties of not more than \$100,000 per day of violation, or imprisonment of not more than 6 years, or both. Any person who knowingly violates Section 301, 302, 303, 306, 307, 308, 318, or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the Act, and who knows at that time that he thereby places another person in imminent danger of death or serious bodily injury, shall upon conviction, be subject to a fine of not more than \$250,000 or imprisonment of not more than 15 years, or both. In the case of a second or subsequent conviction for a knowing endangerment violation, a person shall be subject to a fine of not more than \$50,000 or by imprisonment of not more than 30 years, or both. An organization, as defined in Section 309(c)(3)(B)(iii) of the CWA, shall upon conviction of violating the imminent danger provision, be subject to a fine of not more than \$1,000,000 and can be fined up to \$2,000,000 for a second or subsequent conviction.
- (2) Any person may be assessed an administrative penalty by the Administrator for violating Section 301, 302, 306, 307, 308, 318, or 405 of the Act, or any permit condition or limitation implementing any of such sections in a permit issued under Section 402 of the Act. Administrative penalties for Class I violations are not to exceed \$10,000 per violation, with the maximum amount of any Class I penalty assessed not to exceed \$25,000. Penalties for Class II violations are not to exceed \$10,000 per day for each day during which the violation continues, with the maximum amount of any Class II penalty not to exceed \$125,000.

c. Property Rights

The issuance of this NPDES permit does not convey any property rights of any sort, or any exclusive privilege. 122.41(g)

d. Renewal of NPDES Permits

Application for renewal of this NPDES permit, or notification of intent to cease discharging by the expiration date, must be submitted to the Department at least 180 days prior to the above expiration date (unless permission has been granted by the Department for submission at a later date). 122.41(b)

SECTION C. MANDATED COAL MINING ACTIVITY PERMIT CONDITIONS AND REQUIREMENTS

1. Except to the extent that the Department otherwise directs in the permit that specific actions be taken, the permittee shall conduct coal mining activities as described in the approved application. 86.41(1)
2. The permittee shall affect by coal mining activities only those lands specifically approved in the permit for which a bond has been filed with the Department in accordance with 25. Pa. Code, Chapter 86, Subchapter F (relating to bonding and insurance requirements). 86.41(3)
3. The permittee shall allow the authorized representatives of the Commonwealth, without advance notice or a search warrant, upon presentation of appropriate credentials, and without delay, to have access to areas in which coal mining activities will or are being conducted. 86.41(2)
4. The permittee shall take all possible steps to prevent an adverse impact to the environment or public health and safety resulting from non-compliance with any term or condition of this permit including:
 - a. Any accelerated or additional monitoring necessary to determine the nature and extent of non-compliance and the results of the non-compliance;
 - b. Providing warning, as soon as possible after learning of the non-compliance, to a person whose health and safety is in imminent danger due to the non-compliance. 86.42(1)
5. The permittee shall conduct the activities in accordance with measures specified in this permit as necessary to prevent environmental harm or harm to the health or safety of the public. 86.42(2)

**INSTRUCTIONS FOR COMPLETING A
DISCHARGE MONITORING REPORT
DMR**

The DMR is a form provided by the Department to aid the permittee in reporting the results of discharge self-monitoring. The DMR attached to the permit is an original provided as a master, so do not write on it but rather duplicate it and complete the duplicates for submission to the Department.

A separate DMR must be filled out monthly for each outfall. Below is a brief explanation of the information that must be entered on the DMR form.

1. Monitoring Period: next to MONITORING MONTH enter the month and year of the monitoring period. For example, enter 07/82 for the month July, 1982.
2. Flow: under AVERAGE enter the average of the daily flow measurements that were made during the month, and under MAXIMUM enter the highest daily flow for the month.
3. pH: under MINIMUM enter the lowest pH reading for the month, and under MAXIMUM enter the highest pH reading for the month.
4. Alkalinity Violations: for the month, under MAXIMUM enter the number of samples where acidity was greater than or equal to alkalinity.
5. Temperature: under MINIMUM enter the lowest temperature reading for the month, and under MAXIMUM enter the highest temperature reading for the month.
6. Other Parameters: for each of the other parameters, under AVERAGE enter the average of all the daily determinations for the month, and under MAXIMUM enter the highest daily determination for the month.
7. Frequency: under FREQ enter the frequency of sampling or measurement. For example, enter 4 if four daily determinations of iron concentration were made during the month, enter 10 if ten daily flow measurements were made during the month, enter CONT if pH is monitored continuously, etc.
8. Sample Type: under TYPE enter the type of sample or measurement. For example, enter GRAB for grab sample, 8HC for eight-hour composite sampling, EST for estimated flow measurement, MBAS where flow is measured, I-S for immersion stabilization, etc.
9. Signature: enter the name and title of the person signing the form, the person's signature, and the date signed.
10. Violation: if a violation of any discharge requirement occurred during the month, an explanation must accompany the DMR. Attach a brief explanation to describe cause and corrective action taken, and reference each violation by date (ref to Section B.3.c(3) of the permit for the information required in the explanation).
11. No Discharge: if no discharge occurred during the month at an outfall, enter the MONITORING MONTH, the signature information at the bottom of the form, write "no discharge" across the form, and submit to the Department.

2. MINING AND RECLAMATION BOND

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3. SUBSIDENCE BOND

- 

SECTION E. SPECIAL CONDITIONS REGARDING OPERATION AND RECLAMATION

1 Requirement to submit oral reports and written materials:

- a. The permittee shall submit to the Department's District Office all oral reports and written materials required by this permit *except for the materials related to the Subsidence Control Plan that may be referred to in Section F of this permit*. Unless specified otherwise by the Department, single copies of written materials must be submitted to the District Office except for DMRs and HMRs which must be submitted in duplicate. These oral reports and written materials must be submitted to the District Office at:

Department of Environmental Protection
District Mining Operations
186 Enterprise Drive
Phillipsburg, PA 16866
Phone: 814-342-8200

- b. In addition to submitting two copies of HMRs to the Department's District Office as required by Subsection a above, the permittee shall also submit one copy of the HMRs and one copy of the DMRs to the Department's California Office at:

Department of Environmental Protection
District Mining Operations
25 Technology Drive
California Technology Park
Coal Center, PA 15423
Phone: 724-769-1100

2. The permittee shall notify the Mine Conservation Inspector from the Bureau of Mining and Reclamation at least ten days prior sealing any borehole associated with the mining activity authorized by this permit. Within ten (10) days of borehole sealing, a certificate of borehole/sealing procedure form must be submitted to the California District Office and the Mine Conservation Inspector.
3. Discharge self-monitoring shall be conducted by the permittee as required by Section A of this permit. Monitoring results obtained during each month shall be summarized for that month and reported on the attached discharge monitoring report (DMR) for each outfall. The permittee shall submit the DMRs to the Department's District Office no later than the 28th day from the last day in the quarter for which samples are taken, e.g. samples taken during the second quarter (April/May/June) are to be submitted by July 28th.
4. For each hydrologic monitoring point, the permittee shall monitor for the listed parameters on the monitoring point's hydrologic monitoring report (HMR). Unless otherwise required by this permit, each monitoring point need be monitored only once per quarter. Monitoring results obtained during each quarter shall be summarized for that quarter and reported on the HMR. For the purposes of this permit, the quarters are defined as January/February/March, April/May/June, July/August/September, and October/November/December. The permittee shall submit the HMRs to the Department's District Office and California Office no later than the 28th day of the month following the reporting quarter (i.e. April 28, July 28, October 28, January 28).

SECTION E. SPECIAL CONDITIONS REGARDING OPERATION AND RECLAMATION

5. Each pond authorized by this permit shall be designed and inspected during construction under the supervision of, and certified to the Department upon completion of construction by, a registered professional engineer that the pond was constructed as approved in the permit application. Within 30 days after pond construction, the permittee shall submit a completed POND CERTIFICATION (attached) to the Department's California Office, and submit a copy of the certification to the Department's mine conservation inspector.
6. This Coal Mining Activity Permit 14831301 supersedes in its entirety the Coal Mining Activity Permit 14831301 issued on April 24, 1985, reissued on October 7, 1986 and July 22, 1992. All of the following application materials are made part of the official documentation for this Permit 14831301: a. the application material that was submitted in support of the Permit 14831301 issued on April 24, 1985, reissued on October 7, 1986 and July 22, 1992; b. the application materials that were submitted in support of all the revisions approved under the Permit 14831301; c. the application material submitted in support of this Permit 14831301 to renew Permit No. 14831301 and the application material submitted to transfer Permit 14831301 from Pennsylvania Mines Corporation to Pennsylvania Mines, LLC.
7. The Department is granting a variance to conduct surface mining operations within 100 feet of Shimel Run and Moshannon Creek, and the Department hereby orders the permittee to employ the methods and techniques described in the application material to prevent adverse hydrologic or water quality impacts that could result from conducting operations within 100 feet of the stream.
8. This permit does not authorize the extraction of coal. Before coal extraction can be authorized, the permittee must submit a subsidence control plan that must be approved by an amendment for this permit.
9. This permit renewal is issued for reclamation activities only and does not authorize extraction of coal.
10. This permit transfers all rights and liabilities of Rushton Mining Company, Permit 14831301 to Pennsylvania Mines Corp. Pennsylvania Mines Corp. by application and affidavit dated May 23, 1996 assumes all liability for reclamation, water pollution, planting, and all other responsibilities under the law, the Rules and Regulations, and the terms and conditions of the aforementioned permit.
11. This permit transfers all rights and liabilities of Pennsylvania Mines Corporation, Permit 14831301 to Pennsylvania Mines, LLC. Pennsylvania Mines, LLC by application and affidavit dated July 13, 2000 assumes all liability for reclamation, water pollution, planting, and all other responsibilities under the law, the Rules and Regulations, and the terms and conditions of the aforementioned permit.
12. The permittee shall notify and receive approval from Deep Mine Safety and Mine Safety and Health Administration at least ten days prior to any installation of AMD sludge injection borehole(s).
13. The following revisions are included with this mining activity permit:

Revision No.	Date of Approval	Description
(1)	August 20, 1987	Install power borehole at the Shaft #2 site.
(2)	August 30, 1988	Install ventilation borehole and revise subsidence control plan boundary.

SECTION E. SPECIAL CONDITIONS REGARDING OPERATION AND RECLAMATION

14. The following revisions are included with this mining activity permit (continued):

Revision No.	Date of Approval	Description
(3)	December 6, 1988	Install three sludge boreholes.
(4)	February 8, 1991	Install five sludge boreholes.
(5)	November 6, 1991	Install 8" dewatering borehole.
(6)	July 22, 1992	Renew Permit #14831301 - Reclamation Only.
(7)	November 17, 1995	Stream grouting plan along Moshannon Creek.
(8)	September 24, 1996	Permit Transfer to Pennsylvania Mines Corporation from Rushton Mining Company.
(9)	March 25, 1998	Renew Deep Mine Permit No. 14831301.
(10)	February 8, 1999	Revise permit to delete monitoring point L-4 from the HMR Plan.
(11)	May 26, 1999	Approval for the addition of three (3) sludge boreholes.
(12)	June 16, 1999	Permit Revision to Install Alkaline Addition Boreholes on Permitted Surface Area of the Surface Activity Site.
(13)	September 8, 1999	Revise permit to delete monitoring points.
(14)	August 31, 201	Permit Transfer from Pennsylvania Mines Corporation to Pennsylvania Mines, LLC. Approve Surety Bond No. 92901524 and 929201523 for permit transfer.
(15)	January 6, 2004	Approval for the installation of AMD sludge injection borehole(s) into the Rushton Mine workings.
(16)	January 12, 2004	Renew deep mine permit no. 14831301.
(17)	June 30, 2004	Approval for the additional sludge pond.
(18)	August 28, 2006	Permit revision – add surface acres for sludge disposal boreholes (BH-BR(1) & (2)) and pipeline. Approve additional collateral bond. Reflect bond change from Surety Bond No. 92901524 and 929201523 to Collateral Bonds No. SM208915W and SM208907W approved December 20, 2004.
(19)	MAR 16 2010	Renew deep mine permit no. 14831301 for water treatment.

**DISCHARGE MONITORING REPORT
DMR**

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

COAL MINING ACTIVITY PERMIT 14831301
OUTFALL 001
MONITORING MONTH /
MO YR

NOTE: READ DMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	PERMIT REQUIREMENT	UNITS	MONITORING RESULTS			MONITORING	
			MINIMUM	AVERAGE	MAXIMUM	FREQ	TYPE
Flow	*	MGD	*				
Iron	3.0/6.0	MG/L	*				
Suspended Solids	35/70	MG/L	*				
Manganese	2.0/4.0	MG/L	*				
Aluminum	2.0/4.0	MG/L	*				
Sulfates	*	MG/L	*				
Specific Conductance	*	UMHO	*				
Alkalinity Violations	ALK>ACID	*	*	*			
pH	6.0-9.5	S.U.		*			

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. Explanations are attached if discharge violations occurred during the monitoring month.

TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

DISCHARGE MONITORING REPORT
DMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

COAL MINING ACTIVITY PERMIT 14831301
OUTFALL 003
MONITORING MONTH /
MO YR

NOTE: READ DMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	PERMIT REQUIREMENT	UNITS	MONITORING RESULTS			MONITORING	
			MINIMUM	AVERAGE	MAXIMUM	FREQ	TYPE
Flow	*	MGD	*				
Iron	3.0/6.0	MG/L	*				
Suspended Solids	35/70	MG/L	*				
Manganese	2.0/4.0	MG/L	*				
Aluminum	2.0/4.0	MG/L	*				
Sulfates	*	MG/L	*				
Specific Conductance	*	UMHO	*				
Alkalinity Violations	ALK>ACID	*	*	*			
pH	6.0-9.5	S.U.		*			

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TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

DISCHARGE MONITORING REPORT
DMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

COAL MINING ACTIVITY PERMIT 14831301
OUTFALL 004
MONITORING MONTH /
MO YR

NOTE: READ DMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	PERMIT REQUIREMENT	UNITS	MONITORING RESULTS			MONITORING	
			MINIMUM	AVERAGE	MAXIMUM	FREQ	TYPE
Flow	*	MGD	*				
Iron	3.0/6.0	MG/L	*				
Suspended Solids	35/70	MG/L	*				
Manganese	2.0/4.0	MG/L	*				
Aluminum	2.0/4.0	MG/L	*				
Sulfates	*	MG/L	*				
Specific Conductance	*	UMHO	*				
Alkalinity Violations	ALK>ACID	*	*	*			
pH	6.0-9.5	S.U.		*			

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TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

DISCHARGE MONITORING REPORT
DMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

COAL MINING ACTIVITY PERMIT 14831301
OUTFALL 005
MONITORING MONTH /
MO YR

NOTE: READ DMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	PERMIT REQUIREMENT	UNITS	MONITORING RESULTS			MONITORING	
			MINIMUM	AVERAGE	MAXIMUM	FREQ	TYPE
Flow	*	MGD	*				
Iron	3.0/6.0	MG/L	*				
Suspended Solids	35/70	MG/L	*				
Manganese	2.0/4.0	MG/L	*				
Aluminum	2.0/4.0	MG/L	*				
Sulfates	*	MG/L	*				
Specific Conductance	*	UMHO	*				
Alkalinity Violations	ALK>ACID	*	*	*			
pH	6.0-9.5	S.U.		*			

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TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT HMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

MINING ACTIVITY PERMIT 14831301
LAT: 40 ° 51 ' 16 "
LONG: 78 ° 14 ' 52 "
Surface Elevation 1520 MSL

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: A2 DESCRIPTION: Moshannon No. 10 Mine							
Date Sampled (MO/DA/YR)								
Flow (gpm)								
Iron (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

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TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT
HMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

MINING ACTIVITY PERMIT 14831301
LAT: 40 ° 51 ' 34 "
LONG: 78 ° 13 ' 57 "
Surface Elevation 1525 MSL

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: A3 DESCRIPTION: Bigelow Run Mine							
Date Sampled (MO/DA/YR)								
Flow (gpm)								
Iron (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

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TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT HMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

MINING ACTIVITY PERMIT 14831301
LAT: 40 ° 52 ' 26 "
LONG: 78 ° 14 ' 06 "
Surface Elevation 1470 MSL

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: A5 DESCRIPTION: Pauline Mine							
Date Sampled (MO/DA/YR)								
Flow (gpm)								
Iron (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

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TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT HMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

MINING ACTIVITY PERMIT 14831301
LAT: 40 ° 52 ' 51 "
LONG: 78 ° 15 ' 38 "
Surface Elevation 1475 MSL

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: A7 DESCRIPTION: Monarch Mine							
Date Sampled (MO/DA/YR)								
Flow (gpm)								
Iron (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

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TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT HMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

MINING ACTIVITY PERMIT 14831301
LAT: 40 ° 51 ' 43 "
LONG: 78 ° 15 ' 04 "
Surface Elevation 1450 MSL

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: A9 DESCRIPTION: Spark Plug Mine							
Date Sampled (MO/DA/YR)								
Flow (gpm)								
Iron (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

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TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT
HMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

MINING ACTIVITY PERMIT 14831301
LAT: 40° 53' 07"
LONG: 78° 13' 29"
Surface Elevation 1435 MSL

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: A11 DESCRIPTION: Moshannon No. 11 Mine							
Date Sampled (MO/DA/YR)								
Flow (gpm)								
Iron (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

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TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT HMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

MINING ACTIVITY PERMIT 14831301

LAT: 40° 51' 35"

LONG: 78° 14' 29"

Surface Elevation 1550 MSL

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: A12 DESCRIPTION: Beaver No. 1 Mine							
Date Sampled (MO/DA/YR)								
Flow (gpm)								
Iron (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT
HMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

MINING ACTIVITY PERMIT 14831301
LAT: 40 ° 51 ' 51 "
LONG: 78 ° 15 ' 05 "
Surface Elevation 1455 MSL

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: A14 DESCRIPTION: Associated Drilling Mine							
Date Sampled (MO/DA/YR)								
Flow (gpm)								
Iron (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT HMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

MINING ACTIVITY PERMIT 14831301
LAT: 40 ° 51 ' 29 "
LONG: 78 ° 15 ' 03 "
Surface Elevation 1450 MSL

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: A16 DESCRIPTION: Columbia No. 1 Mine							
Date Sampled (MO/DA/YR)								
Flow (gpm)								
Iron (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT
HMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

MINING ACTIVITY PERMIT 14831301
LAT: 40 ° 52 ' 38 "
LONG: 78 ° 13 ' 27 "
Surface Elevation 1520 MSL

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: BH-Q DESCRIPTION: Sleepy Hollow Road Borehole							
Date Sampled (MO/DA/YR)								
Static Water Elevation (MSL-ft)								

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

TYPED OR PRINTED NAME AND TITLE SIGNATURE DATE

HYDROLOGIC MONITORING REPORT HMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

MINING ACTIVITY PERMIT 14831301
LAT: 40 ° 51 ' 58 "
LONG: 78 ° 13 ' 59 "
Surface Elevation 1595 MSL

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: K3 DESCRIPTION: Spring - in hollow east of the mine office							
Date Sampled (MO/DA/YR)								
Flow (gpm)								
Iron (mg/l)								
Manganese (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

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TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT
HMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

MINING ACTIVITY PERMIT 14831301
LAT: 40 ° 51 ' 59 "
LONG: 78 ° 15 ' 00 "
Surface Elevation 1435 MSL

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: L1 DESCRIPTION: Moshannon Creek - Upstream of Discharge 001							
Date Sampled (MO/DA/YR)								
Stream Flow (cfs)								
Iron (mg/l)								
Suspended Solids (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

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TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT HMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

MINING ACTIVITY PERMIT 14831301
LAT: 40° 52' 19"
LONG: 78° 14' 18"
Surface Elevation 1435 MSL

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: L4 DESCRIPTION: Moshannon Creek - Downstream of Discharge 004							
Date Sampled (MO/DA/YR)								
Stream Flow (cfs)								
Iron (mg/l)								
Suspended Solids (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT
HMR

Pennsylvania Mines, LLC
Rushton Mine
Rush Township
Centre County

MINING ACTIVITY PERMIT 14831301
LAT: 40 ° 53 ' 36 "
LONG: 78 ° 14 ' 57 "
Surface Elevation 1490 MSL

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: L16 DESCRIPTION: Weir							
Date Sampled (MO/DA/YR)								
Stream Flow (cfs)								
Iron (mg/l)								
Manganese (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

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TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

APPLICATION TO SRBC FOR AQUIFER TEST PLAN WAIVER
FOR
USE OF RUSHTON MINE FOR CONSUMPTIVE WATER USE MITIGATION
NOVEMBER 2011

APPENDIX C-2
RUSHTON MINE PERMIT REVISION – PA DEP No. 14831301, JANUARY 2011



pennsylvania

DEPARTMENT OF ENVIRONMENTAL PROTECTION
CALIFORNIA DISTRICT MINING OFFICE

JAN 05 2011

Certified Mail #7010 1870 0002 2305 5102

Pennsylvania Mines, LLC
2 North 9th Street
Allentown, PA 18101

Re: Operation Name: Rushton Mine
Permit No.: 14831301
Rush Township, Center County

Ladies and Gentlemen:

We have enclosed a revised permit for the above operation. This proposal was accepted for technical review on September 20, 2010.

The permit has been revised to install a replacement sludge injection borehole into the abandoned mine workings.

Please refer to Page E-3, Special Condition No. 14, Revision No. 20, which identifies the approved changes.

The enclosed information supersedes the original issued permit and should be incorporated on a page-by-page basis.

If you have any questions about the permit, please contact me at 724.769.1100.

Sincerely,

Joel Koricich
Environmental Group Manager
District Mining Operations

Enclosure

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

No. 14831301

BITUMINOUS COAL MINING ACTIVITY PERMIT

Permittee Name: Pennsylvania Mines, LLC
and Address: Two North Ninth Street
Allentown, PA 18101
Operation Name: Rushton Mine

Location of Operation
Municipality: Rush Township
County: Centre

This permit approves the following activities as indicated by an "X":

☒ Operation of an Underground Coal Mine ☐ Coal Preparation ☐ Coal Refuse Disposal
☒ Other: Stream Encroachment & Reclamation Activities Only (See Section E.9)
☒ Discharge of Wastewater as Specified in Part A ☐ Subsidence Control Plan

This permit is for 121.1 acres of surface area and 5,912 acres of subsurface area.

This approval (as indicated by an "X") is subject to the attached LIMITS OF AUTHORIZATION and:

☒ PART A - EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS
☒ PART B - MANDATED NPDES PERMIT CONDITIONS AND REQUIREMENTS
☒ PART C - MANDATED COAL MINING ACTIVITY PERMIT CONDITIONS AND REQUIREMENTS
☒ PART D - BOND DESCRIPTIONS
☒ PART E - SPECIAL CONDITIONS REGARDING OPERATION AND RECLAMATION
☐ PART F - SPECIAL CONDITIONS REGARDING SUBSIDENCE CONTROL

This permit is hereby issued in accordance with the provisions of the Surface Mining Conservation and Reclamation Act, Act of May 31, 1945 (P.L. 1198, No. 418), as amended, 52 P.S. §§1396.1 et seq., the Clean Streams Law, Act of June 22, 1937 (P.L. 1987, No. 394), as amended, 35 P.S. §§691.1 et seq., and the Air Pollution Control Act, Act of January 8, 1960 (1959) (P.L. 2119, No. 787), as amended, 35 P.S. §§4001 et seq., and the regulations promulgated pursuant to these Acts. This permit is also issued in accordance with the following statutes and regulations promulgated pursuant to these statutes, as indicated by an "X":

☒ Bituminous Mine Subsidence and Land Conservation Act, Act of April 27, 1966 (P.L. 31, as amended, 52 P.S. §§1406.1 et seq.), and the regulations promulgated pursuant to this Act.
☐ Coal Refuse Disposal Control Act, Act of September 24, 1968 (P.L. 1040, No. 318), as amended, 52 P.S. §§30.51 et seq., and the regulations promulgated pursuant to this Act.
☒ Dam Safety and Encroachments Act, Act of November 26, 1978 (P.L. 1375, No. 325), as amended, 32 P.S. §§693.1 et seq., and the regulations promulgated pursuant to this Act.
☐ Solid Waste Management Act, Act of July 7, 1980 (P.L. 380, No. 97), 35 P.S. §§6018.101 et seq., and the regulations promulgated pursuant to this Act.

The permittee is hereby authorized to conduct coal mining activities as described in the approved permit application numbered 14831301 and approved revisions, and in accordance with, the laws and regulations and terms and conditions referenced above. A violation of any provision of the referenced laws, regulations, terms and conditions is a violation of this permit. Any modifications to the permitted facilities necessary to meet the terms and conditions of this permit require the prior written approval of the Department.

