Appendix G

CULTURAL RESOURCES

WEST VIRGINIA
Division of Culture and History

The Culture Center
1900 Kanawha Blvd., E.
Charleston, WV 25305-0300
Randall Reid-Smith, Commissioner
Phone 304.558.0220 • www.wvculture.org
Fax 304.558.2779 • TDD 304.558.3562
EEO/AA Employer

December 17, 2013

Jonathan J. Aya-ay
Planning Branch
U.S. Army Corps of Engineers
Huntington District
502 Eighth Street
Huntington, WV 25701

RE: Bluestone Dam Safety Modification Project
FR#: 14-188-SU

Dear Mr. Aya-ay:

We have reviewed the above referenced project to determine potential effects to cultural resources. As required by Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties," we submit our comments.

We have reviewed the above referenced intent to prepare a Supplemental Environmental Impact Statement (EIS) and Dam Safety Modification Report (DSMR) for the Bluestone Dam. Please keep in mind the Bluestone Dam was previously determined eligible for inclusion the National Register of Historic Places. We look forward to reviewing the new EIS and DSMR

We appreciate the opportunity to be of service. If you have questions regarding our comments or the Section 106 process, please contact Ernest Blevins, Structural Historian, at (304) 558-0240.

Sincerely,

Susan M. Pierce
Deputy State Historic Preservation Officer

SMP/EEB

MEMORANDUM OF AGREEMENT
AMONG
THE U. S. ARMY CORPS OF ENGINEERS, HUNTINGTON DISTRICT,
THE WEST VIRGINIA STATE HISTORIC PRESERVATION OFFICER
REGARDING
THE BLUESTONE LAKE DAM SAFETY ASSURANCE AND DRIFT AND DEBRIS PROJECTS, SUMMERS COUNTY, WEST VIRGINIA

WHEREAS, the U. S. Army Corps of Engineers, Huntington District (Huntington District), proposes to modify the Bluestone Dam, located in Summers County, West Virginia; and,

WHEREAS, the Huntington District has determined that the modification of Bluestone Dam to comply with modern safety standards and to allow drift and debris to pass efficiently through the dam, will have an effect upon a property eligible for inclusion in the National Register of Historic Places (National Register) and has consulted with the West Virginia State Historic Preservation Officer (WVSHPO) pursuant to the regulations 36 CFR Part 800 implementing Section 106 of the National Historic Preservation Act of 1966, as amended (16 USC 470 f);

NOW, THEREFORE, the Huntington District and the WVSHPO agree that the undertakings shall be implemented in accordance with the following stipulations in order to take into account the effects of the undertakings on historic properties.

Stipulations

The Huntington District shall ensure that the following measures are carried out:

1. Documentation of Bluestone Dam.

The Huntington District will develop a detail history of Bluestone Dam covering its planning, engineering, construction and its significance in the themes of law, politics, government, economics and conservation. The documentation will consist of a narrative report and include historic photographs, copies of original blueprints and designs, and photographs recording the structure's current internal and external appearance. The history will be reviewed and accepted by the WVSHPO.

2. Distribution of Documentation

Final copies of the documentation report will be distributed to the WVSHPO, Summers County Historic Landmarks Commission and Summers County Historical Society.

3. Public Outreach

Efforts will be made to inform the public about the significance of Bluestone Dam by revising the Corps web site to include historical information and historic photos of the dam, development of a brochure on the history of Bluestone Dam for distribution to visitors and school groups, and upgrade and improvement of displays at the Interpretive Center once these projects are complete.

4. Design

Incorporate into the Interpretative Center an area where visitors can view Bluestone Lake once the projects are completed.

5. Discoveries Without Prior Planning

If the Huntington District discovers historic properties or archeological sites without prior planning or unanticipated effects on historic properties or archeological sites are found after the Huntington District has completed the Section 106 process, the Huntington District will make reasonable efforts to avoid, minimize or mitigate adverse effects to such properties or sites pursuant to 36 CFR 800.13(b). If no construction has commenced, the Huntington District will consult with WVSHPO to resolve adverse effects pursuant to 36 CFR 800.6. If construction has commenced, the Huntington District will determine actions to take to resolve adverse effects, and notify WVSHPO within 48 hours of discovery. The notification shall describe the actions proposed by the Huntington District to resolve the adverse effects. WVSHPO shall respond within 48 hours of the notification and the Huntington District shall take into account his/her recommendations and carry out appropriate actions. The Huntington District will provide WVSHPO a report of the actions when they are completed pursuant to 36 CFR 800.13(b)3.

6. Summary Reports and Consultation

The signatories to this Agreement shall consult at least twice to review implementation of the terms of this Agreement. The review shall be three years and six years after the execution of this Memorandum of Agreement. Prior to each review, a report shall be provided by the Huntington District to the WVSHPO detailing how obligations pursuant to this Agreement have been carried out. If revisions to this Agreement are needed, the signatories to this Agreement shall consult to make such revisions in a manner consistent with 36 CFR Part 800.

7. Dispute Resolutions

Should the WVSHPO or the Huntington District fail to agree on the terms of this agreement the Huntington District shall, pursuant to 36 CFR 800.6(b)(v), request the Advisory Council on Historic Preservation (Council) to join the consultation and provide the Council with the documentation set forth in 36 CFR 800.11(g). If the Council decides to join the consultation, the Huntington District shall proceed in accordance with 36 CFR 800.6(b)2. If the Council decides not to join consultation, the Council will notify the Huntington District and proceed to comment in accordance with 36 CFR 800.7(c).

Execution of this Memorandum of Agreement by the Huntington District and the WVSHPO, its submission to the Council, and implementation of its terms, is evidence that the Huntington District has afforded the Council an opportunity to comment on the Bluestone Dam Project and its effects on historic properties, and that the Huntington District has taken into account the effects of the project on historic properties.

IN WITNESS WHEREOF, the parties hereto have caused their respective names to be signed by their duly authorized officers:

By: _____ Date: 17 Aug 2000
John D. Rivenburgh
Colonel, Corps of Engineers

By: _____ Date: 9/7/00
State Historic Preservation Officer
West Virginia

WEST VIRGINIA DIVISION OF
CULTURE AND HISTORY

August 31, 2000

Mr. James S. Everman
Chief, Planning Division
Department of the Army
502 Eighth Street
Huntington, WV 25701

RE: Bluestone Dam Safety Assurance Project
FR#: 94-314-SU-14

Dear Mr. Everman:

We have reviewed the draft Memorandum of Agreement for the above mentioned project. As required by Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties," we submit our comments.

Enclosed please find the signed original of the MOA for the Bluestone Dam Safety Assurance Project. Once you make a copy for your records, mail the original to the Advisory Council on Historic Preservation at the following address:

Advisory Council on Historic Preservation
1100 Pennsylvania Avenue, NW
Suite 809
Washington, D.C. 20004

We appreciate the opportunity to be of service. *If you have questions regarding our comments or the Section 106 process, please call Marc Holma, Senior Structural Historian for Review and Compliance, at (304) 558-0220, Ext. 723.*

Sincerely,

Susan M. Pierce

Susan M. Pierce
Deputy State Historic Preservation Officer

SMP: mh

Enclosure (1)

HISTORIC DOCUMENTATION REPORT

BLUESTONE DAM

HINTON VICINITY, SUMMERS COUNTY, WEST VIRGINIA

March 15, 2002

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Bluestone Dam
Summary

Location:
Across the New River at Bluestone Lake,
Hinton Vicinity, Summers County, West Virginia

UTM Coordinates: 17 / 510058 / 4165954

Present Owner:
U.S. Army Corps of Engineers, Huntington District

Present Use:
Flood Control Dam

Date of Construction:
1942-1948

Designer:
U.S. Army Corps of Engineers, Huntington District

Contractors:
Dravo Construction Company, Primary Contractor

Significance: Bluestone Dam is a large concrete gravity structure located on the New River. The dam's construction created Bluestone Lake, which contributes to flood protection on the New and Kanawha Rivers and, ultimately, on the Ohio River. Planning and construction of the dam led to a lengthy court battle that was settled only through appeal to the United States Supreme Court. The high court's decision established the federal government's right to control dam construction and hydroelectric power generation on navigable waterways. The case also established the New River as a navigable stream, even though the river was too shallow to support commercial traffic. Bluestone Dam is also representative of the ambitious public works projects undertaken by the federal government during the 1930s and early 1940s, and its massive, streamlined design is reflective of the Art Deco and Art Moderne design philosophies of the 1930s and 1940s. Paul Cret, an architect known for designs of bridge abutments, dams and government buildings of the 1920s-1940s, was responsible for the aesthetic component of the dam's design. Along with Tygart Dam, Bluestone Dam is one of West Virginia's best examples of concrete gravity dams of the 1930s and 1940s. The dam's builders also utilized recently developed concrete technologies, including air entrainment and artificial chilling of mixing water.

Project The Huntington District, U.S. Army Corps of Engineers sponsored the recordation of Bluestone Dam. Historic documentation was completed by Hardlines Design Company, Roy A. Hampton III, Primary Investigator/Historian, Mary E. Crowe, Historian, Amy D. Case, Editor.

SECTION 1: INTRODUCTION

Bluestone Dam is an important historic resource, and the history of its planning, development, and construction stretches from the early years of the twentieth century, to the New Deal era of the 1930s, through World War II and into the first years of the postwar era. As early as 1911-1912, a privately constructed hydroelectric dam was first planned for this section of the New River. In the 1930s, conflict arose between plans to construct a federally owned and operated power-generating and flood control dam, and private plans to build a for-profit hydroelectric facility. This friction led to a court battle that ultimately made its way to the United States Supreme Court. The justices' landmark decision established federal jurisdiction over the development of dams in waterways across the United States.

It was 1941 before the lawsuits were settled and the U.S. Army Corps of Engineers Huntington District began constructing the dam, by which time the United States was on the brink of entering World War II. Construction of the first 35% of the dam by Dravo Construction Company during the war era is a complex story of delays caused by wartime materials shortages and the discovery of large amounts of weak foundation rock beneath the site of the main dam. At the beginning of construction in 1942, the War Production Board made completion of Bluestone Dam a top priority because of the need for hydroelectric power, but the board soon lowered the dam's priority rating. The construction delays eventually led the War Production Board to despair of ever completing the project in time to produce power for the industrial war effort, and construction on the dam halted in 1944. After a long hiatus, construction resumed in 1946 amid the economic and social adjustments of the post-World War II era. The proposed hydroelectric facilities of the dam, which made its construction a high priority at the beginning of World War II, were never built. Except for the installation of its crest gates, the dam was completed by the end of 1948. The crest gates were installed in 1952.

Bluestone Dam is an impressive example of the type of massive concrete gravity dams built by the federal government from the mid-1930s through the end of the 1940s. The dam impounds water that forms Bluestone Lake, which serves as an important recreational facility and tourist attraction in Summers County, West Virginia. Most importantly, the dam is part of the ring of flood control facilities that protects the Kanawha Valley and ultimately the Ohio River Valley from the devastating floods that once ravaged the region. Finally, the dam is an impressive engineering landmark that dominates the landscape of the New River below Hinton, and is a reminder of the extensive federal flood control efforts that began with the New Deal and continued during the post-World War II era.

Due to severe problems with driftwood and trash accumulation in Bluestone Lake behind the dam, Bluestone Dam will be significantly altered over the next few years. One of the most significant alterations will be the completion of a tunnel and gate tower in the dam that will allow driftwood and trash to be flushed through the dam during high water conditions. This improvement will lessen the buildup of trash on Bluestone Lake and

will help protect the falls and rapids of the New River below Bluestone Dam from being obstructed by the driftwood and other debris that are sometimes flushed through during low water conditions.

SECTION 2: DESCRIPTION OF BLUESTONE DAM AND LAKE

General

Bluestone Dam is a straight, concrete gravity structure, with an overall length of 2,048 feet and a maximum height of approximately 165 feet above streambed. The width of the dam at its crest is 16 feet, while the maximum base width of the dam measures 200 feet. The main body of the dam has 55 concrete monoliths. The dam contains 942,000 cubic yards of concrete and 7,800 tons of steel. The dam is located on the New River, approximately 64.8 miles above the river's mouth. The dam impounds water that creates a long, narrow lake that extends ten and one-half miles up the New River valley.

Fig. 1. 1937 Location Map, Bluestone Dam.
Shows location of Bluestone Dam in relation to major cities, towns, and rivers in the region.
(Huntington District, U.S. Army Corps of Engineers)

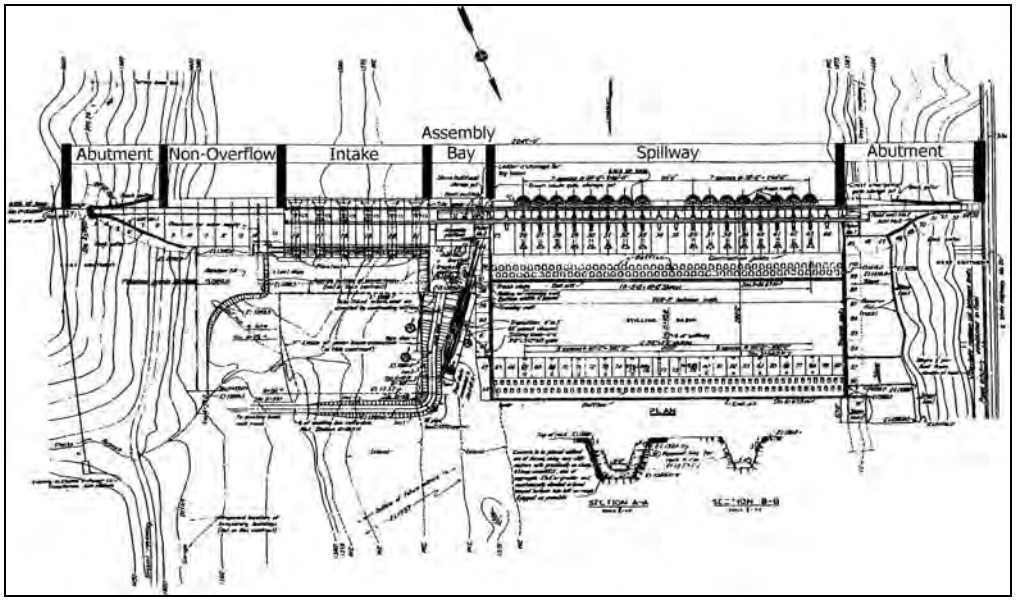

Fig. 2. Diagram of Sections of Bluestone Dam.
Adapted by Mary Crowe, Hardlines Design Company,
from 1936 plan of Bluestone Dam.

Detailed Description of Dam

The five major sections of Bluestone Dam are the east abutment, the non-overflow section, the intake section, the assembly bay area, the spillway, and the west abutment (see fig. 2). The east abutment is 201 feet long, and the non-overflow section measures 207 feet in length. The south slope of the non-overflow section is very steep, while the north slope is nearly vertical at the top but becomes more broadly sloped at the bottom. The east abutment and non-overflow sections are 16 feet wide at their crests. Directly west of this abutment is the 330-foot intake section of the dam, which features six "penstocks." These penstocks (see fig. 3) are large steel pipes that penetrate the concrete of the dam and that, if uncapped, would allow water to flow from the reservoir. The penstocks were intended to accommodate the six 30,000-kilowatt units for the hydroelectric plant originally planned for the dam, but this hydroelectric facility was never constructed. The penstocks are currently capped, to prevent water from flowing through them. This section of the dam is steeply vertical at the top and becomes more broadly sloped at the bottom on the north elevation. Immediately north of the penstocks is a small lagoon contained within an earth and rock dike. On top of this dike is an access road leading to the dam's main entrance at Pylon No. 2. The south face of this section of the dam has vertical walls that contain six bulkhead recesses, one for each of the penstocks.

Fig. 3. North Elevation of Dam, Intake Section Looking Southeast.
Five of the six penstocks are visible.

Fig. 4. North Elevation of Dam.
Detail with assembly platform section of dam at center.
Pylon No. 2 is visible at the right of the assembly platform.

West of the intake section is the dam's 142-foot wide assembly platform (see fig. 4). This section includes two concrete pylons and a multi-story assembly platform area. The assembly bay consists of the main door and entrance room on the first floor, storage rooms on the second floor, a machine room on the third floor, and the assembly platform on the roof. Pylon No. 1, on the east side of the assembly bay, contains a stairway leading from the machine room level to the top of the dam. Pylon No. 2, on the west side of the assembly bay, extends the entire height of the dam and contains an elevator and stairway. This pylon has recessed molded corners and a setback at the top that reinforces the Art Deco architectural lines of the dam. A trash chute also passes through Pylon No. 2, and an office and a control room with the electrical system's switchboard are located on the pylon's top floor. The trash chute in Pylon No. 2 dumps into a small channel positioned between the penstock lagoon and the main spillway.

West of the assembly platform area is the spillway section, which is the longest part of the dam (see fig. 5). This 790-foot structure features 16 sluices in the dam's base that can be opened to regulate the water level of Bluestone Lake. The sluices are concrete tubes that cut through the dam and that allow water to flow out of the reservoir. The sluice openings are located in the bottom portion of the north elevation of the dam, which is broadly sloped and curved. The south elevation of this section of the dam has a steep, nearly vertical slope. A semi-cylindrical reinforced concrete trash rack protects the entrances leading from the south elevation to each of the sluices.

Fig. 5. North Elevation of Dam Showing Spillway Section.

Operation of the reservoir is controlled through these 16 hydraulic sluices, which can release a total of 70,000 cubic feet of water per second when the reservoir is filled to an elevation of 1520 feet above mean sea level. Each sluice measures 5 feet 8 inches wide by 10 feet high. Each of the 16 sluices has two gates, one serving as the service gate and the other as an emergency gate that can be operated in the event that the service gate fails. The gate machinery is located in an operating gallery positioned just above the sluices (see fig. 6). In addition to the operating gallery, an inspection gallery runs the entire length of the dam beneath the sluices and a few feet above the foundation rock. A hydraulically powered hoist raises and lowers the gates to increase or decrease water flow through the sluice.

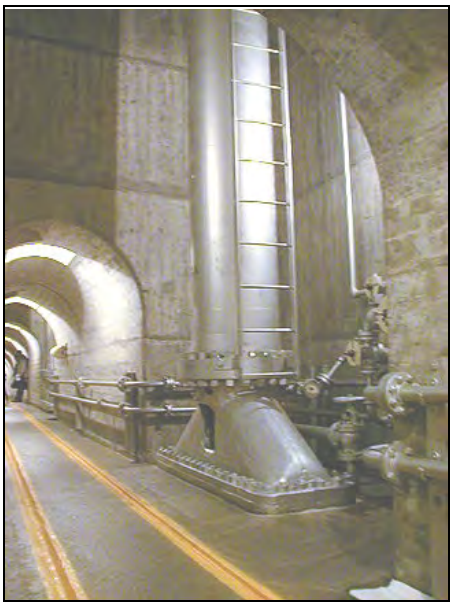

Fig. 6. View of Bluestone Dam Operating Gallery With Sluice Gate Hydraulic Hoist.

In their text on the design of dams, Hanna and Kennedy refer to sluice gates as “slide gates” and state:

> Slide gates are used for controlling the flow over spillways where the quantity of water to be handled is relatively small and the range of fluctuation is about 10 ft. or less. They are also used for relatively small discharges through outlets under heads up to about 120 ft. These gates are usually made of cast iron or cast steel in one piece or rolled-steel plates and sections. The frames of the cast gates are made of the same materials as the gate leaves, and the leaves are reinforced with horizontal and vertical ribs. The gates are operated with hoists.[1]

The sluices discharge into a stilling pool that extends 364 feet north of the dam. A 23-foot high stilling weir that extends the full width of the spillway section forms the northern edge of the stilling basin. Training walls approximately 50 feet in height flank both sides of the stilling basin. The stilling basin contains two sets of concrete baffles to slow the speed of the water, one set located just north of the sluices, and a second set positioned just north of the stilling weir. The spillway has a maximum discharge capacity of 430,000 cubic feet of water per second, and the spillway's stilling basin measures 798 feet wide by 347.5 feet in length.[2]

The spillway portion of the dam is also equipped with 21 steel crest gates at the top of the dam. Each of these crest gates measures 30 by 31 feet and can be opened to discharge excess floodwaters in extreme high water conditions. Each gate is supported on piers that are eight feet wide and that reflect Art Deco architectural influences in their curved, streamlined design. The crest gates are simple rectangular vertical lift gates, and an electric hoist lifts each gate individually via a series of cables attached to two pulleys at the top of the gate. An electric motor powers each gate machine, which consists primarily of a series of reduction gears, brake components, and other elements. A gantry crane, capable of moving along the entire length of the spillway and intake sections on top of the dam, moves emergency bulkheads and can raise and lower crest gates when the gate machinery is out of service.

Fig.7. Detail of Crest Gates and Gate Piers, North Elevation of Dam.

The west abutment section of the dam is 307 feet wide and includes a large multi-story pylon on its eastern edge. This third pylon is similar in external appearance to Pylon No. 2 and helps give the dam a sense of architectural balance. This third pylon contains storage rooms and a stairway. Two additional adits into the dam are situated in each abutment and lead to the dam's interior.[3]

The overall appearance of the dam is impressive, although the north elevation possesses much greater aesthetic appeal than the south elevation. The south elevation is fairly plain and functional in design, with nearly vertical walls punctuated mainly by the crest gates, the trash racks of the sluices, and the penstock bulkhead recesses. Like the north elevation, the south elevation is visually powerful in scale and massing, but lacks the north elevation's more pleasing composition and proportions. The long spillway section of the dam includes, on the north elevation, streamlined gate piers that thicken as they transition into the massive curved concrete ogee weir that makes up much of this portion of the dam. The curved weir surmounted by these tapering, streamlined gate piers lends a visually striking quality to this elevation.

Fig. 8. South Elevation of Dam, with Spillway Section in Foreground, Looking Northeast.

In contrast, the three tall pylons of the dam's north elevation counter the horizontality of the spillway section. The pylons feature sweeping vertical streamlined projections, corner recesses and distinctive setback tops. The arrangement of the spillway, the three pylons, and the projecting assembly platform section of the dam establishes a dynamic but balanced asymmetrical composition. Overall, the dam has a sense of mass that is related to the large scale, impressive height, and dramatic setting of the New River Valley and the surrounding hills. The proportions and Art Deco streamlining of the gate piers and pylons heighten the dam's scale and mass.

Fig. 9. North Elevation, Bluestone Dam.
View looking southeast from just north of west abutment.

Bluestone Lake and Surrounding State and Federal Lands

The purpose of Bluestone Dam is to store water in a large lake to prevent flooding along the New and Kanawha Rivers. Bluestone Lake is long and narrow in shape, and it extends approximately ten and one-half miles up the New River, and into the lower section of the Bluestone River. The depth of the reservoir at the dam reaches about 150

feet. The winter pool of the lake is approximately 9.5 miles long with a surface area of 1,800 acres. The winter pool stores an average of 36,500 acre-feet of water (an acre-foot is one acre of water one foot deep, or 325,850 gallons). The summer pool length of the reservoir is 10.7 miles, with a surface area of 2,040 acres and a storage capacity of about 36,500 acre-feet. Under maximum flood control storage pool conditions, the lake extends to 36.1 miles in length, spreads to a surface area of 9,180 acres, and contains a total of 631,000 acre-feet of water. The average pool level for the dam ranges between 1406 and 1410 feet above mean sea level, but at maximum capacity, the pool can rise to 1,520 feet above mean sea level.[4]

Federal property around Bluestone Lake has been designated as the Bluestone Wildlife Management Area. This area includes 17,632 acres of land and contains recreational facilities such as campgrounds and a rustic cabin area. A large area for public hunting has also been reserved at the upper end of the lake. A day and overnight camp operated by the Presbyterian Churches of West Virginia is also located within the area. The State of West Virginia has developed a portion of the federal land and adjacent state-owned lands as Bluestone State Park and Pipestem State Park. Bluestone State Park is located on the shores of Bluestone Lake, contains 25 cabins, 87 tent/trailer campsites, and provides boat rentals, hiking trails, and an accessible fishing pier. The U.S. Army Corps of Engineers manages operation of the dam and its immediate site, while the State of West Virginia, under a licensing agreement with the federal government, provides fish, wildlife, and forest management of lands around the lake in West Virginia. Federal lands located in Virginia are operated by the U.S. Army Corps of Engineers in cooperation with law enforcement and conservation officials of Virginia.[5]

Fig. 10. Bluestone Lake, Looking South from Top of Dam, March 2001.

SECTION 3: HISTORY OF BLUESTONE DAM: CONTEXT, PLANNING, AND DESIGN

Hinton, Summers County, and the New River Valley

Bluestone Dam is located in Summers County, West Virginia, near the county seat of Hinton, which is only about 15 miles from the border between Virginia and West Virginia. A mountainous topography dominates the area, which is punctuated by the New River gorge and other smaller valleys associated with the tributary streams of the New River watershed, including the Greenbrier and Bluestone Rivers. This area has a long history of occupation by humans, since the New River Valley provides the only natural pass through the Allegheny Mountains. Adena and Hopewell pottery has been found in the area, suggesting that these cultures inhabited the area. The Cherokee and Shawnee later occupied the region, when Euro-American explorers first penetrated the area.[6] A British expedition led by Thomas Batts and Robert Fallam reached the New River in 1671 and found evidence suggesting that earlier Euro-American traders had traveled through the valley.[7]

Euro-American settlement arrived slowly to this part of the New River Valley. Some New York settlers came to the area, but the French and Indian War decimated Euro-American settlements.[8] It was reported that the first Euro-American settlement in what is now Summers County may have been started by Andrew Culbertson of Pennsylvania around 1753.[9] There were many conflicts between Euro-American settlers and Native Americans during the 1760s and 1770s.[10] At the end of Lord Dunmore's War in 1774, the Cherokee ceded their claims to the area in the Treaty of Camp Charlotte. After these events, organized settlement of the area began in earnest in the 1770s, on the eve of the revolutionary war.[11] In the portion of the valley that is now part of Summers County, settlement proceeded slowly, and the area remained sparsely inhabited for many decades. The area was generally too rough and remote for most settlers.[12] Residents practiced subsistence farming here by the mid-nineteenth century, but the lack of good roads leading in and out of the area limited markets for surplus crops to the immediate vicinity.[13]

West Virginia achieved statehood in 1863, but Summers County was not established until 1871. Summers County was formed from parts of Monroe, Mercer, Greenbrier, and Fayette Counties by an act of the West Virginia State Legislature.[14] The county was named for George W. Summers (1807-1868), a noted legislator and jurist.[15] Hinton, the seat of government for Summers County, remained a very small community until the arrival of the Chesapeake and Ohio Railroad around 1870.[16] The disastrous 1878 flood damaged part of the town, but Hinton survived and was officially incorporated as a municipality under West Virginia law in 1880.[17] In 1868, area construction on the Chesapeake and Ohio Railroad encouraged the growth of Hinton and Summers County, as did the completion in 1878 of the Giles, Fayette and Kanawha Turnpike.[18] Local folklore also maintains that the legendary contest between John Henry and a steam drill occurred in 1872 during the construction of the Big Bend Railroad Tunnel in Summers County.[19]

With these developments, the transportation of livestock and crops to markets outside the immediate locale became more feasible. The raising of tobacco and hogs were soon the predominant economic activities that brought cash into the area. While coal mining was never widespread in Summers County, the migration of a large number of coal miners to surrounding communities created a larger market for agricultural products from Summers County. The coming of the railroad also encouraged industrial development by bringing jobs to the area and by introducing the timber industry into Summers County. The railroad allowed local farmers and craft workers to ship their goods to markets outside the area, and mass-produced goods from major urban areas could now be easily imported, replacing the handcrafted goods and materials that formerly dominated the region. [20]

The arrival of railroads led to a period of economic development in the area that lasted from about 1880 through the 1920s.[21] By 1908, Hinton featured a public school, wholesale hardware and grocery businesses, three banks, and three lumber and planning mills. The city also had extensive railroad facilities, including a two-story passenger depot, a freight depot, and a railway machine shop and roundhouse complex. It was reported that the C&O Railroad had invested over $1,000,000 in track, yards, and property in Hinton by 1908.[22] The population of Summers County in 1870 was reported as less than 4,000, but by 1880 it had grown to 9,033, and by 1900 it had reportedly grown to about 16,000.[23]

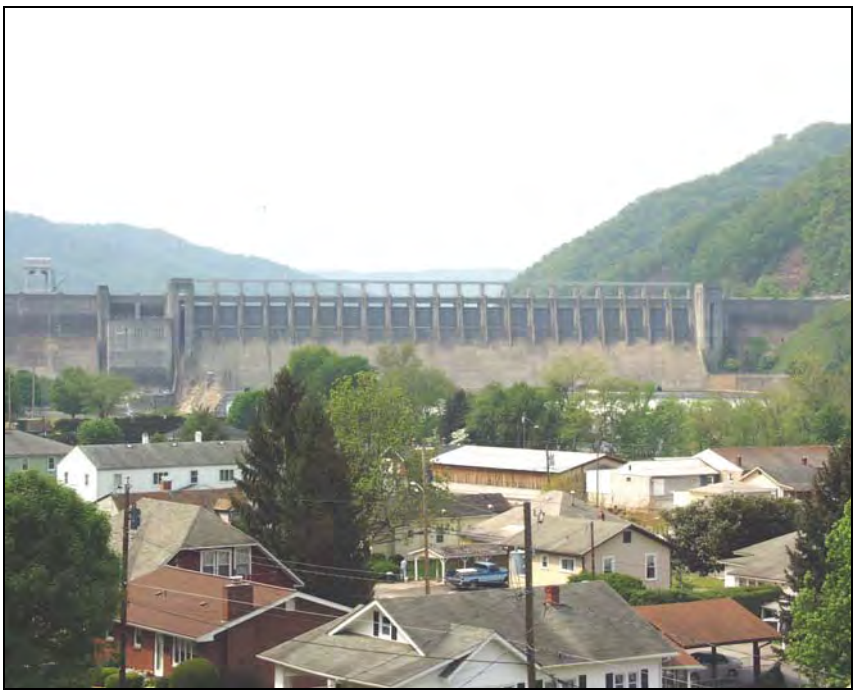

Fig. 11. View of the Bellepoint Residential Area of Hinton, with Bluestone Dam in Background.

However, Miller's 1908 *History of Summers County* indicated that the county was still predominantly agricultural at that time. The principal farm products were corn, wheat, rye, potatoes, oats, and grass. A number of sandstone quarries were operating in the area, producing both white and yellow sandstones, and a purplish brownstone. While the county had a number of stone quarries, it was not a major center for coal production, unlike other areas of the state. Only a few locations in Summers County were known to have coal deposits in 1908.[24]

Summers County continued to experience population growth in the early twentieth century. After 1930, possibly as the result of the economic hardships brought by the Great Depression, the population of Summers County began to decline.[25] In contrast, nearby counties of the New River basin experienced sharp population increases from 1930-1950, reflecting the growth of the coal industry. These counties, however, experienced a population decrease from 1950-1970, partly because of the increased mechanization of the coal industry.[26] The population of Summers County also declined during this period, bottoming out in the early 1970s. Growth returned to the area in the 1980s, and Summers County's population reached 15,875 residents by 1985. Much of this growth can be traced to the recreation and tourism industries.[27] The area currently benefits from tourism generated by recreational activities associated with Bluestone Lake, Pipestem State Park, and the nearby New River Gorge National Scenic River. Bluestone Lake is a popular fishing, hunting, and boating area, while the New River Gorge is a popular camping, hiking, and rafting destination.

Fig. 12. Current View of the New River, Looking North from Bluestone Dam. The scenic New River attracts tourists to Summers County each year.

Efforts to Construct a Private Hydroelectric Dam 1910-1936

While Bluestone Dam was eventually constructed by the U.S. Army Corps of Engineers and remains a federal facility today, private power companies originally planned to develop hydroelectric dams on the New River at the beginning of the twentieth century. A team of engineers designing a railroad line through the area may have generated the idea of building a hydroelectric power dam near the present Bluestone facility. By 1910, a group of residents in and around Hinton, West Virginia, commissioned drawings and a rough set of specifications for a dam. The inhabitants thought that the plans and specifications could be used to attract a utility company to the region to develop hydroelectric power. Based on the observations made by the railroad engineers, local residents chose a site about two miles upstream from the present Bluestone Dam and near the mouth of the Bluestone River.[28]

Hinton area residents presented their plan to the Appalachian Power Company, a private utility organized in May 1911 through the merger of different power plants along the New River.[29] The merger included a large number of coal-fired power plants, and the new company was capitalized at $25,000,000. Chartered in Richmond, Virginia, the company announced plans in June 1911 to build two hydroelectric dams on the New River in Pulaski County, Virginia, about 50 miles south of Hinton. Work began on a concrete dam near Grayson in Pulaski County on June 23, 1911. Apparently, the Appalachian Power Company had plans to build 11 or 12 additional dams at irregular intervals on the New River to produce large quantities of cheap electricity.[30]

The Appalachian Power Company showed immediate interest in building a hydroelectric dam at the Bluestone site. Geological testing at the Bluestone site soon revealed, however, that suitable foundation rock for the dam was located far beneath the surface at that location, complicating the construction of a dam there. The company identified a second possible site for the dam at Bull Falls, about nine miles upstream from the present Bluestone Dam.[31] In 1912, Appalachian Power sent a survey crew of engineers and laborers to Bull Falls and began negotiating for land for the future reservoir.[32] While the Bull Falls site was favorable in some ways, some engineers disliked its location above the mouth of the Bluestone River, because it would not take advantage of that river's flow to power the hydroelectric plant.[33]

The construction of a dam at Bull Falls did not advance beyond the survey stage, and state and federal governments meanwhile affirmed their jurisdiction over the construction of hydroelectric facilities. Perry and Lady's histories of Bluestone Dam claim that the passage of the West Virginia Water Power Act of 1913 halted work at Bull Falls. The Water Power Act allowed the state to regulate the rights, duties and powers of companies producing hydroelectric power, to authorize eminent domain powers for those companies, and to establish other regulations and policies. The legislation stated that all streams capable of producing electricity or other forms of power should be under the control and supervision of the state. The act also maintained, however, that the State of

West Virginia could not interfere with the federal government's authority over navigable streams. Perry states that the Appalachian Power Company tried to push through additional legislation permitting the company to build a Bull Falls dam without interference from the State of West Virginia. However, this legislation was not passed until 1929, with the approval of a compromise bill that facilitated hydroelectric development and protected the interests of the state.[34] A 1924 report written by a subsidiary of Appalachian Power only stated that the company applied to the Public Service Commission of West Virginia to develop a power dam in 1913. The Water Power Act was not mentioned.[35]

The West Virginia Power Company was formed in 1923 as a subsidiary of Appalachian Power to oversee planning and construction of the Bluestone/Bull Falls project. In late 1923, West Virginia Power commissioned Clark and Krebs, Engineers, of Charleston, West Virginia, to undertake a feasibility study and field investigation related to the proposed construction.[36] This study consisted of establishing a gauging station on the New River under the direction of the U.S. Geological Survey, re-checking older survey materials for accuracy, and revising area maps to reflect current conditions. The engineers undertook a survey of the New River between the Bluestone and Greenbrier Rivers to locate possible alternatives to the previously recommended dam site.

After considering potential alternatives, the company identified one site that warranted further investigation. The West Virginia Power Company referred to the originally selected dam site as the "Upper Site," which was Bull Falls. The report calls the selected alternative location the "Lower Site," which was the Bluestone site. The power company conducted further survey work at each of these sites, including core drilling to determine subsurface conditions. The field team also surveyed the land needed to accommodate reservoirs at each of the two locations. The goals of this survey were to assess the geological suitability of the land for a reservoir basin, the potential effect that the reservoir might have on the vicinity's mineral resources, and the value of the land that would be needed for the reservoir.[37] Finally, the team investigated the local availability of materials such as sand and quarry rock that would be necessary for the dam's construction. Given the extensive nature of this study, the West Virginia Power Company seems to have been very committed to building a hydroelectric dam on this portion of the New River.[38]

The West Virginia Power Company report of 1923 reflects the type of dam envisioned for the Bluestone project. The document describes the construction of a dam using "cyclopean concrete," a technique in which large, "cyclopean" limestone rocks or boulders were embedded in concrete during pouring.[39] This technique was a common construction option for early twentieth-century concrete dams, and was, for example, discussed in the planning of Liberty Lake Dam (Lower Girard Dam) near Youngstown, Ohio, in 1916-1917, although it was ultimately rejected. This method appears to have been a way to use concrete construction while retaining some of the stone masonry

techniques used in nineteenth-century dams. The cyclopean aggregate stones for the West Virginia Power Company dam were to have taken up about 25% of the dam's mass, with concrete making up the remaining 75%. Since concrete was relatively expensive in the 1920s, the insertion of large boulders in the concrete might have also been an economic measure.

Although the text of the 1923 report does not specify the exact type of dam, the description of cyclopean concrete suggests that the power company envisioned a concrete gravity dam. The report also included an elevation drawing of the proposed dam showing a large concrete gravity structure (see fig. 13). The drawing shows the north elevation of the dam, which was to feature a large powerhouse on the east side. The remainder of the dam was a long spillway area with three different sections. The east section of the spillway appears to have been planned with eight operable gates, while the west section would have featured 22 similar gates. In the center of this portion of the dam was a 13-gate section labeled as an "automatic spillway." The crest of the dam was somewhat higher in the "automatic spillway" section.[40]

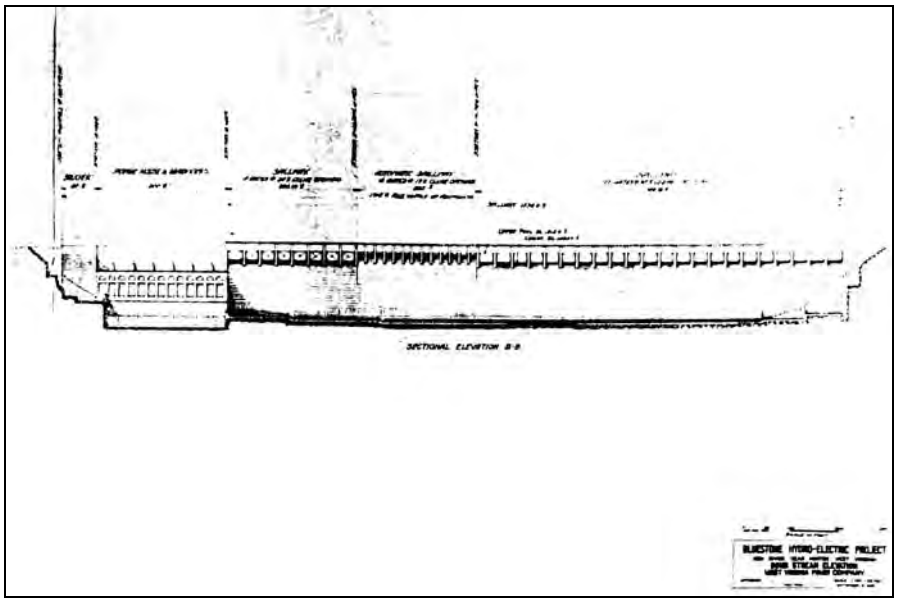

Fig. 13. Appalachian Power Company's Drawing of Proposed Bluestone Hydroelectric Dam (*Bluestone Development Report*, October 22, 1924).

Many builders of private power and reservoir dams during the 1920s selected buttress dam designs for their projects. Buttress dams consist of a series of piers supporting a thin, watertight concrete membrane. The thinness of a buttress dam's concrete columns and other elements required that these components be built using reinforced concrete, with steel rebar increasing the concrete's tensile strength. It is unclear why the West Virginia Power Company selected a gravity dam, but the site's geological conditions might have required this type of structure.

In 1923, engineer Major Milo P. Fox of the United States Army Corps of Engineers, Huntington District, held a series of hearings at Hinton, West Virginia, concerning the power company's application for a permit to build a 140-foot high dam on the New River, just above the present site of Bluestone Dam. Fox eventually recommended that the permit be granted because of the importance of the project in developing the area's power resources.[41] In the same year, the Federal Power Commission granted a preliminary permit to the West Virginia Power Company to develop hydroelectric power at the site.[42]

While the West Virginia Power Company conducted extensive studies related to construction of a dam at the Bluestone site, the company did not build a dam at this location during the 1920s. Perry states that the West Virginia Public Service Commission did not act on the company's permit application, and instead placed it on a "retired" docket until 1930.[43] This may explain why construction of the dam did not proceed in 1923, despite West Virginia Power's extensive surveying efforts.

In 1929, legislation amended the 1913 West Virginia Water Power Act and made it easier for the Appalachian Power Company and its subsidiary, the West Virginia Power Company, to build the Bluestone Dam project. The firm began developing detailed studies of the Bluestone site. U.S. Army Corps of Engineers sources indicate that the West Virginia Power Company completed additional core drilling at Bull Falls in 1929-1930. According to the Corps, the company determined that the Bull Falls site was geologically superior to the Bluestone site, but favored the larger reservoir capacity and easy access to railroad lines available at Bluestone.[44]

The West Virginia Power Company petitioned for a reinstatement of their application to build a dam at Bull Falls, and was allowed to submit an amended application that proposed complete utilization of the available fall within the portion of the New River affected by the project. The most sweeping amendment to the original West Virginia Power Company application was that the firm now proposed hydroelectric development at Bull Falls and at the present site of Bluestone Dam.[45] The company argued that the original plan for a single dam would interfere with Kanawha River navigation if the dam were operated in an economically feasible fashion.[46] In their amended application, West Virginia Power also envisioned construction of a third hydroelectric facility, the Claytor

Lake Dam at Radford, Virginia. Lady maintains that the coal industry, fearful of hydroelectric power development in the area, sued to delay construction of the West Virginia Power Company's Bluestone project. [47]

The West Virginia Power Company maintained that since the New River was not navigable, its hydroelectric dams could be built without the approval of the Federal Power Commission or other federal agencies. The U.S. Army Corps of Engineers and the Federal Power Commission argued, however, that the river was navigable, and that the construction of power dams on the New River was subject to federal regulation. This disagreement led to a lengthy court battle between the federal government and the West Virginia Power Company's parent organization, the Appalachian Power Company. This court battle delayed construction of a federal dam at the Bluestone site until 1942.[48] The Appalachian Power Company (now owned by American Electric Power) constructed a dam at Claytor Lake, but none was ever built at Bull Falls.

The West Virginia Power Company met federal opposition to its plans to build hydroelectric dams at Bluestone and Bull Falls, but two private hydroelectric dams were built on the New River in the 1930s. West Virginia Power's parent company, Appalachian Power, was able to construct Claytor Dam on the New River near Radford, Virginia, from 1937-1939. Between 1930 and 1936, the New-Kanawha Power Company built Hawk's Nest Dam on the New River 39 miles above Charleston, West Virginia. Hawk's Nest Dam cost $35 million, and contained a three-mile, thirty-foot tunnel that diverted part of the flow of the New River to a 135,000-horsepower capacity power plant that generated electricity for Union Carbide Corporation.[49]

Federal Reservoirs and Flood Control Program

The construction of Bluestone Dam was part of a federal campaign to construct reservoir dams, a trend that began in the 1920s and gained momentum during the 1930s and early 1940s. Presidential Executive Order 7183-A of September 12, 1935 authorized construction of Bluestone Dam. The facility was also part of a 14-reservoir plan for Ohio River Valley flood protection authorized by the Federal Flood Control Act of 1936.[50]

Flooding along major river valleys became an increasingly severe problem as urban populations grew along navigable rivers during the second half of the nineteenth century. As early as the 1850s, Charles Ellet proposed the construction of a series of storage reservoirs on the Ohio, Kanawha, Missouri and upper Mississippi basins to provide hydropower, benefit navigation, and control flooding. Congress, however, in 1857 rejected a series of detailed studies associated with the Ellet Plan, and engineer W. Milnor Roberts and Colonel William E. Merrill declared in 1870 that many of the engineering problems posed by the Ellett plan were unsolvable.[51]

One of the main objections Roberts and Merrill made to the Ellett plan was that Ellett proposed building reservoir dams over 100 feet high. Construction of high dams over running streams was a difficult undertaking in the post-Civil War era, and dam failures, most notably the 1889 collapse of the South Fork Conemaugh River Dam at Johnstown, Pennsylvania, lowered confidence in contemporary dam-building technology.[52]

The initial phase of federal involvement in reservoir dam construction came in 1902 with the National Reclamation Act. The Federal Bureau of Reclamation began building dams in the western United States to facilitate agricultural irrigation. The first multi-purpose high concrete dam built by the U.S. Army Corps of Engineers was Wilson Dam on the Tennessee River near Florence, Alabama, a dam begun in 1918 but only finished in 1926 because of interruptions related to World War I. Wilson Dam was intended to provide hydroelectric power and to provide extra water to maintain stable navigation pools on the Tennessee River Navigation System during low water conditions.[53]

While the U.S. Army Corps of Engineers began building Wilson Dam in 1918 for hydroelectric power and to provide water for the Tennessee River Navigation System, the Corps began constructing reservoir dams for flood protection only somewhat later. Federal revenue was limited during the nineteenth century, and the government hesitated to take on large and expensive flood control projects. The Corps of Engineers was involved in flood protection efforts during the nineteenth century, but these efforts were primarily directed towards the construction of flood control levees. However, a series of damaging floods in the early twentieth century, including the 1907 Pittsburgh flood, the Mississippi River floods of 1912, and the 1913 Miami River flood in Ohio, drew attention to the issue of flood control. Interest in the Ellett Plan was revived between 1907 and 1912, and the idea of building storage reservoirs on the Kanawha River was discussed. It was argued that dam technology had advanced considerably since Roberts and Merrill voiced their objections to the Ellett Plan, but a number of important figures, including Captain Frederick Alstaetter, the Wheeling District Engineer for the Corps of Engineers, still opposed the reservoir concept. General William Bixby, who served as Chief of Engineers for the Corps, believed that multi-purpose federal reservoirs could provide many benefits, but that the construction costs and expansion of federal powers needed to complete these projects could not be justified.[54]

Some progress was made towards federal involvement in flood control reservoir development in the early twentieth century. The Inland Waterways Commission was created in 1909 and recommended the development of a comprehensive federal plan for the nation’s rivers. In 1913, a severe flood damaged the central Ohio cities of Dayton, Columbus, Delaware, Zanesville, Chillicothe and Circleville. The flood also affected some communities along the Ohio River, including Parkersburg and Huntington, West Virginia. National attention once again focused on flood control, and the State of Ohio

passed a Conservancy Act in 1914 authorizing the formation of regional conservancy districts to deal with flooding and other water resource issues.[55] President Woodrow Wilson also ordered the formation of the Ohio River Flood Board to study the flooding problem and make recommendations. The board recommended that the authority of the federal government over rivers should be extended beyond navigation issues to include responsibility for flood control.[56]

The Ohio River Flood Board was also concerned that local governments might build flood control structures in a piecemeal fashion, without proper hydrological studies or consideration of the effects of these projects on nearby communities. The board recommended thorough river basin studies to gather reliable data that could be used for planning. In 1915, Congress approved a series of water resource studies for the Kanawha, Muskingum, and Scioto River basins, among other locations. The Corps of Engineers' Wheeling District submitted a report in 1916 that recommended the construction of storage reservoirs to protect the Kanawha Valley and identified 18 possible reservoir sites for future study. The United States' entry into World War I in 1917 then delayed implementation of the Kanawha study and other documents.

In the post-World War I climate of the early 1920s, there was new emphasis on the need to generate hydroelectric power. This led Congress to pass the Water Power Act of 1920.[57] In 1925, Congress directed the Chief of Engineers to produce cost estimates for the development of detailed water resource studies covering development of navigation, hydroelectric power and flood control in all of the nation's major river basins. The Chief of Engineers submitted cost estimates in 1926, and Congress approved them in 1927. Since the estimates were printed in House of Representatives Document No. 308, 68th Congress, these reports came to be known as the 308 Reports or the 308 Surveys.[58]

The 308 Reports outlined the development potential for each river basin for navigation, power production, and flood control. It represented a major shift by the U.S. Army Corps of Engineers from its past emphasis on navigation to a new focus that included multi-purpose water resource development. The 308 Surveys have been credited with laying the foundation for the ambitious water development programs that the U.S. Army Corps of Engineers undertook through the rest of the twentieth century.[59]

The 308 Surveys are important in the history of Bluestone Dam, since construction of the dam was one of four large storage reservoir projects recommended by Huntington District Engineer Major Fred W. Herman in a 308 Report covering the Kanawha River and submitted to Congress in 1932. The report stated that flooding in the Kanawha Valley, which had been damaging and costly in the past, could be significantly reduced by the construction of these reservoirs.[60] With industrial development and a growing population in the Kanawha Valley, construction of flood control reservoirs for the area

was an important priority. Congress nevertheless in 1932 still approved major flood control construction projects only if they also benefited navigation. Major Herman suggested that plans for private hydroelectric dams in the area could be modified to provide flood protection as well.[61] Eventually, Congressman John Kee of Bluefield, West Virginia, led a drive to build a federal reservoir dam on the New River in West Virginia for power production and flood control. Kee's efforts were opposed by some citizens of the area and by the Appalachian Power Company, which was trying to build a private hydroelectric dam at the Bluestone site.[62]

As debate continued over the construction of Bluestone Dam, progress was made in securing authorization for the first high concrete dam built in West Virginia by the U.S. Army Corps of Engineers. The New Deal's 1933 National Industrial Recovery Act (NIRA) allocated funds for the construction of dams and other public works projects to alleviate unemployment and to spur economic recovery from the Great Depression. The Public Works Administration (PWA) controlled construction of NIRA projects. The Pittsburgh Flood Commission lobbied the PWA to fund construction of nine dams that would relieve flooding in the Pittsburgh area.[63] In 1933, Major William Styer of the U.S. Army Corps of Engineers, Pittsburgh District, recommended construction of a reservoir dam on the Tygart River to assist in flood control and to provide supplemental water supply to the Monongahela River navigation system during low water. The PWA approved Styer's recommendation in October 1933 and allocated funding for the construction of Tygart Dam in January 1934. The first great concrete high dam of the Ohio River watershed flood protection system was then built near the town of Grafton in Taylor County, West Virginia, between 1934 and 1938. Funding and construction of Tygart Dam represented the first step in a long process to provide a series of reservoir dams that would eventually prevent billions of dollars in flood damage in cities along the Allegheny, Monongahela, Kanawha and Ohio Rivers. Authorization for the construction of Bluestone Dam came soon after construction began on Tygart Dam, but because of lawsuits and political wrangling, the actual building of Bluestone did not begin until 1942, four years after the completion of Tygart Dam. Construction at Bluestone was further interrupted during the United States' involvement in World War II, with the War Production Board's order on December 31, 1943 to bring work to a halt. Construction completely stopped in early 1944, and resumed only in January 1946.[64]

Early Huntington District Planning Studies and Field Surveys for Bluestone Dam 1935-1936

The U.S. Army Corps of Engineers first expressed interest in building a dam at the Bluestone site in 1932 as part of the 308 Report on flood control for the Kanawha River Valley. After strong lobbying by Congressman Kee and others, $164,000 was appropriated in August 1935 from federal emergency relief funds for surveys, foundation

exploration, and design work. Executive Order 7183-A of September 12, 1935 authorized the construction of Bluestone Dam for both flood control and power purposes. The executive order also allotted $1,000,000 of funds from the Emergency Relief Appropriation Act of 1935 for the Bluestone project. The executive order directed that $800,000.00 of the allocated funds were to be used for the acquisition of land necessary for the project.[65]

Perry indicates that a Huntington District survey party was sent to Hinton in 1935. A Lieutenant Lakin reportedly headed this party, which was first headquartered in the Hinton Post Office. After a short time in the post office, the survey team determined that it needed more space and received permission from the Elks to move their headquarters to the Hinton Elks Lodge. Perry reported that the survey party remained in the Hinton area until late 1936.[66]

The Huntington District survey party carefully examined the area along the New River above Hinton. Perry indicates that they submitted the following statement regarding the selected dam site:

> The final site chosen was approximately one mile above the Mouth of Greenbrier, three miles above the C&O Railroad station in Hinton. The New River has its sources in the Blue Ridge Mountains of North Carolina near the Tennessee line. The river flows northeasterly into Virginia, until it reaches the horseshoe curve near Radford, Virginia, where it turns northwest and flows in this general direction through West Virginia to its junction with the Gauley River to form the Great Kanawha, 91 miles above its mouth at Pt. Pleasant, West Virginia. Throughout its entire course the river flows through rugged, mountainous country. Its valley is narrow and the flood pain is a little wider than its river channel which varies form 200 to 1,000 feet in width. The grade of the riverbed is very steep and has an average slope of nine feet per mile for its entire 341 miles.
>
> The Bluestone Dam project was located in the section having the flattest slope, of four feet per mile. The Sandstone and shale formation for a distance of approximately 40 miles upstream from the site of the dam is flat shale while above and in adjacent country the rock sometimes stands on end. The Geological Survey Branch of the Department of the Interior has discovered that there is more water flowing in the New River below Radford Dam than at the Bluestone Dam site. There is the probability that the New River may be losing some of its water through the rock standing on end into subterranean streams. Sufficient data has not been collected to determine which direction the water may be flowing, but the

Geological Department is of the opinion that water is seeping through to the Greenbrier River but have no bona fide evidence to substantiate this theory.

The mean annual rainfall of the New River watershed above Hinton, for a period of 54 years, is 40 inches. The mean annual varies from 27 inches in 1930 to a maximum of 52 inches in 1901. The rainfall is heaviest in the upper region of the basin which has recorded some of the greatest precipitation on record in the country. In 1916 it is recorded, 23 inches of rain fell in 24 hours at Alta Vista Pass, North Carolina.

The average daily discharge of the river at the Bluestone Dam site is 6,000 second feet, the minimum recorded is 600 second feet and the maximum of 280,000 second feet occurred in 1901. The flood of 1878, which is recorded as the greatest flood on record discharged 276,000 second feet, but did more damage because the Greenbrier River was in flood stage at the same time. Historians state that the old Summers County Court House was located in the center of that part of Hinton now known as Bellepoint, and that water not only washed the Court House away, destroying all of the records but swept the entire valley of all buildings, principally farm houses and buildings. The Greenbrier River is over 100 miles in length. It originates in the northern part of the state, hence it is remote that both rivers should be in flood stage at the same time. For the purpose of design the Army Engineers estimated that the New River under the most severe rainfall conditions could produce a 24 hour run off amounting to 36,000 second feet, with a peak discharge of over 400,000 second feet. Computations made by private as well as governmental agencies indicate that the Bluestone Dam built to its entire height would hold back approximately 15 feet of water in the Kanawha River Valley below, during a flood of major proportions.

The lower 25 miles of the Bluestone Dam reservoir is unusually free of utilities and natural growth. There are no railroads or well improved highways, a comparatively small amount of agricultural land, no minerals or natural resources, and very little usable timber. In the upper end of the reservoir, 2 first class railroads, a steam power plant, a few bridges and towns are located at low elevations in the valley. The elevation of these improvements of 1520 is the controlling height to which the dam can be built, without considerable expense of relocation. The reservoir when filled to its crest will extend from Hinton, West Virginia, to Narrows, Virginia, a distance of about 36 miles. On the left bank the reservoir will extend up the Bluestone River a distance of 7 miles and on the right bank,

> Indian Creek will be inundated for a distance of 5 miles. Back water in other tributaries will be negligible. Considering its length the average width of the reservoir is small. The depth of the water at the dam will be 150 feet and the surface area at full pool will cover 9 thousand acres.
>
> The Army Engineers made extensive investigation of the dam foundation by core drilling 74 holes varying from 2 to 30 inches in diameter. The 30-inch holes were drilled to permit geologists to descend and obtain a true picture of the sandstone shale formation. One 30-inch hole in the right bank went to a depth of 60 feet below the rock surface.
>
> The dam will rest on hard, fine-grained sandstone from 60 to 90 feet thick and will tie into beds of shale, sandstone and impure beds of limestone at the abutments. The engineers and geologists are satisfied with the tests which indicate that the Bluestone Dam site is satisfactory for a high lift concrete gravity dam.
>
> In order to attempt to make the dam more attractive to electrical power consumers, a hydro-electric installation is provided. The engineers estimate that the dam when operated as a combined power and flood control project will eliminate approximately 82% of the flood damage on the New River and the Great Kanawha River below the dam. It will have additional benefit by storing a portion of its surplus run-off for purging the New River and Great Kanawha River, during summer periods of low water as well as helping to maintain the pool in the Ohio River. It will also provide for a steady flow of water to the 175,000 H.P. hydro-electric plant at Hawk's Nest, which suffered during the drought of the Summers, Fall, and Winter of 1934. The reservoir can also be deemed beneficial as a rest haven for migratory water fowl.[67]

As indicated above, Corps survey work at the Bluestone site during 1935-1936 included a large amount of core drilling to investigate the suitability of the area's bedrock for supporting a concrete gravity dam. Back at the Huntington District Office, reports on the hydroelectric potential of the site and the flood control needs of the area were being assembled. The Huntington District issued a definite project report on Bluestone on December 1, 1936, and adopted plans to construct a concrete gravity dam rising to a height of 165 feet above the streambed. This proposed dam was planned at that time to impound a minimum of 623,000 acre-feet of water. The height of the dam was limited by the need to avoid flooding a steam generating plant, a major highway, and a number of bridges in the upper portion of the reservoir area.[68] Most of the primary construction drawings for the dam are dated December 1936, and may have been completed at that time in connection with the December 1 issuance of the definite project report for Bluestone.

Some adjustments in the location of the dam were made based on the Huntington District's geological investigations. Core samples at the original proposed location of the axis of the dam revealed heavily weathered sandstone in areas close to the proposed location of the dam. This defect was serious enough that the proposed location for the axis of the dam was subsequently shifted 200 feet downstream. This shifted location would serve as the final site of the dam once construction started. Some core samples from the area were also subjected to laboratory analysis to determine the strength of the foundation stone. Although the site was ultimately deemed a suitable location for a high concrete dam, a large inflow of water occurred during drill testing of rock in the area proposed for the intake area of the dam. It was recommended that additional drill testing be completed in this area during construction.[69] In terms of geology, it was found that the area was composed of interstratified layers of shale and sandstone. Because of geological disturbances, it was determined that much of the rock in the area had vertical fissures and other gaps and crevices.[70]

Court Struggle 1935-1940

Even before the Huntington District began its planning and geological studies for Bluestone Dam in 1935-1936, two conflicting views had developed around the future of the New River in Summers County, West Virginia. In the early 1930s, the Appalachian Power Company was promoting plans through its subsidiaries, the West Virginia Power Company and the Virginia Power Company, to build two hydroelectric dams near what is now the Bluestone Dam site. The company also wished to build a third dam on the New River near Radford, Virginia.[71] In contrast, Congressman John Kee of Bluefield, West Virginia, had been leading a campaign in the early 1930s to promote construction of a multi-purpose federal dam at the Bluestone site that would generate hydroelectric power and serve as a flood control facility.[72] After years of litigation, the United States Supreme Court finally resolved this growing conflict in a decision that reaffirmed federal jurisdiction over the nation's waterways and river commerce, including navigation, hydropower development and flood control.

