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LOWER LITTLE SANDY CREEK WATERSHED ASSESSMENT REPORT

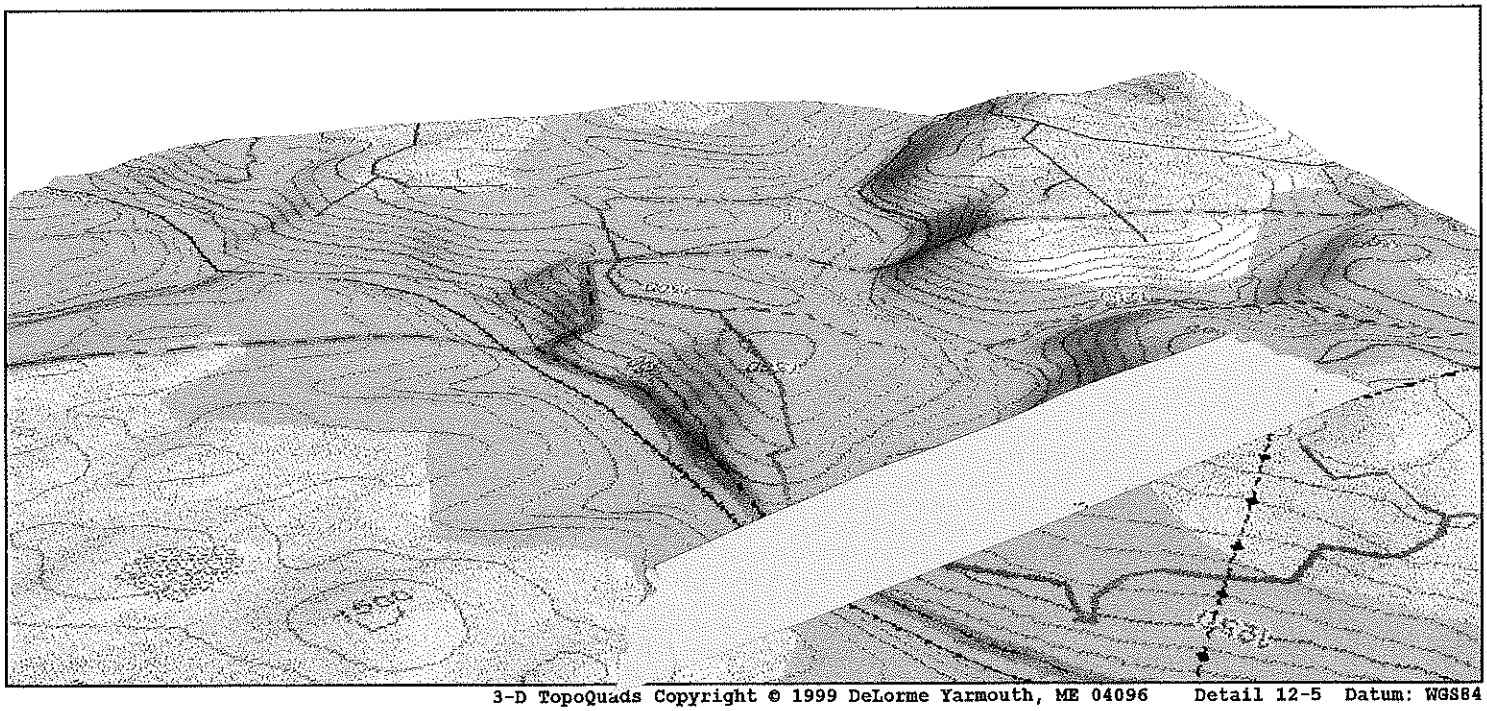
REDBANK TOWNSHIP
ARMSTRONG COUNTY, PA

PREPARED BY:
DAVID E. BEALE, WATERSHED SPECIALIST
AND
ROBERT GOROG

SPONSORED BY:
ARMSTRONG COUNTY CONSERVATION DISTRICT

UNDER:
PENNSYLVANIA GROWING GREENER PROGRAM

February 1, 2001



 Detail 12-5 Datum: WGS84

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Access

Access to the lower corridor is along a gas well road along the south side of Little Sandy Creek from a bridge crossing on SR-3003 (Langville Road) in Jefferson County. The Armstrong County Line is 1.5 miles down stream from this road and the mouth of Little Sandy Creek is 2.8 miles downstream. This lower corridor is among the more remote areas of Armstrong County.

Physiography and Topography:

The Little Sandy Creek Watershed lies within the Pittsburgh Low Plateau Physiographic Unit.

Elevations rise from approximately 1070 at the mouth of Little Sandy Creek at Redbank Creek, to approximately 1600 on the hilltops south of the village of North Freedom. The topography is generally steep along the stream valleys with somwhat more gentle sloped uplands. Some level flood plains exist immediately adjacent to Little Sandy Creek. The topography has developed as a result of erosional processes.

