Appendix I1:
QA by PADEP on University's TGD-563-2000-655 Sampling Protocol

Pennsylvania Department of Environmental Protection

Division of Water Quality Standards

Benthic Macroinvertebrate Field sampling QA audit form:

Name: Keith Garmire

Date: April 25, 2013

Location: Blockhouse Run

Station ID: BSW23 (Lat. 39.773555 Long. -80.34321)

Type of Stream Sampled: Freestone **Low-gradient** **Limestone**

Is stream reach appropriate for sampling? **Yes** **No**

The sampling reach collected was a monitoring station used by CONSOL Coal Co. to determine if mining affected the use of Blockhouse Run within this mining panel. As part of the Act 54 five year studies this monitoring sampling point was being sampled to determine if the sampling protocol were being met.

Is sample reach representative of the stream segment? **Yes** **No**

The stream sampling segment (100 meters) was mapped prior to sampling. The reach had the five habitats needed to meet the requirements of the Surface Water Protection (563-2000-655) - Underground Bituminous Coal Mining Operations (Protocol).

Were field parameters (water temperature, specific conductance, pH, dissolved oxygen, alkalinity, turbidity, etc.) collected and recorded appropriately. **Yes** **No**

Were water chemistry samples collected? If yes, PA DEP BOL# = _____; SAC =_____

Not Collected	Yes	No

Were manual flows measurements taken? If yes, meter manufacturer/model = _____

Not Taken	Yes	No

Is there a variety of flow/depth regimes being sampled? Yes No

The stream segments lower portion had a small mining induced pool with the middle and upper portions of the sampling segment was a normal riffle, run, pool configuration. Samples collected: (2) CPOM, (2) Vegetation, (2) Snags, (2) Cobble / Gravel, and (2) Silt / Sands; equaling 10 total samples required by Surface Water Protection (563-2000-655) - Underground Bituminous Coal Mining Operations (Protocol).

Is the kick duration between 45 and 60 seconds? Yes No

Kick duration was between 45 and 60 seconds with substrate thoroughly disturbed.

Is an appropriate area (100 cm x 100 cm) being disturbed for each kick? Yes No

Yes, 100 cm X 100 cm area was properly disturbed.

Is net being emptied after each kick in order to minimize clogging / back wash?

Yes **No**

The D-frame net was emptied after each kick cycle. No clogging or backwash was observed.

Are samples being composited carefully to avoid loss of material? **Yes** **No**

The D-frame net was being cleaned and the debris was being transferred to a sample container with a bucket and sieve.

Are sample bottles being labeled clearly and properly? **Yes** **No**

Sample bottles were labeled properly.

Are nets and sieves checked carefully for bugs prior to cleaning? **Yes** **No**

The D-frame and Sieves were examined very carefully after each kick.

Is habitat assessment conducted after careful observation and walking of sample reach?

Yes **No**

A habitat assessment was conducted after careful observation, mapping and walking the sampling reach.

Is investigator meeting QA requirements? **Yes** **No**

Comments/Recommendations:

Sampling procedure was performed according to the Surface Water Protection (563-2000-655) - Underground Bituminous Coal Mining Operations (Protocol), completed all necessary tasks to meet QA requirements: I recommend that Keith Garmire consider collecting water chemistry samples when collecting macroinvertebrate samples if the Act 54 contract permits. I also recommend checking D.O. calibrations against the D.O. chart available @ http://water.usgs.gov/owq/FieldManual/.

Reviewer: Joel C. Folman **Employee:** Keith Garmire

Signature: Joel C Folman 5/2/2013 **Signature:** Keith M Garmire

Pennsylvania Department of Environmental Protection

Division of Water Quality Standards

Benthic Macroinvertebrate Field sampling QA audit form:

Name: ~~Alison Hale PhD~~

Date: April 30, 2013

Location: Maple Run

Station ID: MR-4 (Lat. 39.82312 Long. -80.24027)

Type of Stream Sampled: **Freestone** **Low-gradient** **Limestone**

Is stream reach appropriate for sampling? **Yes** **No**

The sampling reach collected was a monitoring station used by Alpha / Cumberland Mine to determine if mining affected the use of Maple Run within this mining panel. As part of the Act 54 five year studies this monitoring sampling point was being sampled to determine if the sampling protocol were being met.