From the beginning of serious efforts to build the Bluestone Dam, a complex legal dispute arose over the definition of a stream's navigability and the extent of federal power to regulate dam construction on a given waterway. The Appalachian Power Company's position was that the New River was not a navigable waterway and therefore did not fall within the jurisdiction of the Federal Power Commission (FPC) as outlined in the commerce clause of the United States Constitution. Federal authorities disagreed, and in 1932 the Huntington District U.S. Army Corps of Engineers submitted a report to Congress in which Bluestone Dam was one of four large reservoirs recommended for flood control and power development in the Kanawha Valley.[73]

The dispute over the New River's navigability was rooted in earlier federal legislation. The River and Harbors Act of 1899 forbid the construction of any dam on navigable waters without the consent of the U.S. Congress. This legislation had the effect of tying federal regulation of rivers and streams to the issue of navigability. Then, in 1920, Congress enacted the Federal Water Power Act, which authorized the Federal Power Commission to license the construction of hydroelectric dams. The act stated that parties who wished to build a dam in a non-navigable stream needed to file a declaration of intent with the Federal Power Commission. The commission would investigate the project and determine whether or not it affected interstate or foreign commerce interests. If the commission determined that the dam would affect these interests, the party would have to obtain a federal license before construction could move forward. If the commission determined that these interests would be unaffected, permission would be granted to proceed with the project without a federal license.[74]

On June 25, 1925, the New River Development Company (an affiliate of American Gas and Electric, the parent company of Appalachian Power) filed a declaration with the Federal Power Commission to build a hydroelectric dam at Radford, Virginia. The commission asked that the Chief of Engineers of the U.S. Army Corps of Engineers submit a report on the project and its potential impact. This report stated that the New River was navigable, and that the dam at Radford, if not properly operated, could adversely affect navigation on the Kanawha River. The report recommended issuing a license for the project, as long as control was maintained by the United States. After the commission requested a second review of the project, the Chief of Engineers issued a second report concluding that the New River was not navigable in its present condition, and that the proposed power dam project would not adversely affect navigation on the Kanawha. After a number of hearings and meetings on the subject, the Federal Power Commission ruled that the New River was not "navigable" as this term was defined in the Federal Water Power Act, but that the project would affect the interests of interstate and foreign commerce. The commission tendered a license to the Appalachian Power Company in July 1927, but in April 1928, the company refused the license, stating that a number of conditions in the license were unrelated to navigation interests.[75]

In February 1930, the Appalachian Power Company stated that its Radford project was not within the jurisdiction of the Federal Power Commission, but also offered to accept a "minor part" license from the commission that would only regulate issues that would affect federal navigation interests. On December 22, 1930, the commission began functioning under new laws that gave it additional independence. In April 1931, the commission rejected the "minor part" license concept. In response, the Appalachian Power Company took legal action against the commission to restrain interference in the

use of the company's property, but the case was eventually dismissed. While this case was pending, the Federal Power Commission adopted a resolution stating that the New River was navigable from its mouth to Wilson Creek in Virginia.[76] The Appalachian Power Company had therefore already taken legal action at the beginning of the 1930s to avoid federal regulation of its proposed hydroelectric dam construction projects on the New River, and the navigability of the river was being debated as part of this conflict.

A number of events in the mid-1930s escalated the level of legal conflict over dam construction rights on the New River. Around June 1, 1934, the Appalachian Power Company began construction on a dam at Radford, Virginia. Federal authorities filed for an injunction against this dam's construction on May 6, 1935, arguing that the building of a dam on that site was permissible only under license from the Federal Power Commission (FPC). The government's attorneys argued further that the New River was navigable, that the power company's proposed dam would obstruct navigation and adversely affect commerce, and that Appalachian Power was in violation of the Rivers and Harbors Act and the Federal Water Power Act.[77] A ruling in federal district court found in favor of Appalachian Power, stating that the river was non-navigable and therefore not subject to the FPC's jurisdiction, that the company's dam would not impair the navigable capacity of the Kanawha or its tributaries, that the FPC's findings were subject to judicial review, and that the Commission's effort to impose licensing restrictions on the power company was unlawful.[78]

Meanwhile, the U.S. Army Corps of Engineers had been advocating construction of a federal hydroelectric and flood control dam at the Bluestone site. Executive and legislative measures promoted the federal position that the United States government exercised ultimate jurisdiction over the Bluestone project. The Roosevelt administration announced that the Bluestone Dam and Reservoir would provide flood control, hydroelectric benefits and a more even flow of water on the Kanawha River. According to the administration, this would improve navigation on the Kanawha, control flooding on the New, Kanawha and Ohio Rivers, and reduce pollution for downstream cities and towns. The sale of hydroelectric power generated by the dam would then offset the project's construction costs. On September 12, 1935, Roosevelt ordered the Secretary of War to proceed with the construction of a federal dam at the Bluestone site, using funds from emergency relief appropriations.[79] In addition to presidential authorization, Congress included appropriations for the Bluestone project in the Flood Control Acts of 1936 and 1938.[80] In 1936, the Huntington District set up a field office at Hinton, West Virginia, and began surveying conditions at the Bluestone site. Two Civilian Conservation Corps camps were also established in the area to provide labor for clearing the dam site of trees and other debris.[81] Construction on the new federal dam seemed to be under way.

The Appalachian Power Company quickly affirmed its opposition to the government's construction plans and insisted that the New River was not a navigable waterway. The West Virginia Power Company, a subsidiary of Appalachian Power, obtained its first injunction in 1936 to prevent the construction of a dam and reservoir by federal authorities. Specifically, when the government sought to condemn land for the dam in April 1936, the West Virginia Power Company obtained an injunction from the Southern West Virginia District Court forbidding the act of condemnation on grounds of unconstitutional delegation of powers.[82] Federal Judge George W. McClintic was responsible for the ruling against the government. The government then appealed the district court's decision to Federal Circuit Court. In September 1937, the circuit court ruled that the Flood Control Act of 1936 made the issue of the legality of federal construction of Bluestone Dam irrelevant. However, the West Virginia Power Company soon filed a suit challenging the circuit court's ruling.[83]

Meanwhile, in response to challenges to the government's authority to oversee and regulate dam construction over a United States waterway, the U.S. Army Corps of Engineers had been collecting evidence to demonstrate the navigability of the New River. This evidence included historical data showing that the river had been navigable since pioneer days, and a demonstration that the river had the potential to be developed into a waterway suitable for commercial navigation. The overall goal of federal efforts was to demonstrate that the 111-mile stretch of the New River from Allisonia, Virginia to Hinton, West Virginia, could be used for transportation and commerce.[84]

The Huntington District found extensive evidence that the New River had been used for transportation during the nineteenth century. The Corps documented that in 1812 Chief Justice John Marshall led a delegation down the New River to determine possible navigation improvements that would enable the New River to support steamboat traffic. In 1819 the Virginia Assembly commissioned a survey of the river that included a 55-mile upstream voyage from the mouth of the Greenbrier to the mouth of Sinking Creek. A surviving Civil War veteran volunteered his recollections that the Confederate Army used the New River to transport supplies, and in 1861 the General Assembly of Confederate Virginia appropriated $30,000 to improve river transport. An 1872 report by the Corps documented a mile-by-mile survey of the New River from above Allisonia to the mouth of the Greenbrier River, a study that was the basis for federal improvement plans of the 1880s. The Huntington District also produced records from the 1880s documenting that steamboats and keelboats had traveled on the New River at that time. Annual reports by the Chief of Engineers during the 1870s and 1880s supported the Corps' position that the New River was a navigable waterway. Improvements executed from 1877 to 1883, before the dominance of the railroad, opened the river to transportation by the iron and timber industries and decreased the isolation of some mountain communities by linking them to keelboat or steamboat lines.[85]

In a final demonstration, Patrick A. Gragnon and four other men ascended the New River in a sixteen-foot boat powered by an outboard motor. The team pushed off from Hinton, West Virginia, and landed at Allisonia, Virginia, after several days of rough travel. It was necessary to pull or push the boat for about one and one quarter miles traveling upstream, and for only a few hundred feet going downstream. The journey was undertaken in July 1936, when the river was at its normal summer low water stage. The Corps of Engineers cited this journey as evidence that the New River remained a navigable stream in 1936.[86] In 1939, the federal government made a second attempt to condemn the land needed for Bluestone Lake, but the West Virginia Power Company obtained a second injunction in federal district court to block the Corps of Engineers' construction plans. In September 1940, the case went to the United States Circuit Court of Appeals in Richmond, Virginia, where the appellate court concurred with the district court in declaring the New River non-navigable and therefore outside the FPC's jurisdiction.[87] As a result, lawyers for the two sides in the dispute argued *United States vs. Appalachian Power Company* before the United States Supreme Court on October 14 and 15, 1940.[88] While the evidence introduced was the same as in the previous two cases, the high court arrived at a different interpretation of the physical characteristics of the New River. The Supreme Court's majority decision referred to the "conventional rule that factual findings concurred in by two courts will be accepted by the Court unless clear error is shown."[89]

Nevertheless, a majority of the justices departed from this guideline on the grounds that standards of navigability were not absolute formulas always applicable to every waterway at all times, but that each case had to be considered in light of relevant public and private interests.[90] The court also emphasized that the actual condition of a waterway was not the only criterion by which its navigability should be judged, but that the potential for developing the river into a viable transportation route had to be taken into account: "To appraise the evidence of navigability on the natural condition only of the waterway is erroneous. Its availability for navigation must also be considered." The need to construct navigational aids to render a river feasible for transportation did not prevent a stream from being defined as navigable, and once rendered navigable, "a waterway remains so." The court went on to say that, "Nor is it necessary that the improvements should be actually completed or even authorized. The Power of Congress over commerce is not to be hampered because of the necessity for reasonable improvements to make an interstate waterway available for traffic. . . . It is merely that improvements make applicable to certain waterways the existing power over commerce."[91]

The high court therefore supported the idea of the federal government's eminent authority over the` nation's rivers, whether or not those streams were currently developed to their fullest potential. As for the lapse in the New River's development during the later nineteenth and twentieth centuries, the Court responded, "Even absence of use over long periods of years, because of changed conditions, the coming of the railroad or improved highways does not affect the navigability of rivers in the constitutional sense."[92] The

decision recognized the documentation offered by the U.S. Army Corps of Engineers regarding the river's development during the 1870s and 1880s as evidence of the waterway's navigability.[93] The Court also cited legal precedents affirming governmental sovereignty in cases involving authority over navigable waterways and the resolution of disputes over resources around or within those rivers.[94]

The ramifications of this important case extended far beyond the bounds of the New River projects, including Bluestone Dam, that were affected by the ruling. The court's decision prioritized federal control over the nation's waterways and over the actual or potential commerce exercised on those rivers. The ruling also confirmed the federal right of eminent domain in acquiring and developing the land necessary to support the transportation network and hydroelectric potential of the nation's waterways, and it established the federal government's central authority in decisions affecting flood control measures.

The case also had implications in the perennial issue of states' rights. Forty-one state governments including West Virginia, Virginia, and Kentucky, filed amicus briefs in the Supreme Court case supporting Appalachian Power's contention that the New River was not navigable and not under federal jurisdiction. The individual states maintained that regulation of rivers like the New that were not currently capable of supporting commercial navigation should be regulated by the states, and not be federal authorities. The Supreme Court decision meant that states no longer had primary authority to regulate rivers like the New, but would have to submit to federal oversight of these rivers.[95]

On December 16, 1940, the Supreme Court overturned the decision of the two lower federal courts and found that the New River remained a navigable waterway.[96] This decision supported the constitutionality of the federal government's construction of the Bluestone Dam and Reservoir and cleared the way for the Corps' acquisition of the construction site. On November 10, 1941, the Supreme Court refused the Appalachian Power Company's request for a rehearing of the case.

Appalachian Power lost the Supreme Court case and was barred from building a hydroelectric dam at Bluestone. However, the case did not stop the company from proceeding with plans for a hydroelectric dam on the New River at Radford, Virginia. In 1937, Appalachian Power began construction of Claytor Dam near Radford, and the dam's hydroelectric plant began operation on August 1, 1939. The Federal Power Commission did not grant a license for Claytor Dam until 1943, but the license was made retroactive to July 1, 1931. American Electric Power renewed the fifty-year license in 1981 and currently owns and operates Claytor Dam.[97]

Design of the Dam

Twentieth-Century Concrete Dam Types

Engineers of the Huntington District U.S. Army Corps of Engineers designed Bluestone Dam. The 1949 Final Report for the dam states that the dam was designed by the Engineering Division of the Huntington District under the direction of the Huntington District Engineer, assisted by a "board of eminent consultants."[98] The Chief of Engineers, U.S. Army, approved the design of the dam. The final report also states that the preliminary design and cost studies for the dam considered a number of design alternatives. All of the alternatives for the dam's construction were also concrete masonry dam types, including the multiple arch, massive buttress, and round-head buttress dam types. The report also states: "the selection of the straight gravity type dam was concurred in by all concerned with the design of the project, including all members of the Board of Consultants."[99]

Dams are generally divided into two major categories. The first type is the gravity dam, which resists water pressure by its sheer mass. Gravity dams are designed so that the buildup of earth, rock, concrete, or masonry is great enough that water stored behind the dam cannot push it downstream.[100] In contrast, the second major category of dams, the structural dam, contains much less material than a gravity dam of comparable size. Structural dams rely on their shape to provide stability, not on sheer bulk or mass. The major types of structural dams used in the United States are the arch dam, which is composed of a thin curved arch, and the buttress dam, which consists of a series of buttresses supporting a concrete membrane.[101] In the 1938 publication "The Design of Dams," the authors state that the various forms of buttress dams required less concrete than solid-gravity dams, could often be completed in less time, and were sometimes less expensive.[102] The authors describe solid gravity dams as the most prevalent type of concrete dam, except in cases where narrow canyon widths made an arch dam more practical.[103] Arch and buttress dams could be built using less concrete than a gravity dam, but arch dams were only suitable for locations where the dam spanned a narrow canyon with high walls, since the curve of an arch dam allows the pressure of the impounded water to be deflected toward the canyon walls.[104] A number of gravity dams are curved, such as Hoover Dam, but these examples are nonetheless gravity dams and not true arch dams, because their stability is based on bulk and mass rather than on their curved form.[105]

Buttress dams are similar to gravity dams in the way they function, but a buttress dam takes advantage of the vertical pressure of water on its upstream face to help stabilize the dam. Because of this design feature, a buttress dam can be built with a series of buttresses spaced between 15 to 70 feet apart as the main supports. The large amount of empty

space between the buttresses allows the construction of this type of dam with far less concrete than a gravity dam of similar size.[106] One problem with buttress dams was that the construction of concrete forms to build the multiple buttresses required a large amount of skilled carpentry work. While buttress dams used less concrete, they were nevertheless often more labor intensive to build. In general, buttress dams have most commonly been built in times when labor was cheap and materials such as concrete more expensive. In contrast, when labor costs are higher and concrete less expensive, the construction of concrete gravity dams becomes more economically feasible than building concrete buttress dams.

Buttress dams appear to have been built commonly in the 1920s, often by private water or power companies. Examples of buttress dams exist in Ohio near Youngstown (Girard Dam, 1917), and Toledo (Defiance Power Dam, 1913). In contrast, the numerous flood control dams built by the Pittsburgh District U.S. Army Corps of Engineers in western Pennsylvania and northern West Virginia during the 1930s and early 1940s were always massive gravity dams. A significant number of these dams were built of earth and rock fill, but many were examples of concrete gravity construction similar to Bluestone Dam.

Concrete Gravity Dams in West Virginia and the New River Valley

A number of concrete gravity dams were built in West Virginia and in adjacent portions of the New River Valley located in Virginia. Bluestone Dam and Hawk's Nest Dam are two major concrete gravity dams on the New River in West Virginia. West Virginia also possesses a number of concrete gravity dams on other rivers.

The first major concrete gravity flood control dam built by the Pittsburgh District U.S. Army Corps of Engineers was Tygart Dam, located near Grafton in Taylor County, West Virginia, northwest of Summers County. Tygart Dam has a maximum height of 234 feet above streambed, is 207 feet wide at its base, and is 1,921 feet long. The outlet works of the dam include ten sluices through the dam. Eight of the sluices are rectangular and are controlled via slide gates. The two additional sluices are each controlled by a 54" ring jet valve, backed up by an emergency slide gate.[107]

Construction on Tygart Dam began in 1934 and was completed in 1938. Tygart Dam was therefore under construction when preliminary drawings for Bluestone Dam were being drawn up in 1936.[108] After building earth and rock fill gravity dams at Tionesta and Crooked Creeks from 1938-1940, the Pittsburgh District returned to concrete gravity structures with Mahoning Creek Dam, constructed from 1939-1941. The Pittsburgh District also built a combined concrete and earth fill dam at Loyalhanna Creek from 1939-1942.[109] Berlin Dam, built by the Pittsburgh District between 1941 and 1943, was also a combination earth and concrete structure and featured a small four-bay section of crest gates similar in overall design to the crest gate section of Bluestone Dam.[110]

There are a number of differences between the dams at Bluestone and Tygart. One of the more significant differences is that Tygart Dam does not possess a set of crest gates, unlike Bluestone Dam. In place of crest gates, Tygart Dam has a 489-foot long uncontrolled gravity ogee spillway in the center of the dam. Tygart was constructed as a flood control facility and to augment water flow on the Monongahela River navigation system. The dam was not designed for hydroelectric power production, which probably explains the lack of crest gates. In contrast, Bluestone Dam was originally planned as a hydroelectric and flood control dam, and although a hydroelectric plant was never built, the dam is equipped with features such as penstocks and crest gates that would allow the dam to be fairly easily adapted to hydroelectric use. However, a number of design features developed for the Tygart Dam spillway and outlet works were adapted for use at Bluestone. While the dams are very different in many ways, the experiences of the Pittsburgh District in designing and constructing Tygart Dam appear to have influenced the Huntington District's design for Bluestone Dam.

While Tygart Dam was not equipped to provide hydroelectric power, two privately owned dams built on the New River in the 1930s were equipped to provide electric power. Hawk's Nest Dam, a concrete, 948-foot long gravity dam, was completed in 1936 on the New River about 30 miles east of Charleston. Hawk's Nest Dam is located approximately eight miles above the mouth of the New River and just below the mouth of Mill Creek. The dam is 60 feet in height and has a maximum storage capacity of 7323 acre-feet of water, compared to Bluestone's maximum capacity of 631,000 acre-feet. The dam diverts the waters of the New River through a four-mile tunnel that drops 165 feet to a hydroelectric generating plant. In 1976, Hawk's Nest Dam was owned by Union Carbide Company and was providing electricity to power a ferroalloy plant owned by Union Carbide in Fayette County, West Virginia.[111] The dam and hydroelectric plant are still privately owned and continue to provide electric power used by the metals industry.

While the Appalachian Power Company was unable to build its version of Bluestone Dam, it did complete Claytor Dam on the New River at Claytor Lake, near the town of Radford in Pulaski County, Virginia. Construction began on Claytor Dam in 1937 and was completed in 1939, at a total cost of about $11,000,000. The dam and lake were named after William Graham Claytor, who was Vice President and Director of the Appalachian Power Company. The general contractor for Claytor Dam was Rinehart and Dennis Company, and it was reported that approximately 230,000 cubic yards of concrete were used in construction of the dam. This dam is a concrete gravity structure 130 feet high, 1150 feet long, and 108 feet thick at its base. The dam features a hydroelectric plant that can generate 76,000 kilowatts of electricity. Like the plant envisioned for Bluestone Dam, the Claytor Dam hydroelectric plant is powered by lake waters traveling through a series of penstocks. The spillway section of the dam is somewhat similar in design to that at Bluestone, and it features a tall concrete ogee weir surmounted by nine steel crest gates measuring 50 feet by 28 feet. The dam produces hydroelectric power and

is owned today by Appalachian Power's successor company, American Electric Power (AEP). Claytor was the largest AEP hydroelectric facility until the construction of Smith Mountain Dam in 1965. Claytor Lake extends about 21 miles up the New River and is one of the largest lakes in Virginia. The lake can store about 232,000 acre feet of water.[112] While comparable in design to Bluestone, Claytor Lake Dam is lower in height, and is only about half as long as Bluestone Dam. It is unclear if Hawk's Nest and Claytor Dams had any influence on the Huntington District's design for Bluestone Dam.

Although it does not make any mention of the influence of Claytor, Hawk's Nest, or Tygart dams on the design of Bluestone Dam, a digest of design decisions concerning Bluestone Dam from October 1936 reveals interesting information about the design process. For example, this document indicated that a sketch by Dr. Paul Cret (1876-1945) was the basis for the dam's overall design. Cret was a successful French architect who became a United States citizen in 1927. Cret was educated at the École des Beaux Arts in Paris, which was widely recognized as Europe's leading architectural academy at that time. The University of Pennsylvania appointed Cret as an architecture critic in 1903, after which Cret remained closely associated with the United States and the City of Philadelphia. Cret served in the French army during World War I but otherwise spent most of his time in the United States. During the 1930s, Cret designed a significant number of federal facilities, most notably the 1932 Federal Reserve Bank building in Washington D.C. Cret worked as architect for many engineering projects, most notably the Benjamin Franklin Suspension Bridge in Philadelphia.[113] The federal government retained Cret as an advisor and to design aesthetic components of dams and lockkeeper houses in the 1930s. Correspondence links Cret to the Pittsburgh District's Tygart Dam (1934-1938). Lists of Cret's major accomplishments also include involvement in the design of Montgomery Locks and Dam, a navigation structure on the Ohio River, and Bonneville Dam in Oregon for the U.S. Army Corps of Engineers.[114] Cret was largely responsible for the streamlined Art Deco lines of Bluestone Dam as it was constructed. Documentation indicates that Cret personally introduced his elevation sketch of Bluestone Dam at a Board of Consultants meeting in 1936. [115]

Another interesting item mentioned in this report was the use of hydraulic models to guide the design of various parts of the dam, including the overflow section, crest gates, sluice gates, and stilling basins. Use of modeling was mandated by a decision of the Huntington District Engineer on November 6, 1935.[116] The modeling was performed at the Hydraulic Laboratory of the Carnegie Institute of Technology in Pittsburgh under the direction of the Huntington District Engineer. The general design of these features and other parts of the dam were worked out in the design room of the Huntington District, but in many cases, multiple design schemes were produced for a particular detail or feature. Construction of a scale model of the dam allowed the laboratory to test and measure the effects of water on various parts of the dam. Modeling was used to determine the shape

of a number of concrete components, including the spillway section, the spillway gate piers, and training walls. Modeling also helped determine the design of the dam's rectangular sluices, needle valve sluice outlets, and protection methods for counteracting erosion of the toe of the dam, the power house tail race, and the left bank of the New River below the stilling weir.[117]

One important problem addressed in the modeling studies was how to slow the speed of high-velocity jets of water issuing from the dam's sluice gates. This question was first addressed via modeling at Tygart Dam, which could, at full reservoir levels, release up to 500,000 horsepower of destructive energy from its sluice gates. If not slowed, this energy could cause destructive erosion below the dam. After hydraulic model studies, the solution chosen at Tygart was to install a concrete "cushion pool" or stilling basin below the dam by building a small concrete auxiliary dam 250 feet downstream from the base of the main dam. Concrete deflectors were also installed at the sluice openings to further dissipate the jets of water as they made contact with the stilling basin surface. The solution reached at Tygart was used at Bluestone, with only minor modifications.[118] Additional model studies for Bluestone Dam were completed in 1946 at the U.S. Army Corps of Engineers Waterways Experiment Station at Vicksburg, Mississippi.[119]

The Huntington District originally intended to construct a dam that would perform both flood control and hydroelectric functions. During the planning process, a number of design options were considered according to their ability to facilitate hydroelectric power production. In August 1936, three alternatives were considered. The first possibility specified the construction of the dam as a flood control project only. In this option, the crest gates would be omitted, and the design of the hydroelectric powerhouse would be deferred to a later date. Plans being drawn up for the dam in August 1936 were based on the second design option, which called for crest gates but made provisions for building the hydroelectric powerhouse at a later date. The third possibility was to build the dam as a combined flood control and hydroelectric facility by completing the crest gates and powerhouse in the initial construction campaign.[120] As construction began in 1941, option three was favored because of the need for hydroelectric power at that time. When construction resumed in 1946, however, option two seems to have become the preferred plan. The powerhouse structure was not constructed, although the penstocks needed for hydroelectric power were installed. The crest gates were also not installed during the 1946-1949 construction campaign, but instead were added during a separate construction effort in 1952.

Water can flow through Bluestone Dam via sluice gates or crest gates. A series of sixteen tunnels allow water through the dam, and hydraulically operated sluice gates control the flow by opening and closing the tunnels. In a meeting on January 21-22, 1936, the Board of Consultants discussed the types of sluice gates that might be used in the dam. W. H.

McAlpine was the only board member opposed to the use of butterfly gates instead of vertical lift gates. The ensuing discussion led to an official decision that Broome gates would be favored over butterfly gates, although it was recognized that the Broome gates would be expensive because each gate would need an individual operating hoist. Hydraulic cylinder-operated gates were also advocated as a cheaper alternative.[121]

In May 1936, the Board of Consultants decided to install either Broome or fixed roller gates on the dam. The decision between Broome and fixed roller gates was to be determined based on which type could be installed at the lowest cost.[122] In *Design of Dams*, Hanna and Kennedy indicate that Broome gates are a type of roller gate. Hanna and Kennedy also state that these gates use rollers to overcome the problem of friction that is often encountered in the use of slide gates. Hanna and Kennedy list three major types of roller gates: Stoney, Sirnit, and Broome, and give this description of Broome gates:

> In the Broome type, the roller train travels in the same manner as the traction tread of the caterpillar tractor. The rollers bear on a track on the gate and a track on the frame. The frame seat is inclined toward the gate near the bottom, and the gate being thus inclined is forced to seat by gravity and vertical water pressure, and the rollers are relieved of the load. The roller type of gate is usually used for heads under about 70 ft., but they are applicable to wider spans than slide gates on account of their lesser frictional resistance to motion.[123]

In the end, hydraulically powered sluice gates were installed. It is unclear when the initial decision to install Broome gates was overturned, but hydraulically operated sluice gates are referred to in the 1941 specifications for Bluestone Dam. However, the installation diagram drawings for these sluice gates were not delineated until 1946. Hanna and Kennedy refer to sluice gates as “slide gates” and state:

> Slide gates are used for controlling the flow over spillways where the quantity of water to be handled is relatively small and the range of fluctuation is about 10 ft. or less. They are also used for relatively small discharges through outlets under heads up to about 120 ft. These gates are usually made of cast iron or cast steel in one piece or rolled-steel plates and sections. The frames of the cast gates are made of the same materials as the gate leaves, and the leaves are reinforced with horizontal and vertical ribs. The gates are operated with hoists.[124]

The Bluestone sluice gates are operated via hydraulic machinery. Each of the sixteen sluices actually has two gates, a service gate and an emergency gate that can be operated in case there is a problem with the service gate. The gate machinery is located in an

operating gallery located just above the sluices. A hydraulically powered hoist moves the sluice gate up and down to increase or decrease water flow through the sluice.

The dam also contains a set of 21 crest gates for releasing water from the lake during high water conditions. The crest gates are positioned at the top of the dam, where they allow excess water to flow out of the reservoir in extreme high water conditions. The Board of Consultants had to decide if each of the 21 crest gates was to have its own operating system to lift and lower the gate, or if the gantry crane that was to be mounted on top of the dam could be used to raise and lower these gates. A decision was made to have an individual operation system for each gate, rather than using the gantry crane. The cost of installing an individual operating mechanism for each gate was estimated to be about $100,000, and the Board recognized that this machinery would increase maintenance costs for the dam. However, it decided that this cost was justified since the individual operating machinery would allow more uniform raising of the gates. There was also concern that the gantry crane might at some point be needed to lift the crest gates and perform other functions at the same time if the individual crest gates' machinery was not installed.[125]

SECTION 4: HISTORY OF BLUESTONE DAM: CONSTRUCTION

Construction of the Dam 1941-1952

Contract Award, 1941

On November 10, 1941, the United States Supreme Court refused to revisit its decision that the Hinton to Allisonia section of the New River was navigable and therefore under federal jurisdiction. This decision cleared the last obstacles for federal construction of Bluestone Dam, and the Huntington District immediately mobilized its resources to get construction under way as soon as possible. The day after the court decision was announced, the U.S. Army Corps of Engineers announced that it would immediately advertise for bids on the project. The Corps was hoping that bids could be opened on December 15, even though the contractor probably could not begin work until January 1, 1942.[126] Meanwhile, Corps legal representatives filed a new motion for the government to take possession of lands needed for Bluestone Dam and Lake.[127]

The Huntington District soon appointed personnel to oversee construction of the dam. Robert B. Jenkinson of the Huntington District was named resident engineer for the Bluestone project. Jenkinson, a native of Greenville, Ohio, graduated from Wayne Technical College in 1924 and joined the U.S. Army Corps of Engineers in 1931. He was involved in the construction of the Huntington District's Winfield, London, and Marmet Locks and Dams on the Kanawha River, and Gallipolis Locks and Dam (now Robert C.

Byrd Locks and Dam) on the Ohio River in the 1930s. Jenkinson and four other officials paid a visit to Hinton to study the construction site and to select a location for the office building that would house the Corps' engineering staff during construction of the dam. Construction began on this two-story wood-frame building on November 28, 1941.[128]

Representatives of companies bidding on the Bluestone Dam construction contract visited the site on December 2, 1941. Visiting the site were representatives of the Dravo Corporation of Pittsburgh, the United Construction Company and Porter-DeWitt Construction Company of Minnesota, the Seaboard Construction Company of Kiski, New York, and the Morrison Knudsen Company of Boise, Idaho. These representatives visited the construction site and investigated the availability of construction materials in the area.[129]

The U.S. Army Corps of Engineers announced in early December 1941 that bids for construction of Bluestone Dam would be opened on December 16, but the opening was delayed to allow contractors more time to evaluate wage scales set for the project by the U.S. Department of Labor.[130] Bids for the construction of the dam were opened on December 23, 1941. The following contractors submitted offers: Seaboard Construction Company of Mt. Kisco, New York, Dravo Corporation of Pittsburgh, and a joint venture by B. Perini and Sons, Inc. – Rugo Construction Company of Framingham, Massachusetts. The high bidder was Perini and Sons at $11,722,750.00. Dravo was in the middle at $11,376,080.00, and Seaboard Construction was the low bidder at $10,195,575.00. The government estimated project cost was $9,749,826.00.[131] Major F. H. Faulkner, Huntington District engineer, announced that construction on Bluestone Dam would begin in early 1942, once the Corps completed procedures necessary to formally award the construction contract to the low bidder. These procedures included investigation of the company that submitted the low bid, and approval of the contract by the U.S. Engineer's Office in Cincinnati. The overall estimate for all aspects of the project (including both the contractor's portion and direct government expenses) was about $14,000,000, but with the installation of hydroelectric generation facilities, the estimate came to about $22,000,000.[132]

Seaboard was low bidder by slightly over one million dollars but, since that company could not obtain performance bond, the contract went to the Dravo Corporation on January 12, 1942, on a bid of $11,376,000.00. Dravo actually began construction operations on January 19. Contract No. W-516-eng-1818, as awarded to the Dravo Corporation, called for them to do all work in connection with the construction of the actual structure of Bluestone Dam. Certain appurtenant items of work, such as drilling and grouting the deep curtain wall, clearing the reservoir area, removing cemeteries, and furnishing and erecting certain electrical and mechanical items, were exempted from this contract and awarded to specialists in such work under separate prime contracts. The

original contract called for completion of all work in 900 calendar days after reception of the notice to proceed, or by July 4, 1944.[133]

First Construction Phase and Subsequent Termination of Construction, 1942-1945

Work on the dam proceeded during the early years of World War II, in an effort to secure the hydroelectric power of the project and to apply the energy toward relieving the critical shortage of electric power. The work was originally given a priority rating of A-2 by the War Production Board, but as war industries increasingly and urgently needed materials and supplies, this rating soon dropped to A-6, with the A-2 remaining only for emergency items. A few months later, when the need for electric power reached crisis levels, the priority rating was moved up, and the contractor was once more able to obtain needed materials and supplies.[134]

The Corps issued a notice to proceed for construction of Bluestone Dam on January 14, 1942. By January 19, Dravo work crews had begun preliminary excavation, had started building the construction plant, and had undertaken construction of a timber bridge over the Greenbrier River and a railroad spur to the site.[135] Earth was removed from a large portion of the construction site, allowing the drilling of 30-inch core holes to investigate the condition of the foundation rock.[136] The timber bridge under construction over the Greenbrier was supported on wooden pilings and was completed between February 8 and March 6, 1942. The first train crossed over to the construction site on April 14, 1942.[137]

The following months were spent building the construction plant and other facilities necessary for the dam's construction. The construction plant was located on the east side of the Bluestone River on a 400-foot wide section of plain (see fig. 14). The facility was laid out according to a linear plan along small-gauge railroad tracks that led to the dam site. The construction plant consisted of 29 buildings, including personnel-related facilities, a concrete mixing plant, storage buildings, and various shop structures. Highlights of the portion of the plant immediately north of the dam included a multi-story concrete mixing plant immediately adjacent to the dam site, a series of shops and locker rooms north of the concrete plant, and the contractor's office. The northern half of the plant featured U.S. Army Corps of Engineers offices, storage facilities, a sawmill, a large platform for carpentry layout and assembly, a boiler house, and a tractor and truck repair garage.[138] Most of the construction plant buildings were hastily constructed wood-frame structures. Since electrically powered cranes, vibrators, and other equipment were to be used in the dam's construction, an electrical line was run to the site, and four electrical substations were built as part of the construction plant.[139]

Fig. 14. Historic View of the Bluestone Dam Construction Plant. View was probably taken from dam during later phases of construction. (1949 Final Report)

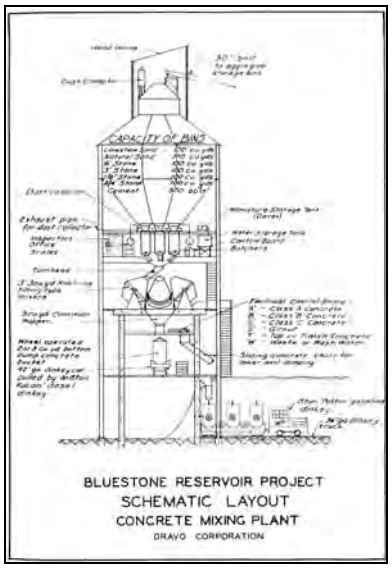

Fig. 15. Schematic Drawing of Bluestone Concrete Mixing Plant (Final Report, 1949).

One of the most important components of the construction plant was the concrete mixing facility (see figs. 15-16). The C. S. Johnson Company of Champaign, Illinois designed the concrete plant. It contained three Koehring tilting mixers turned by 40-horsepower motors. The complex also included six aggregate bins, each bin consisting of 100 cubic yards of aggregate, and one large cement bin with a capacity of 800 barrels of cement. Eight scales for weighing aggregate, cement, and water were also included.[140]

Fig. 16. Historic Photograph of the Concrete Mixing Plant at Bluestone Dam (1949 Final Report)

The plant was also equipped with a "dinkey" small-gauge railroad system for transportation of materials (see fig. 17). The system was characterized as a 42-inch gauge track system on elevated trestles that were supported on steel bents.[141] However, Dravo apparently used one diesel 42-inch gauge locomotive and two gasoline-powered 36-inch dinkey locomotives on the project, indicating that both 42-inch and 36-inch gauge track was in use.[142] Concrete was transferred from the dinkey cars to forms on the dam by whirler cranes mounted on steel trestles (see fig. 18). The trestles were, in many cases, mounted on completed portions of the dam. The locations of the whirler cranes changed as concrete pouring began on higher sections of the dam.[143]

Construction of dams in the 1930s and 1940s became easier and less expensive because of advances in construction equipment. Gasoline- and diesel-powered vehicles could now be used to move earth and rock more efficiently than the steam-powered equipment used in the past. Electric cranes replaced the derrick rigs used to lift building materials at nineteenth-century dam construction sites. Small-gauge railroads transported concrete and other materials quickly and efficiently across the construction site. Dravo Corporation appears to have taken full advantage of the equipment available in the early

1940s, and its construction plant was full of modern power equipment. However, World War II-related delays in obtaining equipment, and the spare parts and replacement components needed to keep them running, slowed the project's progress.

Fig. 17. Historic Photograph of a Dinkey, with Locomotive and Cars, Used at Bluestone Dam (Final Report, 1949).

Fig. 18. Historic Photograph of a Whirler Crane Used at Bluestone Dam (Final Report, 1949).

Fig. 19. A Row of Sheetpile Cells at Bluestone Dam. The bulk of Cofferdams 1 and 2 were made up of these steel cells filled with sand, gravel, and loam, and topped off with broken shale. (1949 Final Report)

In addition to building the construction plant, another early task in the project was the construction of cofferdams, which would divert the flow of the river and provide dry areas in which construction could begin. The river was about 100 feet wide at the dam site, with a 400-foot flood plain. The river was seldom deeper than two or three feet in the summer, but it could rise as much as ten to twelve feet during late fall, winter, and early spring. The river diversion plan for the site included construction of two large cofferdams.[144]

The first cofferdam was located on the eastern section of the dam, and it covered the easternmost 34 of the 55 concrete monoliths that made up the dam. Construction of the second cofferdam was not completed until the second construction phase of the dam in 1946.[145] Much of the first cofferdam was constructed of steel sheetpile cells filled with sand, loam, and coarse gravel, then topped off with broken shale (see fig. 19). The remainder of the cofferdam was constructed using the "Ohio River Box Type," with timber sheeting tied together with steel coffer rods.[146] The three-sided cofferdam produced a dry area on the eastern section of the river, while water was allowed to flow freely on the western half of the river. The south wall of the cofferdam consisted of 19 cells connected by intermediate cell segments, while the west wall contained 20 cells. The south wall of the cofferdam was 770 feet long, 22 feet thick, and was built to an average of 13 feet above the riverbed, using the Ohio River Box technique.[147] Construction of the cofferdam was completed using a large whirler crane mounted on a set of steel rails. This crane positioned materials and drove piling. Once construction of the cofferdam advanced into the river, it was necessary to build rock fill mounds in the river to support the crane (see fig. 20). The construction of cofferdams for river projects was usually a major operation that required large amounts of materials and many hours of labor. Approximately 93,000 linear feet of sheet piling weighing 1,430 tons were used to construct the first cofferdam at Bluestone.[148]

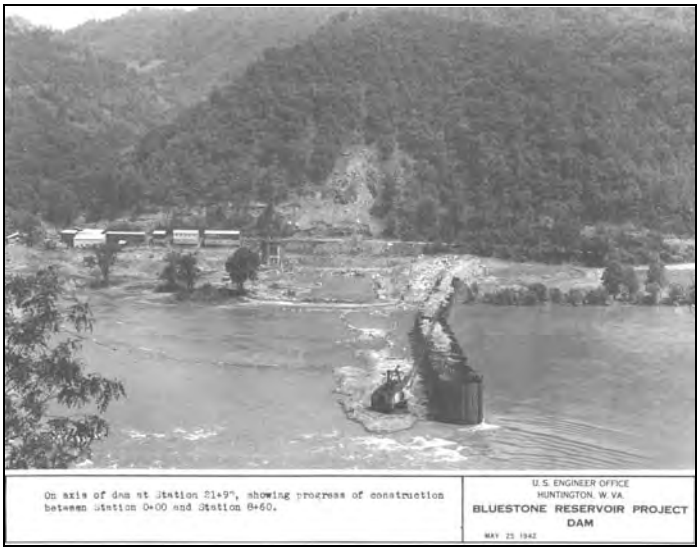

Fig. 20. Construction of the First Cofferdam in May 1942. Note whirler crane mounted on steel rails positioned on a pile of crushed rock. (1949 Final Report)

Fig. 21. First Cofferdam in August 1942. (1949 Final Report)

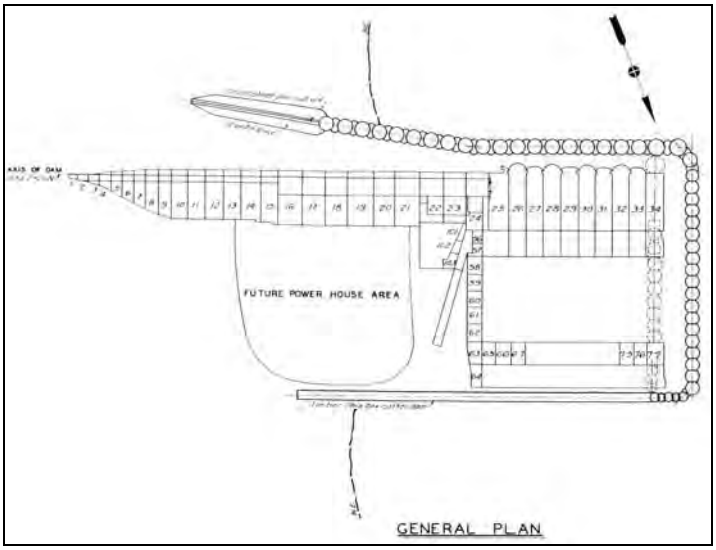

Fig. 22. Plan of First Cofferdam for Bluestone Dam (1949 Final Report). This cofferdam covered the eastern portion of the construction site, while the New River flowed through on the western half of the construction site until the second cofferdam was built.

Fig. 23. Scene from the First Bluestone Dam Construction Phase, January 1943. Whirler crane is visible in foreground. (1949 Final Report)

The construction of the plant, transportation facilities, and the first cofferdam proceeded fairly smoothly. However, the project soon fell behind schedule due to unforeseen difficulties with the foundation rock. A series of test holes were drilled into the riverbed to explore the condition of the rock on top of which the dam would be positioned. The first 30" core holes were drilled in the stone on the sites of the dam's concrete monoliths (numbers 13 to 17) on March 30, 1942. This drilling continued until Corps officials ordered a 25' by 32' exploratory shaft excavated at the toe of the dam.[149] A series of problems were discovered as a result of this drilling, including a seam in the foundation rock 34 feet below surface. Concerned that the seam might facilitate water seepage, a large open pit investigation of the seam was undertaken. In the end, this open pit excavation covered an irregular area of approximately 218 feet by 100 feet, and in some places reached 40 feet below surface. A total of 16,023 cubic yards of rock were removed from this area, requiring 25,665 feet of line drilling and pouring 11,737 cubic years of concrete backfill. Aside from the concrete backfill, the total cost of the excavation was $120,626.[150] According to correspondence from Dravo Corporation, it was originally expected that this exploratory work would be completed by the time that the construction site's concrete mixing plant was operational. Instead, nine exploratory areas were investigated, with the process continuing until February 8, 1943. The work revealed large areas of weak foundation stone that had to be removed.[151] In its official record of the construction campaign, the Huntington District stated:

> Although original contract plans did not call for any drilling and grouting, except for a few investigation holes and drain and anchor holes, the information obtained from the extensive foundation investigations in the intake and powerhouse area, supplemented by investigations in other area, indicated that desirability and necessity for some degree of shallow foundation consolidation. Consequently, under a supplemental agreement with the Contractor, the entire area under the dam, with the exception of the narrow abutment monoliths, was consolidated by grouting through 3-inch diamond drilled core holes. This involved the drilling of 879 holes to an average depth of 45.2 feet per hole, and the placing of 89,666 bags of grout.[152]

Dravo Corporation recorded additional project delays due to materials arriving late or being unavailable because of wartime shortages. Items arriving weeks or months late included concrete mixers, conveyors, and locomotives for the "dinkey" railroad system used to haul building materials.[153] Dravo also used Mack trucks for hauling earth and foundation fill (see fig. 24). Although the trucks were fast, rugged and highly reliable, Dravo had to stop using them because it became impossible to obtain replacement tires. Once the trucks were out of commission, hauling was done with slow, cumbersome vehicles known as Athey Wagons towed by tractors (see fig. 25). The performance of the Athey Wagons was unsatisfactory, and in 1946, when World War II tire rationing ended, Dravo stopped using the wagons and returned to using trucks.[154] At the beginning of construction, the company also planned to use three new C-17 model 30-ton electric whirler cranes to lift materials and equipment. However, these cranes could not be procured because of wartime shortages. In the end, the company acquired one C-17 crane from an old derrick boat and converted it for use, and for the other two cranes, made do

with two 15-ton C-14 cranes that were modified to a 17-foot gauge. It was reported that "Although the C-14's were capable of handling this load, the speed and technique required in placing large quantities of concrete tended to tax them beyond their limits and their performance was not equal to that of the C-17s."[155]

Fig. 24. Historic Photograph of Mack Truck Used at Bluestone Dam (Final Report, 1949). These trucks were reliable, but wartime tire shortages forced Dravo to stop using them during the first construction campaign.

Fig. 25. Historic Photograph of an Athey Wagon Used at Bluestone Dam (Final Report, 1949). When tire shortages grounded Dravo's Mack trucks, these wagons were used.

Part of the problem, according to Dravo Vice President J. S. Miller, was the project's rating by the War Production Board. Particularly harmful, according to Dravo, was the demotion of the project from a favorable rating of A-2 (the highest rating was A-1-a) to a much less favorable rating of A-6. Miller stated that the first pour of concrete on the main dam at Bluestone was originally scheduled for July 13, 1942, but because of delays in receiving equipment, the first pour did not occur until September 26, 1942. This first concrete was poured not on the main dam, but on the small stilling weir of the main spillway. The first concrete on the main portion of the dam was poured on November 13, 1942, four months later than the originally scheduled date.[156]

Delays in the first construction phase of Bluestone Dam do not appear to have been attributable to poor performance by Dravo Corporation. The company experienced shipping delays of materials and items because of wartime industrial demands. The company also had no control over the discovery of flawed foundation rock underneath the dam site and associated drilling and grouting that was not included in the original contract. While these delays were not due to incompetence on the part of Dravo Corporation, they had a devastating effect on the company's efforts to complete Bluestone Dam in a timely manner. Because of the delays, on January 8, 1943, the War Production Board directed that all construction work on Bluestone Dam be suspended except for such work necessary to bring the project to a safe point of suspension. The priority rating for the job was again reduced to A-6 and the contractor was directed to construct the portion of the dam inside Cofferdam No. 1 to elevation 1390, a level approximating the top of the cofferdam, and to remove the cofferdam and then suspend construction operations for the duration of the war.

Some of the concrete monoliths were completed to a level below elevation 1390, because of the contractor's system of pouring concrete. As a result, monoliths were left at varying levels, ranging from elevation 1375.0 to 1402.5. Once these monoliths were completed to this level, work was suspended on March 1, 1944 with the dam approximately 35% complete.[157] There was some discussion in April 1944 of whether it would be more favorable for the government to simply suspend the existing contract, or to terminate the contract and offer a new contract for completion of the dam once conditions were favorable for the resumption of work. It was estimated that if the contract were terminated, the government would need to pay Dravo Corporation a total of $4,900,321. In contrast, if the contract were suspended and then resumed, the government would be obligated to pay Dravo $4,090,207, plus a monthly charge of $12,231.[158]

In a letter of March 10, 1944, Dravo officials stated that they did not want the Bluestone contract to be terminated, but wanted to complete the dam at the earliest possible moment. Dravo officials also argued that the government would save money by keeping the existing contractor instead of putting the project out to be re-bid at the end of the war.[159] In the end, a supplemental agreement of January 1, 1945 called for suspension of work under the old contract, but supplied "necessary instruments for repaying the contractor all justified costs and expenses costs and expenses incurred by him because of

the suspension."[160] This agreement made provision for acceptance of all completed work on the dam and payment in full of the contractor, and to reimburse the contractor for demobilizing the construction plant. All ownership of Dravo's construction plant at the dam was to be conveyed to the U.S. Government for $412,000.00, with the understanding that the construction plant would be returned to the contractor upon resumption of construction at the dam. The agreement also called for a lump sum of $66,226.00 to be paid to Dravo for performing additional work related to the suspension of construction activities.[161]

Fig. 26. Bluestone Dam, Construction Photo Showing Construction Progress on Main Dam and Spillway (U.S. Army Corps of Engineers, February 23, 1944). Sheetpile cells can be seen in the foreground.

Aside from the construction plant itself, Dravo left other pieces of equipment at the site, including whirler and crawler cranes, tractors, bulldozers, and trucks. Three Dravo employees, a clerk, mechanic, and mechanic's helper, stayed on-site to maintain and service the equipment. The federal government also provided three men who were in charge of guarding the construction site. The government paid Dravo Corporation for the three men that the company committed to the site. Dravo employees also completed maintenance work and improvements on the railroad access trestle and the aggregate bins of the concrete plant, efforts that included creosote work and the replacement of rotten railroad ties. After significant deterioration was detected on the bridge, Dravo undertook

additional rehabilitation from October to December 1945. Work on rehabilitating the aggregate bins, which involved cleaning and priming over 900 wooden piles, was not completed until two weeks before active construction resumed in January 1946.[162]

Second Construction Campaign and Completion 1946-1949

The first construction phase from 1942-1944 had completed a great deal of important work. The dam site had been cleared, and weak foundation rock had been removed and the resulting spaces filled with concrete. Work had begun on lower sections of some of the large concrete monoliths that would make up much of the dam's concrete mass. However, there was a large amount of work to be done when construction resumed in 1946. There was still a large amount of concrete that needed to be poured for the monoliths, and additional concrete work was needed on other parts of the dam. Other important features of the dam that waited to be installed until the second construction campaign included the sluice gates, crest gates, and the penstocks, which were large water pipes installed in the hydroelectric area of the dam.

On December 29, 1945, President Truman signed a deficiency appropriation bill that included $3,000,000 for the completion of Bluestone Dam. This act paved the way for the resumption of construction. Soon thereafter, Albert C. Hook was appointed interim resident engineer for the U.S. Army Corps of Engineers at Bluestone. Hook was to serve in that position until Robert Jenkinson, who had been resident engineer on the project before construction was halted, could return from service in the U.S. Navy. Robert Thompson, Bluestone project superintendent for Dravo, also soon arrived at the site.[163] Construction of Bluestone Dam resumed on January 2, 1946.

The first four months of the new construction campaign was taken up by the rehabilitation of the construction plant and preparation of the site for the resumption of construction. Dravo was required to perform this work at an actual cost basis, without additional money added for profit. Much of the work required replacing rotten wood. Approximately 50% of the wood in the construction plant, dinkey trestles, and other structures had rotted. The government was able to obtain free surplus war stock lumber to repair the wooden structures, although much of this wood was of inferior quality or cut to the wrong dimensions. The overall cost of rehabilitating the construction plant was $195,688.13.[164]

Permanent construction activities on the site resumed only in July 1946, following a series of delays. A second cofferdam that needed to be constructed could not be built until after June 1, 1946, because of delays in reaching an agreement that a "…highway traversing the west abutment of the dam could be abandoned."[165] Apparently, the West Virginia State Road Commission decided to keep this low-lying road open to accommodate school bus traffic. A second problem occurred when partial filling of the reservoir could not proceed as planned because the government was not yet ready to purchase a number of low-lying farms above the dam that were in the planned reservoir area. The raising of water in the reservoir was further delayed when the State Road

Commission had to raise a highway bridge in the reservoir area to prevent it from being flooded. In reference to these problems, the final report for the dam's construction stated: "the contractor understood the position of the government and cooperated to the fullest extent. In most cases, he subjected himself to greater risk and more trouble than the United States requested or had a right to expect. He did not claim any extra time or payment for the delays."[166]

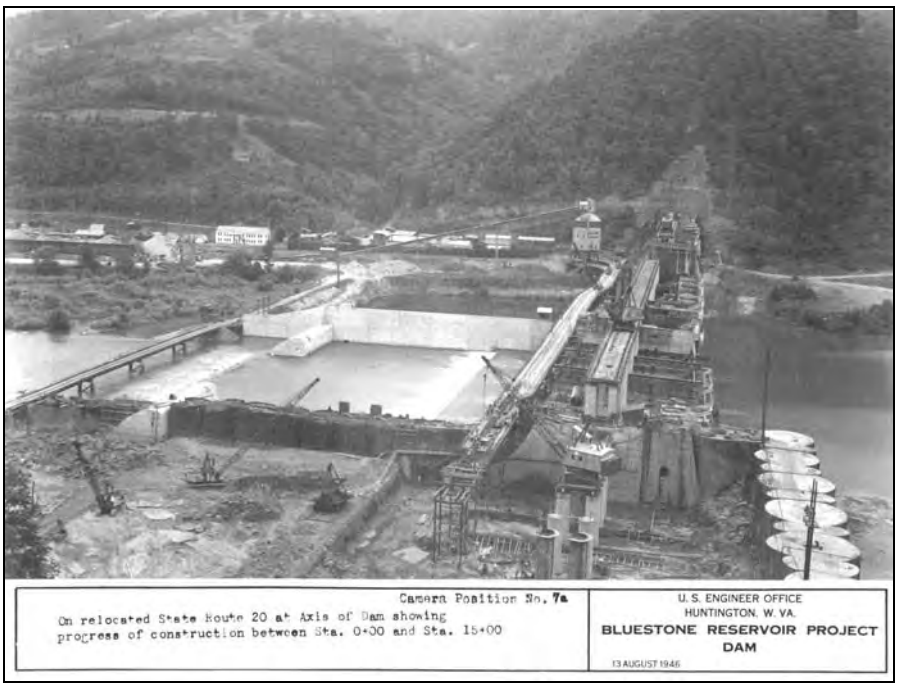

Fig. 27. Construction Underway at Bluestone Dam, August 1946. De-watered area of second cofferdam is visible in foreground, while river is diverted through eastern half of spillway. (1949 Final Report)

While these delays and a number of other problems arose during the second construction campaign, this phase was not plagued by the material, labor and equipment shortages of the World War II era. With the end of wartime tire rationing, Dravo discontinued use of inefficient Athey Wagons and returned to utilizing reliable Mack dump trucks. Unable to obtain new 30-ton whirler cranes during World War II, Dravo was able to commission the construction of a new electric 30-ton C-17 crane in 1946 for Bluestone. By the time concrete pouring was at its height in the second construction campaign, the company was using a total of five whirler cranes on the construction site's main trestle.[167]

The second cofferdam only covered the area of the river occupied by monoliths 34-55 of the dam, and was therefore smaller than the first cofferdam. The upstream arm of the second cofferdam required construction of seven new sheetpile cells, while two cells from the old cofferdam were utilized. The downstream arm of the second cofferdam followed the "Ohio River Box" design. As the second cofferdam was being completed, the river arm of the first cofferdam was removed.[168]

The late summer and fall of 1946 was a productive period that saw the pouring of a large amount of concrete. Concrete at Bluestone Dam was discharged directly from mixers at the concrete plant into a 12 cubic yard wet-batch hopper. From this hopper located underneath the mixer floor, the concrete was drawn into buckets, each with a capacity of 3 cubic yards. Three buckets were placed on each dinkey railroad flat car and hauled to the construction site. Whirler cranes lifted the buckets off of the flat cars and lowered the buckets into position. The bottom of each bucket opened to release the wet concrete (see fig. 28), and empty buckets were returned to the flat cars for removal. The progression of flat cars was arranged so that the whirler cranes constantly removed and poured buckets of concrete. Once poured, the concrete often clumped in a tight mass, so electric vibrators were used to spread the concrete into corners and depressions, and to surround pieces of steel rebar and pipe that were to be embedded in the dam. The vibrators each weighed about 95 pounds and operated on 110 volts of electricity.[169]

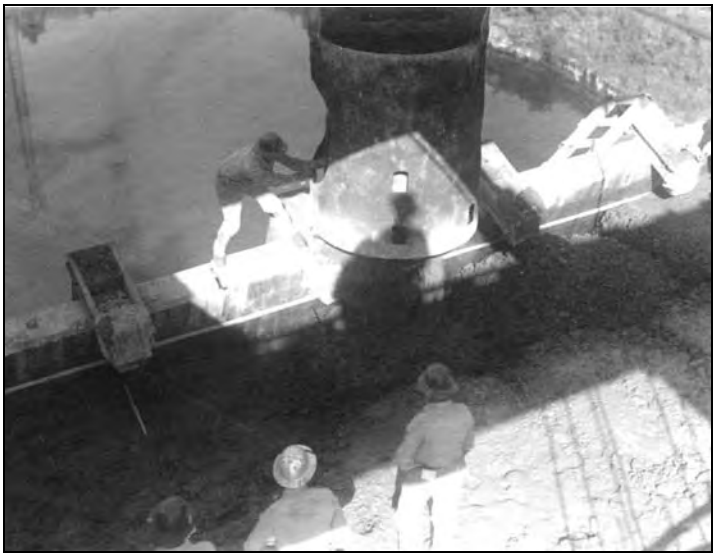

Fig. 28. Historic View of Concrete Being Released from a 3 Cubic Yard Bucket at Bluestone Dam (1949 Final Report)

As concrete pouring progressed, components of the sluice gates also arrived at the construction site in mid-1946. The Hardie-Tynes Manufacturing Company in Birmingham, Alabama, manufactured the sluice gates and machinery. Unlike the penstocks, which were acquired under the Dravo contract for dam construction, the federal government purchased the sluice gates directly. The components of the gate assemblies were lowered into place using the whirler cranes. To avoid misalignment, the positioning of the gate assemblies had to be precise, so eight 30-ton hydraulic jacks were used to carefully position the assemblies. As they moved the assemblies into position, a series of steel wedges fixed the jacks into position. Once the gate frame was adjusted to its correct position, the wedges were arc-welded to the frames and to nearby steel piling caps to prevent further movement of the gate assembly. The hoists and hoist machinery were then installed using the whirler cranes. By June 30, 1947, 24 hoists had been installed, and concrete had been poured around 16 of the 24 hoists.[170]

The sluice gates were installed in stages, not simultaneously. Sluice gates were installed on the western half of the dam during stage two of the river diversion plan, during which the second cofferdam was in place. In stage three, when the upper wall of the second cofferdam was removed, the river was allowed to flow through the western bays of the spillway, while semicircular cofferdams were installed in some of the sluice openings in the eastern half of the dam to allow for the installation of trash racks and the sluice gates. Once the gates were installed in the eastern half of the dam, these gates were opened, and water began flowing through this half of the dam. The gates of the western half of the dam were then closed (stage 4). This allowed the completion of unfinished sections of the stilling weir on the western half of the dam.[171]

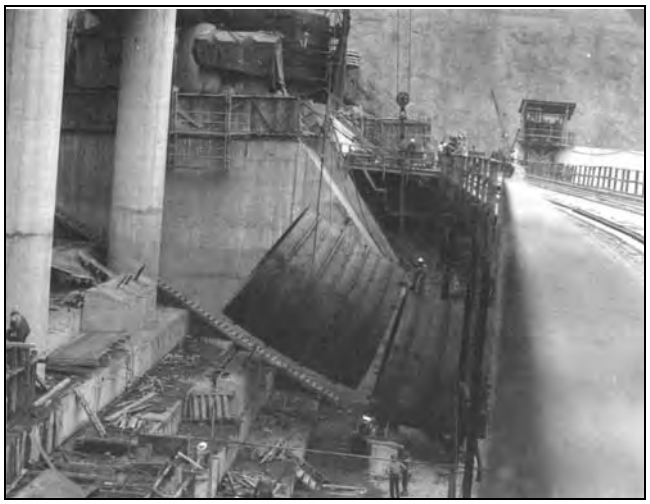

Fig. 29. Bluestone Dam, Construction Photograph of Penstock being set into place by a Whirler Crane (1949 Final Report).

The large steel plates used to build the penstocks also arrived in multiple shipments between September 18 and December 21, 1946. Each penstock was made up of 14 steel rings, with each ring consisting of two semicircular steel plates of varying widths. The thickness of the rings varies from 15/16” to ¾” thick, depending on the position of the ring within the penstock. Each penstock also featured twenty steel stiffener rings. All parts of the penstocks were held together by welding, except for a few bolts that were used to secure the temporary bulkheads that stopped water from flowing through the penstocks. Each penstock assembly weighed approximately 90 tons. The steel for the penstocks was provided by the Bethlehem Steel Company. During installation, circular wooden centerings called “spiders” were placed inside the penstocks.[172] Remains of a “spider” were identified and photographed when the intake section lagoon was de-watered in March 2001 (see fig. 32). The “spiders” structurally reinforced the penstocks and helped maintain their circular form as they were moved around during construction.