Geology

The subject portion of Little Sandy Creek lies within the structure of the North Freedom-Hebron anticline. This structure crosses the main creek approximately one half mile upstream from the mouth. The strike of the anticline is approximately due north at this point.

The surface strata lie within the lower portion of the Allegheny Formation on the uplands and within the upper portion of the Pottsville formation in the valley.

The Lower Kittanning Coal has been mined on the headwaters of Nolf Run south of the village of North Freedom. The geological interval indicates the possible existence of outcrops of the Vanport Limestone, Clarion Coal and Brookville Coal (Lower Clarion) seams within the study area. However, there is no field evidence to indicate that these strata exist in mineable thicknesses.

Soils

The general soils association map for Armstrong County shows most of the study area as being within Association Number 1 – Weikert-Gilpin Association with a minor area within association Number 5 - Wharton-Rayne Cavode Association.

Individual soils mapping units include the following:

Series	Mapping Symbol	Slope	Origin
Gilpin-Weikert Complex	GWC	8-15%	Residual
Gilpin-Weikert Complex	GWD	15-25%	Residual
Rayne Silt Loam	RnB	3-8%	Residual
Weikert and Gilpin Soils	WkF	8-25%	Residual
Wharton Silt Loam	WrB	3-8%	Residual
Cavode Silt Loam	CaB	3-8%	Residual
Earnest Silt Loam	EnB	3-8%	Coluvial
Earnest Silt Loam	EnC	8-15%	Coluvial
Rainsboro Silt Loam	RaA	3-8%	Aluvial-Coluvial
Melvin Silty Clay Loam	Me		Aluvial-Coluvial
Pope Loam	Po		Aluvial

Prime farmland units in this list include RnB, WrB, RaA, and Po.

Hydric units within this list include EnB, Me

Flood Plain unit - PO.

Land Use

The watershed area of Little Sandy Creek within Armstrong County is 1,362 Acres approximately 538 Acres of this area is in agriculture. Approximately 824 Acres are in Forest. Some of the agricultural land has been abandoned and is reverting to forest. Also, some of the area in the agricultural category is reclaimed strip mine and residential land.

A portion of the residential village of North Freedom lies within the study area. This village is along PA Route 536. This paved road and two unimproved township roads T-784 and SR-1019 leading south from Route 536 are the only public roads within the study area.

Agriculture

All of the agricultural land lies on the uplands south of Little Sandy Creek and mostly within the Nolf Run Tributary. This land consists of small farms including beef, dairy, grain, and hay operations.

The total area of agricultural land is slightly less than 538 Acres. This area encompasses some residential land along Route 536 and some minor areas of reclaimed strip-mined land.

One area of farmland along a tributary to Nolf Run located south of Route 536 and west of SR 1019 extends to the edge of the stream. At this site, cropland and hayland extend to the stream banks. It is likely that increased siltation and nutrient enrichment has occurred along this tributary as a result of this condition. The soils within this zone are Melvin and Ernest Silt Loam on slopes of 0-8%. These soils are Hydric units in Armstrong County.

Forest Land

The forested area covers 824 Acres. Most of this is in the large poletimber to small sawtimber stage of development. The main forest type is Northern Hardwood. Mixed Oak forms the next largest component. Hemlock and

Hemlock-White Pine stands are found in strips along the stream corridors. Some minor areas of bottomland hardwoods exist on the flood plain (Pope Soil) along Little Sandy Creek.

Much of this forest area has been cutover within the last 10 years. There is evidence of recent harvesting operations within the study area.

Timber management appears to be mainly by diameter limit cuttings. In the long run this practice will reduce the timber growth potential of the existing stands. Some areas have been commercially clear-cut along Nolf Run.

No areas of stream impairment were noted as a result of timber harvesting operations.

Mining

The only mining operations observed within the study area are represented by reclaimed strip mines along the highest elevations on the southern boundary of the watershed of the Nolf Run Tributary. These operations appear to have been in the Lower Kittanning Seam of Coal. No impairment in the streams was noted as a result of these operations. Some of the reclaimed land has been put into agricultural use.

Natural Gas Development

The entire study area has had extensive drilling for gas. Most of this gas development has occurred within the last fifteen years. This development has had some impact on the streams as a result of well site and access road construction. This activity has resulted in increases in erosion and siltation. The gas well sites and roads near the stream courses have had the greatest impact on the stream due to siltation. At present, these sources are stable and are not considered as a source of impairment within the lower Little Sandy Creek Watershed.

Riparian Zones

Little Sandy Creek

The riparian zones along the main stream are of two types. The first and predominant vegetative type consists of Hemlock-Hardwood Forest on WkF soil units. The predominant species include Hemlock, White Pine, and Mixed Hardwoods (Mixed Oaks, Maple, Black Cherry, Birch, Etc.) with a dense understory of Rhododendron. These sites are cool throughout the summer months and provide considerable shade to the stream during midday. This condition is important for the maintenance of a cold water fishery.

These sites have numerous spring seeps. The existence of these spring seeps create an unstable condition from the stand point of soil erosion. When disturbed by road construction slides often readily result unless particular care is exercised in location and construction with proper drainage structures installed.

