APPENDIX A

EXCERPTS FROM 1979 DAM INSPECTION REPORT (WOODWARD CLYDE CONSULTANTS)

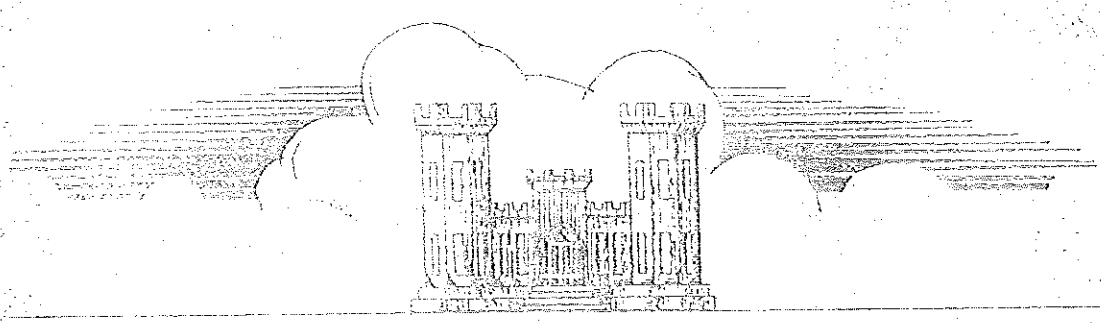
91:16

DELAWARE RIVER BASIN
SCHUYLKILL RIVER, BERKS COUNTY

PENNSYLVANIA
NDS ID PA. 00723
DER ID 6-434

NEW KERNSVILLE DAM

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM



DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

JULY 1979

DELAWARE RIVER BASIN

NEW KERNSVILLE DAM, BERKS COUNTY, PENNSYLVANIA

NDS I.D. NO. PA 00723
DER I.D. NO. 6-434

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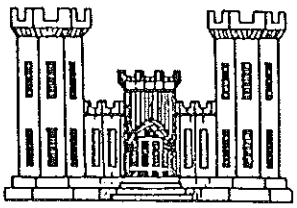

Prepared by:

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Submitted to:

DEPARTMENT OF THE ARMY
Baltimore District, Corps of Engineers
Baltimore, Maryland 21203

JULY 1979

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION PROGRAM
NEW KERNSVILLE DAM
NATIONAL ID #PA 00723
DER #6-434

SECTION 1
PROJECT INFORMATION

1.1 General.

a. Authority. The Dam Inspection Act, Public Law 92-367, authorized the Secretary of the Army, through the Corps of Engineers, to initiate a program of inspection of dams throughout the United States.

b. Purpose. The purpose of the inspection is to determine if the dam constitutes a hazard to human life or property.

1.2 Description of Project.

a. Dam and Appurtenances. New Kernsville Dam is a "run of the river" dam with limited storage capacity across the Schuylkill River. It is a concrete gravity structure with a central 600 foot ogee spillway section and a nonoverflow section at each end of the spillway. A 260 foot earth embankment joins the right nonoverflow section to the abutment. The overall length of the dam is 1,600 feet.

The ogee gravity spillway has a base width of 58.6 feet and a total height from the foundation to the crest of the nonoverflow section of 45 feet. The height of the spillway crest above the stream bed is about 33 feet. The bucket at the downstream toe of the spillway has a radius of 15 feet and a thickness of 5 feet, extending 16 feet downstream from the toe of the dam. The height of the nonoverflow section above the downstream apron is 44.88 feet. The dam foundation was grouted with holes extending 25 feet below the foundation on 5 foot centers.

The gravity nonoverflow sections at each end of the spillway have a width of 8 feet for the top 10.5 feet. Below this elevation, the downstream base batters at 7 on 10 and the upstream base has a batter of 1 on 20. Beyond the ends of the nonoverflow sections are earth embankments which tie the nonoverflow sections to natural ground. The earth embankment sections have a top width of about 30 feet consisting of about

11 feet of earth and 19 feet of rock. Both faces of the embankment have slopes of 3H:1V. The upstream face is protected with rock fill up to four feet thick and the downstream face with rock fill up to two feet thick. The upper portion of the embankment is reported to consist of impervious materials and the downstream portion to consist of a more pervious fill. The embankments are also reported to contain a centerline core trench excavated to rock. The core trench has a base width of 15 feet and side slopes of 1H:1V.