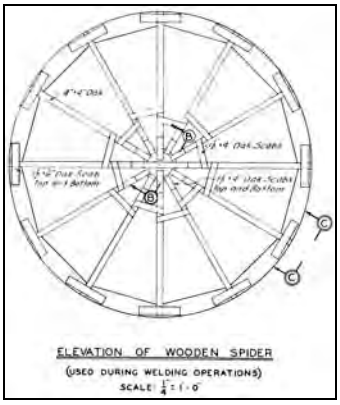

Fig. 30. Elevation Drawing of a “Spider” Penstock Centering (1949 Final Report).

Fig. 31. Penstock in Place with “Spider” Visible (1949 Final Report)

Fig. 32. Remains of a Wooden "Spider" Penstock Centering. Photographed at the bottom of the Bluestone Dam lagoon during April 2001 de-watering. This centering was apparently discarded into the lagoon during the 1946-1949 construction phase and has been preserved by continual immersion in water.

During the winter of 1947, work slowed on the dam's large monoliths. Smaller areas of concrete such as the small west training wall monoliths were then poured, in order to use the wintertime steam concrete curing techniques on portions of the dam that had smaller surface areas of concrete.[173] By spring 1947, the penstocks had been completely embedded in concrete, and work concentrated on the west training wall and stilling weir, and on construction of concrete monoliths in the area of the dam covered by the second cofferdam. By late summer 1947, almost all monoliths had been brought up to grade, and work began on dismantling the second cofferdam. It was also reported for the first time that the contractor had the job in a "balanced state" and could freely move construction activity from one portion of the site to another, instead of concentrating on a specific area of the job to help it "catch up" with more thoroughly constructed areas.[174]

In a March 1948 report, Dravo Corporation announced its intention to complete a number of tasks in the following months that would require the closing of some of the dam's sluice gates. These operations included closing eight of the 16 sluice gates of the dam so that work on one half of the stilling weir could be completed. The company also planned to remove some or all of the "dinkey" trestle across the spillway. Apparently, the past policy of the Huntington District was to have Dravo Corporation keep all sluice gates

open at all times. This policy was established to keep Bluestone Lake from overtopping the "Old True Bridge." However, Dravo Corporation claimed that the continuation of this policy would seriously delay work on the dam.[175] The Huntington District replied in April 1948 that the Route 20 bridge would be raised by the West Virginia Highway Department as soon as water levels were low enough. Until then, the district was not comfortable with closing any of the sluice gates.[176]

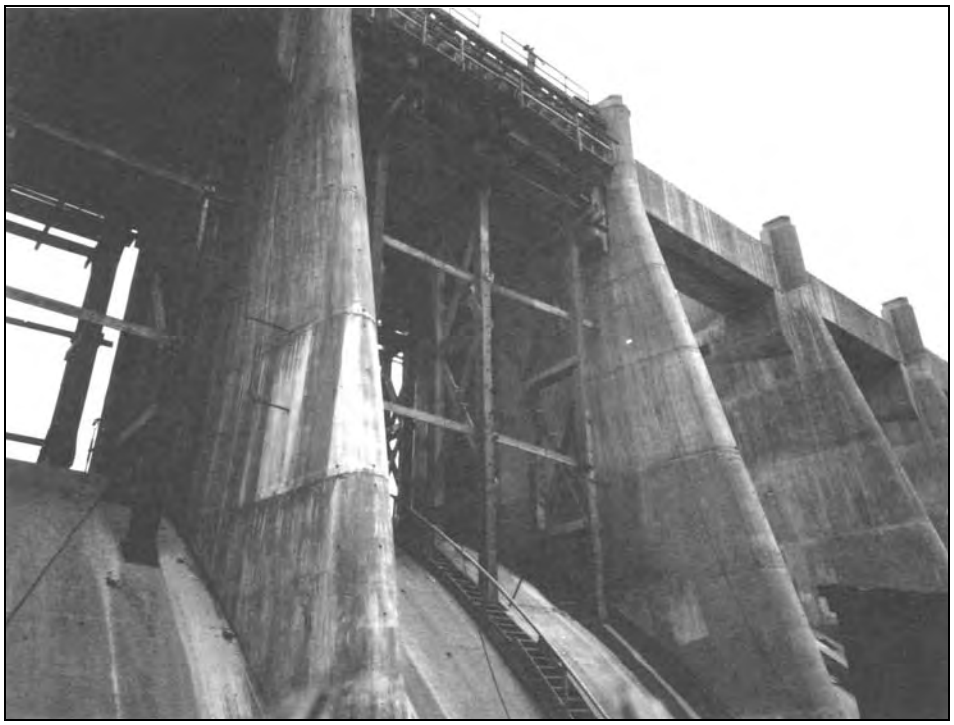

Fig. 33. View of a Section of Bluestone Dam's Service Bridge Under Construction. This photo was taken relatively late in the second 1946-1948 construction phase. (1949 Final Report)

Concrete work on the upper sections of the monoliths continued through late 1948. Construction on upper sections of the dam was finished in December 1948, concluding all permanent work. The completion date for the dam had been established as September 1, 1948, but the completion date was delayed until December 11, 1948. The government officially accepted the dam on December 10, 1948. The remainder of the construction campaign consisted of removing the whirler cranes and the contractor's construction plant from the site. Dravo Corporation finished this demobilization in January 1949.

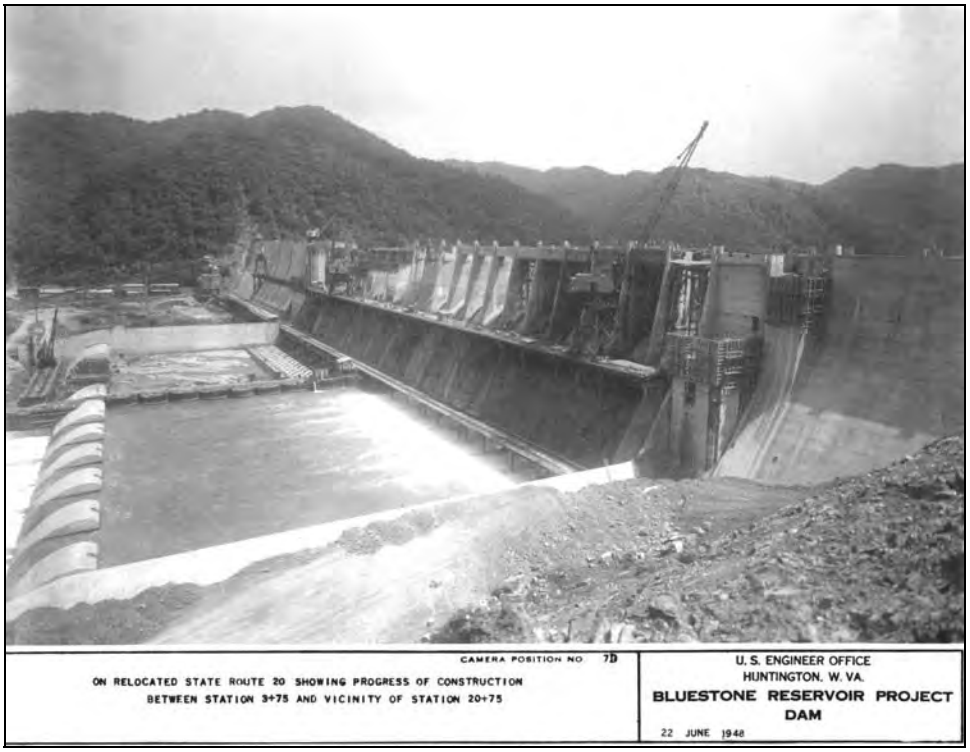

Fig. 34. Construction of Crest Gate Piers Underway in June 1948. Western half of spillway is in full operation, with sluice gates opened. Construction work continues on eastern portion of spillway. (1949 Final Report)

Fig. 35. Dismantling the Concrete Plant at Bluestone Dam at the End of the Second Construction Phase (1949 Final Report)

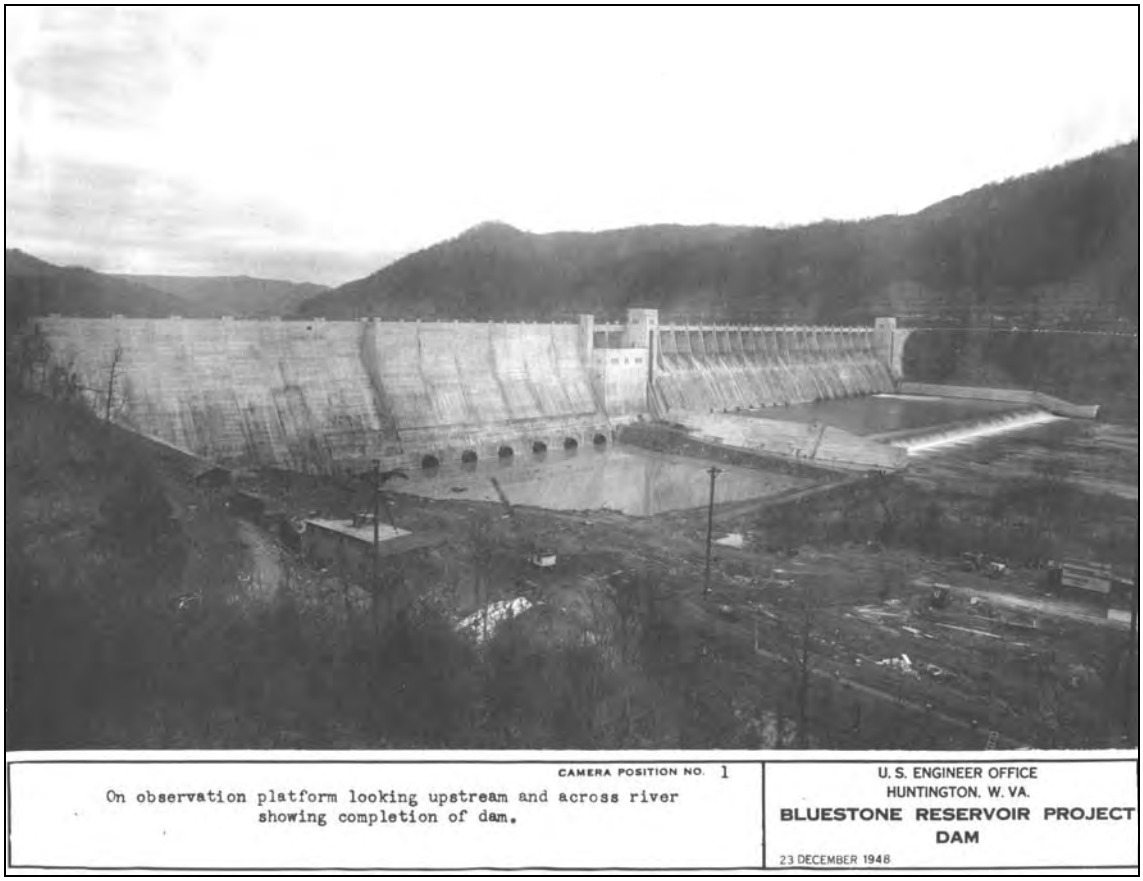

Fig. 36. North Elevation of Bluestone Dam at the End of the Second Construction Phase. Note that crest gates and gate machinery have not been installed in the spillway section (1949 Final Report).

With the alleviation of the World War II-era power shortage, construction of the dam's hydroelectric powerhouse was cancelled. The dam was thus completed as a flood control structure with provisions that would allow for the future addition of a powerhouse. The powerhouse was never constructed, and while Bluestone Dam continues to function as a flood control facility, it currently has no hydroelectric power facilities.

The total amount of money paid to Dravo Corporation under the Bluestone Dam construction contract was $13,419,935.08. This amount included an adjustment of $991,662.17 under the contract's escalator clause, fees of $477,356.80 paid to Dravo because of the suspension of construction, and other fees and charges for items such as government purchase of the contractor's access railroad and bridge, refunds for federal transportation taxes and emergency freight charges, and payments for increases in freight rates.[177] In comparison, Dravo's original January 1942 bid to complete the job was $11,376,000.00, and the original government estimate of the cost of the contract was

$9,749,826.00. In the end, the government paid Dravo Corporation $2,043,935.08 more than Dravo's original bid for the project. Much of this cost can be attributed to expenses associated with shutting down and resuming construction of the dam at the end of World War II, and to higher material and labor costs that were encountered when construction was resumed in 1946.

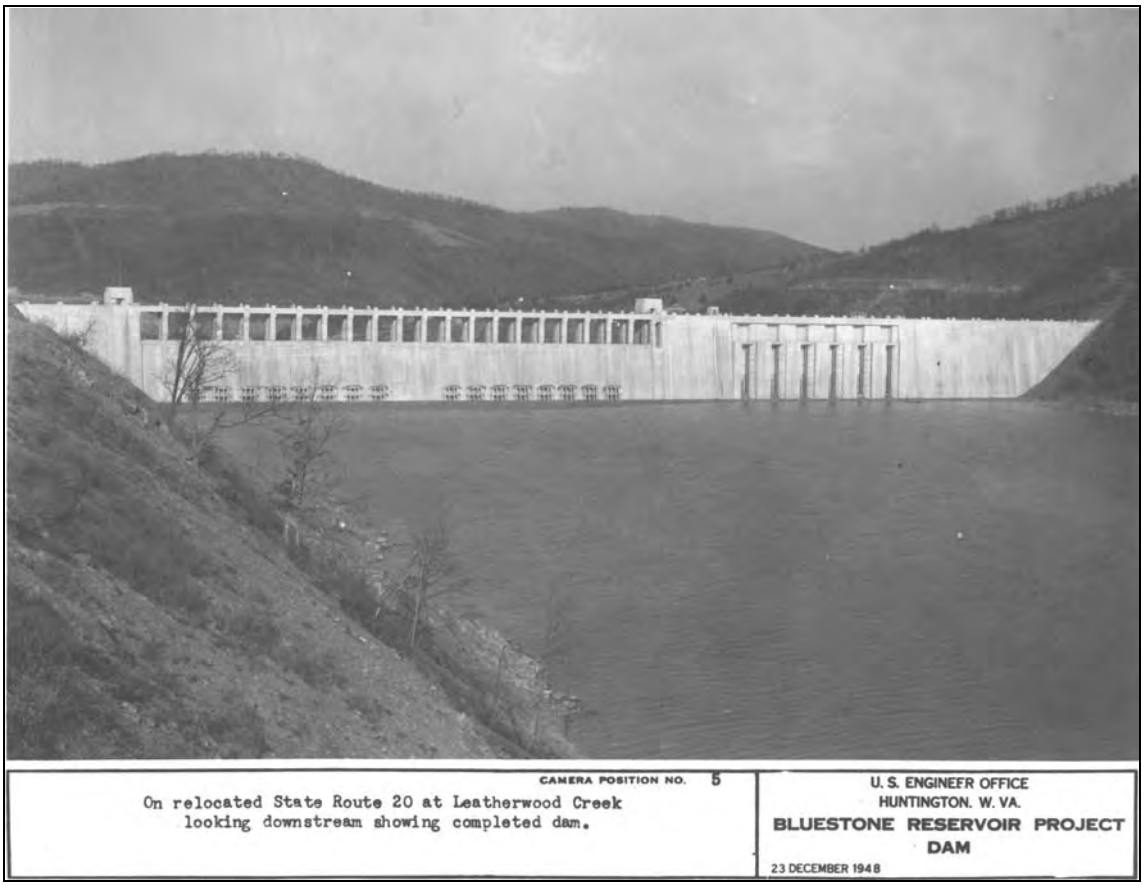

Fig. 37. South Elevation of Bluestone Dam at End of Second Construction Phase, December 1948 (1949 Final Report)

The amount paid to Dravo did not represent the full cost of Bluestone Dam to the government. The government paid directly for some items used in the construction of the dam, such as all cement used and the dam's 32 sluice gates and gate liners. Separate contracts covered a few other construction items. The full cost to the federal government for the dam and associated structures and improvements was $18,743,463.19.[178]

Installation of Crest Gates and Initial Operation of Dam, 1949-1952

Dravo Corporation finished removal of its construction plant and completed site cleanup in January 1949. The original contract called for the installation of the dam's crest gates as part of the main construction campaign, although the gates were not actually designed until after construction had started. Like the sluice gates, the crest gates were purchased directly by the United States and installed by Dravo Corporation. However, it was argued late in the second construction campaign that since the hydroelectric powerhouse was not to be built, the gates were not essential for operating the dam as a flood control structure. It was also argued that if the Huntington District took additional time to re-design the gates to have a higher allowable unit stress, it would permit significant financial savings. The installation of the crest gates was finally removed from the main construction contract under Contract Modification No. 20.

Fig. 38. View Across the Service Bridge on the Crest of Bluestone Dam, 1949. Crest gate openings have been completed but gates have not been installed. The gates were not actually installed until 1952 (1949 Final Report).

The government planned to complete design modifications on the gates and purchase them in 1949. Installation of the gates was to take place in 1950 under a separate construction contract.[179] In the end, installation of the crest gates was not completed until 1952. With the expense of crest gate installation, the total construction cost for Bluestone Dam was nearly $30 million.[180]

Even before the crest gates were fully installed, Bluestone Dam was fulfilling its flood control mandate. During a severe flood in December 1950, the dam stored 121,400 acre-feet of water, lowering the flood's crest levels at Hinton by four feet and at Charleston by ten feet. Without the intervention of Bluestone Dam, the 1950 flood would have caused severe property damage in Charleston, Hinton and other communities. Within twelve years of its completion, Bluestone Dam probably prevented flood damage that would have amounted to twice the cost of the dam's construction.[181]

Division of Labor and Working Conditions During Construction, 1942-1949

Supervision and Management

Dravo Corporation built Bluestone Dam under the direction of the Huntington District U.S. Army Corps of Engineers. The Contracting Division of Dravo's General Construction Department administered the project. The Dravo construction superintendent was Orval Auhl during the first construction phase, with R. A. Thompson as Assistant Construction Superintendent. For the second construction phase, R. A. Thompson took over as construction superintendent while Auhl took over administration of Dravo's General Construction Department. The assistant construction superintendent, also known as the "walking boss," was responsible for daily operation at the construction site, assigning tasks to work groups, making sure that all groups of workers stayed busy, and resolving any problems or difficulties that might arise.[182]

In contrast, the construction superintendent defined a broad strategy for completing the work, but left the daily operation of the construction site to the assistant superintendent. The Construction Superintendent met periodically with the assistant superintendent and head foremen to discuss important issues. The construction superintendent also closely assessed the costs of the project and recommended changes in future construction procedures. The superintendent also monitored the arrival of construction materials to determine if material availability would affect the long project's long-range progress. The construction superintendent was also in charge of addressing any safety hazards or violations reported by the U.S. Army Corps of Engineers safety inspector and safety engineer assigned to the site. In general, the construction superintendent coordinated with the resident engineer and his own subordinates to assure that the project was progressing as planned.[183]

The project also included a Materials Clerk and clerical staff responsible for ordering and accounting for all supplies and materials, and an Office Engineer and accounting staff in charge of tracking financial expenditures. The superintendent also had an Office Manager who served as the Construction Superintendent's administrative aide, overseeing hiring and firing, timekeeping, payroll, and salary check preparation. The office manager was also responsible for writing correspondence and for any public relations activities.[184]

Workers and Foremen

Foremen and workers under the control of the Assistant Superintendent completed the actual construction work. The two largest groups of employees were the laborers, who were under the control of the General Labor Foreman, and the carpenters, who were supervised by a General Carpenter Foreman. The laborers handled many aspects of construction, including excavation, drilling, loading, shooting, and hauling. The laborers were also in charge of concrete operations such as unloading aggregate, cleaning cars, cleaning forms, and pouring concrete. The laborers completed other miscellaneous tasks, including painting and general cleanup.

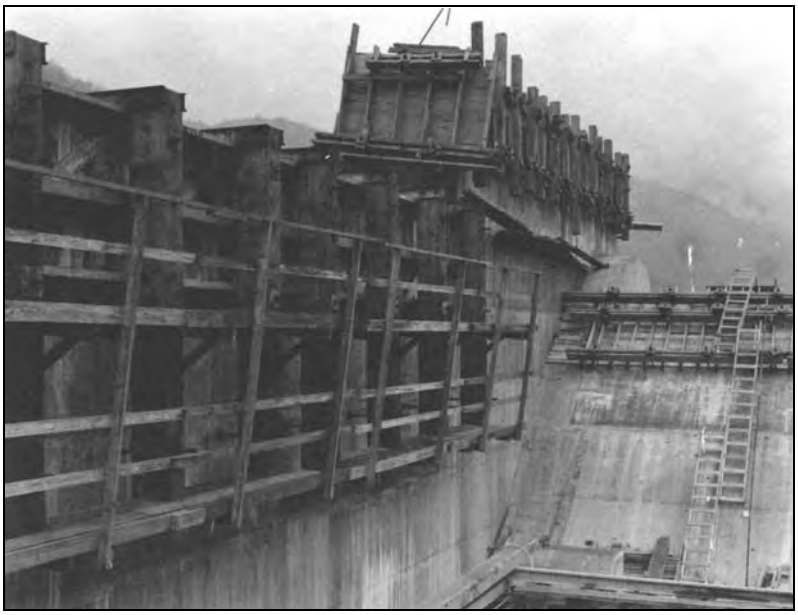

Fig. 39. Cantilever-Type Concrete Forms at Bluestone Dam. (1949 Final Report) Much of the work of constructing a concrete gravity dam in the 1940s consisted of building thousands of wood forms to pour the concrete into. For this reason, a large force of carpenters were employed during the construction of Bluestone Dam.

The carpenters were divided into three major groups. One crew of about 70 carpenters installed most of the concrete forms, built the railroad trestles and cofferdams, and placed any concrete rebar that was needed. A smaller group of carpenters constructed specialized forms needed for certain parts of the dam. These carpenters worked on the large carpenter's assembly platform or in the carpenter's shop. The assembly platform was located in the northern half of the Bluestone Dam construction plant, north of the dam site, and appears to have remained at this site during the entire construction of the

dam. A small sawmill was positioned south of the assembly platform. Workers assigned to the assembly platform included many of the most experienced carpenters, whose higher skill levels were useful in constructing the more complex forms for complicated sections of the dam, such as the sluice intakes. The third group of carpenters worked on specific assignments related to particular parts of the dam. The final report for the project stated that Dravo was short of carpenters for most of the job. Based on this statement it appears very likely that Dravo recruited local men to fill its need for additional carpenters.[185]

Fig. 40. Workers on the Carpenter's Platform at the Bluestone Dam Construction Plant. Many of the wooden forms used to pour concrete were constructed here. (1949 Final Report).

The Master Mechanic supervised a third division of workers. The Master Mechanic and his crew were responsible for operating all electrical and mechanical equipment and for constructing all of the dam's mechanical and electrical features. There were three divisions of mechanics, each overseen by an assistant master mechanic. One division was in charge of electrical work and equipment, another for mechanical work and equipment, and a third division was in charge of work completed on the job's second shift.[186]

On construction jobs, there is often friction among the different crafts or building trades. The friction sometimes results from a general suspicion and dislike between the trades, or from disputes over which trade is assigned which tasks. Resentment can result if, for

example, carpenters believe that laborers are being assigned work that should rightfully go to the carpenters, or vice versa. The 1949 final report for the construction of Bluestone Dam made this statement about relations between the various building trades: "There was good-natured rivalry between the various groups and crafts, but all of the supervisors and most of the key employees had worked together and for the contractor for a long time. Consequently, there was no serious labor trouble and a well organized happy job was the result."[187]

Work Schedule and Shifts

The daily work schedule included a day shift, a second shift, and a third shift. The day shift put forms in place and prepared those forms for concrete pouring. The second and third shifts poured and cured the concrete, unloaded aggregate, and made machinery repairs. It was reported that about 25-30 employees were used on the second shift, and that approximately 15-20 employees worked on the third shift. Scheduling the concrete pours for the second shift left the cranes available during the day shift for moving and placing forms. Likewise, on second shift, the workers did not need the cranes for lifting forms and could concentrate wholly on lifting and placing buckets of wet concrete. In this way, the work proceeded smoothly, with relatively little interference between form construction and concrete pouring.[188]

Labor Relations

The time span of the construction of Bluestone Dam was a turbulent one in terms of the availability of labor in the United States. By the time construction began, World War II had begun. The war effort quickly made it difficult to find able-bodied male workers. By the time construction resumed in 1946, the supply of common laborers became more plentiful, but skilled tradesmen were hard to come by, possibly because of the post-World War II construction boom. However, aside from problems with worker availability, the labor situation at Bluestone Dam appears to have been fairly placid.

The 1949 completion report for Bluestone Dam paints a fairly pleasant picture of labor relations. The report states that a strike or work stoppage was never considered during the dam's construction. The project was operated as a unionized closed shop, in which employees were required to join the union before working on the job. The closed shop agreement was signed with the Heavy Construction Department of the American Federation of Labor (AFL).[189] The AFL established a hiring hall at Hinton and all requests for labor were initially channeled through the hiring hall. However, it was reported that after the start of work, the hiring hall was no longer able to supply an adequate workforce. Dravo Corporation then initiated a recruiting effort that included advertising, the use of an employment agency, and contacting potential employees within a 150-mile radius of Hinton, West Virginia. Dravo's agreement with the AFL permitted the hiring of non-union employees in cases where the AFL hiring hall could not supply

sufficient labor for the project. However, men who were not hired through the AFL hiring hall were asked to sign union agreements before they started work. Because of federal wartime policies, potential employees were also cleared through the United States Employment Service.[190]

As the war progressed, labor scarcity became an issue. In 1942, Dravo Corporation provided a physical examination for all job applicants, and 20% of the candidates were rejected because of physical disabilities. However, labor became scarcer during 1943, and the rejection rate due to physical disabilities dropped to 9%. It was reported that during the 1943 labor shortage,

> …only men, who in the company doctor's opinion would have been definite liabilities to the work and were reasonably certain to be injured were rejected. The hiring qualifications of the company were reduced so as to make use of illiterates, men with fingers missing, men with medium deafness, and, in some cases, one eye. However, under no circumstances would men be hired with one arm or leg missing. It was not the policy of the examining physician to relate to the applicant the cause of his rejection, unless the applicant requested him to do so. Although the armed forces continued to take more of his physically fit men, and made it necessary for him to employ less physically able workers, the Contractor would not submit to waiving the physical examination entirely, in spite of adverse criticism from both the AFL and the United States Employment Service. He managed to maintain crews on all three shifts by working a selected number of employees overtime shifts each week. The maximum number of men employed at one time during this period of work was 306.[191]

Clearly the departure of servicemen at this time forced Dravo to relax its hiring standards and accept workers it would have rejected in times of a more plentiful labor supply.

After the end of World War II, construction resumed at Bluestone Dam. The account of labor conditions in the 1949 Final Report for the dam construction has some interesting perspectives on labor in the post-World War era. The report first states that the strict physical examination standards maintained by Dravo Corporation at the beginning of World War II were re-instated. The account also states that "The returning war veterans did not show too great an inclination for work during the first part of 1946, apparently preferring to take advantage of their unemployment insurance, and difficulty was experienced in securing a force of physically able men. However, during the latter part of the year, the situation eased and an ample supply of physically fit, unskilled labor was available and waiting for work."[192] Thus, the supply of common laborers became more plentiful after the first months of 1946. However, the report paints a different picture of the availability of skilled workers. The 1949 Annual Report stated:

> The skilled occupations offered more of a problem, and the Contractor was short on carpenters for the major portion of the work. In order to secure and hold the skilled craftsmen, it was necessary to upgrade men beyond their experience. Carpenter helpers were signed on as carpenters. Laborers and handymen were noted as carpenter helpers, etc. The more experienced men, distressed and disgusted at being paid the same rate as the upgraded men, openly loafed and slowed down to match the slower rate of progress set by these employees. Three rounds of wage increases were granted during the time of the contract, matching the increases secured by labor throughout industry. These were an average of $0.15 per hour increase effective 1 February 1946, and average $0.15 per hour increase effective 16 December 1946, and an average $0.125 per hour increase effective 10 November 1947. There was some agitation for a fourth round of increases in the summer of 1948, but seeing the end of the job close ahead, the union did not press the issue to any extent. All wage increase discussions were conducted peaceably with both parties recognizing the needs of the other and seeking a just solution. The net result of the combined slowdown and lowered productivity on the part of the workers, with the higher wages paid, was to make the unit cost of all work performed considerably higher than it had been.[193]

With the post-World War II construction boom in America, it is not surprising that Dravo had difficulty attracting skilled construction workers to Bluestone.

Wages

The original 1941-1942 minimum worker wages for the project ranged from $0.55 to $1.50 per hour. Unskilled laborers, apprentices, and helpers were paid minimum wage levels below $1.00 an hour, while most skilled trades had wages in the $1.00 to $1.25 per hour range. A few skilled trades, especially the structural steel workers and the equipment operators, received minimum wage levels of over $1.25 per hour. The operators of derricks, two-drum hoists, and pile drivers earned $1.50 per hour.[194]

These wages increased as the project progressed, especially during the 1946-1948 construction phase. An authorized wage rate chart in the 1949 final construction report tracked the increase in wages over the course of the project. For example, machinists at Bluestone had an authorized wage rate of $1.25 per hour from the beginning of the project in 1942 through the beginning of 1946. Machinist wages were raised to $1.40 in February 1946, went up again to $1.55 in December 1946, and topped at $1.675 in November 1947. The two 1946 wage increases amounted to a $0.15 per hour for all classes of labor, while the 1947 increase amounted to $0.125 for all grades of labor.[195]

Workforce Size

The number of workers at the site fluctuated somewhat during the original 1942-1944 construction phase. The work crew went from approximately ten men on January 14, 1942, when the notice to proceed with construction was issued, and rose to about 100 men by the middle of February 1942. The highest number of workers on the site during 1942 was approximately 250 men, who were present at the site in the first half of May. In the middle of May 1942, however, Dravo laid off 43 workers, citing the scarcity of construction materials. Through the middle of July 1942, Dravo further reduced the workforce by laying off an additional 19 men, again citing the lack of construction materials. The workforce slowly increased to nearly 200 men in autumn 1942, with the first concrete pouring at the main dam on November 15. The workforce stayed at or around 200 men throughout the winter of 1942-1943, jumping to a high of about 260 men in late May and early June 1943.[196]

Beginning in August 1943, the number of men employed on the project steadily declined. In contrast to the situation in 1942, when labor was available but men were laid off during material shortages, the declining workforce in later 1943 was attributed to a scarcity of workers. This labor shortage was blamed on a number of factors. The most obvious reason was that young, able-bodied men were leaving to fight in World War II. Information was also circulating that the Bluestone Dam construction project would be shut down in the near future, making employment there less appealing for potential workers. On October 10, 1943, Dravo records even stated that "hunting season (is) interfering with work."[197] In late fall 1943 and winter 1944, the workforce continued to decline steadily, from approximately 150 workers in early November 1943 to about 125 workers in the last half of December 1943, and down to about 40 workers by February 1944.[198] Construction at Bluestone Dam was suspended on March 1, 1944. Detailed information on workforce size could not be located for the second construction phase of 1946-1948.

Safety and Accidents

The occupational safety measures provided by Dravo Corporation for the workers at Bluestone Dam included on-site medical staff. The company originally retained a physician during the entire duration of active construction. The physician lived at the jobsite and was on-call at all times at the field hospital, which handled all injuries and first-aid cases, except in severe cases requiring the injured party's transfer to a Hinton facility. The field hospital included an office, a first-aid room, an examination room, and an X-ray room. The first-aid room was equipped to treat superficial wounds, eye injuries, sprains, contusions, asphyxiation, and fractures.[199]

Dravo also employed safety experts at the construction site to maintain a safe working environment. The company hired a full-time safety engineer at the beginning of the project, but wartime labor shortages made it difficult for Dravo to retain him full-time,

and the superintendent or other engineers later took over the safety engineer's duties. With resumption of construction in 1946, Dravo Corporation reported that it was unable to find an affordable full-time physician or a safety engineer. As a result, a first-aid man was hired to administer basic medical services and to be responsible for some safety duties. Other safety tasks were assigned to various supervisors. The Construction Superintendent also assumed a large degree of responsibility for the safety program and relied on the various project foremen to enforce safety measures, to educate workers regarding safe work methods and to instruct them in avoiding work-related hazards. Foremen were also required to attend a safety meeting every two to three weeks, and to have a weekly five- to ten-minute safety meeting with their work crews.[200] Dravo provided all workers with a hard hat and required employees to wear the hats at all times when on the construction job. The company made available other safety equipment, including goggles, welding shields, safety belts, life jackets, and respirators.[201]

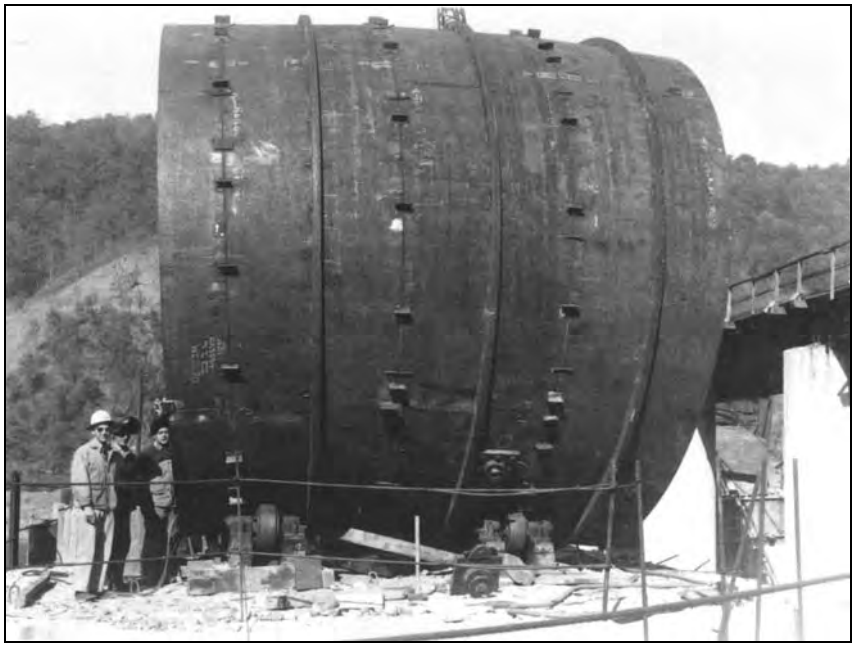

Fig. 41. Workers Posed Next to a Section of Steel Penstock During 1946-1948 Construction Phase. (1949 Final Report)

Injuries on the Bluestone job do not seem to have been excessive. There was some concern among Dravo and Huntington District staff that many of the men employed on this job were rural farm workers who lacked experience completing potentially dangerous construction tasks. Dravo tried to address this issue by having frequent safety meetings and presentations and by encouraging foremen and other supervisors to enforce safety regulations. Despite these efforts, "…because of the nature of the work being scattered all about the project, making it impossible to constantly check for safety

violations, some men persisted in being negligent where the use of protective equipment was concerned and many avoidable injuries occurred, particularly eye injuries. Fortunately, most of them were minor and required little, if any, treatment."[202] Nail punctures were another common injury on the job, and men with these wounds were required to report to the infirmary for tetanus shots and other medical treatment. While workers were required to wear hard hats at Bluestone Dam, they were not required to wear safety boots, and the large number of nail punctures and other foot injuries on the job were probably related to this policy.[203]

Out of 3,008,835 man-hours worked at Bluestone by Dravo employees, there were 3,042 first-aid dressings, 143 non-lost-time injuries, and 26 lost-time injuries. Out of the 427,846 man-hours worked by governmental employees at Bluestone, there were seven first-aid dressings, one non-lost-time injury, and four lost-time injuries. A safety record sheet in the Final Report indicated that there were two fatalities and four instances in which injuries resulted in permanent disabilities, but no further details were given.[204]

Records for one of the fatal accidents were located in surviving construction correspondence. On June 10, 1948 at 4:20 p.m., Dravo laborer Coin B. Owens was unloading a car of concrete aggregate and sustained an injury that required the surgical amputation his left arm. Owens died from complications related to the surgery on July 1, 1948. Although it did not describe the accident in great detail, correspondence related to the event stated that the cause of the accident "appears to be deliberate chance taking on the part of the foreman, and the subcauses are given as defective brake on railroad car and inoperative derail device."[205] Documentation indicates that the foreman was responsible for "dropping" the aggregate out of the car at the time of the accident, and there was extensive discussion of a defective brake and the fact that the car was located on an uneven grade. As the aggregate descended, the car may have shifted and derailed, injuring Owens. The recommended course of action in the aftermath of the accident was to fire the foreman of the unloading crew, to test the derail device before additional cars were unloaded in the area in question, and to repair the brake if it was found defective. The final statement was that "no car of aggregate should be dropped downgrade when men are in the car if the derail is out of order." The foreman in charge at the time of the accident, R. G. Wooten, was fired and the replacement foreman and other foremen were briefed on the accident and resulting safety measures.[206]

Summary

Labor relations for the Bluestone project seem to have been fairly placid. There was apparently a relatively low level of tension between the union, the contractor, and the U.S. Army Corps of Engineers concerning labor questions. There appear to have been no strikes or threats of strikes during either of the project's two construction phases. Major labor-related problems for the project seem to have been caused by fluctuating personnel

availability, which was the result of nationwide trends and world events. Military enlistment and the draft drained the labor pool of able-bodied construction workers, a shortage that plagued the first construction phase of 1943-1944. During the second phase of construction from 1946-1948, skilled workers became scarce, probably because of the post-World War II construction boom that accompanied the return of men and women from overseas service. This situation caused the promotion of less skilled men to highly skilled positions. The 1949 Final Report cited an unfortunate result of this situation, which was an intentional slowdown by the more skilled employees, an action that increased the project costs. The contractor and the U.S. Army Corps of Engineers seem to have tolerated this slowdown, since there are no existing records that document any retaliation against this action.

Had this dam been constructed during the high unemployment of the 1930s, as originally planned, the workers probably would have had less bargaining leverage. If a worker lost his or her job during times of high unemployment, there was a high likelihood that an unemployed replacement could be found to take his or her place. However, the first Bluestone Dam construction campaign occurred during wartime conditions in which labor was scarce. The remainder of the dam was completed during the post-World War II building boom of the late 1940s, when skilled construction workers were in high demand. These tight labor markets gave the union and workers at Bluestone more leverage in dealing with the general contractor.

Construction Technology and Engineering Significance

Introduction

Bluestone Dam is a late example in the series of concrete gravity dams built by federal agencies during the ambitious public works program that began in the early 1930s. In its design and technology, Bluestone Dam was fairly typical for its time. Articles in engineering journals do not cite many innovations or “firsts” associated with Bluestone. In a number of ways, the design of the dam is similar to that of the Pittsburgh District’s Tygart Dam (1935-1937) built in northern West Virginia on the Tygart River. In most cases, each concrete gravity dam built in this period is a unique structure. Each dam had to be tailored, both in scale and design, to its site. Each dam therefore had different dimensions, and elements such as crest gates, sluice gates, stilling basins and spillway chases were individually designed and engineered to suit the specific site. Design variations were also related to the function of the dam, since hydroelectric dams required features that were unnecessary for dams intended only for water storage.

Despite the lack of “firsts” reported in engineering journal articles on the dam, there are several interesting aspects of the dam’s design and engineering. The dam was built in an

era when scientific research and new discoveries led to advancements in concrete technology. In the 1940s, for example, construction specialists were beginning to understand the value of air entrainment, a technique in which the strength and durability of concrete was enhanced by trapping air bubbles in the mix. This technique was not used in the first construction phase of Bluestone Dam, but it was adopted soon after the second construction phase began in 1946. Along with Tygart Dam, Bluestone Dam was also a fairly early example of the use of hydraulic model testing to assist in the design of the spillways and other parts of the dam related to water flow. Since it was planned and designed in the mid-1930s and built from 1942-1948, Bluestone Dam's construction technologies reflect the changes that occurred in American construction from the Great Depression era of the 1930s, through World War II, and into the postwar era of the late 1940s.

Concrete

The vast majority of Bluestone Dam's mass consists of concrete, some of it reinforced with steel rods, or rebar. Concrete that is not reinforced with steel performs well under compression, when forces place pressure directly on the concrete. Plain concrete does not have very high tensile strength, meaning that it is not very strong when subjected to pulling, stretching, or bending. By embedding steel rebar in concrete, the concrete's tensile strength increases greatly. Most structural concrete construction today uses steel-reinforced concrete.

The transportation and pouring of the Bluestone Dam concrete appears to have been fairly typical for the time. The concrete was transported in bottom-dump concrete buckets, each with a capacity of two to three cubic yards. Flat cars on the dinkey railroad then moved the buckets around as needed. Whirler cranes picked up the concrete dump buckets, positioned them above the spot where the concrete needed to be poured, and then the buckets were emptied. A vibrator was then inserted into the liquid concrete to settle and consolidate the material, and to remove air and water pockets that formed during pouring. The surface of the concrete was then tamped and leveled. Finishing was accomplished in most areas with wooden floats, although some areas of the dam were finished with a steel trowel. Mixing and placing inspectors were on duty during all shifts to ensure that good results were obtained in the concrete work.[207]

Many of the concrete techniques used at Bluestone Dam reflected the forefront of concrete construction technology in the 1940s. Some of the processes utilized at Bluestone, such as air entrainment, were among the earliest applications of new innovations in dam construction. The engineers and construction managers in charge of the Bluestone project during both major phases of the dam's construction were apparently aware of the latest developments in concrete building techniques.

Fig. 42. Dinkey Railroad Trestle at Bluestone Dam. This wooden trestle built next to the dam allowed the dinkey railroad to transport buckets of concrete to sections of the dam where they were needed. (1949 Final Report).

The original construction specifications for Bluestone Dam were issued in 1941. These specifications state that the concrete was to be "…composed of cement, fine aggregate, coarse aggregate, and water so proportioned and mixed as to produce a plastic, workable mixture in accordance with all requirements under this section and suitable to the specific conditions of placement."[208] The specifications also outlined three grades of concrete to be used. Class A concrete was to be used for highly reinforced areas of the dam such as slabs, beams, hoist support piers, and service bridge girders. Class B concrete was to be used for training walls, spillway aprons, stilling weirs, and in some sections of the reinforced spillway piers of the dam. Class C concrete was intended for all other sections of the dam. Every cubic yard of Class C concrete was to contain 329 pounds of cement. The total for Class B went up to 423 pounds, and the highest cement content was reserved for Class A concrete, at 517 pounds per cubic yard.[209] The specifications indicated that most of the large sections of the dam would be poured in horizontal concrete courses measuring three to five feet in height. All concrete was then to be spread and settled through the use of mechanical vibrating equipment, which removed air bubbles and pushed the concrete into crevices and depressions after pouring.[210]

The 1949 Final Report for Bluestone Dam indicates that all concrete poured on the dam was cured with either water or steam, depending on the weather conditions. The curing, or hardening, process is actually a chemical change that takes place within the concrete, and is not a matter of the concrete simply "drying out." The exposed portions of the concrete at Bluestone had to be kept wet during the curing process, and during warm

months a hose and sprinkler system sprayed water on the exposed concrete surfaces and wooden forms. In colder months when freezing presented problems, the concrete prepared for Bluestone Dam was cured using steam. In this process, steam was pumped onto the curing concrete's exposed surface. The steam had the dual purpose of heating the concrete while also keeping the surface of the concrete wet. In extremely cold temperatures, tarps were placed over the concrete's surface to hold the steam close to the concrete. Steam curing generally took about five days, but could take longer during very cold conditions.[211] A more complex problem was the maintenance of an acceptable internal temperature inside the curing concrete.

In building a series of large concrete dams in the 1930s and 1940s, the U.S. Army Corps of Engineers soon realized the need to avoid temperature extremes inside large masses of uncured concrete. One way to avoid excessively high temperatures was to chill the water used in mixing the concrete. Refrigerated mixing water may have been used as early as 1939 at Hiwassee Dam to lower the temperature of concrete as it cured.[212] The Corps further developed water-chilling techniques for the Norfolk Flood Control Dam in Arkansas (1941-1945). At Norfolk Dam, crushed ice was dumped into the concrete mixing water during warm months, which was successful in reducing the temperature of the freshly mixed concrete by about 10 degrees Fahrenheit.[213] The use of chilled water and low-heat cement in the initial construction campaign at Bluestone was roughly contemporary with the Norfolk project, but the 1941 construction specifications for Bluestone Dam do not seem to have required that a water-cooling plant be built at the site.[214] A water-cooling unit was nevertheless installed in the original concrete plant that was built on the site in 1942. The cooling unit was a York ice machine with two ammonia compressors powered by a pair of 100-horsepower motors. The cooling plant was designed to cool 100 gallons of river water per minute, from its original temperature of 85 degrees down to 35 degrees. If the water temperature before cooling was as low as 60 degrees, the plant could process 200 gallons per minute.[215]

In general, it was reported that the concrete curing efforts at Bluestone Dam were satisfactory, although contemporary observers made some amusing comments about this process. Authors of the 1949 Final Construction Report wrote:

> On the whole, the curing operations were satisfactory, but it was a continual battle to keep them so. Contractor's employees, working near a lift being cured, understandably didn't like to be sprayed with water, especially on cold days. Consequently, they turned the water off, plugged the pipes, cut the hoses, and performed other similar acts in an effort to keep the water off of themselves. It was necessary to keep an inspector roving over the job constantly on the day shift in order to keep the water turned on and the concrete under continuous curing.[216]

Another interesting technological aspect of the Bluestone Dam's construction is the modification of the concrete mixture as the construction progressed. The concrete mixture appears to have remained consistent throughout the 1942-1944 construction campaign, but in late 1946, detected problems encouraged changes. Corps officials observed that the dam's sloping concrete surfaces contained too many irregularities. A change order stated that the "sloping surfaces of the concrete being placed on the dam contain air and water pockets."[217] These air and water pockets were detrimental to the durability of the concrete and needed to be eliminated.[218]

After some discussion of the probable cause of these defects, the problem was determined to be an insufficient amount of natural and stone sand in the concrete's fine aggregate. The Corps decided that the solution was to increase the amounts of natural and stone sand in the aggregate, so that the sand would occupy between eight and ten percent of the aggregate's volume. This change resulted in an increase of $84,640 to the construction contract.[219] A significant increase in the amount of fine sand did improve the concrete's quality by reducing air and water pockets and other unsightly pockmarks on the surface of the concrete. This technique mainly improved the appearance of the concrete, and not its strength or durability.[220]

Shortly after the alterations to the fine aggregate's compositional proportions, a second major change was made to the composition of Bluestone Dam's concrete. Beginning in the mid-twentieth century, a technique known as air entrainment was developed to provide more durable, workable concrete. Air-entrained concrete often possesses a more consistent appearance than regular concrete, and it is highly resistant to harsh climate conditions. In the 1940s, the air entrainment technique generally involved adding a mixture that trapped small air bubbles in the concrete. Air entrainment eventually became standard practice in concrete construction, but it was still an innovation in the early 1940s. The original 1941 construction specifications for Bluestone Dam do not mention air entrainment, and the technique was not used during the 1942-1944 construction phase. A change order of March 20, 1947 explained, "When the original plans/specs were prepared, the advantage of the use of air entraining agents in the concrete had not yet been adequately determined. Higher authority has subsequently recommended the use of air entraining admixtures in concrete structures of this type."[221]

A series of experimental concrete pours at Bluestone Dam were undertaken in 1946, and a variety of materials were added to the concrete to improve its workability, durability, consistency, and appearance. For some experimental pours, materials like pozzolith and natural cement were added to the mixture. Two air-entraining agents, Darex AEA and Vinsol Resin, were also used in some experimental pours. In early 1948, the American Society for Testing Materials (ASTM) officially recognized only these two air-entraining admixtures for concrete. The ASTM characterized Darex AEA as a triethanolamine salt of a sulfonated hydrocarbon, and described Vinsol Resin as a petroleum-hydrocarbon

insoluble fraction of a coal-tar hydrocarbon extract of pine wood.[222] Additional experiments and research on concrete additives were performed at the U.S. Army Corps of Engineers Ohio River Division Laboratory at Mariemount, Ohio. In the end, it was felt that Darex AEA improved the consistency, workability, and durability of the concrete, and it was also relatively easy to add. These factors made Darex AEA the best choice.[223]

A letter dated January 7, 1947 and sent by a Corps official to J. S. Miller of Dravo Corporation stated that recent tests on the concrete of Bluestone Dam showed that the addition of an air-entraining agent to the concrete would "produce a concrete that is more plastic and workable than ordinary concrete."[224] On March 20, 1947, a change order was issued to add Darex AEA to all concrete being poured at Bluestone Dam. The additional cost to add Darex to all future concrete poured at Bluestone was reported as $24,566.00.[225] The change order stated that:

> Recent developments in the use and design of concrete mixes have indicated that the addition of an air entraining admixture to the concrete is necessary in order to produce a more workable mix and a more durable concrete. Tests of various admixtures conducted by the Ohio River Division Laboratories and this district determined that Darex AEA, as manufactured by the Dewey and Almy Chemical Company of Cambridge, Mass. is the air entraining agent best suited for use in connection with the remaining concrete to be placed at the Bluestone Dam.[226]

The concrete of the lower sections of the dam built in 1942-1944 still retains a darker, ochre-colored hue, and there are many areas of moss growth and discoloration. The concrete of the upper portions of the dam is of a slightly different color and is cleaner and smoother, with relatively few moss growths, pockmarks, or other surface irregularities. This may be evidence of the greater durability of the post-1946 concrete poured at the dam, a concrete produced with a higher percentage of fine sand and using the process of air entrainment.

Schnitter states that air-entraining agents were first used in connection with concrete dam construction at Angostura Dam in South Dakota. The U.S. Bureau of Reclamation completed this dam in 1949, around the time that Bluestone Dam was finished.[227] Experiments using Vinsol Resin as an air-entraining agent were published in connection with Angostura Dam in 1949.[228] Davis states that around 1945, air entrainment became standard practice for pouring concrete that was to be exposed to severe weather conditions.[229] However, Davis does not clearly state when this technique was first applied to concrete dam construction. Depending on when air entrainment was first used in the construction of a concrete dam, Bluestone may have been one of the first concrete gravity dams built in the United States with air-entrained concrete.

Primary Contractor

Dravo Corporation was the primary construction contractor for Bluestone Dam. By the 1940s, the company was a well-established business. Francis R. Dravo, a mechanical engineer, founded Dravo Construction in 1891. By the turn of the century, the Pittsburgh company was experienced in heavy marine construction. Dravo Construction received its first federal government contract to build a river navigation structure in 1902, and is today best known as a builder of federal locks and dams on the Ohio, Allegheny and Monongahela Rivers.[230]

In addition to lock and dam construction, Dravo was also heavily involved in the building of concrete piers and abutments for bridges. While many of these bridges were located on the Ohio, Allegheny and Monongahela Rivers, the company also built bridge piers for spans in Maryland, Delaware, Michigan, Massachusetts and the District of Columbia. However, most of the company's bridge related work was clustered in the states of Ohio, Pennsylvania, West Virginia and Kentucky. Major clients for Dravo's bridge-related operations included the municipal governments of Pittsburgh and Philadelphia, the Pennsylvania Railroad, and the Pittsburgh and Lake Erie Railroad. Dravo Corporation was involved in 47 major bridge construction projects between 1903 and 1947.[231]

With regard to dam construction, Dravo was highly active in Ohio, West Virginia, and western Pennsylvania. Dravo held the American patent for a type of roller dam gate developed by the Krupp Corporation in Germany. As a result, Dravo was contracted by the Huntington District U.S. Army Corps of Engineers to build navigation dams on the Kanawha River at Marmet and London, West Virginia, during the early 1930s. Dravo was also responsible for the construction of Gallipolis Dam (now Robert C. Byrd Dam) on the Ohio River, which was the largest roller gate dam in the world upon its completion in 1938.[232]

SECTION 5: OPERATION AND ENVIRONMENTAL IMPACT OF BLUESTONE DAM

Bluestone Dam's Role in Flood Control, Tourism and Recreation, 1952-2001

Since the completion of the facility, the U.S. Army Corps of Engineers, Huntington District, has operated Bluestone Dam as a flood control reservoir facility. In 1938, Congress had plans for five flood control reservoirs for the Kanawha River basin, including Bluestone Dam. In 1941, planning began on Sutton Dam and Lake, located on the Elk River 85 miles above Charleston. Construction of this concrete gravity dam, which is 40 feet higher than Bluestone Dam, was completed between 1956 and 1961. Construction of Summersville Dam on the Gauley River took place between 1960 and 1966, providing additional flood control for the area. Bluestone Dam, Sutton Dam, and

Summersville Dam today provide flood protection to West Virginia's Kanawha Valley, which includes the city of Charleston, an important industrial center and the state capital. These three reservoirs control 57% of the total water drainage in the Charleston area, and Bluestone Lake controls about 44% of this total. Bluestone Dam has prevented approximately $1.6 billion in flood damages since it began operation at the beginning of 1949. [233] Bluestone Lake currently extends 10 ½ miles up the New River, and has the largest drainage area and flood storage of any dam in West Virginia.

Bluestone Lake is also the third largest lake in West Virginia, and in addition to providing important flood control benefits to the Kanawha Valley, the reservoir is an important recreational facility for Summers County. As such, the lake provides significant economic benefits to Hinton and Summers County. During the summer, the lake's total surface area covers more than 2,040 acres and provides opportunities for recreational activities such as boating, fishing and water skiing. The area surrounding the lake is a popular destination for picnics, hunting, biking, and camping.

Federal lands around Bluestone Lake are designated as the Bluestone Wildlife Management Area. This includes 17,632 acres of land, much of which has been leased to the State of West Virginia for forest, fish and wildlife conservation. The Bluestone Lake Wildlife Management Area is one of the most popular public hunting and fishing areas in the state, and features wild turkey, whitetail deer, and a variety of small game. Many also believe that the New River is West Virginia's best warm-water fishery. Bluestone Dam and Bluestone Lake attract over 1.3 million visitors annually, which brings significant economic benefit to the local economy.[234] The area includes recreational facilities such as seven campgrounds and a rustic cabin and barn area. A large public hunting area has also been reserved at the upper end of the lake, and the Presbyterian Churches of West Virginia operates a day and overnight camp within the area.

Bluestone State Park is also located on the shores of Bluestone Lake, about 16 miles south of Interstate 64. While the Huntington District U.S. Army Corps of Engineers manages the operation of the dam and its immediate site, including the parking areas, scenic overlook, and picnic area, the State of West Virginia, under a licensing agreement with the federal government, provides fish, wildlife, and forest management of the lands around the lake in West Virginia. The State of West Virginia has developed a portion of the reservoir lands and adjacent state-owned lands as Bluestone State Park and Pipestem State Park. The state park contains 25 cabins, 87 tent/trailer campsites, and provides boat rentals, hiking trails, and an accessible fishing pier. The portion of the lake and associated lands located in Virginia are operated by the U.S. Army Corps of Engineers in cooperation with law enforcement and conservation officials of Virginia.[235]

In 1997, Bluestone Dam was evaluated to determine whether or not the structure was eligible for the National Register of Historic Places. It was found that Bluestone Dam

was historically significant under National Register Criterion A, which recognizes resources that are associated with important events in American history, or with important patterns and trends in American history. Resources eligible for the National Register under Criterion A can be historically significant at the local, state, or national level. It was found that Bluestone Dam is historically significant for its associations with the landmark Supreme Court case that strengthened the federal government's ability to develop water resources. The dam was also cited as significant for its associations with the federal flood control program of the early to mid-twentieth century, which resulted in the establishment of large reservoirs in many parts of the United States. These reservoirs have prevented billions of dollars in flood damage to cities and towns of all sizes. Use of Works Progress Administration (WPA) funds for the project and the positive local economic impact of Bluestone Lake and the Bluestone Wildlife Management area were also mentioned as themes that contribute to the dam's historic significance.[236]

The U.S. Army Corps of Engineers funded the 1997 National Register eligibility assessment, because of long-range plans to alter Bluestone Dam. One severe problem in the dam's operation is the severe buildup of driftwood and other trash in Bluestone Lake during and after times of high water. At times, up to a twenty-acre area of flood debris can back up behind Bluestone Dam. These materials range from driftwood to old tires, bottles, cans, and abandoned refrigerators and other appliances. Removal of these items is time-consuming, and if these materials pass through the dam during low water conditions, they can become snagged in scenic areas below Bluestone Dam in the New River Gorge Scenic River Area, which is administered by the National Parks Service.[237]

The U.S. Army Corps of Engineers has been concerned about this problem and its effect on the natural and scenic resources below Bluestone Dam. Plans are currently in place to construct a drift release tower at Bluestone Dam. This facility would consist of a large opening in the dam that could be manipulated to pass driftwood and other debris through the dam during high water, so that the material will wash down the New River and out of the area. Some larger pieces of debris such as tires and appliances may be removed before they pass through the drift release tower. The estimated cost of the drift release tower is currently $9.2 million, and completion is expected in the summer of 2003. Construction of the tower is part of a comprehensive effort to remove trash from the New River, which is one of the top whitewater rafting destinations in the eastern United States.[238]

The Impact of Bluestone Dam and Bluestone Lake in Summers County and the New River Valley

Bluestone Dam has had an undeniable impact on the New River Valley, on Hinton, and on Summers County and the surrounding counties of Virginia and West Virginia that border the shores of Bluestone Lake. In many cases, the construction of a flood control

reservoir dam has sparked protest and opposition due to the displacement of residents and communities in the area flooded by the reservoir. In the case of Bluestone Dam, the New River Valley above the mouth of the Bluestone River was geologically suitable for a reservoir. The area to be flooded by the lake was also sparsely populated and contained no large towns, cities, or major railroad or power production facilities, hence the human displacement caused by Bluestone Dam was less severe than that caused by other flood control dams. The displacement of those who established farms, homes, businesses and communities in a given area is nevertheless always a traumatic experience, especially if the residents have a long history in the region. While a relatively modest number of residents had to relocate out of the Bluestone Lake impoundment area, many of the families had long-standing ties to the locale and had been living in the New River Valley since the early to mid-nineteenth century.[239]

Bluestone Lake did exact a price on the area residents. Perry reported in his 1949 report on the dam's construction that "many landmarks of this region have been either removed or inundated, and it has had a vast effect upon the people of this area."[240] Perry stated that many "cherished homes" were destroyed by the lake, along with two churches, the Greenbrier Baptist/Four Mile Church and the Buffalo Church. Perry also recalled that the lake inundated the sites of three historic mills at Indian Mills, Upper Bluestone Mills, and Lower Bluestone Mills. Perry also stated that the reservoir flooded the sites of four ferries that crossed the New River, at Pack's Ferry, Haynes Ferry, Warford Ferry, and Shanklin's Ferry.[241] Perry mourned the loss of many scenic sites in the Bluestone Lake area, including Landcraft's Shoals and Bull Falls, which had been studied as a potential site for Bluestone Dam. Historic sites that Perry stated would be flooded by the lake included Thurmond Camp Ground, a battle site at Salt Well, and a tannery site and swimming hole known as "Round Rock" near Landcraft's Eddy.[242]

Cemetery removal was one of the more grim tasks necessary to make way for Bluestone Lake. By 1949, twenty-five cemeteries were removed, resulting in the relocation of 681 graves from the reservoir area. The Wearly Monument Company of Muncie, Indiana, performed the cemetery removal services under a separate contract for the Bluestone project.[243] Many of those interred in the lake area were early settlers of the region who were born before 1850, and included members of the Meador, Pack, Bradberry, and Landcraft families. These names are still common in this area.[244] Since the National Historic Preservation Act did not exist in the 1940s, it is likely that the filling of Bluestone Lake submerged other undiscovered historic and prehistoric sites. The cemeteries were usually private or family burial grounds and ranged in size from a single grave to 149 burials. Despite efforts to identify the dead, only about half of the deceased could be identified. The remains were re-interred in four nearby cemeteries. Next of kin were consulted if they could be identified, otherwise, re-interment occurred in the nearest of the four cemeteries, or in a nearby cemetery that contained burials from the same family as the deceased. The cemetery removal campaign also uncovered evidence of pre-

Civil War slavery in the area. The 1949 Final Report stated that "Two cemeteries contained only the remains of Negro slaves, and it is possible that many of the unknown graves were those of Negroes"[245]

The most serious public issue surrounding items that were to be submerged by the impoundment of water in Bluestone Lake was the relocation of a state road, West Virginia Route 20, which ran through the proposed reservoir site. Two plans were proposed to relocate Route 20. In one scenario, the new road would follow the New River past the dam site and then rejoin the old course of Route 20 above a settlement known as "True." The alternative called for the road's relocation up Beech Run Mountain and then across the Bluestone River. The second proposal would have increased the distance to Athens, West Virginia, by seven miles. On August 10, 1942, following popular sentiment in the area, the West Virginia State Road Commission announced that it favored the relocation of Highway 20 along the New River. While this plan was approved, the actual relocation of the road did not occur until 1946.[246]

The delay in relocating Route 20 caused old Route 20 to become flooded a number of times during the winter of 1947-1948, cutting off transportation between Hinton and the town of Pipestem. After the beginning of January 1948, it became necessary to transport children from Pipestem to school in Hinton by a barge supplied by the U.S. government. The bridge that carried Route 20 over the Bluestone River was also submerged for most of that winter. During the following spring, this bridge was elevated fifteen feet to prevent further flooding. Meanwhile, grading of the new section of Route 20 was completed in September 1948.[247]

Some families and cemeteries had to be relocated out of the Bluestone Lake impoundment area, but the area was very sparsely populated, and a relatively modest amount of disruption resulted from the dam's construction. In contrast, the dam has provided significant flood prevention benefits to communities such as Hinton, located near the New River and directly below Bluestone Lake. The dam also lowers floodwater along the Kanawha River, which has saved Charleston, the West Virginia state capital and a major center of industry, from severe flooding that was once commonplace before the construction of Bluestone and its sister flood control dams in the area.