The second forest type within the riparian zone consists of Bottomland hardwoods on the flood plain areas (Pope soil units). This vegetative type has developed on aluvial deposits associated with flood events. The predominant vegetation includes Sycamore and Tulip Poplar with other hardwoods increasing in prevalence away from the stream. The understory is generally dense consisting of Spicebush, Witch Hazel, and other shrubs toward the landward sides. Streamside, willows and silky dogwood are predominant. These flood plains are considered important in ameliorating the effects of floodwaters, acting as a giant sponge.

Some minor areas of multiflora rose were noted along the riparian zones of the main stream.

Two areas of impairment were noted within the riparian zone of Little Sandy Creek.

The first area is a section of severe bank erosion occurring along an outside bend of the stream along an area of Pope soil. This site is located approximately 2,600 feet downstream from the Armstrong County line on the north side of the stream. A ford used for access is present immediately upstream of this site and may have contributed to the problem. The erosion at this site is

active during high water events and shows no sign of abating naturally. This site is remote from public access, which makes a remediation project unfeasible.

An 8-10′ escarpment exposed in the sandy soil is being used by Kingfishers as a nesting site. These birds burrow into the sand and create nest cavities in the burrows.

The second erosion site is a slide on the south side of the stream approximately 500 feet downstream from the first erosion site. This slide appears to have occurred naturally although there is a gas well on the hillside 200-300′ feet above the slide. This slide area is on the WkF soil unit. It is anticipated that this site will likely stabilize itself over time.

Moderate use of the riparian zones and stream bottom is being made by All-terrain Vehicles (ATVs). It is not known if this is permitted by the landowners.

Nolf Run Riparian Zones

North of Route 536, the riparian zone of this stream is heavily wooded and similar to the Hemlock-Hardwood forest type found along the main stream.

South of Route 536, the riparian zone is in agriculture. The stream in this area would greatly benefit from establishment of riparian corridors.

Stream Morphology

Little Sandy Creek

Little Sandy Creek is classed as a C stream according to the Rosgen Method of Stream classification. The width ranges from approximately 80 feet to about 120 feet. The pool to riffle ratio is estimated to be about 65 percent pool to 35 percent Riffle. The stream bottom consists of cobbles to sand. Some bolders are present along the shorelines in places. A few areas have sandstone bedrock bottom.

The banks are generally stable. The only area of instability is described under the riparian description in the previous section of this report. The stream at this problem site has developed a second channel. Moderate to heavy siltation was noted throughout the Armstrong County corridor. This problem appears to be from unknown Jefferson County sources; although, minor contributions of sediment from Armstrong sources are noted elsewhere in this report. As noted these sources include gas well development and operations, agriculture, illicit ATV traffic, and possible logging operations.

Nolf Run

The upper portion of Nolf Run is classed as an E stream. This section is south of Route 539 where the stream flows through open farmland. This southern portion of Nolf Rum has little overhead cover and is largely open to sunlight at midday. The stream is small having a width of 5-10′. This southern portion is considered impaired by agriculture. There may also be some impairment from malfunctioning sewage systems along the village of North Freedom. This latter source was not confirmed.

North of Route 536, the stream drops from an elevation of approximately 1475′ to about 1125′ at its confluence with Little Sandy Creek. The northern section is classed as a B type stream under the Rosgen System. The stream in this section consists of step pools, with steep riffles. There is considerable cover for fish and the stream likely maintains cool temperatures during the summer. The stream in this section is largely shaded at midday.

Biology

Little Sandy Creek

Little Sandy Creek is classed as a cold water fishery (CWF) by Chapter 93 of DEP rules and regulations; however, there is a high population of Smallmouth Bass in the study section of the stream indicating at best a cold water to warm water transitional fishery. The bass population appears healthy with at least three age classes present in a rod and reel sample.

The study included a survey of the macroinvertebrate population. Table 1 presents the results of this study. The presence of several taxa in the pollution sensitive category indicates good water quality over time.

Nolf Run Biology

Our study of the biological community on Nolf Run only examined one site. This study site is located near the mouth of the stream.

At this site, four taxa in-group 1, and three in-group 2 were identified. This data indicates an excellent Biotic index. Table 1 presents the macroinvertebrate biological data.

During the search for macroinvertebrates, two trout were observed. Also observed were several species of minnows. Neither the trout nor the minnows were identified as to species. The trout were seen in early October, indicating a capacity for holdover if not reproduction. Further investigation is needed to determine if a breeding population of trout is present.

Water Quality

Little Sandy Creek

This stream is classed as CWF-Cold Water Fishery under the Pennsylvania Department of Environmental Protection, Chapter 93.

Water chemistry was field checked on the main stream, at a point near the county line.
pH and specific conductivity were measured in the field and a sample was collected for laboratory analysis. The results of these tests are presented in the water sample reports.