Original Permit Issuance Date: April 24, 1985
Latest Permit Renewal Date: January 12, 2004
Latest Permit Revision Date: JAN 05 2011
Permit Expiration Date: July 22, 2012

By Wm. S. Plassio
William S. Plassio

Title District Mining Manager

SECTION E. SPECIAL CONDITIONS REGARDING OPERATION AND RECLAMATION

14. The following revisions are included with this mining activity permit (continued):

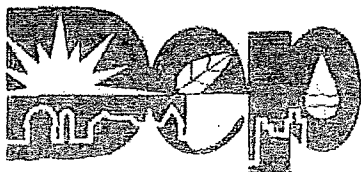
Revision No.	Date of Approval	Description
(3)	December 6, 1988	Install three sludge boreholes.
(4)	February 8, 1991	Install five sludge boreholes.
(5)	November 6, 1991	Install 8" dewatering borehole.
(6)	July 22, 1992	Renew Permit #14831301 - Reclamation Only.
(7)	November 17, 1995	Stream grouting plan along Moshannon Creek.
(8)	September 24, 1996	Permit Transfer to Pennsylvania Mines Corporation from Rushton Mining Company.
(9)	March 25, 1998	Renew Deep Mine Permit No. 14831301.
(10)	February 8, 1999	Revise permit to delete monitoring point L-4 from the HMR Plan.
(11)	May 26, 1999	Approval for the addition of three (3) sludge boreholes.
(12)	June 16, 1999	Permit Revision to Install Alkaline Addition Boreholes on Permitted Surface Area of the Surface Activity Site.
(13)	September 8, 1999	Revise permit to delete monitoring points.
(14)	August 31, 201	Permit Transfer from Pennsylvania Mines Corporation to Pennsylvania Mines, LLC. Approve Surety Bond No. 92901524 and 929201523 for permit transfer.
(15)	January 6, 2004	Approval for the installation of AMD sludge injection borehole(s) into the Rushton Mine workings.
(16)	January 12, 2004	Renew deep mine permit no. 14831301.
(17)	June 30, 2004	Approval for the additional sludge pond.
(18)	August 28, 2006	Permit revision -- add surface acres for sludge disposal boreholes (BH-BR(1) & (2)) and pipeline. Approve additional collateral bond. Reflect bond change from Surety Bond No. 92901524 and 929201523 to Collateral Bonds No. SM208915W and SM208907W approved December 20, 2004.
(19)	March 16, 2010	Renew deep mine permit no. 14831301 for water treatment.
(20)	JAN 05 2011	Permit revision to install a replacement sludge injection borehole, BH-BRIA, for the borehole BH-BR(1) into the abandoned mine workings.

APPLICATION TO SRBC FOR AQUIFER TEST PLAN WAIVER
FOR
USE OF RUSHTON MINE FOR CONSUMPTIVE WATER USE MITIGATION

NOVEMBER 2011

APPENDIX D

RUSHTON MINE PERMIT – PA DEP No. 14743701, SEPTEMBER 2008



Pennsylvania Department of Environmental Protection

25 Technology Drive
California Technology Park
Coal Center, PA 15423

SEP 12 2008

California District Office

724-769-1100

Certified Mail #7007 2560 0000 7190 5474

Mr. Jeffrey Parrett
Pennsylvania Mines, LLC
PPL Generation, LLC
2 North Ninth Street, Gen PL6
Allentown, PA 18101

Re: Operation Name: Pauline Hollow Coal Refuse Disposal Site
Permit No.: 14743701
Rush Township, Centre County

Ladies and Gentlemen:

We have enclosed a renewed permit for the above operation. This proposal was accepted for technical review on April 29, 2008.

The permit has been revised to renew CMAP No. 14743701.

Please refer to Page 15, Special Condition No. 18, Revision No. 12, which identifies the approved changes.

The enclosed information supersedes the original issued permit and should be incorporated on a page-by-page basis.

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, PO Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 1-800-654-5984. Appeals must be filed with the Environmental Hearing Board within thirty (30) days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in Braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

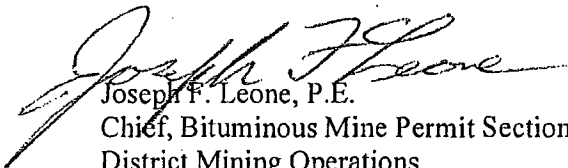
SEP 12 2008

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD (717-787-3483) FOR MORE INFORMATION.

If you have any questions about the permit, please contact me at the above number.

Sincerely,


Joseph F. Leone, P.E.
Chief, Bituminous Mine Permit Section
District Mining Operations

Enclosure

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COAL REFUSE DISPOSAL PERMIT NO. 14743701

Permittee: Pennsylvania Mines, LLC
PPL Generation, LLC
2 North Ninth Street, Gen PL6
Allentown, PA 18001

Issuance Date October 11, 1983

Expiration Date October 11, 2013

Renewal Date SEP 12 2008

Name of Operation Pauline Hollow Coal Refuse Disposal Site

Municipality Rush Township County Centre

Revision Date SEP 12 2008

1. This permit is hereby issued in accordance with the provisions of the Coal Refuse Disposal Control Act, 52 P.S. §30.51 et seq., Act of September 24, 1968 [P.L. 1040, No. 318], as amended, and The Clean Streams Law, 35 P.S. §691.1 et seq., Act of June 22, 1937 [P.L. 1987, No. 394], as amended, and the regulations promulgated pursuant to these Acts. This permit is also issued in accordance with the following statutes and regulations promulgated pursuant to these statutes as marked:
 - ☐ Surface Mining Conservation and Reclamation Act, 53 P.S. §1396.1 et seq., Act of May 31, 1945 [P.L. 1198, No. 418], as amended.
 - ☒ Dam Safety and Encroachments Act, 32 P.S. §693.1 et seq., Act of November 26, 1978 [P.L. 1375, No. 325], as amended.
 - ☒ Air Pollution Control Act, 35 P.S. §4001 et seq., Act of January 8, 1960 [1959 P.L. 2119, No. 787], as amended.
 - ☒ Solid Waste Management Act, 35 P.S. §6018.101 et seq., Act of July 7, 1980 [P.L. 380, No. 97].
2. This permit is for 150.0 acres, of which 120.0 acres are planned to be affected by coal refuse disposal and 30.0 acres are planned to be affected by support activities. Permittee may conduct coal refuse disposal activities only on that area of the permit outlined on the authorization to conduct coal refuse disposal activities and the accompanying maps contained in Part C of this permit. Initial authority to conduct mining activities is granted for an area of 150.0 acres described in Part C of the permit. Additional authority to conduct mining activities may be granted by written approval of the Department and attached to Part C of this permit. Permittee is prohibited from conducting mining activities on that portion of the permit area which has not been authorized for mining by the Department, in writing, and shown on the bond approval and coal refuse disposal mining authorization map(s) contained in Part C of this permit.
3. Permittee is also granted authority to discharge from facilities located 1.8 miles south of Phillipsburg to the following receiving waters: unnamed tributary Moshannon Creek to West Branch Susquehanna River to Susquehanna River. This authority is subject to the effluent limitation, monitoring requirements, operating conditions, and area restrictions set forth in the permit application and Parts A, B, and C of this permit.
4. Permittee is hereby authorized to conduct coal mining activities, including the construction and operation of Industrial Waste Treatment facilities and erosion and sediment control facilities, pursuant to, and in accordance with, the terms and conditions of this permit for the areas where the Authorization to Conduct Coal Refuse Disposal Activities has been granted. Any modifications to wastewater treatment facilities, including erosion and sediment control facilities, necessary to meet the terms and conditions of this permit require written approval.
5. The permittee shall conduct all coal mining activities as described in the approved permit application and all supporting documents. The terms and conditions of this permit shall supersede any conflicting provisions of the permit application and supporting documents or revisions to the permit application.

6. The permittee's failure to comply with the laws of the Commonwealth, including the Department's regulations regarding coal mining activities, or failure to comply with the terms and conditions of this permit, may result in an enforcement action; in permit termination, suspension, revocation and reissuance, or modification; or in denial of a permit renewal application.
7. Application for renewal of this permit, or notification of intent to cease discharging by the expiration date, must be submitted to the Department at least 180 days prior to the above expiration date (unless permission has been granted by the Department for submission at a later date) using the appropriate application forms. In the event that a timely and complete application for renewal has been submitted and the Department is unable, through no fault of the permittee, to reissue the permit before the above expiration date or to take other appropriate action before the above expiration date, the terms and conditions of this permit will be automatically continued and will remain fully effective and enforceable pending the grant or denial of the application for permit renewal.
8. As a condition of this permit and of the permittee's authority to conduct the activities authorized by this permit, the permittee hereby authorizes and consents to allow authorized employees or agents of the Department, without advance notice or a search warrant, upon presentation of appropriate credentials, and without delay, to have access of and to inspect all areas on which coal mining activities are being or will be conducted. This authorization and consent shall include consent to collect samples of waste or water, to take photographs, to perform measurements, surveys, and other tests, to inspect any monitoring equipment, to inspect the methods of operation, and to inspect and/or copy documents required by the Department to be maintained.
9. No coal mining activities may be commenced under this permit unless the activities are in compliance with all applicable ordinances enacted pursuant to the Municipalities Planning Code, the Act of July 31, 1968, (P.L. 805, No. 247), as amended, 53 P.S. §10001 et seq.
10. The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights.
11. Nothing herein contained shall be construed to be an intent on the part of the Department to approve any act made or to be made by the permittee inconsistent with the permittee's lawful powers or with existing laws of the Commonwealth regulating coal mining activities and the practice of professional engineering. This permit shall not be construed to sanction any act otherwise forbidden by federal or state law or regulation, or by local ordinance, nor to preempt any duty to obtain state or local assent required by law for the coal mining activity.
12. The permit shall be void three (3) years from the date of issuance unless the permittee has commenced coal mining activities under this permit prior to that time.
13. Initiation of coal mining activities under this permit constitutes an acceptance of all terms and conditions of the permit.
14. Permittee shall take all possible steps to prevent any adverse impact to the environment or public health and safety resulting from noncompliance with any term or condition of the permit including:
 - [i] any accelerated or additional monitoring necessary to determine the nature and extent of noncompliance and the results of the noncompliance; and
 - [ii] providing warning, as soon as possible after learning of such noncompliance, to any person whose health and safety is in imminent danger due to the noncompliance.
15. Permittee shall conduct the activities in accordance with any measures specified in the permit as necessary to prevent environmental harm or harm to the health or safety of the public.

PART A
EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

CMAP # 14743701

NPDES # PA0600156

I. MINE DRAINAGE TREATMENT FACILITIES

a. EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS FOR OUTFALL 001

DISCHARGE TO: Moshannon Creek

FROM: Main Sedimentation Basin

LAT: 40° 52' 21.3 " LONG: 78° 14' 2.3 "

Based on the hydrologic data and anticipated wastewater characteristics and flows described in the permit application and its supporting document and/or revisions, the following effluent limitations and monitoring requirements apply to the subject outfall:

<u>Discharge Parameter</u>	<u>DISCHARGE LIMITATIONS¹</u>			<u>MONITORING REQUIREMENTS</u>	
	<u>Average Monthly</u>	<u>Maximum Daily</u>	<u>Instant Maximum</u>	<u>Measurement Frequency</u>	<u>Sample Type</u>
Flow (mgd)				2/month	estimated
Iron	3.0	6.0	7.0	2/month	grab
Suspended Solids	35	70	90	2/month	grab
Manganese	2.0	4.0	5.0	2/month	grab
Aluminum				2/month	grab
Sulfates				1/quarter	grab
Specific Conductance (umho)				1/quarter	grab

pH not less than 6.0 nor greater than 9.0 standard units at all times.

Alkalinity must exceed acidity at all times.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

b. PARAMETERS SUBJECT TO 24-HOUR, NON-COMPLIANCE REPORTING FOR "MAXIMUM DAILY" LIMITATIONS UNDER B.3.c(1) (b) OF THIS PERMIT ARE: N/A

c. SAMPLES TAKEN IN COMPLIANCE WITH THE MONITORING REQUIREMENTS SPECIFIED ABOVE SHALL BE TAKEN AT THE FOLLOWING LOCATION(S): outfall from main sedimentation basin

Note: ¹Unless otherwise indicated, discharge limitations are concentrations expressed in mg/l, and the total (dissolved plus suspended fractions) is applicable for each parameter.

At a minimum, any other discharge from areas disturbed by mining activities, including areas disturbed by mineral preparation, processing or handling facilities shall comply with the following discharge limitations.

DISCHARGE LIMITATIONS

Concentration [mg/l
unless otherwise specified]

<u>Discharge Parameter</u>	<u>Average Monthly</u>	<u>Instantaneous Maximum</u>
--------------------------------	----------------------------	----------------------------------

IRON (Fe): There shall be no discharge of water containing a concentration of Iron in excess of seven milligrams per liter.

MANGANESE (Mn): There shall be no discharge of water containing a concentration of Manganese in excess of four milligrams per liter.

TOTAL SUSPENDED SOLIDS (TSS): There shall be no discharge of water containing more than seventy milligrams per liter of Total Suspended Solids.

MONITORING REQUIREMENTS

<u>Measurement Frequency</u>	<u>Sample Type</u>	<u>Reporting Frequency</u>
----------------------------------	------------------------	--------------------------------

A grab sample once a month when discharging for pH (field and laboratory), total iron, total manganese, total suspended solids, acidity, alkalinity, sulfates, and specific conductance and temperature.

A grab sample daily for pH when discharging.

pH not less than 6.0 standard units nor greater than 9.0 standard units at all times.

Alkalinity must exceed acidity at all times.

There shall be no discharge of floating solids or visible foam in other than trace amounts.

PART A

The following conditions apply to Part A of this permit.

1. DEFINITIONS

- a. The term "Bypass" means the intentional diversion of wastes from any portion of a treatment facility.
- b. The term "severe property damage" means substantial physical damage to property, damage to the treatment facilities which causes them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.
- c. The "average monthly concentration" means the arithmetic average of all the daily determinations of concentration made during a calendar month.
- d. The "daily determination of concentration" means the concentration of a composite sample taken during a calendar day.
- e. The "maximum daily concentration" means the daily determination of concentration for any calendar day.
- f. The "instantaneous maximum concentration" means the concentration not to be exceeded at any time in any grab sample.
- g. The term "Composite Sample" means a combination of individual samples obtained at regular intervals over a time period. Either the volume of each individual sample is proportional to discharge flow rates, or the sampling interval (for constant volume samples) is proportional to the flow rates over the time period used to produce the composite. The maximum time period between individual samples shall not exceed two hours, except that for wastes of a uniform nature the samples may be collected on a frequency of at least twice per working shift and shall be equally spaced over a 24-hour period (or over the operating day if flows are of a shorter duration).
- h. The term "Grab Sample" means an individual sample collected in less than 15 minutes.
- i. The term "i-s" means immersion stabilization, a technique in which a calibrated device is immersed in the effluent stream until the reading is stabilized.
- j. The term "At outfall XXX" means a sampling location in outfall line XXX downstream from the last point at which wastes are added to outfall line XXX, or otherwise specified.
- k. The term "Estimate" means to be based on a technical evaluation of the sources contributing to the discharge including, but not limited to, pump capabilities, water meters and batch discharge volumes.

2. SELF-MONITORING, REPORTING, AND RECORDS KEEPING

a. Representative Sampling

Samples and measurements taken as required herein shall be representative of the volume and nature of the monitored discharge.

b. Reporting of Discharge Monitoring Results

- [1] Discharge monitoring results obtained in accordance with the frequencies and for those parameters set forth in Part A of this permit shall be summarized and reported on a Discharge Monitoring Report (DMR) Form.

Duplicate signed copies of these reports shall be submitted on a quarterly basis (unless specified otherwise in Part A), no later than the 28th day of the month following the end of the monitoring quarter to the district office address listed in Part B of this permit. For the purposes of this permit, the quarters are defined as January/February/March; April/May/June; July/August/September; and October/November/December.

- [2] If the permittee monitors any pollutant, using analytical methods described in 2.3 below, more frequently than the permit requires, the results of this monitoring shall be incorporated, as appropriate, into the calculations used to report self-monitoring data on the DMR.

c. Noncompliance Reporting

- [1] 24-Hour Reporting - The permittee shall orally report to the Department within 24 hours of becoming aware of the following:

- [a] Actual or anticipated noncompliance with any term or condition of this permit which may endanger health or the environment.
- [b] Actual or anticipated noncompliance with any "maximum daily" discharge limitation which is identified in Part A.1 of this permit as being either:
 - [i] A toxic pollutant effluent standard established by EPA pursuant to Section 307(a) of the Clean Water Act;
 - [ii] For a toxic or hazardous pollutant which, if not adequately treated, could constitute a threat to human health, welfare, or the environment; or
 - [iii] Any pollutant identified as the method to control a toxic pollutant or hazardous substance (i.e. indicator pollutant).
- [c] Any unanticipated bypass which exceeds any effluent limitations in the permit.
- [d] Where the permittee orally reports this information within the above mentioned 24-hour time period, a written submission outlining the above information must be submitted to the Department within five (5) days of becoming aware of such a condition, unless this requirement is waived by the Department upon receipt of the oral report.

- [2] **Other noncompliance Reporting**

- [a] The permittee shall give advance notice to the Department of any planned changes to the permitted activity or facility which may result in noncompliance with permit requirements.
- [b] Where the permittee knows in advance of the need for a bypass which will exceed effluent limitations, it shall submit prior notice to the Department at least ten (10) days, if possible, before the date of the bypass.
- [c] The permittee shall report all instances of noncompliance which are not reported above at the time of DMR submission.

[3] The reports and notifications required above shall contain the following information:

- [a] A description of the discharge and cause of noncompliance;
- [b] The period of noncompliance, including exact dates and times and/or the anticipated time when the discharge will return to compliance; and
- [c] Steps being taken to reduce, eliminate, and prevent recurrence of the noncomplying discharge.

d. **Specific Toxic Substance Notification Levels** - The permittee shall notify the Department as soon as it knows or has reason to believe the following:

- [1] That any activity has occurred, or will occur, which would result in the discharge of any toxic pollutant which is not limited in the permit, if that discharge will exceed the highest of the following "notification levels".
 - [a] One hundred micrograms per liter;
 - [b] Two hundred micrograms per liter for acrolein and acrylonitrile;
 - [c] Five hundred micrograms per liter for 2, 4-dinitrophenol and 2-methyl -4, 6-dinitrophenol;
 - [d] One milligram per liter for antimony;
 - [e] Five (5) times the maximum concentration value reported for that pollutant in the permit application; or
 - [f] Any other notification level established by the Department.
- [2] That it has begun, or expects to begin, to use or manufacture as an intermediate or final product or by-product any toxic pollutant which was not reported in the permit application.

e. **Test Procedures**

Unless otherwise specified in this permit, the test procedures for the analysis of pollutants shall be those contained in 40 CFR Part 136, or alternate test procedures approved pursuant to that part.

f. **Recording of Results**

For each measurement or sample taken pursuant to the requirements of this permit, the permittee shall record the following information:

- [1] The exact place, date, and time of sampling or measurements;
- [2] The person(s) who performed the sampling or measurements;
- [3] The dates the analyses were performed;
- [4] The person(s) who performed the analyses;

[5] The analytical techniques or methods used; and

[6] The results of such analyses.

g. **Records Retention**

All records of monitoring activities and results (including all original strip chart recordings for continuous monitoring instrumentation and calibration and maintenance records), copies of all reports required by this permit, and records of all data used to complete the application for this permit shall be retained by the permittee for three (3) years. The three year period shall be extended as requested by the Department or the EPA Regional Administrator.

3. **MANAGEMENT REQUIREMENTS**

a. **Toxic Pollutants**

Notwithstanding the above, if a toxic effluent standard or prohibition (including any schedule of compliance specified in such effluent standard or prohibition) is established under Section 207(a) of the Clean Water Act for a toxic pollutant which is present in the discharge, and such standard or prohibition is more stringent than any limitation for such pollutant in this permit, then this permit shall be modified or revoked and reissued by the Department to conform with the toxic effluent standard or prohibition and the permittee so notified.

In the absence of a Departmental action to modify or to revoke and reissue this permit, any toxic effluent standard or prohibition established under Section 307(a) of the Clean Water Act is considered to be effective and enforceable against the permittee.

b. **Duty to Provide Information**

[1] The permittee shall furnish to the Department, within a reasonable time, any information which the Department may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit.

[2] The permittee shall furnish to the Department, upon request, copies of records required to be kept by this permit.

[3] *Other Information* - Where the permittee becomes aware that it failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Department, it shall promptly submit such facts or information to the Department.

[4] The permittee shall give advance notice to the Department of any planned physical alterations or additions to the permitted facility.

c. **Facilities Operation**

The permittee shall at all times maintain in good working order and properly operate all facilities and systems (and related appurtenances) for collection and treatment which are installed or used by the permittee for water pollution control and abatement to achieve compliance with the terms and conditions of the permit. Proper operation and maintenance includes but is not limited to effective performance based on designed facility removals, adequate funding, effective management, adequate operator staffing and training, and adequate laboratory and processing controls including appropriate quality assurance procedures. This provision includes the operation of backup or auxiliary facilities or similar systems when necessary to achieve compliance with this permit.

d. **Adverse Impact**

The permittee shall take all reasonable steps to minimize or correct any adverse impact on the environment resulting from noncompliance with this permit.

e. **Bypassing (applies to coal processing/preparation plants only)**

- [1] Bypassing not Exceeding Permit Limitations - The permittee may allow any bypass to occur which does not cause effluent limitations to be exceeded, **but only** if the bypass is for essential maintenance to assure efficient operation. This type of bypassing is **not** subject to the reporting and notification requirements of Part 2.c above.
- [2] Other Bypassing - In all other situations bypassing is prohibited unless the following conditions are met:
 - [a] A bypass is unavoidable to prevent loss of life, personal injury or "severe property damage";
 - [b] There are no feasible alternatives to a bypass, such as the use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. (This condition is not satisfied if the permittee could have installed adequate backup equipment to prevent a bypass which occurred during normal periods of equipment downtime or preventive maintenance); and
 - [c] The permittee submitted the necessary reports required under Part 2.c above.
- [3] The Department may approve an anticipated bypass, after considering its adverse effects, if the Department determines that it will meet the three conditions listed above.

f. **Reduction, Loss, or Failure of the Treatment Facilities**

Upon reduction loss, or failure of the treatment facilities, in order to maintain compliance with its permit, the permittee shall control production and all discharges until either the facility is restored or an alternative method of treatment is provided. This requirement applies in the situation where, among other things, the primary source of power to the treatment facility is reduced, lost, or fails.

g. **Removed Substances**

Solids, sludges, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from adversely affecting the environment.

4. **RESPONSIBILITIES**

a. **Confidentiality of Reports**

Except for data determined to be confidential under 25 Pa. Code, Chapter 92, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Department and the EPA Regional Administrator. Effluent data shall not be considered confidential.