Bluestone Lake is also a major tourist attraction, especially for those interested in fishing and boating. Other attractions such as the New River Gorge National Scenic River, and Pipestem State Park provide further opportunities for recreational activity. The presence of Bluestone Lake as a water recreation area thereby enhances the tourism potential of Summers County and benefits the local economy.

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Columbus, Ohio 43214
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APPENDIX A:

COMMENTS FROM WEST VIRGINIA STATE HISTORIC PRESERVATION OFFICE

WEST VIRGINIA DIVISION OF
CULTURE AND HISTORY

September 27, 2001

Mr. S. Michael Worley
Department of the Army
Corps of Engineers
502 Eighth Street
Huntington, WV 25701

RE: Bluestone Dam - Historic Documentation Report
FR#: 01-1427-SU

Dear Mr. Worley:

We have received the above referenced project for review as required by Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties."

The Preliminary Draft of the *Historic Documentation Report for Bluestone Dam* has been reviewed by our office. Staff found the report to be quite extensive in the past history of the construction of the dam by the US Army Corps of Engineers, and inclusive of the significance of the construction technology and impact on the region. The drawings cover a wide scope of sections of the construction and the photographs appear to be complete. Please send us the final copy of the report and other items as covered in the Memorandum Of Agreement.

We appreciate the opportunity to be of service. If you have any questions, please contact our office (304) 558-0220.

Sincerely,

Susan M. Pierce

Susan M. Pierce
Deputy State Historic Preservation Officer

SMP:kmj

THE CULTURAL CENTER • 1900 KANAWHA BOULEVARD, EAST • CHARLESTON, WEST VIRGINIA 25305-0300
TELEPHONE 304-558-0220 • FAX 304-558-2779 • TDD 304-558-3562
EEO/AA EMPLOYER

APPENDIX B:

LARGE FORMAT PHOTOGRAPHS

BLUESTONE DAM

INDEX TO LARGE FORMAT PHOTOGRAPHS

BLUESTONE DAM
New River
Hinton Vicinity
Summers County
West Virginia

Jeff Bates, Hardlines Design Company Photographer, March 1 and May 3, 2001

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2	AERIAL VIEW OF SOUTH ELEVATION OF DAM, LOOKING NORTH
3	AERIAL VIEW OF SOUTH ELEVATION OF DAM, LOOKING NORTHEAST
4	AERIAL CONTEXT VIEW OF NORTH ELEVATION OF DAM, LOOKING SOUTH
5	AERIAL CONTEXT VIEW, NORTH ELEVATION OF DAM, LOOKING SOUTHWEST
6	AERIAL PERSPECTIVE VIEW OF DAM'S NORTH ELEVATION, LOOKING SOUTHWEST
7	AERIAL CONTEXT VIEW OF NORTH ELEVATION OF DAM, LOOKING SOUTH
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9	AERIAL VIEW OF SOUTH ELEVATION OF DAM, LOOKING NORTHEAST FROM WEST SHORE OF BLUESTONE LAKE
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11	AERIAL VIEW, LOOKING SOUTHWEST, OF NORTH ELEVATION

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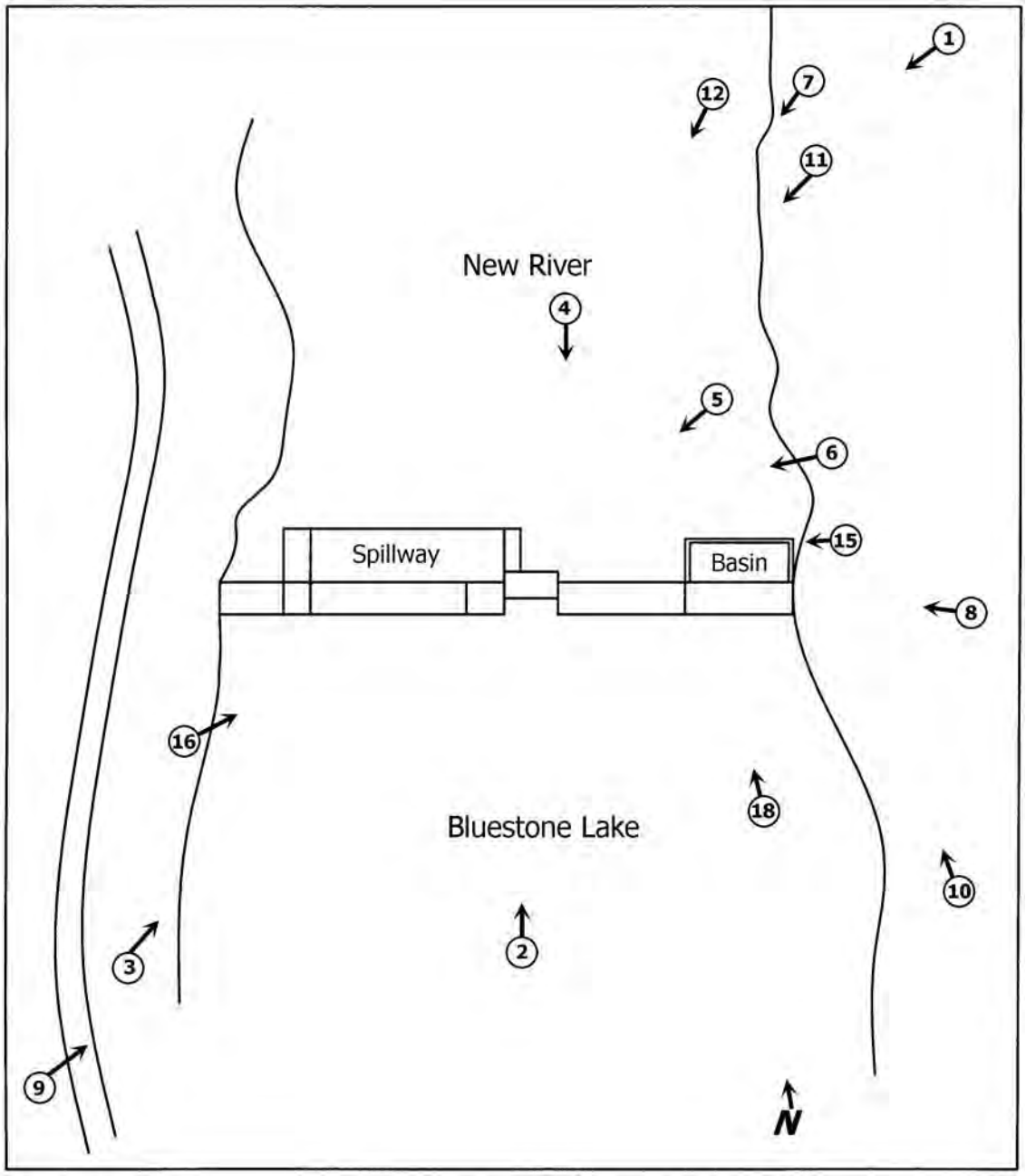
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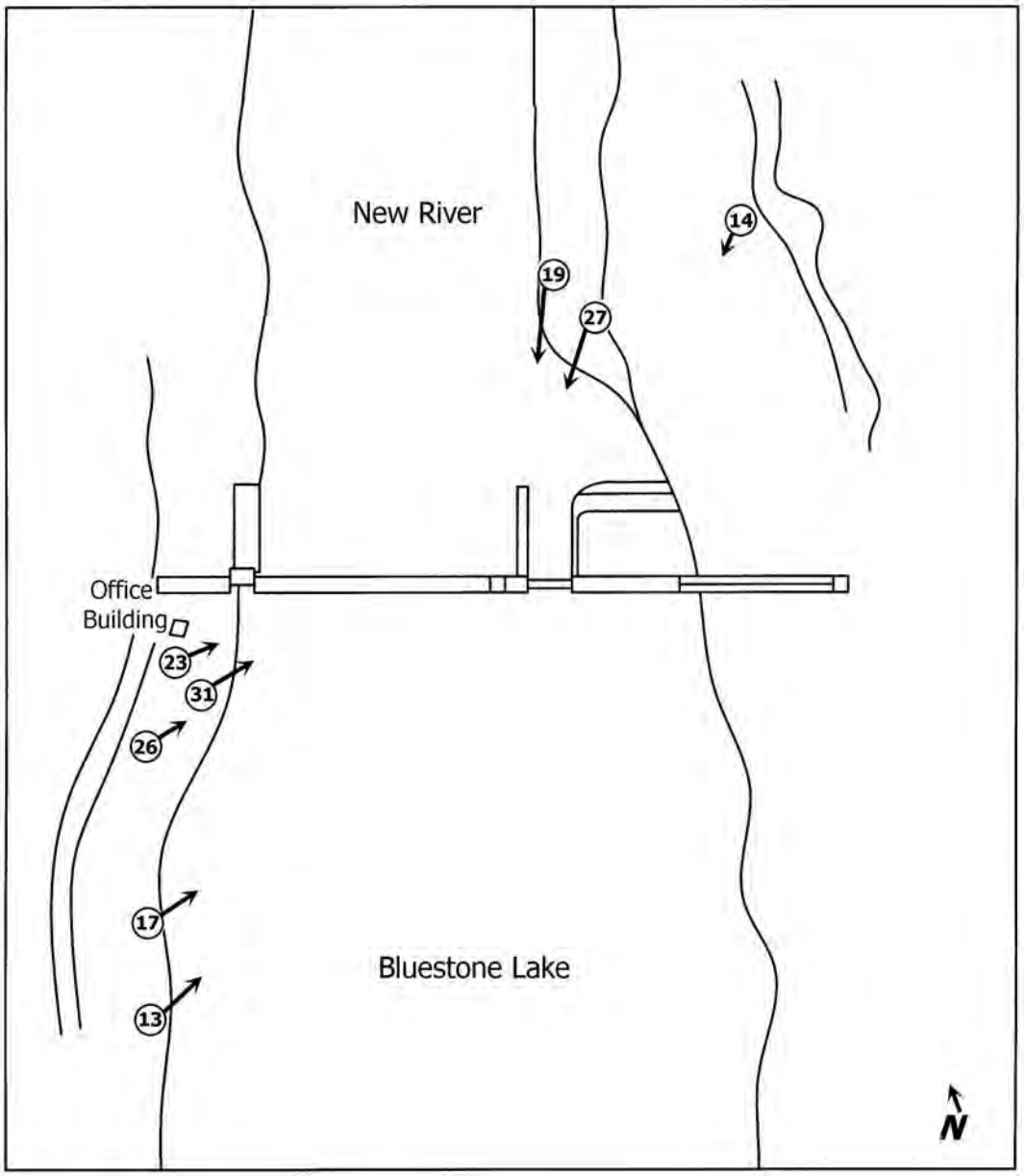
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BLUESTONE DAM
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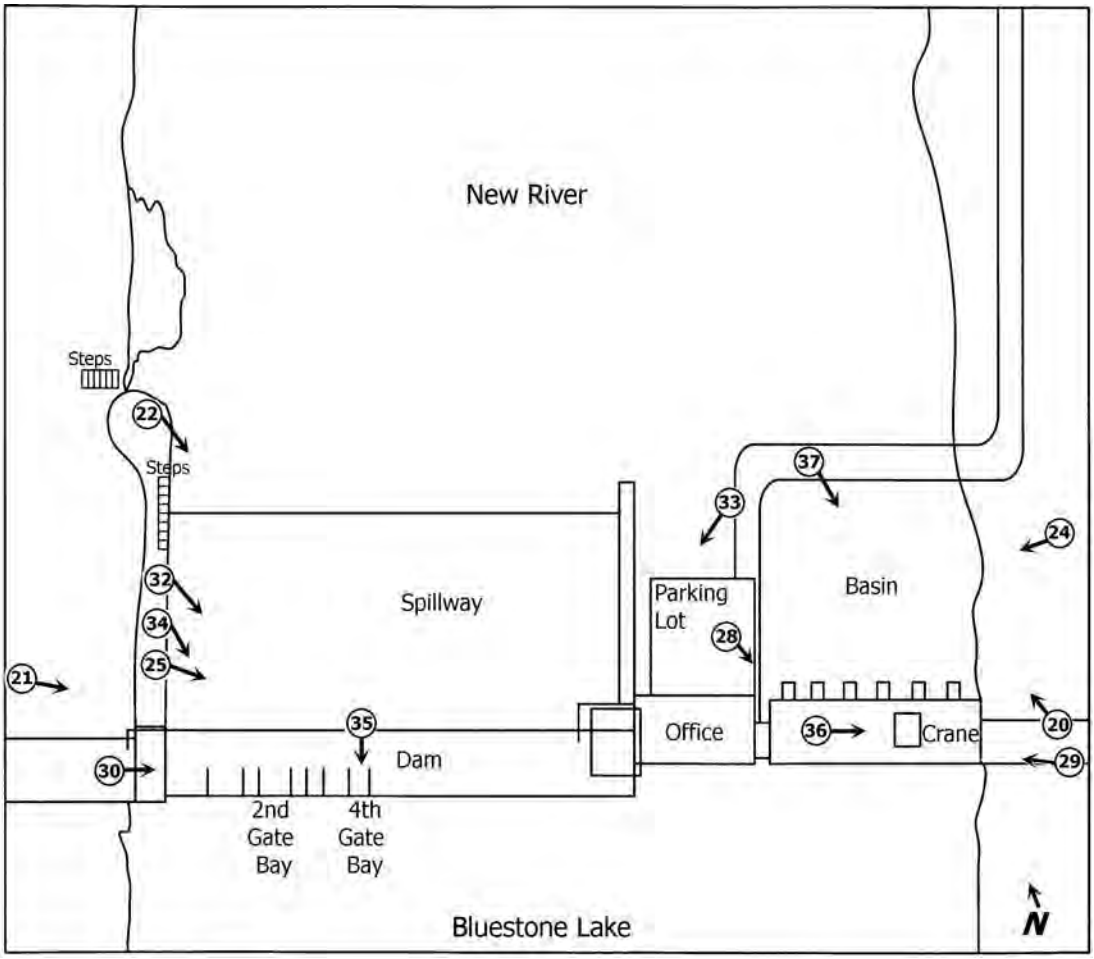

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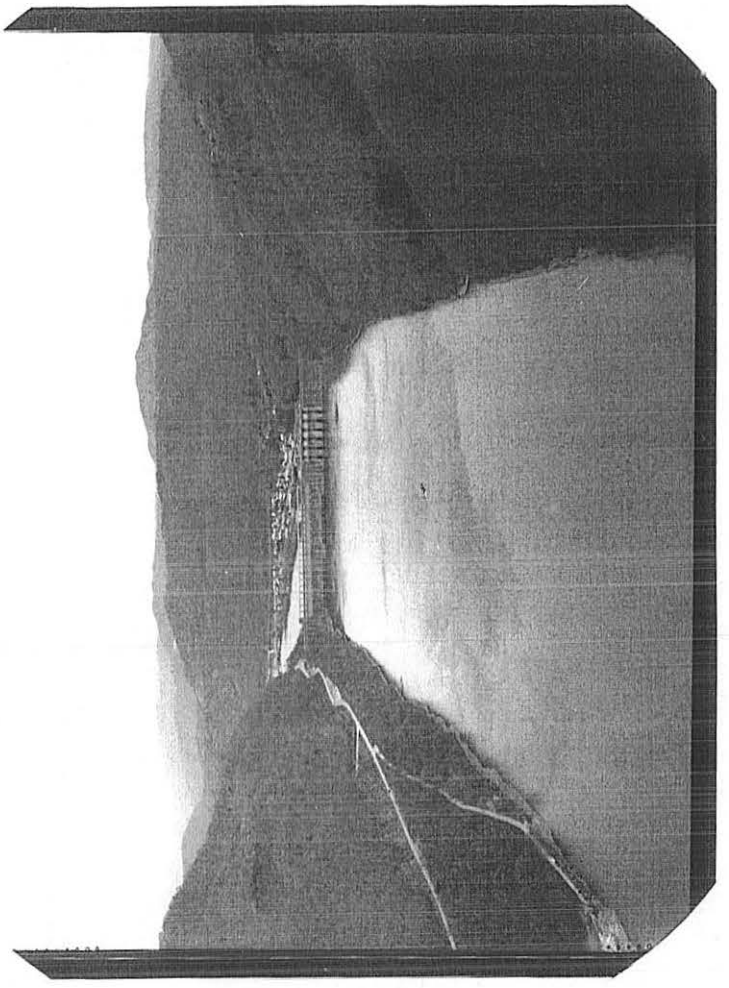

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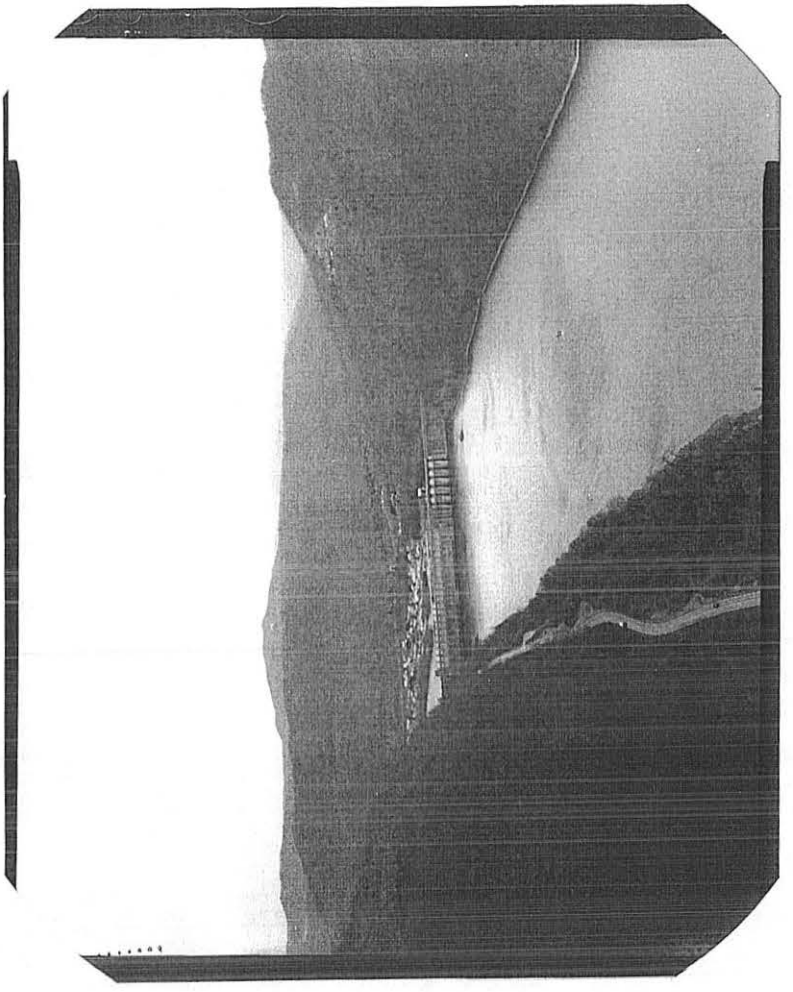

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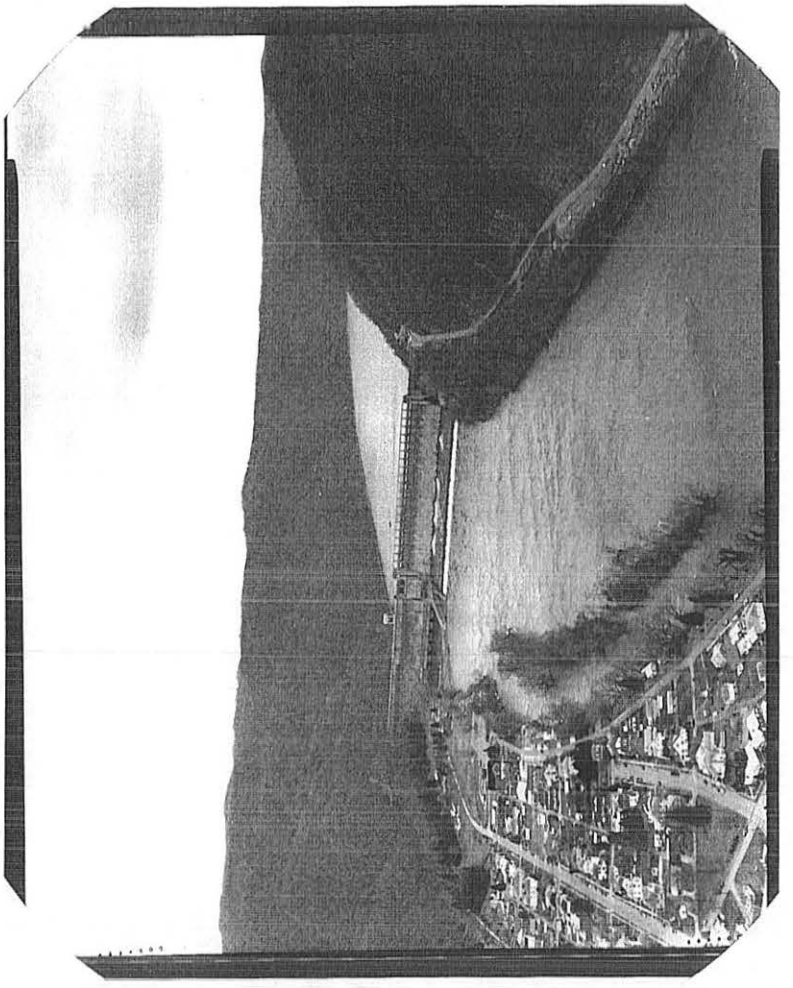

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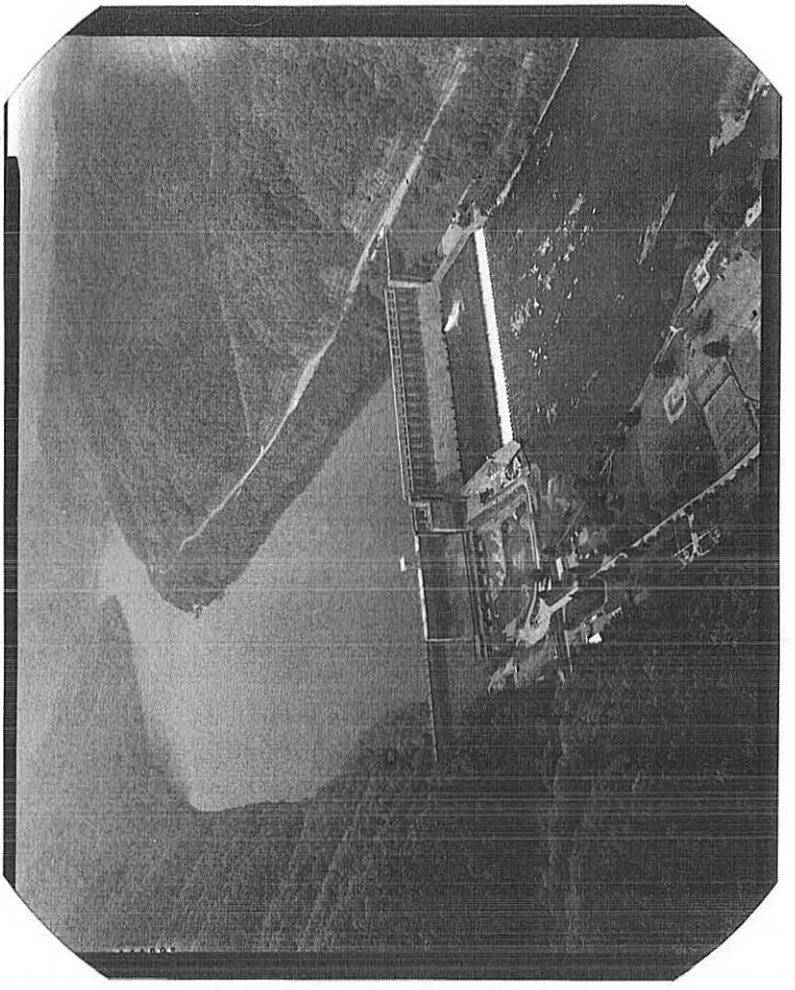

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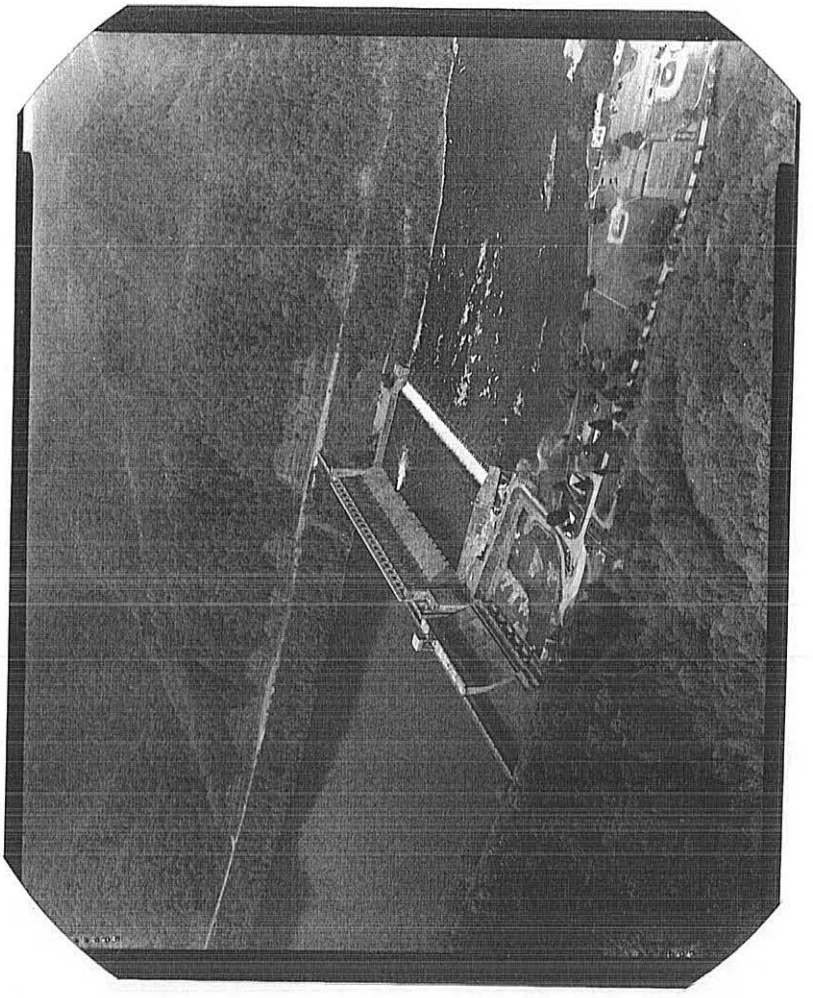

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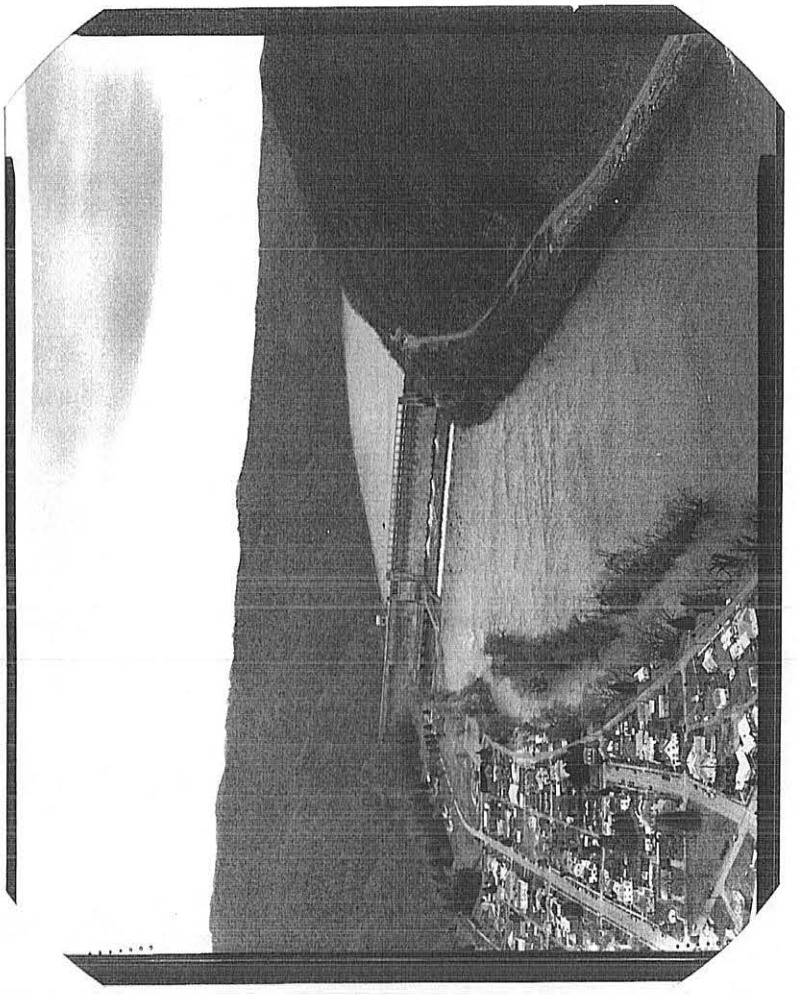

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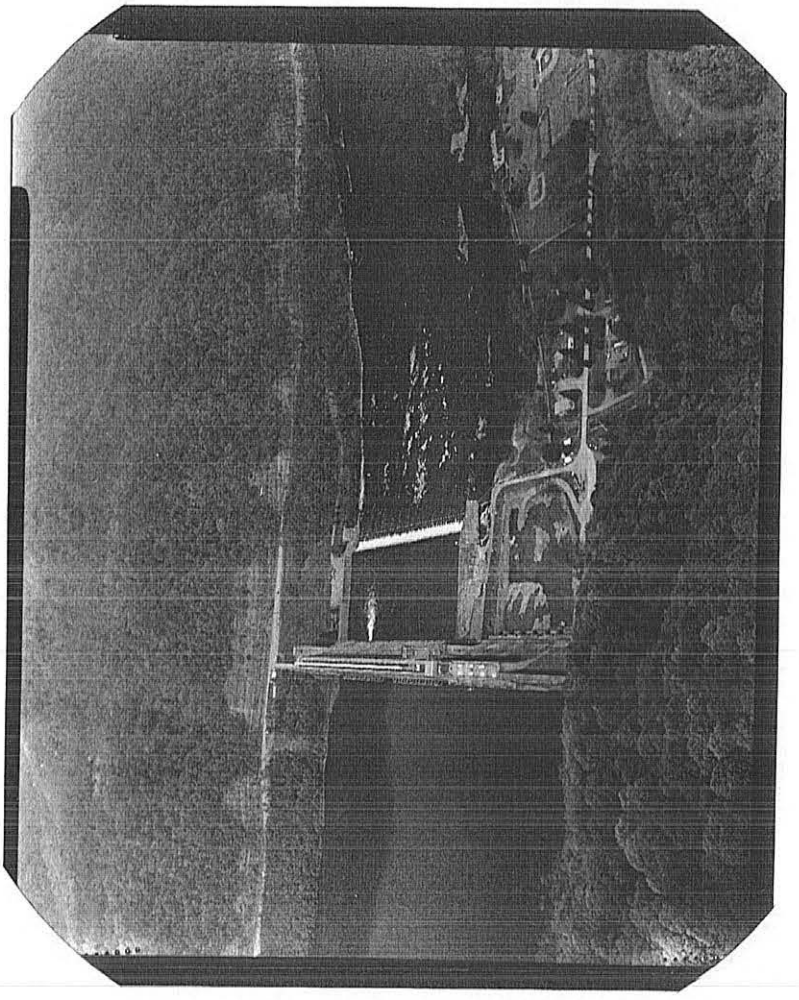

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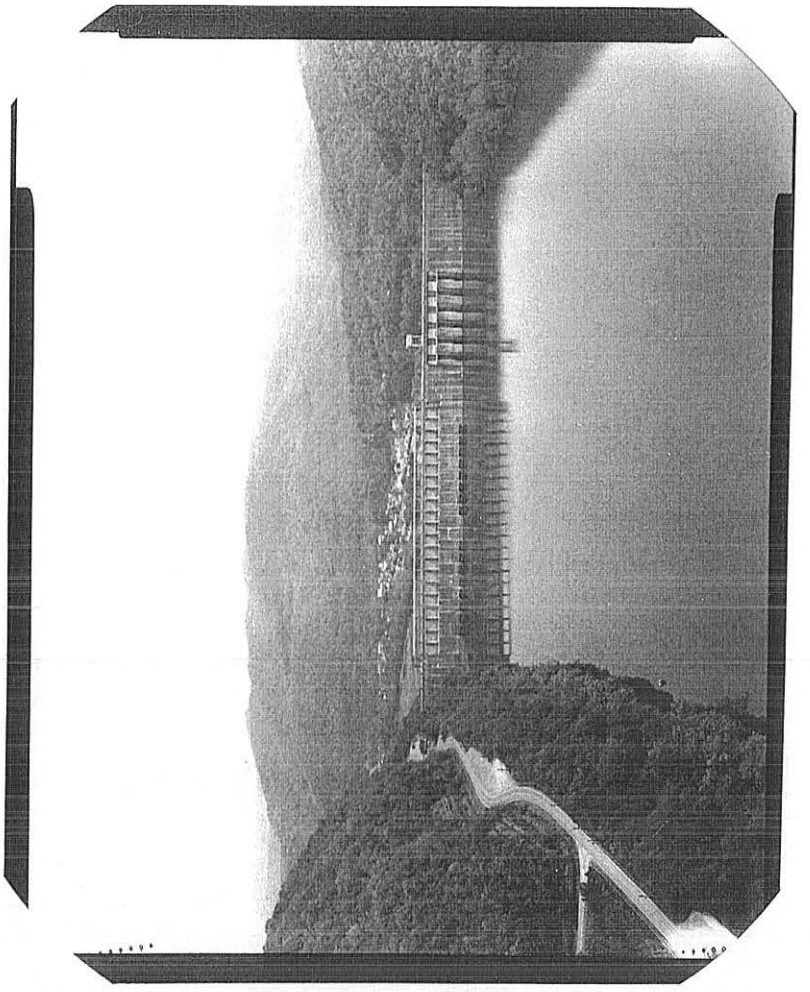

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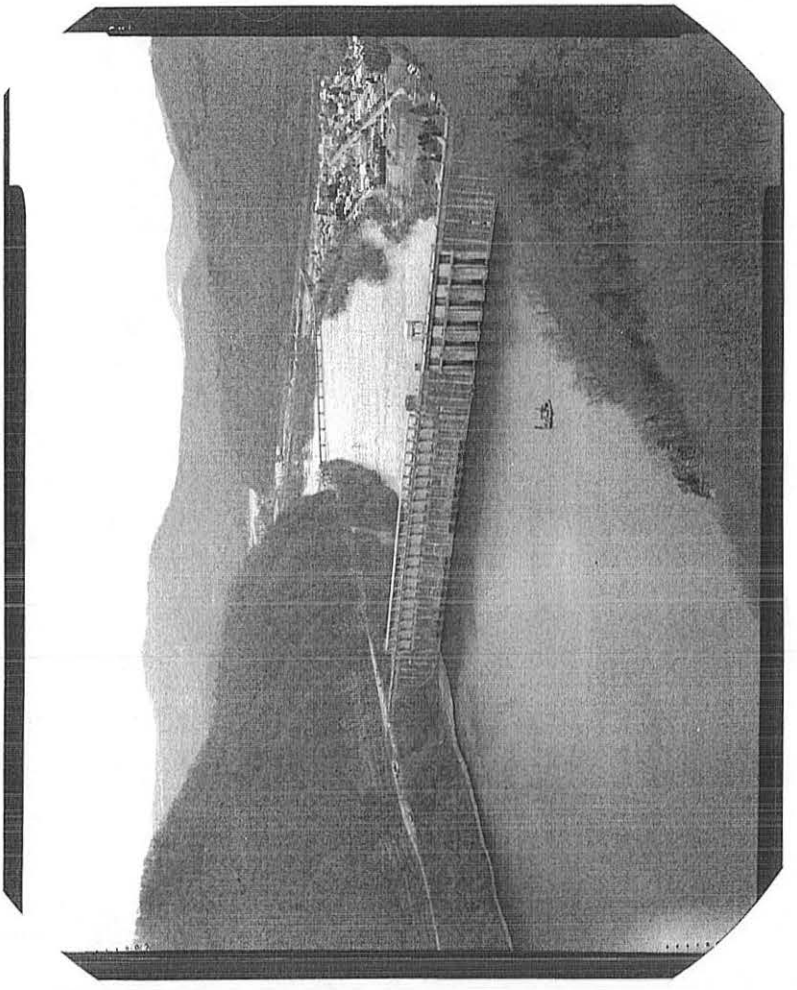

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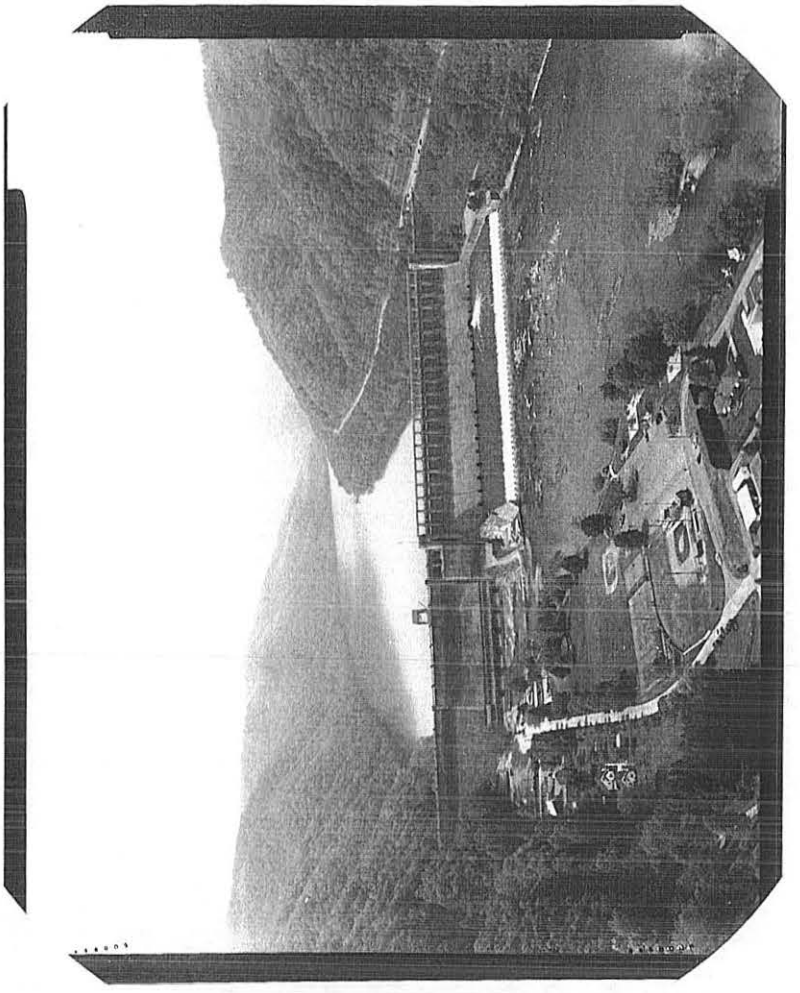

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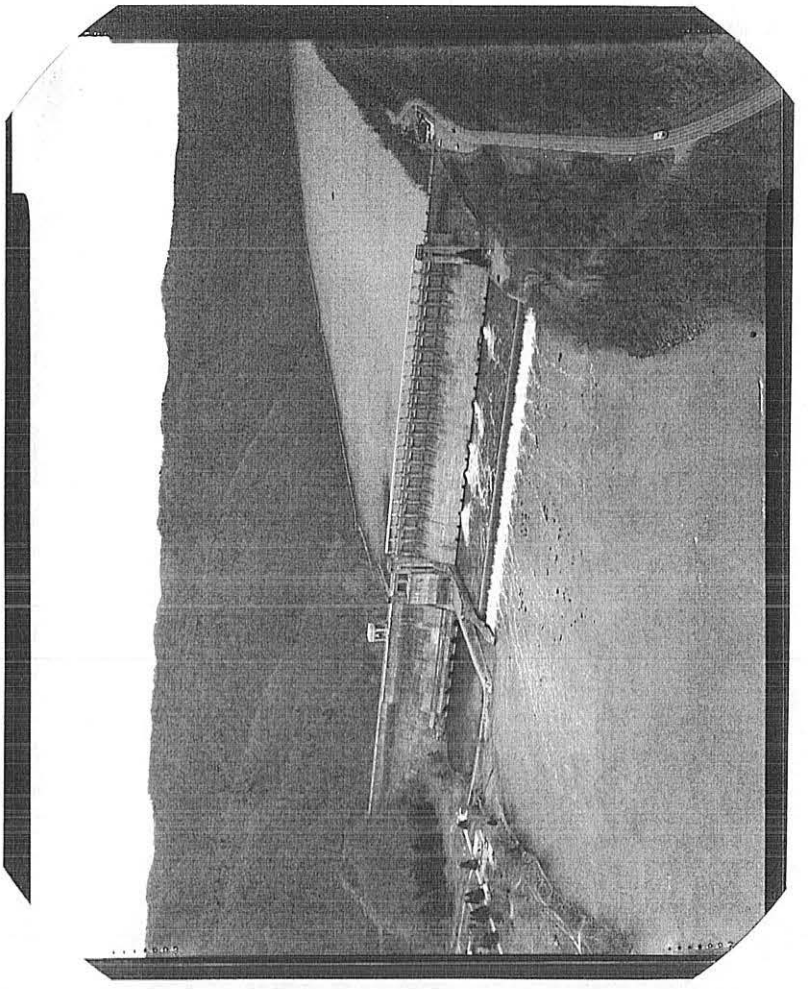

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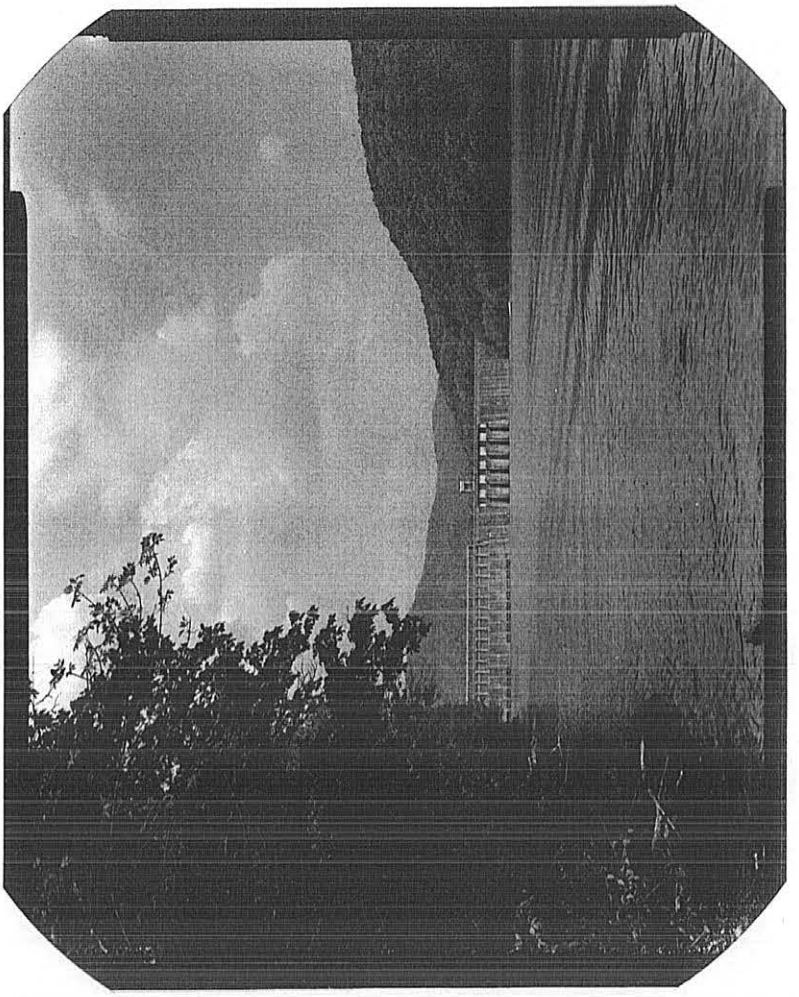

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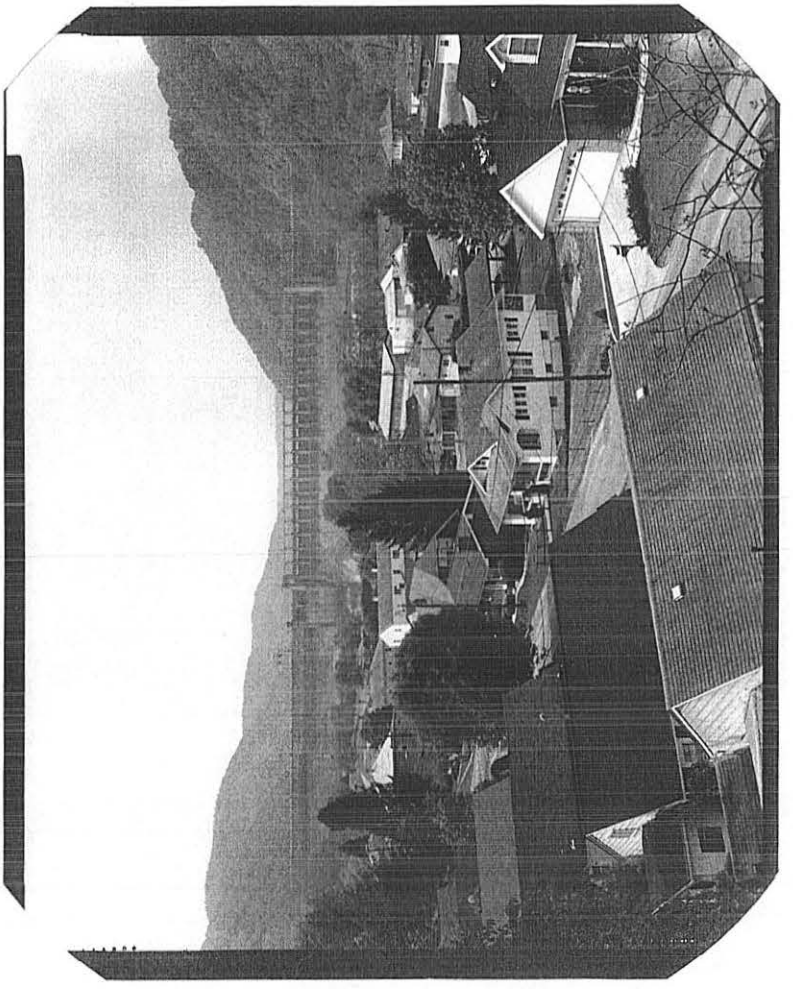

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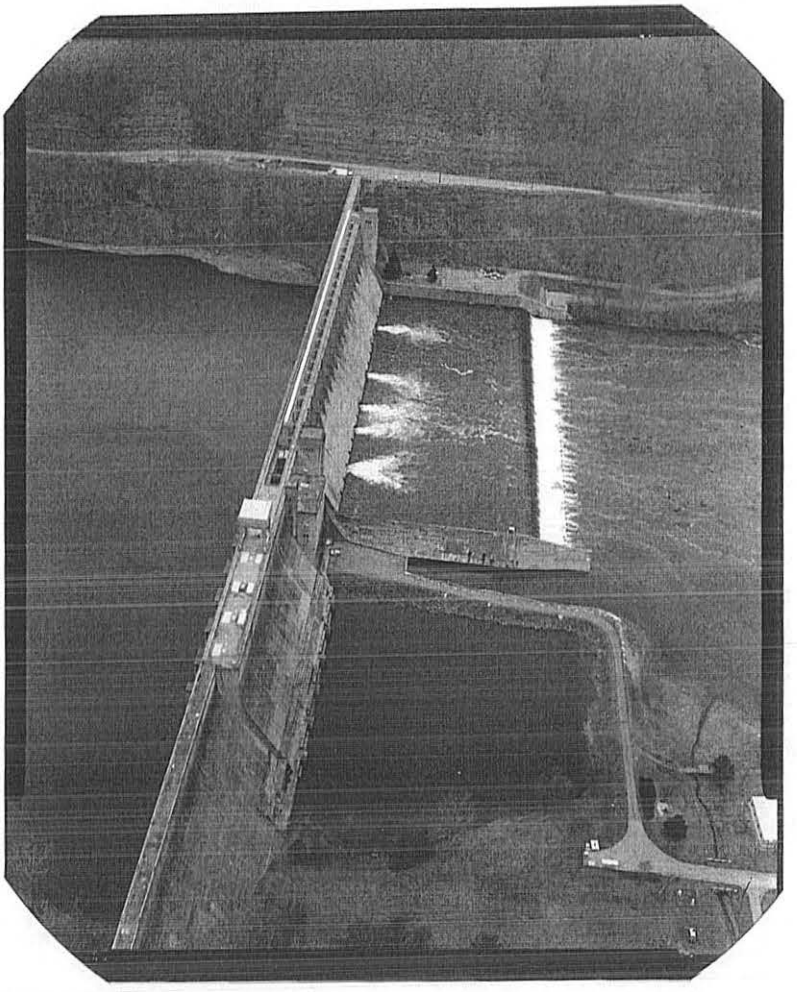

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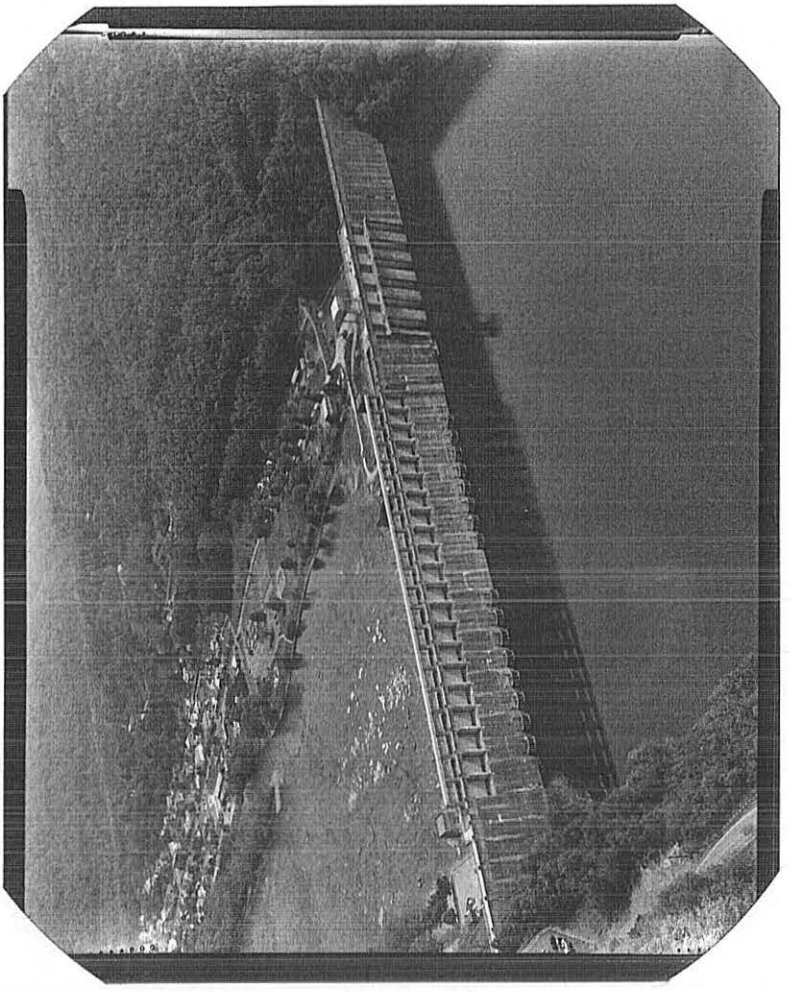

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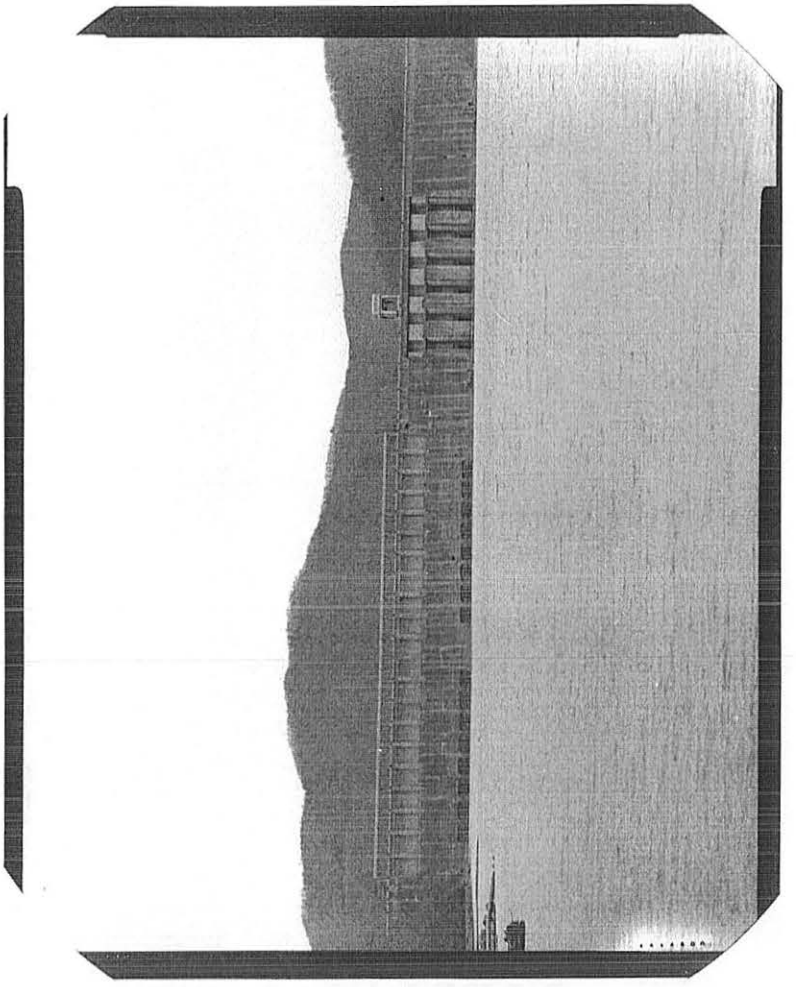

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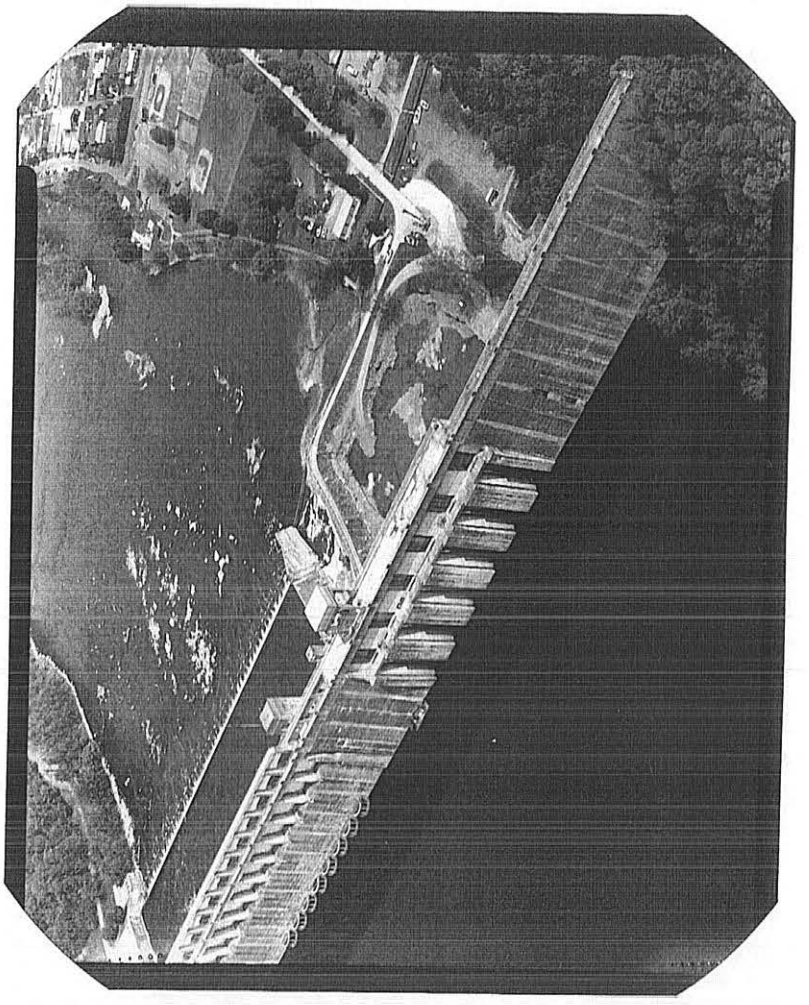