Water chemistry appears to be good; however, visual observations of heavy foam were made at the sample point. This foam is indicative of quantities of dissolved and suspended materials. The source and nature of this foam is unknown, but appears to originate in Jefferson County upstream of this study area. Also, a moderate covering of silt was noted on the stream bottom. The source of this silt is likely in Jefferson County.

Conclusions

Little Sandy Creek and Nolf Run have good quality both in terms of water chemistry and biology. Little Sandy Creek maintains a transitional fishery between a warm and cold water fishery. Nolf Run is a cold water fishery. Water quality in both streams depends largely on activities in Jefferson County. The major sources of impairment are apparently within Jefferson County with minor sources within Armstrong County.

Recommendations

1. Maintain vigilance within the watershed to identify any possible sources of impairment as they appear and immediately act to remedy any problems.

2. Conservation organizations could work to obtain easements if not outright ownership of large areas of the corridor to insure public access to the lower watershed area.

3. The Armstrong Conservation District should work in cooperation with Jefferson County Conservation District to insure water quality in the lower Little Sandy Creek Watershed.

4. Law enforcement agencies should be encouraged to actively prosecute illicit ATV use. ATV users should be educated as to the damage caused by irresponsible activities.

5. Areas of agricultural impairment along the tributary to Nolf Run should have riparian zones restored.

6. An area of three to five Acres immediately south of Route 536 along the Nolf Run Tributary is a candidate for establishment of a wetland. At present this area is in open hayland, which was not cut in 1999.

7. At present, the study area, although under private ownership, is largely open to the public. The owners should be encouraged not to post the area against responsible outdoor recreation.

Little Sandy Creek			
WATER CHEMISTRY AND BIOLOGICAL ASSESSSMENT			
PARAMETER	STATION DESIGATION		
	Little Sandy Creek	Nolf Run	Nolf Run
Sample Site Number	1	2	3
Lattitude	N41°2.471'	N41°1.36'	N41°2.303'
Longitude	W19°12.851'	W79°13.005'	W79°13.111'
Water Chemistry			
Field Ph	7.4	6.5	7.2
Field Conductivity	222	276	309
Lab pH	6.22		
Specific Conductivity (umhos/cm)	225		
Alkalinity (mg/l)	25		
Acidity (mg/l)	<1		
Iron (mg/l)	0.25		
Manganese (mg/l)	0.06		
Aluminum (mg/l)	0.26		
Sulfate (mg/l)	67		
Suspended Solids (mg/l)	<1		
Macroinvertebrate Count			
Group 1 Taxa	2 Mayflies-- Stenomena, Isonychia, 1 Caddis, I Stonefly-- Acroneuria		2 Mayflies-- Stenomena, Borrower, 1 Caddis (case), 1 Stonefly-- Acroneuria
Group 2 Taxa	1 Caddis-- Hydropsyhce, Crayfish, 2 Dragonfly, 1 Water Beetle		Crayfish, Hellgrammite, Hydropsyhce
Group 3 Taxa	None Found		None Found
Fish			
	Bass, Numerous Minnows		Trout, Sculpin, Unidentified Minnows
Group I Taxa are polution sensitive			
Group 2 Taxa are somewhat polution sensitive			
Group 3 Taxa are polution tolerant			

Stream Visual Assessment Protocol

Owners name_____ Evaluator's name David E. Beale Date Oct. 7, 2000
Stream name Little Sandy Creek Waterbody ID number_____
Reach location Armstrong County Line to Mouth
Ecoregion_____ Drainage area_____ Gradient 0.47%
Applicable reference site_____
Land use within drainage (%) row crop * hayland * grazing/pasture * forest 60% residential <1%
Confined animal feeding operations____ Cons. Reserve_____ industrial_____ Other:_____
Weather conditions-today Cloudy and Cool - 52° Past 2-5 days Rain within 48 hours
Active channel width 120' Dominant substrate: boulder____ gravel √ sand____ silt_____ mud_____

* Total Agriculture land use 40%

Site Diagram See Map #2

Assessment Scores

Channel condition	8	Pools	7
Hydrologic alteration	9	Invertebrate habitat	7.5
Riparian zone	10	**Score only if applicable**	
Bank Stability	8	Canopy cover	9
Water appearance	7.5	Manure presence N/A	
Nutrient enrichment	7.5	Salinity N/A	
Barriers to fish movement	10	Riffle embeddedness	7
Instream fish cover	8	Marcroinvertebrates Observed (optional)	7.5

Overall score (Total divided by number scored)	106 /13=8.15	<6.0	Poor
		6.1-7.4	Fair
		7.5-8.9	Good
		>9.0	Excellent

Suspected causes of observed problems On two visits to this portion of the Watershed, Little Sandy Creek has been High and cloudy. Rocks show moderate silt coating. Sources of siltution are apparently in Jefferson County.

Recommendations The Armstrong Conservation District should work with the Jefferson Conservation District to Identify and remediate sediment sources.