b. Location. The dam is located on the Schuylkill River, approximately 1.5 miles north of Hamburg, in Windsor Township, Berks County, Pennsylvania. The site is shown on USGS Quadrangle entitled "Auburn, Pennsylvania" at coordinates N 40° 34.4' W 76° 0.1'. A regional location plan of New Kernsville Dam is enclosed as Plate 1, Appendix E.

c. Size Classification. The dam is classified as an "Intermediate" size dam by virtue of its 45 foot height and estimated 1,850 acre-foot total storage capacity.

d. Hazard Classification. A "High" hazard classification is assigned consistent with the potential for extensive property damage and possible loss of life along the Schuylkill River downstream of the dam.

e. Ownership. The dam is owned by the Department of Environmental Resources (DER), Office of Resource Management. All correspondence should be sent to Mr. Samuel R. Reed, Director, Bureau of Operations, Office of Resource Management, Department of Environmental Resources, Post Office Box 1467, Harrisburg, Pennsylvania 17120.

f. Purpose of Dam. The purpose of this dam is to create a desilting basin.

g. Design and Construction History. New Kernsville Dam was constructed as a result of Pennsylvania Act 441, "Schuylkill River Desilting Project", June 1945. New Kernsville Dam is one of a series of several dams along the Schuylkill River constructed to form desilting basins to trap coal sediment carried by the river.

Foundation investigations began September 3, 1947, with Sprague & Henwood, Incorporated. Completion date for the test borings was February 11, 1948. Justin & Courtney*, Philadelphia, Pennsylvania, designed the dam, which was constructed by Poirier & McLane Corporation under a Pennsylvania GSA (Department of General Services) Contract No. 100-1.

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* Justin & Courtney is now a division of O'Brien & Gere, Syracuse, New York.

Subsurface grouting was done by the Pennsylvania Drilling Company of Pittsburgh, Pennsylvania. Construction began June 1948, and was completed by November 10, 1949.

The dam was constructed in two stages by use of coffer dams and earth dikes. The left half of the dam was constructed first with diversion on the right side. During the second stage of construction, the river was diverted by means of three 4 x 5 foot conduits with concrete stoplogs to facilitate closure after construction. Several post-construction photographs were available for review in the final report prepared by the Schuylkill River project engineers, dated July 1, 1951. There were no construction photographs or construction reports available in DER files.

h. Normal Operating Procedures. All water flows over the weir of the spillway. Flood water storage capacity is minimal compared to the size of the drainage area. In the event spillway capacity is exceeded and the dam is overtopped, no damage would result. According to a memorandum dated March 12, 1948, from the Chief, Division of Dams, the overflow sections could be overtopped without serious damage. Mr. Courtney of Justin & Courtney confirmed that the dam could be overtopped without serious damage.

1.3 Pertinent Data.

A summary of pertinent data for New Kernsville Dam is presented as follows.

a.	Drainage Area (sq miles)	340
b.	Discharge at Dam Site (cfs)	
	Maximum Known Flood (Tropical Storm Agnes, 1972, measured at downstream gaging station)	42,800
	At Top of Nonoverflow Section	83,400
c.	Elevation (feet above MSL)	
	Top of Dam	393.88
	Spillway Crest	383.0
	Downstream Apron (toe)	350.0
	Normal Pool	383.0
d.	Reservoir (miles)	
	Length at Normal Pool	1.25
	Fetch at Normal Pool	0.60

e.	Storage (acre-feet)	
	Normal Pool	583
	At Top of Nonoverflow (est.)	1,260
f.	Reservoir Surface (acres)	
	Normal Pool	54
g.	Dam Data	
	Type	Concrete gravity
	Length	1,600 feet
	Height (above downstream apron)	43.88 feet
	Crest Width (concrete nonoverflow section)	8 feet
	Volume	
	Concrete	45,000 cu yds
	Earth/Rock	7,000 cu yds
	Cutoff	Concrete sections founded in rock
	Grout Curtain	Upstream single line grout curtain
h.	Spillway	
	Type	Concrete ogee weir
	Elevation	383 feet
	Length	599.8 feet

NEW KERNSVILLE DAM

CHECK LIST
HYDROLOGIC AND HYDRAULIC
ENGINEERING DATA

DRAINAGE AREA CHARACTERISTICS: *Large, mountainous, greater than 55% wooded, 25% developed and 10% strip mining.*

