MEMORANDUM

Subject: Spanish Needle Creek near Carlinville, Illinois
(Macoupin County)
To: Brian Koch, DWPC, Water Quality Standards Section, Springfield
From: Jim Hefley, DWPC, SWS, Springfield RO
Date: April 4, 2011

On September 28, 2010 the author and Matt Short of the Springfield Surface Water Section, met with Brian Koch of the Springfield Water Quality Standards Section for the purpose of conducting a special stream survey on Spanish Needle Creek, approximately four miles south of Carlinville. The survey was performed to evaluate aquatic conditions in the vicinity of Shay Mine. Three stations were sampled on Spanish Needle Creek in order to evaluate aquatic conditions upstream and downstream from the area of concern (Table 3). Conditions in the vicinity of and downstream from the mine were compared to those of a control or background location using habitat, water chemistry and macroinvertebrate populations.

The control or background station (DAZL-SM-A1) was located upstream from the Shay Mine area and was characterized as a run bordered by a wooded riparian corridor. Substrate consisted of a sand and gravel matrix with areas of exposed claypan and leaf litter. Station DAZL-SM-C1 was located adjacent to Shay Mine and was characterized as a run with shallow riffle patches. This reach was bordered by a wooded riparian corridor. Substrate consisted primarily of bedrock with areas of sand and gravel deposition and leaf litter. Station DAZL-SM-C2 was located approximately 0.3 mile upstream from Macoupin Creek and was characterized with pool / run sequences and a wooded riparian corridor. Substrate consisted of a sand and gravel matrix. Brush was a common cover here as well.

A calculated macroinvertebrate biotic index (MBI) value of 4.82 was recorded for the background station which indicated good aquatic conditions and no apparent stream impairment. A value of 5.07 was recorded at the C1 station which also indicated good aquatic conditions and no apparent stream impairment (Table 1). A visual inspection of available habitat at station C2 revealed abundant populations of intolerant taxa of Ephemeroptera, Trichoptera and Odonata, indicating good aquatic conditions for Spanish Needle Creek upstream from the Macoupin Creek confluence. Fish were observed at all stations sampled. General use water quality standards were met for the reported parameters at the time of this survey (Table 2).

Attachments: Map
Tables

Cc: Bob Mosher, DWPC, WQS manager
CMU files

Figure 1. Locations of stations sampled on Spanish Needle Creek in the vicinity of Shay Mine, 2010.