Is sample reach representative of the stream segment? **Yes** **No**

The stream sampling segment (100 meters) was mapped prior to sampling. The reach had the five habitats needed to meet the requirements of the Surface Water Protection (563-2000-655) - Underground Bituminous Coal Mining Operations (Protocol).

Were field parameters (water temperature, specific conductance, pH, dissolved oxygen, alkalinity, turbidity, etc.) collected and recorded appropriately. **Yes** **No**

Were water chemistry samples collected? If yes, PA DEP BOL# = _____; SAC =_____

Not Collected **Yes** **No**

Were manual flows measurements taken? If yes, meter manufacturer/model = _____

Not Taken **Yes** **No**

Is there a variety of flow/depth regimes being sampled? **Yes** **No**

The stream segment is located in a small 2 order stream channel, the sampling segment was a normal riffle, run, pool configuration. Samples collected: (1) CPOM, (2) Vegetation, (2) Snags, (3) Cobble / Gravel, and (2) Silt / Sands; equaling 10 total samples required by Surface Water Protection (563-2000-655) - Underground Bituminous Coal Mining Operations (Protocol).

Is the kick duration between 45 and 60 seconds? **Yes** **No**

Kick duration was between 45 and 60 seconds with substrate thoroughly disturbed.

Is an appropriate area (100 cm x 100 cm) being disturbed for each kick? **Yes** **No**

Yes, 100 cm X 100 cm area was properly disturbed.

Is net being emptied after each kick in order to minimize clogging / back wash?

Yes **No**

The D-frame net was emptied after each kick cycle. No clogging or backwash was observed.

Are samples being composited carefully to avoid loss of material? **Yes** **No**

The D-frame net was being cleaned and the debris was being transferred to a sample container with a bucket and sieve.

Are sample bottles being labeled clearly and properly? **Yes** **No**

Sample bottles were labeled properly.

Are nets and sieves checked carefully for bugs prior to cleaning? **Yes** **No**

The D-frame and Sieves were examined very carefully after each kick.

Is habitat assessment conducted after careful observation and walking of sample reach?

Yes **No**

A habitat assessment was conducted after careful observation, mapping and walking the sampling reach.

Is investigator meeting QA requirements? **Yes** **No**

Comments/Recommendations:

Sampling procedure was performed according to the Surface Water Protection (563-2000-655) - Underground Bituminous Coal Mining Operations (Protocol), completed all necessary tasks to meet QA requirements: I recommend that Alison Hale PhD consider collecting water chemistry samples when collecting macroinvertebrate samples if the Act 54 contract permits. I also recommend checking D.O. calibrations against the D.O. chart available @ http://water.usgs.gov/owq/FieldManual/.

Reviewer: Joel C. Folman **Employee:** Alison Hale PhD

Signature: Joel C. Folman 5/2/2013 **Signature:** Alison Hale, PhD

Pennsylvania Department of Environmental Protection

Division of Water Quality Standards

Benthic Macroinvertebrate Field sampling QA audit form

Name: Tom Hann

Date: 3/29/2013

Location: UNT 40944 to Crafts Creek

Station ID: BSW13 (Lat. 40.05639 Long. -80.355253)

Type of Stream Sampled: Freestone Low-gradient Limestone

Is stream reach appropriate for sampling? Yes No

The sampling reach collected was a monitoring station used by CONSOL Coal Co. to determine if mining affected the use of this tributary 40944 to Crafts Creek. As part of the Act 54 five year studies this monitoring sampling point was being sampled to determine if the sampling protocol was being met.

Is sample reach representative of the stream segment? Yes No

The sampling stream segment (100 meter) was mapped prior to sampling. The reach had the five habitats needed to meet the requirements of the Surface Water Protection (563-2000-655)-Underground Bituminous Coal Mining Operations (protocol).