ELEVATION TOP NORMAL POOL (STORAGE CAPACITY): *383 feet (583 Acre-Feet).*

ELEVATION TOP FLOOD CONTROL POOL (STORAGE CAPACITY): *393.88 feet (1250± Acre-Fee*

ELEVATION MAXIMUM DESIGN POOL: ---

ELEVATION TOP DAM: *399.88 feet.*

SPILLWAY

a. Elevation *383 feet.*

b. Type *Concrete ogee weir.*

c. Width *600 feet.*

d. Length ---

e. Location Spillover *Central portion of structure.*

f. Number and Type of Gates *None.*

OUTLET WORKS:

a. Type *Non-functional construction diversion conduits with concrete stop logs.*

b. Location

c. Entrance inverts *366.0 feet.*

d. Exit inverts *360.34*

e. Emergency draindown facilities *None.*

HYDROMETEOROLOGICAL GAGES:

a. Type *Four reporting National Weather Service Stations within the watershed.*

b. Location

c. Records *National Weather Service.*

MAXIMUM NON-DAMAGING DISCHARGE: *Not determined.*

Classification (Ref - Recommended Guidelines for Safety Inspection of Dams)

1. The hazard potential is rated as "High" as there would be loss of life if the dam failed.
2. The size classification is "Intermediate" based on its 43.9 ft. height measured from end of downstream apron.
3. The spillway design flood, based on size and hazard classification, is the Probable Maximum Flood (PMF).

Hydrology and Hydraulic Analysis

1. Design/Evaluation Data. No original design data was available. The "Application Report" evaluated the spillway capacity as 80,200 cfs with a maximum depth of 10.88 ft. This was considered adequate. The maximum recorded discharge at the downstream gaging station at Berne, about 45 miles below the dam, was 24,000 cfs in 1942.
2. Evaluation of structure.
   New Kernsville Dam is a "run-of-the-river" dam with very little flood storage capacity, therefore, reservoir routing was not done and the spillway adequacy was determined by comparing the inflow hydrograph with spillway capacity.

   Inflow Hydrograph - determined by the computer program
   Computer input as follows:
   drainage area - the design value verified from USGS 1:250,000 maps
   rainfall, shown on sheet 7, ref. Hydrometeorological Report No. 33.
   Snyder's hydrograph parameter, t_p, C_p

$$t_p = C_t (L \cdot L_{ca})^{0.3}$$

   $C_t = 1.35$ Information received from Corps of
   $C_p = 0.40$ Engineers, Baltimore, for Zone 6.
   $L = 35.88$ mi. from USGS, 1:24000
   $L_{ca} = 26.78$ miles

$$t_p = 1.35 (35.88 \cdot 26.78)^{0.3}$$
$$= 10.60$$

Spillway Capacity Ref. Chow, Open Channel Hydraulics, p. 364

$X^n = K H_d^{n-1} Y$

H_d = design head excluding velocity head of approach

$n = 1.836$ for 1H:3V u/s face of weir

$K = 1.936$ " " " " " "

Horz. Dist. fr. X=0	X	Y	H_d
4' 0 1/2"	0	0	—
8' 1 1/8	4.08'	9 3/4"	12.75
10' 9 3/4"	6.80'	1'11"	14.03
13' 6"	9.58'	3'5 5/8"	14.65

Use H_d = 14 ft.

USBR, Design of Small Dams, p. 372

assume $C_o = 3.92$ $Q = 14^{3/2} \cdot 600 \cdot 3.92 = 123,200$ cfs

height of weir ~23 ft, ave. channel width ~800 ft

$v = 123,200/(37 \times 600) = 5.5$ ft/sec

velocity head ~ 0.48 ft

H_o (design head) = 14.48 say 14.5 ft

$C_o = 3.92 \cdot 0.97 = 3.80$ when pool is at top of non overflow section

maximum spillway capacity

$Q = 3.80 \cdot 600 \cdot 11.38^{3/2}$

$Q \sim 87,500$ cfs assuming weir is not submerged and velocity head is 0.5 ft.