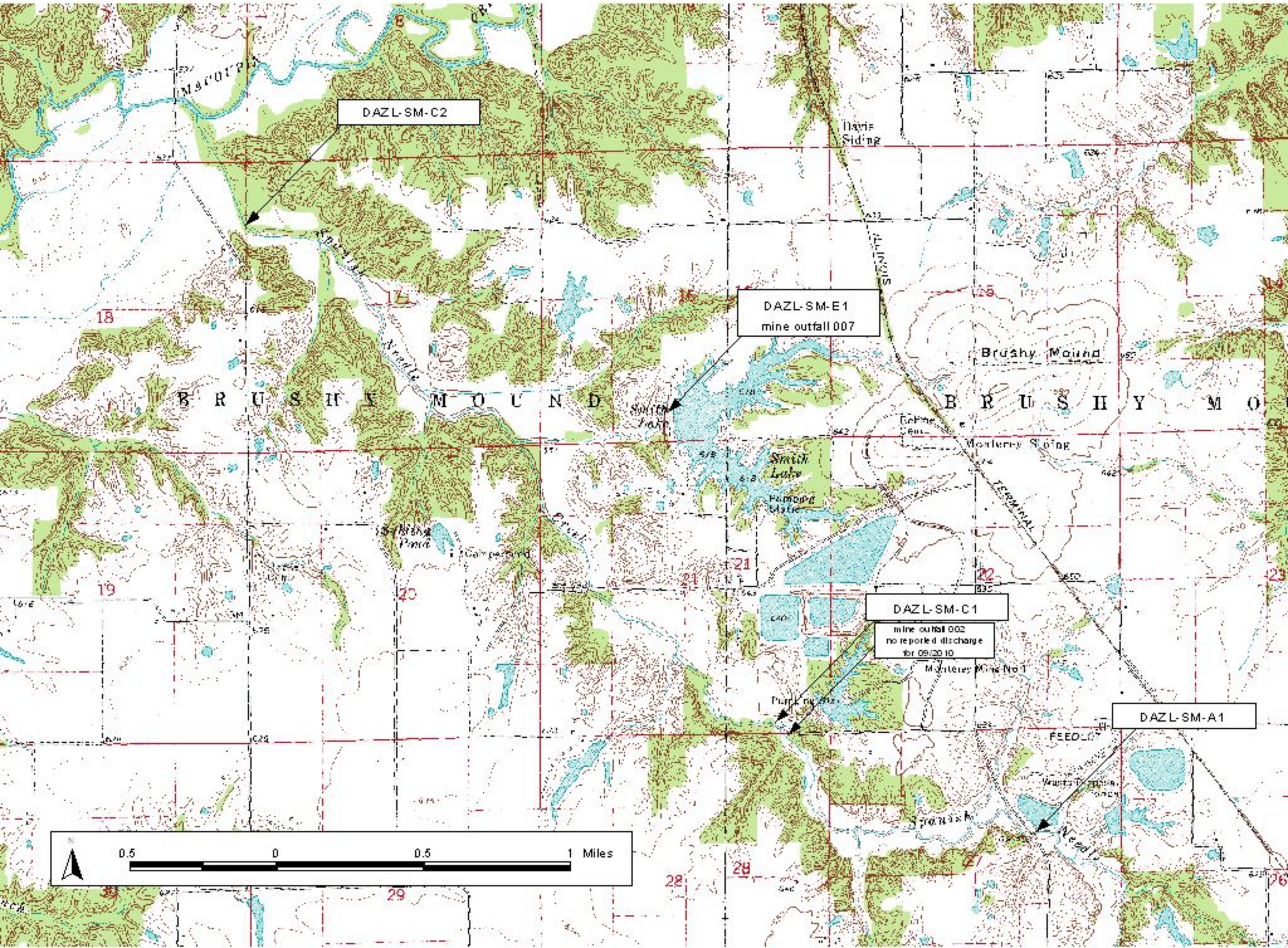

Table 1. Macroinvertebrate data from stations sampled on Spanish Needle Creek in the vicinity of Shay Mines, 2010.

TAXON	TOLERANCE RATING	DAZL-SM-A1 9/28/2010	DAZL-SM-C1 9/28/2010
Plecoptera	1.5		
Aeshnidae	3.0	1	1
Isonychiidae	3.0		
Corydalidae	3.0		
Calopterygidae	3.5	35	41
Trichoptera (Non-Hydropsychidae)	3.5		
Heptageniidae	3.5	18	9
Sialidae	4.0		
Hyalellidae	4.0	16	2
Baetidae	4.0	12	14
Dryopidae	4.0	1	4
Potamanthidae	4.0		
Tipulidae	4.0		
Corbiculidae	4.0		
Gomphidae	4.5	2	1
Ephemeridae	5.0		
Cambaridae	5.0	3	1
Ceratopogonidae	5.0		
Elmidae	5.0	2	13
Libellulide/Cordulidae	5.0	5	3
Sphaeriidae	5.0		
Caenidae or Tricorythidae	5.5	1	9
Coenagrionidae	5.5	59	13
Hydropsychidae	5.5	16	10
Asellidae	6.0		
Chironomidae (Non-Chironomus)	6.0	3	8
Simuliidae	6.0		
Turbellaria	6.0		
Hydrobiidae	6.0		
Pleuroceridae	6.0		
Planorbidae	6.5		
Scirtidae (larvae only)	7.0		1
Lymnaeidae	7.0		
Ancylidae (Ferrissia sp.)	7.0		
Tabanidae	7.0		
Culicidae	8.0		
Erpobdellidae	8.0	2	
Glossiphoniidae	8.0		
Muscidae	8.0		
Physidae	9.0	5	19
Stratiomyidae	10.0		
Oligochaeta	10.0		
Red Chironomidae (blood midge)	11.0	2	1
TOTAL ABUNDANCE		183	150
TAXA RICHNESS		17	17
MBI		4.82	5.07

Table 2. Water chemistry data from discharges and stations sampled on Spanish Needle Creek in the vicinity of Shay Mines, 2010.