Were field parameters (water temperature, specific conductance, pH, dissolved oxygen, alkalinity, turbidity, etc.) collected and recorded appropriately. Yes No

Were water chemistry samples collected? If yes, PA DEP BOL# = _____; SAC = _____

Not Collected Yes No

Were manual flows measurements taken? If yes, meter manufacturer/model = _____

Not Taken Yes No

Is there a variety of flow/depth regimes being sampled? Other Yes No

Samples collected: (2) Cobble /Gravel, (2) Silt/Sand, (2) Vegetation, (2) Snags and (2) CPOM; equaling 10 total samples required by Surface Water Protection (563-2000-655)-Underground Bituminous Coal Mining Operations (protocol).

Is the kick duration between 45 and 60 seconds? Yes No

Kick duration was between 45 and 60 seconds with substrate thoroughly disturbed.

Is an appropriate area (100 cm x 100 cm) being disturbed for each kick? Yes No

Yes, 100 cm X 100 cm area was properly disturbed.

Is net being emptied after each kick in order to minimize clogging / back wash?

Yes No

The D-frame net was emptied after each kick cycle. No clogging or back wash was observed.

Are samples being composited carefully to avoid loss of material? Yes No

The D-Frame net was being cleaned and the debris was being transferred to a sample container with a bucket and sieve.

Are sample bottles being labeled clearly and properly? Yes No

Sample bottles were labeled properly.

Are nets and sieves checked carefully for bugs prior to cleaning? Yes No

The D-Frame was examined very carefully after each kick.

Is habitat assessment conducted after careful observation and walking of sample reach?

Yes No

A habitat assessment was conducted after careful observation, mapping and walking the sample reach.

Is investigator meeting QA requirements? Yes No

Comments/Recommendations:

Sampling procedure was performed according to the Surface Water Protection protocol (563-2000-655). Tom Hann completed all necessary tasks to meet QA requirements; I recommend that Tom Hann consider collecting water chemistry samples when collecting macroinvertebrate samples if the Act 54 contract permits.

Reviewer: Joel C. Folman **Employee:** Tom Hann

Signature: [signature] 4/1/2013 **Signature:** [signature]

Pennsylvania Department of Environmental Protection

Division of Water Quality Standards

Benthic Macroinvertebrate Field sampling QA audit form

Name: Grace Noble

Date: 4/5/2013

Location: Crafts Creek

Station ID: BSW20 (Lat. 40° 3.3569' Long. -80° 20.1215)

Type of Stream Sampled: Freestone **Low-gradient** Limestone

Is stream reach appropriate for sampling? **Yes** No

The sampling reach collected was a monitoring station used by CONSOL Coal Co. to determine if mining affected the use of Crafts Creek. As part of the Act 54 five year studies this monitoring sampling point was being sampled to determine if the sampling protocol were being met.

Is sample reach representative of the stream segment? **Yes** No

The sampling stream segment (100 meter) was mapped prior to sampling. The reach had the five habitats needed to meet the requirements of the Surface Water Protection (563-2000-655)- Underground Bituminous Coal Mining Operations (protocol).

Were field parameters (water temperature, specific conductance, pH, dissolved oxygen, alkalinity, turbidity, etc.) collected and recorded appropriately. Yes **No**

Were water chemistry samples collected? If yes, PA DEP BOL# = _____; SAC = _____

Not Collected Yes No

Were manual flows measurements taken? If yes, meter manufacturer/model = _____

Not Taken Yes No

Is there a variety of flow/depth regimes being sampled? Other__ Yes No

Samples collected: (2) Cobble /Gravel, (2) Silt/Sand, (2) Vegetation, (2) Snags and (2) CPOM; equaling 10 total samples required by Surface Water Protection (563-2000-655)-Underground Bituminous Coal Mining Operations (protocol).

Is the kick duration between 45 and 60 seconds? Yes No

Kick duration was between 45 and 60 seconds with substrate thoroughly disturbed.

Is an appropriate area (100 cm x 100 cm) being disturbed for each kick? Yes No

Yes, 100 cm X 100 cm area was properly disturbed.

Is net being emptied after each kick in order to minimize clogging / back wash?

Yes No

The D-frame net was emptied after each kick cycle. No clogging or back wash was observed.

Are samples being composited carefully to avoid loss of material? Yes No

The D-Frame net was being cleaned and the debris was being transferred to a sample container with a bucket and sieve.