5. **OTHER**

PART B

SPECIAL CONDITIONS OR REQUIREMENTS

COAL REFUSE DISPOSAL PERMIT NO. 14743701

1. Requirement to submit oral reports and written materials:
 - a. The permittee shall submit to the Department's District Office all oral reports and written materials required by this permit. Unless specified otherwise by the Department, single copies of written materials must be submitted to the District Office except for DMRs and HMRs which must be submitted in duplicate. These oral reports and written materials must be submitted to the District Office at:

Department of Environmental Protection
Mining and Reclamation
186 Enterprise Drive
Phillipsburg, PA 16866
Phone: 814-342-8200
 - b. In addition to submitting two copies of HMRs to the Department's District Office as required by Subsection a above, the permittee shall also submit one copy of the HMRs and one copy of the DMRs to the Department's California Office at:

Department of Environmental Protection
Mining and Reclamation
25 Technology Drive
California Technology Park
Coal Center, PA 15423
Phone: 724-769-1100
2. The permittee shall notify the Mine Conservation Inspector from the Bureau of Mining and Reclamation at least ten days prior sealing any borehole associated with the mining activity authorized by this permit. Within ten (10) days of borehole sealing, a certificate of borehole/sealing procedure form must be submitted to the California District Office and the Mine Conservation Inspector.
3. Discharge self-monitoring shall be conducted by the permittee as required by Section A of this permit. Monitoring results obtained during each month shall be summarized for that month and reported on the attached discharge monitoring report (DMR) for each outfall. The permittee shall submit the DMRs to the Department's District Office and the California District Office no later than the 28th day from the last day in the quarter for which samples are taken, e.g. samples taken during the second quarter (April/May/June) are to be submitted by July 28th.
4. For each hydrologic monitoring point, the permittee shall monitor for the listed parameters on the monitoring point's hydrologic monitoring report (HMR). Unless otherwise required by this permit, each monitoring point need be monitored only once per quarter. Monitoring results obtained during each quarter shall be summarized for that quarter and reported on the HMR. For the purposes of this permit, the quarters are defined as January/February/March, April/May/June, July/August/September, and October/November/December. The permittee shall submit the HMRs to the Department's District Office and California Office no later than the 28th day of the month following the reporting quarter (i.e. April 28, July 28, October 28, January 28).
5. This permit is issued for the establishment and maintenance of permanent vegetative cover on the former coal refuse disposal site and associated disturbed areas. There shall be no further coal refuse disposal activities authorized within this permit area

PART B

SPECIAL CONDITIONS OR REQUIREMENTS

COAL REFUSE DISPOSAL PERMIT NO. 14743701

CONTINUED

6. Only municipal sewage sludge generated at the following facilities shall be utilized at this site:

Allegheny County Sanitary Authority
3300 Preble Avenue
Pittsburgh, PA

Passaic Valley Sewerage Commissioners
600 Wilson Avenue
Newark, NJ

- Centrifuged (lime stabilized) material
and
"Zimpro" sludge material

City of Philadelphia
Southwest Philadelphia Water Pollution Control Plant
1500 E. Hunting Park Avenue
Philadelphia, PA

- Sludge cake material
and
"Mine Mix" material

Springfield Waste Water Treatment Plant
1600 East Columbus Avenue
Springfield, MA 01103

- lime stabilized sludge material.

7. The maximum one time sludge application for this site is limited to sixty (60) dry tons/acre. The approved source for the sludge is limited to the following:

- a. Allegheny County Sanitary Authority Material - 60 dry tons/acre;
- b. Southwest Philadelphia Water Pollution Control Plant ("Sludge Cake") - 60 dry tons/acre;
- c. Southwest Philadelphia Water Pollution Control Plant ("Mine Mix") - 60 dry tons/acre;
- d. Passaic Valley Sewerage Commissioners ("Zimpro" material) - 60 dry tons/acre;
- e. Passaic Valley Sewerage Commissioners (Centrifuged-lime stabilized) - 60 dry tons/acre;
- f. Springfield Waste Water Treatment Facility (lime stabilized sludge) - 60 dry tons/acre.

These application rates of sludge material are subject to change at any time should the chemical or physical characteristics of the sludge change. All changes to the application rate must be approved by the Department.

8. This site cannot be utilized for sludge application or storage until staging areas, separate generator sludge storage areas, utilization soil zones one through ten, and permit markers are installed and approved by the Mine Conservation Inspector for each area utilized on this site for sewage sludge reclamation activities. These staging and utilization areas must be identified in the field consistent with the Form 4 Map dated 7/19/96. Only one type of sludge may be applied, at the rates listed in Special Condition No. 8, on any of the ten designated soil sample areas.
9. Should field conditions indicate that sludge application, within the boundaries identified on the Form 4 Map, create a potential for pollution, the Department reserves the right to delete areas for sludge application.
10. The Department shall be notified by the permittee, in writing, of the starting dates of sludge storage, sludge application, and when sludge application and seeding operations are completed.

PART B

SPECIAL CONDITIONS OR REQUIREMENTS

COAL REFUSE DISPOSAL PERMIT NO. 14743701

CONTINUED

11. Two copies of the Annual Operation Report required by 25 PA Code §275.222 shall be submitted to the Department on or before March 1 of each year or within thirty (30) days of final sludge application. The Annual Operation Report shall be submitted on forms provided by the Department and include information required by Permit Conditions 12, 13 and 15, and one (1) copy must be submitted to each office listed below:
- | | |
|--|--|
| Department of Environmental Protection
Mining and Reclamation
District Mining Operations
25 Technology Drive
California Technology Park
Coal Center, PA 15423 | Department of Environmental Protection
Waste Management
Southwest Region Field Operations
400 Waterfront Drive
Pittsburgh, PA 15222-4745 |
|--|--|
12. Pursuant to Chapter §275.221, the operator is required to make and maintain a daily operational record for each day of activity at the site. The record shall be made available to DEP personnel upon request. The log shall clearly record, in narrative form, the daily operations conducted at the site. Log entries shall be of sufficient detail to allow the calculations of application rates of lime and sludge, and, at a minimum, include the following information:
- the source, hauler, number of trucks received, tonnage per truck and total tonnage received; calcium carbonate content, application method, and application rate of all lime or other alkaline materials used to increase soil pH to at least 6.0, or to maintain soil pH at 6.0 or greater.
 - the source, hauler, number of trucks received, tonnage per truck and total tonnage received; the type, percent moisture, percent sludge, weight, application method, and application rate of all sludge received.
 - the particular map location of areas currently being limed or currently being used for land application of sewage sludge, and the areas where sewage sludge was previously applied.
 - general weather conditions during disposal and spreading operations.
 - a record of deviations from the permit plans.
 - a record of actions taken to correct violations of the Act, the Environmental Protection Acts, and Title 25, Chapter 275 of the Pennsylvania Code.
13. The amount of sludges stored at this site may not exceed the amount that may be applied to the site at the approved application rates. The staging area must be constructed to prevent leachate from escaping the staging area and from surface runoff entering the staging area. After precipitation events the leachate from storage areas is to be pumped down to prevent overflow; the leachate may be irrigated to an area of the site which is prepared for application of sludge.
14. Stockpiling sludge is only to occur in the two staging areas shown on Form 4 Maps dated 7/9/96. The sludge storage areas must be maintained in such a manner to prevent vector and/or odor problems.

PART B

SPECIAL CONDITIONS OR REQUIREMENTS

COAL REFUSE DISPOSAL PERMIT NO. 14743701

CONTINUED

15. Water Quality shall be sampled, analyzed and reported as follows:

Quarterly: For sediment ponds 10 and 11, the refuse underdrain (point A), the upgradient monitoring well B and the downgradient monitoring well C as shown on Form 4 Maps dated 11/2/95. The following parameters must be analyzed and reported:

pH, specific conductance, chloride, nitrate nitrogen, phosphorus, fecal coliform bacteria, total coliform bacteria.

Annually: Aluminum, arsenic, cadmium, cobalt, copper, chromium, cyanide, iron, lead, manganese, mercury, molybdenum, nickel, selenium, sodium, and zinc.

All data should be submitted to the Chief, Permit and Technical Services, California District Office within thirty (30) days of sampling.

Two years following the final application of sludge to this site, the operator may submit a written request to the Chief, Permit and Technical Services, California District Office to discontinue monitoring of water quality. Monitoring shall not be discontinued until written permission from DEP is provided.

16. This permit incorporates and requires, as a condition thereof, compliance with the following:

- a. All discharges from the Pauline Hollow Coal Refuse Disposal Area will be piped into the A Seam Works of the Rushton Mine via boreholes located at the Pauline Hollow Coal Refuse Disposal Area.
- b. All discharging of water into the B Seam Works from the Pauline Hollow Coal Refuse Disposal Area will be halted as per this special condition.

17. This permit transfers all rights and liabilities of Rushton Mining Company, Permit 14743701 to Pennsylvania Mines, LLC by application and affidavit dated July 13, 2000. Pennsylvania Mines, LLC assumes all liability for reclamation, water pollution, planting, and all other responsibilities under the law, the Rules and Regulations, and the terms and conditions of the aforementioned permit.

18. The following revisions are included with this mining activity permit:

Revision No.	Date of Approval	Description
(1)	October 2, 1987	Design plans revised to increase the final elevation of the refuse disposal area to a maximum elevation of 1730 MSL.
(2)	June 6, 1988	Renew Permit No. 14743701.
(3)	October 8, 1993	Renew Permit No. 14743701.
(4)	April 16, 1996	Revised for utilization of sewage sludge for land reclamation.

PART B

SPECIAL CONDITIONS OR REQUIREMENTS

COAL REFUSE DISPOSAL PERMIT NO. 14743701

CONTINUED

18. The following revisions are included with this mining activity permit (continued):

Revision No.	Date of Approval	Description
(5)	October 23, 1996	Revised to add Springfield Waste Water Treatment Plant lime stabilized sludge, change loading rates of all sludges to 60 dry tons/acre and to allow winter storage of biosolids at this site.
(6)	August 24, 1998	Renew Permit No. 14743701.
(7)	February 8, 1999	Permit Revision to Delete Monitoring Point "G" from the HMR Plan.
(8)	September 23, 1999	Permit Revision to Delete Monitoring Points.
(9)	August 31, 2001	Transfer from Rushton Mining Company (Pennsylvania Mines Corp.) to Pennsylvania Mines, LLC.
(10)	January 12, 2004	Renew Permit No. 14743701.
(11)	January 10, 2004	Reincorporate MWB, MWC, D, F, H, into the Hydrologic Monitoring requirements.
(12)	SEP 12 2008	Renew Permit No. 14743701

PART C

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

AUTHORIZATION TO CONDUCT COAL REFUSE DISPOSAL ACTIVITIES

COAL REFUSE DISPOSAL PERMIT NO. 14743701

Permittee: Pennsylvania Mines, LLC
PPL Generation, LLC
2 North Ninth Street, GEN PL6
Allentown, PA 18101

Issuance Date October 11, 1983

Expiration Date October 11, 2013

Renewal Date SEP 12 2008

Revision Date SEP 12 2008

Name of Operation Pauline Hollow Coal Refuse Disposal Site

Municipality Rush Township County Centre

- A. Permittee is hereby authorized to conduct coal refuse disposal activities on lands of Rushton Mining Company, situated in Rush Township, Centre County.
- B. The attached map, Form 4 Map, defines your permit boundaries and area(s) upon which coal refuse disposal activities have been authorized by Part "C" of this permit. This map is to be used as a base map to document any future change(s) in the bonding status for this permit area.
- C. The approved erosion and sediment control plan related to the area to be affected in accordance with this authorization must be constructed in accordance with the approved plan, certified by a professional engineer, and the engineering certification submitted to the Department and approved prior to the commencement of other coal mining activities in this area.
- D. Bond Description
- | | | | |
|---|--|--|---|
| <input type="checkbox"/> Original Bond | <input type="checkbox"/> Additional Bond | <input checked="" type="checkbox"/> Replacement Bond | <input checked="" type="checkbox"/> Transfer Bond |
| <input checked="" type="checkbox"/> Collateral Bond No. | SM208910W dated June 29, 2004 | | |
| in amount of | \$150,000 | | |
| supported by | Letter of Credit from Wachovia Bank | | |
| | Executed on 12/7/04 | | |
| <input type="checkbox"/> Additional Remarks | | | |
- E. The following special conditions are specifically related to this bonding increment. N/A

By: Joseph F. Leone
Joseph F. Leone, PE

Title: Chief, Bituminous Mine Permit Section

DISCHARGE MONITORING REPORT
DMR

Pennsylvania Mines, LLC
Pauline Hollow Coal Refuse Disposal Site
Rush Township
Centre County

COAL MINING ACTIVITY PERMIT 14743701

OUTFALL 001

MONITORING MONTH /
MO YR

LAT: 40° 52' 21.3" LONG: 78° 14' 2.3"

NOTE: READ DMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	PERMIT REQUIREMENT	UNITS	MONITORING RESULTS			MONITORING	
			MINIMUM	AVERAGE	MAXIMUM	FREQ	TYPE
Flow	*	MGD	*				
Iron	3.0/6.0	MG/L	*				
Suspended Solids	35/70	MG/L	*				
Manganese	2.0/4.0	MG/L	*				
Aluminum	*	MG/L	*				
Sulfates	*	MG/L	*				
Specific Conductance	*	UMHO	*				
Alkalinity Violations	ALK>ACID	*	*	*			
pH	6.0-9.0	S.U.		*			

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. Explanations are attached if discharge violations occurred during the monitoring month.

TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT

HMR

Pennsylvania Mines, LLC

Pauline Hollow CRDA

Rush Township

Centre County

MINING ACTIVITY PERMIT 14743701

LAT: 40 ° 51 ' 59 "

LONG: 78 ° 15 ' 00 "

Surface Elevation 1435 MSL

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: L1 DESCRIPTION: Moshannon Creek - Upstream							
Date Sampled (MO/DA/YR)								
Stream Flow (cfs)								
Iron (mg/l)								
Suspended Solids (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Dissolved Solids (mg/l)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT HMR

Pennsylvania Mines, LLC
Pauline Hollow CRDA
Rush Township
Centre County

MINING ACTIVITY PERMIT 14743701

LAT: 40 ° 52 ' 19 "
LONG: 78 ° 13 ' 55 "

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: "H" DESCRIPTION: Main Refuse (Leachate) Underdrain							
Date Sampled (MO/DA/YR)								
Flow (gpm)								
Iron (mg/l)								
Suspended Solids (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Dissolved Solids (mg/l)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT HMR

Pennsylvania Mines, LLC
Pauline Hollow CRDA
Rush Township
Centre County

MINING ACTIVITY PERMIT 14743701

LAT: 40 ° 52 ' 25 "

LONG: 78 ° 14 ' 08 "

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: "D" DESCRIPTION: Pauline Hollow Outlet at Railroad							
Date Sampled (MO/DA/YR)								
Flow (gpm)								
Iron (mg/l)								
Suspended Solids (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Dissolved Solids (mg/l)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT HMR

Pennsylvania Mines, LLC
Pauline Hollow CRDA
Rush Township
Centre County

MINING ACTIVITY PERMIT 14743701

LAT: 40 ° 51 ' 52 "

LONG: 78 ° 13 ' 32 "

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: MWB DESCRIPTION: Upgradient Monitoring Well							
Date Sampled (MO/DA/YR)								
Static Water Elevation (MSL-ft)								
Iron (mg/l)								
Suspended Solids (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Dissolved Solids (mg/l)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT HMR

Pennsylvania Mines, LLC
Pauline Hollow CRDA
Rush Township
Centre County

MINING ACTIVITY PERMIT 14743701

LAT: 40 ° 52 ' 22 "

LONG: 78 ° 14 ' 02 "

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: MWC DESCRIPTION: Downgradient Monitoring Well							
Date Sampled (MO/DA/YR)								
Static Water Elevation (MSL-ft)								
Iron (mg/l)								
Suspended Solids (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Dissolved Solids (mg/l)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

HYDROLOGIC MONITORING REPORT
HMR

Pennsylvania Mines, LLC
Pauline Hollow CRDA
Rush Township
Centre County

MINING ACTIVITY PERMIT 14743701

LAT: 40 ° 52 ' 29 "

LONG: 78 ° 14 ' 09 "

NOTE: READ HMR INSTRUCTIONS BEFORE COMPLETING THIS FORM

PARAMETER	MONITORING POINT: "F" DESCRIPTION: Moshannon Creek - Downstream							
Date Sampled (MO/DA/YR)								
Stream Flow (cfs)								
Iron (mg/l)								
Suspended Solids (mg/l)								
Manganese (mg/l)								
Aluminum (mg/l)								
Sulfates (mg/l)								
Specific Conductance (umho)								
Dissolved Solids (mg/l)								
Alkalinity (mg/l)								
Acidity (mg/l)								
Field pH (S.U.)								
Laboratory pH (S.U.)								

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, and based on my inquiry of those individuals immediately responsible for obtaining the information, I believe the submitted information is true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

TYPED OR PRINTED NAME AND TITLE

SIGNATURE

DATE

Dennis J. Murphy
Vice President



Pennsylvania Mines, LLC
Two North Ninth Street
Allentown, PA 18101-1179
Tel. 610.774.4316
djmurphy@pplweb.com

December 22, 2011

Andrew D. Dehoff, P.E., Manager - Project Review
Susquehanna River Basin Commission
1721 North Front Street
Harrisburg, PA 17102-2391

**PENNSYLVANIA MINES, LLC
RUSHTON MINE
GROUND-WATER WITHDRAWAL APPLICATION**

Dear Mr. Dehoff:

Pennsylvania Mines, LLC, is owner and operator of the Rushton Mine and is a wholly-owned subsidiary of PPL Corporation (PPL). Pennsylvania Mines requests that the Commission review and approve the enclosed groundwater withdrawal application for the purpose of providing flow augmentation to partially mitigate consumptive water use at PPL facilities in the Susquehanna basin. Subject to Commission approval, it is PPL's intent to use water from the Rushton Mine as a component of a corporate storage asset pool to satisfy Commission consumptive use mitigation requirements for PPL's existing and proposed projects in the basin.

Commission regulation §806.22(b)(1)(ii) recognizes that consumptive water use mitigation may be provided by the release of water for flow augmentation from underground storage chambers approved by the Commission from which water can be withdrawn for a period of 90 days without impact to surface water flows. As currently configured and without modification of existing permits, Rushton Mine can provide at least 180 million gallons of water from storage during a 90-day period, thus offering the capability to mitigate 2.0 million gallons per day (mgd) of consumptive water use.

Background

Rushton Mine is an underground bituminous coal mine located in Centre and Clearfield counties, PA. Active mining ceased at Rushton Mine in 1991, and there are no plans to resume mining.

Current operation consists of: pumping water from the mine; treating the water withdrawn by means of an aeration, lime slurry and settling pond system; discharging treated water to Moshannon Creek; and returning settled sludge to the mine. Operation is in accordance with two permits issued by PA DEP: Bituminous Coal Mining Activity Permit No. 14831301 (NPDES #PA0600156) and Coal Refuse Disposal Permit No. 14743701 (NPDES #PA008966).

Proposed Operation

PPL representatives presented the concepts of the proposed operation of Rushton Mine at a meeting with you and other Commission representatives on July 15, 2011; at that meeting, the Commission representatives encouraged submittal of the proposal to the Commission for its review and approval.

PPL proposes to use the void volume in Rushton Mine as an underground storage reservoir from which to provide flow augmentation for consumptive use mitigation at PPL facilities. The mine pool would be maintained at the maximum level at the beginning of the low flow season and drawn down as flow conditions in the Susquehanna River Basin require to provide at least 180 mg of flow augmentation. Over a 90-day flow augmentation period, this operation would provide 2.0 mgd of flow augmentation for consumptive use mitigation. Following a low flow season, the pool would be allowed to refill. Under the proposed operation, the maximum gross withdrawal rate would remain at 7.6 mgd as limited by the capacity of the present facilities, except during unusually wet conditions when pre-aeration treatment planned to be installed in 2012 will provide sufficient treatment capacity for two-pump operation. Further details of the proposed operation are included with the enclosed application.

The proposed operation of Rushton Mine for flow augmentation will not require the project to be operated outside of the current discharge/treatment rates or pool levels, will not require any significant modification of facilities, and can be accomplished without modification of the PA DEP permits. Nevertheless, Commission staff has indicated that the change of purpose of operations justifies the Commission's review and approval. Consequently, PPL submits this application for groundwater withdrawal at Rushton Mine.

PPL believes that an aquifer test at Rushton is not necessary to allow the Commission to determine that Rushton Mine can be utilized for flow augmentation, within the proposed limits, without a significant adverse effect on the local or regional water table or groundwater users in the area, or on the water resources of the basin. Indeed, PPL expects to demonstrate that the proposal unquestionably will be beneficial to basin water resources. Accordingly, on November 21, 2011, Pennsylvania Mines submitted to the Commission an application for an aquifer test plan waiver.

We believe the completed Project Information Form submitted with the application for an aquifer test plan waiver will fulfill the requirement for this application, and have enclosed a copy of the completed form. Several of the attachments and appendices of the application for aquifer test plan waiver that may be helpful in your review of the enclosed application are included as attachments to this application. Copies of Rushton's two PA DEP permits were included with the application for an aquifer test plan waiver and are not included with this application.

Fee

The Commission's current review fee for withdrawals exceeding 5 mgd and up to 10 mgd is \$32,475. Accordingly, payment in the amount of \$32,475 is enclosed.

PPL requests the Commission's prompt review and approval of this application. Please contact Mr. Gary Petrewski at (610) 774-5996 or e-mail him at gpetrewski@pplweb.com if you have any questions.

Sincerely,



Dennis Murphy, Vice President
Pennsylvania Mines, LLC

Enclosures:

Application to SRBC for Ground-Water Withdrawal at Rushton Mine
Completed Project Information Form



Susquehanna River Basin Commission

a water management agency serving the Susquehanna River Watershed

Ground-Water Withdrawal Application for Existing Rushton Mine Pump Borehole

Note: This application form has been modified by Applicant as is appropriate for an existing, single-source groundwater withdrawal that is not a well.

1. Applicant Information:

Company Name Pennsylvania Mines, LLC

Mailing Address Two North Ninth Street (GENPL4)

City Allentown State PA Zip 18101-1179

Contact Person Gary Petrewski Title Environmental Manager

Telephone (610)774-5996 Fax (610)774-2618 E-mail gp@pplweb.com

2. a. Location of existing bore hole from which water from the Rushton Mine pool is pumped to the surface and subsequently treated and discharged to Moshannon Creek:

State PA County Centre

Municipality Rush Township

b. The following attachments to this application provide supplemental information on Rushton Mine and its current operation:

- Attachment 1 is a composite of USGS 7-1/2 minute quadrangles (Houtzdale, Philipsburg, Sandy Ridge and Wallaceeton) depicting the extent of the Rushton Mine and the location of the bore hole.
- Attachment 2 is a plot plan of the Rushton Mine.
- Attachment 3 is a description of the existing operation
- Attachment 4 is a schematic diagram of water flow at the mine.
- Attachment 5 is a map of mines overlying Rushton Mine.
- Attachment 6 shows the variation of mine pool level from 1997 through September 2011.
- Attachment 7 shows the monthly average pumping from the mine 1997 through September 2011.
- Attachment 8 shows the estimated monthly recharge flow to the mine 1997 through September 2011.
- Attachment 9 shows the estimated void space in the mine at 10-ft intervals below Elev. 1420 ft

3. **Purpose of withdrawal:** The existing withdrawal to maintain the Rushton Mine pool at or below Elevation 1420 ft will be continued. The timing of the withdrawal will be managed to provide low flow augmentation in order to partially mitigate consumptive water use for PPL facilities.
4. Approval is requested to operate the existing Rushton Mine pool pumping and treatment facilities to provide flow augmentation for consumptive water use mitigation as generally described in the transmittal letter of this application and as described in detail in Attachment 10.
5. The requested operation to provide flow augmentation would not entail increasing the maximum capacity of the existing pumping and treatment system or the maximum consecutive 30-day average pumping rate (7.6 mgd).
6. **Existing and projected total water pumpage:**

Total Project Water Pumpage¹	Existing (mgd)²	Projected (mgd)³ for Design Year 2036
Average Daily	Approximately 5.0	Unchanged from existing
Maximum Daily	Approximately 7.6	Unchanged from existing
System Capacity ⁴	Approximately 8.5 [Note 1]	Unchanged from existing

[Note 1] Pre-aeration treatment facilities presently planned to be installed in 2012 will allow use of the main and spare borehole pumps in parallel to control mine water level during periods of high groundwater inflow to the mine, without impairing water quality. Such operation is expected to be intermittent only.

Explanation

¹ Project water usage is on an annual basis.

² For new projects, the existing use should be the proposed use during the first year of operation. Not Applicable

³ The projected use should be for 25 years in the future (design year). If the project duration is less than 25 years, indicate the year for which projections were made. At this time, no change in the average or maximum pumping is planned. However, there is potential to increase capacity in the future in order to provide additional flow augmentation for the purpose of mitigating consumptive water use.