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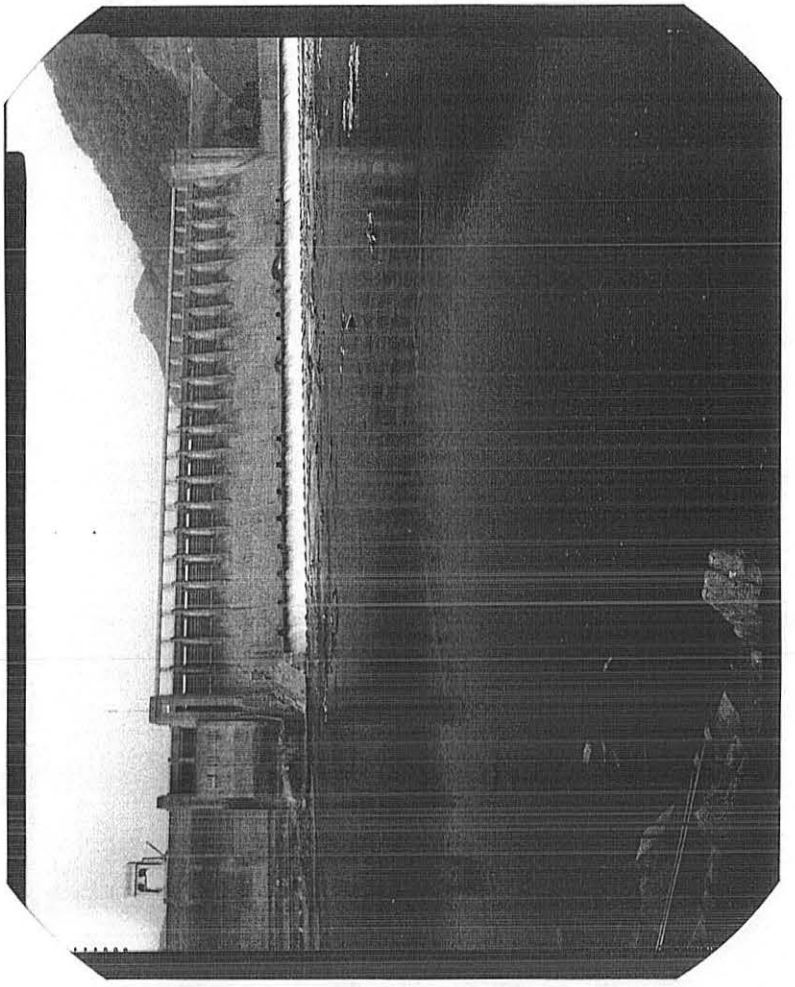

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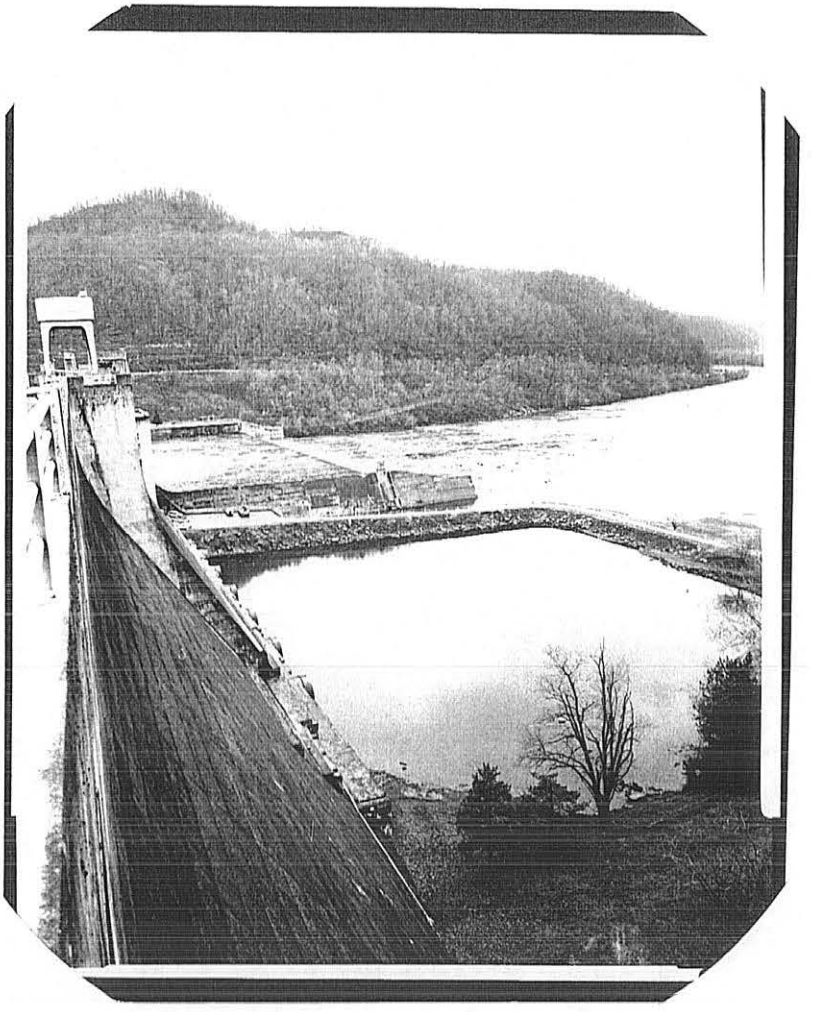

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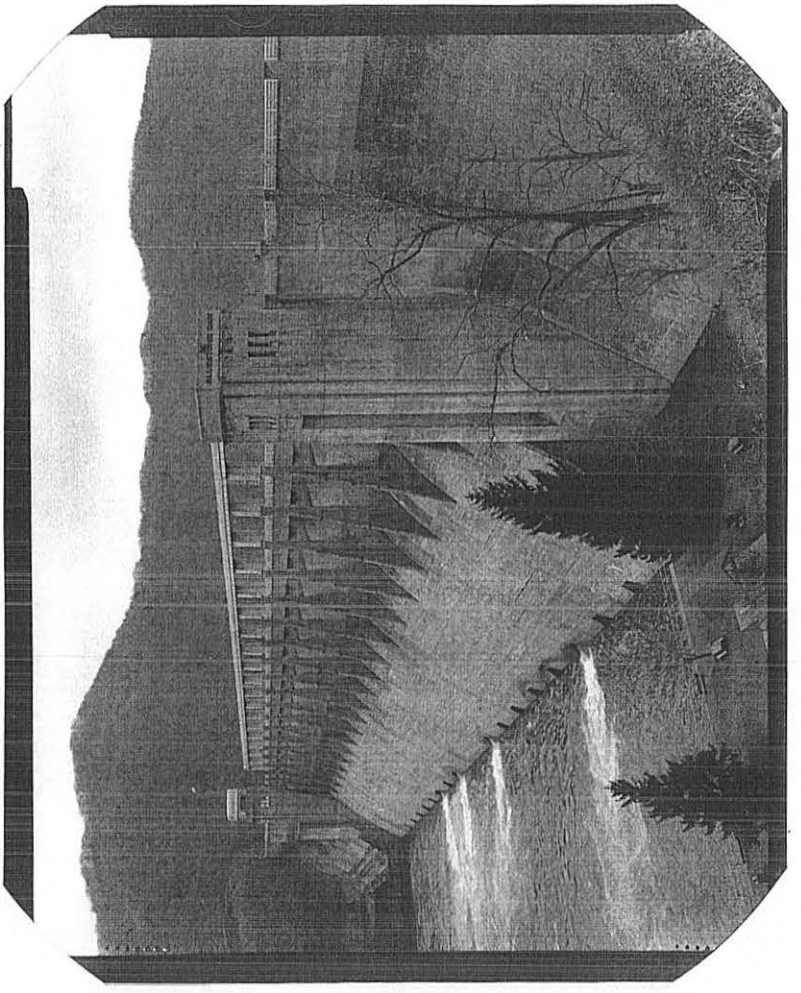

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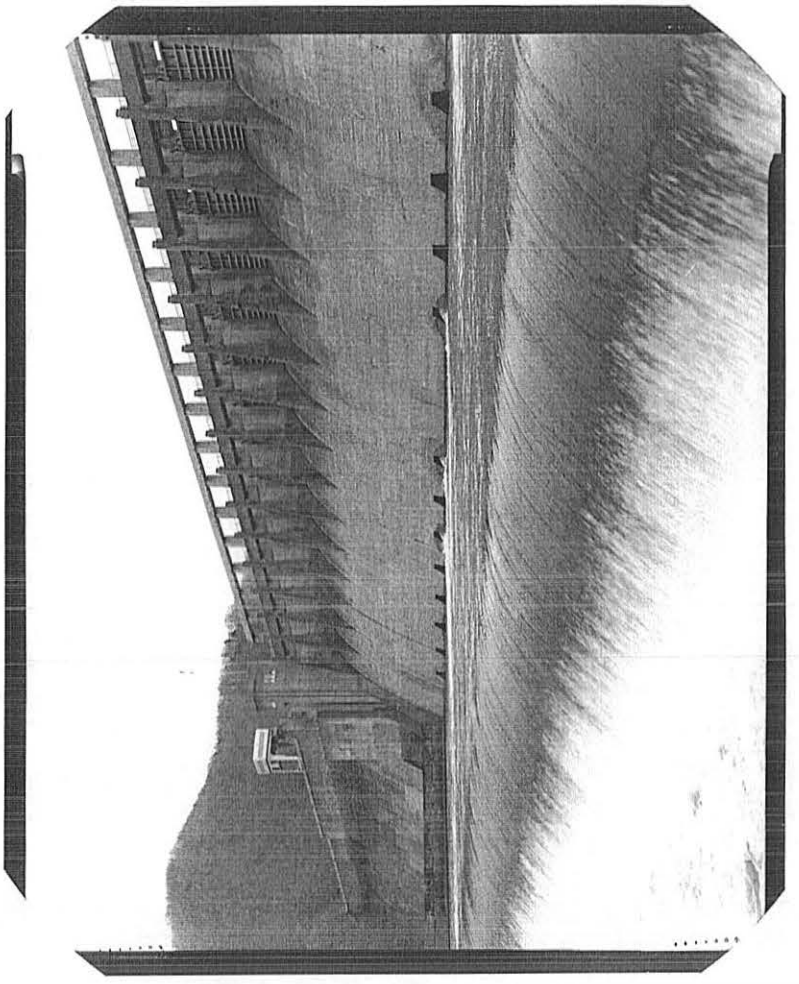

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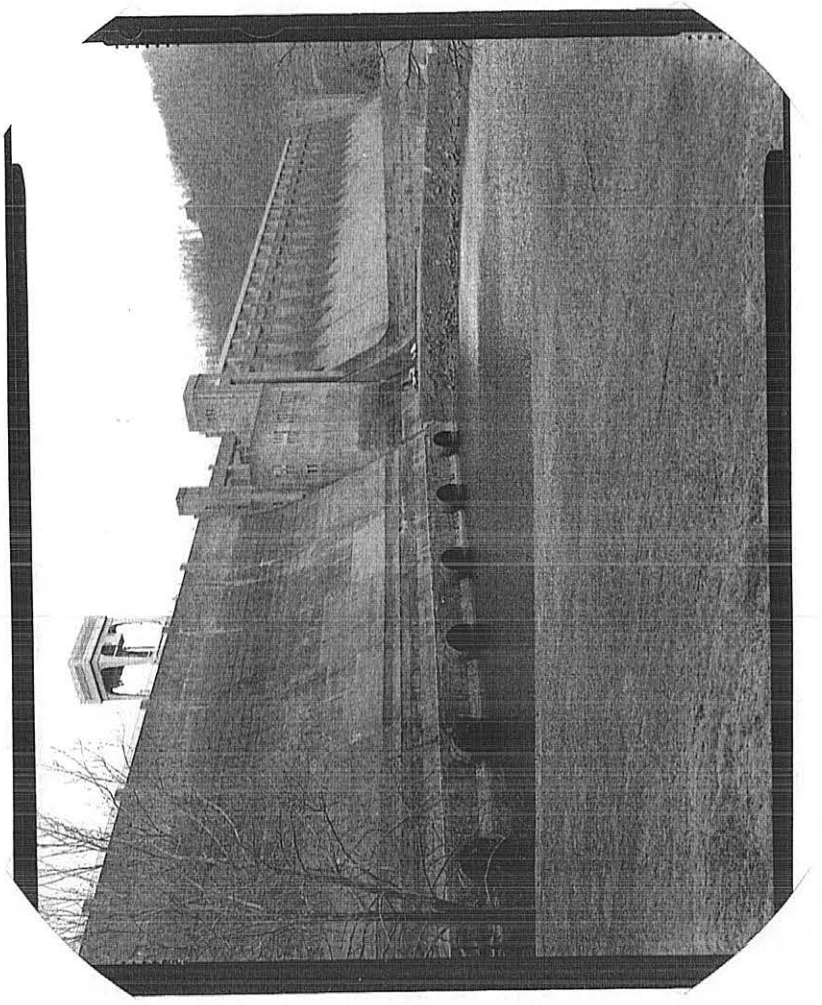

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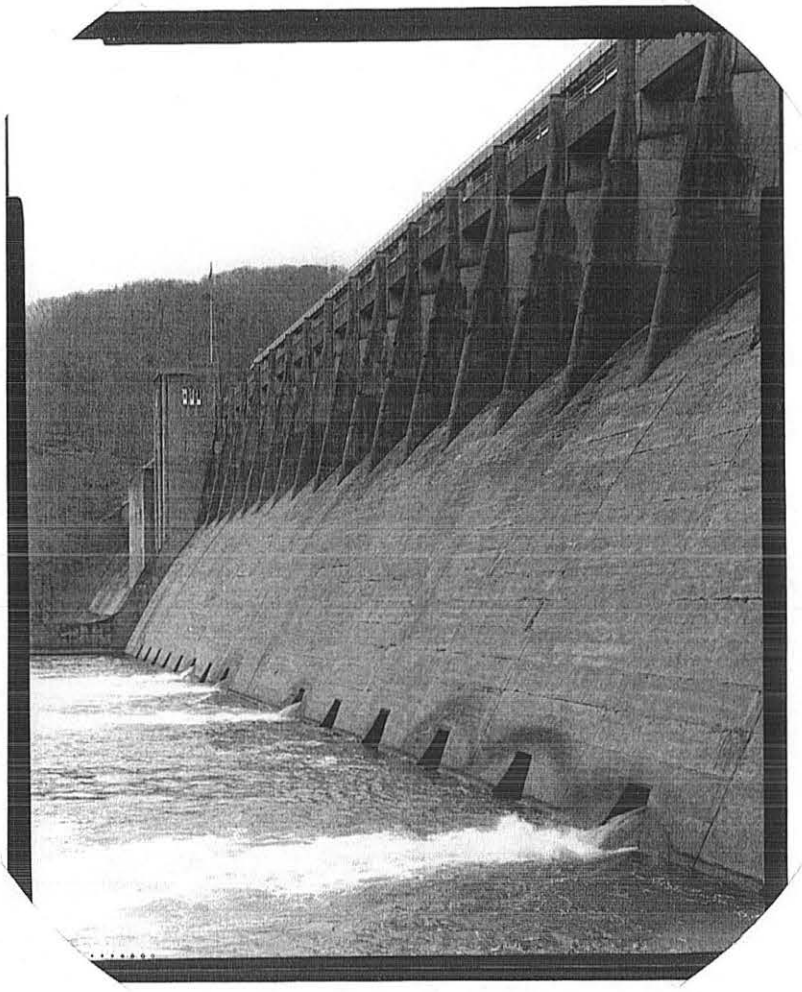

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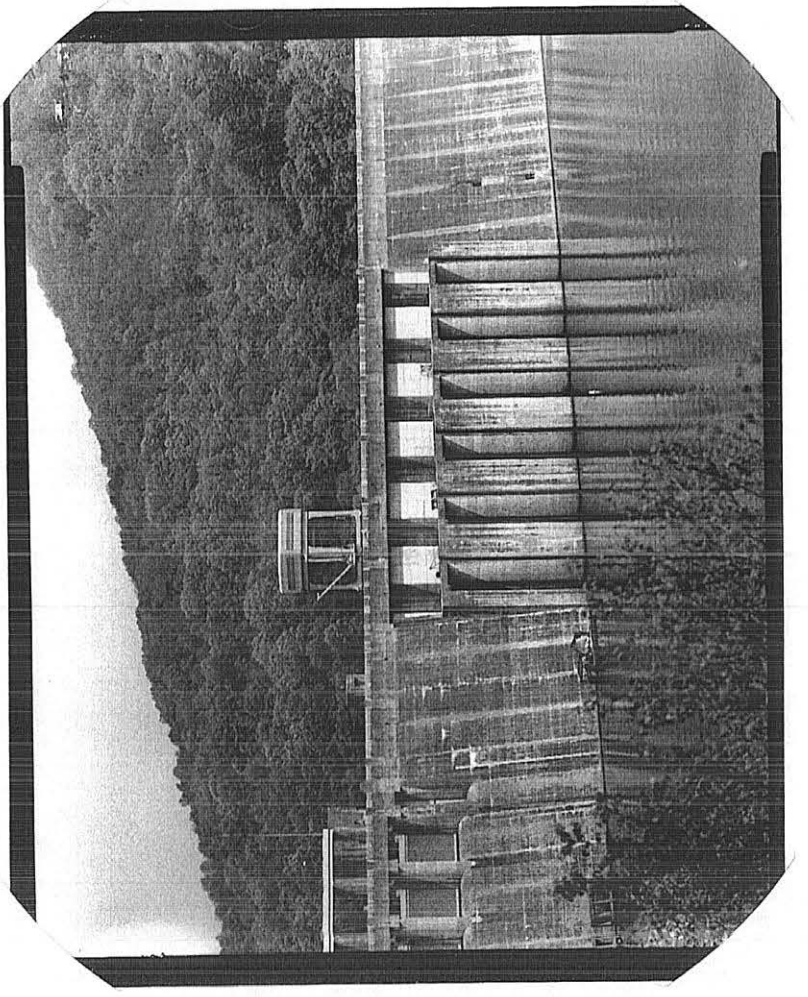

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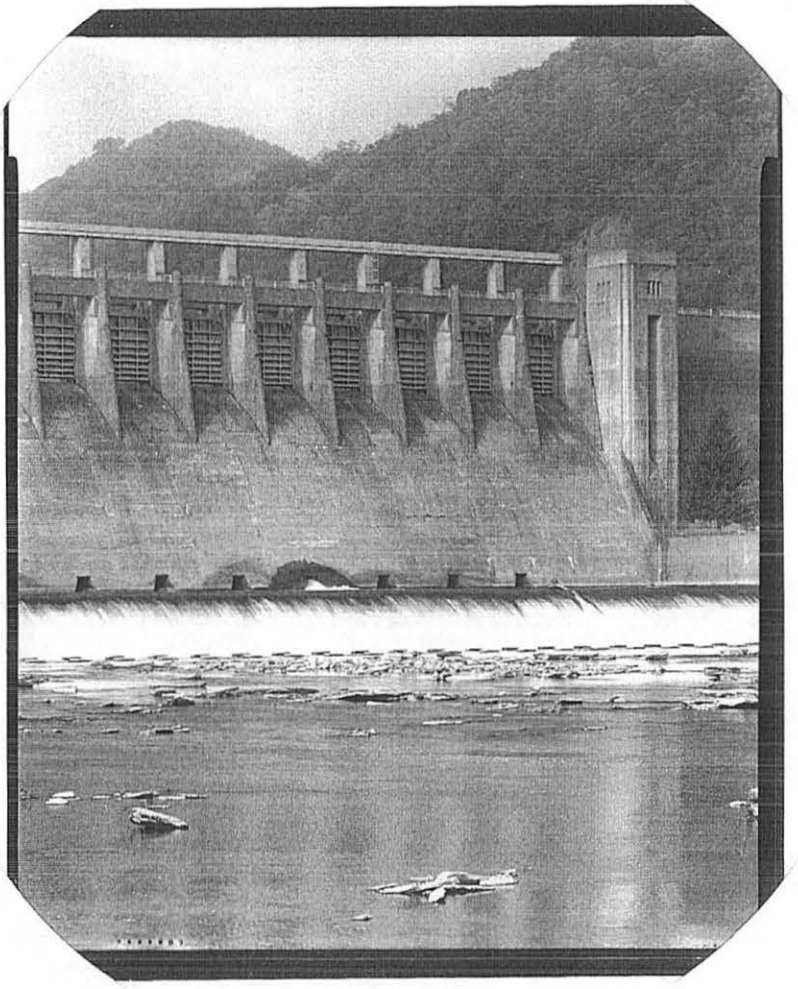

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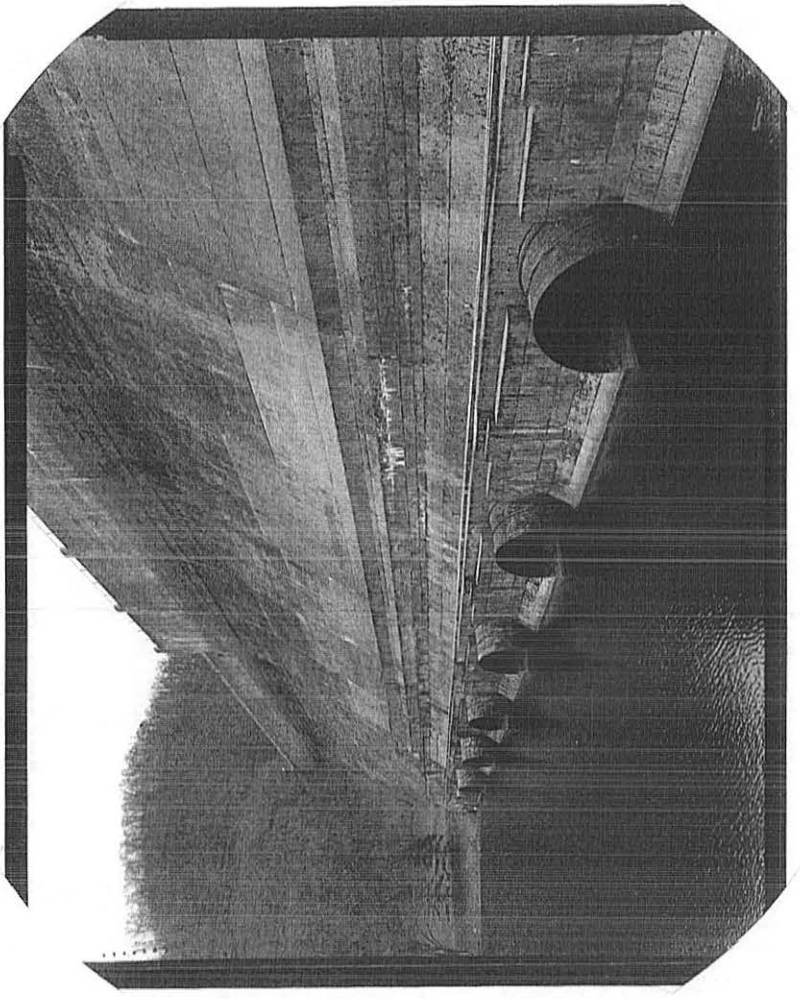

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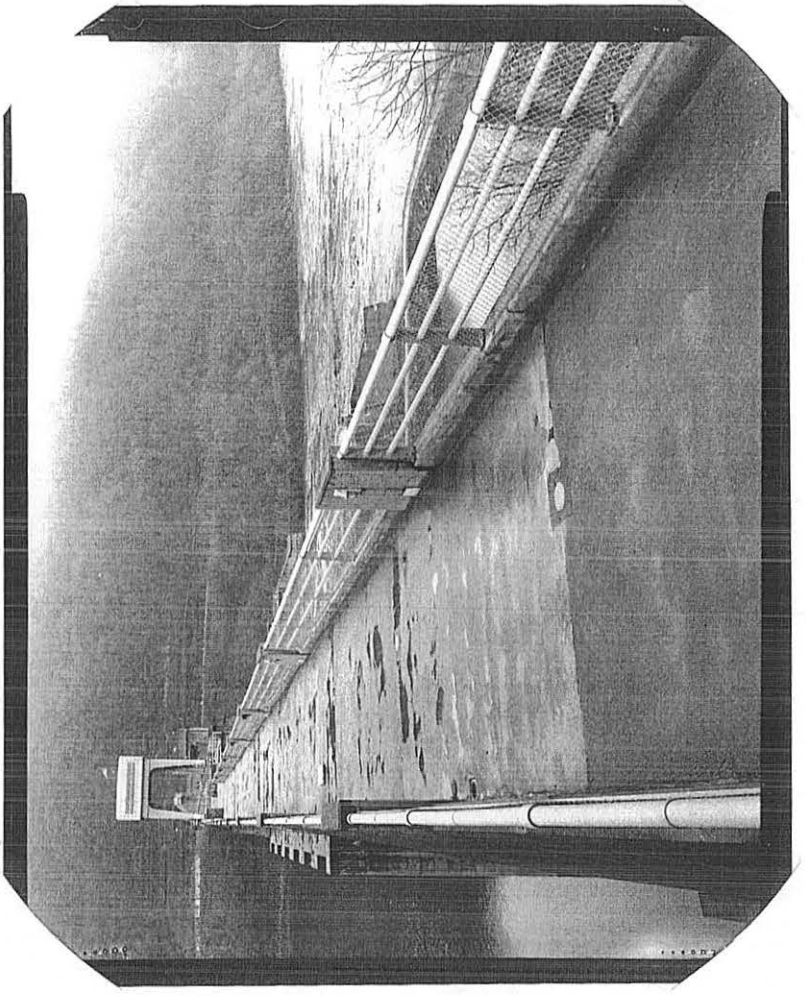

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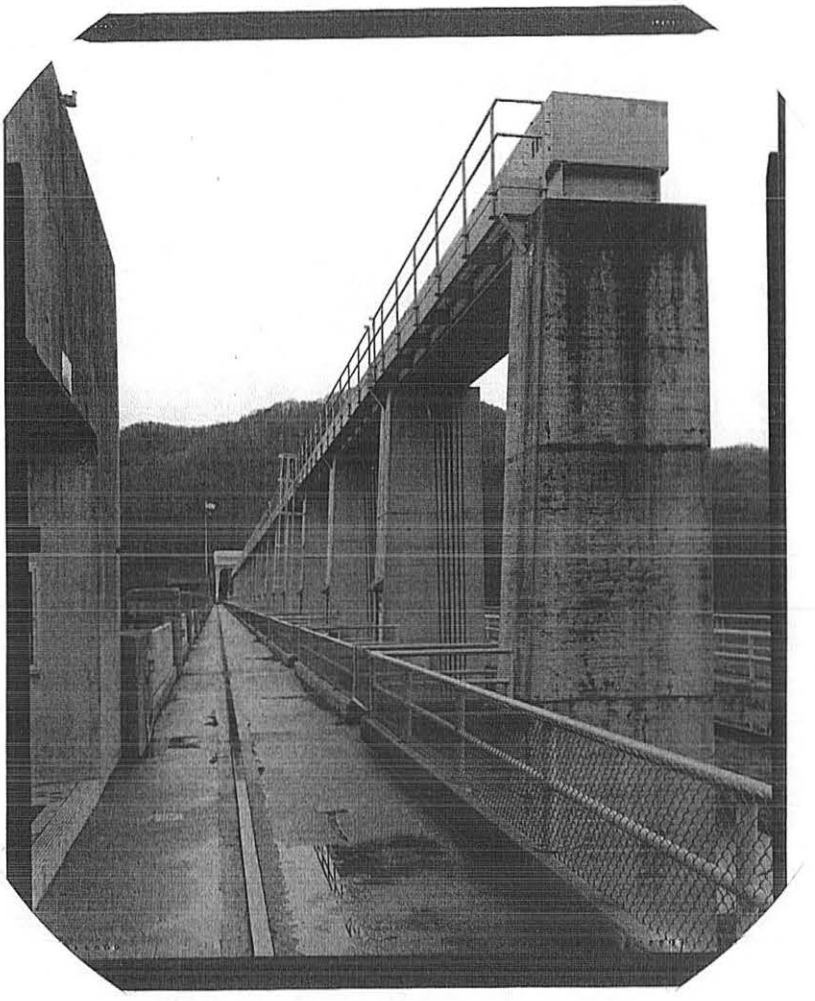

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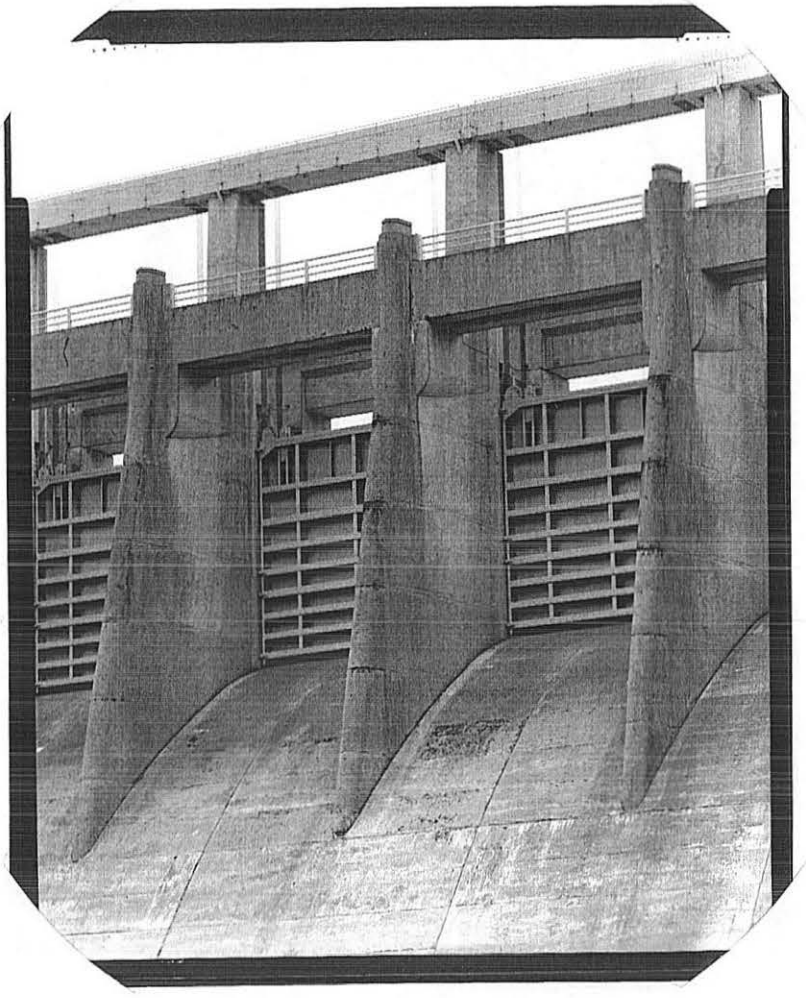

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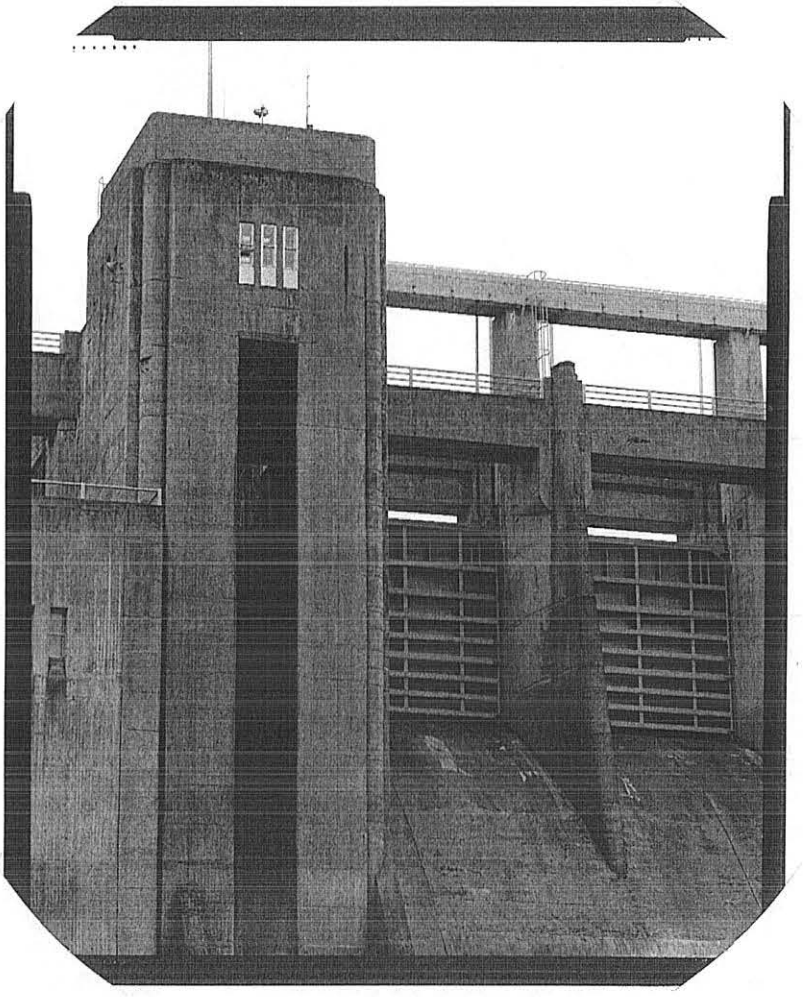

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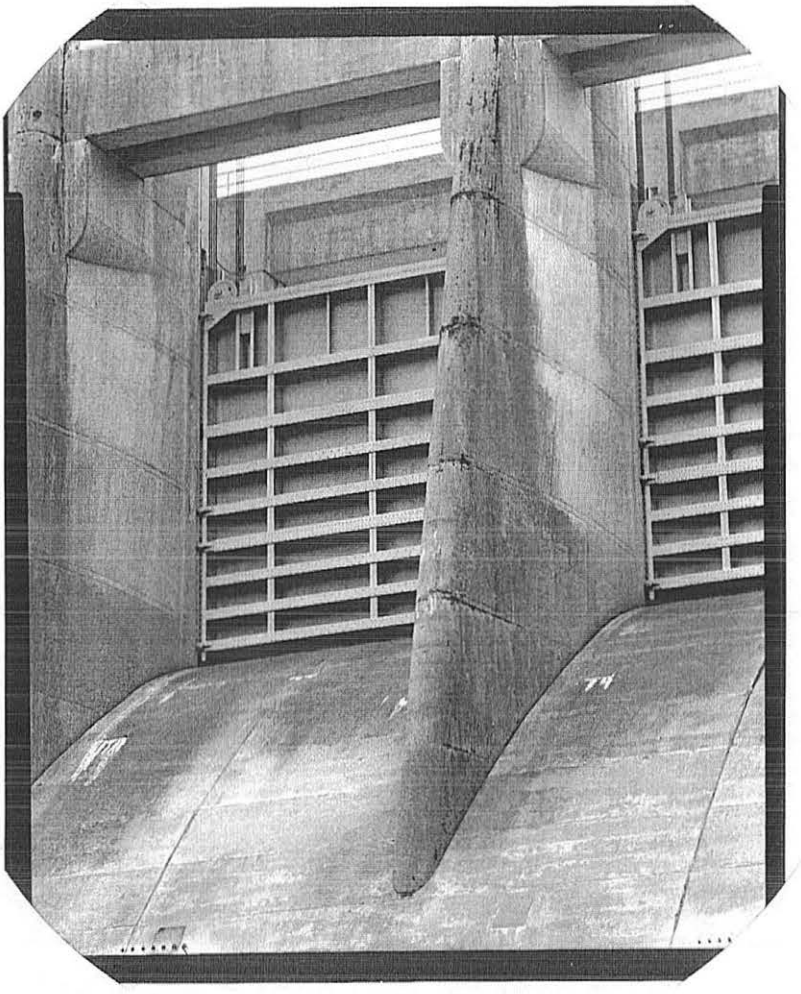

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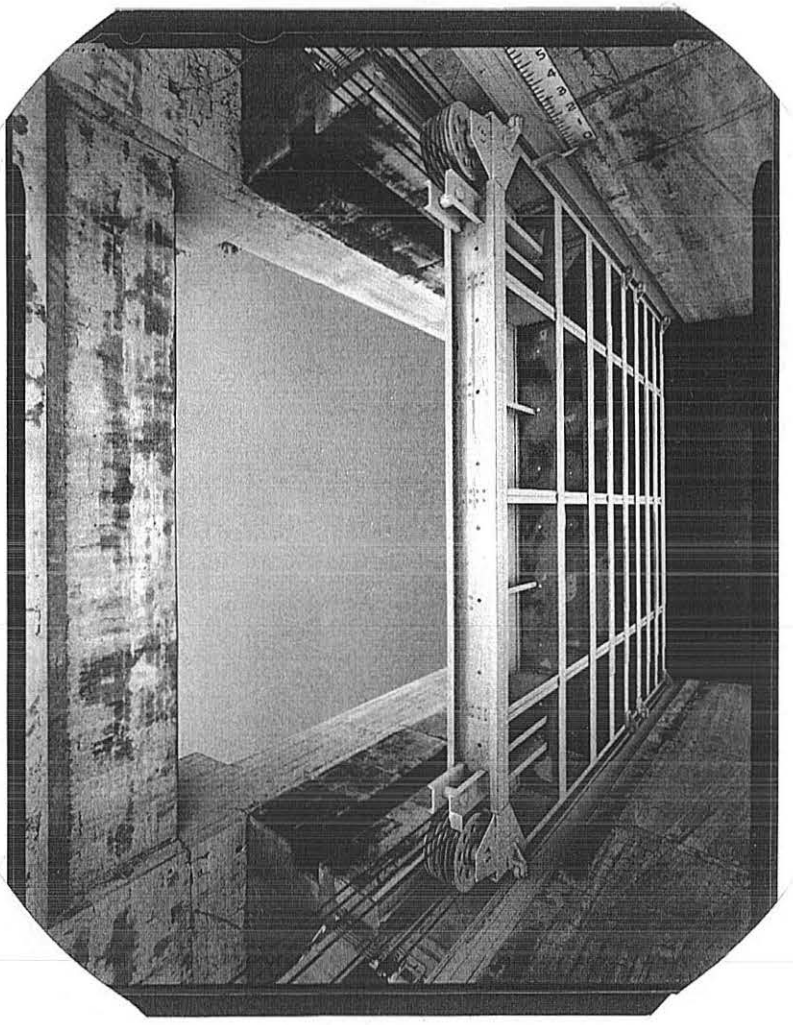

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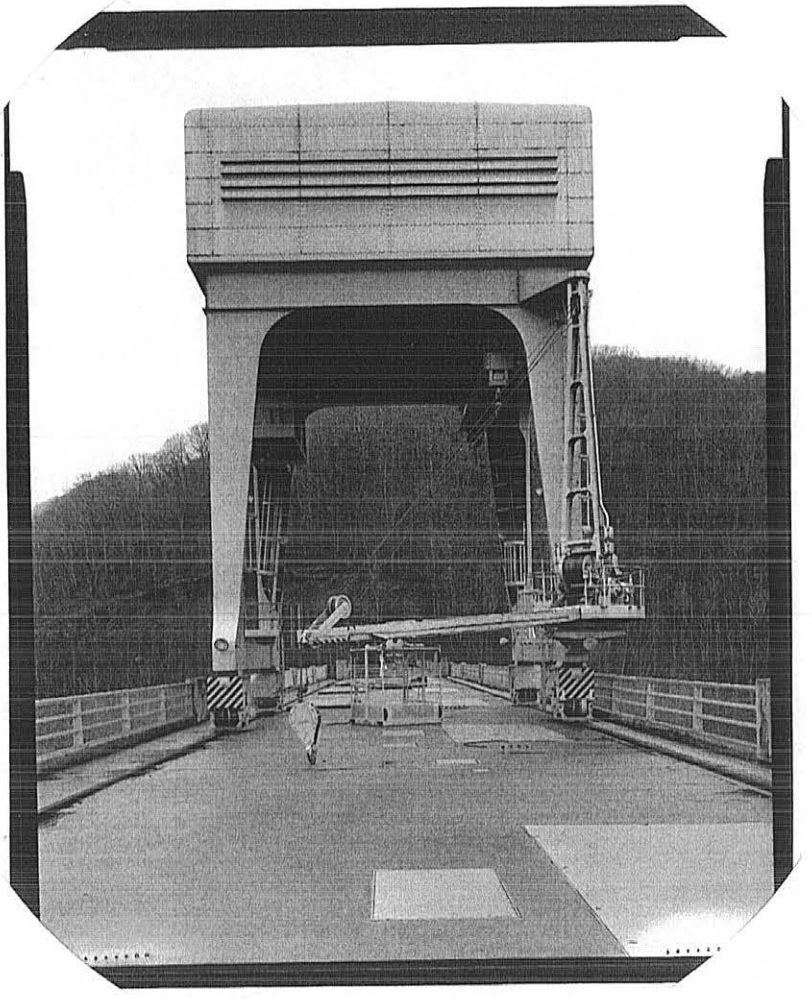

Contract Publication WV05-72

UPDATE TO THE HISTORIC PROPERTIES MANAGEMENT PLAN FOR BLUESTONE LAKE IN WEST VIRGINIA

By
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Cultural Resource Analysts, Inc.

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Chapter 1. Project Description and Background

Introduction

The U.S. Army Corps of Engineers, Huntington District (Huntington District), has fee-owned property and easements at Bluestone Lake, located on the New River in Summers, Mercer, and Monroe counties in West Virginia, and Giles County, Virginia (Figure 1-1). This report represents an update of the 1998 modification of the Historic Properties Management Plan (HPMP) for Bluestone Lake (USACE 1998).

The modified 1998 HPMP served as the framework for this report, and was in turn modified further to accommodate the Scope of Services for this update pursuant to the requirements set forth in Chapters 6-8 f of EP 1130-2-540 (Appendix A). New information was obtained from the Huntington District, the West Virginia State Historic Preservation Office (WVSHPO), and other primary and secondary sources.

Topics to be addressed by this HPMP update include:

1) project description and background;

2) the environmental setting of the reservoir;

3) relevant culture history;

4) the history of cultural resource investigations at the reservoir;

5) descriptions of the known cultural resources;

6) curation of known collections and associated radiocarbon dates;

7) impact zones, upland and reservoir processes, and the physical integrity of the cultural resources;

8) site evaluations and the identification of archaeologically sensitive landforms; and

9) management priorities, recommendations, and general policies.

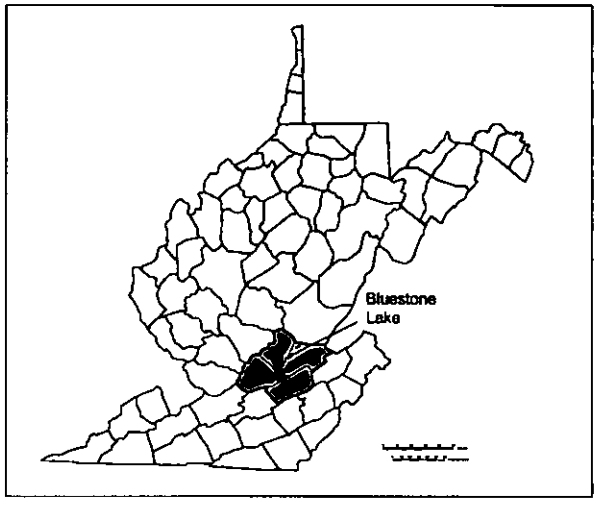


Figure 1-1. Location of Bluestone Lake in Mercer, Monroe, and Summers Counties, West Virginia, and Giles County, Virginia.

Bluestone Lake

The Bluestone Lake Project was authorized for construction by Executive Order No. 7183 dated September 12, 1935, the Flood Control Acts of June 22, 1935 and June 28, 1938, for flood control, hydroelectric power, recreation and fish and wildlife recreation purposes. The dam for Bluestone Lake is located three miles upriver from Hinton, West Virginia, and 65 miles upriver from where the New and Gauley rivers converge to form the Kanawha River. The Kanawha River continues north to join the Ohio River 162 miles downriver from the Bluestone Lake dam.

The project is located in the Appalachian Plateau physiographic province and the Southern Appalachian Ridges and Valleys land resource area (USDA 1981), with elevations ranging from 1370 ft amsl at the dam to 3000 ft amsl above the Bertha camping area (USACE 1975). Normal pool elevation is 1410 ft amsl, and the elevation during winter drawdown is 1406 ft amsl. The area considered under this management plan contains a total of 21,931 acres, of which

19,658 acres are leased to the West Virginia Department of Natural Resources (DNR) for park, recreation, fish, and wildlife purposes. At normal elevation, the lake itself contains 2,040 acres.

Bluestone Lake has a shoreline of approximately 29 miles. Most of the shoreline is steep, rocky, and forested along the seasonal pool elevation. The main portion of the lake is 10.8 miles long. The valley is narrow, causing the lake to have a ribbon like appearance. The lake has a mean width of 1,558 ft and a maximum depth at the dam of 42 ft at normal pool elevation (USACE 1975).

Organization and Content of Report

This report is organized into eight chapters. The environmental setting of the project area is described in Chapter 2, including a discussion of physiography, geology, geomorphology, soils, hydrology, climate, and flora and fauna. Chapter 3 presents a culture history for southeastern West Virginia, while a review of relevant archaeological investigations previously conducted within associated counties is provided in Chapter 4. Chapter 5 presents a discussion of identified sites, with descriptions, locations, and other characteristics provided on a site by site basis. Chapter 5 also provides information for existing collections, including curation location and associated accession numbers, as well as an inventory and brief discussion of radiocarbon assays. Processes of site disturbance, impact zones, and site integrity are discussed in Chapter 6. Discussion centers on National Register of Historic Places (NRHP) evaluations and the identification of archaeologically sensitive landforms in Chapter 7. Management recommendations and summary statements are provided in Chapter 8.

Chapter 2. Environmental Setting

Introduction

Bluestone Lake is located on the New River in Summers, Mercer, and Monroe counties in West Virginia, and in Giles County, Virginia. The lake begins north of The Narrows in Giles County, Virginia, flowing northward into Mercer and Monroe counties, West Virginia briefly before running through the heart of Summers County, West Virginia (Figure 2-1). The boundaries presented in Figure 2-1 are based on the USACE Monumentation and Boundary Line (MBL) Map of Bluestone Lake. This map was originally completed in 1973, and updated in 1980. The Huntington District Bluestone Lake Real Estate Map, originally dated 1953 and updated in 1989, was also employed as part of the GIS boundary mapping for this project. Horizontal control is based on the 1927 North American Datum.

Physiography, Geology, and Soils

Bluestone Lake is located in the Appalachian Plateau physiographic province, just west of the Allegheny Front, and is within the Southern Appalachian Ridges and Valleys land resource area (USDA 1981, 1984). The Southern Appalachian Ridges and Valleys land resource area is a broad band of northeast-southwest trending ridges and valleys extending from Pendleton County southwest through Summers County and into Mercer County (USDA 1981). Most of the area has steep or very steep hillsides and ridges that are separated by the less sloping valleys.

The Bluestone Lake area is underlain by gently- to strongly-folded rocks of the Mauch Chunk Group. The Mauch Chunk Group is a Mississippian system comprised of (in descending order of extent) the Bluestone, Princeton, Hinton, and Bluefield formations (USDA 1984). These formations consist of red, green, and gray shale and sandstone, with a few thin limestone beds present in the Hinton and Bluestone formations.

The upper portion of Bluestone Lake, from the dam at Hinton south to Toms Run, consists of soils from the Calvin and Berks-Gilpin soil associations (USDA 1984). These associations represent moderately deep, strongly-sloping to very steep, well-drained upland soils. South of Toms Run and Bull Falls to the Virginia border the lake narrows back to the original New River width as it becomes surrounded by soils of the Monongahela-Kanawha-Chagrin soil association in Crump's Bottom. These soils are deep, nearly level to strongly-sloping, well-drained, and moderately well-drained soils on stream terraces and floodplains. The Calvin and Berks-Gilpin soil associations found adjacent to the northern portion of the lake are found in the uplands above the stream terraces and floodplains in this southern area.

Climate

The climate in this area of West Virginia is continental in character and temperature and precipitation levels can fluctuate widely. The prevailing winds are westerly and most of the storms cross the state in a west to east pattern. Low-pressure storms that originate in the Gulf of Mexico and move in a northeasterly direction across West Virginia contribute the greater proportion of precipitation received by the state. Warm, moist, tropical air masses from the Gulf predominate during the summer months when humidity levels also remain quite high. As storms move through the state, occasional hot and cold periods of short duration may be experienced. During the spring and fall, storm systems tend to be less severe and have a lesser frequency, thus resulting in less radical extremes in temperature and rainfall.

Summers County winters are typically cold and snowy at higher elevations. In the valleys intermittent thaws preclude a long-lasting snow cover. Summers are relatively

warm on mountain slopes and very warm with occasional very hot days in the valleys. Rainfall is evenly distributed throughout the year, but heavier amounts occur on the windward, west-facing slopes than in valleys.

At Bluestone Lake the average winter temperature is 34 degrees F. The average daily minimum temperature is 24 degrees F. In summer, the average temperature is 72 degrees F at Bluestone Lake, with the average daily maximum temperature being 79 degrees F. In the general project area the average annual temperature is 52 degrees F. At Bluestone Lake the total annual precipitation is 35 inches. Of this amount, approximately 60 percent usually falls in the period from April to September. Thunderstorms occur on about 45 days per year. Average seasonal snowfall totals about 21 inches at Bluestone Lake.

As discussed by Niquette and Donham (1985), climatic conditions during the Holocene age represented a series of transitions in temperature, rainfall, and seasonal patterns. These transitions created a seemingly infinite range of ecological variation across time and space, both limiting and expanding survival strategies of human populations.

The beginning of the Holocene Age, between 11,300 and 12,700 BP, was associated with major and fairly rapid warming temperatures, decreases in cloud cover, and generalized landscape instability (Delcourt 1979; Webb and Bryson 1972). Estimated temperature increases during this period were three times greater than later Holocene fluctuations (Webb and Bryson 1972). During the early Holocene, rapid increases in boreal plant species occurred on the Allegheny Plateau in response to the retreat of the Laurentide ice sheet from the continental United States (Maxwell and Davis 1972; Whitehead 1973). At lower elevations, deciduous species returned after having migrated to southern Mississippi Valley refugia during the Wisconsin advances (Delcourt and Delcourt 1981).

The climate during the early Holocene was considerably cooler than modern climate and extant species in upper altitude zones of the Allegheny Plateau reflected conditions most similar to the Canadian boreal forest region (Maxwell and Davis 1973). Conditions at lower elevations were less severe and favored the transition from boreal to mixed mesophytic species. Paleoindian sites in the eastern United States are generally associated with the Early Holocene or Pleistocene-Holocene interface, but Late Pleistocene sites are also known. Middle Holocene (8000 - 4000 BP) climate conditions appear to have been consistently dryer and warmer than twentieth-century conditions (Delcourt 1979; Wright 1968). The influx of westerly winds during this Hypsithermal climatic episode contributed to periods of severe moisture stress in the Prairie Peninsula and to an eastward advance of prairie vegetation (Wright 1968). Delcourt has identified Middle Holocene moisture stress along the Cumberland Plateau in Tennessee, but indicates that upland barrens did not expand appreciably as did the midwestern prairies (Delcourt 1979). Changes in Archaic settlement patterns in both central and northern Missouri have been associated with possible decreases in upland resource availability during the episode (Joyer and Roper 1980; Warren 1982).

The earliest distinguishable Late Holocene climatic episode began around 4000 - 5000 BP and ended around 2800 BP. This episode is associated with the establishment of essentially modern deciduous forest communities in the southern highlands and increased precipitation across most of the mid-continental United States (Delcourt 1979; Maxwell and Davis 1972; Warren and O'Brien 1982). Beginning around 2800 BP, generally warm conditions, probably similar to the twentieth century, prevailed until the onset of the Neo-Boreal episode around 700 BP. Fluctuations in this Late Holocene Pacific episode appear to have varied locally, with either increased or decreased temperatures and precipitation (Baerris, Bryson and Kutzbach 1976; Warren and O'Brien 1982).

Figure 2-1. Bluestone Lake map of Huntington District boundaries and site locations used in this report.

Certain of these fluctuations have been associated with adaptive shifts in midwestern prehistoric subsistence and settlement systems. An example is Struever and Vickery's (1973) suggestion of a possible correlation between the onset of a cooler, moister period around 1600 BP and increased use of *polygonum* (knotweed) by Late Woodland groups in the Midwest (Struever and Vickery 1973:1215-1216). During this same period (1600-1300 BP) warmer temperatures have been inferred for the Great Plains and dryer conditions for the Upper Great Lakes (Baerreis et al. 1976; Warren and O'Brien 1982). Other fluctuations during the Pacific episode are similarly non-uniform across the midcontinental United States; however, the interfaces of all fluctuations are generally consistent. Local paleoecological evidence is required in order to determine the kinds of climatic fluctuations Woodland populations experienced during the Pacific episode. Given evidence of fluctuations elsewhere, it is most likely that changes occured around 1700 BP, 1300 BP, and 900 BP, with a possible fourth change around 2300 BP.

Recent studies of historic weather patterns and tree ring data by Fritts, Lofgren, and Gordon (1979) have indicated that climatological averages were "unusually mild" when compared with seventeenth - nineteenth century trends (Fritts et al. 1979:18). Their study suggests that winters were generally colder, weather anomalies were more common, and unusually severe winters were more frequent between 1602 and 1899 than after 1900. These cooler, moister conditions were associated with the Neo-Boreal episode, or Little Ice Age, which began around 700 BP and coincided with minor glacial advances in the northwest and Europe (Denton and Karlan 1973; Warren and O'Brien 1982). This episode is viewed by Warren and O'Brien (1982) as a causal factor in vegetation pattern shifts in northeast Missouri.

The effects of the Neo-Boreal episode, which ended during the mid- to late-nineteenth century, have not been studied in detail for this region. Despite this, it appears that the area experienced less radical temperature decreases during the late Neo-Boreal than did the upper Midwest and northern Plains (Fritts et al. 1979). Related changes in extant vegetation should therefore be more difficult to detect. It is probably safe to assume, however, that average temperatures were at least a few degrees cooler during the late Prehistoric and early Historic periods. The frequency of severe winters and average winter precipitation were probably greater as well.

Floral Resources

Bluestone Lake is included in the Mixed Mesophytic Forest Region. The forest associations found in this region are the oldest and most complex of the deciduous forests. Mesophytic refers to a climax community where dominance is shared by several species.

Approximately 15,490 acres of project land located above seasonal pool are forested with approximately 4,400 acres of cleared land located on the bottomlands and ridgetops. Canopy tree species include white oak, red oak, black oak, scarlet oak, chestnut oak, pitch pine, Virginia pine, American beech, tulip tree, basswood, sugar maple, white pine, black maple, hemlock, red maple, black walnut, American elm, black locust, shagbark hickory, butternut hickory, and American planetree. Understory species include black tupelo, sassafras, flowering dogwood, sourwood, redbud, striped maple, magnolia, serviceberry, hop hornbeam, American holly, and witch hazel. Common shrubs and herbs include mountain laurel, azalea, smilax, hydrangea, paw paw, viburnums, spicebush, gooseberry, elderberry, rattlesnake plantain, alumroot, wood tickseed, Christmas fern, maidenhair fern, lady fern, Jack-in-the-pulpit, Solomon's seal, trillium, goldenseal, hepatica, mayapple, bloodroot, violets, wild phlox, bluebells, foam flower, stonecrop, and Dutchman's breeches (USACE 1975:13).

Faunal Resources

The types of faunal species inhabiting southern West Virginia and Summers County have changed in response to broader environmental changes and climatic

fluctuations over the last 12,000 years. Extinct late Pleistocene species might have included giant beaver, stag moose, mammoth, mastodon, horse, giant ground sloth, and dire wolf (Funkhouser 1925; Jillson 1968). With the retreat of the Wisconsin ice sheets and the onset of more moderate climatic conditions, these species were replaced by modern types such as turkey, passenger pigeon, caribou, wolves, and buffalo. Today, the area is inhabited by a wide range of animals including beaver, bobcat, eastern cottontail, white-tailed deer, groundhog, gray and red fox, muskrat, raccoon, fox and gray squirrel, grouse, quail, wild turkey, and woodcock. Local rivers support such fish species as largemouth bass, spotted bass, black crappie, channel catfish, flathead catfish, sunfish carp, and sucker.

Chapter 3. Culture History

Introduction

Discussion of culture history is restricted primarily to the Bluestone Lake area whenever possible, although references to West Virginia in general and other external areas are made when local information is lacking. The culture history is described using broad temporal divisions that are generally accepted by scholars, beginning with the earliest appearance of human groups in the New World.

Prehistoric Culture History

Pre-Clovis Period

In the eastern United States, support for "Early Entry" is provided by a small number of professionally excavated sites. Evidence for pre-Clovis occupation at these sites is based on information obtained from relative and/or absolute dating. Although very little is known about this early period of occupation, archaeologists are becoming more aware of both the contexts in which such sites occur and the types and styles of diagnostic artifacts as more sites are identified and excavated.

Over the last decade a growing body of data has accumulated supporting a pre-Clovis occupation in North America, including areas in the upper Ohio Valley and Southeast where technologically distinct lithic assemblages have been recovered from contexts located stratigraphically below Early Paleoindian contexts (Adovasio et al. 1999; Goodyear 1999; McAvoy and McAvoy 1997). The few available uncorrected radiocarbon dates place this occupation at approximately 15,000 to 13,000 B.C.

Two of the most important sites reported to contain pre-Clovis components are located in relatively close proximity to West Virginia. The first site is Meadowcroft Rockshelter (36Wh297) located in extreme western Pennsylvania (Adovasio et al. 1999). At Meadowcroft, a sequence of deeply-stratified archaeological deposits has been unearthed, with interpretation of chronology in large part based on 52 radiocarbon dates, 13 of which are older than 10,850 ± 870 B.C. (Adovasio et al. 1999). All but four of the dates are internally consistent. The earliest cultural deposits at the site, both stratigraphically and temporally, are classified as belonging to the Miller complex, which, according to Adovasio et al. (1999), appears to represent the pioneer population in the upper Ohio Valley and perhaps the Northeast. Using existing radiocarbon dates, this manifestation appears to pre-date 13,000 B.C.

The Cactus Hill site (44Sx202) in Sussex County, Virginia, is a stratified open-air site located on an eolian sand dune. The site was found to contain a long record of occupation that included late Pleistocene and early Holocene components. McAvoy and McAvoy (1997) documented the presence of an occupation located stratigraphically below a Clovis stratum. White pine charcoal recovered from a feature-like deposit was dated to 13,120 ± 70 B.C. A second radiocarbon assay of 14,720 ± 730 B.C. for this occupation was obtained from a feature-like deposit in association with a cluster of prismatic blades. The presence of an overlying occupation with western-style Clovis points dating to 8970 ± 250 B.C. is highly significant because it supports the integrity of the site's stratigraphic record (Goodyear 1999). Together, information from these sites strongly suggests that parts of the eastern U.S., including the general area of West Virginia, was inhabited several thousand radiocarbon years before the first Clovis hunters entered the region. Existing data, although incomplete, fails to provide observable culture-historic linkage between pre-Clovis and Clovis, at least as viewed from Meadowcroft and Cactus Hill, where the occupations are characterized by disparate technologies separated by thousands of radiocarbon years.

Little information for examining the functional variability of Pre-Clovis sites is available, although it is evident that both rockshelter and open-air settings were utilized. At Meadowcroft Rockshelter the pre-Clovis inhabitants reduced chert cores and thinned and refurbished bifaces made from a variety of local and regional raw materials, including Kanawha Black Flint from West Virginia. On this basis, Adovasio et al. (1999) interpret the organization of the lithic system as curated rather than expedient. The presence of fire hearths and ash lenses indicated fires were important and possibly served as an anchor to which many other activities were tethered. The site may have been occupied repeatedly during this period by small, kin-based groups.