Estimate of Tailwater Level

$S_o = 0.00417$ from Water Resources Bulletin No. 4

section about 700 ft downstream

Area ~ 7632 ft² w/ water level @ 383.0

W.P. ~ 716 ft from section estimated from USGS map

$Q = A \frac{1.49}{n} R^{2/3} S_o^{1/2}$

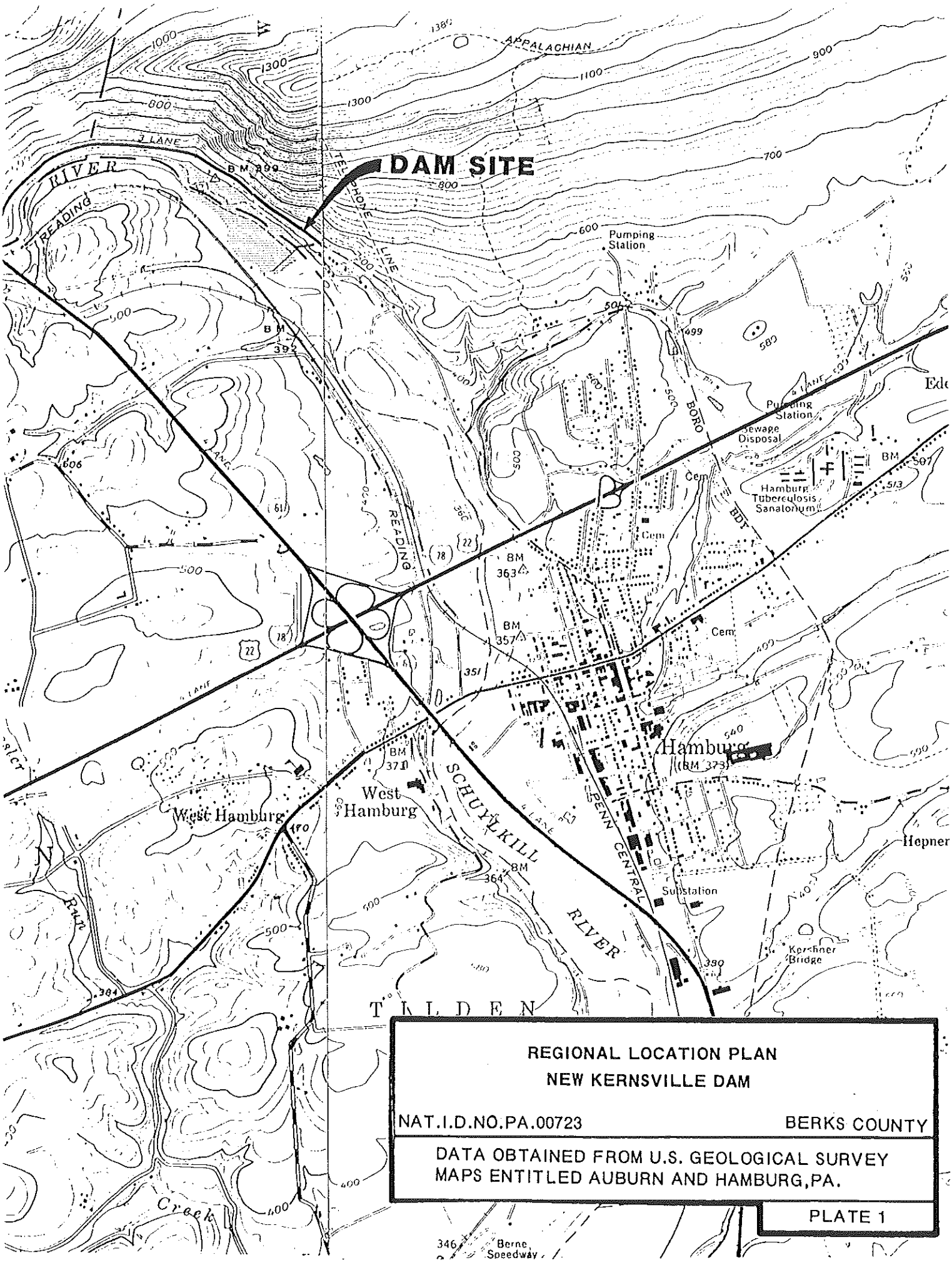
$= 7632 \frac{1.49}{0.035} \left(\frac{76.32}{716}\right)^{2/3} 0.00417^{1/2}$

$= 101,600$ cfs

therefore, weir is not expected to be submerged at max. spillway cap.

Spillway Adaquacy

As the spillway discharges more than 0.5 PMF but less than 1.0 PMF without overtopping the nonoverflow sections, the spillway is rated as "Inadequate" but not "Seriously Inadequate."