Are sample bottles being labeled clearly and properly? Yes No

Sample bottles were labeled properly.

Are nets and sieves checked carefully for bugs prior to cleaning? Yes No

The D-Frame and Sieves were examined very carefully after each kick.

Is habitat assessment conducted after careful observation and walking of sample reach?

Yes No

A habitat assessment was conducted after careful observation, mapping and walking the sample reach.

Is investigator meeting QA requirements? Yes No

Comments/Recommendations:

Sampling procedure was performed according to the Surface Water Protection protocol (563-2000-655). Grace Noble completed all necessary tasks to meet QA requirements; I recommend that Grace Noble consider collecting water chemistry samples and flow measurements when collecting macroinvertebrate samples if the Act 54 contract permits.

Grace Noble was reminded that in cobble /gravel habitats that using her toe and heal to dig and agitate the substrate is very important when collecting this habitat.

Reviewer: Joel Q. Folman Employee: Grace Noble

Signature: 4/8/2013 Signature:

Appendix I2:
QA by PADEP on University's Macroinvertebrate Identification

FORM 8.8C: QUANTITATIVE MULTI-HABITAT BIOASSESSMENT OF DIVERSE COMMUNITY

Mine Name: Blacksville #2
Stream Name: Roberts Run, 41813, BSW22
Stream NHD#:
Sample Date: 4/25/2013
Pre-Mining Sampling Survey: 1 or 2 (check one)
Post-Mining Sampling Survey: X1 or 2 (check one)
Length of Sampled Reach: 100 meters
Sampler(s): A. Hale, K. Garmire
Comments:

Starting Lat/Long: 39.77194°/ -80.36198°
Ending Lat/Long: 39.77248°/ -80.36292°

Composite of 10 jabs from 10 sampling locations that effectively represents the observed habitats

	Number of jabs
Cobble / Gravel Substrate	3
Snag	2
Coarse Particulate Organic Matter	2
Submerged Aquatic Vegetation	0
Sand / Fine Sediment	3

Enter the number of individuals for each Genus identified in lab. (F = Family / G = Genus)

Class or Order: Voltine Status (M) Multi, (U) uni, (S) semi	Family: Voltine Status (M) Multi, (U) uni, (S) semi	Genus:	Functional Feeding Group	Pollution Tolerance Value	Sub. 1 - 4 F	Sub. 1 - 4 G	Sub. ___ F	Sub. ___ G	Sub. ___ F	Sub. ___ G	Sub. ___ F	Sub. ___ G
Ephemeroptera	Ameletidae	Ameletus	CG	0	OK	2						
Ephemeroptera	Baetidae	Baetis	CG	6	3	~~5~~					2	
Ephemeroptera	Baetidae	Acentrella	SC	4	OK	2						
Ephemeroptera	Ephemerellidae	Ephemerella	CG	1	OK	5						
Ephemeroptera	Ephemerellidae	Eurylophella	SC	4	OK	3						
Plecoptera	Chloroperlidae	Sweltsa	PR	0	OK	1						
Plecoptera	Perlodidae	Diploperla	PR	2	OK	3						
Plecoptera	Perlodidae	Isoperla	PR	2	OK	49						
Plecoptera	Nemouridae	Amphinemura	SH	3	31	~~30~~						
Trichoptera	Hydropsychidae	Diplectrona	FC	0	OK	2						
Trichoptera	Lepidostomatidae	Lepidostoma	SH	1	OK	1						
Trichoptera	Limnephilidae	Pychnopsyche	SH	4	OK	3						
Trichoptera	Rhyacophilidae	Rhyacophila	PR	1	OK	1						
Trichoptera	Uenoidae	Neophylax	SC	3	OK	2						
Megaloptera	Sialidae	Sialis	PR	6	OK	2						
Coleoptera	Elmidae	Optioservus	SC	4	OK	1						
Coleoptera	Psephenidae	Ectopria	SC	5	OK	1						
Diptera	Stratiomyidae	Caloparyphus	CG	8	OK	1						
Diptera	Tabanidae	Chrysops	PI	7	OK	2						
Diptera	Tipulidae	Pilaria	PR	7	1	~~3~~						
Diptera	Tipulidae	Tipula	SH	4	OK	4						
Diptera	Chironomidae		CG	6	57	OK						
Decapoda	Cambaridae	Cambarus	CG	6	1							
		Total Number of Individuals:			58	123						

Diphetor

Pseudolimnophila 2

Lab sub-sample 1-4 (200 +/- 20%)
(Continue to sub-sample if numbers are <160 or >240.)