Stream Visual Assessment Protocol

Owners name_____ Evaluator's name David E. Beale Date Oct. 7, 2000
Stream name Nolf Run Waterbody ID number_____
Reach location Rt 536 to Mouth
_____
Ecoregion_____ Drainage area_____ Gradient_____
Applicable reference site_____
Land use within drainage (%) row crop _____ hayland_____ grazing/pasture_____ forest_____ residential_____
Confined animal feeding operations_____ Cons. Reserve_____ industrial_____ Other:_____
Weather conditions-today Cool Cloudy Past 2-5 days Rain past 48 hours
Active channel width 10-20' Dominant substrate: boulder √ gravel √ sand √ silt_____ mud_____

Site Diagram See Map #3

Assessment Scores

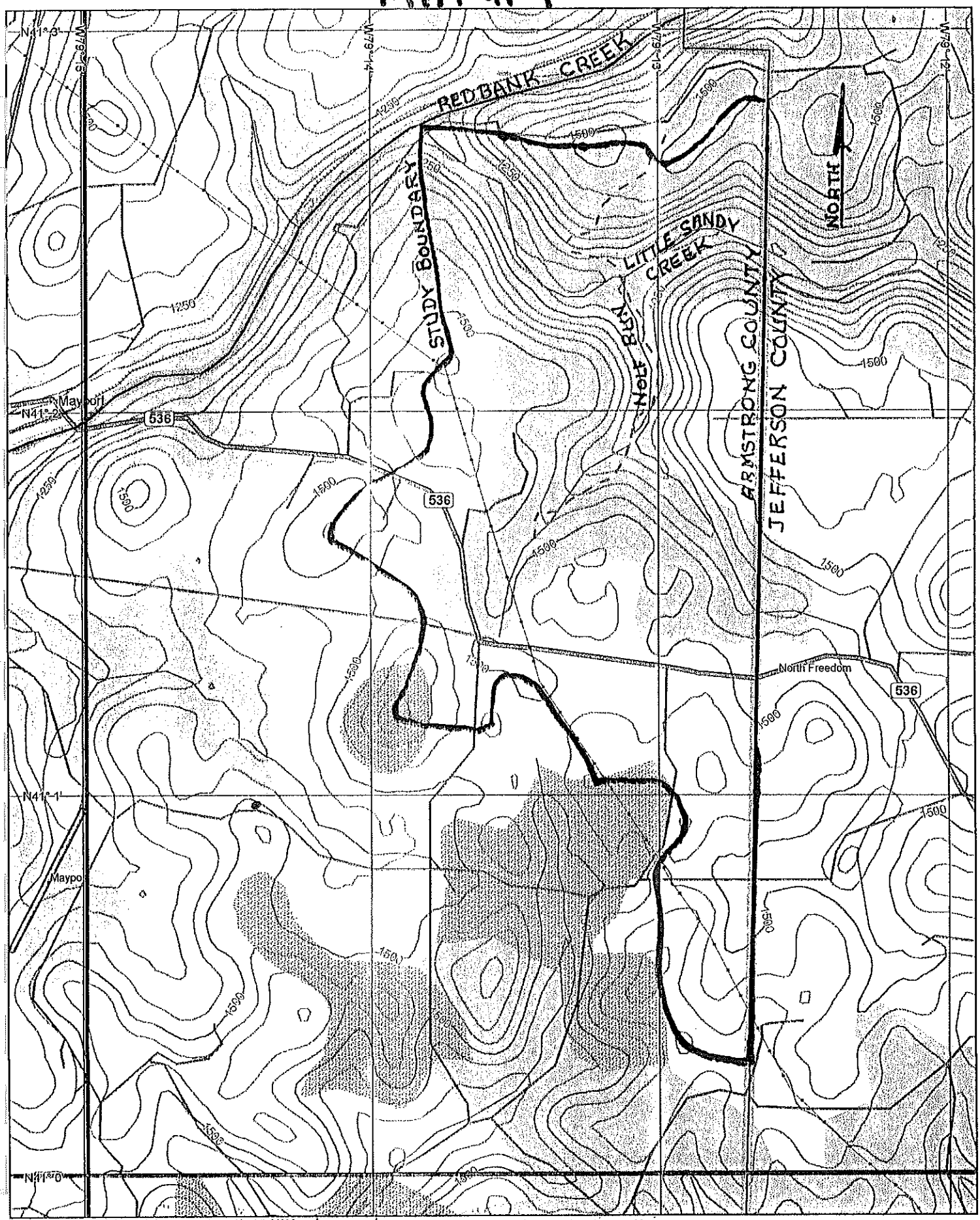
Channel condition	10	Pools	8
Hydrologic alteration	10	Invertebrate habitat	9
Riparian zone	8	**Score only if applicable**	
Bank Stability	10	Canopy cover	10
Water appearance	10	Manure presence N/A	
Nutrient enrichment	7	Salinity N/A	
Barriers to fish movement	9	Riffle embeddedness	7.5
Instream fish cover	8	Marcroinvertebrates Observed (optional)	9