⁴ The existing system capacity should not include the proposed sources unless the application is for a new project having no prior withdrawal. Not Applicable

7. **Existing sources of water:**
 - a. **Wells: Not Applicable (Table deleted)**
 - b. **Other sources of water (stream intakes, interconnections, reservoirs, springs, etc.): Not Applicable (Table deleted)**
8. **Information about existing Rushton Mine pump bore hole and pump:**

Rushton Mine Pumping Bore Hole: the pump is installed in the old air shaft which measures approximately 20 ft by 16 ft and is approximately 219 ft deep to the bottom of coal elevation; a spare pump is also installed in the shaft

Geologic Formation Pennsylvanian, Allegheny Group, Lower Kittanning Coal, "A" Seam

Date Drilled <u>NA</u>	Driller <u>NA</u>
Depth Drilled <u>NA</u> ft	Diameter <u>NA</u> in
Casing: Min. <u>NA</u> in	Max. Length <u>NA</u> ft
Screen: Type <u>NA</u>	Diameter <u>NA</u> in
Top of Screen <u>NA</u> ft	Bottom of Screen <u>NA</u> ft
Yield <u>NA</u> gpm	Specific Capacity <u>NA</u> gpm/ft
Permanent Pump: Type <u>Deep-well turbine pump (with identical spare pump)</u>	
Capacity <u>5,300 – 5,500</u> gpm	Intake Setting <u>Elevation 1365</u> ft
Air Line Depth <u>NA</u> ft	Type of Metering <u>none</u>

9. Existing nearby wells:

The well database of the Pennsylvania Topographic and Geologic Survey includes only one well that can positively be identified as being located over the Rushton Mine. However, the specific locations of many wells included in the database are not indicated. A ground survey would be needed to identify and locate all "nearby" wells, necessitating an understanding of what area is considered to be "nearby." In any case, a ground survey is considered to be unnecessary for the following reasons:

- (1) When Rushton Mine was active, the mine was dewatered to El. 1240 ft; this drawdown far exceeds the maximum drawdown proposed in this application. No wells in service prior to closure of Rushton Mine (1991) could be adversely affected by the proposed operation.
- (2) The number of acres of surface or near-surface area that could possibly be affected by the proposed operation is judged to be very limited or negligible; possible effects could occur in areas influent to or effluent from the mine between approximately El. 1380 ft and El. 1420 ft. This potentially affected area, as shown on Attachments 1 and 2 taken together, is largely owned by Pennsylvania Mines.
- (3) Rushton is overlain by several other mines (all are inactive), as shown in Attachment 5. The water-filled voids in these overlying mines would mask any effect of pool fluctuations in the Rushton Mine, below.
- (4) The bulk of the area over and around Rushton Mine is served by the Pennsylvania American Water Company (PAWC), Moshannon Valley District. PAWC's Moshannon Valley District provides water to approximately 18,000 people living in Philipsburg and South Philipsburg boroughs and Rush Township in Centre County, and in Chester Hill and Osceola Mills boroughs and Boggs, Bradford, Decatur, Graham and Morris townships in Clearfield County. PAWC's sources of water are the Cold Stream Dam Reservoir, Blue Spring, Blue Spring Well #1, Cold Stream Wells #1 and #2, and Trout Run Wells #1 and #2. [Source: PADEP "Source Water Assessment Summary for The Pennsylvania American Water Moshannon District Public Water System," September 2003] PPL believes all these sources lie outside the area of the Rushton Mine.

- (5) Finally, the depth of the Rushton Mine below ground level strongly suggests there is no reason to believe there will be any effect upon groundwater levels or any existing wells.

10. Driller's log:

Attach separate sheet describing the nature and depth interval of subsurface materials and water-bearing zones penetrated during drilling of each proposed well. NA

11. Pumping test:

PPL believes that a pumping test for this existing withdrawal is not necessary. Accordingly, on November 21, 2011, Pennsylvania Mines applied to the Commission for an aquifer test plan waiver.

12. Preparer:

Name Jan C. Phillips, P.E.

Title _____

Company _____

Address 2611 Walnut Street

Allentown, PA 18108

Phone (610) 821-0160 Fax (610) 821-0160

Signature *Jan C. Phillips*

Date 12/22/2011 E-mail Address jcphllps@enter.net

13. Applicant:

Name (print or type) Dennis J. Murphy Title Vice President

Signature *Dennis J. Murphy* Date 12/22/2011

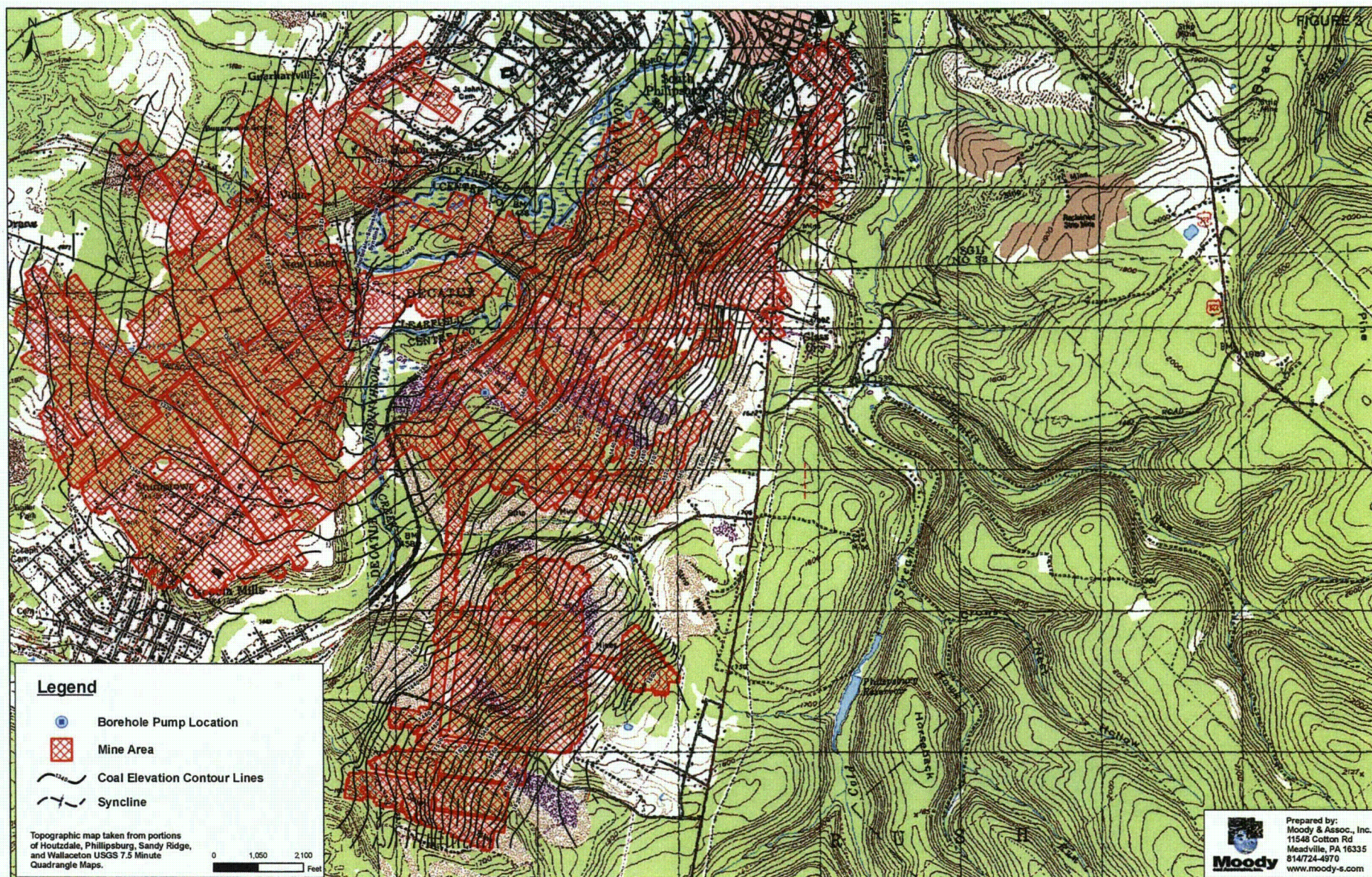


APPLICATION FOR GROUND-WATER WITHDRAWAL AT RUSHTON MINE
Index of Attachments

No.	Description	Corresponding Designation in November 21, 2011 Application for Aquifer Test Plan Waiver
1	Composite of USGS topographic quadrangles depicting mine location	Figure 2 of Appendix B
2	Plot plan	Figure 1
3	Description of existing operation	Excerpt from Section 1
4	Schematic flow diagram	Figure 2
5	Map of mines overlying Rushton Mine	Figure 4
6	Mine pool level 1997 through Sept. 2011	Figure 3
7	Gross monthly pumping 1997 through Sept. 2011	Table 1
8	Estimated recharge rate 1997 through Sept. 2011	Figure 7
9	Estimated mine void space below El. 1420	Table 2
10	Description of proposed operation	Excerpt from Section 1

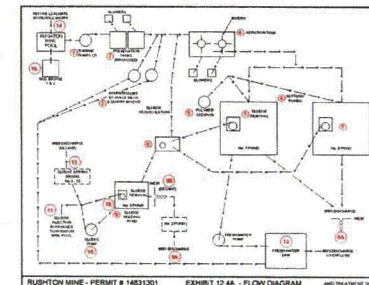
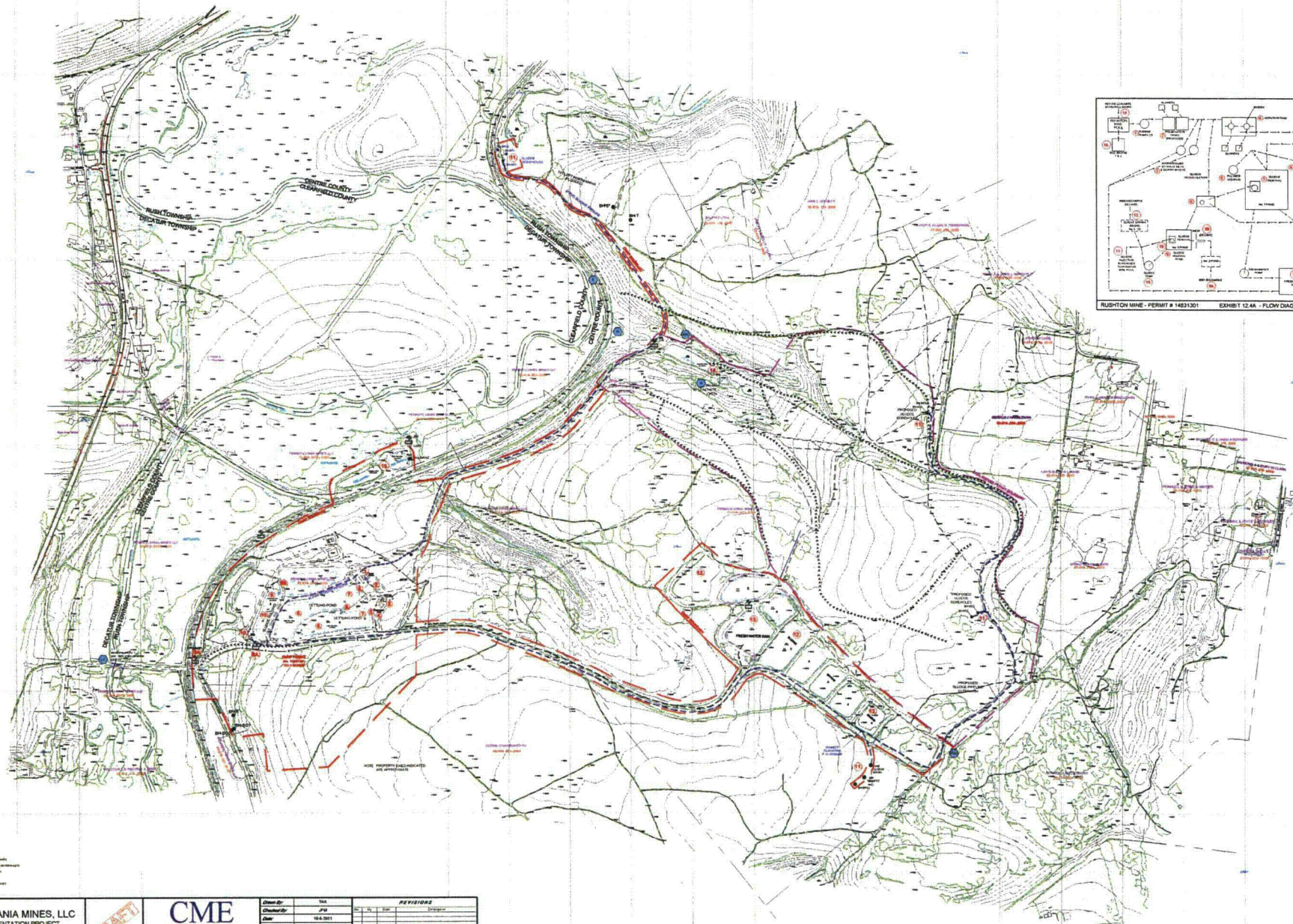
ATTACHMENT 1

[Figure 2 of Appendix B of Application for Aquifer Test Plan Waiver]



ATTACHMENT 2

[Figure 1 of Application for Aquifer Test Plan Waiver]



LEGEND

Proposed Flow Augmentation
Proposed Road
Proposed Pipeline
Proposed Structure

PENNSYLVANIA MINES, LLC
FLOW AUGMENTATION PROJECT
RUSHON MINE SURFACE AREA - 2009
DECATUR & RUSH TOWNSHIP
CLEARFIELD & CENTRE COUNTY, PENNSYLVANIA

DRAFT

CME
ENGINEERING
CME ENGINEERING LP
979 George Street, Ste. 100, Clearfield, PA 16830
724-632-4600 FAX: 724-632-4601

Drawn By	SL
Checked By	JL
Date	06/01/11
Scale	1" = 20'
Project No.	2009-110
Revision	Rev. 1
Drawn By	SL
Checked By	JL
Date	06/01/11
Scale	1" = 20'
Project No.	2009-110
Revision	Rev. 1

ATTACHMENT 3

Description of Existing Operation

[Excerpt from Section 1 of Application for Aquifer Test Plan Waiver]

Rushton Mine is operated under PA DEP Bituminous Coal Mining Activity Permit No. 14831301 (NPDES #PA0600156) initially issued in 1985. The permit was most recently renewed in March 2010 (APPENDIX C-1), and revised in January 2011 (APPENDIX C-2). The mined area under permit is approximately 5,900 acres and varies in elevation between approximately El. 1240 ft and El. 1660 ft.¹

Rushton Mine also operates under PA DEP Coal Refuse Disposal Permit No. 14743701 (NPDES # PA008966), issued September 2008 (APPENDIX D).

Current operation consists of: pumping water from the mine; treating the water withdrawn by means of an aeration, lime slurry and settling pond system; discharging treated water to Moshannon Creek; and returning settled sludge to the mine.

A main pump and an identical spare pump are set in the main mine pool borehole. The pumps are variable-speed, high-head turbine pumps. The intake of the main pump is set at El. 1365 ft; the intake of the spare pump is slightly higher. Normally, only one pump is operated, but the two pumps can be operated in parallel, at reduced speed and load; this occurs during wet conditions as were experienced in September and October 2011. Total pumping capacity varies with mine pool level and is limited by power supply to the pumps.

The nominal maximum pumping-treatment capacity is 7.6 mgd as limited by the capacity of the main mine pool pump and the treatment system. Occasional pump discharge up to approximately 8 mgd has been estimated. The nominal maximum treatment capacity is expected to be increased to approximately 8.5 mgd by the addition of pre-aeration tanks in 2012, following which more frequent two-pump operation is expected.

The two settling ponds have a combined area of approximately 4.4 acres. Sludge is collected from the settling ponds, conveyed to a sludge retention pond (area approximately 0.8 acres) and re-injected into the mine at a nominal rate of 0.7 mgd. The nominal maximum discharge to Moshannon Creek is thus approximately 6.9 mgd. The ponds act to attenuate fluctuation of discharges to the creek.

The discharge to Moshannon Creek is gravity flow. There are two return flow outfalls to Moshannon Creek (NPDES permit outfalls 001 and 005). Measuring weirs were put into use on these two outfalls in January 2011. The locations of the measuring weirs and outfalls to Moshannon Creek are shown on Figure 1 [Attachment 2 of this application].

Figure 2 [Attachment 4 of this application] is a schematic diagram showing the principal water flows at Rushton.

¹ All elevations in this application are considered to be feet mean sea level.

Good pumping discharge and mine pool elevation data are available since 1997. From January 1997 through September 2011, the average rate of pumping from the mine was approximately 5.1 mgd, and monthly average pumping rates ranged from 3.0 mgd to 8.0 mgd. Table 1 [Attachment 7 of this application] presents monthly average gross pumping rates from 1997 through September 2011.

There is potential for off-site breakouts of untreated water when the mine pool level exceeds El. 1420 ft, and this is considered to be the nominal maximum pool level permitted. Consequently, Pennsylvania Mines attempts to control the mine pool level at or below approximately El. 1418.5 ft in order to provide a margin of safety in the event of loss of power or other malfunctioning of the pumps. With the present pumping equipment and configuration, the mine pool can be lowered at least to El. 1379.5 ft.

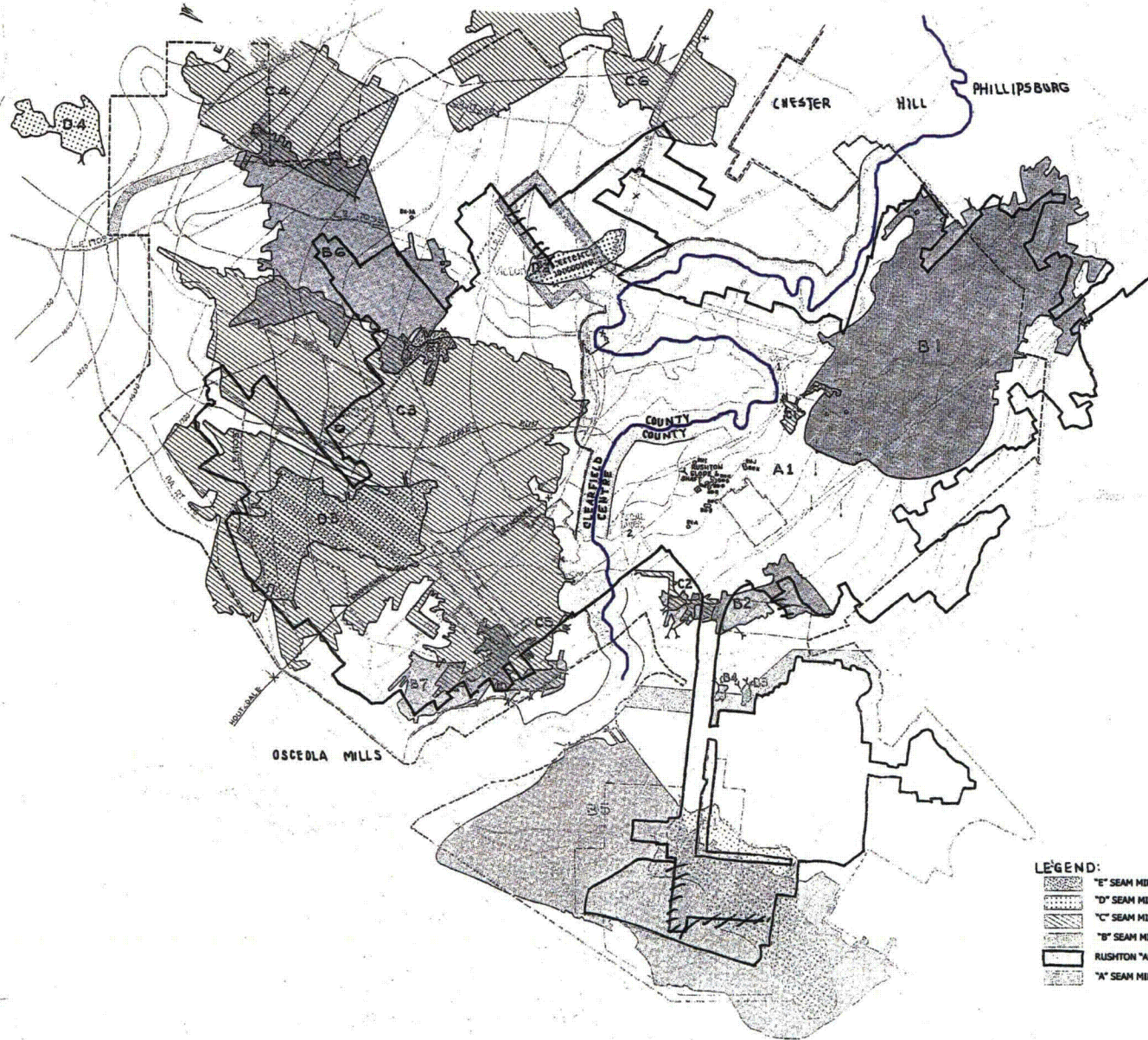
The mine pool typically rises in the winter and spring and falls through summer and fall. Daily mine pool levels are available since 1997. During 1997-2010 monthly average pool levels fluctuated between El. 1385 ft and El. 1420 ft, averaging approximately El. 1406 ft. Figure 3 [Attachment 6 of this application] depicts average monthly pool levels from January 1997 through September 2011.

ATTACHMENT 4

[Figure 2 of Application for Aquifer Test Plan Waiver]

ATTACHMENT 5

[Figure 4 of Application for Aquifer Test Plan Waiver]



Abandoned Mines on East Flank of Ashmun Creek

Key	Mine Name	Seam Name	Total Openings
A1	Rushton Mine	A Seam	2
B1	Monkham 11 Mine	B Seam	6
B2	Beaver No. 1 Mine	B Seam	3
B3	Beaver No. 2 Mine	B Seam	2
B4	Beaver No. 3 Mine	B Seam	1
B5	Monkham 10 Mine	B Seam	7
C1	Pauline Mine	C Seam	3
C2	Brighton Mine	C Seam	2
D1	Bondie	D Seam	11

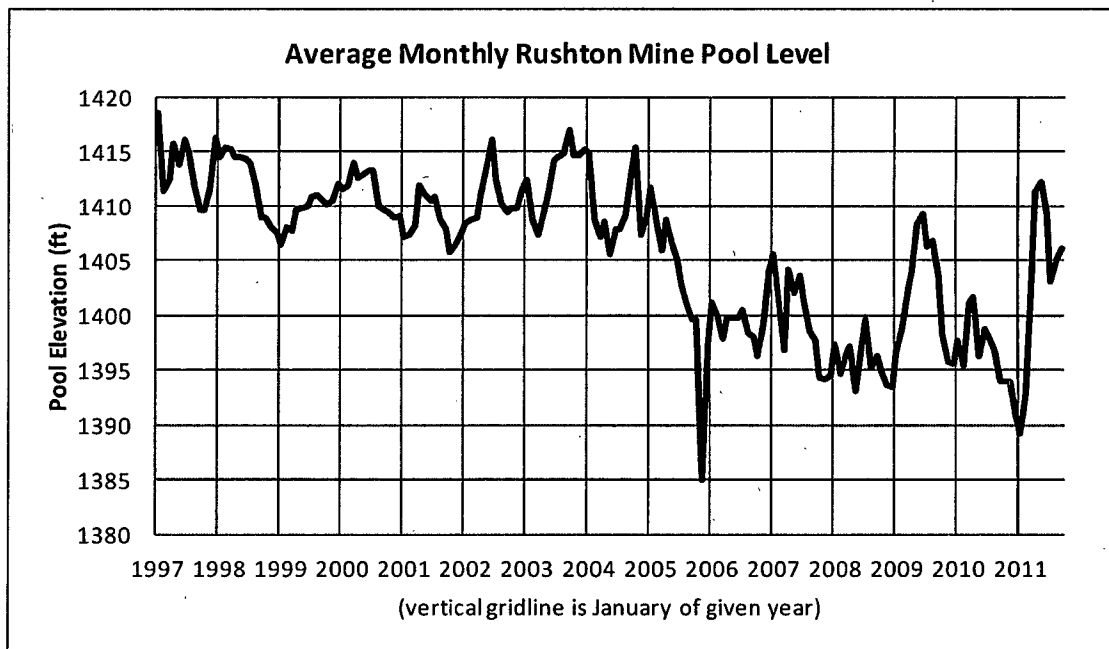
Abandoned Mines on West Flank of Ashmun Creek

Key	Mine Name	Seam Name	Total Openings
B6	Monkham Mine	B Seam	2
B7	Columbia No. 1 Mine	B Seam	5
C3	Associated Drilling	C Seam	3
C4	El-Coal Mine	C Seam	4
C5	Spunk Plug Mine	C Seam	10
C6	Public Mine	C Seam	2
D2	Passmore Mine	D Seam	2
D3	Madison Mine	D Seam	4
D4	Cuddale No. 4 Mine	D Seam	1
E1	Rosdine No. 2 Mine	E Seam	4

* - Stripped through portion of mine
 ** - Scaled at entry - Mine pool elevation greater than discharge elevation

ATTACHMENT 6

[Figure 3 of Application for Aquifer Test Plan Waiver]