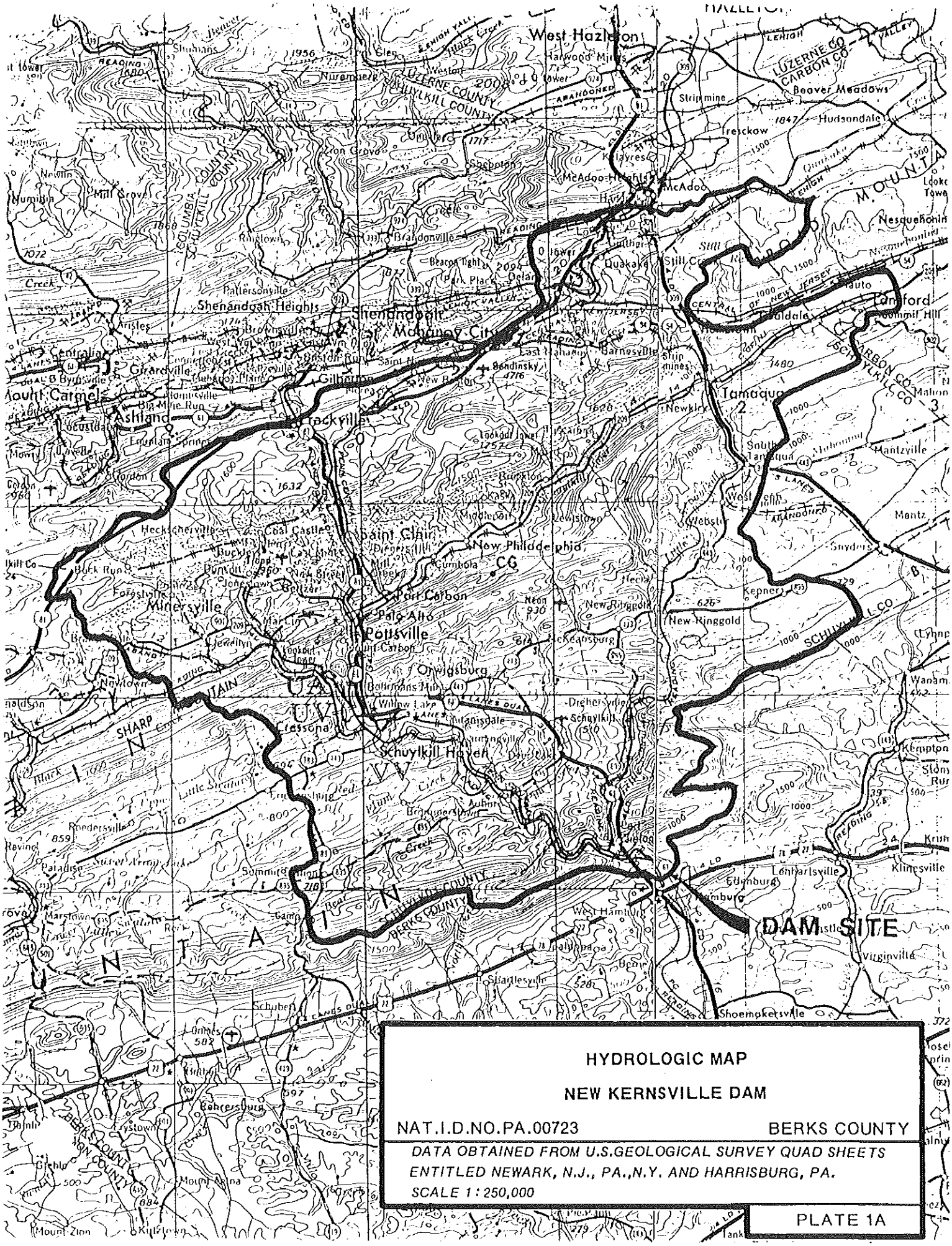


REGIONAL LOCATION PLAN
NEW KERNSVILLE DAM

NAT.I.D.NO.PA.00723 BERKS COUNTY

DATA OBTAINED FROM U.S. GEOLOGICAL SURVEY MAPS ENTITLED AUBURN AND HAMBURG, PA.

PLATE 1



HYDROLOGIC MAP

NEW KERNSVILLE DAM

NAT.I.D.NO.PA.00723 BERKS COUNTY

DATA OBTAINED FROM U.S.GEOLOGICAL SURVEY QUAD SHEETS ENTITLED NEWARK, N.J., PA.,N.Y. AND HARRISBURG, PA.

SCALE 1 : 250,000

PLATE 1A