Overall score	115.5/13	<6.0	Poor
(Total divided by number scored)	8.8	6.1-7.4	Fair
		7.5-8.9	Good
		>9.0	Excellent

Suspected causes of observed problems Much of this portion of Nolf Run has been cut-over. Silvicultural systems are substainedard. Possible Sources of Impairment in Jefferson County should be investigated

Recommendations

MAP #1



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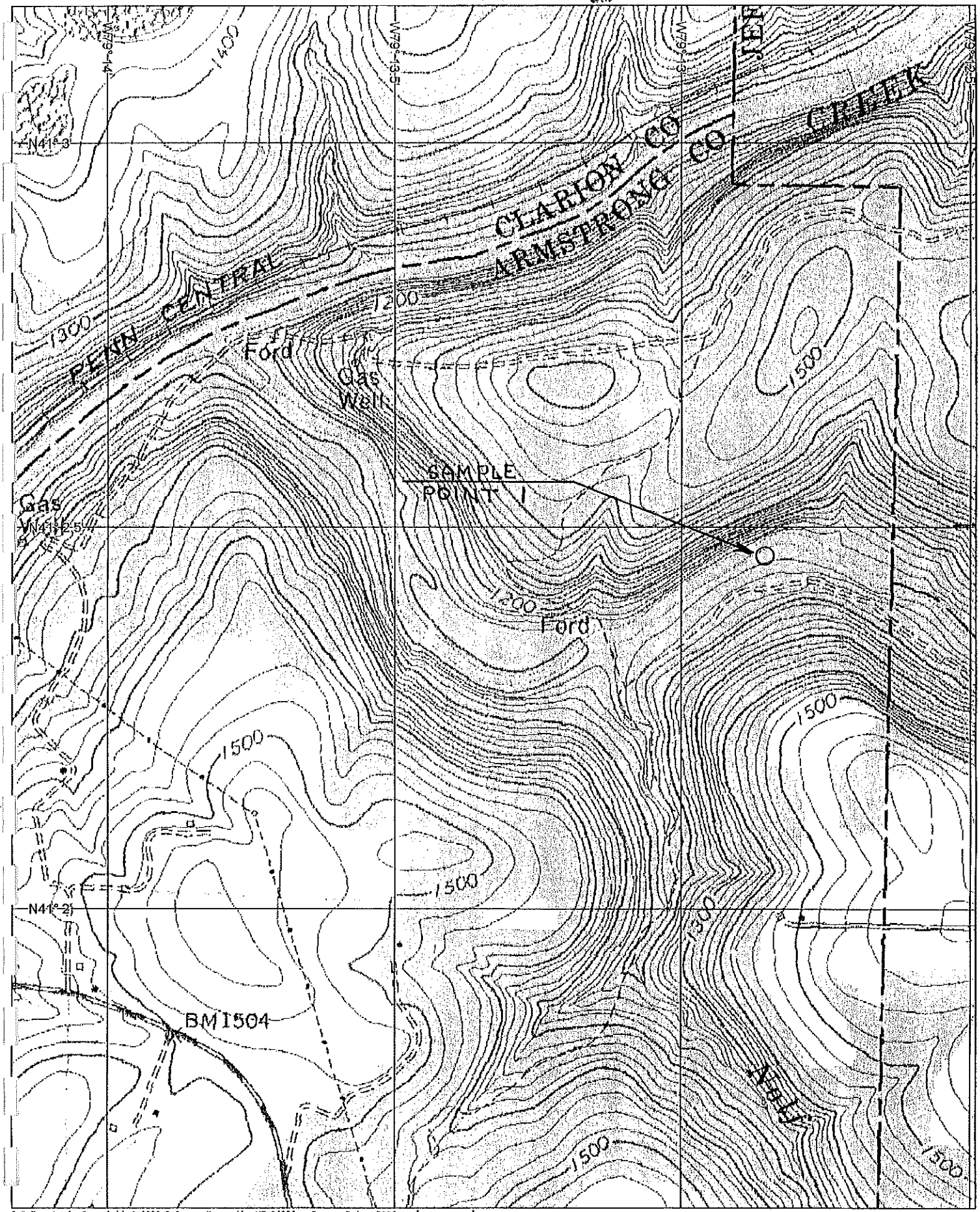
MAP # 2