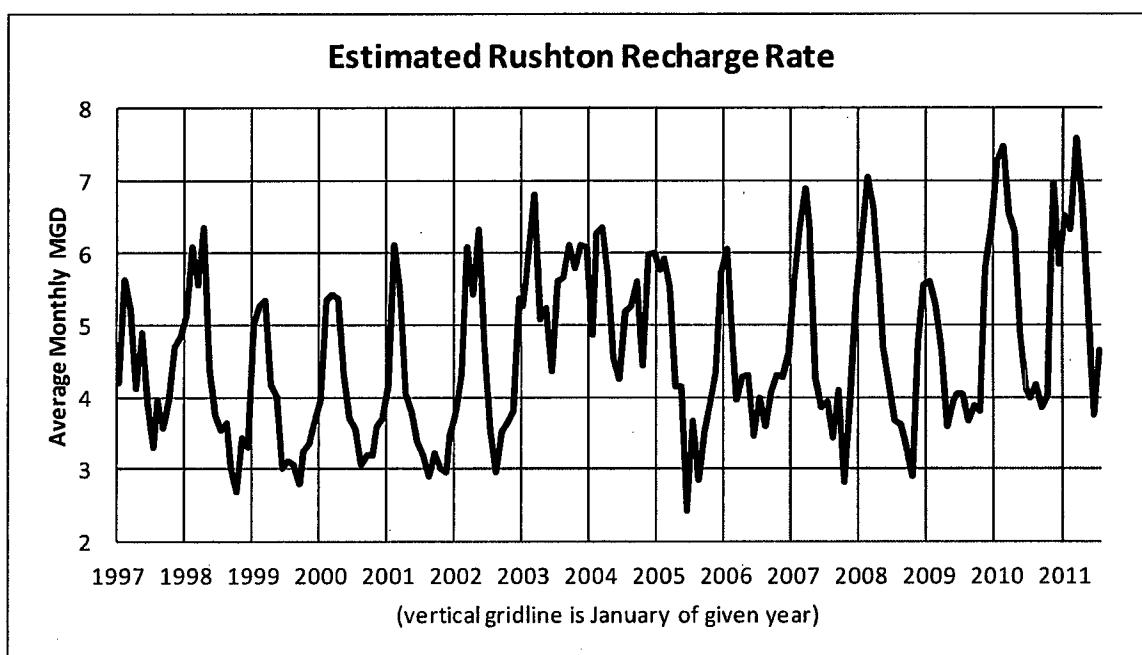
ATTACHMENT 7

[Table 1 of Application for Aquifer Test Plan Waiver]

	GROSS PUMPING (MGD)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1997	4.3	5.2	5.9	5.6	4.5	5.3	4.6	4.1	4.5	3.8	3.8	5.0
1998	5.4	5.6	6.8	6.2	7.0	4.9	4.3	4.3	4.3	3.4	3.1	3.9
1999	3.6	5.4	5.7	5.7	4.6	4.4	3.2	3.4	3.4	3.1	3.4	3.6
2000	4.1	4.2	5.8	6.1	5.9	4.7	4.3	4.2	3.4	3.5	3.6	4.1
2001	4.2	4.5	6.4	5.8	4.6	4.2	3.8	3.7	3.4	3.6	3.2	3.1
2002	3.7	4.1	4.6	6.3	5.6	7.0	5.6	4.2	3.3	3.8	3.8	4.0
2003	6.1	6.2	6.6	7.2	5.2	5.5	4.7	6.0	6.2	6.9	6.4	6.7
2004	7.2	6.0	6.9	7.1	6.3	4.8	4.6	5.3	5.3	6.6	5.4	6.3
2005	6.6	6.8	6.5	6.1	4.8	4.8	3.0	4.3	3.2	5.1	4.5	3.4
2006	6.1	6.9	5.3	4.2	4.7	4.7	3.9	4.6	4.1	4.4	4.1	4.2
2007	5.3	7.0	6.8	7.2	7.1	4.7	4.6	4.6	4.1	4.8	3.1	4.1
2008	5.9	6.9	7.6	7.6	6.3	4.7	4.8	4.3	4.0	3.8	3.3	5.0
2009	5.7	5.7	5.4	4.7	3.6	4.5	4.6	4.7	4.7	4.9	4.4	6.2
2010	7.0	7.7	7.7	7.6	7.2	5.2	4.7	4.7	4.8	4.2	4.7	8.0
2011	6.3	6.0	5.6	7.6	7.5	6.6	4.4	4.9	6.4			
average	5.4	5.9	6.2	6.3	5.6	5.1	4.4	4.5	4.4	4.4	4.0	4.8
max	7.2	7.7	7.7	7.6	7.5	7.0	5.6	6.0	6.4	6.9	6.4	8.0
min	3.6	4.1	4.6	4.2	3.6	4.2	3.0	3.4	3.2	3.1	3.1	3.1

ATTACHMENT 8

[Figure 7 of Application for Aquifer Test Plan Waiver]



ATTACHMENT 9

[Table 2 of Application for Aquifer Test Plan Waiver]

Estimated Rushton Mine Void Space below Elevation 1420 [Note 1]

Interval Elevations (feet)	Interval Area Mined (acres)	Interval Mine Void Volume (million gallons) [Note 2]	Cumulative Mine Void Volume (million gallons)
1420-1410	46	45	45
1410-1400	43	42	87
1400-1390	45	44	131
1390-1380	54	53	184
1380-1370	74	72	256
1370-1360	118	115	371
1360-1350	169	165	536
1350-1340	179	175	711
1340-1330	162	159	870
1330-1320	187	182	1,053
1320-1310	205	200	1,253
<1310	795	777	2,030
Total interval area mined	2077		

Notes: [1] Table from Moody Report, APPENDIX B to the November 21, 2011 waiver application
 [2] Coal seam assumed five feet thick with 60 percent of coal removed.

ATTACHMENT 10

Description of Proposed Operation

[Excerpt from Section 1 of Application for Aquifer Test Plan Waiver]

PPL proposes to use the void volume in Rushton Mine as an underground storage reservoir from which to provide flow augmentation for consumptive use mitigation at PPL facilities. The operational elevation limits presently envisioned are from El. 1418.5 ft (or possibly as high as El. 1420.0 ft) to El. 1379.5 ft. Table 2 [Attachment 9 of this application] shows the estimated void volume in the Rushton Mine at 10-ft intervals below El. 1420 ft. From the table, the void volume between El. 1379.5 ft and El. 1418.5 ft is estimated as 181 million gallons (mg). The mine pool would be maintained at the maximum level at the beginning of the low flow season and drawn down as flow conditions in the Susquehanna River Basin require to provide at least 180 mg of flow augmentation. Over a 90-day flow augmentation period, this operation would provide 2.0 million gallons per day (mgd) of flow augmentation for consumptive use mitigation. Following a low flow season, the pool would be allowed to refill. Under the proposed operation, the maximum gross withdrawal rate would remain at 7.6 mgd as limited by the capacity of the present facilities, except during unusually wet conditions when the proposed pre-aeration treatment will provide sufficient treatment capacity for two-pump operation. The area of the pool affected by fluctuation between El. 1380 ft and El. 1420 ft would be primarily within the Centre County portion of the mine.

The drawdown test conducted in 2005 [documented in the request for aquifer test waiver] indicated that the rate of recharge is not affected by the drawdown. Thus, the total amount of the withdrawal in any year would not change whether or not the mine is operated for low flow augmentation in that year.

PROJECT INFORMATION FORM

[Copy of form submitted with Application for Aquifer Test Plan Waiver]

Susquehanna River Basin Commission

a water management agency serving the Susquehanna River Watershed



PROJECT INFORMATION

1. Project Owner's Name, Registered Fictitious Name or Trade Name* Pennsylvania Mines, LLC
Address 2 North Ninth St.

City Allentown State PA Zip 18101

Type of Organization (Owner):

- | | |
|--|---|
| <input type="checkbox"/> Sole Proprietorship | <input checked="" type="checkbox"/> Limited Liability Company |
| <input type="checkbox"/> Corporation | <input type="checkbox"/> Limited Liability Partnership |
| <input type="checkbox"/> General Partnership | <input type="checkbox"/> Government Agency |
| <input type="checkbox"/> Limited Partnership | <input type="checkbox"/> Other _____ |

Authorized Contact Person Gary Petrewski Title Environmental Manager

Address (if different) 2 North Ninth St.

GENPL4

City Allentown State PA Zip 18101

Telephone (610) 774-5996 Fax (610) 774-2618 E-Mail gpetrewski@pplweb.com

2. Project Operator's Name or Registered Fictitious or Trade Name* (if different from No. 1) Same as No. 1
Address _____

City _____ State _____ Zip _____

Type of Organization (Operator):

- | | |
|--|--|
| <input type="checkbox"/> Sole Proprietorship | <input type="checkbox"/> Limited Liability Company |
| <input type="checkbox"/> Corporation | <input type="checkbox"/> Limited Liability Partnership |
| <input type="checkbox"/> General Partnership | <input type="checkbox"/> Government Agency |
| <input type="checkbox"/> Limited Partnership | <input type="checkbox"/> Other _____ |

3. Authorized Contact Person Same as above Title _____

Address (if different) _____

City _____ State _____ Zip _____

Telephone () Fax () E-Mail _____

4. Parent Corporation Name, and Registered Fictitious or Trade Name* (if different from No. 1): (Use additional sheets, if necessary, to describe the corporate hierarchy.) PPL Generation, LLC

Corporate Registration: Entity No. 23-3056813 State PA

Address (if different) 2 North Ninth St.

City Allentown State PA Zip 18101

* Please attach a copy of your Department of State, Division of Corporations, State Records and UCC (New York), Division of Corporations (Pennsylvania), or Department of Assessments and Taxation (Maryland) **approved** name registration or trade name registration.



5. All Proprietors, Corporate Officers and Directors, or Partners: (add as many lines as needed)

Name	Title	Address	Telephone	Fax	E-mail
William H. Spence	President	2 North Ninth St, Allentown, PA 18101	(610) 774-3683	(610) 774-5019	whspence@pplweb.com
Dennis J. Murphy	Vice President	Same	(610) 774-4316	(610) 774-4121	djmurphy@pplweb.com
James E. Abel	Treasurer	Same	(610) 774-5987	(610) 774-5235	jeabel@pplweb.com
Elizabeth Stevens Duane	Secretary	Same	(610) 774-4107	(610) 774-4177	esduane@pplweb.com

6. Corporate Contact:

Name Gary Petrewski

Title Environmental Manager

Address 2 North Ninth St.

GENPL4

City Allentown

State PA

Zip 18101

Telephone (610) 774-5996

Fax (610) 774-2618

E-Mail gpetrewski@pplweb.com

7. Project Hydrogeologist:

Name David M. Anderson, P.G.

Title Senior Geologist

Company Moody and Associates, Inc

Address 11548 Cotton Road

Meadville, PA 16335

Telephone (814) 724-4970

Fax (814) 724-4973

E-Mail danderson@moody-s.com

P.G. License No. PG1435G

State PA

Expiration Date 09/30/2013

8. Project Engineer:

Name Jan C. Phillips, P.E.

Title NA

Company Jan C. Phillips, P.E.

Address 2611 Walnut Street

Allentown, PA 18104-6230

Telephone (610) 821-0160

Fax (610) 821-0160

E-Mail jcphllps@enter.net

P.E. License No. PE017909E

State PA

Expiration Date 9/20/2013

9. Representing Attorney, if applicable:

Name _____

Firm _____

Address _____

Telephone () _____

Fax () _____

E-Mail _____

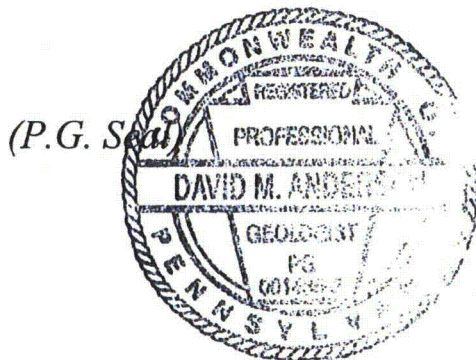
10. Name(s) and Signature(s) of Preparer and Project Owner:

The undersigned representatives of the project sponsor certify, under penalty of law (or perjury), as provided by 18 Pa. C.S.A. §4904; Section 210.45, of the New York Penal Law; Section 9-101 Maryland Crimes Code and 28 U.S.C. §1746, attest that the information for all parts contained herein and all information accompanying this application(s) is true and correct, and that they are authorized to act as representatives on behalf of their respective corporate entities.

Preparer Name Jan C. Phillips, P.E. Date 11-4-2011
Signature *Jan C. Phillips*
Title Consultant
Company Jan C. Phillips, P.E.

Preparer Name David M. Anderson, P.G. Date 11-4-2011
Signature *David M. Anderson*
Title Senior Geologist
Company Moody and Associates, Inc.

Project Owner Name Dennis J. Murphy Date 11-4-2011
Signature *Dennis J. Murphy*
Title Vice President
Company Pennsylvania Mines, LLC



(P.E. Seal)

Notes:

1. Mark any information on the application that is considered confidential or proprietary.
2. Items 1 through 6 and 10 are required, and items 7 through 9 are project specific.

RECEIVED MAR 09

Dennis J. Murphy
Vice President
& Chief Operating Officer



PPL Holtwood, LLC
Two North Ninth Street
Allentown, PA 18101-1179
Tel. 610.774.4316
djmurphy@pplweb.com

March 9, 2012

Andrew D. Dehoff, P.E., Manager - Project Review
Susquehanna River Basin Commission
1721 North Front Street
Harrisburg, PA 17102-2391

PPL HOLTWOOD, LLC
HOLTWOOD HYDROELECTRIC STATION
APPLICATION TO PROVIDE CONSUMPTIVE WATER USE MITIGATION

Dear Mr. Dehoff:

PPL Holtwood, LLC, is owner and operator of the Holtwood Hydroelectric Station ("Holtwood"). Holtwood is a 108-megawatt (MW) plant located on the Susquehanna River in Lancaster and York counties, PA, and is licensed by the Federal Energy Regulatory Commission (FERC) as Project PA-1881. PPL Holtwood is filing this application with the Commission to seek approval under Commission regulation §806.22(b)(1)(ii) to amend the existing Holtwood docket to permit PPL to operate Holtwood to mitigate for consumptive water use by PPL facilities in the basin. Subject to Commission approval, it is PPL's intent to use water from the Holtwood project as a component of a corporate storage asset pool to satisfy Commission consumptive use mitigation requirements for PPL existing and proposed projects. PPL intends to separately file an application to request the formation of the Corporate Storage Asset Pool.

PPL Holtwood is currently expanding Holtwood to 195.5 MW by addition of a second powerhouse and other structural and operational enhancements. The Commission approved the expansion on June 18, 2009 (Docket No. 20090623). The expanded project is expected to be fully in service by 2013. However, the proposed operation for consumptive water use mitigation for which this application is submitted to the Commission does not depend upon completion of the expansion.

Background

Holtwood's reservoir, Lake Aldred, contains approximately 54,770 acre-feet of storage and has a surface area of approximately 2,649 acres at the normal maximum operating level, El. 169.75 ft. During the summer recreation season (May 15 to September 15), Holtwood is required by its FERC license to maintain Lake Aldred at a pool level not lower than El. 167.50 ft. The amount of usable storage between El. 167.50 ft and El. 169.75 ft is approximately 5,830 acre-ft.

Other than during the recreation season, Holtwood maintains Lake Aldred at a pool level not lower than El. 163.50 ft. The amount of usable storage between El. 163.50 ft and El. 169.75 ft is approximately 15,170 acre-ft.

The hydraulic capacity of the existing plant is approximately 31,500 cfs. When the expansion is completed, the plant hydraulic capacity will be approximately 61,460 cfs.

Proposed Operation for Consumptive Water Use Mitigation

PPL Holtwood proposes to provide consumptive water use mitigation from Holtwood by preserving storage above minimum required pool elevations and releasing water from storage during Commission flow augmentation periods.

During the recreation season (through September 15), PPL is proposing to provide up to 3,370 acre-feet of storage in the Holtwood pond (Lake Aldred) above the FERC-required recreational pool minimum elevation of 167.5 feet to provide consumptive use make-up water in the basin. After September 15 PPL is proposing to provide up to 6,090 acre feet of Lake Aldred storage for consumptive use make-up.

The proposed consumptive use mitigation operation will complement the daily and continuous minimum flow operations required by PPL's current FERC license. As has been recognized in the procedure for implementing the daily flow release requirement now in effect under the FERC license, a procedure for correction for inadvertent departure from precise end-of-day (3:00 a.m.) lake level target and releases will be necessary. PPL proposes to develop an operations plan in consultation with the Commission subsequent to Commission action on the proposed corporate storage asset pool.

PPL Holtwood believes that approval of the Commission is the sole approval required for the proposed consumptive use mitigation operation at Holtwood, insofar as the required minimum recreation lake level and all other FERC license requirements would be maintained.

Attachments

An application fee in the amount of \$4,750 is enclosed. Attachment 1 contains the Project Information Form. Attachment 2 is a report summarizing the results of analysis using the Commission's OASIS model to simulate operation of the Holtwood project as proposed to

mitigate existing and potential future PPL consumptive use projects in the basin. This analysis presumes implementation of the Bell Bend Nuclear Power Project, and use of PPL's Rushton Mine as a component of the PPL proposed Corporate Storage Asset Pool. Applications for those two projects have been separately filed with the Commission. Attachment 3 is a disc containing OASIS input and output files of model runs referenced in the Attachment 2 report.

Please contact Mr. Gary Petrewski at (610) 774-5996 or e-mail him at gpetrewski@pplweb.com should you have any questions regarding this application.

Sincerely,



Dennis Murphy

Enclosures:

- Attachment 1 - Project Information Form
- Attachment 2 - Modification And Use Of The Oasis Model To Evaluate Sources Of Flow Augmentation For PPL Consumptive Water Use Mitigation In The Susquehanna River Basin; Document JCP-BB-1, Rev. 0, March 7, 2012
- Attachment 3 - Disc of OASIS Input and Output files - March 1, 2012 Report Runs

cc: (w/ attachment 1&2)

Mr. John Fringer
Project Manager
U.S. Nuclear Regulatory Commission
11545 Rockville Pike Mailstop: T-6 C32
Rockville, MD 20852

Ms. Jamie Davis
Office of Environmental Programs (3EA30)
U.S. Environmental Protection Agency
1650 Arch Street
Philadelphia, PA 19103-2029

Ms. Amy Elliott
U.S. Army Corps of Engineers
State College Field Office
1631 South Atherton Street, Suite 102
State College, PA 16801

Mr. Mark Hartle
Pa Fish & Boat Commission
450 Robinson Lane
Bellefonte, PA 16823

Ms. Kelly Heffner
Deputy Secretary – Water Management
Pennsylvania Department of Environmental
Protection
Rachel Carson State Office Building
400 Market Street
Harrisburg, PA 17101

Mr. Gene Trowbridge
Pennsylvania Department of Environmental
Protection
Northeast Regional Office
2 Public Square
Wilkes-Barre, PA 18711

Ms. Jennifer Kagel
United States Fish & Wildlife Service
Pennsylvania Field Office
315 S. Allen St. #322
State College, PA 16801

ATTACHMENT 1

Project Information Form



Susquehanna River Basin Commission

a water management agency serving the Susquehanna River Watershed

PROJECT INFORMATION

1. Project Owner's Name, Registered Fictitious Name or Trade Name* PPL Holtwood, LLC
Address 2 North Ninth Street

City Allentown State PA Zip 18101

Type of Organization (Owner):

- | | |
|--|---|
| <input type="checkbox"/> Sole Proprietorship | <input checked="" type="checkbox"/> Limited Liability Company |
| <input type="checkbox"/> Corporation | <input type="checkbox"/> Limited Liability Partnership |
| <input type="checkbox"/> General Partnership | <input type="checkbox"/> Government Agency |
| <input type="checkbox"/> Limited Partnership | <input type="checkbox"/> Other _____ |

Authorized Contact Person Gary Petrewski Title Environmental Manager

Address (if different) 2 North Ninth Street

GENPL4

City Allentown State PA Zip 18101

Telephone (610)774-5996 Fax (610)774-2618 E-Mail gpetrewski@pplweb.com

2. Project Operator's Name or Registered Fictitious or Trade Name* (if different from No. 1) Same as No. 1

Address _____

City _____ State _____ Zip _____

Type of Organization (Operator):

- | | |
|--|--|
| <input type="checkbox"/> Sole Proprietorship | <input type="checkbox"/> Limited Liability Company |
| <input type="checkbox"/> Corporation | <input type="checkbox"/> Limited Liability Partnership |
| <input type="checkbox"/> General Partnership | <input type="checkbox"/> Government Agency |
| <input type="checkbox"/> Limited Partnership | <input type="checkbox"/> Other _____ |

3. Authorized Contact Person Same as No. 1 Title _____

Address (if different) _____

City _____ State _____ Zip _____

Telephone () Fax () E-Mail _____

4. Parent Corporation Name, and Registered Fictitious or Trade Name* (if different from No. 1): (Use additional sheets, if necessary, to describe the corporate hierarchy.) PPL Generation, LLC

Corporate Registration: Entity No. 2916799 State PA

Address (if different) 2 North Ninth Street

City Allentown State PA Zip 18101

* Please attach a copy of your Department of State, Division of Corporations, State Records and UCC (New York), Division of Corporations (Pennsylvania), or Department of Assessments and Taxation (Maryland) **approved** name registration or trade name registration.

5. All Proprietors, Corporate Officers and Directors, or Partners: (add as many lines as needed)

Name	Title	Address	Telephone	Fax	E-mail
David G. DeCampli	President/ Manager	2 North Ninth Street Allentown, PA 18101	(610) 774-4247	(610) 774-6092	dgdecamp@pplweb.com
Victor N. Lopiano	Senior Vice President	Same	(610) 774-3913	610-774-6092	vnlopiano@pplweb.com
Dennis J. Murphy	Vice President and Chief Operating Officer/ Manager	Same	(610) 774-4316	(610) 774-4121	djmurphy@pplweb.com
Paul A. Farr	Treasurer/ Manager	Same	(610) 774-2426	(610) 774-7016	pfarr@pplweb.com
Elizabeth Stevens Duane	Secretary	Same	(610) 774-4107	(610) 774-5019	esduane@pplweb.com

6. Corporate Contact:Name Gary PetrewskiTitle Environmental ManagerAddress 2 North Ninth StreetGENPL4City AllentownState PAZip 18101Telephone (610)774-5996Fax (610)774-2618E-Mail gpetrewski@pplweb.com7. Project Hydrogeologist:Name Not Applicable

Title _____

Company _____

Address _____

Telephone () _____

Fax () _____

E-Mail _____

P.G. License No. _____

State _____

Expiration Date _____

8. Project Engineer:Name Jan C. Phillips, P.E.Title NACompany Jan C. Phillips, P.E.Address 2611 Walnut StreetAllentown, PA 18104-6230Telephone (610)821-0160Fax (610)821-0160E-Mail jcphllps@enter.netP.E. License No. PE017909EState PAExpiration Date 9/20/2013

9. Representing Attorney, if applicable:

Name _____

Firm _____

Address _____

Telephone () Fax () E-Mail _____

10. Name(s) and Signature(s) of Preparer and Project Owner:

The undersigned representatives of the project sponsor certify, under penalty of law (or perjury), as provided by 18 Pa. C.S.A. §4904; Section 210.45, of the New York Penal Law; Section 9-101 Maryland Crimes Code and 28 U.S.C. §1746, attest that the information for all parts contained herein and all information accompanying this application(s) is true and correct, and that they are authorized to act as representatives on behalf of their respective corporate entities.

Preparer Name Jan C. Phillips, P.E. Date 3/09/12Signature Title NACompany Jan C. Phillips, P.E.

Preparer Name _____ Date _____

Signature _____

Title _____

Company _____

Project Owner Name PPL Holtwood, LLC ; Dennis J. Murphy Date 3/09/12Signature Title Vice President and Chief Operating OfficerCompany PPL Holtwood, LLC

Not Applicable

(P.G. Seal)

(P.E. Seal)

Notes:

1. Mark any information on the application that is considered confidential or proprietary.
2. Items 1 through 6 and 10 are required, and items 7 through 9 are project specific.

PENNSYLVANIA DEPARTMENT OF STATE
CORPORATION BUREAU
ROOM 308 NORTH OFFICE BUILDING
P.O. BOX 8722
HARRISBURG, PA 17105-8722

706

PPL HOLTWOOD, LLC

THE CORPORATION BUREAU IS HAPPY TO SEND YOU YOUR FILED DOCUMENT.
PLEASE NOTE THE FILE DATE AND THE SIGNATURE OF THE SECRETARY OF THE
COMMONWEALTH. THE CORPORATION BUREAU IS HERE TO SERVE YOU AND WANTS
TO THANK YOU FOR DOING BUSINESS IN PENNSYLVANIA. IF YOU HAVE ANY
QUESTIONS PERTAINING TO THE CORPORATION BUREAU, CALL (717) 787-1057.