PARAMETER	DAZL-SM-A1		DAZL-SM-E1		DAZL-SM-C1		DAZL-SM-C2	
	9/28/2010		9/28/2010		9/28/2010		9/28/2010	
Field Air Temp., Deg. C.	15.0		18.0		17.0		21.0	
Field Water Temp., Deg. C.	12.8		19.8		15.6		15.2	
Field pH, units	7.7		7.9		7.9		7.9	
Field Dissolved Oxygen, mg/l	8.3		5.8		9.5		9.1	
Field % D.O. saturation	79.3		65.5		97.7		92.4	
Field Conductivity, umhos/cm	464		1377		910		808	
Turbidity,	5.5		5.0		13.0		NA	
BOD, mg/l	ND		ND		ND		ND	
carb BOD, mg/l	ND		ND		ND		ND	
Solids, Total Suspended (TSS), mg/l	ND		5.0		29.0		12.0	
Solids, suspended, volatile, mg/l	4.0		5.0		7.0		6.0	
T. Chloride, mg/l	16.4		204.0		60.2		54.5	
T. Carbon, organic, mg/l	7.35		5.51		6.76		5.79	
T. Nitrogen, NO2+NO3 as N, mg/l	0.22		ND		0.20		0.20	
T. Sulfate, mg/l	34.6		263.0		148.0		103.0	
T. Nitrogen, ammonia as N, mg/l	ND		0.03	J	0.05	J	ND	
T. Nitrogen, Kjeldahl, mg/l	0.655		1.02		0.646		0.545	
T. Phosphorus as P, mg/l	0.357		0.028		0.341		0.262	
T. Aluminum, ug/l	115.0	J,V	48.0	J	456.0	J,V	331.0	J,V
T. Arsenic, ug/l	3.05		ND		4.38		3.42	
T. Barium, ug/l	85.8		42.3		87.7		91.8	
T. Beryllium, ug/l	0.31	J	0.63	J	0.45	J	0.49	J
T. Boron, ug/l	44.1	V	455.0		87.6	V	100	V
T. Cadmium, ug/l	ND		ND		ND		ND	
T. Calcium, ug/l	55100		44400		71800		80700	
T. Chromium, ug/l	ND		ND		ND		ND	
T. Cobalt, ug/l	ND		ND		ND		ND	
T. Copper, ug/l	2.07	J	ND		1.62	J	1.89	J
T. Iron, ug/l	395		64		665		549	
T. Lead, ug/l	ND		1.47	J	0.88	J	1.12	J
T. Magnesium, ug/l	19200		17800		24300		28700	
T. Manganese, ug/l	135		170		179		370	
T. Nickel, ug/l	2.74	J	1.02	J	2.86	J	2.63	J
T. Potassium, ug/l	10700		4940		10200		9540	
T. Silver, ug/l	ND		ND		ND		ND	
T. Sodium, ug/l	17800		235000		44300		56600	
T. Strontium, ug/l	164		419		193		231	
T. ,Vanadium, ug/l	ND		ND		ND		ND	
T. Zinc, ug/l	8.52		2.06	J	2.97	J	8.31	
Hardness, mg/l	217		184		279		320	

ND - Not detected at or above the reporting limit
NA - Data not available
* - Standard not met
J - Value is between method detection limit and reporting limit
V - Indicates the analyte was detected in both the sample and the associated method blank

Table 3. Description of stations sampled on Spanish Needle Creek, 2010.