The pre-Clovis occupation at Cactus Hill is represented by a small assemblage of materials recovered from secure contexts, in large part mirroring the types of materials documented at Meadowcroft Rockshelter. The presence of hearths and possible shallow features, in combination with the type and quantity of materials recovered, suggest the site was used as some type of short-term camp. More specific information is not available.

The flaked stone assemblage from the pre-Clovis levels at Meadowcroft Rockshelter contains small prismatic blades, prepared polyhedral cores, and unfluted lanceolate points. The core and blade industry has been described as having an Eurasiatic, Upper Paleolithic flavor (Adovasio et al. 1999). The pre-Clovis assemblage is viewed as distinct and lacking apparent connections with Clovis. Adovasio et al. (1999) indicate that the chipped stone lithic assemblage includes raw materials derived from a number of local and non-local source areas. Included is Flint Ridge from Ohio, Kanawha Black Flint from West Virginia, Pennsylvania jasper from quarries well east of the site, and local Monongahela chert. The diversity of raw materials suggests a relatively high degree of residential mobility and a curated lithic technology.

Lithic artifacts from the pre-Clovis occupation at Cactus Hill include flake debris and prismatic blades, as well as basally thinned trianguloid to lanceolate bifaces. The technology and pattern of raw material usage is described as distinct from the overlying Clovis occupation (McAvoy and McAvoy 1997). Raw materials used in the manufacture of chipped stone tools include higher quality local cherts, quartzite, and good grades of metavolcanic materials.

The assemblages are not morphologically or technologically diverse, although both core and blade and biface technologies are represented. Lacking from the reported assemblages are drills, formal unifaces, and groundstone implements. To date, items fashioned from ivory, bone, wood, and other non-lithic materials have not been reported. The tool kit is highly portable and not unlike those associated with other late Pleistocene and early Holocene hunter-gatherer cultures in the region.

The extant record is not sufficient to interpret the settlement and subsistence strategies used by pre-Clovis peoples in the Bluestone Lake region. Information obtained from the analysis of lithic assemblages elsewhere indicates small groups of highly mobile hunter-gatherers probably occupied the region, likely using a foraging rather than a collector strategy. Forager strategies are based on a high degree of residential mobility, and the associated artifact assemblages typically reflect generalized rather than specialized activities. Pre-Clovis artifacts have not been discovered in association with extinct Pleistocene species. Adovasio et al. (1999) view these early populations as generalized hunter-foragers, rather than specialized hunters.

No sites with pre-Clovis components have been identified in the Bluestone Lake area.

Paleoindian Period

In its current form, the archaeological record for the eastern U.S. suggests the first wide-spread occupation took place during the early Paleoindian period at approximately

9500 to 9000 B.C., when small, mobile groups using Clovis technology adapted to rapidly changing environmental conditions during the late Pleistocene or Pleistocene/Holocene transition (Tankersley 1994). Available evidence indicates that the Paleoindian lifestyle and technologies survived until about 8000 B.C., when side notched points, typically associated with the beginning of the Early Archaic period, replace lanceolate varieties.

Paleoindian sites are most often recognized by the presence of morphologically and technologically distinct fluted and unfluted lanceolate bifaces, often made of high-quality tool stone. Sites are typically small and characterized by low-density scatters of lithic artifacts, typically confined to disturbed and/or temporally and culturally mixed contexts. Most studies have focused on issues of artifact typology, lithic technology, and technological organization, mobility, and settlement dynamics. Subsistence remains are rarely encountered and few sites in the region have been dated by either relative or absolute methods. Nevertheless, archaeologists in the eastern U.S. have proposed a number of chronologies for the period.

Frameworks for culture-historic development in the eastern U.S. typically divide the Paleoindian period into two or three subperiods (Table 3-1). However, inference and cross-dating have been at least as important to the development of these chronologies as stratigraphy and radiocarbon dating. In other words, many of the "diagnostic" point types used to define various subperiods are not securely dated (Anderson 1996; Bonnichsen and Will 1999; Curran 2000; Peterson 1995). Anderson (1996:14) indicates his use of Early, Middle, and Late subperiods is based on the fact that the "...best current evidence indicates these subdivisions encompass major episodes of technological or organizational change within the Southeast." For the purpose of this study, the three subperiod framework proposed by Tankersley (1996) for Kentucky is followed, with Early Paleoindian dating from 9500 to 9000 B.C., Middle Paleoindian from 9000 to 8500 B.C., and Late Paleoindian from 8500 to 8000 B.C.

There have been 79 Paleoindian points found in West Virginia, generally recovered from surface contexts (Broyles1967; Campbell and Cooper 1985; Carr and Gardner 1978; Dunnel 1967, 1979; Fuerst 1981; Gardner 1987:23; McMichael 1962; Mayer-Oakes 1955; O'Malley 1988; Olafson 1959; Wilkins 1978). To date, no Paleoindian period sites have been excavated in the state. A review of the Kentucky-Ohio-West Virginia radiocarbon database indicates that none of the 301 dates reported for West Virginia as of 1996 are associated with Paleoindian sites or deposits (Maslowski et al. 1995). Recently, Anslinger (1998) reported a date of 10,960 B.C. for the St. Albans site in Kanawha County. The dated material consisted of wood charcoal recovered from a thermal feature located 4.8 m below surface. However, because diagnostic artifacts were not in direct association, the reliability of this assay is problematic. Because West Virginia lacks radiocarbon dates for the Paleoindian period, any temporal designations used in chronologies (e.g., Table 3-1) or to date specific point types are inferential.

In addition to the lack of radiocarbon dates, the current record for the state appears to lack information for any stratified sites containing a clear record of Paleoindian occupation. Although some rockshelter sites reported by McMichael (1965) and Bays and Bays (1977) appear to contain possible Late Paleoindian points, the level of documentation is not sufficient to make conclusive interpretations. Given the quality of photographs and/or line drawings available in these reports, it is possible some of these specimens actually represent Late Archaic Guilford points.

In general, Paleoindian artifacts are typically described as belonging to a small, portable tool kit of Upper Paleolithic derivation (Adovasio et al. 1999). The tool kit was highly specialized toward hunting and processing large game, which, at least in some regions of the country, included extinct species of late Pleistocene megafauna. Although some differences in morphology and technology are present in artifact assemblages obtained from geographically dispersed sites,

there is a considerable amount of similarity, whether the sites are located in the Northeast, Southeast, Midwest, or Great Plains (Tankersley 1996). Artifacts of known Paleoindian origin reported for West Virginia sites are limited to diagnostic fluted and unfluted point types. Given that most of the reported artifacts have been recovered from surface contexts, this is not unexpected. Review of the literature indicates that most reported specimens date to the Middle to Late Paleoindian periods, with little evidence exists for Early Paleoindian Clovis points.

Artifacts made from bone, ivory, antler, and wood have been recovered from Early Paleoindian sites, although the most diagnostic artifact is the fluted Clovis point. Clovis points were possibly mounted to bone and ivory foreshafts, which in turn were inserted into primary shafts of wood (Tankersley 1996). Artifacts documented for Early Paleoindian assemblages include Clovis points, unifacial end and side scrapers, spurred end scrapers, polyhedral cores and percussion blades, bifacial knives, hammerstones, antler billets, bone and ivory foreshafts, awls, and eyed bone needles.

In some areas, the Middle Paleoindian tool kit witnessed some losses and several new additions. Items no longer used include prismatic blades detached from prepared polyhedral cores. According to Tankersley (1996), the core and blade technology was replaced by a bipolar technology, and was presumable developed in response to the use of poorer quality raw materials for tool manufacture. In the Middle and Upper Ohio Valley, the hallmark artifacts for the period are fluted Cumberland and Gainey points. Scrapers, and especially spurred end and slug-shaped varieties are quite common during this period.

The Late Paleoindian tool kit includes large, bipointed, alternately beveled bifaces, backed bifaces, proximal end and side scrapers, hafted perforators, and backed and snapped unifaces. Fluted points are, for the most part, replaced with unfluted lanceolate varieties belonging to the Plano and Dalton clusters (Justice 1987; Tankersley 1990, 1996).

Because the composition of Paleoindian assemblages in the eastern U.S. is heavily biased toward chipped stone artifacts and waste debris, the primary method for identifying functional variation in the settlement record has been lithic analysis. Through technological, typological, raw material, and assemblage composition and diversity studies, researchers have been able to develop persuasive interpretations for site activities and the functional orientation of sites. Collectively, this information is valuable for settlement system reconstruction that can be useful in areas like West Virginia and Bluestone Lake, where Paleoindian settlement system data is lacking. This is especially true where such data can be interpreted in combination with environmental and subsistence data. For example, Gardner (1977, 1987) identified five functionally distinct types of sites for the Flint Run Complex of Paleoindian sites in northern Virginia. These site types include quarries, lithic reduction stations, tool-manufacturing base camps, base camp maintenance stations, and hunting sites, and their definitions were based on assemblage composition and setting. The range of site types identified for the Flint Run Complex might not be present in all other areas, as natural setting is viewed as an important, if not causal, factor in the spatial segregation of activities within the larger settlement system (Gardner 1987). Similar site types have been reported for other areas of the eastern United States. For Kentucky, Tankersley (1990) discusses open habitations, caves and rockshelters, quarries and workshops, kill sites, and isolated finds. This is the kind of general information that is recorded on the typical state archaeological site recording form. Unlike the types defined for the Flint Run Complex, these "types" are defined by setting and/or assemblage composition. For example, the type open habitation refers to sites located at strategic positions on the landscape, regardless of the

Table 3-1. Select Paleoindian Chronologies for the Eastern United States.

Subperiod	Temporal Range (B.P.)	Diagnostic Points	Reference
Southeast			
Early Paleoindian	10,500 - 8900	Clovis	Goodyear 1999
Middle Paleoindian	8900 - 8500	Cumberland, Beaver Lake, Redstone, Quad, Suwannee, Simpson	
Late Paleoindian	8500 – 7950	Dalton	
Virginia			
Paleoindian I	≤9450 to ≥7950	Clovis	Gardner 1989
Paleoindian II	Operative by 8550		
Paleoindian III	Ended by 7950		
West Virginia			
Early Paleoindian	9,500 to 8900	Clovis	Pollack and Crothers 2005
Middle Paleoindian	8900 to 8500	Gainey, Cumberland	
Late Paleoindian	8500 to 8000	Lanceolate Plano (Plainview & Agate Basin) and Dalton (Dalton, Beaver Lake, Quad) Clusters	
West Virginia			
Clovis	12,950+ to 7950	Clovis	McMichael 1968
Cumberland		Cumberland	
Dalton		Dalton	
West Virginia			
Early Paleoindian	12,950 to 9950	Clovis, Cumberland	Fuerst 1981
Late Paleoindian	9950 to 8950	Hardaway fluted notched, Plano, Dalton	

range of site-specific activities conducted.

Little can be said about the functional variation of Paleoindian sites anywhere in West Virginia at this time. As previously indicated, the overwhelming majority of identified sites consist of isolated points recovered from plowzone and other disturbed surface contexts. In the West Virginia State Plan, Gardner (1987) discusses the site types he had identified for the Flint Run Complex in northern Virginia, as mentioned previously. Whether a similar range of sites is reflected in West Virginia and archaeological record of the Bluestone Lake area is not known, although it seems reasonable to assume that the types of activities with such sites would have been conducted.

Based on the evidence at hand, it appears that the Paleoindian subsistence strategy was that of foragers rather than collectors. Foragers gather food on a daily basis and typically do not obtain surpluses that require storage. Furthermore, foragers acquire subsistence resources on an encounter basis, and are characterized by high residential mobility, low-bulk subsistence inputs, and regular daily food procurement strategies (Binford 1980). Resource exploitation is organized through residential moves and changes in group size. Evidence that local Paleoindian populations consisted of small, highly-mobile groups is supported by the density and structural characteristic of sites.

Review of the literature indicates that most information relevant to Paleoindian subsistence and settlement in West Virginia is descriptive and artifact specific. Because of the small number of sites identified and the lack of large and functionally diverse artifacts assemblages, subsistence remains and seasonal indicators, the data base is not conducive to the development of models of settlement and subsistence. However, based on the location of individual finds, it is evident that Paleoindian peoples exploited a wide variety of natural settings within the dissected uplands and terrace settings of major drainages (Broyles 1969; Gardner 1987; Wilkins 1978).

Five sites with Paleoindian components have been identified within the Huntington District boundaries at Bluestone Lake. Identification of these components is based on the recovery of diagnostic artifacts from

surface contexts at 46Su28, 46Su39, 46Su41, 46Su42, and 46Su45. Four of these sites (46Su39, 46Su41, 46Su42, and 46Su45) are located within close proximity of one another along a floodplain terrace of the New River near Bertha, below the Bluestone Conference Center. The floodplain terrace on the outer (eastern) bend of the river exhibits a near-continuous distribution of artifacts. Site 46Su28 is located further upstream, on a floodplain terrace near Harvey Falls in upper Crump's Bottom.

Archaic Period

The concept of the Archaic, whether as a Stage or Period, has been used to define a roughly 7000-year span of time during the Holocene Epoch that witnessed gradual developments and changes in the technological, adaptive, and socio-cultural dimensions of indigenous hunter-gatherer cultures as they adapted to increasingly modern environmental conditions. Over the years, and especially following the development of modern recovery techniques in archaeology, the definition of the Archaic for parts of the Eastern Woodlands has been modified to include many of the variables (e.g., agriculture, pottery, mound construction) traditionally used to define the Woodland Period beginning about 1000 B.C. .

The Archaic Period is usually divided into Early (8000 to 6000 B.C.), Middle (6000 to 3000 B.C.) and Late (3000 to 1000 B.C.) subperiods. The temporal limits and variables used to define each subperiod seldom receive unanimous support from archaeologists working within a given region, with researchers proposing a number of culture-historic frameworks (e.g., Gardner 1987; Jefferies 1996; McMichael 1968; Muller 1986; Fuerst 1981). The chronologies presented in Table 3-2 are generally similar, and reflect general concepts of cultural change with regard to the three subperiods. Gardner's chronology breaks the three Archaic subperiods down into several phases, each of which strictly reflects the chronological positions of diagnostic hafted bifaces and do not necessarily coincide with cultural changes.

Most researchers describe a similar suite of site types that were employed during the Archaic period. While the internal structure, duration, use, size, and organization of these site types sometimes differed based on changing patterns of settlement and subsistence during the Early, Middle, and Late Archaic subperiods, the site types themselves are similar throughout the Archaic period (Fuerst 1981, Gardner 1987). These site types were used and organized differently and with varying frequency as resource acquisition strategies changed from foraging during the Early Archaic to logistical forays initiated from base-camps during the Middle Archaic to collector strategies that developed by Middle and/or Late Archaic times.

Site types typically identified during the Archaic period include transient camps or stations with a limited array of identifiable activities, and multi-activity base camps (Gardner 1987). Transient camps or stations typically reflect a short duration and a reduced set of artifacts and activities. For example, lithic procurement and food procurement sites are typically transient camps. Base camps are larger, and exhibit a variety of features and artifacts that reflect a wide range of daily activities. The consistent nature of site types throughout the Archaic period is not attributable to a lack of dynamic change, but reflects the nature of residential patterns typical of pre-agricultural eras (Gardner 1987).

Thirty-seven separate sites with Archaic components have been identified within the Huntington District boundaries at Bluestone Lake (Table 3-3). These include 11 with Early Archaic components, four with Middle Archaic components, 26 with Late Archaic components, and seven with non-specific Archaic components. Ten sites have multiple Archaic components.

Table 3-2. Selected Archaic Chronologies for West Virginia.

Subperiod	Temporal Range	Diagnostic Points	Reference
West Virginia			
Early Archaic	8000-6000 B.C.	Charleston, Amos, Kirk, McCorkle, St. Albans, LeCroy, Kanawha	Wilkins 1978
Middle Archaic	6000-4000 B.C.	Stanly, Morrow Mountain, Guilford, Amos	
Late Archaic	4000-2000 B.C.	Big Sandy II, Brewerton, Hansford, various stemmed and side-notched	
Transitional	2500-800 B.C.	Piedmont, Perkiomen-Susquehannock, Orient, Snook Kill	
West Virginia			
Early Archaic I	8000-7500 B.C.	Corner-notched (Palmer, Kirk)	Gardner 1987
Early Archaic II	7500-7200 B.C.	Side-notched (Warren, Big Sandy 1, Kessell)	
Early Archaic III	7200-6700 B.C.	Kirk Stemmed	
Middle Archaic I	6700-6000 B.C.	McCorkle, St. Albans, LeCroy	
Middle Archaic II	6000-5000 B.C.	Stanly	
Middle Archaic III	5000-4000 B.C.	Morrow Mountain,	
Middle Archaic IV	4000-3500 B.C.	Guilford	
Middle Archaic V	3500-2500 B.C.	Brewerton/Halifax	
Late Archaic I	2500-1800 B.C.	Savannah River Stemmed	
Late Archaic II	1800-1200 B.C.	Holmes/Savannah River, Susquehanna	
West Virginia			
Early Archaic	9000-6000 B.C.	Kessell, Charleston, Kirk, McCorkle, St. Albans, LeCroy, Kanawha, Palmer, Big Sandy	Pollack and Crothers 2005
Middle Archaic	6000-3000 B.C.	Stanly, Morrow Mountain, Guilford, Big Sandy II	
Late Archaic	3000-1000 B.C.	Savannah River, Brewerton, Perkiomen, Ashtabula, Susquehanna, Normanskill, Dry Brook, Lamoka, Orient, Meadowood, Ledbetter, Lackawaxen, Buffalo, Merom	

Table 3-3. Archaeological Sites with Archaic Components at Bluestone Lake.

Early Archaic	Middle Archaic	Late Archaic	Archaic
-	-	-	44Gs15
-	-	44Gs17	-
-	-	-	44Gs22
-	-	46Su3	-
-	-	46Su5	-
46Su6	-	46Su6	-
46Su9	-	46Su9	-
-	-	46Su10	-
46Su20	-	46Su20	-
46Su21	-	-	-

Table 3-3. Archaeological Sites with Archaic Components at Bluestone Lake.

Early Archaic	Middle Archaic	Late Archaic	Archaic
-	-	46Su22	-
-	-	46Su28	-
46Su39	46Su39	46Su39	-
46Su41	-	46Su41	-
-	-	46Su42	-
-	46Su43	46Su43	-
46Su44	-	46Su44	-
-	-	46Su45	-
-	46Su48	-	-
-	-	46Su52	-
-	-	46Su53	-
46Su54	-	-	-
-	-	-	46Su58
-	-	-	46Su60
-	-	46Su165	-
-	-	-	46Su191
-	-	46Su194	-
-	-	46Su196	-
-	-	-	46Su199
-	-	-	46Su200
-	-	46Su208	-
-	46Su212	46Su212	-
-	-	46Su325	-
46Su326	-	46Su326	-
46Su330	-	46Su330	-
-	-	46Su405	-
46Su441	-	-	-

Early Archaic

Analysis of available radiocarbon assays indicates the emergence of Early Archaic cultures took place during the early Holocene at approximately 8000 B.C. Based primarily on transitional lithic forms and technologies and the similarity of adaptive systems, it is evident that regional Early Archaic expressions developed in situ from late Paleoindian manifestations (Funk 1978). The Early Archaic tool kit is strikingly similar to that used during the late or terminal Paleoindian period, with the primary differences being the replacement of lanceolate hafted bifaces with notched varieties, and the introduction of drills and chipped stone axes (Pollack and Crothers 2005). Morphological and technological changes in hafted bifaces have been documented at a number of deeply stratified open-air and rock shelter sites, including St. Albans in West Virginia (Broyles 1966, 1971) and Longworth-Gick in Kentucky (Collins 1979). Early Archaic artifact assemblages typically contain a limited range of tool functional types, including cores, flake debris, bifaces and hafted bifaces, unifacial scrapers and adzes. Piercing, cutting, and scraping tools associated with the procurement and processing of meat and hides are most common, while implements designed for the collection and preparation of plant foods are generally lacking. During the first half of the Early Archaic subperiod, tools were generally made from high quality raw materials, following the pattern established during the preceding Paleoindian period, and were highly to moderately curated relative to later Middle and Late Archaic technological systems. Early Archaic hafted bifaces include types belonging to the Large Side Notched, Thebes, Kirk, Rice Lobed, and LeCroy clusters (Justice 1987). At the St. Albans site (46Ka27), Broyles (1966, 1971) identified a deeply stratified sequence of Early Archaic deposits that included Kirk Corner Notched, MacCorkle, St. Albans Side-Notched, LeCroy Bifurcate Base, and Kanawha Stemmed components. The information from this site played an important role in the development of the Early Archaic culture-historic sequence for much of the Eastern Woodlands.

Although the Early Archaic sequence for the much of the Eastern Woodlands was developed using data from the St. Albans site, the data from St. Albans and other Early Archaic sites in the region generally fails to provide information for the first five centuries of the period, from approximately 8000-7500 B.C. This elusive segment of the early Holocene sequence is recognized archaeologically by hafted bifaces of the Thebes and Large Side Notched clusters (Justice 1987). For West Virginia, the only hafted biface belonging to either of these clusters recovered from a seemingly primary context is the Kessell Side Notched specimen from Zone 36 at the St. Albans site dated at 7900 B.C. (Broyles 1971). Thebes Cluster hafted bifaces (e.g., Thebes, St. Charles, Lost Lake), although not common in the Kanawha Valley have been reported or illustrated for several sites (McMichael 1965; McMichael and Mairs 1963, 1969; Youse 1969). None of the specimens appear to have been recovered from primary depositional contexts.

In West Virginia, there is a general lack of data for the first 500 years of the Archaic Period. An examination of the published and unpublished literature including Anslinger (1998); Brashler et al. (1994); Broyles (1971); Hemmings (1985); Maslowski et al. (1995); Niquette et al. (1991); Updike et al. (2000); and Youse (n.d.) identified 25 radiocarbon assays for West Virginia sites dating prior to 6000 B.C.. Twenty-four of the dates are within the two millennia period assigned to the early Holocene, most of which are reported for the St. Albans site.

The latter part of the Early Archaic Period is recognized by hafted bifaces belonging to the Rice Lobed and LeCroy clusters (Justice 1987). The former cluster includes the types Rice Lobed, MacCorkle Stemmed, and St. Albans Side Notched. Types in this cluster are characterized by a basal notch or bifurcated stem. The only radiocarbon assay for an archaeological context in West Virginia dating to the late Pleistocene is an assay of 10,960 ±

60 B.C. obtained from charcoal recovered from a thermal feature located 4.8 m (15.7 ft) below surface at the St. Albans site (Anslinger 1998). Diagnostic artifacts were not in association, and based on stratigraphic considerations the date is considered problematic (Anslinger 1998).

The LeCroy Cluster consists of the LeCroy Bifurcated Stem, Lake Erie Bifurcated Base, Kanawha Stemmed, and Fox Valley Truncated Barb point types (Justice 1987). Of these types, LeCroy and Kanawha are common to the Kanawha Basin and are dated at the St. Albans site to 6300 B.C. and 6210 B.C., respectively (Broyles 1971). Given the paucity of available stratigraphic and radiometric data for the Early Archaic period in West Virginia beyond the St. Albans site, it is reasonable to conclude that a certain amount of temporal overlap exists for some of the Early Archaic point types discussed above. Nevertheless, the temporal sequence for early side notched, Kirk Corner Notched, and bifurcated forms is well documented regionally, and is supported by recent data from Dust Cave (Sherwood et al. 2004).

Until a higher quality data set is obtained and more thorough re-analyses of existing data sets (i.e. St. Albans) are conducted, it will be difficult to effectively examine Early Archaic settlement and subsistence on a local or even regional basis. In general, the Early Archaic period witnessed the establishment of the oak-hickory forests that were present at the time of early Euro-American settlement and exploration of the area. However, these forest communities were still immature with different proportions of particular plant species (Ford 1977). Consequently, the proportions of animal species dependent on the forest resources also may have been different. Adding a temperate climate to this environmental setting, it would appear localized fluctuations in available resources would have prohibited human groups from establishing permanent territories (Ford 1977).

Archaeological evidence tends to support this model of limited natural resources promoting the continuation of small, mobile hunting bands. The primary distinction between Early Archaic groups and Paleoindian groups is the initial development of technologies to hunt smaller game and process plant foods. Plant processing and fishing tools rarely appeared, however, indicating such resources provided a minor dietary component (Dragoo 1976). Artifact assemblages and site locations indicate hunting was the primary subsistence practice, with some sites suggesting periodic seasonal reuse (Dragoo 1976). Although seasonal scheduling appears to be developing, the limited natural resources would require frequent changes in groups' territories to offset localized fluctuations. This is evidenced by the wide distribution of diagnostic projectile point styles during this period (Dragoo 1976).

By the beginning of the Early Archaic subperiod many of the harsh conditions associated with the terminal Pleistocene had improved, and the large megafauna species exploited by earlier Paleoindian populations had become extinct. Deciduous forests rich in nut-producing taxa migrated northward and rivers that previously served as sluiceways for glacial meltwaters dwindled in size, exposing broad alluvial valleys conducive to travel, exploitation, and settlement. As interpreted by Muller (1986:56), "many of the features of the Early Archaic, though poorly understood, reflect the beginning of the long period of specialization to Eastern Woodland local environments." Archaeological data collected from surface surveys and excavations indicate that the formation of most Early Archaic sites resulted from short-term occupations by small, mobile bands. Evidence for midden, pit features, structures, and human and dog burials is also generally lacking. When features are present they tend to consist of thermal facilities, including possible smudge pits. Investigations by Ballweber and Michael (1990) document the common occurrence of Early Archaic materials in association with mountain top sites in Boone, Kanawha, Logan, and Wyoming counties in southwestern West Virginia, and Wilkins (1977) documented similar evidence for Early Archaic occupation in Boone County. The largest Early Archaic

sites, however, are often located along terrace margins and natural levees adjacent to large rivers. Both stratigraphic and spatial analyses indicate that these sites were occupied repeatedly for long periods of time. Using data from ridgetop and valley bottom sites, Wilkins (1978) postulated that Early Archaic populations in the Kanawha Basin consisted of semi-sedentary bands exploiting seasonally available resources. However, Wilkins' Early Archaic analytical unit did not differentiate between the various recognized cultures or point traditions, and as such probably masks temporal and cultural variability for the period.

Eleven archaeological sites with Early Archaic components have been identified (Table 3-3). Three of these sites (46Su39, 46Su41, and 46Su44) are located within close proximity of one another along a floodplain terrace of the New River near Bertha, below the Bluestone Conference Center. Two other sites, 46Su20 and 46Su54, are located in the lower portion of Crump's Bottom in the Bull Falls area. The remaining six sites (46Su326, 46Su6, 46Su330, 46Su21, 46Su9, and 46Su441), are widely spaced along New River floodplain terraces, continuing upstream south to The Narrows.

Middle Archaic

The Middle Archaic subperiod spans the period from approximately 6000 to 3000 B.C. Based on trends in the geographic distribution of hafted biface styles, this period marks the first significant development of regionally distinct archaeological cultures in the eastern U.S. (Jefferies 1996). This development is generally viewed as a socio-cultural and technological response to the adaptation of hunter-gatherers to local environments as warmer, drier conditions began to prevail (Fuerst 1981).

A review of the local and regional literature identified 16 radiocarbon dates for 12 West Virginia sites that fall within the period 6000 to 3000 B.C. (Hemmings 1985; Broyles 1971; Wilkins 1985; Youse 1985, 1992; Niquette et al. 1991; Maslowski et al. 1995; Anslinger et al. 1996; McMichael 1968). Based on the regional record, most of the dates appear to provide realistic data for the period of occupation, and provide the best available framework for development of a preliminary chronology. However, most of these dates and their associated sites are located in the Kanawha Valley, and reflect the general lack of data available for southern West Virginia and the Bluestone Lake area. Middle Archaic tool assemblages include a broader range of functional types and styles that reflect concomitant changes in settlement and subsistence. Regional hafted biface types include Stanly, Amos, Morrow Mountain, and Guilford. In West Virginia the distribution of the latter two types is generally in the southern part of state in the New River drainage basin. Toward the end of the subperiod, and probably extending into the early Late Archaic, side-notched varieties including Big Sandy II and Brewerton are common. Also present are newly-introduced groundstone implements including grooved axes, pitted anvils, and mortars and pestles. At midden sites where preservation is generally enhanced, tools of bone and antler usually comprise a significant part of the total assemblage.

Middle Archaic cultures in West Virginia are generally recognized by the presence of diagnostic hafted bifaces, many of which have regional distributions. However, little study of the period has been completed by professional archaeologists, and only a few sites have been tested and dated, with studies by amateurs being most common. In general, data from sites located in alluvial settings along the Kanawha River have provided the most important information; upland sites have more extensively mixed cultural deposits and have not been reliably dated. Collectively, the stratigraphic sequences reported for the St. Albans and Hansford Ballfield sites document nearly ten millennia of occupation, with the record for the Early, Middle, and Late Archaic especially well represented (Brashler et al. 1994; Broyles 1971; Turner 1998; Wilkins 1985; and Youse 1992). Other evidence for Middle Archaic occupation comes from the Amos Power Plant site (46Pu60). Salvage excavations conducted by the West Virginia

Archeological Society from 1968-1970 identified a previously unrecognized type of hafted biface defined by Broyles (1971) as Amos Corner Notched. Broyles assigned this new type to the early part of the Early Archaic; however, subsequent radiocarbon assays obtained for the Amos and Charleston Town Center (46Ka165) sites indicate a Middle Archaic association (Youse n.d., 1992). The contexts for the samples from which these determinations were derived are not well documented, and at least one sample at the Amos site consisted of charcoal collected from two discrete contexts separated by about 0.9 m of elevation (Youse n.d.). Regardless of potential problems, these determinations suggest the Amos occupation in the lower Kanawha Valley post-dates Stanly and pre-dates the appearance of side-notched hafted bifaces typically identified as Big Sandy II and Brewerton.

Overall, however, our current state of knowledge for the Middle Archaic subperiod in southern West Virginia is generally limited to the hafted biface sequence, a small number of radiometric determinations, a paucity of information regarding site types, and some information for raw material use patterns. Meaningful information for subsistence and settlement patterns, site structure, and any details of the adaptive system(s) is generally lacking. Middle Archaic subsistence was based on the exploitation of a wide range of plants and animals (Jefferies 1996; Jefferies and Lynch 1983; Styles et al. 1983). Pollack and Crothers (2005) use data from such sites as Eva (Lewis and Lewis 1961) and Modoc Rock Shelter (Styles et al. 1983) to infer Middle Archaic subsistence patterns along the New River. White-tailed deer and wild turkey were the most important animals consumed, while hickory nuts were the most important plant foods of the Middle Archaic diet (Jefferies 1996). Riverine resources, such as fish and shellfish, also became important, especially towards the end of the Middle Archaic (Brown and Vierra 1983; Jefferies and Lynch 1983).

Based on diagnostic point types, it appears that Middle Archaic peoples had settlement patterns similar to their Early Archaic predecessors. Differences in the intensity of exploitation of upland resource zones between Early and Middle Archaic times is difficult to determine given gaps in the current database, and possible differences in technological systems. Regional studies of subsistence patterns indicate that the overall diversity of the subsistence base increased and mobility decreased during the Middle Archaic. These changes appear to mark a shift in Archaic foraging to a largely logistic collector strategy (Brown and Vierra 1983; Stafford 1994; Stafford et al. 2000). Unlike Early Archaic foragers that moved camp from resource to resource, Middle Archaic groups increasingly acquired resources, at least in part, through logistical forays initiated from base-camps. Residential sites associated with foragers generally have low densities of artifacts, simple hearths, and associated general activity areas (Stafford et al. 2000). Sites of logistically organized groups, on the other hand, show evidence of greater residential stability. In the archaeological record this stability is recognized by the presence of rock-filled midden, large and functionally diverse pit features, and in some instances structures and human and dog burials (Brown and Vierra 1983; Jefferies 1996; Stafford 1994; Stafford et al. 2000). This fundamental shift is perhaps best documented in the deeply-stratified records reported in the Midwest for the Koster (Brown and Vierra 1983) and Modoc Rock Shelter (Styles et al. 1983) sites in southern Illinois. However, in southern West Virginia and the Bluestone Lake area, few Middle Archaic sites have been examined, and it is not clear when the shift from foraging to logistically-organized collecting took place.

Only four sites with Middle Archaic components have been identified within the Huntington District boundaries at Bluestone Lake (Table 3-3). Two of these sites (46Su39 and 46Su43) are located within close proximity of one another along a floodplain terrace of the New River near Bertha, below the Bluestone Conference Center. This area contains a dense concentration of multicomponent sites. Site 46Su212 is part of

the dense concentration of sites at the mouth of Indian Creek, and 46Su48 is located across from Wylie Island farther to the south.

Late Archaic

The Late Archaic period is usually characterized as a time of change that includes the rise of inter-regional trade systems, mortuary ceremonialism, differentiation of status and wealth, focal economies and sedentism, population growth, and horticulture. As Gardner (1987:39) notes, however, these traits do not necessarily coincide with changes in the projectile point types used to chronologically define the Late Archaic, but occur at different times in different places, only partly in other places, and even not at all in some areas. For example, as more Late Archaic and Terminal Archaic sites are investigated, the clear division between pre-ceramic and ceramic lifestyles and cultures becomes increasingly blurred. Storage facilities, structures, the accumulation of exotic materials and ritualistic burial practices, pottery, and horticulture are increasingly associated with Archaic point styles and radiocarbon assays. Some sites, such as Cogswell phase sites in eastern Kentucky, consistently exhibit a combination of Archaic and Woodland attributes (Ison 1988; Ledbetter and O'Steen 1991; Sheldon and Hughes 1990).

Archaeological evidence for the earliest Late Archaic cultures often consists of stemmed points with prominent, squared shoulders. However, the boundary between Middle and Late Archaic is not well defined in many areas; for example, notched points such as Brewerton Eared-Notched and Brewerton Eared-Triangle (Justice 1987) are often considered diagnostic of the late Middle and/or early Late Archaic periods (note differences in Gardner's chronology in Table 3-2). Truncer (2004) reports the appearance of steatite bowl fragments at several Late Archaic sites in the Kanawha Basin and Northern Panhandle, and "copies" of these bowls manufactured from local sandstone are not uncommon on habitation sites within the Kanawha Valley. The development of stone bowl technology is attributed in part to changes in the processing of foodstuffs, and is often associated with the intensification of the use of small starchy and oily seeds as a food source. Stone bowls were later replaced by thinner and more expedient ceramic vessels, the traditional hallmark of the Woodland period. Studies now suggest that pottery may have been introduced gradually over a period of 500 or more years (Seeman 1986), reflecting diffusion of the technology from external areas (possibly the Northeast) as opposed to local invention. Research has demonstrated that ceramics did not occur suddenly or widely over the Eastern Woodlands, and the use of ceramics as a mark for the beginning of the Woodland period is falling out of favor.

As with the Early and Middle Archaic periods, evidence for Late Archaic occupation in West Virginia comes from sites located in a variety of valley and upland settings, though to date the highest quality information for evaluating various aspects of Late Archaic life comes from floodplain sites. For example, the Buffalo site (46Pu31), which is best known for its Late Prehistoric villages, contains a sealed Late Archaic occupation tested by Broyles (1976). On the basis of a single radiocarbon assay dating to 1920 B.C., this component is considered contemporary with Panhandle Archaic to the north, but with a different cultural expression. Hafted bifaces from the site were defined by Broyles (1976) as Buffalo Expanding Stem and Buffalo Straight Stem. Broyles indicated that the smaller Buffalo points are morphologically similar to Savannah River points, but that the two are not related. Eleven Late Archaic features are documented at the Buffalo site as shallow basin fire pits and deeper pits, which probably functioned as cooking facilities. The latter contained large quantities of thermally-altered rock and charcoal. Post molds were associated with thermal features suggesting the construction of wind breaks.

Prufer (2001) has outlined some recent developments in Late Archaic settlement models. This revised model of Archaic settlement is based on new information and

new interpretations of old data. According to Prufer, in light of new data, the larger sites, once called base camps, can now be partitioned into multiple areas that were similar to the smaller sites. Under this model, the larger size of the "base camps" is now considered to be the results of repeated reoccupation throughout the Archaic period, not to a different site function. The large, intensively re-occupied sites often have rich middens, functionally diverse artifact assemblages that include both utilitarian and non-utilitarian items, large numbers of functionally diverse features (e.g., hearths, earth ovens, refuse pits), and human and dog burials. At shell midden sites, where organic artifacts are more likely to survive, assemblages generally include a wide assortment of items made from bone, antler, shell, and teeth. Because stone boiling technology was prevalent, thermally-altered rock is a common component of many sites dating to the period (Dragoo 1958; Winters 1969). Members of "regional macrobands" normally coalesced in these camps along major rivers between winter and late spring to exploit emerging post-winter resources (Wilkins 1978; Fuerst 1981). During the late spring or summer, as resources became more plentiful, a number of extended families would gather at a centralized base camp located along a major river or stream. With the arrival of fall, the family-based groups would depart the base camp and occupy short-term hunting and gathering camps in the uplands. The collection and possible processing of nuts would be important at this time. During the winter, groups would either re-occupy the summer base camp or disperse into the hinterlands.

Overall, the Late Archaic subperiod is considered a time of significant population growth and increasing regionalism (Jefferies 1996). Changes in adaptive strategies resulted in larger and more intensively occupied sites in some areas than witnessed during the preceding periods. In many areas of the midcontinent, the data suggest collector strategies were developed by Middle and/or Late Archaic times. Collectors are logistically organized, and subsistence resources are acquired and supplied to a great extent by specialized, task-oriented groups. Because of the complexity of the system, a wider range of site functions are created relative to those of the more highly mobile foragers. Semi-sedentary residential bases (i.e. base camps) occur, with many of the procurement and processing tasks being conducted at more ephemeral and/or specialized transient camps and stations.

A total of 26 sites with Late Archaic components have been identified within the Huntington District boundaries of Bluestone Lake (Table 3-3). Seven of these sites (46Su3, 46Su39, 46Su41, 46Su42, 46Su43, 46Su44, and 46Su45) are, like the Early Archaic sites, located within close proximity of one another along the floodplain terraces of the New River near Bertha, below the Bluestone Conference Center. Fifteen sites with Late Archaic components (roughly north to south, 46Su20, 46Su53, 46Su165, 46Su325, 46Su326, 46Su6, 46Su10, 46Su22, 46Su52, 46Su194, 46Su196, 46Su208, 46Su212, 46Su28, and 46Su330) have been identified throughout lower, middle, and upper Crump's Bottom and the Indian Creek vicinity. The remaining four sites (46Su5, 46Su405, 46Su9, and 44Gs7) are widely spaced south of Crump's Bottom to The Narrows.

Woodland Period

Like the Archaic period which preceded it, the Woodland period encompassed a long period of time, during which important changes occured in social organization and subsistence and settlement patterns. This time span also is broken into three subdivisions: the Early Woodland (ca. 1000 B.C. to A.D.1), the Middle Woodland (ca. A.D.1 to 500), and the Late Woodland (ca. A.D. 500 to 1000) (Table 3-4). These periods are based on several very broad and traditionally held generalizations

Table 3-4. The Woodland Period in South-Central/Lower New River Region of West Virginia (Pollack and Crothers 2005, Fenton and Andrews 1999, Johnson 1996, Fuerst 1988, Ison et al. 1985, Wilkins 1979).

Tradition	Period	Phase	Temporal Range	Attributes of Note
Kanawha Tradition	Early Woodland	Transitional	1000 to 800 B.C.	No mound building; introduction of thick-walled pottery
		Early Adena	800 to 500 B.C.	Small burial mounds, cremations, minimal grave goods, thick-walled Fayette Thick-like ceramics
		Leslie Mound	500 to 200 B.C.	Accretional mounds, cremations in small log and bark tombs, usually no grave goods, Armstrong ceramics
	Middle Woodland	Murad Climax	200 B.C. to A.D. 1	Large mounds, elaborate log tombs, exotic grave goods, Armstrong ceramics
		Armstrong	A.D. 1 to 500	Mound building declines and moves to secondary drainages, hunting/ gathering/gardening, diffuse small villages, Lick Creek ceramics
	Late Woodland	Schoolyard	A.D. 500 to 800	Hunting/gathering/gardening, diffuse small villages/ hamlets, Lick Creek ceramics
		Buck Garden	A.D. 500 to 1000	Hunting/gathering/gardening, diffuse small villages, Buck Garden ceramics

concerning some of the more significant cultural changes that took place during the Woodland period. For example, the Early Woodland period in West Virginia has been characterized in a general sense as marking the introduction of ceramic vessels in the region, and late in the period, early developments in mound ceremonialism and elaboration of burial practices (Burdin 2004, DuVall 1999, Botwick 1995, Fuerst 1988, Ison et al. 1985). The Middle Woodland period is generally associated with a fluorescence of mound building and Hopewellian-influenced cultural traits (Fuerst 1988). The Late Woodland period has been characterized by the rise in mortuary facilities at habitation sites, a decline in mound construction and burial ceremonialism, and reduced exchange of exotic goods (Burdin 2004, Railey and Henderson 1986, Botwick 1995).

A total of 35 separate sites with Woodland components have been identified within the Huntington District boundaries at Bluestone Lake (Table 3-5). These include four sites with Early Woodland components, eight with Middle Woodland components, ten with Late Woodland components, and 17 with non-specific Woodland components. Four additional sites have been identified from which ceramic vessel fragments have been recovered, but the type of pottery is unknown. Hence, these sites are classified as Woodland/Late Prehistoric. Overall, five sites have multiple Woodland components, and all five are located within close proximity of one another along a floodplain terrace of the New River near Bertha, below the Bluestone Conference Center.

Table 3-5. Archaeological Sites with Woodland and Late Prehistoric Components at Bluestone Lake.

Early Woodland	Middle Woodland	Late Woodland	Woodland	Woodland/Late Prehistoric	Late Prehistoric
-	-	-	-	-	44Gs10
-	-	-	-	44Gs11	-
-	-	-	44Gs15	-	44Gs15
-	-	-	44Gs17	-	-
-	-	-	44Gs20	-	-
-	-	44Gs48	-	-	-
-	-	-	46Me19	-	-
-	-	46Su1	-	-	-
-	-	-	-	-	46Su3
-	46Su6	-	-	-	46Su6
-	-	-	-	-	46Su7
-	-	-	-	-	46Su8
-	46Su9	-	-	-	46Su9
-	-	-	46Su10	-	46Su10
-	-	-	-	-	46Su19
-	-	46Su20	-	-	46Su20
-	46Su22	-	-	-	46Su22
-	-	-	-	-	46Su24
-	-	-	46Su28	-	46Su28
-	-	-	-	-	46Su29
46Su39	46Su39	46Su39	-	-	46Su39
46Su41	46Su41	46Su41	-	-	-
-	46Su42	46Su42	-	-	46Su42
46Su44	-	46Su44	-	-	46Su44
46Su45	46Su45	46Su45	-	-	46Su45
-	-	-	46Su47	-	46Su47
-	-	-	46Su48	-	46Su48
-	-	46Su49	-	-	46Su49
-	-	-	-	-	46Su50
-	-	-	-	46Su52	-
-	-	-	46Su55	-	-
-	-	-	-	-	46Su56
-	-	46Su58	-	-	46Su58
-	46Su60	-	-	-	46Su60
-	-	-	-	-	46Su61
-	-	-	46Su62	-	-
-	-	-	46Su165	-	-
-	-	-	46Su191	-	-
-	-	-	-	46Su193	-
-	-	-	46Su194	-	-
-	-	-	-	46Su195	-
-	-	-	46Su196	-	-
-	-	-	46Su199	-	46Su199
-	-	-	46Su200	-	-
-	-	-	-	-	46Su208
-	-	-	46Su212	-	-
-	-	-	-	-	46Su279
-	-	-	-	-	46Su326

Early Woodland

The Early Woodland period is generally thought to begin with the appearance of thick-walled pottery around 1000 B.C., with a roughly 200-year transition from the Late Archaic period to the first definable Early Woodland mound-building phase around 800 B.C. that will be referred to as the Early Woodland Transitional period in this text. Numerous dates have been proposed for the end of the Early Woodland period, reflecting both geographic differences and the varying extent to which Middle Woodland Hopewell-like traits were adopted in some areas. Some researchers place the transition from Early to Middle Woodland around 200-400 B.C. (Burdin 2004, Fenton and Andrews 1999, Botwick 1995, Fuerst 1988,), while others contend that the Early Woodland period in southern West Virginia essentially continued until around A.D. 1, with the advent of the Hopewellian-influenced Armstrong phase (Ison et al. 1985,). Excavation results from Early Woodland mounds in southern West Virginia tend to favor the former chronology (Table 3-4).

The Early Woodland is divided into three phases, including an Early Woodland Transitional phase (1000-800 B.C.), the Early Adena phase (800-500 B.C.), and the Leslie Mound phase (500-200 B.C.) (Table 3-4) (Fuerst 1988, Ison et al. 1985). The Early Woodland Transitional phase includes the Hansford Ballfield site (46Ka104), for which a radiocarbon date of 1170±70 B.C. was recorded (Wilkins 1977). The Leslie Mound phase includes such sites as the Leslie Mound (46Pu3, radiocarbon dated to 300 B.C.) and the Jarvis Farm mound (46Ka105, radiocarbon dated to 305 B.C) (Maslowski et al. 1995). These three phases are generally defined based on changes in mortuary practices and mound construction, rather than any identifiable changes in settlement or subsistence patterns.

Summaries of Early Woodland settlement have generally focused on either the burial mounds or the habitation sites. Fenton and Andrews (1999) use descriptions of habitation sites from several excavations of Early Woodland sites in eastern Kentucky as a baseline for expectations, since little information is available for southern West Virginia. Habitation sites are characterized as fairly small, short-term sites with one or two circular structures and little evidence of repeated occupation (McBride 1994; Niquette 1989; Boedy 1989). Interior pits and hearths have been identified, but few storage features have been recorded (Fenton and Andrews 1999). Rockshelters were utilized as well, with evidence of Early Adena phase occupations identified in rockshelters in Nicholas County (Maslowski 1985).

Mound building began during the Early Adena phase in West Virginia, post-800 B.C. Typical of Early Adena mound building is the Turkey Creek Mound, where "the Early Adena component is evidenced by a low earthen mound with a cremation in a shallow elliptical pit and grave goods that include Meadowood-like points and a 'ritually killed' blocked end tubular stone pipe" (Fuerst 1988:37, referencing McMichael and Mairs 1969). During the Leslie Mound phase (500-200 B.C.), mound building began to take on more of the characteristics of incipient formal ceremonialism with construction of larger accretional mounds, pre-mound structures with paired posts, and the placement of crematory basins within small log and bark tombs (Fuerst 1988, Ison et al. 1985).

Geometric earthworks have been associated with the Early Woodland period elsewhere in West Virginia, including in the Kanawha River valley below Charleston.

Diagnostic ceramics and hafted bifaces associated with the Early Woodland Transition (1000 to 800 B.C.) include thick, grit- or steatite-tempered pottery, Orient Cluster hafted bifaces, and Potts hafted bifaces (Burdin 2004; Fuerst 1988, Ison et al. 1985). Both Potts and Orient hafted bifaces have been recovered from Early Woodland contexts in Summers County (Ison et al. 1985; O'Malley 1985). The Early Adena phase (800 to 500 B.C.) is characterized by leaf-shaped Adena blades, ovate-stemmed Adena hafted bifaces (Botwick 1995, Ison et al. 1985) and

continued use of thick-walled ceramics bearing resemblance to Vinette I and Fayette Thick types (Ison et al. 1985). Diagnostic ceramics from the Leslie Mound phase (500 to 200 B.C.), as defined by Wilkins (1979), include Adena stemmed points and thinner, shale- or siltstone-tempered Armstrong pottery that is similar to Adena Plain ceramics elsewhere (Ison et al. 1985).

Early Woodland subsistence practices are based on hunting, gathering, and gardening strategies (Burdin 004; Railey 1996). Most groups appear to have pursued a generalized pattern of food-gathering, possibly supplemented by cultivation of native domesticates (Fenton and Andrews 1999, Cutler and Blake 1984). Horticultural activities were conducted primarily within stream bottoms, although some cultivation along ridges was also considered possible (Gremillion 1994; Ison 1988). Hunting strategies focused on white-tailed deer and wild turkey, supplemented by fish, waterfowl, and mollusks in some areas.

The large "base camps" commonly identified during the Late Archaic disappeared and were replaced by multiple smaller hamlets scattered in lowland settings that may be related to an increased reliance on indigenous domesticates (Fenton and Andrews 1999, Smith 1992). The use of rockshelters in upland settings appears to have been limited. Better-studied areas in southwestern West Virginia and eastern Kentucky have demonstrated a clear separation of ceremonial and habitation sites, with small camps scattered in upland tributary valleys and mortuary sites located along high river terraces along main-stem and secondary valleys (Fenton and Andrews 1999, Niquette 1992, Fuerst 1981). Preferred settlement locations in eastern Kentucky include second-order streams, narrow valley bottoms, and hillside ridges in highly dissected country (Fenton and Andrews 1999, Kerr and Creasman 1995).

Four sites with Early Woodland components have been identified within the Huntington District boundaries of Bluestone Lake (Table 3-5). All four of these sites (46Su39, 46Su41, 46Su44, and 46Su45) are located within close proximity of one another along the floodplain terraces of the New River near Bertha, below the Bluestone Conference Center.

Middle Woodland

The transition to the Middle Woodland period generally coincides with the fluorescence of mound building and the influence of Hopewellian peoples to the north and west. The period begins with a flurry of mound building during the Murad Climax phase (200 B.C. to A.D. 1) (Fuerst 1988), though Ison et al. (1985) place the same Murad Climax phase in the Early Woodland period. Radiocarbon dates of 100 B.C. (Murad Mound, 46Ka30) and 175 B.C. (Young Mound, 46Ka65) have been recorded for Murad Climax phase sites (Fuerst 1988). The Armstrong phase (A.D. 1 to 500) is characterized by a sharp decline in mound building activities. A radiocarbon date of A.D. 120 has been obtained from a pit with Armstrong ceramics at the Mount Carbon site (46Fa7) in Fayette County; closer to Raleigh County, a radiocarbon date of A.D. 310 has been returned from the Armstrong phase Spring site (46Su67) (Ison et al. 1985).

During the Middle Woodland period, the Murad Climax phase (200 B.C. to A.D. 1) represents the high point of Hopewell-like mound building in the region. The number, size, and complexity of earthen burial mounds increased, and was accompanied at some point by the construction of graded ways and earthen/stone enclosures (Fuerst 1988). Examples of such constructions are common in Fayette and especially Kanawha County to the north. Examples of Murad Climax phase sites include Murad Mound (46Ka30), Young Mound (45Ka65), the South Charleston Mound, Bell Creek Mound (46Fa5), Gore Mound (46Bo26), and possibly the Mound Carbon Stone Walls (46Fa1) (Fuerst 1988). Other site types from the Murad Climax phase are not well known.

By the late Middle Woodland Armstrong phase, mound building was on the decline. Since some mound sites originally identified

as part of McMichael's (1962) Armstrong phase have been reassigned to the Leslie Mound phase of the Early Woodland period (Wilkins 1979), few Armstrong phase sites (A.D. 1 to 500) remain. A small Middle Woodland occupation with Lick Creek ceramics recovered from pits has been identified at the Spring Site (46Su67) in Summers County. Several rock shelters in Nicholas County are described as having Armstrong ceramics; since little description is available for these assemblages, it is possible that the 20 or fewer sherds recovered from these sites may actually represent Lick Creek ceramics and date to the Armstrong phase (Ison et al. 1985), rather than the late Early Woodland Leslie Mound phase or the early Middle Woodland Murad Climax phase.

The Middle Woodland period includes elaborate mortuary practices and exotic artifacts. Most researchers offer few specifics regarding the ceramics and hafted bifaces of this phase, preferring to focus on non-local trade artifacts and burial goods. Fuerst (1988:39) notes that Murad Climax phase ceramics and hafted bifaces include lobed and zoned incised Armstrong pottery, Robbins hafted bifaces, and Cresap hafted bifaces. Armstrong ceramics have been typically considered a Middle Woodland ware type, and were first described by McMichael (1962). Henderson (1986) and Ison et al. (1985) have since refined McMichael's Armstrong series into an Early Woodland to Middle Woodland type (Armstrong) and Middle to Late Woodland type (Lick Creek) based on excavations in Summers County. The newer definition of the Early to Middle Woodland Armstrong ware describes the ceramic type as a thin, plain, shale/siltstone/claystone-tempered ware with occasional zoned incising that Wilkins (1979) suggests first came into use during the Leslie Mound phase, prior to the Hopewellian-influenced mound building of the Murad Climax phase. Exotic materials such as mica, copper, or marine shell are commonly reported in burial mounds, but are not generally encountered at habitations sites (Fenton and Andrews 1999). Other artifacts typically associated with mound and mortuary contexts during the Murad Climax phase include rolled copper beads, stone and clay pipes, slate gorgets, hematite celts, copper bracelets and headdresses, cached blades, mica sheets, and zoomorphic platform pipes, all of which point toward contact with the Ohio Hopewell (Fuerst 1988, Ison et al. 1985).

Armstrong ceramics were followed by the thicker, cordmarked, shale/siltstone/claystone-tempered Lick Creek ceramics in the late Middle Woodland (Armstrong phase) and into the early Late Woodland (Schoolyard phase).

Middle Woodland hafted bifaces during the Armstrong phase include Snyders, Affinis Snyders, Connestee Triangular, and Manker (Burdin 2004, Justice 1987, Ison 1985). As discussed briefly above, McMichael's (1962) Armstrong series ceramics were revised and refined by Henderson (1986) and Ison et al. (1985) based on excavations at three sites within the Green Sulphur Springs complex in Summers County. Henderson also formally defined a new pottery series, referred to as Lick Creek, that is loosely based on a "second type" of Armstrong Cordmarked ceramics documented by McMichaels (1962). Lick Creek ceramics date from the late Middle Woodland and into the early Late Woodland, and represent cordmarked ware tempered with soft, subangular siltstone. Decoration, when present, occurs only as notched lips. Calibrated radiocarbon dates of A.D. 580±60 (late Middle Woodland Armstrong phase) and A.D. 780-840±70 (early Late Woodland Schoolyard phase) were obtained for carbonized materials associated with Lick Creek ceramics at the Schoolyard site (46Su72) in Summers County (Henderson 1986).

The Middle Woodland Murad Climax phase (200 B.C. to A.D.1) is known primarily from its mound and ceremonial contexts. Associated sites include the Murad Mound (46Ka30), Young Mound/Mound 30, Criel/South Charleston Mound, Bell Creek/Hale Mound (46Fa5), Gore Mound (46Bo26), and possibly the Mount Carbon Stone Walls (46Fa1). The Murad Mound has been radiocarbon dated to 100 B.C.

(McMichael and Mairs 1969), and the Young Mound/Mound 30 has been radiocarbon dated to 175 B.C. (Youse 1969).

Middle Woodland subsistence and settlement, from the Murad Climax through the Armstrong phase, appears to be a continuation of Early Woodland patterns (Fenton and Andrews 1999). Settlements appear to continue as dispersed camps and hamlets along river bottoms and on upland benches and ridgetops (Maslowski 1985, Niquette 1992). The Armstrong phase marks the decline of Hopewell mound building in the region (Fuerst 1988). Mounds tended to be smaller and located in the stem valleys off of major tributaries, rather than prominently placed on floodplains of large rivers (Fenton and Andrews 1999, Frankenberg and Henning 1993).

Eight sites with Middle Woodland components have been identified within the Huntington District boundaries of Bluestone Lake (Table 3-5). Five of these sites (46Su39, 46Su41, 46Su42, 46Su45, and 46Su60) are, like the Early Woodland sites, located within close proximity of one another along the floodplain terraces of the New River near Bertha, below the Bluestone Conference Center. Two sites, 46Su6 and 46Su22, are located near the confluence of Indian Creek with the New River. 46Su6 is located on an upper terrace above the river, and 46Su22 is located on a floodplain terrace just north of the confluence.

Late Woodland

Some of the most recent chronological work appropriate for the Bluestone Lake region divides the Late Woodland period into the Schoolyard phase (A.D. 500 to 800) and the Buck Garden phase (A.D. 800 to 1000) (Fuerst 1988, Railey and Henderson 1986, Ison et al. 1985). The Schoolyard phase is based on excavations at the Schoolyard site (46Su72), where radiocarbon dates of A.D. 470 and A.D. 760 have been recorded in association with Lick Creek ceramics (Ison et al. 1985). The term "Buck Garden phase," first developed by McMichael (1965) in association with rock-tempered Buck Garden ceramics, had been used interchangeably with the Late Woodland period in southern West Virginia until the recent establishment of the Schoolyard phase (Fuerst 1988). Contexts containing grit-tempered version of Buck Garden pottery has been radiocarbon dated to A.D. 820 at the Mount Carbon site in nearby Fayette County.

Wilkins (1979), Fuerst (1988) and others have noted that "Buck Garden" is really a "catch-all" term for the Late Woodland period, likely encompasses multiple cultural developments (as demonstrated by Ison et al. 1985), and should probably be abandoned as a phase designation. Until such time as the associated Buck Garden ceramics are better understood, however, the phase designation should probably continue to be used for the latter portion of the Late Woodland period in the southern West Virginia.

There is a general lack of large Woodland villages in southern West Virginia during the Late Woodland period, with most long-term habitation occurring in hamlets (Ison et al. 1985). While the Late Woodland component of the Mount Carbon site in Fayette County may represent a seasonal coalescence of smaller hamlet sites, settlement during both the Late Woodland period and the preceding Middle Woodland period appears to have occurred primarily in the form of smaller settlements, rockshelters, or as minor components within the more substantial Late Prehistoric villages that were to follow.

Late Woodland ceramics are generally tempered with various kinds of crushed rock, including chert, sandstone, siltstone, limestone, and others (Fenton and Andrews 1999). More specifically, Buck Garden and Lick Creek ceramic series are most commonly cited for the region (Burdin 2004). Lick Creek ceramics are a thick, cordmarked, chalky-paste, siltstone-tempered type identified at the Green Sulphur Springs complex in Summer County and associated with the late Middle Woodland and earliest portions of the Late Woodland, as noted during the discussion of Middle Woodland material culture earlier in this chapter (Henderson 1986). Buck Garden

ceramics are generally characterized by a wide range of rock temper types (McMichael 1962). Wilkins (1979) has noted that Buck Garden ceramics represent an undifferentiated collection of several ceramic types, and other authors have commented on the wide range of decorative and technological variability encompassed by the rock-tempered, collared, S-twist-dominated Buck Garden assemblage (O'Malley 1990:738, Kerr et al. 1991:157). As Kerr et al. note, the Buck Garden assemblage likely includes a range of early and late Late Woodland types, and, as it stands, is of questionable usefulness for comparative purposes.

Diagnostic Late Woodland hafted bifaces in the Kanawha River basin include hafted bifaces from the Lowe and Chesser clusters during the early Late Woodland period. Chesser Notched and Lowe Flared Base hafted bifaces were recovered in association with Lick Creek ceramics at the early Late Woodland Schoolyard Site, part of the Green Sulphur Springs Complex in Summers County (Ison et al. 1985). Jack's Reef Cluster hafted bifaces (Justice 1987:217-219, Seeman 1992) were more common in the later stages of the Late Woodland period (Burdin 2004). A variety of small triangular hafted bifaces, including Levanna and Hamilton types, are also associated with Late Woodland components.