ENTITY NUMBER: 2916798

MICROFILM NUMBER: 2000006

0958-0960

P BISHOP
DECHERT PRICE & RHOADS ESQS
COUNTER

200006 958

#273941

CONSENT TO USE OF SIMILAR NAME

DSCB:17.3 (Rev 90)

Pursuant to 19 Pa. Code § 17.3 (relating to use of a confusingly similar name) the undersigned association, desiring to consent to the use by another association of a name which is confusingly similar to its name, hereby certifies that:

1. The name of the association executing this Consent to Use of Similar Name is: PP&L, Inc.

2. The (a) address of this association's current registered office in this Commonwealth or (b) name of its commercial registered office provider and the county of venue is (the Department is hereby authorized to correct the following information to conform to the records of the Department):

(a) 2 N. 9th Street, Allentown, PA 18101, Lehigh County
Number and Street City State Zip County

(b) c/o: _____
Name of Commercial Registered Office Provider County

For an association represented by a commercial registered office provider, the county in (b) shall be deemed the county in which the association is located for venue and official publication purposes.

3. The date of its incorporation or other organization is: June 4, 1920

the statute under which it was incorporated or otherwise organized is: Pennsylvania Business Corporation Law

5. The association(s) entitled to the benefit of this Consent to Use of Similar Name is (are): _____

PPL Holtwood, LLC

6. A check in this box: _____ indicates that the association executing this Consent to Use of Similar Name is the parent or prime affiliate of a group of associations using the same name with geographic or other designations, and that such association is authorized to and does hereby act on behalf of all such affiliated associations, including the following (see 19 Pa. Code § 17.3(c)(6)):

IN TESTIMONY WHEREOF, the undersigned association has caused this consent to be signed by a duly authorized officer thereof this 4th day of January, 2000.

PP&L, INC.

(Name of Association)

BY: _____

(Signature)

TITLE: Vice President-Power Production & Engineering

Microfilm Number _____

200006-959

Filed with the Department of State on JAN 04 2000

Entity Number 2916718

Kim Pizzigalli
Secretary of the Commonwealth

APPLICATION FOR REGISTRATION AS A FOREIGN LIMITED LIABILITY COMPANY

DSCB:15-8981 (Rev 95)

In compliance with the requirements of 15 Pa.C.S. § 8981 (relating to registration), the undersigned foreign limited liability company, desiring to register to do business in this Commonwealth, hereby states that:

1. The name of the limited liability company is: PPL Holtwood, LLC
2. (If the name set forth in paragraph 1 is not available for use in this Commonwealth, complete the following): The name under which the limited liability company proposes to register and do business in this Commonwealth is:

N/A

3. The name of the jurisdiction under the laws of which the limited liability company was organized and the date of its formation are:

Jurisdiction: Delaware

Date of Formation: 11/29/99

4. The (a) address of this limited liability company's initial registered office in this Commonwealth or (b) name of its commercial registered office provider and the county of venue is:

(a) 2 North Ninth Street, Allentown, PA 18101-1179, Lehigh County

Number and Street

City

State

Zip

County

(b) c/o: _____

Name of Commercial Registered Office Provider

County

For a limited liability company represented by a commercial registered office provider, the county in (b) shall be deemed the county in which the limited liability company is located for venue and official publication purposes.

5. (Check and complete one of the following):

 The address of the office required to be maintained by it in the jurisdiction of its organization by the laws of that jurisdiction is:

Number and Street

City

State

Zip

X It is not required by the laws of its jurisdiction of organization to maintain an office therein and the address of its principal office is:

2 North Ninth Street, Allentown, PA 18101-1179

Number and Street

City

State

Zip

- ~~6. (Strike out if inapplicable): The company is a restricted professional company organized to render the following restricted professional service(s):~~

PA. DEPT. OF STATE

JAN 11 2000 3:30

PA. DEPT. OF STATE

200006 - 960

IN TESTIMONY WHEREOF, the undersigned limited liability company has caused this Application for Registration as Foreign Limited Liability Company to be signed by a duly authorized member or manager thereof this 30th day of December, 19 99.

PPL HOLTWOOD, LLC

(Name of Limited Liability Company)

BY: James E. Abel

James E. Abel

(Signature)

TITLE: Treasurer

PENNSYLVANIA DEPARTMENT OF STATE
CORPORATION BUREAU
ROOM 308 NORTH OFFICE BUILDING
P.O. BOX 8722
HARRISBURG, PA 17105-8722

179

PPL GENERATION, LLC

THE CORPORATION BUREAU IS HAPPY TO SEND YOU YOUR FILED DOCUMENT.
PLEASE NOTE THE FILE DATE AND THE SIGNATURE OF THE SECRETARY OF THE
COMMONWEALTH. THE CORPORATION BUREAU IS HERE TO SERVE YOU AND WANTS
TO THANK YOU FOR DOING BUSINESS IN PENNSYLVANIA. IF YOU HAVE ANY
QUESTIONS PERTAINING TO THE CORPORATION BUREAU, CALL (717) 787-1057.

ENTITY NUMBER: 2916799

MICROFILM NUMBER: 0200002

0874-0875

P BISHOP
DECHERT PRICE & RHOADS ESQS
COUNTER

Profile Number 200002-874

File Number 2916799

Filed with the Department of State on

JAN - 4 2000

Kim Riggan
Secretary of the Commonwealth

APPLICATION FOR REGISTRATION AS A FOREIGN LIMITED LIABILITY COMPANY

DSCB:15-8981 (Rev 95)

In compliance with the requirements of 15 Pa.C.S. § 8981 (relating to registration), the undersigned foreign limited liability company, desiring to register to do business in this Commonwealth, hereby states that:

The name of the limited liability company is: PPL Generation, LLC

(If the name set forth in paragraph 1 is not available for use in this Commonwealth, complete the following): The name under which the limited liability company proposes to register and do business in this Commonwealth is:

N/A

The name of the jurisdiction under the laws of which the limited liability company was organized and the date of its formation are:

Jurisdiction: Delaware

Date of Formation: 11/29/99

The (a) address of this limited liability company's initial registered office in this Commonwealth or (b) name of its commercial registered office provider and the county of venue is:

(a) 2 North Ninth Street, Allentown, PA 18101-1179, Lehigh County

Number and Street

City

State

Zip

County

(b) c/o:

Name of Commercial Registered Office Provider

County

For a limited liability company represented by a commercial registered office provider, the county in (b) shall be deemed the county in which the limited liability company is located for venue and official publication purposes.

(Check and complete one of the following):

 The address of the office required to be maintained by it in the jurisdiction of its organization by the laws of that jurisdiction is:

Number and Street

City

State

Zip

 X It is not required by the laws of its jurisdiction of organization to maintain an office therein and the address of its principal office is:

2 North Ninth Street, Allentown, PA 18101-1179

Number and Street

City

State

Zip

~~(Strike out if inapplicable): The company is a restricted professional company organized to render the following restricted professional service(s):~~

PA. DEPT. OF STATE

NO. JAN - 4 AM 11:32

2000 JAN - 7 AM 11:40

200002 - 875

IN TESTIMONY WHEREOF, the undersigned limited liability company has caused this Application for Registration as a
return Limited Liability Company to be signed by a duly authorized member or manager thereof this 30th day of
mber, 19 99.

PPL GENERATION, LLC

(Name of Limited Liability Company)

BY:

James E. Abel
James E. Abel

(Signature)

Treasurer

TITLE:

ATTACHMENT 2

Modification And Use Of The Oasis Model To Evaluate Sources of
Flow Augmentation For PPL Consumptive Water Use Mitigation In The
Susquehanna River Basin; Document JCP-BB-1, Rev. 0, March 7, 2012

MODIFICATION AND USE OF THE OASIS MODEL
TO EVALUATE SOURCES OF FLOW AUGMENTATION
FOR PPL CONSUMPTIVE WATER USE MITIGATION IN THE
SUSQUEHANNA RIVER BASIN

Document JCP-BB-1

Rev. 0

March 7, 2012

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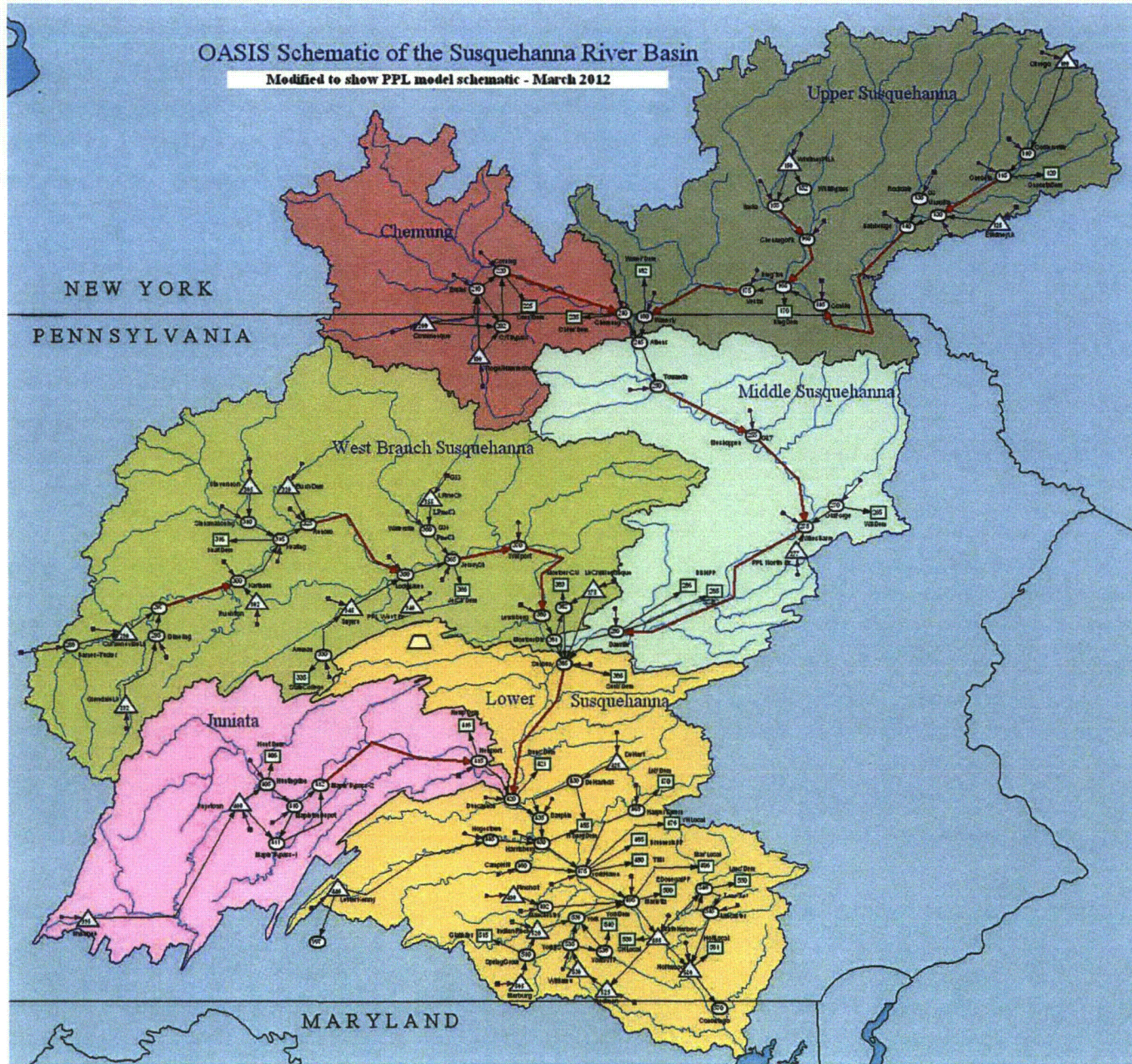
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OASIS Schematic of the Susquehanna River Basin

Modified to show PPL model schematic - March 2012



MODIFICATION AND USE OF THE OASIS MODEL
TO EVALUATE SOURCES OF FLOW AUGMENTATION
FOR PPL CONSUMPTIVE WATER USE MITIGATION IN THE
SUSQUEHANNA RIVER BASIN

1. PURPOSE

PPL has been evaluating basin storage resources from which releases can be made during drought periods to mitigate consumptive water use at existing and proposed PPL-owned facilities in the Susquehanna River Basin. On June 23, 2011 PPL presented to the Susquehanna River Basin Commission (SRBC) a conceptual proposal to form a Corporate Storage Asset Pool consisting of PPL-owned storage assets that could be collectively used in concert with SRBC-controlled storage assets to satisfy SRBC's consumptive use regulations for all PPL-owned consumptive use projects in the basin. This report summarizes an evaluation of using PPL's existing Rushton Mine and Holtwood Hydroelectric projects as components of the Corporate Storage Asset Pool to satisfy SRBC's consumptive use mitigation requirements. The use of an additional, unspecified storage asset in the West Branch Subbasin as a potential future addition to the Corporate Storage Asset Pool is also examined; this asset is called "West Branch" in this report.

This evaluation was undertaken using the Susquehanna River Basin "OASIS" daily flow model.¹ PPL acquired from SRBC the right to use and modify the model for purposes relating to basin water management. In the course of this evaluation, PPL modified and updated the OASIS model as acquired from SRBC.²

The general purposes of this report are:

- To describe the modifications to the OASIS model (Section 3);
- To discuss PPL's evaluation (Section 4); and
- To present key results and conclusions (Section 5)

Tables follow the text of this report.

¹ The Susquehanna River Basin OASIS model was developed for SRBC by HydroLogics, Inc.

² In this report, "OASIS" or "the model" or "the SRB OASIS model" will refer to the OASIS model of the Susquehanna River Basin developed by HydroLogics, Inc., including the model's basic "physical" structure of stream reaches, junctions, reservoirs, inflows and withdrawals. "SRBC's model run" will refer to the specific model run with input files provided to PPL by SRBC (as was programmed either by SRBC or by HydroLogics, Inc. for SRBC).

2. SUMMARY

PPL has made extensive use of the Susquehanna River Basin OASIS model to evaluate sources of storage ("resources" or "assets") as proposed or potential components of a PPL Corporate Storage Asset Pool ("Asset Pool"). PPL envisions that the Asset Pool would be operated to mitigate consumptive water use ("CU") at existing and planned PPL CU facilities, in accordance with an "Asset Pool Operations Plan" to be developed cooperatively with the SRBC.

The results of PPL's evaluation using OASIS, as described in this report, suggest that an Asset Pool consisting of Holtwood (as the primary resource), Rushton Mine, and one other resource, can satisfy SRBC's requirement for mitigation of the CU at PPL's existing and planned facilities in the basin.

In the course of its evaluation, PPL has modified the SRBC OASIS model. The principal reasons to modify the model were to:

- Simulate the operation of the proposed Asset Pool to mitigate consumptive water use at PPL consumptive use projects
- Simulate the operation of Rushton Mine, Holtwood and "West Branch" as potential components of the Asset Pool
- Simulate the operation of Whitney Point Lake for low flow augmentation
- Simulate the existing in-basin diversion at the Barnes & Tucker mine
- Remove negative inflows in order to eliminate zero or unrealistically low river flows
- Include BBNPP as a consumptive water use
- Program Holtwood to reflect the daily flow requirement of the amended license
- Remove the portion of the model simulating the basin below Holtwood in order to (a) prevent potential influences of operations of downstream facilities (e.g., Conowingo, Muddy Run and the City of Baltimore) on upstream river flows and reservoir operations and (b) reduce the size of output files
- Simulate the operation of Montour and Lake Chillisquaque in accordance with the Montour Drought Operations Manual
- Include consumptive use mitigation for Montour in releases from of Cowanesque Lake

The principal focus of PPL's evaluation has been to determine how river flows would be affected by the operation of various combinations of CU mitigation resources in the Asset Pool. PPL has also evaluated the relative effect of the CU of the proposed Bell Bend Nuclear Power Plant ("BBNPP") on river flows; BBNPP will be located in the Middle Susquehanna Subbasin. This report does not address the economic benefits and costs of CU mitigation.

Individual CU mitigation resources in the Asset Pool would not be assigned to specific CU facilities but would be operated in a coordinated fashion to serve PPL's combined need, and to better optimize Basin resources. Factors to be considered in determining "optimum" operation would include: operating cost, status of contents and outlook for refill; ambient downstream river flows and flow needs; maintenance requirements; and perhaps others.

As envisioned, the Asset Pool Operations Plan would (a) prescribe the operation of the Asset Pool, including specific operational requirements for individual CU mitigation resources and (b) accommodate changes or additions to both the CU mitigation resources and the facilities for which CU mitigation is provided.

PPL existing CU facilities are:³

- Susquehanna Steam Electric Station ("SSES") – Middle Susquehanna Subbasin
- Montour Steam Electric Station ("Montour SES") – West Branch Subbasin
- Brunner Island Steam Electric Station ("Bises") – Lower Susquehanna Subbasin
- Phoenix Links Golf Course ("Phoenix GC") – Lower Susquehanna Subbasin

PPL existing CUs for which additional mitigation is not required are:

- SSES CU up to 40 million gallons per day (mgd) as a 30-day average, mitigated by PPL's sponsorship of storage in Cowanesque Reservoir
- Montour SES CU up to 17.0 mgd, mitigated by a combination of PPL's sponsorship of storage in Cowanesque Reservoir and drought operation of Lake Chillisquaque
- Bises CU up to 8.1 mgd (grandfathered under SRBC regulations)

PPL CUs potentially to be mitigated by new CU mitigation resources and included in OASIS modeling to date are:

- SSES CU exceeding 40 mgd as a 30-day average
- Montour SES CU exceeding 17.0 mgd
- Bises CU exceeding 8.1 mgd
- Phoenix GC CU (combined with Bises CU in OASIS)
- BBNPP CU

For purposes of OASIS modeling, PPL CU values are assumed to be constant during each month of the year. The monthly CU values (mgd) are presented in TABLE 1. The CUs for existing PPL facilities represent average values, on a monthly basis. The BBNPP CU value for each month is the maximum average full-load CU for that month indicated by simulation of BBNPP operation over the period 1949 through 2009. The principal component of BBNPP's CU is cooling tower evaporation. Allowance was made for other plant losses and in-river evaporation.

The "net mgd" values shown in TABLE 1, both with and without BBNPP, represent the PPL CU proposed to be mitigated by the Asset Pool.

³ During the second quarter of 2012, PPL expects to acquire the power plant currently known as "AES Ironwood" that is located in the Delaware River Basin but deriving water supply from the Susquehanna River Basin. SRBC has approved the plant's consumptive use of up to 4.500 mgd of basin waters as an out-of-basin diversion. (Ref. Docket No. 19980502-1) PPL has not included the consumptive use in OASIS modeling to date.

Prospective CU mitigation resources evaluated as components of the Asset Pool to date are:

- Holtwood – proposed as an initial component of the Asset Pool
- Rushton Mine – proposed as an initial component of the Asset Pool
- “West Branch” - representing an unspecified source in the West Branch Subbasin that could be potentially developed in the future as a component of the Asset Pool.

A “North Branch” CU mitigation resource (representing an unspecified source upstream from Danville that could be potentially developed in the future as a component of the Asset Pool) has been included in OASIS for possible future evaluation but has not been evaluated to date.

For convenience, the suite of various model runs for which results are presented in this report is referred to as the “February 2012 runs.” PPL made numerous other preliminary modeling runs prior to February 2012; those runs are neither discussed nor their results presented herein. PPL considers the results of the February 2012 runs to represent the important results of the evaluation.

The effect and adequacy of CU mitigation resources is quite dependent upon the assumed “trigger flows,” i.e., the ambient river flow or flows that indicate when CU mitigation releases are required. Four alternative trigger flow cases were evaluated, all based on flow in the Susquehanna River at Harrisburg:

- “P95”: the flows exceeded 95 percent of the time during the individual months July through November, in effect during each of those respective months
- “Adjusted P95”:
 - the flow exceeded 95 percent of the time during August, in effect during the months July and August
 - the flow exceeded 95 percent of the time during September, in effect during the month of September
 - the flow exceeded 95 percent of the time during October, in effect during the months October and November
- “Q7-10”: the seven-day average annual low flow exceeded once every ten years on average, in effect during the months July through November
- “August-October P95”: the flows exceeded 95 percent of the time during the individual months August, September and October, in effect during each of those respective months, with no trigger flow in effect in July or November.

The values for the various trigger flows, in cubic feet per second (cfs), were provided by SRBC and are presented in TABLE 2.

Other important assumptions adopted for the February 2012 runs are listed below. These are discussed in Sections 3 and 4.

- The model is “cut off” below Holtwood
- Safe Harbor operates on a daily run-of-river basis
- Holtwood operates on a daily run-of-river basis except when providing CU releases or refilling following a period of CU releases

- River flow indicators are Danville, Sunbury, Marietta, Harrisburg and Holtwood; the Holtwood flow represents total outflow from the Holtwood project
- The operating procedures of the Montour Drought Operations Manual are in effect
- CU mitigation resources collectively serve PPL's combined CU mitigation need; i.e., releases from resource "X" are not specifically allocated to CU facilities "Y" or "Z."
- The increases in Holtwood outflow indicate the potential beneficial effects of the Asset Pool with respect to maintaining flow to the Chesapeake Bay, in accordance with SRBC policy. The effects of facilities and withdrawals downstream from Holtwood on flow to the Chesapeake Bay are not evaluated herein.

The key results of the February 2012 runs are:

- The future designation by SRBC of a "trigger flow" for PPL CU mitigation will be very important and will affect the amount of PPL CU mitigation resources required and the operation of those resources.
- Releases (a) from Cowanesque Reservoir for Montour SES and Three-Mile Island ("TMI") according to the present plan⁴ and (b) from Whitney Point Lake for low flow augmentation⁵ combine to offset the potential flow effects of BBNPP CU, as indicated by low flow statistics at Danville.
- Releases (a) from Cowanesque Reservoir for TMI according to the present plan⁶ and (b) from Whitney Point Lake for low flow augmentation⁷ combine to offset the potential flow effects of BBNPP CU, as indicated by low flow statistics at Sunbury and Harrisburg.
- BBNPP CU appears to reduce low flows at Marietta (downstream from TMI and BISES) by less than 2 percent. However, PPL understands that low flow augmentation from Raystown Lake improves conditions compared to unregulated low flows in this area of the river.
- Flows at Holtwood (outflow) appear to indicate potential flow improvements to the Chesapeake Bay.
- An Asset Pool consisting of Rushton and Holtwood appears to provide sufficient water to meet PPL's existing CU mitigation need, subject to Commission review.
- If BBNPP is built, potential CU mitigation from Rushton and Holtwood appears to meet the need for CU mitigation at BBNPP, while meeting most or all of the mitigation needs for existing PPL CU facilities. Inclusion of the "West Branch" or other significant resource in the Asset Pool appears to be needed to meet PPL's total need if the trigger flow is based on the P95 flow at Harrisburg.

Determining flow improvements depends upon the selection of appropriate "base flow" scenarios modeled by representative OASIS runs. The "base flow" runs differ at the different flow points (Danville, Sunbury, Harrisburg, Marietta and Holtwood). PPL proposes that the appropriate "base flow" runs are those which exclude the benefits of Whitney Point low flow

⁴ Ref. "Cowanesque Operations Manual," SRBC Publication 157, January 1994.

⁵ As implemented by the SRBC-Corps Whitney Point "Section 1135 Modification."

⁶ Ref. "Cowanesque Operations Manual," SRBC Publication 157, January 1994.

⁷ As implemented by the SRBC-Corps Whitney Point "Section 1135 Modification."

augmentation and the benefits of releases from Cowanesque for designated uses downstream. The specific values selected for comparison in this study are the low flows exceeded 95%, 96%, 97%, 98%, 99% and 100% of the time during the period July through November.

Prior runs (not included among the February 2012 runs) suggest that storage capacity in Lake Chillisquaque might suffice to provide additional CU mitigation beyond that provided by operation according to the Montour Drought Operations Manual. PPL would like to explore this possibility with SRBC staff.

3. MODIFICATIONS TO OASIS MODEL

The SRBC model operates on a daily basis, simulating the period February 1930 through March 2008. PPL understands that inflows at the various inflow nodes were developed based on actual gaging station records for the model period. The starting point for PPL's modifications was SRBC's model run ("reference run") "_Automatic_QFERC+1000_updated_20110216."

PPL's modifications may be considered in three categories:

- Structural: changes to the basin stream-reservoir-demand network.
- Programming: changes to routines or water management rules implemented by the several operator control language ("OCL") files.
- Data: changes to data in either the OCL files or in the "statdata.mdb" files.