2nd bottle
Isoperla 3
Leuctra 3

2 pupae
1 exuvia
1 adult stonefly
} Do NOT Count

FORM 8.8C: QUANTITATIVE MULTI-HABITAT BIOASSESSMENT OF DIVERSE COMMUNITY

Mine Name: Enlow Fork Mine

Stream Name: UNT to Templeton Fork, 32740

Stream NHD#:

Sample Date: 5/9/2013

Pre-Mining Sampling Survey: 1 or 2 (check one)

Post-Mining Sampling Survey: 1 or X2 (check one)

Length of Sampled Reach: 100 meters

Sampler(s): A. Hale, G. Noble, K. Piper, L. Kiefer

Comments:

Starting Lat/Long: 40.05283°/ -80.389657°

Ending Lat/Long: 40.053718°/ -80.389913°

Composite of 10 jabs from 10 sampling locations that effectively represents the observed habitats

	Number of jabs
Cobble / Gravel Substrate	3
Snag	1
Coarse Particulate Organic Matter	2
Submerged Aquatic Vegetation	2
Sand / Fine Sediment	2

Class or Order: Voltine Status (M) Multi, (U) uni, (S) semi	Family: Voltine Status (M) Multi, (U) uni, (S) semi	Genus:	Functional Feeding Group	Pollution Tolerance Value	Enter the number of individuals for each Genus identified in lab. (F = Family / G = Genus) Sub. 1 - 4 F	Sub. 1 - 4 G	Sub. ___ F	Sub. ___ G	Sub. ___ F	Sub. ___ G	Sub. ___ F	Sub. ___ G
Ephemeroptera	Ameletidae	Ameletus	CG	0	OK	10						
Ephemeroptera	Baetidae	Baetis	CG	6	OK	18						
Ephemeroptera	Baetidae	Centroptilium	CG	2	OK	1						
Ephemeroptera	Siphlonuridae	Siphlonurus	CG	7	OK	1						
Ephemeroptera	Ephemerellidae	Eurylophella	SC	4	OK	1						
Plecoptera	Chloroperlidae	Haploperla	PR	0	OK	1						
Plecoptera	Nemouridae	Amphinemura	SH	3	OK	28						
Plecoptera	Perlodidae	Isoperla	PR	2	OK	36						
Plecoptera	Perlidae	Perlesta	PR	4	OK	3						
Plecoptera	Leuctridae	Leuctra	SH	0	OK	2						
Trichoptera	Rhyacophilidae	Rhyacophila	PR	1	OK	3						
Trichoptera	Hydropsychidae	Diplectrona	FC	0	OK	4						
Trichoptera	Hydroptilidae	Ochrotrichia	SC	4	OK	2						
Trichoptera	Glossomatidae	Agapetus	SC	0	OK	2						
Trichoptera	Uenoidae	Neophylax	SC	3	OK	1						
Coleoptera	Elmidae	Optioservus	SC	4	OK	1						
Coleoptera	Elmidae	Stenelmis	SC	5	OK	1						
Coleoptera	Psephenidae	Psephenus	SC	4	OK	1						
Diptera	Tipulidae	Tipula	SH	4	OK	1						
Diptera	Tipulidae	Hexatoma	PR	2	OK	2						
Diptera	Tipulidae	~~Pilaria~~	PR	7		3	Pseudolimnophila					
Diptera	Ephydridae	~~Scatella~~	CG	6		2	Only key to Family					
Diptera	Ceratopogonidae		PR	6	8	OK						
Diptera	Chironomidae		CG	6	53	OK						
Decapoda	Cambaridae	Cambarus	CG	6	3							
Oligochaeta			CG	10	6	OK						
		Total Number of Individuals:			70	122						

Lab sub-sample 1-4 (200 +/- 20%) (Continue to sub-sample if numbers are <160 or >240.)