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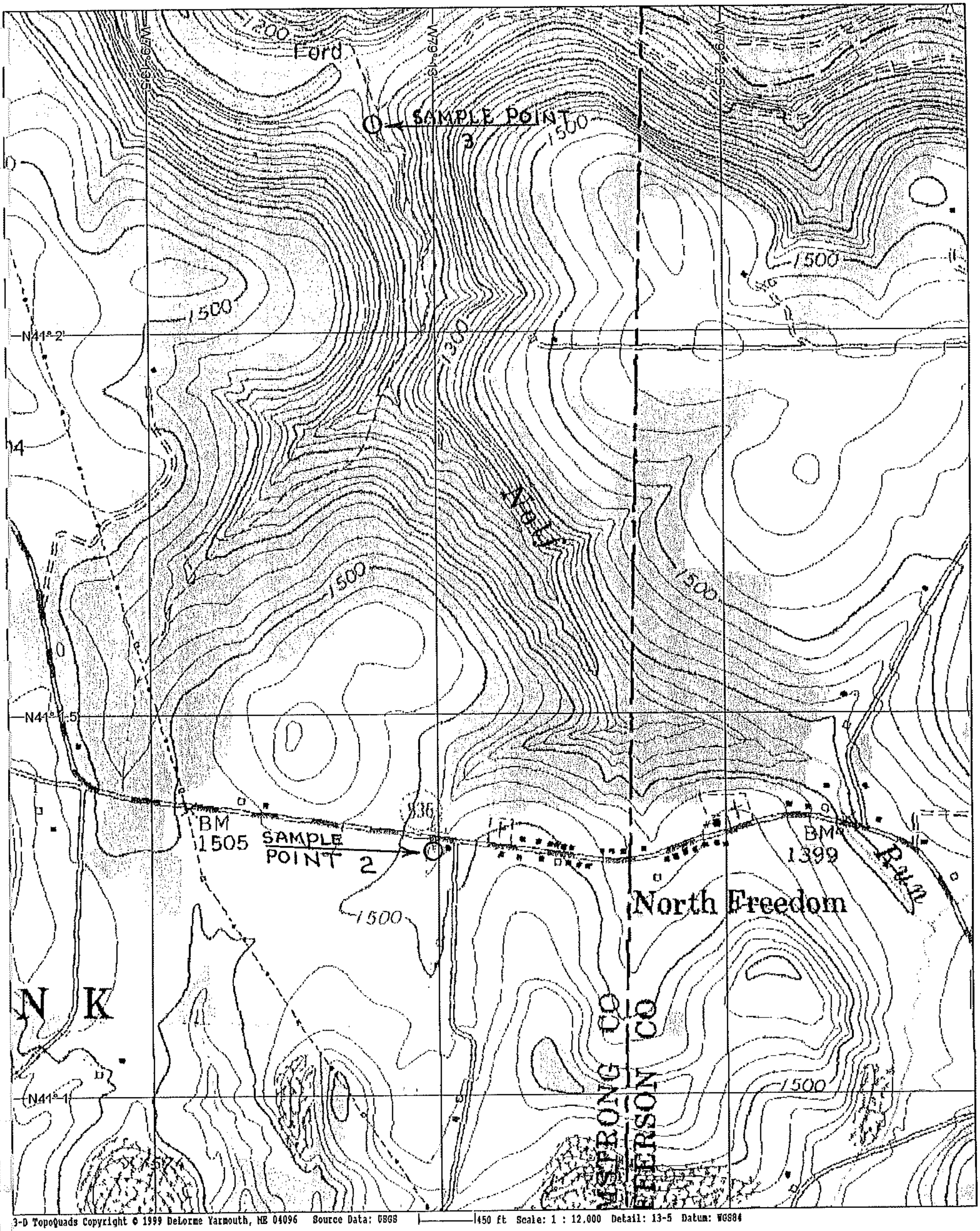
MAP # 3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Ford
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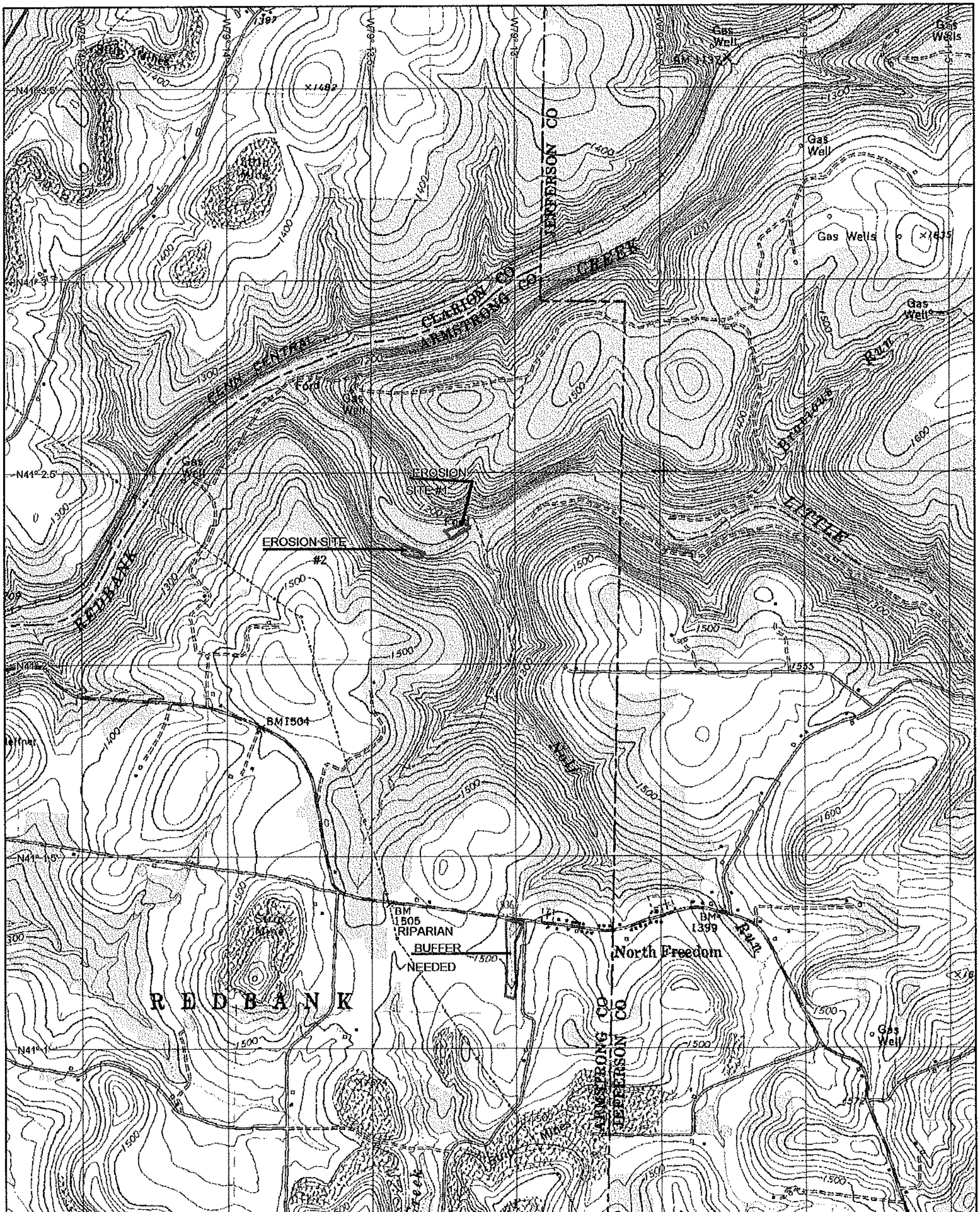
1500
1500
N41° 2'
1300
1500
1500
N41° 1.5'
BM 1505
SAMPLE POINT 2
336
BM 1399
Run
North Freedom
1500
N K
ARMSTRONG CO
JEFFERSON CO
1500
N41° 1'
3-D TopoQuads Copyright © 1999 DeLorme Yarmouth, ME 04096 Source Data: USGS
450 ft Scale: 1 : 12,000 Detail: 13-5 Datum: WGS84