Some modifications fall into more than one of the three categories.

The significant PPL modifications are summarized, below. Model nodes are represented by the node number in brackets, e.g. "[300]," and model arcs by upstream/downstream nodes separated by a period, e.g. "385.420." Demands simulated in the model are entirely consumptive.

3.1 Structural Modifications

Model cutoff

The SRBC model extends downstream from Holtwood to the Chesapeake Bay and includes Conowingo, Muddy Run, the Baltimore water supply system, and several demands downstream from Conowingo. The PPL model is "cut off" downstream from Holtwood [560]. Holtwood discharge is simulated as the flow in 560.570; node [570] represents Conowingo Reservoir but is a non-operating terminal node in the cut-off model. The primary purpose of the "cutoff" is to evaluate only the part of the basin system that PPL operations (either demands or storage releases) could affect, without requiring assumptions about Conowingo or Baltimore operations. A secondary purpose is to reduce model run times and the amount of output data.

The model has been tested with and without cutoff to determine suitability for purposes of PPL's evaluation. (See subsection 3.4 "Model Cutoff and Hydro Peaking," below.)

Proposed Bell Bend Nuclear Power Plant (BBNPP)

BBNPP is added as a demand node [286], removing water from the river system at Danville [280] via 280.286.

Barnes & Tucker

The Barnes & Tucker in-basin transfer is added to the model as node [288]. Inflow to [288] and outflow to Curwensville Lake [290] via 288.290 is 10.0 mgd when the Harrisburg flow is below the assumed SRBC Q7-10 trigger flow and 7.5 mgd at all other times.

Rushton Mine

PPL's Rushton Mine is proposed as a component of the Asset Pool (SRBC Pending No. 2011-146) and is added as reservoir node [302]. Model outflow from Rushton enters the river system at Karthaus [300]. Modeled inflow to Rushton for each month of the year is based on estimates of inflow derived from estimated net pumping and observed mine pool level fluctuations; inflow ranges from 2.9 mgd to 5.2 mgd. To retain the model overall water balance, inflow to [302] is subtracted from inflow to [300]. The available CU mitigation from Rushton is modeled as 2.0 mgd. The 2.0 mgd represents the potential available mitigation from the existing project, i.e., maximum drawdown to approximately El. 1380 ft from the nominal maximum operating level of El. 1420 ft. The estimated mine void in this interval is 565 acre-ft. To represent depletion of storage, the amount of flow augmentation and the inflow to the mine are combined in the Rushton release as flow in 302.300.

"West Branch" resource

Additional PPL storage in the West Branch subbasin potentially to be included in the Asset Pool is added as "West Branch" reservoir node [340]. Model outflow from "West Branch" enters the river system at Lock Haven [350]. Inflow to "West Branch" is modeled as a constant 5.0 mgd. To retain the model overall water balance, inflow to [340] is subtracted from inflow to [350]. The potential available storage and the maximum potential CU release are initially considered to be essentially unlimited, but were limited in the February 2012 runs to the amounts necessary to provide for the total PPL CU mitigation need under the P95 trigger flow.⁸ To represent depletion of storage, the amount of flow augmentation and the inflow are combined in the "West Branch" release as flow in 340.350.

"North Branch" resource

Additional PPL storage upstream from Wilkes-Barre [275] potentially to be included in the Asset Pool is added as "North Branch" reservoir node [277]. Model outflow from "North Branch" enters the river system at Wilkes-Barre. Inflow to "North Branch" is modeled as a constant 5.0

⁸ The estimated need for a "West Branch" resource under a P95 trigger flow is 9.3 mgd maximum CU mitigation release rate and a total storage of 1,383 acre-ft. This was determined by a run not reported herein.

mgd. To retain the model overall water balance, inflow to [277] is subtracted from inflow to [275]. No runs were made utilizing "North Branch"; in effect, [277] remains "full" and all inflow passed to [275] via 277.275.

Montour – Lake Chillisquaque

The SRBC model shows Montour SES as a demand [382] receiving supply both by (gravity) flow from Lake Chillisquaque [375] and (pumped) flow from the West Branch at the "Montour Diversion" [381], located just above Sunbury [385]. Lake Chillisquaque discharges to Sunbury via 375.385.

The "Montour – Lake Chillisquaque" system was modified in the PPL model to better reflect actual operation of the Montour complex, including drought operations. In the modified model, Montour SES [382] again receives supply from both Lake Chillisquaque [375] and "Montour Diversion" [381], but the Montour SES CU is represented by a new node [383], which receives flow via 382.383. Non-consumptive Montour SES use demand is discharged to Sunbury via 382.385. Also, water can be pumped from the river to the lake via 381.375. Conservation flow (0.81 cfs) and excess inflow to the lake are released via 375.381 as in the SRBC model. The flow in Chillisquaque Creek downstream from the Montour SES is not modeled per se but would be represented by the sum of the flows in 375.385 and 382.385.

Letterkenney diversion

The SRBC model has an out-of-basin diversion [997] from Letterkenney Reservoir [440]. The relationship of daily Letterkenney diversion and outflow was irregular, apparently influenced by in-basin river flows. As a result, varying amounts of flow would bypass the Lower Susquehanna. PPL replaced the diversion with a constant in-basin demand [441] of 1.4 mgd to alleviate variability. Letterkenney operates as an uncontrolled reservoir meeting the 1.4 mgd demand and a constant minimum release of 3.2 mgd to Conodoguinet Creek via 440.445. The Letterkenney demand and minimum release rates were suggested by SRBC staff.

3.2 Programming Modifications

In addition to programming necessary to implement the "Structural Modifications" discussed above, significant program modifications to the model are discussed in this section.

TABLE 3 lists the OCL files included in the reference SRBC model run and the PPL model. TABLE 3 indicates PPL's implementation of each file. PPL's additions and modifications to the OCL files are discussed in this section.

Elimination of negative inflows

In the SRBC model, inflows at several nodes are adjusted in the adjust_inflows OCL file to eliminate negative inflows. In order to maintain overall water balance, the adjustment routine

zeroes each negative inflow as it occurs and applies the negative amount to succeeding positive inflows by zeroing those positive inflows until all negativity has been distributed. However, several other nodes had negative inflows. Of particular significance were negative inflows at Wilkes-Barre [275] that sometimes reduced the river flow in 275.280 to zero. In the PPL model, all inflows were included in the adjust_inflows OCL file in order to be certain to eliminate negative inflows throughout the model system.

Whitney Point flow augmentation

In the SRBC model reference run, operation of Whitney Point Lake [150] does not replicate the SRBC-Corps Section 1135 Project Modification. Minimum reservoir outflow to the river 150.155 is 10 cfs. Reservoir outflow to the river 150.155 is intended to be constrained to a maximum 2,000 cfs May-September and 3,500 cfs in other months.

PPL added a Whitney Point OCL file to simulate the Section 1135 reservoir operation for flow augmentation. The flow augmentation replicates as closely as possible the rules provided by SRBC staff.⁹ The modified operation triggers releases from Whitney Point to meet flow targets in the Otselic River below the lake, at Chenango Forks [160], and at Waverly [180].

Hydro peaking operations

In the SRBC model reference run, Safe Harbor and Holtwood operate strictly as a run-of-river reservoirs (outflow = inflow less losses). PPL developed routines to simulate maximum Safe Harbor and Holtwood weekly peaking, i.e. to maximize weekday generation and minimize weekend day generation as limited by inflow, available storage, plant hydraulic capacity and, for Holtwood, the required minimum daily flow release (see below).

PPL tested the model both with Safe Harbor/Holtwood run-of-river and peaking, both with and without model cutoff. Safe Harbor/Holtwood peaking operation was assumed in some comparative preliminary runs to evaluate PPL CU mitigation. However, as discussed in Section 3, it was determined that that run-of-river hydro operation will be assumed in the model runs to evaluate PPL CU mitigation as reported herein. (See subsection 3.4 "Model Cutoff and Hydro Peaking")

Holtwood daily minimum flow operation

In addition to the maximum weekly peaking routine discussed above, PPL also modified the holtwood_ops OCL file to reflect the daily minimum release requirement of the amended license. Holtwood is required each day to release either net inflow or 98.7 percent of the prevailing Conowingo minimum flow, whichever is less. The Conowingo minimum flow is the

⁹ "Whitney Point Lake – Determining Release Rates for Flow Augmentation" dated 2/4/2011. PPL understands that the document was developed by the Corps.

lesser of the "QFERC" flow¹⁰ or the prior-day flow at Marietta. With the redeveloped project, there will be a required minimum flow of 200 cfs to the Piney Channel. However, since run-of-river operation was assumed for both Safe Harbor and Holtwood, these requirements did not affect outcomes of the various runs evaluated for this report.

Holtwood operation for PPL consumptive use mitigation

Holtwood will be proposed to be included in the Asset Pool and is modeled in selected PPL runs as the primary source of CU mitigation. PPL proposes to provide CU mitigation releases from Holtwood by maintaining the lake levels above the current minimum levels by an amount sufficient to provide the corresponding amount of CU mitigation releases. During CU mitigation operation, the lake would be drawn down daily by an amount equivalent to the amount of CU mitigation provided. Daily (but not weekly) peaking could continue during CU mitigation operation as constrained by the pool limits necessary to assure adequate water for CU mitigation.

PPL proposes to provide CU releases during the recreation season (ends September 15) from storage between El. 168.80 ft and El. 167.50 ft. (El 167.50 ft is the minimum lake level allowed during the recreation season.) This storage is estimated as 3,370 acre-ft.

PPL proposes to provide CU releases during the post-recreation season (beginning September 16) from storage between El. 167.50 ft and El. 165.00 ft. (The minimum operating level is El. 163.50 ft.) This storage is estimated as 6,090 acre-ft.

Holtwood was evaluated to determine the maximum amount of CU mitigation both during the recreation season and the post-recreation season, as discussed in Section 4.

In the February 2012 runs, the daily Holtwood lake levels in OASIS represent the elevation of the remaining CU mitigation storage during the months July through November and the full operating lake level (El. 169.75 ft) during the months December through June.

Montour SES drought operations

The SRBC model reference run excludes CU makeup for Montour SES. PPL modified the model (with the modified Montour-Lake Chillisquaque structural changes discussed above) to simulate drought operations in accordance with the Montour SES Drought Operations Manual. To implement drought operations, PPL (1) added the montour_ops OCL file to simulate operation of the Montour system including Lake Chillisquaque and (2) modified the SRBCstorage_ops OCL file to simulate releases from Cowanesque Lake for Montour SES.

¹⁰ During the July-November PPL CU release period, "QFERC" is 5,000 cfs through September 14 and 3,500 cfs thereafter.

Curwensville pass-through of Barnes & Tucker

Curwensville Lake operation is modified in the SRBCstorage_ops OCL file so that the Barnes & Tucker flow augmentation 288.290 entering Curwensville is always added to the reservoir release and not retained in the reservoir.

Potential new PPL consumptive use mitigation

The operation of potential new sources for additional PPL CU mitigation is programmed in the PPL_CU_mitigation OCL file. This includes the maximum CU release and the priority of use of each source.

3.3 Data Modifications

Demand weights

In the SRBC model reference run, demand weights¹¹ are relatively low (200 or 210) so that demand withdrawals are automatically curtailed during low river flows. In the PPL model, in order to accurately compare the effects of different basin operations on river flows without the effect of variations in consumptive demands, all demand weights are set at 2000, with the result that demands are constant under all conditions with one exception; there are times when flow in the Lackawanna River at Old Forge [270] is not adequate to meet the Wilkes-Barre demand [265].

PPL consumptive water use (demand)

The modeled demand (representing CU) at existing PPL facilities is modified to represent average full-load values, on a monthly basis. BBNPP demand (representing CU) has been added to represent the maximum simulated full-load demand for each month. All February 2012 runs include the CUs of all existing PPL facilities. The BBNPP CU was included in selective runs.

Safe Harbor and Holtwood SAE values

The Safe Harbor and Holtwood storage-area-elevation (SAE) values are modified to: (1) show absolute storages; (2) increase the Safe Harbor maximum operating level to EL. 228.0 ft; and (3) to correct the values to correspond to known values.

¹¹ OASIS uses numerical "weights" (selected by the user) to prioritize choices among river flows, water in storage, and water withdrawn (demands). In this case, the weight for each demand was set at 2,000, a value higher than the weights of river flows and water in storage so that demands would not be curtailed as river flows decreased during drought.

Curwensville dead storage

The elevation of the top of “dead” (unusable) storage in Curwensville is revised to El. 1135 ft from El. 1150 ft, as recommended by SRBC staff.

Trigger flows

Trigger flows for flow augmentation for PPL CU mitigation are set in the PPL_CU_mitigation OCL file. Trigger flows for SRBC storage releases (from Cowanesque and Curwensville) are set in the SRBCstorage_ops OCL file. (PPL developed and initially tested the CU_trigger OCL file to facilitate testing varying CU mitigation trigger flows; however, for the purpose of the February 2012 runs, it was found to be more convenient to insert and adjust trigger flows in the PPL_CU_mitigation OCL file.)

The trigger flows for SRBC releases from Cowanesque and Curwensville, respectively, are the Wilkes-Barre and Harrisburg Q7-10 flows as simulated in the SRBC model reference run.

3.4 Model Cutoff and Hydro Peaking

Two important alternative attributes of the model for purposes of PPL’s evaluation are whether or not to (a) cut off the model downstream from Holtwood (“model cutoff”) and (b) assume weekly peaking at Safe Harbor and Holtwood (“hydro peaking”). Four preliminary runs were made for the purpose of testing the effects of model cutoff:

- Run 1: no model cutoff, no hydro peaking
- Run 1C: model cutoff, no hydro peaking
- Run 1P: no model cutoff, hydro peaking
- Run 1PC: model cutoff and hydro peaking

These runs are not included among the February 2012 runs.

Results of the four preliminary runs are presented in TABLE 4. The results indicate:

- Model cutoff does not affect flows upstream from Holtwood
- Model cutoff affects Holtwood outflows only when hydro peaking is assumed
- Hydro peaking does not affect flows upstream from Holtwood

It is important to recognize the overwhelming potential effect of peaking at Safe Harbor on outflow at Holtwood. There are three reasons for this:

- Safe Harbor has no flow (release) requirement;
- Safe Harbor’s usable reservoir capacity greatly exceeds Holtwood’s, both during the recreation season and at other times; and
- Safe Harbor’s hydraulic capacity significantly exceeds Holtwood’s even with Holtwood redeveloped.

Accordingly, Holtwood operation, to a large degree, depends on Safe Harbor operation. If Safe Harbor is regulating its storage for peaking operation, Holtwood can effectively peak in parallel

with Safe Harbor without using any of its own storage (i.e., by keeping a steady pond level). In addition, during relatively low flow periods, it is sometimes possible for Holtwood to use its reservoir storage to intensify its own peaking.

Nevertheless, because of the degree of control of Safe Harbor on Holtwood daily operations, PPL considers it more representative to assume daily run-of-river operation at both Safe Harbor and Holtwood for purposes of evaluating the effects of CU mitigation resources using OASIS. Accordingly, the February 2012 runs as reported in this report assume daily run-of-river operation at Safe Harbor and Holtwood (i.e., no hydro peaking) except when Holtwood is making CU releases or refilling after drawdown for CU releases.

Since model cutoff is shown not to affect flows upstream from Holtwood, the cutoff model was used for all February 2012 runs.

4. EVALUATION OF POTENTIAL CONSUMPTIVE USE MITIGATION ASSETS

PPL has made dozens of OASIS runs to test various combinations of different CU facilities, different CU mitigation resources and alternative possible trigger flows. Reported herein are the results of the “February 2012 runs” – a selected group of runs made or reviewed in February 2012. The February 2012 runs include combinations of the following options:

- Whether Cowanesque operates for SSES only, or for SSES and Montour, or for SSES, Montour and Three-Mile Island (“TMI”)
- Whether Whitney Point Lake operates for low flow augmentation
- Whether BBNPP is operational
- Alternative PPL CU mitigation trigger flows (TABLE 2)
- Whether PPL CU mitigation is provided; when it is, Rushton Mine and Holtwood are always assumed to provide mitigation.
 - Rushton provides 2.0 mgd.
 - Holtwood provides between 27.0 mgd and 36.3 mgd during the recreation season and 31.5 mgd during the post-recreation season; the basis for these values is discussed below.
- Whether the “West Branch” CU mitigation resource is operational in addition to Rushton and Holtwood; if so, the maximum CU mitigation release is 9.3 mgd; the basis for this value is discussed below.
- Alternative priorities of the sources of CU mitigation; Rushton is always first priority.

TABLE 5 is a “menu” of the February 2012 runs and the assumed options of each.

The assumed maximum amount of usable storage (mine void space) available at Rushton Mine is 565 acre-feet; this is the estimated volume between El. 1420 ft and El. 1380 ft. The assumed maximum CU “release” rate of 2.0 mgd is the rate of withdrawal that can be sustained for a period of 92 days.

The storage in Holtwood proposed to be dedicated to CU mitigation, in both the recreation and post-recreation seasons, is described in "Holtwood operation for PPL consumptive use mitigation" in Section 3.2. The maximum values of CU releases available from Holtwood CU mitigation storage depend upon the assumed PPL CU mitigation trigger flow.

Initial determination of the maximum possible available CU release values was made by working in Excel for selected drought years (1930 and 1961-1966) using as a basis the data from an OASIS run. In the Excel work, as in the OASIS modeling, it was assumed that the Holtwood CU storage can refill, to the extent possible according to flows, when (a) the Harrisburg flow exceeds the PPL trigger flow and (b) the inflow to Holtwood exceeds the Holtwood daily flow release requirement (98.7% of the lesser of the QFERC flow and the prior day flow at Marietta).

The Excel work indicated the following maximum possible Holtwood CU release rates:

PPL CU Trigger Flow	Maximum possible CU release during recreation season [year]	Maximum possible CU release during post-recreation season [year]
P95	28.1 mgd [1962]	35.4 mgd [1964]
Adjusted P95	38.6 mgd [1964]	35.4 mgd [1964]
Q7-10	109.7 mgd [1964]	82.6 mgd [1964]
August-October P95	38.6 mgd [1964]	55.0 mgd [1964]

Based on the Excel work and the PPL CU values, the initial maximum possible Holtwood CU releases selected for the alternative trigger flows were:

	Recreation season (mgd)	Post-recreation season (mgd)
July-November P95	27.0 [1]	31.5 = max need (September) with Rushton providing 2.0
Adjusted July-November P95	36.3 = max need (July) with Rushton providing 2.0	same as above
Q7-10	same as above	same as above
August-October P95	same as above	same as above

[1] Increased to 31.5 mgd in Run F-7A to provide 100 percent of CU mitigation need

However, in runs F-4B and F-4D, as discussed in Section 5, the 36.3 mgd recreation season maximum proved to result in excessive drawdown at Holtwood during the recreation season and was reduced to 29.6 mgd in those runs to constrain the drawdown to El. 167.50 ft.

The need for PPL storage in a "West Branch" resource was evaluated in the following manner. Run F-5A modeled operation of Rushton, Holtwood and West Branch, assuming a July-November P95 trigger flow (Harrisburg) and unlimited storage in West Branch. Holtwood was assumed to provide up to 27.0 mgd during the recreation season and up to 31.5 mgd during the post-recreation season. The priority of CU releases in Run F-5A was first Rushton, then Holtwood, and finally West Branch if and as needed. The maximum storage used in West Branch in Run F-5A was 1,383 acre-ft and the maximum CU release required was 9.3 mgd. These values were then accepted as the West Branch capability in Runs F-6A and F-7A, with

West Branch given priority over Holtwood in those runs to improve flows in the main stem of the river. In Run F-6A, some PPL CU remained un-mitigated. In Run F-7A, the maximum recreation season CU release from Holtwood was increased to 31.5 mgd, the maximum needed in September, and the total PPL need was met.

The results of the February 2012 runs are discussed in Section 5 and presented quantitatively in the referenced tables.

5. RESULTS AND CONCLUSIONS

In addition to the secondary result that use of a cutoff OASIS model is appropriate for evaluating the potential benefits of the PPL Asset Pool, the primary results of this study are presented to show:

- The effectiveness of PPL CU resources to meet PPL CU mitigation needs
- The effect of BBNPP CU on local river flows (at Danville) in the absence of upstream CU assets serving BBNPP
- The effect of PPL CU assets on main stem river flows

The key results are presented in TABLE 6 (a and b) through TABLE 12.

5.1 Effectiveness of PPL CU Mitigation Resources

For the runs simulating PPL CU mitigation releases, TABLES 6a and 6b present results in terms of the total annual CU (in million gallons) for which CU releases would be required and the respective amounts of this CU either mitigated or unmitigated during an average year and drought years 1930, 1962 and 1964. (The data for an "average" year are the average annual values for the entire model period.) These values are intended solely to suggest the relative effectiveness or adequacy of the Asset Pool resources represented by each run. When unmitigated CU is indicated, this value does not distinguish between insufficiency of CU releases on the days when (a) the combined rate of maximum allowable CU mitigation releases was less than the total net CU and (b) the available CU mitigation releases were limited due to depletion of storage in the CU mitigation resources.

It was assumed for purposes of the modeling that, when BBNPP is in service, CU releases (without regard to the source) would be applied to BBNPP CU first and to the CUs of the other PPL facilities second. As indicated in TABLE 6a and TABLE 6b, for a July-November P95 trigger flow, Rushton and Holtwood together suffice to satisfy the BBNPP CU need in all years for all runs. For runs F-4A, -4B and -4D, the CU of the existing facilities is only partially satisfied. The greatest deficiencies in runs F-4A, -4B and -4D occurred in 1962; this is because the drought in 1962 was most severe during the Holtwood recreation season, when Holtwood CU mitigation was relatively limited. To satisfy all PPL CU mitigation need in all years under a July-November P95 trigger flow, an adjusted July-November P95 trigger flow, or an August-October P95 trigger flow in all years, CU mitigation resources additional to Rushton and Holtwood would be needed, as is simulated in Run F-7A.

TABLE 7 presents the maximum and average Rushton and "West Branch" drawdown and minimum Holtwood lake levels in an average year and in selected drought years 1930, 1962 and 1964. Drawdown at Holtwood is maintained above the minimum recreation and post-recreation season levels respectively in all runs. In the July-November P95 runs (F-4A and F-7A), lake level is drawn down very close to the minimum recreation season level (El. 167.50 ft) in 1962. As explained below, there were violations of the minimum recreation season lake level in the initial runs F-4B and F-4D, which were subsequently revised to maintain the lake level above the minimum.

The fundamental reason for excessive Holtwood drawdowns in the initial runs F-4B and F-4D is that the initial maximum CU releases were determined by an Excel spreadsheet. Excel can manipulate data in a way that OASIS cannot. Specifically as pertains to this work, Excel can use "today's" flow at Harrisburg and "today's" inflow at Holtwood for comparison, respectively, with the PPL trigger flow and the required daily Holtwood release in order to determine whether a CU release is required or whether there is excess inflow that can be stored for refill. But OASIS determines "today's" Harrisburg flow and "today's" inflow at the same time (end of day) it determines the Holtwood outflow. Thus, for example, when "yesterday's" Harrisburg flow is lower than the PPL CU trigger flow but "today's" Harrisburg flow exceeds the trigger flow, OASIS will nevertheless call for a CU release "today." Further, if "today's" inflow is greater than the required daily flow but the perceived (programmed) inflow based on "yesterday's" Safe Harbor release is less than the required daily flow, OASIS will not allow "today's" excess flow to be used to refill the CU storage. On most days the OASIS and Excel analyses agree, but there can be differences during low flow periods on days when flows change significantly from one day to the next.

Consequently, Runs F-4B and F-4D were revised by reducing the maximum CU release to the largest release that would maintain the recreation season lake level above El. 167.50 ft at all times. The reduction was to 29.6 mgd from 36.3 mgd, and this left a small amount of non-BBNPP CU unmitigated.

5.2 Local Effect of BBNPP CU

TABLE 8, which compares low flow statistics at Danville from Runs F-3 and F-1, indicates that CU mitigation releases from Cowanesque Reservoir for Montour, SSES and TMI combined with low flow augmentation releases from Whitney Point Lake more than offset flow reductions due to potential BBNPP CU at very low flows. The flow improvements diminish at flows greater than P97 flows because the trigger flow for Cowanesque Reservoir releases is the Q7-10 flow at Wilkes-Barre for Montour SES and at Harrisburg for TMI. This suggests that Asset Pool resources to mitigate BBNPP CU need not be located upstream from BBNPP.