Station	Description
DAZL-SM-A1	Spanish Needle Creek upstream from Wheeler Road; Upstream watershed approximately 9.4 square miles; Macoupin County Lat: 39.19719 Long: 89.85551
DAZL-SM-E1	Effluent from 007 outfall downstream from Smith Lake; Upstream watershed approximately 0.9 square miles; Macoupin County Lat: 39.21715 Long: 89.87956
DAZL-SM-C1	Spanish Needle Creek adjacent to Shay Mine and downstream from the 002 outfall. Fair weather access road from mine property to creek; Upstream watershed approximately 11.7 square miles; Macoupin County Lat: 39.20242 Long: 89.87286
DAZL-SM-C2	Spanish Needle Creek approximately 0.3 mile upstream from the Macoupin Creek confluence. Access off Stagecoach Road; Upstream watershed approximately 15.6 square miles; Macoupin County Lat: 39.22690 Long: 89.90601

Shay Mine
Spanish Needle Creek
Macoupin Creek Basin
Macoupin County

DIGITAL PHOTOGRAPHS

Station: DAZL-SM-A1
Date: 09/28/2010
Road: Wheeler Road
Direction: Looking US
Location: Upstream from mine property. Access at bridge and walk upstream.
Photo by: MBS
Legal :
Lat/Long DD: 39.19719 / 89.85551
Gazetteer Page # : 68

Comments: A segment during normal low flow with wooded riparian. Predominately sandy substrate with gravel and cobble in riffle areas.

Station: DAZL-SM-A1
Date: 09/28/2010
Road: Wheeler Road
Direction: US looking DS
Location: Access at bridge and walk upstream.
Photo by: MBS
Legal :
Lat/Long DD: 39.19719 / 89.85551
Gazetteer Page # : 68

Comments: A segment during normal low flow with wooded riparian. Predominantely sandy substrate with gravel and cobble in riffle areas.

DIGITAL PHOTOGRAPHS

Station: DAZL-SM-C1
Date: 09/28/2010
Road: Mine Property fair weather access road.
Direction: Looking downstream.
Location: West edge of mine DS of 002 outfall. Access creek down a path from road. Sample US of waterfall.
Photo by: MBS
Legal :
Lat/Long DD: 39.20242 / 89.87286

Comments: A segment with wooded riparian during normal low flow. A shallow reach with bedrock substrate.

Station: DAZL-SM-C1
Date: 09/28/2010
Road: Mine Property fair weather access road.
Direction: Waterfall at lower end of reach.
Location: West edge of mine DS of 002 outfall. Access creek down a path from road. Sample US of waterfall.
Photo by: MBS
Legal :
Lat/Long DD: 39.20242 / 89.87286

Comments: A segment with wooded riparian during normal low flow. A shallow reach with bedrock substrate.

DIGITAL PHOTOGRAPHS

Station: DAZL-SM-E1
Date: 09/28/2010
Road: Smith Lake Dam
Direction: DS of Dam
Location: 007 outfall
Photo by: MBS
Legal :
Lat/Long DD:
39.21715 / 89.87956

Comments: Walk down backside of Smith Lake dam to 007 outfall pipe.

Station: DAZL-SM-E1
Date: 09/28/2010
Road: Smith Lake Dam
Direction: Looking DS of 007
Location: 007 outfall
Photo by: MBS
Legal :
Lat/Long DD:
39.21715 / 89.87956

Comments: Pooled area below outfall.

DIGITAL PHOTOGRAPHS

Station: DAZL-SM-C2
Date: 09/28/2010
Road: Co. Road 5 Stagecoach Road
Direction: US
Location: Spanish Needle US from the Macoupin Creek confluence.
Photo by: MBS
Legal :
Lat/Long DD: 39.22690 / 89.90601

Comments: Access from grassy pull-off approx. 0.3 mi USSB. Mostly run with various sized pools. Wooded riparian with sand and fine gravel substrate.

Station: DAZL-SM-C2
Date: 09/28/2010
Road: Co. Road 5 Stagecoach Road
Direction: US
Location: Spanish Needle US from the Macoupin Creek confluence.
Photo by: MBS
Legal :
Lat/Long DD: 39.22690 / 89.90601

Comments: Access from grassy pull-off approx. 0.3 mi USSB. Mostly run with various sized pools. Wooded riparian with sand and fine gravel substrate