While many of the cultural manifestations thought to represent the hallmarks of the transition from the Middle Woodland to the Late Woodland period are present in some parts of West Virginia, some of these traits are poorly expressed in southern West Virginia. In portions of West Virginia nearer the Ohio Valley, changes in Late Woodland settlement patterns include the nucleation of dispersed hamlets into larger villages; however, in southern West Virginia, settlement tended to remain relatively dispersed as people continued to occupy upland rockshelters and establish open-air campsites on ridgetops, upland benches, and stream heads (Fenton and Andrews 1999:41). The reliance on local sources of rock temper noted in the earlier summary of Late Woodland ceramics is consistent with the idea of reduced mobility and exchange during the Late Woodland period.

Results from excavations at the Schoolyard Site in Summers County generally support a diffuse subsistence economy based on hunting and gathering and supplemented by gardening (Ison et al. 1985). Agricultural practices did intensify in some areas, with corn added to the diet to varying degrees (Burdin 2004, Fenton and Andrews 1999). More specifically, McMichael and Mairs (1969) characterize the Buck Garden phase (late Late Woodland period) as marking the appearance of small, diffuse hamlets or villages based on horticulture.

Ten sites with Late Woodland components have been identified within the Huntington District boundaries of Bluestone Lake (Table 3-5). Five of these sites (46Su39, 46Su41, 46Su42, 46Su44, and 46Su45) are, like the Early and Middle Woodland sites, located within close proximity of one another along the floodplain terraces of the New River near Bertha, below the Bluestone Conference Center. Sites 46Su49 and 46Su58 are located further upstream on New River floodplain terraces on either side of the river at Wylie Island. Downstream from Bertha, 46Su20 is located on a river floodplain in lower Crump's Bottom near Bull Falls, and 46Su1 is a rockshelter located opposite the confluence of the Bluestone River with the New River. Site 46Gs48 is located on the west bank floodplain of the New River across from Glen Lyn, Virginia, and north of The Narrows.

Late Prehistoric Period

Significant cultural developments took place during the Late Prehistoric period, the sources of which were both indigenous and foreign. By A.D. 1000, many native peoples had come to depend on the cultivation of corn, beans, and squash for their livelihood, a change in subsistence that had its roots in the preceding late Late Woodland period. Changes took place during the Late Prehistoric period in technology, settlement size and plan, settlement patterns, exchange, and burial practices. In some regions of the Eastern

Woodlands, socio-political organization became more complex and chiefdoms developed (Chapman 1985; Dent 1995; Gallivan 2003; Milner 1998; Potter 1993). In other areas, including the Bluestone Lake area, socio-political organization apparently remained small-scale and tribal (Pollack and Crothers 2005, Fuerst 2004, 2005; Henderson 1998; Snow 1994). While predominantly indigenous Late Prehistoric cultural expressions are usually considered to have ended by A.D. 1700, Henderson (2005) ends the Late Prehistoric period with the advent of European trade goods after A.D. 1500 – in other words, commencing with indirect rather than direct contact.

Several factors have hampered efforts to understand the Late Prehistoric period in the Lower New River Region. The region is on a distinct cultural boundary zone between the Ohio Valley's Fort Ancient culture and the Ridge and Valley Province's Intermontane Culture (Evans 1955; Johnson 1984; Maslowski and King 1983); few major excavations have been conducted at Late Prehistoric sites in this region; and few radiocarbon dates are available. As noted by Henderson (2005) in Pollack and Crothers' recent study of the New River Gorge National River, the Bluestone Lake study area provides a rich research opportunity for investigating how groups influenced each other and interacted across cultural boundaries; in this case, the Fort Ancient-inspired groups of the lower New River valley and those of the "Intermontane" (Radford) Culture located further upstream on the New River, past Narrows and into Virginia. Several Late Prehistoric villages have been identified along the New River in this area, making Bluestone Lake an important region both for the study of Late Prehistoric culture history and for the study of what may represent different ethnic groups on either side of a "cultural fracture zone" (Evans 1955; Johnson 1984; Maslowski and King 1983).

Late Prehistoric settlements exhibit several important differences from the preceding Woodland societies, including 1) an increased reliance on agriculture; 2) increased sedentism; and 3) a rise in sociopolitical complexity. However, unlike contemporaneous Mississippian groups in the Midwest and Southeast, no large ceremonial centers or earthworks have been found at Late Prehistoric sites in the Bluestone Lake area that would indicate a similar settlement hierarchy.

To date, the only site types identified for the Late Prehistoric period in the Bluestone Lake area (and in West Virginia generally) are villages and small extractive camps. However, the majority of recorded Late Prehistoric sites are circular villages located on a trail network situated on the floodplains and terraces of major rivers. Nucleated villages contained concentric activity areas with an outer domestic/residential areas and inner plazas, with burials occurring within the villages rather than in association with mounds as the use of mounds and earthworks became uncommon. These sites tend to become consolidated over the course of the Late Prehistoric period, moving from higher to lower terraces possibly to more effectively exploit floodplain environments (Fuerst 1981). Little is known about the small extractive camps, which are usually identified by the presence of a small amount of shell-tempered pottery or an isolated biface in upland settings.

The Late Prehistoric period in the Bluestone Lake area generally begins around A.D. 1000 and continues until at least A.D. 1500. Numerous regional chronologies within this general framework have sprung up over time, including various phases, traditions, and complexes (Ison et al. 1985; Graybill 1981, 1986, 1988; McMichael 1968). These categories represent attempts to reflect the complex multicultural interactions of the region. One of the Late Prehistoric study areas defined by Henderson (2005) is the "Fort Ancient – Mountain Interior," which encompasses a variety of complexes that have been variously referred to as Mount Carbon, Woodside, and Bluestone. These Fort Ancient-related complexes include the area in the Upper Kanawha River Valley, the Big Sandy/Guyandotte River, and the Lower New River regions. The Bluestone Lake area is

encompassed by Henderson's Lower New River region, and the Late Prehistoric sites in the Bluestone Lake area constitute the sites used to define the Bluestone Complex of the lower New River region (Henderson 2005).

There is little or no data in the Bluestone Lake area for what is often called the early Late Prehistoric period (A.D. 1000-1200) elsewhere in West Virginia. The poorly defined (and possibly defunct) late Late Woodland Buck Garden phase is thought to have continued until around A.D. 1200, but little supporting evidence has been identified (Railey and Henderson 1986). Little is known about the culture history of the Bluestone Lake area until after the beginning of the Bluestone Complex around A.D 1200.

The Late Prehistoric period begins around A.D. 1200 in the Bluestone Lake region with the advent of the Bluestone Complex. A detailed summary of the Bluestone Complex was assembled by Henderson (2005), and much of the discussion below is derived from her discussion of Late Prehistoric cultures for the University of Kentucky's study of the New River Gorge National River (Pollack and Crothers 2005).

Limited excavations and surface collections at five large village sites in the Bluestone Reservation provide the data upon which Graybill defined the Bluestone Complex (A.D. 1150-1550) (Johnson 1984:369). These sites are Barkers Bottom (46Su3), French Farm (46Su9), Harmon Farm (46Su22), Farley Farm (46Su20), and Warford (46Su24) (Applegarth et. al. 1978; Graybill 1988:57-60; Johnson 1984, 1996:112-116; Johnson et. al. 1980; Solecki 1949). Based on the relative frequency of shell-tempered ceramics, the relative proportions of exterior surface treatments, and a series of nine acceptable radiocarbon dates, the earliest Bluestone villages are Barkers Bottom and French Farm. Calibrated dates show that French Farm was occupied in the late A.D. 1200s and late A.D. 1300s, while Barkers Bottom was occupied repeatedly: during the early A.D. 100s, late A.D. 1200s, the early A.D. 1300s, the late A.D. 1300s-early 1400s, and the early A.D. 1500s (Johnson 1984, 1996; Jones 1987). Harmon Farm was occupied sometime between A.D. 1400 and 1500 (calibrated to the early A.D. 1400s) (Johnson 1984, 1996; Jones 1987). Ceramic assemblage characteristics for the undated Warford and Farley Farm sites suggest the former was occupied sometime before A.D. 1400 and that the latter was occupied as late as the early A.D. 1500s.

Although information is limited, investigations at Barkers Bottom, Harmon Farm, and French Farm suggest that Bluestone Complex sites represent planned, circular villages with central plazas (Applegarth et al. 1978; Graybill 1988; Johnson 1984). These semi-permanent settlements were lived in year-round. The domestic activity area that encircles the plaza includes houses, hearths, and storage/refuse pits, including bell-shaped pits (Johnson 1984, 1996). Smaller, extractive camps also may have been part of the settlement pattern, but none have been documented to date (Graybill 1988). It is not known whether palisades surrounded these villages (Johnson 1984). Burial mounds were not present, but burials did occur, although information on burial patterns and practices is limited due to the small number of graves investigated. At French Farm, one individual, covered with eight sandstone slabs, was buried partially flexed with shell beads, while another was a bundle burial (Johnson 1984).

Bluestone Complex ceramic assemblages are predominantly shell-tempered and plain surfaced, but these plain surfaced examples share only the most basic characteristics (temper and exterior surface treatment) with specimens from southwestern Virginia assigned to New River Plain defined by Evans (1955) and Holland (1970). Instead, they are identical, in terms of decoration, castellations, handles, and vessel form, to middle Fort Ancient Feurt phase ceramics from sites such as Roseberry Farm, located far to the north on the Ohio River (Johnson 1996). Johnson (1978) considers that these ceramics represent a diffused, nonlocal ceramic tradition.

Bluestone Complex sites also include variable mixtures of shell-tempered, knot-roughened/net-impressed or Z-twist cordmarked New River series ceramics and limestone-tempered, knot-roughened/net-impressed or cordmarked Radford series ceramics (Graybill 1988; Johnson 1978, 1984). Vessel forms include constricted neck jars. Other ceramic artifacts include pipes, discs, and scrapers (Applegarth et al. 1978; Johnson 1984). Lithic artifacts include triangular projectile points, bifaces, drills, and vasiform stone pipes. The points are isosceles with straight or flared bases. French Farm also produced Yadkins and Clarksville Small triangular hafted bifaces (Johnson 1984). Antler tine projectile points and flakers are present, and bone artifacts include shuttles, beamers, and awls as well as ornaments, such as beads, drilled animal teeth, and turkey digits (Johnson 1984). Shell artifacts include freshwater mussel shell hoes, and ornaments, such as circular and ovoid beads and marginella shell beads (Johnson 1984). Macrobotanical data from these sites was scarce, but includes small samples of carbonized Northern Flint corn cobs from Barkers Bottom feature fill (Johnson 1984). C13/C14 analyses on human bone suggest that corn represented a significant portion of the diet (Graybill 1988). Nuts and wild plant foods were collected. Like their contemporaries, the Bluestone Complex inhabitants hunted a variety of mammals, birds, and fish, with deer, bear, elk, and turkey representing the species of major importance but also consuming occasional small mammals, box turtle, fish, and freshwater mussels (Applegarth et al. 1978; Johnson 1984).

Johnson (1984, 1996) has suggested that the earlier, downriver Bluestone Complex sites of Barkers Bottom, Warford, and Harmon Farm represent the movements of a single intrusive Fort Ancient population or a local population heavily influenced by Fort Ancient cultural traditions. He provides several scenarios for the contemporary occupation at the upstream French Farm. It was either occupied by a local terminal Late Woodland population with a Radford ceramic tradition that was assimilating foreign Feurt phase ceramic traits, a mixed Fort Ancient-Intermontane Culture population, or, like the rest of the other Bluestone Complex sites, its inhabitants were an intrusive population that, due to their proximity to groups producing Radford Series ceramics, were absorbing significant amounts of southwestern Virginia ceramic tradition traits or potters.

On the other hand, Graybill (1988:58; see also Johnson 1996:115) considered the Bluestone Complex a local cultural development due to the high percentages of limestone-tempered Radford ceramics; cordmarked and knot-roughened/net-impressed exteriors; and other traits such as smoking pipes and triangular points. Determining the identity of the Bluestone Complex inhabitants hinges on the origin of the population, and the direction of the vectors of change, which can only be resolved with more research in the area.

A total of 30 sites with Late Prehistoric components have been identified within the Huntington District boundaries of Bluestone Lake (Table 3-5). Seven of these sites (46Su3, 46Su39, 46Su42, 46Su44, 46Su45, 46Su60, and 46Su61) are located within close proximity of one another along the floodplain terraces of the New River near Bertha, below the Bluestone Conference Center. Eleven sites with Late Prehistoric components (roughly north to south, 46Su19, 46Su20, 46Su24, 46Su326, 46Su6, 46Su10, 46Su22, 46Su208, 46Su28, 46Su29, and 46Su279) have been identified throughout lower, middle, and upper Crump's Bottom and at the confluence of Indian Creek with the New River. Site 46Su199 was identified on a stream terrace further upstream on Indian Creek, and 46Su56 was identified on a New River floodplain across from Saltwell Ridge near Lick Creek.

Continuing upstream and to the south along the New River, eight prehistoric archaeological sites have been recorded on the New River floodplain on either side of Wylie Island. Late Prehistoric components have been recorded for seven of these sites, including

46Su8, 46Su9, 46Su47, 46Su48, 46Su49, 46Su50, and 46Su58. Site 46Su7 is located at the confluence of Roundbottom Creek and the New River, and the remaining three sites (44Gs10, 44Gs15, and 44Gs48) all situated on New River floodplain terraces near Glen Lynn in Virginia, downstream (north) of The Narrows.

Protohistoric Period

The Protohistoric period is typically defined as beginning at the first evidence of European contact around A.D. 1550 and continuing to around A.D. 1700. Archaeological evidence for occupation of the Bluestone Lake area during the Protohistoric period is limited. A blue glass bead was reportedly recovered from Barkers Bottom (46Su3) (Solecki 1949:378). Outside of the project area but within Summers County on a terrace overlooking the confluence of the Little Bluestone and Bluestone River, recent research at 46Su672 documented a possible protohistoric component (Stathakis 2001; Trader 2003). The site produced two glass beads: a green one that may date to between A.D. 1600 and 1625, and a dark blue or black glass bead that could not be dated (Trader 2003:74-75).

Historic Period Culture History

The first documented settlement marked the beginning of the Colonial and Revolutionary War Period (A.D. 1753 - 1795). This settlement was located on Crump's Bottom at the mouth of Joshua's Run and was settled by Andrew Culbertson in 1753. This settlement was subsequently abandoned at the outbreak of the French and Indian War (Miller 1908; USACE 1979, 1983).

At the outbreak of Dunmore's War in 1774 Colonel William Preston ordered Major James Robertson to build a small fort on Culbertson's Bottom. This fort was referred to as Culbertson's Fort. Major Robertson commanded a small detachment of scouts at the fort to watch the Indian trails on the Bluestone River and Paint Creek (USACE 1979, 1983)

In October 1774, Captain Joseph Martin took command of Culbertson's Fort (Thwaites and Kellogg 1905) and a month later the detachment of scouts was disbanded. In 1777 Captain John Lucus was in command of the fort at Culbertson's Bottom which was now referred to as Fort Field (Johnston 1906; USACE 1979, 1983).

After much litigation Culbertson's Bottom came into the ownership of Thomas Farley of Albermarle County, Virginia, who built a stockaded fort at the downstream end of the bottom in 1775. James Caldwell stated that Farley's Fort on Culbertson's Bottom was burned by the Indians in the spring of 1778. At this time Caldwell stated that he served under the command of Captain Archibald Woods and they spent 15 days pursuing the party of hostile Indians who burned the fort (USACE 1979, 1983).

Peace was established with the Indians during the Early Settlement Period (A.D. 1795-1848) in 1795 after the Battle of Fallen Timbers. This assured the peaceful settlement of the Ohio and Big Sandy valleys and increased the influx of settlers into the New River Valley. The project area was probably occupied by several families who engaged in subsistence farming with heavy reliance on hunting and fishing as sources of protein. Surplus produce was sold locally but gradually farms grew large enough to ship grain and livestock to eastern markets (USACE 1979, 1983).

The Giles, Fayette and Kanawha Turnpike was completed in 1848 during the Agricultural and Commercial Period (A.D. 1848 - Present). The Turnpike, proceeding from Peterstown, Virginia, crossed the Bluestone River near its mouth on the New River and extended up the Little Bluestone River to Jumping Branch and then to Beckley (Richardson 1949; USACE 1979, 1983).

At this time, part of Crump's Bottom was owned by T.S. Campbell. His estate consisted of 800 acres which included 550 acres of flat

bottomland and 200 acres of virgin timber. Campbell raised 200 head of hogs and 100 head of cattle a year. Each year the stock was driven overland to markets in Philadelphia, Baltimore, and Richmond (Donnelly 1960; USACE 1979, 1983).

L.P. Campbell, the son of T.S. Campbell, indicated that in his boyhood (the 1850s) the New River was full of fish and there was plenty of deer, raccoon, squirrels, wild turkeys, wild ducks, and other waterfowl. At this time there were "millions of pigeons" and flocks of wild geese passing over Crump's Bottom each year. Crump's Bottom was too rich for raising wheat, which would grow up quickly and then fall over, making it difficult to harvest. In 1857 the Campbells sold their estate for $37,000 and bought Red Sulphur Springs where the family ran Red Sulphur Spa (Donnelly 1960; USACE 1979, 1983).

In 1855, Major William G. Crump purchased a large portion of the area that became known as Crump's Bottom. He built a 22-room mansion on a hill overlooking the bottomland. The structure was built by slaves from brick made on the site. The timber in the house was mostly walnut and cherry and the four 40-foot front porch columns were solid poplar. The mansion had a full basement with a dirt floor and a plastered attic on the fourth floor. The kitchen was in a wing in the back of the house and the four main rooms on the first and second floors each had a fireplace (Browning 1953; USACE 1979, 1983).

Upon Crump's death, Colonel John G. Crockett acquired the land and in 1902 he sold the 1,744 acre estate to George W. Harman of Tazewell, Virginia. The federal government acquired the property in 1948 (Browning 1953; USACE 1979, 1983).

Construction of a dam for hydropower purposes in the Bluestone area has been considered since 1910 when a rough set of specifications and drawings for a power project were prepared by several Hinton area residents in order to interest power companies. The site chosen by the residents was near the mouth of the Bluestone River, approximately two miles upstream from its present-day site. These plans were presented to the Appalachian Power Company in 1911, who immediately expressed an interest. Plans were developed for a chain of dams that would make the New River the source of power for supplying coal mines, trolley lines, factories, and farms with electric power at an extremely low price (Perry n.d.)

Appalachian Power Company sent engineers to Bull Falls near Hinton, in 1912 to make surveys for the proposed dam. Negotiations were started for land acquisition. Virginia Power Company, a subsidiary of Appalachian Power Company, made the first land purchases and test excavations on the site at the mouth of the Bluestone River in 1913. Test excavations revealed that suitable foundation rock was at an excessive depth below the surface. Another location was chosen near Bull Falls, about nine miles above the present site. Appalachian Power Company's plans were soon halted by the passage of the West Virginia legislature's Water Power Act of 1913. The Water Power Act was passed to grant, define, and regulate the rights, duties, powers, and privileges of hydropower and other companies producing other energy or power. It also provided that all streams within the state capable of developing energy or power should be under the control of the state. This Act, however, did not interfere with the jurisdiction of the U.S. Government over navigable streams (Perry n.d.).

Appalachian Power Company allowed their plans to lag while efforts were being made to pass legislation that would permit the dam's construction without the interference of the state. Legislation was not passed until 1929 that allowed developers to proceed and protected the interests of the state. In the meantime, Appalachian Power continued testing sites, and in 1924 Virginia Power Company investigated the geology of the New River Valley from Hinton, West Virginia, to Narrows, Virginia. At this time, the current site of the dam was investigated and chosen as the best location. In September 1924, West Virginia Power Company, another subsidiary of Appalachian Power, was formed to con-

struct a single development at the present site. A construction permit application was filed with the West Virginia Public Service Commission. The Huntington District favored the development of the project and recommended that the permit be granted. The Public Service Commission failed to act on the application and it was placed on their retired docket (Perry n.d.; Johnson 1977).

After the 1929 legislation was passed, Appalachian Power resumed plans for the Bluestone Project. The plans were amended to include a joint development at Hinton and Bull Falls, known as the Bluestone Project. Appalachian Power began acquiring lands and in 1930, the West Virginia Power Company petitioncd for reinstatement of the 1924 application. The application was amended to include the double/joint development (Perry n.d.).

Appalachian Power never began construction of the Bluestone Dam. The coal industry was fearful of the competition from hydropower and fought the project. Civic organizations in the coal regions of both Beckley and Bluefield, West Virginia, also were opposed to the dam. During the early 1930s, Congressman John Kee of Bluefield led the fight for federal construction of Bluestone Dam. He argued that it should be built for flood control and hydropower. Appalachian Power and citizens of the area believed the Bluestone Dam might turn the New River Valley into a "despicable mudhole" and fought this (Johnson 1977; Perry n.d.)

In June 1908, the U.S. Government Survey began a study of possibilities for flood control in the Ohio Valley. Stations were established at various points along the Ohio River and its tributaries. Records regarding stream flow were maintained for a period of five years. From this data it was determined that 100 reservoirs were needed for flood control in the Ohio Valley. It was not until the 1930s, however, that serious consideration was given to flood control in the Bluestone area when Congress became concerned with establishing a nationwide flood control policy (Perry n.d.)

In 1927, Congress authorized planning studies of water resources problems and all possible measures that could benefit navigation, hydropower development, or flood control in all the major river basins in the nation. The results of these studies became popularly known as the "308" reports. In 1932, the Huntington District submitted their 308 report to Congress. The Bluestone Dam and Reservoir was one of the four large storage reservoirs recommended as necessary for flood control in the Kanawha Valley. It was recommended that the project be constructed as a federal project under provisions of the National Recovery Act at an estimated cost of $12,942,000 (Lady 1983).

President Franklin Roosevelt authorized construction of the Bluestone Dam and Reservoir in Executive Order 7183-A on September 12, 1935. Appropriations were included by Congress in the Flood Control Acts of June 22, 1936, and June 28, 1938 (Perry n.d.)

Appalachian Power owned much of the land in the proposed reservoir, and attempted, through litigation, to clear the way for construction of their project. Appalachian Power maintained that the New River was not navigable and therefore not under the jurisdiction of the Federal Power Commission. The Federal Power Commission and the Huntington District believed the stream to be navigable and fought Appalachian Power in the courts. The confrontation between the federal government and the power company ended in the Supreme Court in the fall of 1940. At stake was not just the construction of the Bluestone Reservoir, but also the government's control of our nation's waterways, including their navigation, flood control and hydropower development (Johnson 1977; Perry n.d.).

The legal question for the courts revolved around the navigability of the New River. Proof of navigability involved a 111-mile section of the New River from Allisonia, Virginia, to Hinton, West Virginia. Determination rested on whether or not the stream had "capability of use by the public for

the purposes of transportation and commerce." Federal proof of navigability involved several steps, ranging from documentation of historical navigation to an actual boat trip on the New River in 1936 (Johnson 1977; Perry n.d.). In addition to the use of interviews and the documented history of navigation on the New River, the Huntington District demonstrated the possibility of navigation on the river in 1936. Patrick A. Gragnon and four other men ascended the New River from Hinton, West Virginia, to Allisonia, Virginia, in a government survey boat with an outboard motor. The trip was made in July 1936. The trip took several rough days, but the men reached Allisonia, Virginia, with no carries or portages. It was not necessary to pull or push the boat more than 1-1/4 mile going upstream and more than a few hundred feet downstream. Thus, in 1936, the New River was designated a navigable stream (Johnson 1977; U.S. v. Appalachian Power; Lady 1983:189-190).

On October 14 & 15, 1940, the United States v. Appalachian Power Company was argued before the Supreme Court. On December 16, 1940, the Court stated that the issue involved "the scope of the federal commerce power in relation to conditions in licenses, required by the Federal Power Commission for the construction of hydroelectric dams on navigable rivers of the United States" (U.S. v. Appalachian Power). The Court found that the New River was a navigable stream, thus ending Appalachian Power's plans of the past 40 years. With this conclusion, the federal government was given control of our nation's navigable waterways, commerce including not only navigation, but all aspects of water resources development (U.S. v. Appalachian Power Company; Lady 1983:190).

While the Bluestone case was in the courts, the Huntington District established a suboffice at Hinton and undertook detailed surveys and extensive foundation investigations to obtain necessary data for dam design. Land acquisition for the project occurred over several years and could not be completed until after the Supreme Court decision in 1940 (Perry n.d.; Johnson 1977).

While actual dam construction could not begin until the legal obstructions were cleared, two Civilian Conservation Corps (CCC) camps were established near the proposed dam site. These camps provided employment to approximately 200 men who worked to clear the reservoir site. They also built an access road to an observation tower overlooking the dam site and installed a sewer and culvert in the area (Perry n.d.; Johnson 1977).

On November 10, 1941, the Supreme Court denied Appalachian Power's application for a rehearing of the Bluestone Dam case, which brought to a conclusion all legal obstacles which had delayed the project's construction for five years. A few days later, the resident engineer and a staff of 20 men were sent to Hinton and on November 28, 1941, ground was broken for the Huntington District's two-story office building. On December 23, 1941, bids for the construction were opened in Huntington, West Virginia. The contract was awarded to Dravo Corporation on January 14, 1942, on a bid of $11,376,000. Under the contract, Dravo was to construct the dam, exclusive of sluice gates and hydroelectric equipment. The work was to be accomplished in 900 calendar days or by July 4, 1944. Dravo Corporation began work on the construction of Bluestone Dam on January 19, 1942 (Perry n.d.).

The first step necessary for construction of the dam was the building of a railroad bridge across the Greenbrier River at Bellepoint so materials could be transported to the construction site. The bridge was begun on February 10, 1942, and was completed eight days later (Perry n.d.). Actual work on the dam proper began in March 1942 with the construction of cofferdams (Perry n.d.; Johnson 1977).

The War Production Board now obstructed the project's completion. The contract for Bluestone had been awarded during the time the country was mobilizing for war. Dravo Corporation was assured that materials and equipment for Bluestone Dam

would receive sufficient priority to insure its uninterrupted construction (Lady 1983). However, foundation difficulties hampered the construction and caused the work to fall so far behind schedule that the project lost its priority status. On January 8, 1943, the War Production Board directed that all construction work be suspended except for such work necessary to bring the project to a safe point of suspension. Operations continued on a limited basis until December 31, 1943. On December 29, 1945, President Truman signed a project resumption deficiency appropriation bill which included $3,000,000 for Bluestone Dam. After a lapse of two years, construction work was resumed on January 2, 1946 (Perry n.d.; Lady 1983:195).

State Highway No. 20 was the principal highway from Hinton to the south, and three miles of it lay in the reservoir area. A new route outside the New River valley was out of the question--the road had to be relocated in the reservoir above the projected pool level. A high-level bridge across the arm of the reservoir extending up the Bluestone River also had to be constructed. The government paid the West Virginia State Highway Commission $2,395,910 to complete the work. Permanent construction activities were finally resumed in July 1946. Work progressed smoothly and all work was accepted by the U.S. Government on December 10, 1948 (Lady 1983:195-196).

Bluestone Dam and Reservoir was completed as a flood control project with provisions for the future addition as a powerhouse. The war years had caused delays in construction of other authorized flood control projects and the government felt it necessary to utilize the entire capacity of Bluestone Reservoir for flood control to protect the industrialized Kanawha Valley. Additionally, the critical power shortage of the war years had been alleviated, making the cost of the power installation less economic (Lady 1983).

A minimum pool elevation was initially established at 1391.6 ft amsl. As recreation demands increased, the pool level was raised. During the 1950s, the reservoir was affected by the Korean War. Army engineers at Fort Belvoir, Virginia, chose Prince, West Virginia, as a suitable site for conducting service tests of pontoon bridges and other floating equipment and for training troops in the installation of this material because the stream flow of the New River at Prince could be controlled by Bluestone Dam. Between 1950 and 1953, the pool of Bluestone Lake was raised and lowered intermittently for bridge testing purposes. In 1970, a normal pool elevation of 1410 ft amsl was established and is maintained today (Lady 1983).

Chapter 4. History of Cultural Resource Investigations

Introduction

The Historic Properties Management Plan (HPMP) presented in this report has its roots in the Huntington District report entitled, "Cultural Resource Reconnaissance Report, Bluestone Lake, Summers County, West Virginia," issued in 1979. This early report presented basic background information for cultural resource management, including culture history and chronology, a summary of Solecki's early work from 1949, some soils information, and a detailed report by Jack Rich summarizing the removal of 153 burials from the Late Prehistoric village at 46Su9. At this time, only 28 sites were reported on Huntington District property at Bluestone Lake. Information from this initial report contributed to a more wide-ranging summary entitled *Social and Cultural Resources Report, Bluestone Lake, Summers County, West Virginia* issued by the Huntington District in 1983, that addressed wide-ranging social issues as well as cultural resources. In 1993, a Huntington District report provided individual site descriptions for the first time (USACE 1993). In 1994, the Huntington District issued its first formal HPMP, which relied heavily upon the initial report in 1979 and the 1993 site descriptions (USACE 1994). This first HPMP was updated in 1998 (USACE 1998) to include attempts to relocate known sites and obtain a GPS point for those sites. The HPMP presented in this report is based on the 1998 report, updating the earlier reports to include new information and to comply with current HPMP requirements.

No systematic archaeological survey of the Huntington District property at Bluestone Lake has been conducted. Archaeological sites were first officially reported by Solecki (1949) during his non-systematic survey of major open-air sites and rockshelters prior to the construction of the dam at Bluestone Lake. Members of the West Virginia Archeological Society (WVAS) have also conducted informal walkover surveys over the years, primarily during the 1980s. Surveys of threatened, sensitive areas adjacent to the New River in Giles County, Virginia, were conducted by Howard MacCord in the late 1960s and early 1970s. More recently, small, systematic surveys have been conducted by Huntington District archaeologists and private companies, focusing on small areas with planned construction impacts. More extensive (but still limited) test excavations have been conducted at some of the larger village sites. Overall, archaeological survey at Bluestone Lake has been informal and generally focused on riverine environments.

Previous Investigations

The first archaeological survey was conducted by Ralph Solecki of the Smithsonian Institution in 1948. Solecki (1949) recorded 28 sites within the project boundaries, surveying most of the floodplains and identifying major village sites. He also excavated a few test pits and/or trenches at several sites, including 46Su3, 46Su20, and 46Su24.

Under contract to the Huntington District in 1977, the University of Pittsburgh's Archaeological Research Program conducted testing at 46Su3, a Late Prehistoric village site now located on an island in the lake and periodically inundated (Adovasio et al. 1980). Testing was designed to evaluate the effects of constant inundation and to determine site boundaries. Additional testing was conducted at 46Su3 in 1978 and 1979 by the University of Pittsburgh. Site 46Su3 produced a total of 26 cultural features, including refuse/storage pits, fire pits, human burial pits, and several features of unknown function. Artifacts

recovered include lithics, ceramics, bone, and shell fragments.

As part of the same inundation study, excavations were conducted at 46Su9 and 46Su22 in 1979 by the University of Akron (Johnson 1984; Adovasio et al. 1980). Site 46Su9 yielded 13 cultural features including storage/refuse pits, two human burial pits, one possible collapsed wall/living floor, and one pit of unknown function. Site 46Su22 produced four cultural features including one possible living floor, one storage/refuse pit, one firepit, and one pit of unknown function. Artifacts from all three sites include projectile points, groundstone artifacts, groundstone and ceramic pipes, worked bone and shell implements, and ceramics (Johnson 1984).

Soil Systems, Inc. (SSI) completed an archaeological survey of gas transmission line corridors in several counties in West Virginia, including Summers and Monroe counties in the Bluestone Lake area. This report was completed for Columbia Gas Transmission Corporation in 1980 (SSI 1980). No sites were identified within the Huntington District boundaries at Bluestone Lake during this survey.

A Phase I survey of Line KA for the Columbia Gas Transmission Corporation was conducted by Archaeological and Historical Consultants, Inc. and Gray and Pape, Inc. (Tidlow et al. 1996). Sites recorded during this survey located within the Huntington District boundaries at Bluestone Lake include 46Su633, 46Su634, 46Su635, and 46Su636. Sites 46Su635 and 46Su636 were recommended as not eligible for the NRHP, but 46Su633 was recommended as potentially eligible for the NRHP. Following additional Phase I field and archival investigations, 46Su634 was also recommended as not eligible for the NRHP (Purtill et al. 1997). A Phase II archaeological evaluation of 46Su633 was conducted in 1997 by Gray and Pape (Putrill et al. 1997). Despite the presence of diagnostic artifacts dating from the Middle to Late Archaic period and a relatively intact subsurface deposit across the wooded portion of the site, 46Su633 was recommended as not eligible for the NRHP (Purtill et al. 1997).

A total of 41 sites have been recorded within the Huntington District boundaries at Bluestone Lake by Stephen Trail and Eugene Holland of the New River Chapter of the WVAS. These sites are generally known only from the information recorded on West Virginia Archaeological Site Forms. Trail recorded sites from 1981- 1982, 1984-1986, 1988-1989, and 1991. Holland and Trail recorded sites in 1983. The NRHP eligibility of these sites has not been evaluated, and only 25 were relocated during the 1998 GPS survey (USACE 1998).

Seven sites were recorded by Huntington District archaeologists in 1978 (USACE 1979). These sites include 46Su39, 46Su41, 46Su42, 46Su43, 46Su44, 46Su45, and 46Su54. Six additional sites were identified and included in a report on social and cultural resources at Bluestone Lake in 1983 (USACE 1983). These sites include 46Su325, 46Su326, 46Su327, 46Su328, 46Su329, and 46Su330.

Four sites that actually represent navigation cuts in the river bedrock (sluices) were identified by William Trout (1983) as part of his ongoing work with The Virginia Canals & Navigations Society (Trout 2003).

In 1985, *An Historical and Archeological Survey of the Bluestone River, Madam Creek, and the Jumping Branch/Nimitz Areas of Summers County, West Virginia*" was submitted to the Summers County Historical Landmark Commission by Paul Marshall and David Fuerst. No sites were recorded within the reservoir's boundaries during this survey.

Documentary research and a preliminary archaeological survey were performed on four late eighteenth-century fort sites within the project area in August 1991 by the University of Kentucky's Program for Cultural Resource Assessment (McBride, Updike & Bonshire 1991). This research covered Lafferty's Fort (46Su290), Farley's Fort (46Su19), Fort Byrd (46Su23, also referred to as Fort Field or Culbertson's Fort), and Cook's Fort (46Su5). The exact locations of the forts could not be

determined. There was little documentary information to confirm even the existence of Cook's Fort. It is possible that the Cook's Fort located at Indian Mills mentioned by Solecki (1949) has been confused with Valentine Cook's Fort in Monroe County, West Virginia.

A Phase I survey of construction areas associated with a West Virginia-American Water Company upgrade project was conducted by C. Michael Anslinger of Cultural Resource Analysts, Inc. in 1995. Three previously unrecorded sites (46Su616, 46Su617, and 46Su618) were identified (Anslinger 1995). Sites 46Su616 (a rockshelter) and 46Su617 were both considered potentially eligible for the NRHP, and recommendations were included for avoidance or Phase II archaeological evaluation of their NRHP eligibility. Attempts to relocate the previously identified rockshelter at 46Su2, located nearby according to WVSHPO maps, were unsuccessful. Site 46Su345 (the Robert Neely Grist Mill) was relocated during the survey, but was located well outside the project area. Since 46Su345 would not be impacted by the proposed project, no further investigation was recommended at the time (Anslinger 1995).

In March and April of 1998, a survey was undertaken to relocate sites recorded for the properties of Bluestone Lake as part of an update to the Bluestone Lake Historic Properties Management Plan (HPMP) (USACE 1998). The survey utilized a two-man crew equipped with Trimble Pathfinder Global Positioning equipment. Survey methodology included visiting the location of each site as plotted by the office of the WVSHPO on USGS topographic quadrangle maps. The Huntington District also provided a GIS overlay of archaeological sites within the Bluestone Lake properties that had been created for the Department of Natural Resources (DNR) (Schaefer 1997).

During the survey an attempt was made to verify the presence of prehistoric or historic artifacts at each site through pedestrian survey of locations with high ground visibility, or through limited shovel testing when visibility was limited or non-existent. Using the GPS equipment, the location of each site was recorded. Following data correction using Trimble Pathfinder software, the relocated sites were plotted onto the DNR GIS overlay and onto USGS topographic quadrangle maps for the area. The survey focused on providing confirmation of locations, and did not evaluate site dimensions. Not all sites were relocated, and some appeared to be situated some distance from their projected location. Observed differences between plots depicted on the DNR GIS overlay, the USGS topographic quadrangle maps at the WVSHPO and the GPS survey results are noted during the presentation of survey results in Appendix B (Table B-1).

Archaeological data from sites at Bluestone Lake have been used in a number of publications. A particularly rich outlet for research based on Bluestone Lake sites has been the New River Symposium. Articles related to Bluestone Lake sites appeared in the publication, *Proceedings, New River Symposium* from 1982 to 1991, as shown in Table 4-1.

Table 4-1. Articles Associated with Bluestone Lake Appearing in Journals and Other Published and Unpublished Sources.

Proceedings, New River Symposium	
Citation	***Title***
Dirkmaat and Siegel 1982:198-203	Effects of Prolonged Inundation on the Physical and Chemical Properties of Faunal Remains
Maslowski 1982:185-194	Archeology of the Bluestone Reservation
Marwitt 1982:195-197	Test Excavations at Three Late Prehistoric Village Sites at Bluestone Lake, Summers County, West Virginia
Rollins 1982:204-211	Molluscan Fauna at Three Bluestone Lake Sites: The Effects of Inundation upon Data Recovery
Maslowski and King 1983:69-88	Indian Pottery Types from the Bluestone Reservation
Lady 1983:183-201	Bluestone Lake - Past, Present, and Future
Maslowski and Woody 1984:183-192	Historic Sites in Crump's Bottom, Bluestone Reservation
Maslowski 1985:137-143	Beads and Ornamentation of the Bluestone Indians
Maslowski 1986:165-173	Relationship of Archaeological Sites to Soils in the New River Valley of West Virginia
Hill 1991:10-16	A Toponymic Study of the Lower New River
Other Works Associated with Bluestone Lake	
Citation	***Title***
River Basin Surveys 1948	Appraisal of the Archaeological Resources of Bluestone Reservoir, West Virginia
Solecki 1949	An Archaeological Survey of Two Rivers in West Virginia: The Bluestone Reservation
Perry n.d.	History of Bluestone Dam (manuscript on file)
Faulconer 1975	Fort Culbertson, Site of Indian Wars
Applegarth et al. 1978	46SU3 Revisited
Faulconer 1978	Indian Lore Preserved at Summers County Museum
USACE 1979	Cultural Resource Reconnaissance Report, Bluestone Lake, Summers County, West Virginia
Meador 1980	Aunt Nannie Meador and the Bluestone Dam
Johnson et al. 1980	Fort Ancient on the Frontier: A View From Bluestone Lake, West Virginia
Lenihan, et al. 1981	The Final Report of the National Reservoir Inundation Study, Volumes 1 and 2
Seidel 1981	Taxonomic Analysis of Pseudemyd Turtles (Testudines: Emydidae) from the New River, and Phenetic Relationships in the Subgenus Pseudemys
Applegarth and Davis 1982	A Dalton-Early Archaic Assemblage from Summers County, West Virginia
USACE 1983	Social and Cultural Resources Report, Bluestone Lake, Summers County, West Virginia
Johnson 1984	Archaeological Researches in the Bluestone Reservoir, Summers County, West Virginia
Maslowski 1985b	The Bluestone Monitor Pipe
Sanders 1991; Sanders 1992	A New River Heritage, Volumes I & II
USACE 1993	Cultural Resources Reconnaissance, Bluestone Lake Hydropower Study, Summer County, West Virginia
USACE 1994	Bluestone Lake Historic Properties Management Plan
USACE 1998	Bluestone Lake Historic Properties Management Plan Modified August 1998

Chapter 5. Cultural Resource Descriptions, Curation of Collections, and Radiocarbon Dates

Introduction

The Huntington District reported 126 known archaeological sites located on their property in 1988 (USACE 1998). In 1989, the Huntington District transferred administrative jurisdiction over 858.11 acres of property along the Bluestone River to the National Park Service (NPS) (Figure 2-1). This property included 11 archaeological sites (46Su346, 46Su379, 46Su380, 46Su381, 46Su384, 46Su386, 46Su387, 46Su388, 46Su389, 46Su390, and 46Su391). These sites are now on NPS property, and were not considered as part of the Bluestone Lake HPMP in 1998 (USACE 1998). In addition to the remaining 115 sites reported in 1998 (USACE 1998), 12 additional sites were noted during inspection of Virginia and WVSHPO archaeological site files, bringing the total within Huntington District boundaries at Bluestone Lake to 127 (Appendix A).

Some confusion regarding archaeological site numbering was discovered for sites located in Giles County, Virginia. In 1949, Solecki reported the results of his survey of the Bluestone Reservation, numbering the archaeological sites that he identified in Giles County, Virginia, as 44Gs1 sequentially through 44Gs11 (Solecki 1949). All of these sites were located along the New River at or *downstream* of Narrows, Virginia, and continuing *north* to the West Virginia border. In November 1950, the Smithsonian Institution accessioned the materials from this survey using Solecki's site numbers. However, the State of Virginia did not assign official numbers to Solecki's sites until April 1969. Solecki's numbers were changed at this time, as shown in Table 5-1, to accommodate an ongoing survey by C.G. Holland in Giles County.

In 1970, the Smithsonian Institution published C.G. Holland's report on his survey of southwestern Virginia, which included Giles County and the New River (Holland 1970). Holland had identified seven sites along the New River *upstream* of Narrows, Virginia, beginning at Ripplemead and continuing *south* to the border of Giles County with Pulaski County/Montgomery County, Virginia. Holland numbered these sites as Gs1 sequentially through Gs8. The Smithsonian Institution accessioned the materials from this survey using Holland's site numbers (Table 5-1).

As Table 5-1 demonstrates, the Smithsonian has accessioned collections from different archaeological sites under the same site number, but fortunately, under different accession numbers (Table A-2, Appendix A). Just as the Smithsonian has continued to use Solecki's original site numbers, so too have the WVSHPO, the DNR, and previous versions of the HPMP for Bluestone Lake (e.g., USACE 1998). For this updated version of the Bluestone Lake HPMP, Solecki's numbers have been replaced with the official State of Virginia archaeological site numbers. Note that a consistent site number has been maintained for one site, 44Gs10, throughout the various surveys.

Site locations are, for the most part, based on the results presented during the 1998 survey and update of the Bluestone Lake HPMP (USACE 1998). This report used three points of reference for site location. First, the term "SHPO plot" refers to a GIS plot of archaeological site locations based on the locations of sites recorded on topographic maps at the office of the WVSHPO, which is housed at the West Virginia Division of Culture and History (WVDCH). A second GIS-based plot of archaeological site locations

Table 5-1. Changes in Archaeological Site Numbers in Giles County, Virginia.

Solecki (1949)	Smithsonian Accession (in 1950)	VDHR (in 1969)	Holland (1970)	Smithsonian Accession (in 1971)
44Gs1	44Gs1	44Gs11	-	-
44Gs2	44Gs2	44Gs12	-	-
44Gs3	44Gs3	44Gs13	-	-
44Gs4	44Gs4	44Gs14	-	-
44Gs5	44Gs5	44Gs15	-	-
44Gs6	44Gs6	44Gs16	-	-
44Gs7	44Gs7	44Gs17	-	-
44Gs8	44Gs8	44Gs18	-	-
44Gs9	44Gs9	44Gs19	-	-
44Gs10	44Gs10	44Gs10	44Gs10	44Gs10
44Gs11	44Gs11	44Gs20	-	-
-	-	44Gs1	44Gs1	44Gs1
-	-	44Gs2	44Gs2	44Gs2
-	-	44Gs3	44Gs3	44Gs3
-	-	44Gs4	44Gs4	44Gs4
-	-	44Gs5	44Gs5	44Gs5
-	-	44Gs6	44Gs6	44Gs6
-	-	44Gs7	44Gs7	44Gs7
-	-	44Gs8	44Gs8	44Gs8

was provided for the 1998 relocation survey by the West Virginia DNR. Third, a series of single points were generated by a GPS survey of known sites at Bluestone Lake as part of the 1998 HPMP update. These points were taken at the spot where artifacts of structural remains were identified, and do not necessarily indicate the center point of the site. These were placed in a database and used as a third GIS layer for site location.

For the mapping that appears in this current update of the Bluestone HPMP, the site locations are based first on the GPS points recorded during the 1998 relocation survey. If the site was not relocated during the 1998 relocation survey, then the most representative point based on consideration of the WVSHPO map, the DNR GIS overlay, and the site elevation reported in the West Virginia State Archaeological Site Form is reported as the site location.

The remainder of this chapter presents a general summary of archaeological sites on Huntington District property at Bluestone Lake. Associated radiocarbon dates are presented in Chapter 6, and GPS survey data from 1998 (USACE 1998) is presented in Appendix B.

Archaeological Site Descriptions

The individual site descriptions below include the results of the relocation survey conducted in 1998 (USACE 1998). Additional data generated by that survey is included in Appendices A and B.

44Gs10: The Lurich site is a large Late Prehistoric village site located at an elevation of approximately 1520 ft amsl on a New River floodplain terrace. The site was identified by Solecki in 1949, but an archaeological survey form was not filed with the Virginia State Library (now transferred to the Virginia Department of Historic Resources (VDHR)) until 1965 when limited excavations were conducted by Col. Howard A. MacCord and L.D. Collins (Collins 1965). These excavations identified fourteen prehistoric features, numerous post molds, and a mix of shell, limestone, and sand-tempered pottery that is typical of other villages in the area, especially to the east.

The village is situated on broad, fertile bottom land along the west bank of a sharp bend in the river opposite Emanuels Hollow (Solecki 1949). A narrow swale is present

behind the site. The VDHR site form describes a 300-ft diameter circle of black earth, from which "pottery, points, scrapers, and chips" were recovered. Solecki's original survey also reports mullers, hammerstones, celt fragments, deer bones, and an adult human femur (1949:376). According to the VDHR site form, the collection from MacCord's 1965 survey was reviewed by MacCord in 1984. MacCord noted that the "predominant ceramics are limestone tempered, net and cord (marked), and mussel shell tempered, net and cord (marked)."

This site was not revisited by Cultural Resource Analysts, Inc. (CRAI) personnel during the 1998 survey, and was not included in the 1998 survey report (USACE 1998). The 1973 MBL map indicates that 44Gs10 is within the boundaries of the Huntington District's Bluestone Lake property (USACE 1973).

44Gs11: This site was originally reported as 44Gs1 by Solecki (1949) and is still referred to as such on the DNR GIS plots referenced for this update. In the official VDHR site files, however, archaeological site number 44Gs11 has been assigned to the site identified by Solecki's field site number 44Gs1. References in this revision of the 1998 HPMP will refer to the official VDHR site number.

The site is located on the east bank of the New River at an elevation of about 1520 ft amsl, just south of Rich Creek and opposite an island north of The Narrows (Solecki 1949). Solecki found cultural materials, including "pottery, points, and chips," scattered over 12 acres of cultivated farmland at the site. The valley begins to narrow south of 44Gs11, with floodplain terraces giving way to steeply-sloped ridges on either side as the river/lake approaches The Narrows.

This site was not revisited by CRAI personnel during the 1998 survey, and was not included in the 1998 survey report (USACE 1998). The 1973 MBL map indicates that 44Gs11 is within the boundaries of the Huntington District Bluestone Lake property (USACE 1973).

44Gs15: This site was reported as 44Gs5 by Solecki (1949), and continued to be referred to as such in previous HPMPs developed for Bluestone Lake (USACE 1998). In the official VDHR site files, however, archaeological site number 44Gs15 has been assigned to the site identified by Solecki's field site number 44Gs5. Map references in this revision of the 1998 HPMP have been corrected.

This is an open habitation site located at an elevation of 1520 ft amsl near the Glen Lyn Bridge, west of Manuels (formerly Emanuels) Hollow. The site lies on the east bank of the New River, and exhibits Archaic, Woodland, and Late Prehistoric temporal components. The site was originally identified on cultivated farmland and covered an area of about 15 acres. Artifacts include 22 ceramic sherds, one projectile point, six pieces of debitage, and scattered broken stones and mussel shells (USACE 1979; Solecki 1949).

This site was relocated by CRAI personnel on April 7, 1998 (USACE 1998). The site is located on a ridge within the floodplain on the northern side of the New River, northeast of Glen Lyn. The site area was in pasture. At the edge of the floodplain, there were several tree falls and groundhog holes that were inspected for artifacts. Lithic debris was observed around a groundhog hole. A GPS point was taken where artifacts were observed, near the center of the ridge.

44Gs17: This site was reported as 44Gs7 by Solecki (1949), and continued to be referred to as such in previous HPMPs developed for Bluestone Lake (USACE 1998). In the official VDHR site files, however, archaeological site number 44Gs17 has been assigned to the site identified by Solecki's field site number 44Gs7. Map references in this revision of the 1998 HPMP have been corrected.

The site is located at an elevation of about 1515 ft amsl, and exhibits Late Archaic and Woodland temporal components (USACE 1979; Solecki 1949). The site was originally identified as a small camp site, roughly one acre in size, located on both sides of the mouth

of Limestone Creek at the New River. Two ceramic vessel fragments and three pieces of debitage were recovered (Solecki 1949:375).

On April 7, 1998, this site was relocated by CRAI personnel. The site was located on a secondary terrace above the floodplain of the New River. Lithic debris and a limestone tempered potsherd were observed. A GPS point was taken near the approximate center of the site.

44Gs20: This site was reported as 44Gs11 by Solecki (1949), and continued to be referred to as such in previous HPMPs developed for Bluestone Lake (USACE 1998). In the official VDHR site files, however, archaeological site number 44Gs20 has been assigned to the site identified by Solecki's field site number 44Gs11. Map references in this revision of the 1998 HPMP have been corrected.

This is camp site located at an elevation of about 1505 ft amsl, on the west bank of the New River below Glen Lyn at the confluence of Smith Branch with the river. Three projectile points and several pieces of debitage were recovered (Solecki 1949).

On April 7, 1998, this site was relocated by CRAI personnel. The site was located on a ridge on the broad floodplain of the New River. The site was in pasture and shovel tests were excavated across the floodplain. A Lowe hafted biface base, dating to the Middle Woodland period was recovered in one shovel test. A GPS point was taken near the positive shovel test.

44Gs22: This site is located on a narrow floodplain terrace at the base of a steeply-sloped ridge along the east bank of the New River. The site elevation is about 1520 ft amsl. When the site was recorded on a VDHR site form by MacCord in 1974, it was situated within a roadside park about 0.2 mi. south of Rich Creek. The VDHR site form reports that debitage and Archaic points were recovered at a "depth of four feet under river alluvium" in a "test by unknown persons."

This site was not revisited by CRAI personnel during the 1998 survey, and was not included in the 1998 survey report (USACE 1998). The 1973 MBL map indicates that 44Gs11 is within the boundaries of the Huntington District's Bluestone Lake property (USACE 1973).

44Gs28: This Historic Period site is located on a hill overlooking the west bank of the New River at Glen Lyn, immediately north of U.S. Route 460 and just east of the Glen Lyn post office. Site elevation is about 1523 ft amsl. A historic cemetery with 15 graves was reported on the VDHR site form by MacCord in 1972, with a note that says to "refer to site notes in VRCA files from excavations in Sept. 1972," but those records could not be relocated. MacCord also notes that the area was to be disturbed by construction, so it is unclear if the cemetery remains in place.

This site was not revisited by CRAI personnel during the 1998 survey, and was not included in the 1998 survey report (USACE 1998). The 1973 MBL map indicates that 44Gs28 is within the boundaries of the Huntington District's Bluestone Lake property (USACE 1973).

44Gs41, 44Gs42, 44Gs43, and 44Gs44: These four sites all represent cuts into the river bedrock within the New River itself to form sluices and improve navigation. The cuts at 44Gs41 are located at Schumate Falls, which represented the head of navigation for the Huntington District's Greenbrier Division when construction on the navigation system was discontinued in 1882 (Trout 2003).

These sites were not revisited by CRAI personnel during the 1998 survey, and were not included in the 1998 survey report (USACE 1998). The 1973 MBL map indicates that these four sites are within the boundaries of the Huntington District's Bluestone Lake property (USACE 1973).

44Gs48: This prehistoric site is located on the west bank of the New River, just south of 44Gs17 and Limestone Creek. The site is situated on a low ridge of the floodplain terrace between VA Route 649 and the New River. The site covers about two acres, and is situated at an elevation of about 1515 ft amsl.

Artifacts dating from the Woodland or Late Prehistoric period were recovered by MacCord (1984). These artifacts include limestone-tempered ceramic vessel fragments and one ceramic vessel fragment tempered with mussel shell. The limestone-tempered sherds are leached, with cordmarked and net-impressed surface treatments. The mussel shell-tempered sherd is cordmarked.

This site was not revisited by CRAI personnel during the 1998 survey, and was not included in the 1998 survey report (USACE 1998). The 1973 MBL map indicates that 44Gs48 is within the boundaries of the Huntington District's Bluestone Lake property (USACE 1973).

46Me19: This hamlet is located at an elevation of 1470 ft amsl, and includes a Woodland temporal component. The site was revisited by CRAI personnel on March 26, 1998 (USACE 1998). The site was in a campground area maintained in pasture. Dirt roads providing access to the campground provided limited visibility. Shovel tests yielded flakes. A GPS point was taken on the northern side of a drainage within the boundaries of the WVSHPO plot of the site. This site does not appear on the GIS overlay of archaeological sites at Bluestone Lake provided by the DNR.

46Me20: This prehistoric open habitation site is located at an elevation of 1470 ft amsl. On March 26, 1998, this site was revisited by CRAI personnel. The site area had been in cultivation. There was fire-cracked rock and ground stone observed, but no lithic debris or ceramics were visible. The site probably contains sparse lithic debris and has a low visibility. A GPS point was taken at the approximate center of the site. This site does not appear on the GIS overlay of archaeological sites at Bluestone Lake provided by the DNR.

46Me21: Site 46Me21 is a prehistoric open habitation site located at an elevation of 1470 ft amsl. This site was revisited by CRAI personnel on March 26, 1998 (USACE 1998). The site was in a cultivated field located on a linear ridge within the floodplain. Only one flake was observed. The site probably represents a sparse lithic scatter. A GPS point was taken at the approximate center of the site, southwest of the mapped WVSHPO plot location for this site. This site does not appear on the GIS overlay of archaeological sites at Bluestone Lake provided by the DNR.

46Me103: The Ford Hollow Branch Site is an open habitation site located at an elevation of 1460 ft amsl, on an east bank terrace of the New River north of Ford Hollow Branch. The site was recorded by Stephen Trail in 1989, and reported as a series of small campsites.

This site area was revisited by CRAI personnel on March 26, 1998 (USACE 1998). The area was plowed and flakes were observed across a long, linear ridge paralleling the New River channel. A GPS point was taken near the area where the flakes were observed. The site probably extends to the south of the GPS point. The GPS point is located north of the WVSHPO plot of the site area. This site does not appear on the GIS overlay of archaeological sites at Bluestone Lake provided by the DNR.

46Me121: The Ford Hollow Rockshelter (46Me121) is located at an elevation of 1600 ft amsl at the mouth of Ford Hollow Branch. The site is on the primary trail with the New River. The floodplain is located between the shelter and the river. The site was recorded by Stephen Trail in 1989.

This site area was revisited by CRAI personnel on March 26, 1998 (USACE 1998). There was an overhang present in Ford Hollow, but no artifacts or archaeological deposits were noted within the overhang. No GPS point was taken at this location during the 1998 relocation survey (USACE 1998).

46Su1: Site 46Su1 is a Late Woodland rockshelter located at an elevation of 1565 ft amsl. Late Prehistoric artifacts from the site include shell-tempered ceramics (Solecki 1949).

An attempt was made to locate the site on March 27, 1998, by CRAI personnel. The 1998 survey identified no exposed rock faces in the vicinity. The heads of several drainages

in the area were surveyed as well, but the rock shelter could not be relocated. No GPS point was taken at this location during the 1998 relocation survey (USACE 1998).

46Su2: This rockshelter is located at an elevation of 1400 ft amsl, permanently inundated by Bluestone Lake. Shovel tests in the area produced no cultural material, and the site could not be relocated (Anslinger 1995). The 1998 relocation survey (USACE 1998) also failed to relocate the shelter. This area was revisited by CRAI personnel on April 16, 1998 (USACE 1998). Several rock overhangs were discovered in the area, but none revealed any cultural material. There does not appear to be a shelter at the location as currently mapped, and no GPS point was taken during the 1998 relocation survey (USACE 1998).

46Su3: The Barker Site, 46Su3, is a large Late Prehistoric village located on the southern tip of an island in the New River approximately eight km southeast of the confluence of the New River and the Bluestone at an elevation of 1408 ft amsl. Much of the site is inundated by Bluestone Lake (Adovasio et al. 1979), and briefly exposed during winter drawdown. The site includes Late Archaic, Late Prehistoric, and Protohistoric temporal components. This site is considered to be eligible for the NRHP but has not yet been nominated (USACE 1998).

The site has produced many artifacts and features, including burials. A flood in 1891 is reported to have exposed an ancient graveyard covering approximately 40 acres. The site also produced a sandstone turtle figure which is now housed at the Smithsonian Institution (Solecki 1949; Adovasio et al. 1980). Solecki (1949) excavated a 10 x 15 ft test trench and recovered 131 ceramic vessel fragments, along with few pieces of debitage and some worked bone.

The Cultural Resource Management Program of the University of Pittsburgh conducted testing at 46Su3 in 1977. The goals of the testing were to (1) gauge the effects of inundation; (2) delineate the extent of the archaeological deposits; and (3) gather artifacts and data on the prehistoric inhabitants of the Bluestone Reservation for a newly constructed interpretive center. Additional controlled surface collections and test excavations were conducted in 1978 and 1979 by the Cultural Resource Management Program for the Huntington District and the National Park Service. Many features were exposed during these excavations, including roasting, storage and trash pits, occupational floors, extensive midden areas, and burials (Adovasio et al. 1979; Adovasio et al. 1980). The University of Pittsburgh's excavations of 1977 produced 2,072 ceramic sherds, two pipe bowls, one gaming disc, and one scraper. Four radiocarbon dates were obtained during this work, ranging from AD 1190 +/ 45 to AD 1270 +/ 165 (Adovasio et al. 1980). Artifacts recovered from burials during winter drawdown include two gorgets, two bone pins, one bird bone bead, seven columnella tooth effigy pendants, one bird's head effigy pendant, 24 small tubular columnella beads, six cylindrical columnella beads and 3,088 Marginella shell beads (Maslowski 1985).

Feature I produced a radiocarbon date of AD 1190 +/-45. This feature was one of a series of five probable roasting pits. Fill material removed from the feature consisted of lithics, ceramics, bone, shell, fired rock, ash, and charcoal. Due to percolation, no stratification was evident in the feature (Adovasio et al. 1980).

Diagnostic artifacts recovered from the site include two Levanna and one Pee Dee projectile point, shell-tempered and New River series ceramics, and a glass trade bead (USACE 1983). Approximately 0.6 ft^3 of artifacts from the site are curated at the Delf Norona Museum in Moundsville.

This site was revisited by CRAI personnel and Bob Maslowski, Huntington District archaeologist, on March 17, 1998 (USACE 1998). GPS points were taken on the northern and southern extent of the artifact distribution on the eroded shoreline. The locations of the four auger holes and one excavation unit were recorded as GPS points. In addition, a GPS point was taken at the location of the old gas pipeline with the intent that this landmark

could be used to establish the locations of University of Pittsburgh excavation units on the current ground surface. Subsurface investigations included limited auger testing and the excavation of a 1-x-1-m test unit. The remainder of this section presents a summary of these investigations.