5.3 Main Stem River Flow Effects

The purpose of addressing "main stem" river flow effects (at Sunbury, Marietta and Harrisburg) is to indicate whether providing some or most new PPL CU mitigation at a downstream site

(Holtwood) might be detrimental to the river. The OASIS modeling provides gallon-for-gallon releases for PPL's CU on days required by the respective alternative trigger flows, so that the replacement of the CU is assured from a basin perspective and is not at issue.

The runs representing the several PPL CU mitigation resource scenarios are Runs F-4A, -4B, -4C, -4D and -7A. In TABLES 9 through 12 (for Sunbury, Harrisburg, Marietta and Holtwood outflow, respectively) the low flows exceeded 95% to 100% of the time during July through November in the CU mitigation runs are compared with the corresponding flows of a "base run." The selected "base run" for Sunbury and Harrisburg excludes the effects of CU makeup from Cowanesque Reservoir dedicated to downstream uses (TMI) and from the operation of Whitney Point Lake for low flow augmentation. The selected "base run" for Marietta and Holtwood excludes the effects from the operation of Whitney Point Lake for low flow augmentation.

In comparing flows among runs on the basis of low flow exceedances, it is recognized that comparisons of flows at a particular exceedance do not represent flow improvements or deficiencies on specific days (except where absolute minimum flows occur on the same day among different runs). Since the OASIS model period extends for 79 years, the number of low flow days is sufficient to give statistical meaning to the exceedances.

The effects on river flows at Danville were addressed in Section 5.2, above, with reference to TABLE 8, indicating that BBNPP CU flow impacts are more than offset at extreme low flows by flow improvements derived from the operation of Whitney Point and Cowanesque. Insofar as there is no currently proposed PPL CU mitigation resource upstream from Danville, further comparison of flows at Danville would not be meaningful.

Sunbury

Refer to TABLE 9 – July-November low flow exceedances at Sunbury for Runs F-2b, -4A, -4B, -4C, -4D and -7A.

The "base run" for comparison of the flow effects of PPL CU mitigation at Sunbury is Run F-2b; this run excludes the Cowanesque release for TMI and the low flow augmentation operation of Whitney Point. All PPL CU mitigation scenarios include BBNPP. In Runs F-4A, -4B, -4C and -4D, Rushton is the only new PPL CU resource providing CU mitigation releases upstream from Sunbury; these runs show July-November low flow improvements up to the 96% exceedance low flow. Run F-7A, which also includes PPL CU mitigation releases from the "West Branch" resource, shows low flow improvement through the 95% exceedance low flow.

Low flow improvements due to Curwensville Reservoir operation and to the in-basin transfer at Barnes & Tucker are effective in the "base run" and in all the PPL CU mitigation runs.

The data in TABLE 9 suggest that low flow augmentation from Whitney Point and from Cowanesque for TMI, plus PPL CU mitigation releases from Rushton, more than offsets the flow effect of BBNPP CU at Sunbury during extreme low flows.

Harrisburg

Refer to TABLE 10 – July-November low flow exceedances at Harrisburg for Runs F-2b, -4A, -4B, -4C, -4D and -7A.

The “base run” for comparison of the flow effects of PPL CU mitigation at Harrisburg is Run F-2b; this run excludes the Cowanesque release for TMI and the low flow augmentation operation of Whitney Point. All PPL CU mitigation scenarios include BBNPP. In Runs F-4A, -4B, -4C and -4D, Rushton is the only new PPL CU resource providing CU mitigation releases upstream from Harrisburg; these runs show July-November low flow improvements up to the 97% exceedance low flow. Run F-7A, which also includes PPL CU mitigation releases from the “West Branch” resource, shows low flow improvement through the 96% exceedance low flow. Low flow improvements due to operation of Raystown Lake and Curwensville Reservoir and to the in-basin transfer at Barnes & Tucker are effective in the “base run” and in all the PPL CU mitigation runs.

The data in TABLE 10 suggest that low flow augmentation from Whitney Point and from Cowanesque for TMI, plus PPL CU mitigation releases from Rushton, more than offsets the flow effect of BBNPP CU at Harrisburg during extreme low flows.

Marietta

Refer to TABLE 11 -- July-November low flow exceedances at Marietta for Runs F-2c, -4A, -4B, -4C, -4D and -7A.

The “base run” for comparison of the flow effects of PPL CU mitigation at Marietta is Run F-2c; this run excludes the low flow augmentation operation of Whitney Point. All PPL CU mitigation scenarios include BBNPP. In Runs F-4A, -4B, -4C and -4D, Rushton is the only new PPL CU resource providing CU mitigation releases upstream from Marietta; these runs indicate July-November low flows are slightly reduced, by approximately 10 cfs to 30 cfs or approximately one percent to two percent in the range of the 95% to 100% exceedance low flows. Only at the 98% exceedance low flow is no reduction evident. For Run F-7A, which also includes PPL CU mitigation releases from the “West Branch” resource, the low flow reductions are smaller, i.e., up to approximately 1.5 percent, with a 0.3 percent improvement at the 98% exceedance low flow. The differences between the results at Marietta and the results at Harrisburg reflect the absence of the TMI release from Cowanesque in the PPL CU mitigation runs.

Low flow improvements due to operation of Raystown Lake and Curwensville Reservoir and to the in-basin transfer at Barnes & Tucker are effective in the “base run” and in all the PPL CU mitigation runs. While not illustrated in runs provided in this report, flow releases from Raystown, Curwensville, and Barnes & Tucker would be expected to offset the flow effects of PPL CU at Marietta.

Any assessment of a potential small flow reduction at Marietta should take into account the local nature of the river.

Holtwood (outflow)

Refer to TABLE 12 -- July-November low flow exceedances at Holtwood for Runs F-2c, -4A, -4B, -4C, -4D and -7A.

The "base run" for comparison of the flow effects of PPL CU mitigation in the Holtwood outflow is Run F-2c; this run excludes the low flow augmentation operation of Whitney Point. All PPL CU mitigation scenarios include BBNPP. In Runs F-4A, -4B, -4C and -4D, Rushton and Holtwood provide CU mitigation releases effective at Holtwood; these runs indicate July-November low flows are generally increased, and the very lowest flows significantly increased (up to 2+ percent). For Run F-7A, which also includes PPL CU mitigation releases from the "West Branch" resource and satisfies all PPL CU mitigation needs, the low flow improvements increase from 16-20 cfs (0.5%-0.7%) at the 95%-96% exceedance low flow to 43-48 cfs (2.0%-2.5%) at the 99%-100% exceedance low flow. These increases represent potential improvements to low inflow to the Chesapeake Bay.

Low flow improvements due to operation of Raystown Lake and Curwensville Reservoir and to the in-basin transfer at Barnes & Tucker are effective in the "base run" and in all the PPL CU mitigation runs.



TABLES



TABLE 1. PPL CU values assumed in February 2012 runs. All values are assumed constant during a given month.

	SSES [285]		Montour [383]		BISES + Phoenix [485]		BBNPP [286]	Combined w/o BBNPP		Combined with BBNPP	
	Total mgd	Net mgd	Total mgd	Net mgd	Total mgd	Net mgd	Total mgd	Total mgd	Net mgd	Total mgd	Net mgd
Jan	32.94	0.00	14.61	0.00	9.27	1.17	17.82	56.82	1.17	74.64	18.99
Feb	33.19	0.00	14.72	0.00	9.33	1.23	17.93	57.24	1.23	75.17	19.16
Mar	35.40	0.00	15.68	0.00	11.62	3.52	19.23	62.70	3.52	81.93	22.75
Apr	38.10	0.00	16.87	0.00	13.26	5.16	20.90	68.23	5.16	89.13	26.06
May	40.98	0.98	18.15	1.15	14.86	6.76	22.46	73.99	8.89	96.45	31.35
Jun	42.39	2.39	18.77	1.77	16.13	8.03	23.29	77.29	12.19	100.58	35.48
Jul	43.41	3.41	19.23	2.23	16.86	8.76	23.86	79.50	14.40	103.36	38.26
Aug	42.93	2.93	19.02	2.02	16.66	8.56	23.57	78.61	13.51	102.18	37.08
Sep	41.61	1.61	18.42	1.42	15.71	7.61	22.79	75.74	10.64	98.53	33.43
Oct	39.26	0.00	17.38	0.38	13.58	5.48	21.41	70.22	5.86	91.63	27.27
Nov	36.64	0.00	16.23	0.00	12.12	4.02	19.95	64.99	4.02	84.94	23.97
Dec	34.12	0.00	15.13	0.00	9.42	1.32	18.48	58.67	1.32	77.15	19.80

The bracketed numbers indicate the respective node designations in the OASIS model.

TABLE 2. Alternative "trigger flows" at Harrisburg for PPL CU mitigation releases assumed in February 2012 runs

Month	P95 (cfs)	Adjusted P95 (cfs)	Q7-10 (cfs)	August-October P95 (cfs)
July	4,360	3,500	2,570	
August	3,500	3,500	2,570	3,500
September	2,980	2,980	2,570	2,980
October	3,120	3,120	2,570	3,120
November	4,100	3,120	2,570	

Values provided by the SRBC

TABLE 3. Listing of OCL files in SRBC and PPL OASIS runs

OCL file	Included in SRBC reference run? [1]	Implementation in PPL February 2012 evaluation runs
Aberdeen_ops	yes	Inactive (below Holtwood)
adjust_inflows	yes	modified – see discussion
baltimore_ops	yes	Inactive (below Holtwood)
channel_routing	yes	Unchanged
chester_ops	yes	Inactive (below Holtwood)
Conowingo_ops	yes	Inactive (below Holtwood)
constants_inc	yes	Unchanged
constants_table	yes	Unchanged
holtwood_ops	yes	modified – see discussion
lancaster_ops	yes	Unchanged
main	yes	modified to accommodate added OCL files
muddy_run	yes	Inactive (below Holtwood)
safe_harbor_ops	yes	Unchanged
SRBCstorage_ops	yes	modified – see discussion
substitutes	yes	Unchanged
undef_list	yes	modified to accommodate new variables
york_ops	yes	Unchanged
barnes_tucker	no	added – see discussion
CU_trigger	no	added – see discussion – but inactive in all evaluation runs; could be dropped
montour_ops	no	added – see discussion
PPL_CU_mitigation	no	added – see discussion
whitney_point	no	added – see discussion

[1] “_Automatic_QFERC+1000_updated_20110216”

TABLE 4. Comparison of PPL "preliminary" runs

	Run 1	Run 1C	Run 1P	Run 1PC
Cutoff below Holtwood?	No	Yes	No	Yes
Peaking at Safe Harbor and Holtwood?	No	No	Yes	Yes
Danville flows				
Mean (cfs)	15,562	15,562	15,562	15,562
90% exceedance (cfs)	1,966	1,966	1,966	1,966
95% exceedance (cfs)	1,445	1,445	1,445	1,445
99% exceedance (cfs)	939	939	939	939
Minimum (cfs)	524	524	524	524
Sunbury flows				
Mean (cfs)	26,781	26,781	26,781	26,781
90% exceedance (cfs)	3,454	3,454	3,454	3,454
95% exceedance (cfs)	2,534	2,534	2,534	2,534
99% exceedance (cfs)	1,687	1,687	1,687	1,687
Minimum (cfs)	1,023	1,023	1,023	1,023
Harrisburg flows				
Mean (cfs)	33,967	33,967	33,967	33,967
90% exceedance (cfs)	4,783	4,783	4,783	4,783
95% exceedance (cfs)	3,609	3,609	3,609	3,609
99% exceedance (cfs)	2,522	2,522	2,522	2,522
Minimum (cfs)	1,585	1,585	1,585	1,585
Holtwood flows (outflows)				
Mean (cfs)	38,110	38,110	38,108	38,108
90% exceedance (cfs)	5,454	5,454	4,309	4,085
95% exceedance (cfs)	4,017	4,017	1,251	1,189
99% exceedance (cfs)	2,663	2,664	495	490
Minimum (cfs)	1,681	1,679	490	490

TABLE 5. "Menu" of PPL February 2012 runs

	Runs [see NOTES, below]										
	F-1	F-2b	F-2c	F-3	F-4A	F-4B	F-4C	F-4D	F-5A	F-6A	F-7A
Cowaneseque operates for:											
SSES only	✓										
SSES and Montour		✓									
SSES, Montour, TMI			✓	✓	✓	✓	✓	✓	✓	✓	✓
Whitney Point flow augmentation				✓	✓	✓	✓	✓	✓	✓	✓
BBNPP					✓	✓	✓	✓	✓	✓	✓
PPL CU Mitigation											
Trigger flow (Harrisburg)					P95	Adjusted P95	Q7-10	Aug-Oct P95	P95	P95	P95
Resources (Asset Pool)											
Rushton Mine											
Available storage (acre-ft)					565	565	565	565	565	565	565
Maximum CU release (mgd)					2.0	2.0	2.0	2.0	2.0	2.0	2.0
Holtwood recreation season											
Available storage (acre-ft)					3,370	3,370	3,370	3,370	3,370	3,370	3,370
Maximum CU release (mgd)					27.0	29.6	36.3	29.6	27.0	27.0	31.5
Holtwood post-recreation season											
Available storage (acre-ft)					6,090	6,090	6,090	6,090	6,090	6,090	6,090
Maximum CU release (mgd)					31.5	31.5	31.5	31.5	31.5	31.5	31.5
West Branch storage											
Available storage (acre-ft)									Note	1,383	1,383
Maximum CU release (mgd)									Note	9.3	9.3
Priority of PPL CU mitigation					R,H	R,H	R,H	R,H	R,H,W	R,W,H	R,W,H

NOTES:

- All runs have model cut off below Holtwood
- All runs assume run-of-river operation at Safe Harbor and run-of-river operation at Holtwood except as required for CU mitigation
- All runs assume existing Curwensville operation plus Barnes & Tucker
- West Branch storage and CU release in Run F-5A were unlimited
- Holtwood recreation season maximum CU release (29.6 mgd) was initially selected to be 36.3 mgd
- R = Rushton; H = Holtwood; and, W = West Branch

TABLE 6a. Effectiveness of PPL CU Assets in meeting PPL CU mitigation needs in an average year and in 1930

Run [see TABLE 5 for all run parameters]	Run [see TABLE 5 for complete run parameters]				
	F-4A	F-4B	F-4C	F-4D	F-7A
PPL CU mitigation:					
Rushton (mgd)	2.0	2.0	2.0	2.0	2.0
West Branch (mgd)					9.3
Holtwood (rec season/post rec season mgd)	27.0/31.5	29.6/31.5	36.3/31.5	29.6/31.5	31.5/31.5
Average year					
CU release days	16.2	13.3	6.9	10.5	16.2
Net PPL CU subject to makeup (mg) [1]	542	447	224	355	542
BBNPP	366	304	158	242	366
Other PPL facilities	172	143	70	114	172
Net PPL CU made up (mg) [1]	462	407	224	326	542
BBNPP	366	304	158	242	366
Other PPL facilities	95	103	70	84	172
Percent net PPL CU made up	85	91	100	92	100
BBNPP	100	100	100	100	100
Other PPL facilities	55	72	100	74	100
1930					
CU release days	86	69	50	57	86
Net PPL CU subject to makeup (mg) [1]	2,593	2,186	1,535	1,898	2,593
BBNPP	1,875	1,536	1,100	1,296	1,875
Other PPL facilities	718	650	434	602	718
Net PPL CU made up (mg) [1]	2,338	2,027	1,535	1,739	2,593
BBNPP	1,875	1,536	1,100	1,296	1,875
Other PPL facilities	463	491	434	443	718
Percent net PPL CU made up	90	93	100	92	100
BBNPP	100	100	100	100	100
Other PPL facilities	64	76	100	74	100

[1] PPL total sometimes differs from sum of BBNPP and other facilities due to rounding of components

TABLE 6b. Effectiveness of PPL CU Assets in meeting PPL CU mitigation needs in 1962 and 1964

	Run [see TABLE 5 for complete run parameters]				
	F-4A	F-4B	F-4C	F-4D	F-7A
PPL CU mitigation:					
Rushton (mgd)	2.0	2.0	2.0	2.0	2.0
West Branch (mgd)					9.3
Holtwood (rec season/post rec season mgd)	27.0/31.5	29.6/31.5	36.3/31.5	29.6/31.5	31.5/31.5
1962					
CU release days	78	72	44	47	78
Net PPL CU subject to makeup (mg) [1]	2,830	2,601	1,552	1,644	2,830
BBNPP	1,826	1,683	1,020	1,087	1,826
Other PPL facilities	1,004	917	532	557	1,004
Net PPL CU made up (mg) [1]	2,320	2,299	1,552	1,509	2,830
BBNPP	1,826	1,683	1,020	1,087	1,826
Other PPL facilities	493	616	532	422	1,004
Percent net PPL CU made up	82	88	100	92	100
BBNPP	100	100	100	100	100
Other PPL facilities	49	67	100	76	100
1964					
CU release days	133	119	83	81	133
Net PPL CU subject to makeup (mg) [1]	4,221	3,686	2,429	2,603	4,221
BBNPP	2,961	2,627	1,796	1,822	2,961
Other PPL facilities	1,261	1,059	634	782	1,261
Net PPL CU made up (mg) [1]	3,741	3,460	2,429	2,457	4,221
BBNPP	2,961	2,627	1,796	1,822	2,961
Other PPL facilities	780	833	634	635	1,261
Percent net PPL CU made up	89	94	100	94	100
BBNPP	100	100	100	100	100
Other PPL facilities	62	79	100	81	100

[1] PPL total sometimes differs from sum of BBNPP and other facilities due to rounding of components

TABLE 7. Use of PPL Asset Pool resources

	Run [see TABLE 5 for complete run parameters]				
	F-4A	F-4B	F-4C	F-4D	F-7A
Rushton					
Average drawdown (ft)	0.5	0.4	0.1	0.2	0.5
Maximum drawdown (ft)	40.0	40.0	25.6	31.4	40.0
Date of maximum drawdown	9-Nov-64	20-Nov-64	26-Nov-64	31-Oct-64	9-Nov-64
Holtwood (Jul 1-Sep 15)					
Average lake level (ft)	168.77	168.77	168.77	168.77	168.77
Minimum lake level (ft)					
1930	167.62	167.50	167.89	167.50	167.72
1962	167.52	167.67	168.40	168.31	167.54
1964	167.81	167.71	167.98	167.71	167.86
Holtwood (Sep 16-Nov 30)					
Average lake level (ft)	167.49	167.49	167.49	167.49	167.49
Minimum lake level (ft)					
1930	166.71	167.00	167.09	167.00	166.82
1962	167.50	167.50	167.50	167.50	167.50
1964	165.80	165.83	166.35	166.56	165.81
West Branch storage					
Average drawdown (ac-ft)					54
Maximum drawdown (ac-ft)					1,383
Date of maximum drawdown					11-Nov-30 5-Sep-62 10-Sep-64

TABLE 8. July-November low flow exceedances at Danville, Run F-3 vs F-1.

Run [see TABLE 5 for complete run parameters]		F-1	F-3	F-3 v F-1
Cowanesque operates for:				
SSES only		✓		
SSES, Montour, TMI			✓	
Whitney Point flow augmentation			✓	
BBNPP			✓	
PPL CU Mitigation Sources (Asset Pool)		none	none	
Low flow at Danville (July-November):				
	% time exceeded	cfs	cfs	delta cfs
	95	1,109	1,108	-1
	96	1,051	1,051	0
	97	977	982	5
	98	904	912	8
	99	791	822	31
	100	524	544	20

TABLE 9. July-November low flow exceedances at Sunbury.

	Run [see TABLE 5 for complete run parameters]					
	F-2b	F-4A	F-4B	F-4C	F-4D	F-7A
Cowanesque operates for:						
SSES and Montour only	√					
SSES, Montour, TMI		√	√	√	√	√
Whitney Point flow augmentation		√	√	√	√	√
BBNPP		√	√	√	√	√
PPL CU Mitigation Sources (Asset Pool)	none	Rushton Holtwood	Rushton Holtwood	Rushton Holtwood	Rushton Holtwood	Rushton West Branch Holtwood
Low flow at Sunbury (July-November):						
95% exceedance (cfs)	1,978	1,975	1,974	1,973	1,974	1,979
96% exceedance (cfs)	1,858	1,857	1,857	1,856	1,856	1,868
97% exceedance (cfs)	1,764	1,768	1,768	1,768	1,768	1,771
98% exceedance (cfs)	1,650	1,650	1,650	1,650	1,650	1,659
99% exceedance (cfs)	1,456	1,466	1,466	1,466	1,466	1,477
100% exceedance (minimum, cfs)	1,037	1,078	1,078	1,076	1,078	1,087

TABLE 10. July-November low flow exceedances at Harrisburg.

	Run [see TABLE 5 for complete run parameters]					
	F-2b	F-4A	F-4B	F-4C	F-4D	F-7A
Cowanesque operates for:						
SSes and Montour only	√					
SSes, Montour, TMI		√	√	√	√	√
Whitney Point flow augmentation		√	√	√	√	√
BBNPP		√	√	√	√	√
PPL CU Mitigation Sources (Asset Pool)	None	Rushton Holtwood	Rushton Holtwood	Rushton Holtwood	Rushton Holtwood	Rushton West Branch Holtwood
Low flow at Harrisburg (July-November):						
95% exceedance (cfs)	2,870	2,856	2,856	2,855	2,854	2,863
96% exceedance (cfs)	2,748	2,745	2,745	2,744	2,744	2,753
97% exceedance (cfs)	2,635	2,638	2,638	2,637	2,637	2,649
98% exceedance (cfs)	2,482	2,487	2,487	2,488	2,487	2,497
99% exceedance (cfs)	2,247	2,255	2,256	2,257	2,254	2,268
100% exceedance (minimum, cfs)	1,599	1,603	1,602	1,603	1,596 [see note]	1,604

Note. The minimum flow in run F-4D occurred in November 1963 and reflects the refilling of Rushton following the end of the CU mitigation season in this run.

TABLE 11. July-November low flow exceedances at Marietta.

	Run [see TABLE 5 for complete run parameters]					
	F-2c	F-4A	F-4B	F-4C	F-4D	F-7A
Cowanesque operates for:						
SSes, Montour, TMI	✓	✓	✓	✓	✓	✓
Whitney Point flow augmentation		✓	✓	✓	✓	✓
BBNPP		✓	✓	✓	✓	✓
PPL CU Mitigation Sources (Asset Pool)	None	Rushton Holtwood	Rushton Holtwood	Rushton Holtwood	Rushton Holtwood	Rushton West Branch Holtwood
Low flow at Marietta (July-November):						
95% exceedance (cfs)	3,095	3,085	3,085	3,086	3,085	3,089
96% exceedance (cfs)	2,932	2,920	2,919	2,921	2,917	2,929
97% exceedance (cfs)	2,813	2,795	2,795	2,796	2,793	2,805
98% exceedance (cfs)	2,634	2,634	2,635	2,633	2,634	2,643
99% exceedance (cfs)	2,402	2,395	2,395	2,397	2,395	2,400
100% exceedance (minimum, cfs)	1,775	1,744	1,743	1,744	1,737 [see note]	1,757

Note. The minimum flow in run F-4D occurred in November 1963 and reflects the refilling of Rushton following the end of the CU mitigation season in this run.

TABLE 12. July-November low flow exceedances at Holtwood (outflow).

	Run [see TABLE 5 for complete run parameters]					
	F-2c	F-4A	F-4B	F-4C	F-4D	F-7A
Cowanesque operates for:						
SSes, Montour, TMI	✓	✓	✓	✓	✓	✓
Whitney Point flow augmentation		✓	✓	✓	✓	✓
BBNPP		✓	✓	✓	✓	✓
PPL CU Mitigation Sources (Asset Pool)	None	Rushton Holtwood	Rushton Holtwood	Rushton Holtwood	Rushton Holtwood	Rushton West Branch Holtwood
Low flow at Holtwood (July-November):						
95% exceedance (cfs)	3,086	3,103	3,102	3,081	3,091	3,107
96% exceedance (cfs)	2,938	2,955	2,955	2,935	2,943	2,954
97% exceedance (cfs)	2,782	2,810	2,812	2,806	2,805	2,815
98% exceedance (cfs)	2,626	2,654	2,658	2,656	2,639	2,659
99% exceedance (cfs)	2,304	2,350	2,352	2,353	2,347	2,352
100% exceedance (minimum, cfs)	1,717	1,743	1,747	1,749	1,747	1,750

ATTACHMENT 3

Disc of OASIS Input and Output files – March 7, 2012 Report Runs

Attachment 3 is located in the hard copy folder of correspondence PPL-2012-076 on disc.