 950 ft Scale: 1 : 24.000 Detail: 13-0 Datum: WGS84

CWM LABORATORIES, INC.
220 South Jefferson Street
Kittanning, PA 16201
724-543-3011
Lab #03-457

Date 10-12-00

LAB ANALYSIS REPORT

Client Name/Number:	Armstrong Conservation District	Date Sampled/Collected:	10-7-00
Job Name/Number:	Little Sandy Creek	Date Received:	10-10-00
Sample Number:	1000117	Date Approved/Reported:	10-12-00
Description:	Main Stream	Discard Date:	na
Collector:	RG		

PARAMETER	RESULTS	MDL	METHOD	DATE	ANALYST
Laboratory pH	6.22	-	EPA 150.1	10/10/2000	AL
Specific Conductivity	225 umhos/cm	1.0 umhos/cm	EPA 120.1	10/10/2000	AL
Alkalinity	25 mg/l	1.0 mg/l	EPA 310.1	10/10/2000	AL
Acidity	<1 mg/l	1.0 mg/l	EPA 305.1	10/10/2000	AL
Iron	0.25 mg/l	0.02 mg/l	EPA 236.1	10/11/2000	AL/RS
Manganese	0.06 mg/l	0.02 mg/l	EPA 243.1	10/11/2000	AL/RS
Aluminum	0.26 mg/l	0.10 mg/l	EPA 202.1	10/11/2000	RS
Sulfate	67 mg/l	2.0 mg/l	EPA 375.4	10/10/2000	AL
Suspended Solids	<1 mg/l	1.0 mg/l	EPA 160.2	10/10/2000	AL

Approved By: _____
David C. Kohl

Literature Used in the Preparation of this Report

1. Pennsylvania Department of Environmental Protection Chapter 93 Rules and Regulations.

2. USDA-Soil Survey of Armstrong County 1977.

3. Greater Pittsburgh Region Contour Map, Allegheny, Armstrong, Beaver, Butler, and Washington Counties-Pennsylvania Department of Topographic and Geologic Surveys 1975.

4. Field Guide for Stream Classification Dave Rosgen and Lee Silvey Wildland Hydrology 1998ISBN 0-9-653289-1-0.

5. NWCC Technical Note 99-1, Stream Visual Protocol-December 1998 USDA NRCS.

View of agricultural land in the valley of a tributary of Nolf Run looking south from Route 536.