Site 46Su3 occupies an alluvial landform located on the west side of New River that is often partially inundated by the Bluestone Reservoir. A narrow forested section of the landform located above normal pool forms a small island. Over the years, mechanical processes (including water motion and wave action) appear to have negatively impacted cultural-bearing deposits. Data obtained in 1996 by personnel from the United States Corps of Engineers' Waterways Experiment Station (WES) indicates that this part of the site has experienced a net soil/sediment loss of about 1.0 m since the impoundment of the reservoir, while the forested part of the island (i.e. highest elevations above normal pool) has received a net sediment gain of several feet (Dunn et al. 1996:67, 70). As recorded in Huntington District and WVSHPO files, and by Applegarth et al. (1978) and others, the site has an irregular outline which excludes all the areas located above normal pool.

CRAI personnel visited 46Su3 to determine whether intact site deposits were located beneath the surface of the forested island. The exploratory investigation consisted of the excavation of three bucket auger cores and the cleaning of a small section of eroded bank. The auger was equipped with a bucket measuring 10 cm in diameter. Locations for the auger cores were randomly selected based on the distribution of cultural material exposed along the adjacent shorelines and accessibility. Cores were placed at approximate distances of 10 (C-3), 20 (C-2), and 30 (C-1) meters downstream from the island's southernmost point. Soil/sediment deposits recovered from the auger were carefully examined for cultural and natural inclusions.

Data generated during the investigation indicated that the southwestern part of the island (upstream section) contained buried Late Prehistoric deposits. C-2 and C-3 produced similar stratigraphic data, with approximately 0.7 to 1.1 m of post-occupational historic alluvium overlying the Late Prehistoric deposits. Texture of this stratigraphic unit varied with depth and location, ranging from sand to sandy loam to very fine-grained silty-clay. Organic debris including leaf litter and partially deteriorated pieces of wood was common throughout the deposit. Directly beneath the historic alluvium, a deposit of dark gray brown (10YR3/1-3/2) silty sand to sand loam containing debris associated with the Late Prehistoric occupation was encountered. Shell-tempered ceramics, small pieces of unburned bone, mussel shell, wood charcoal, and thermally-altered rock were identified. The artifact-bearing deposit appeared to be at least 30 cm thick. However, in C-3 the thickness of the cultural-bearing stratum was at least 70 cm (extending to a depth of about 1.8 meters below surface (mbs)), suggesting that a pit feature or midden anomaly was encountered.

The excavation of C-1 produced negative results. The relatively thick deposit of historic alluvium was identified overlying coarser grained deposits lacking cultural inclusions. The excavation of this core was terminated at approximately 1.8 m below surface.

Examination of a cut bank on the New River side of the island found a similar stratigraphic sequence as discussed above. A deposit of historic alluvium about 50-70 cm thick was positioned directly above a darker sandy loam that contained a wide range of cultural debris, including shell-tempered ceramics dating from the Late Prehistoric period. At this location the artifact-bearing deposit was approximately 20 cm thick.

Exploratory subsurface work conducted at 46Su3 in 1998 confirmed the presence of intact Late Prehistoric deposits located approximately 1.0 m beneath the surface of the upstream part of the island. Based on the distribution of artifacts along the eroded shorelines (New River and backchannel sides of the island), and data generated during

augering, as much as 200-400+ m^2 of intact deposits might be present.

46Su5: Cook's Fort is a historic fort site located at an elevation of 1525 ft amsl. The site has historic European and Late Archaic temporal components and Brewerton cultural components. There is much confusion concerning the existence of a Cook's Fort at Indian Mills. It is possible that this Cook's Fort is confused with a Valentine Cook's Fort in Monroe County, West Virginia, that is very well documented in archival research documents. Solecki's (1949) location produced "35 pieces of white and blue chinaware, one piece of crockery, three boar's teeth, and one probable piece of gun flint" (Solecki 1949:343).

Surface collections and metal detecting were conducted at an area on Indian Creek opposite the mouth of Stinking Lick (Solecki's 1949 location) by the University of Kentucky in August 1991. These efforts produced one table knife fragment, one horseshoe, and two unidentified iron/steel fragments. Surface collecting and metal detecting were also conducted at another likely area for the location of the fort and produced several ceramic, glass and kitchen fragments, nail fragments, metal fragments, and a single post-1902 U.S. Army button. No eighteenth-century artifacts were recovered from either location (McBride, Updike & Bonshire 1991).

Solecki's (1949) location for the fort also contained a prehistoric camp site. Artifacts recovered include one hammerstone, three projectile points, several broken flint artifact fragments, two white quartz flakes, and numerous pieces of debitage (Solecki 1949).

CRAI personnel visited the mapped plot of this site location on March 25, 1998 (USACE 1998). The WVSHPO mapped site position is situated on a terrace at the location of a cemetery. There was some ground visibility afforded by the cut bank of the road bed and spoil piles from newly excavated graves. Shovel tests were conducted around the perimeter of the cemetery. There were no prehistoric or historic artifacts observed. No GPS point was taken at this site.

46Su6: Site 46Su6 is an open habitation site. The site has Late Archaic, Middle Woodland, Early Archaic, and Late Prehistoric temporal components along with Savannah River, Brewerton, Buffalo, and Bluestone cultural components. Artifacts from the site include two Guilford, ten Savannah River, three Kirk, two MacCorkle, two Amos Corner Notched, two St. Albans Side Notched, one LeCroy, two "birdpoints", one Brewerton Corner Notched, one triangular, one Pee Dee, one Buffalo Expanding Stemmed, one Lamoka, one Hamilton, one Kirk Straight Stemmed, one Morrow Mountain, and one Levanna projectile point, one drill, and three scrapers (USACE 1983). Solecki's (1949) collections include one hammerstone, three projectile points, four "implements," and several flakes (Solecki 1949:380).

An attempt was made by CRAI personnel to revisit this site on March 18, 1998 (USACE 1998). The site description indicates an open habitation site; however, the topography at this location was very steep and not habitable. No GPS point was taken during the 1998 relocation survey (USACE 1998).

46Su7: Site 46Su7 is an open habitation site with Late Prehistoric temporal components. The site is located at an elevation of 1460 ft amsl. Artifacts recovered consist of eight ceramic vessel fragments and several pieces of debitage (Solecki 1949).

The site location was revisited by CRAI personnel on April 2, 1998 (USACE 1998). The site lies just north of Round Bottom Creek along a ridge parallel to the New River. The site area is wooded. Shovel tests were conducted across the ridge and one flake was observed. A GPS point was taken near the location of the flake, as the center of the site was difficult to estimate given the topography and vegetation in the area. This site was not present on the DNR GIS overlay of archaeological sites.

46Su8: Site 46Su8 is an open habitation site with Late Prehistoric temporal components. The site is located at an elevation of 1535 ft amsl. Artifacts from the site include one hafted scraper and two MacCorkle

projectile points. Solecki's (1949) work produced one broken projectile point, a broken flint "implement," and one ceramic sherd.

This site was revisited on April 2, 1998, by CRAI personnel. The site lies on a terrace above the New River. Lithic debris was recovered in shovel tests at this location. Historic structural remains were also observed. The GPS point location was north of the WVSHPO mapped plot. A GPS point was taken at the approximate center of the landform.

46Su9: The Island Creek site is a village located at an elevation of 1464 ft amsl approximately 13 miles upstream from Bluestone Dam. The site has Late Prehistoric, Late Archaic, Early Archaic, and Middle Woodland temporal components and Bluestone Phase, Radford, and Savannah River cultural components. This site was tested by the University of Akron in May 1979. Two radiocarbon dates were obtained of AD 1220 +/ 40 and AD 1290 +/ 45 (Adovasio et al. 1980). The site has produced many burials and three complete Woodland ceramic vessels. This site is also considered eligible for the NRHP but has not yet been nominated by the WVSHPO. Solecki's (1949) collections include 447 ceramic vessel fragments, one antler tine point, two celts, three projectile point fragments, and 18 pieces of debitage. Other collections have produced ground stone implements, bone tubes and beads, shell pendants, bear tooth pendants, shell gorgets, turtle shell bowls, beamers, one fish hook, shell-tempered pottery, ceramic pipe fragments, olivella and marginella shells, a large marine shell gorget, and a sandstone effigy elbow pipe (USACE 1983).

One third of the 145 documented burials at this site contained grave goods consisting of shell necklaces, wrist and ankle bracelets, marine shells scattered throughout the graves believed to have been part of beaded breech cloths or skirts, and many bone and shell beads, gorgets, and effigy pendants (Maslowski 1985).

A possible refuse/roasting pit, Feature VIII, produced one radiocarbon date. Fill material from the pit consisted of burned and unburned bone, ceramics, lithics, shell, fire-cracked rock, stream cobbles, fire-reddened clay chunks, lumps, and flecks of charcoal and ash (Adovasio et al. 1980).

This site was relocated by CRAI personnel on March 26, 1998 (USACE 1998). The site currently is in pasture, near an isolated tree. Soil exposed in bare spots contained shell-tempered ceramics and lithic debris. The GPS point taken in the field and the location for the site on the current DNR archaeological site overlay are consistent. The WVSHPO plot of the site used during field work appears to be in error, located several hundred meters south of the accurate site plot.

46Su10: This village site is located at an elevation of 1444 ft amsl and has Late Prehistoric temporal and Bluestone Phase cultural components. Artifacts include two Buffalo Expanding Stem projectile points (USACE 1983). The site was relocated on March 10, 1998, by CRAI personnel at the approximate position shown on the mapped WVSHPO plot and on the DNR archaeological site overlay plot. A concentration of ceramics, lithic debris, and fire-cracked rock were visible in the plowed field. A GPS point was taken near the estimated center of the site. Subsequently, test units were excavated to ascertain the existence of sub-plowzone deposits at the site, and to record GPS points at the perimeter of the site. GPS points were taken at all excavation units and at three points forming the boundary of the site. The results of this limited testing are presented below.

Limited test excavation was conducted at 46Su10 on April 14, 1998, by CRAI personnel. This Late Prehistoric village site is located in the upstream section of Crump's Bottom and occupies a similar landscape position as 46Su22, another Late Prehistoric village located in Crump's Bottom that was also examined by CRAI personnel in the spring of 1998 (USACE 1998). Information provided in a report by Dunn et al. (1996:74) indicated that 46Su22 was receiving a net gain in sediment during periods of flood recession.

Data provided in their report indicated that during a February 1996 flood event approximately 3.0 cm of sediment was deposited at a point near the edge of terrace scarp (east side of site), while an area in the southwest part of the site received approximately 1.0 cm during that same event. The primary goal of the exploratory excavations conducted in 1998 was to determine whether floodplain accretion from overbank flooding was indeed an active mechanism for site burial that would aid in long-term site protection.

The investigation consisted of the hand excavation of four 0.5-x-0.5 m test units, with a total of 0.461 m^3 of soil removed but not screened. Bucket auger cores extending to a maximum depth of 2.02 m below surface were used to examine more deeply buried deposits. The four units were placed along an east-west baseline oriented perpendicular to the New River. TU-1 was located nearest the channel with TU-4 being the most distant. Because the site occupies a relatively level tract of terrace, TU-1, TU-2, and TU-3 had similar surface elevations. TU-4, on the other hand, was located at a slightly lower elevation on the eastern edge of a swale that roughly paralleled New River. Test unit data is provided in Table 5-2.

Examination of soil profiles and auger derived sediments indicated that the stratigraphy of TU-1, T-2, and TU-3 was similar, with only the stratigraphy of TU-4 being distinct. The first three units had a dark (Munsell color very dark gray brown 10YR3/1-3/2) Ap horizon with silt texture that occupied the upper 20-28 cm of the profile. The Ap was loose and contained rootlets and crop residue (e.g., partially deteriorated corn stalks). Cultural material including shell-tempered ceramics, chert tools and debitage, thermally-altered rock, and a small quantity of mussel shell was observed on the surface and throughout this soil horizon.

Positioned directly beneath the Ap was a deposit with nearly identical color and slightly coarser texture (i.e. contained some fine sand) that extended to a depth of 40-50 centimeters below surface (cmbs). This deposit was compact and contained a high density of cultural debris, including body sherds up to 15 cm in length. Based on the limited data at hand, it was not possible to make a definitive interpretation for this deposit. The degree of compactness, presence of large sherds, and lack of plow scars suggested that the deposit was not a plowzone. If accurate, this interpretation would indicate that a part of the site contains an A-horizon measuring about 40 cm thick, the upper 20-28 cm of which are incorporated in one or more plowzone(s). Taking into consideration the site's landscape position and history of occupation, it is not unreasonable to conclude that the formation of the thickened or accumalic A horizon resulted from a complex interaction of sedimentological, pedogenic, and human processes.

Table 5-2. Test Unit Data for 46Su10.

Test Unit	Depth Below Surface (m)*	Maximum Auger Depth Below Surface (m)	Distance West from Scarp (m)**	Volume Excavated (m^3)***
TU-1	0.42	1.42	15	0.105
TU-2	0.45	1.40	25	0.113
TU-3	0.42	2.02	35	0.105
TU-4	0.55	2.00	50	0.138
Total				0.461

*Maximum depth excavated by shovel/trowel (not screened); **A sharp, well-defined scarp is located in the treeline along New River; ***Does not include auger cores.

Although a limited amount of sub-A horizon deposits were examined by hand excavation, the primarily method of exploration was bucket augering. As a result, much of the evidence for soil structure was destroyed and the ability to distinguish clearly between B and C horizon deposits lost. Available information indicates, however, that texture generally becomes coarser (more and/or coarser sand) with depth. The B horizon was easily distinguished from the A horizon on the basis of color and texture. Munsell color of moist samples was typically in the range of Munsell color dark brown to dark yellowish brown (10YR4/6 to 10YR5/6), although more heavily-oxidized samples had brown and reddish hues of Munsell color 7.5YR and 5YR. The B horizon contained very low densities of artifacts that appeared to be confined to the upper most part of the horizon. Typically, the materials consisted of flecks of wood charcoal and other small items that might represent materials displaced from the A horizon via bioturbation or pedoturbation. Below 50 cm no evidence of cultural inclusions was found. At 1.35 mbs subangular and rounded pebbles were encountered, and at 1.42 mbs augering was terminated when large rocks were encountered in a very coarse-grained matrix. The latter is interpreted as New River channel deposits.

The soil profile exposed in TU-4 was distinct from the other three units in that the texture was plowzone contained a very low density of cultural material. The Ap was loose and contained large quantities of crop residue. The deposit had a Munsell color of dark brown (10YR3/3) and a fine, heavy silt texture. Depth ranged from 17-19 cm. Underlying the Ap and extending to a depth of about 42 cmbs was a more compact and coarser-grained deposit that did not contain crop residue. This dark brown deposit had a higher density of cultural material than the Ap. It was not clear whether these deposits represented a plowzone. Extending from the base of this deposit to a depth of 55 cmbs was a compact, very dark grayish-brown (10YR3/2) deposit containing a higher density of cultural debris including large pieces of thermally-altered rock, calcined bone, unburned bone, debitage, and ceramics. Examination of the small sherds indicated that they had cordmarked exteriors and were not shell tempered (temper type not determined). Auger coring to a depth of 2.0 mbs failed to find evidence for more deeply buried occupations. Below 60 cm soil/sediments became lighter in color (dark yellowish brown), and at approximately 1.5 mbs more heavily oxidized deposits with brownish and reddish soil colors with reddish and brown Munsell hues of 7.5YR to 5YR were encountered. Mineral staining and mottling were also documented.

Exploratory excavations at 46Su10 generated a limited body of data useful for discussing archaeological stratigraphy. It is evident that the dominant occupation is represented by a Late Prehistoric Bluestone component confined primarily to the upper 40-50 cm of the site. Much of the occupation is contained in plowzone contexts, although intact subplowzone deposits are also present. It is expected that feature deposits possibly including human interments extend to greater depth. The recovery of a Brewerton Side-Notched point from about 40 cmbs in TU-1 reflects a Late Archaic occupation. The point was recovered near the interface of A and B horizons. If the specimen was recovered from its primary depositional context it would indicate that the surface of the site has been relatively stable since Late Archaic times. Given the intensity of Late Prehistoric occupation at the site, it is possible that this artifact was excavated from deeper contexts during the Late Prehistoric occupation. However, as previously stated, auger coring failed to find evidence for more deeply-buried components. Finally, a Woodland component was recognized by the presence of several grit-tempered cordmarked sherds. Evidence for this occupation was restricted to TU-4 in the western part of the site, where several small non-shell-tempered sherds were recovered from a depth of approximately 42 cmbs.

46Su12: This rockshelter site is located at an elevation of 1525 ft amsl and also contains a pictograph. No cultural materials were

collected during Solecki's (1949) survey. Charcoal and ashes were noted, but no associations could be made because the site had been disturbed by looters. At that time, the pictographs were badly weathered and scaled. The drawings were made with some reddish ferruginous or natural iron ore material. The drawings cover an area of approximately three square feet. The site is located near an important crossing of the Indian trail on the New River (Solecki 1949:358).

This area was revisited by CRAI personnel March 13, 1998 (USACE 1998). The area was thoroughly searched. There are several small overhangs in the area; however, none of the overhangs contained artifacts. There were no pictographs observed. The shelter does not appear to be present where the site is currently plotted on the DNR GIS overlay and WVSHPO plots. No GPS points were taken.

46Su13: This is a rockshelter located at an elevation of 1540 ft amsl. A small test was made of the site during Solecki's (1949) survey. No cultural materials were recovered at that time. The floor of the shelter contained evidence of fire, and the rear wall was soot stained (Solecki 1949). This site area was revisited by CRAI personnel on March 25, 1998 (USACE 1998). There is limestone outcropping in the area; however, the site location as shown on the WVSHPO plot had no habitable shelters at that location. No GPS point was taken.

46Su19: Farley's Fort is a historic fort site located at an elevation of 1424 ft amsl. The site has Late Prehistoric and historic European components. Solecki's (1949) work produced one triangular prehistoric projectile point, four prehistoric pottery sherds, and 22 historic ceramic sherds. Solecki's (1949) location produced artifacts believed to date to the nineteenth or twentieth century (McBride, Updike & Bonshire 1991). The exact location of the fort could not be determined during the McBride, Updike & Bonshire (1991) survey. Shovel probes and metal detecting were used in two areas, one in the Bull Falls Campground area suggested by a local informant, and one just east of Tom's Run. Solecki's (1949) location was not checked. Shovel probes in the campground area produced 12 artifacts, none of which were of eighteenth century origin. These artifacts consist of one iron/steel wrench, one modern headed cut nail (post 1830), one wire nail, one .22 long cartridge ("U"), one unidentified iron/steel fragment, and seven clear glass container fragments. Artifacts from the Tom's Run area include one early headed cut or wrought nail (pre 1840), one modern headed cut nail (post 1830), two cut nail fragments, two unidentified square nail fragments, and nine unidentified iron/steel fragments (McBride, Updike & Bonshire 1991). The fort was built around 1775 and is reported to have been burned by the Indians in the spring of 1778 (USACE 1983).

The area of the site plot for 46Su19 was revisited. No historic artifacts were observed in the plowed field, although visibility was hampered by cornstalk debris littering the field. No GPS point was taken at this location because there were no artifacts observed that could be associated with the fort location. The location of the plot of this site is very close to 46Su53.

46Su20: Site 46Su20 is a village site located at an elevation of 1428 ft amsl with Late Prehistoric, Early Woodland, and Early Archaic temporal components, and Bluestone, Radford, and Savannah River cultural components. Solecki's (1949) surface collections produced 930 prehistoric pottery sherds, one flat celt, one ferruginous ball concentration, one bone bead, miscellaneous worked bone fragments, and many projectile points and point fragments, including Kirk Corner Notched and four Savannah River points (USACE 1983). Solecki (1949) excavated two test trenches and one test pit which produced numerous ceramic potsherds, debitage, projectile points and point fragments, one tubular clay pipestem, one carved turtle shell cup, numerous worked animal bone fragments, and human toe bones (Solecki 1949). The site has been taken out of agricultural cultivation. The site was last disked and planted in corn by Bluestone Farms

in 1993. The site was last visited by the Huntington District archaeologist and Bluestone Resource Manager on May 26, 1993.

This site was revisited March 10, 1998, by CRAI personnel. As currently plotted, the site lies on the eastern and western sides of an intermittent creek. Dense prehistoric material, including ceramic sherds and lithic debris, was visible on the western side of the drainage. This area was not planted in corn, and the ground surface was bare. On the eastern side of the drainage, the field was plowed and in corn debris and sparse lithic debris was visible. This site was revisited and test units were excavated to determine the presence of sub-plowzone deposits. GPS points were taken for each test unit and on the perimeter of the site. The results of this limited testing are presented below.

On April 15, 1998, CRAI personnel conducted exploratory excavations at 46Su20. The site is located in the downstream part of Crump's Bottom approximately 1.5 and 1.9 miles downstream from 46Su22 and 46Su10, respectively. According to information provided in a report by Dunn et al. (1996:77), the part of the terrace containing site 46Su20 is receiving less sediment during periods of flood recession than site 46Su22. Therefore, the primary goal of the 1998 investigation was to determine if intact cultural deposits were present and whether floodplain accretion from overbank flooding was an active mechanism for site burial. The investigation consisted of the hand excavation of four 0.5-x-0.5-m test units, with a total of 0.351 m^3 of soil removed but not screened. TU-1 and TU-2 were located in a cornfield on the west side of an intermittent stream that bisects the site, with TU-3 and TU-4 located on the opposite side of the stream in the eastern part of the site.

Examination of TU-1 and TU-2 resulted in the documentation of nearly identical soil profiles. In both units the upper 13-16 cm consisted of an Ap1 horizon with silt to silt loam texture and loose consistency. Crop residue and rootlets were common. Also present was a high density of cultural debris including thermally-altered rock, chert debitage, small shell-tempered body sherds, and small, poorly preserved pieces of calcined bone and wood charcoal. Positioned directly beneath the Ap1 was a roughly10-cm-thick deposit tentatively identified as an Ap2 horizon. The color and texture of the Ap2 could not be distinguished from that of the Ap1. However, modern crop debris was not identified in the Ap2 and the deposit was significantly more compact. Plow scars were not identified, but the basal margin of the Ap2 was sharp and linear, suggesting an artificial rather than natural origin. The Ap2 contained a similar assemblage of cultural material as the Ap1.

At an approximate depth of 25 cmbs the Bt horizon was encountered. The matrix of the Bt horizon was dark yellowish brown (10YR4/6), although dark brown (10YR3/3) mottles were present. Texture was coarser (i.e. higher sand content) than the overlying plowzones, and there was clear evidence for bioturbation in the form of infilled insect and rodent burrows. It appeared that the only cultural material in the Bt horizon was associated with displaced plowzone deposits.

The soil profile for TU-3 was similar to those recorded for TU-1 and TU-2, except it was not possible to clearly identify multiple plowzones. Based on consistency, however, there was some indication that discrete Ap1 and Ap2 horizons were present. TU-3 was located in a cornfield approximately 25-30 m form the terrace scarp. The plowzone was ~25 cm thick with silt loam texture. Rootlets and crop residue were abundant. Munsell color was brown (10YR4/3). Based on surface observations and information obtained during the excavation of the unit, the Ap appeared to contain a relatively low density of cultural debris. Diagnostic items were not recovered from TU-3, although shell-tempered ceramics were identified nearby on the surface. Below the Ap was a darker grayish brown (10YR3/2-3/3), more compact deposit approximately 20 cm thick. The density of cultural material in this deposit appeared to be higher than in the Ap horizon. Texture was slightly sandier. Information obtained from solid Oakfield

cores indicated that a mottled, lighter colored deposit was located beneath this deposit.

TU-4 was located inside the tree line near the edge of the terrace scarp. The unit was shovel excavated to a depth of 40 cm. The upper 32 cm of the profile consisted of post-occupational alluvium with a weakly developed A horizon at the surface (A/C profile). Munsell color was dark brown (10YR3/3) and texture varied from silt to silt loam. Roots were common, but the only evidence for cultural material consisted of a few pieces of debitage identified near the base the C horizon. Below this deposit and extending to a depth of at least 45-50 cm below surface was a darker, grayish brown (10YR3/2), more compact deposit containing a higher density of cultural material including shell-tempered ceramics. This deposit was classified as the historic A horizon. Examination of the uppermost part of the underlying Bt horizon failed to find evidence for cultural associations.

Information obtained from the exploratory excavations indicated that the majority of midden deposits on the west side of the intermittent stream are located in the plowzones, although plow-truncated pits and other types of features might be present. Given the slow rate of alluviation on this part of the terrace, the presence of two plowzones is likely the result of changing agricultural practices (i.e. deeper plowing in the past). On the east side of the steam evidence for intact deposits was discovered in both test units, although the vast majority of deposits are contained within the plowzone(s). Test unit data for 46Su20 is provided in Table 5-3.

46Su21: 46Su21 is an open habitation site located at an elevation of 1460 amsl. Artifacts collected during Solecki's (1949) survey include one notched dark flint projectile point and one flint flake.

This site area was revisited on March 12, 1998 by CRAI personnel. The site area is currently part of the Shanklin Ferry camping ground. Dirt roads throughout the camping area were pedestrian surveyed and sparse lithic debris was noted. One Kirk Corner Notched projectile point was recovered from the road bed. A GPS point was taken near the center of the camping ground.

46Su22: 46Su22 is a Late Prehistoric village site located at an elevation of 1441 ft amsl. The site has Late Prehistoric, Middle Woodland, and Late Archaic temporal components and Bluestone and Savannah River cultural components. The site was tested by the University of Akron in May 1979, producing radiocarbon dates ranging from AD 1410 +/ 50 to AD 1450 +/ 75 (Adovasio et al. 1980). Artifacts include 192 prehistoric pottery sherds, worked antler, worked turtle shell, one bone awl, one perforated shell bead, one nutting stone, one hammerstone, one triangular projectile point, one human tooth, three human femur fragments, and Lamoka and Armstrong points (USACE 1983; Solecki 1949:388). The site has been taken out of agricultural cultivation. The site was last disked and planted in corn by Bluestone Farms in 1993. The site was last visited by the Huntington District archaeologist and Bluestone Resource Manager on May 26, 1993.

Table 5-3. Test Unit Data for 46Su20.

Test Unit	Depth Below Surface (m)*	Maximum Auger Depth Below Surface (m)	Distance West from Scarp (m)**	Volume Excavated (m^3)***
TU-1	0.35	0.30	about 20	0.088
TU-2	0.35	0.34	about 28	0.088
TU-3	0.30	0.65	about 30	0.075
TU-4	0.40	0.70	about 4	0.100
Total				0.351

*Maximum depth excavated by shovel/trowel (not screened); **A sharp, well-defined scarp is located in the treeline along New River; ***Does not include Oakfield cores.

Feature II, a refuse pit, produced one radiocarbon date. Fill material contained sand, ash, chunks of charcoal, and abundant refuse (Adovasio et al. 1980:75).

This site was revisited on March 12, 1998 (USACE 1998). Ceramics and lithic debris were visible in a plowed field. The location of the artifact scatter appears to conform to current WVSHPO and DNR GIS site plots. Artifacts at this site were abundant, and a GPS point was taken. The site was visited again on April 8, 1998 (USACE 1998). Test units were excavated at this site to determine the presence of sub-plowzone deposits. GPS points were taken for each test unit and on the perimeter of the site area. The results of this investigation are presented below.

On April 15, 1998, CRAI personnel conducted exploratory excavations at 46Su22. This site was located in the upstream section of Crump's Bottom approximately 2000 feet downstream (northwest) from site 46Su10. Both of these sites occupy a nearly level terrace of New River. The primary goal of the investigation was to determine if intact deposits were present and whether floodplain accretion from overbank flooding was an active mechanism for site burial that would result in long-term site protection. Although not visited by the team from WES in 1996, the site's geographical proximity and similarity of landscape position to 46Su10, suggests that it too receives a net gain in sediment during periods of flood recession.

The investigation consisted of the hand excavation of four 0.5-x-0.5 m test units, with a total of 0.474 m^3 of soil removed but not screened. The four units were placed along an east-west baseline oriented roughly perpendicular to New River. TU-1 was located nearest the channel with TU-4 the most distant. TU-1 was located inside the treeline on the east side of a farm lane, with the remaining units located on the opposite side of the lane in an agricultural field used most recently to grow corn.

Data obtained for TU-1 suggested that the upper 10 cm of the soil profile was composed of overbank sediment lacking pedogenic development. Although not screened, careful examination of the excavated fill and inspection of the profile walls found no evidence for artifact inclusions. The deposit was fine-grained silt to clayey silt. Roots were abundant and there was no indication that the deposit had ever been plowed. Underlying this deposit of historic alluvium was a moderately compact, dark sand with a Munsell color of 10YR3/1 to 3/2 (very dark gray to very dark grayish brown). Thickness was approximately 30 cm. Tentatively identified as an Apb horizon, the deposit contained a high density of cultural debris including shell-tempered ceramics, chert debitage, wood charcoal, and small pieces of calcined bone. The base of this deposit was sharp and linear and sloped toward New River. The lowest soil horizon identified in TU-1 was a relatively loose sand loam with a Munsell color of dark yellowish brown (10YR3/6 to 5/6). Cultural material including several small shell-tempered body sherds was present in the upper part of the deposit. Whether these materials were in their primary context or whether they represented items dislocated via bioturbation from the overlying deposit could not be established. An Oakfield probe was used to examine deposits to a depth of 0.95 mbs. Evidence for more deeply buried cultural deposits was not found, and texture became slightly coarser with increasing depth.

TU-2, TU-3, and TU-4 had similar profiles. A distinct Ap horizon was identified in each unit. Texture was uniformly silt loam. The Ap was loose and contained a high density of crop debris. Also present was a high density of cultural material including chert debitage, thermally-altered rock, shell-tempered ceramics, and charcoal. The average thickness of the Ap was 25 cm. Directly beneath the Ap was a 7-8 cm thick deposit of highly compact silt loam that was coarser than the Ap but probably not a true sand loam. The basal margin of this deposit was linear and sharp, broken only by insect and earthworm burrows. The presence of several large (15-28 cm diameter) shell-tempered sherds suggested this did not represent an old plowzone. In TU-3 this deposit was 21 cm thick, suggesting the

possible presence of a pit feature and midden anomaly. The deposit is believed to represent part of the historic A horizon, only the upper part of which has been incorporated into the plowzone. Located stratigraphically beneath the A horizon was a yellowish-brown (10YR3/4-4/6) Bt horizon with sand loam texture that contain a low density of cultural material in its uppermost levels. Examination of deeper contexts by bucket augering failed to find evidence for more deeply buried cultural deposits.

Data generated by exploratory excavations at 46Su22 indicate that Late Prehistoric deposits containing a wide assortment of materials including floral and faunal remains are present in subplowzone contexts. Data for TU-1 confirms the fact that the surface of the terrace at the site location is slowly aggrading, with about 10 cm of post-occupational sediment resting directly on top of deposits with artifacts dating from the Late Prehistoric period. Direct evidence for historic/modern alluviation was not observed in the remaining units located in the agricultural field. Undoubtedly this was a reflection of active plowing, with post-occupational alluvium being incorporated into the plowzone. The net gain of sediment is probably insufficient to provide protection to site deposits alone. It is therefore critical that deep plowing not be conducted. Test unit data for 46Su22 is provided in Table 5-4.

46Su23: Fort Byrd, 46Su23 (also known as Fort Field or Culbertson's Fort), is a historic fort site located at an elevation of 1.435 ft amsl. The site also has Late Prehistoric and historic European components. Fort Byrd was built in 1774 near the mouth of Joshua's Run along Crump's Bottom. The name was changed to Fort Field in 1777, and was abandoned in 1778 (McBride, Updike & Bonshire 1991). Archival research revealed no precise locational information, other than Solecki's (1949), which places the fort near the mouth of Joshua's Run. Artifacts recovered during Solecki's (1949) work included five pieces of white chinaware, a piece of crockery jug, a fragment from the bottom of an iron kettle, debitage, burned and broken stones, occasional mussel shells, a piece of dark quartzite flaked blade, and two pieces of aboriginal pottery (Solecki 1949:342). Solecki's (1949) work also revealed an apparent prehistoric camp site. Artifacts recovered during surface collections include several pieces of debitage, two ceramic sherds, one triangular projectile point, and one crude flaked knife (Solecki 1949:388).

Archaeological investigations at this site during the McBride, Updike & Bonshire (1991) survey involved surface collecting and metal detecting in order to try to relocate Solecki's (1949) location. Work was conducted to the east and west of Joshua's Run, revealing historic ceramic fragments, nail fragments, unidentified metal fragments, glass fragments, miscellaneous hardware pieces, and one quartzite flake, suggesting a mid-nineteenth or early twentieth-century site. The exact location of the fort could not be determined (McBride, Updike & Bonshire 1991).

Table 5-4. Test Unit Data for 46Su22.

Test Unit	Depth Below Surface (m)*	Maximum Auger Depth Below Surface (m)	Distance West from Scarp (m)**	Volume Excavated (m^3)***
TU-1	0.55	0.95	15	0.138
TU-2	0.35	0.55	20	0.088
TU-3	0.55	0.85	35	0.138
TU-4	0.44	Not Augered	50	0.110
Total				0.474

*Maximum depth excavated by shovel/trowel (not screened); **A sharp, well-defined scarp is located in the treeline along New River; ***Does not include Oakfield cores.

This area was revisited by CRAI personnel on March 11, 1998 (USACE 1998). The location as plotted by WVSHPO, on either side of the mouth of Joshua's Run, was revisited. There was no historic debris visible on either side of Joshua's Run; however, there was lithic debris visible in the plowed field of the site area, primarily on the western side. A GPS point was taken on the western side of the run, as it appears to represent the prehistoric component of the site. Artifact density appears higher on the western side of the creek.

46Su24: This village site is located at an elevation of 1435 ft amsl. The site has Late Prehistoric temporal components. Artifacts from Solecki's (1949) limited test excavations include 307 prehistoric pottery sherds, lithic debris, one ceramic pipe stem, one bear tooth pendant, a sandstone whetstone, and various animal bone fragments (Solecki 1949:389). This site has not been relocated.

On March 12, 1998, CRAI personnel revisited the area of the site as currently plotted. The site area, as plotted, appears to follow a low ridge that trends east west. The site is plotted as being present on a secondary terrace to the southeast. The site crosses the eastern side of Tom's Run. The campground has several roads throughout the area affording some visibility. Roads in the vicinity were pedestrian surveyed, although gravel hampered visibility somewhat. There were no artifacts visible in the road beds. In addition to the pedestrian survey, three shovel tests were excavated across the ridge on the western side of Tom's Run, and four shovel tests were excavated on the eastern side of the drainage. No artifacts were located in the shovel tests. The site may be comprised of a sparse scatter of artifacts, difficult to relocate with shovel tests. No GPS point was taken at this site.

46Su28: This village site is located at an elevation of 1460 ft amsl. The site has Late Prehistoric, Late Archaic, Paleoindian and Terminal Paleoindian temporal components and Savannah River cultural components. Artifacts include 37 ceramic vessel fragments, one triangular projectile point, one stemmed white quartz point and point fragment, one pitted white quartz hammerstone, flint and quartz flakes, one stemmed point, two Charleston Palmer points, one Chesser Lowe point, one Savannah River point, two scrapers, several point fragments, and various bone and mussel shell fragments (Solecki 1949:390; Adovasio et al. 1980). The site was relocated by Terry Ballengee, and was visited by the Huntington District archaeologist on May 26, 1993.

This site area was revisited by CRAI on April 6, 1998 (USACE 1998). The area is in a campground with a dirt road running along the northern margin of the site area. The plowed field above the terrace has lithic debris. An error was made in acquiring the GPS signal and there was no GPS point collected. The DNR GIS plot of the site area is accurate.

46Su29: This open habitation site is located at an elevation of 1450 ft amsl. The site has Late Prehistoric components. Artifacts recovered during Solecki's (1949) surface collections include four ceramic potsherds, one flaked celt and several pieces of debitage. The site was visited by the Huntington District archaeologist on May 26, 1993.

An attempt was made to revisit this site on April 6, 1998, by CRAI. Excellent visibility was afforded by scraped roads for a campground at that location. Shovel tests were excavated in the vicinity, but no artifacts were observed. The area appears to be an excellent location for a prehistoric site; however, no artifacts were observed, and no GPS point was taken.

46Su39: This prehistoric open habitation site is located at an elevation of 1415 ft amsl. The site was recorded and surface collected by the Huntington District in 1977. The site has Late Archaic, Late Prehistoric, Terminal Paleoindian, Early Archaic, Middle Archaic, Early Woodland, Middle Woodland, and Late Woodland temporal components present, as well as Brewerton, Savannah, and Adena cultural components. Artifacts collected from the site include one Dalton projectile point, one Morrow Mountain I point, one Palmer Corner-Notched point, one Charleston Corner-

Notched point, two Kirk Corner-Notched points, small variety, one Dalton preform, two lanceolate bifaces, one triangular biface, one bifacially retouched blade, 13 laterally retouched blades, two biface fragments, three utilized blades, eight utilized flakes, 18 unifaces, one drill, and one retouched flake (Applegarth and Davis 1982:16).

This site was revisited by CRAI personnel on March 26, 1998 (USACE 1998). The site was located along the elevated terrace bank east of the Bluestone River near a drainage. A GPS point was taken at the estimated center of the site. The GPS point retrieved is north of the current WVSHPO plot for 46Su39. These two sites, 46Su41 and 46Su39, may represent one continuous scatter along this bank of the Bluestone River. This area needs to be systematically surveyed to clarify the relationship between the two sites.

46Su41: This open habitation site is located at an elevation of 1415 ft amsl. The site has Late Archaic, Early Archaic, Early through Late Woodland, Paleoindian, and Terminal Paleoindian temporal components and Brewerton, Savannah River, and Adena cultural components. Artifacts recovered include five Guilford, five Charleston Palmer, two St. Albans Side-Notched, two Kirk, nine Brewerton Side-Notched, seven Savannah River, four Lamoka, one MacCorkle, one Bradley Spike, two Levanna, two Madison, one Morrow Mountain, one Adena, one Hamilton, one Chesser Lowe (USACE 1983), two "birdpoints," one E Notch, one Hardaway Blade, one Big Sandy and one Kanawha Stemmed projectile point, 14 scrapers, five unifacial blades, and one humpback knife. The site was recorded by the Huntington District in 1978.

This site area was revisited March 26, 1998, by CRAI personnel. The site appears to be a long linear scatter on the eastern terrace above Bluestone Lake. Visibility was afforded by a jeep trail and bare spots along the ground surface. A GPS point was taken at the approximate center of the site. There appears to be some confusion over the site locations for 46Su39 and 46Su41. The GPS point is located at the position of the WVSHPO plot for 46Su39. See comments above for site 46Su39.

46Su42: This is an open habitation site located at an elevation of 1415 ft amsl. The site has Middle Woodland, Late Archaic, Late Woodland, Late Prehistoric, and Paleoindian temporal components. Artifacts include two Lamoka, two Levanna, three Chesser Lowe, one Madison, one Kirk, one Brewerton Side-Notched, one Brewerton Corner-Notched, one "birdpoint," 26 scrapers, and one drill. The site was recorded by the Huntington District in 1978.

This site was revisited by CRAI personnel on March 26, 1998 (USACE 1998). This site is a long linear scatter along the eastern bank of the Bluestone River. A possible feature and lithic debris were noted along the edge of the bank, and a GPS point was taken at this location as well as the estimated center of the site. One projectile point, a Late Archaic Brewerton Ear-Notched projectile point was recovered from the bank line.

46Su43: 46Su43 is an open habitation site located at an elevation of 1415 ft amsl with Late and Middle Archaic temporal components and Savannah River and Brewerton cultural components. Artifacts include one Savannah River, one Morrow Mountain, one Guilford, one "birdpoint," two Brewerton Side-Notched projectile points, and one scraper. The site was recorded by the Huntington District in 1978.

This site was relocated by CRAI personnel on March 26, 1998 (USACE 1998). This area is used as a camping area. Lithic debris was observed along the eroded edges of the terrace just above Bluestone Lake. A GPS point was taken in close proximity to the WVSHPO plot for the site.

46Su44: This open habitation site is located at an elevation of 1415 ft amsl and has Late Archaic, Early Archaic, Early Woodland, Late Woodland, and Late Prehistoric temporal components and Savannah River and Brewerton cultural components. Artifacts recovered include one Buffalo Straight

Stemmed, one Lamoka, one Hamilton, one Chesser Lowe, one MacCorkle, one St. Albans, five triangular, one LeCroy, two Guilford, three Brewerton Side-Notched, five Savannah River, and three Levanna projectile points, two unifacial blades, and three scrapers. The site was recorded by the Huntington District in 1978.

This site was revisited by CRAI personnel on March 26, 1998 (USACE 1998). The site area lies along the eastern bank of Bluestone Lake. Lithic debris was observed in eroded patches of ground along the edges of the bank. A GPS point was taken where lithic debris was observed.

46Su45: This open habitation site is located at an elevation of 1415 ft amsl and has Late Archaic, Middle Woodland, Early Woodland, Late Woodland, Late Prehistoric, and Terminal Paleoindian temporal components and Brewerton, Savannah River, and Adena cultural components. Artifacts include one Potts, one Adena, one Jack's Reef, one Levanna, one Madison, one Savannah River, one Charleston Palmer, one Pee Dee, two "birdpoints," three Guilford, and five Brewerton Side-Notched points, one drill, and two scrapers (USACE 1983). The site was recorded by the Huntington District in 1978.

This site was revisited March 26, 1998, by CRAI personnel. Lithic debris was observed along the eastern bank of the Bluestone River in eroded patches of ground. Visibility back from the bank line was very poor. A GPS point was taken where lithic debris was observed.

46Su47: This is an open habitation site located at an elevation of 1475 ft amsl with Woodland and Late Prehistoric components. There is some confusion over this site location. The site as shown on the WVSHPO plot lies on a steep embankment to the terrace west and above the floodplain of the lake. The GIS overlay for the site plots has the site well north at the base of the escarpment, at the western edge of the floodplain. Shovel tests were conducted below the WVSHPO plot in the floodplain, and lithic debris was observed. A GPS point was taken where lithic debris was observed in the floodplain, near the WVSHPO plot but south of the DNR GIS overlay position for the site. This area has several small drainages that do not appear on the USGS quadrangle as well as changes in vegetation which have taken place. There also appears to have been extensive prehistoric occupation in the vicinity and there is probably a nearly continuous scatter of artifacts across this floodplain.

46Su48: This open habitation site is located at an elevation of 1465 ft amsl and has Middle Archaic, Late Prehistoric, and Woodland components. There appears to be confusion over the location of this site. The WVSHPO plot has this site placed on the floodplain, southeast of the northern point of Wylie Island. The WVSHPO site form locates the site further south, on a west bank floodplain at the sharp bend in the river near the southern tip of Wylie Island. There is no DNR GIS overlay for this site. The WVSHPO plot is very close to the location of 46Su9 as shown on the Huntington District's GIS overlay. The area currently is in pasture. Eroded areas at the floodplain edge contained lithic debris and shell-tempered ceramics. One projectile point was collected resembling a Kirk Corner-Notched, dating to the Early Archaic Period.

This site as located on the WVSHPO plot was revisited by CRAI personnel on March 25, 1998 (USACE 1998). A GPS point was taken on the floodplain, labeled as 46Su48, near where the prehistoric artifacts were observed along the bank. However, since the location revisited was near 46Su9 rather than at the location plotted on the actual site form, this GPS point likely represents 46Su9 and not 46Su48.

46Su49: This site is a hamlet located at an elevation of 1457 ft amsl and has Late Prehistoric and Radford components. This site was not revisited by CRAI personnel. A lithic distribution was observed in the field at what was thought to represent the location of 46Su49, but it was actually 46Su48. This mistake was realized after the fieldwork had been completed. Given the intensive

prehistoric occupation for this area, it was considered highly likely that prehistoric material may be found near the location of the WVSHPO plot and the DNR GIS overlay site location.

46Su50: This open habitation/hamlet is located at an elevation of 1466 ft amsl and has Late Prehistoric components.

There appears to be some confusion over the location of this site. The area was revisited by CRAI personnel on March 25, 1998 (USACE 1998). The area was overgrown, and there were several small drainages that were difficult to correlate with the quadrangle map for the area. The WVSHPO plot for this site differs from the GIS overlay as well. The site area shown for the WVSHPO plot is now heavily overgrown, and five shovel tests were excavated at that location. No material was observed. Across the drainage, to the north, shovel tests yielded lithic debris. There were two GPS points taken that correspond to 46Su50. The GPS data above corresponds to the center of the current DNR GIS overlay. The site should extend beyond the DNR GIS overlay plot to the south, along the northern edge of a drainage into Bluestone Lake.

46Su52: This open habitation site is located at an elevation of 1470 ft amsl and has Savannah River cultural components. This site was revisited by CRAI personnel on March 10, 1998 (USACE 1998). The site has sparse lithic debris in a plowed field at the mapped location. The site lies on a circular ridge or knoll within the plowed field. A GPS point was taken at the center of the knoll. One artifact, a small triangular projectile point dating from the Late Woodland through Protohistoric Period was collected from the ground surface. The site as plotted on the DNR GIS overlay extends to the east.

46Su53: This site is an open habitation site with Late Archaic components located at an elevation of 1430 ft amsl. This site area was revisited on March 10, 1998 (USACE 1998). There is some confusion over the location of this site. The floodplain area had been plowed and there was good visibility. At the time of the field visitation, there did not appear to be a concentration of debris at the presumed location. There was a sparse scatter of lithic debris visible on the plowed ground surface northwest of the plot for 46Su53 as shown on the WVSHPO plot and the DNR GIS overlay. A GPS point was taken at the approximate center of the site.

46Su54: This site is an open habitation site with Early Archaic components located at an elevation of 1430 ft amsl. Artifacts recovered consist of one MacCorkle projectile point (USACE 1983). On March 10, 1998, this site was revisited by CRAI personnel. The site is located at the extreme northern edge of the campground area at Bull Falls. Visibility was good as the area was clear of vegetation due to road traffic. The area was pedestrian surveyed and no artifacts were observed. Artifacts were observed by Huntington District archaeologists at this location during the construction of a boat ramp, and a GPS point was taken at that location. This site probably is another example of a sparse lithic scatter along the floodplain terraces adjacent to the river.

46Su55: This site is an open habitation site with Woodland components located at an elevation of 1550 ft amsl. The area was revisited by CRAI personnel on March 24 1998. This site area at the time of visitation was in pasture. Five shovel tests were excavated and one yielded a single flake. The GPS point was recorded at the location of the positive shovel test. The DNR and WVSHPO plots do not conform at this site. The GPS point is located north of the WVSHPO plot and east of the DNR plot.

46Su56: This hamlet site has Late Prehistoric components and is located at an elevation of 1490 ft amsl. This site area was revisited by CRAI personnel on March 26, 1998 (USACE 1998). The site area was in cultivation and visibility was excellent. Lithic debris and fire-cracked rock were visible in an area north of the current DNR GIS overlay for the site. A GPS point was taken at the estimated center point of the artifact concentration.

46Su58: This hamlet site has Archaic, Woodland, and Late Prehistoric temporal

components, and is located at an elevation of 1485 ft amsl on the right bank of the New River opposite the southern point of Wylie Island. Artifacts collected include Radford Series ceramics and triangular projectile points. The site was recorded by Dave Dobbins in 1979.

This site area was visited by CRAI personnel on March 26, 1998 (USACE 1998). The site area is currently a campground facility, with dirt roads affording good visibility. Lithic debris was noted at the southern margin of the campground. A GPS point was taken at the southern edge of the DNR GIS overlay for the site.

46Su60: Site 46Su60 is located at an elevation of 1410 ft amsl. Its original function is unknown. The site contains Archaic, Middle Woodland, and Late Prehistoric temporal components. Ceramic debitage is present and the site also contains fire-cracked rock, hammerstones, pitted anvils/nutting stones, triangular points, and igneous celts. Artifacts have been found to be eroding from the riverbank. The site was recorded by Dave Dobbins in 1979.

This site was revisited by CRAI personnel on March 19, 1998 (USACE 1998). The site is currently wooded. Eroded patches of the bank line were surveyed and shovel tests were excavated inland. A midden-like soil containing fire-cracked rock was identified in shovel tests at a depth of about 30 cmbs. A GPS point was taken near the bank line, near the southeastern margin of the DNR GIS plot.

46Su61: This village/hamlet site is located on the left bank of the New River at an elevation of 1410 ft amsl. The site has Late Prehistoric temporal components. A green celt, scraper, and cordmarked shell-tempered pottery are reported to have been collected from the site. The site was recorded by Dave Dobbins in 1979.

This site was revisited by CRAI personnel on March 19, 1998 (USACE 1998). The area is heavily wooded. Seven shovel tests were excavated across the area encompassed by the WVSHPO plot. Fire-cracked rock was observed in a shovel test at the southern margin of the site, and a GPS point was recorded at that location.

46Su62: This open habitation site has Woodland temporal components and is located at an elevation of 1460 ft amsl. This site area was revisited by CRAI personnel on March 19, 1998 (USACE 1998). The area was heavily wooded. The terrain was sloped and it appears unlikely there is an open habitation site at this locality. Shovel tests were excavated south of the WVSHPO site plot and nor artifacts were observed. No GPS point taken at this locality.

46Su128: This open habitation site is located at an elevation of 1425 ft amsl. The WVSHPO site plot area was revisited by CRAI personnel on March 12, 1998 (USACE 1998). The plot area as shown is in a drainage where the topography precludes any type of prehistoric occupation. A picnic area and a boat ramp are located on a point of land where the drainage enters into the Bluestone Lake. Lithic debris was observed in eroded patches of ground. The area appears to have been disturbed from preparation for the picnic area. A GPS point was taken where lithic debris was observed, south of the DNR GIS and WVSHPO plots.

46Su165: This historic farm/open habitation site is located at an elevation of 1414 ft amsl and has Archaic and Woodland temporal components and Savannah River cultural components. This site was revisited by CRAI personnel on March 11, 1998 (USACE 1998). Historic domestic debris and architectural debris was visible in addition to sparse lithic debris. This historic material may overlap with the historic material observed for site 46Su325. A GPS point was taken at the approximate center of the site, which corresponds to the western edge of DNR GIS and WVSHPO plots.

46Su186: This open habitation site is located at an elevation of 1414 ft amsl and has historic European temporal components. This site was revisited by CRAI personnel on March 16, 1998 (USACE 1998). There are historic structural remains at the lake edge, at

the southwestern edge of the current WVSHPO and DNR GIS site plots. A GPS point was taken at the structural remains.

46Su187: This open habitation site is located at an elevation of 1414 ft amsl and has historic European temporal components. This site area was revisited by CRAI personnel on March 16, 1998 (USACE 1998). The area had recent refuse and trash and there were no historic structural remains observed. It is possible the area of the historic site was inundated at the time of the visit. No GPS point was taken at this site.

46Su188: This open habitation site is located at an elevation of 1415 ft amsl. This site area was revisited by CRAI personnel on March 27, 1998 (USACE 1998). This area is steeply sloped and it appears unlikely that a habitation site would be located in the near vicinity. The area was inundated at the time of the visit and no GPS point was recorded.

46Su189: This open habitation site is located at an elevation of 1420 ft amsl. This site area was revisited by CRAI on March 16, 1998 (USACE 1998). The site location, as plotted by the WVSHPO, is situated at the edge of a terrace in a campground area. The water level was high at the time of the visit and it appears that the site was inundated. No artifacts were observed in bare eroded spots within the campground and there were no artifacts observed in four shovel tests placed along the edge of the terrace overlooking the river to the southwest. No GPS point was taken at this site.

46Su191: The Stinking Lick site is an open habitation site located at an elevation of 1470 ft amsl near the bridge crossing Indian Creek. The site has Archaic and Woodland temporal components. The site was recorded by the Stephen Trail in 1981, and revisited by CRAI personnel on March 23, 1998 (USACE 1998). The site lies on a narrow floodplain of Indian Creek, where there is a small campground. Lithic debris was observed in dirt roads of the campground. A GPS point was taken at the estimated center of the site. This site is not on the DNR GIS overlay for Bluestone Lake.

46Su193: This open habitation site is located at an elevation of 1429 ft amsl on the New River immediately below the mouth of Indian Creek. Triangular projectile points were present. The site was recorded by Stephen Trail in 1981. This site area was revisited by CRAI personnel on March 23, 1998 (USACE 1998). The area is in pasture. The site area seemed excellent for prehistoric habitation, although no material cultural was recovered from eight shovel tests. No GPS point was taken at this site.

46Su194: This open habitation site is located at an elevation of 1460 ft amsl on the New River near Indian Creek. The site has Woodland and Archaic temporal components and Savannah River cultural components. The site was recorded by Stephen Trail in 1981, and was revisited on March 20, 1998 (USACE 1998). The site is located on an upland terrace in a campground overlooking Bluestone Lake. Lithic debitage was observed in eroded patches in the campground. A GPS point was taken at the estimated center of the site, although the site may extend back across the terrace landform.

46Su195: William Holland I (46Su195) is an open habitation site located at an elevation of 1429 ft amsl on a low terrace bordering Bluestone Lake. Triangular projectile points were present. The site was recorded by Stephen Trail in 1981, and revisited March 20, 1998 (USACE 1998). The site is currently used as a campground. Several access roads for the campground were inspected for cultural material. There was no lithic debris visible, and no GPS points were taken.

46Su196: This open habitation site is located on a terrace bordering the New River downstream from the mouth of Indian Creek at an elevation of 1429 ft amsl and has Woodland temporal components and Savannah River cultural components. The site was recorded by Stephen Trail in 1981. This site area was revisited March 23, 1998 (USACE 1998). The site area had been plowed and there was lithic debris visible in the field. A GPS point was taken at the estimated center of the site. This correlates

with the southern margin of the DNR GIS overlay for the site.

46Su198: Indian Mills I is an open habitation site located on a terrace of Indian Creek at an elevation of 1525 ft amsl. The site was recorded by Stephen Trail in 1981, and revisited on March 24, 1998 (USACE 1998). The site area had been plowed and lithic material was observed. There is no DNR GIS plot for this site. A GPS was taken at the estimated center of the site.

46Su199: Indian Mills II is an open habitation/military site located on a major trail near the New River crossing at an elevation of 1525 ft amsl and has Late Prehistoric, Archaic, Woodland, and historic European temporal components. The site was recorded by Stephen Trail in 1981. This site was revisited by CRAI on March 24, 1998 (USACE 1998). The area had been plowed and there was lithic debris visible in addition to historic material. The historic artifacts included clear container glass and wire nails, suggesting a twentieth-century association. A GPS point was taken at the estimated center of the site.

46Su200: The Bradshaw site is an open habitation located on Bradshaw Creek Road near the Seminole Road juncture near Indian Mills at an elevation of 1525 ft amsl and has Archaic and Woodland temporal components. The site was recorded by Stephen Trail in 1981. This site was revisited on March 25, 1998 (USACE 1998). The site is not plotted on the current Huntington District GIS overlay. The site is in pasture. The soils are well drained and suitable for prehistoric occupation, although no lithic debris was observed in five shovel tests across the presumed site location. No GPS point was taken at this site.

46Su202: This open habitation site is located at the junction of Indian Creek and the New River, inside the triangle formed by the merger of the two streams at an elevation of 1429 ft amsl. The site was recorded by Stephen Trail in 1981. When the site was revisited April 1, 1998, it had been recently inundated and there was a three cm layer of recent alluvium covering the ground surface. Sandy alluvium was identified up to a depth of 40 cmbs. Shovel tests encountered fire-cracked rock and fragments of ground stone. A GPS point was taken at the estimated center of the site. This site is currently not on the DNR GIS overlay. The field site plot and the WVSHPO site plot are consistent.

46Su206: This open habitation site is located on a terrace at the mouth of Indian Creek at an elevation of 1415 ft amsl. The site was recorded by Stephen Trail in 1981. This site is not on the current Huntington District overlay for Bluestone Lake. This site area, a long linear ridge parallel with the Bluestone Lake to the west, was revisited on April 1, 1998. The area appears to have been disturbed by bulldozing. Soils are sandy alluvium, but only one flake was observed in a bulldozer pile. A GPS point was taken at the estimated center of the site.

46Su207: This open habitation site is located on a terrace at the mouth of Indian Creek at an elevation of 1550 ft amsl. This site was revisited on April 1, 1998. The area was in pasture, situated on a terrace above the floodplain of Indian Creek. Four shovel tests were excavated. The soil was clayey, and there were no prehistoric cultural remains present. There were, however, historic structural remains present. A GPS point was taken at this location.

46Su208: This open habitation site is located on a terrace at the mouth of Indian Creek at an elevation of 1429 ft amsl and has Late Archaic and Late Prehistoric temporal components and Savannah River cultural components. The site was recorded by Stephen Trail in 1981, and was revisited April 2, 1998 (USACE 1998). The site is in sparse pasture grass that provided some ground visibility. There was sparse lithic debris noted northwest of the current GIS site plot. One GPS point was taken at the approximate center of the site area.

46Su212: This open habitation site is located near the mouth of Indian Creek on a high terrace on a major trail at an elevation of 1440 ft amsl and has Late Archaic, Middle Archaic, and Woodland temporal components

and Savannah River cultural components. The site was recorded by Stephen Trail in 1981, and was revisited by CRAI personnel on April 2, 1998 (USACE 1998). The site area is currently in pasture. Bare eroded edges of the pasture afforded some ground visibility. Lithic debitage was observed and a GPS point was recorded where lithic material was observed. There are the remains of a historic structure approximately 30 m east of the recorded GPS point.

46Su244: This open habitation site is located at the mouth of Lick Creek on a very low terrace at an elevation of 1520 ft amsl. One sugar quartz flaking tool, one scraper, and a light scatter of debitage have been recovered from the site. The site was recorded by Stephen Trail in 1982, and was revisited on March 16, 1998 (USACE 1998). The area is currently wooded, with gullies formed by erosion from inundation by the New River to the east. There were eroded patches of ground surface affording some visibility. Two shovel tests were excavated on level ground near the center of the site plot. No cultural material was observed. No GPS point was recorded for this location.

46Su270: This historic farm/residence site is located on a terrace on the western side of Lick Creek at an elevation of 1520 ft amsl and has historic European temporal components. This site represents the remains of a two-story log home constructed about 1855. The site was recorded by Stephen Trail in 1982.

The heavily-wooded area was revisited by CRAI personnel on March 16, 1998 (USACE 1998). There were no historic structural remains visible, and there was no historic material recorded in three shovel tests excavated on level ground in the presumed site area. The site was not relocated. No GPS point was taken during the 1998 relocation survey (USACE 1998).

46Su271: The Mercer Salt Works site is located on a terrace on Lick Creek one-half mile above the junction of Lick Creek with the New River fronting a salt marsh at an elevation of 1520 ft amsl. This was the site of the Mercer Salt Works, a Civil War era salt manufacturing plant. The works were burned in 1861 by soon to be President Hayes and was rebuilt in 1862. The works was permanently closed in 1866 due to high fuel prices and competition from the Malden Salt manufacturer operation. The works consisted of a general store, water mill, blacksmith shop, and the salt works. Stones from the furnace, smoke stack, and foundations are all that remain. The works operated from about 1850 to 1866. The site was recorded by Stephen Trail in 1982.

This site was revisited by CRAI personnel on March 16, 1998 (USACE 1998). A linear pile of stones with iron bars was located and a GPS point was taken atop this feature. The site probably has numerous features reflecting the industrial activity taking place there. This feature appears to be near the center of the site area.

46Su272: The Mercer Salt Works Blacksmith Shop is an industrial site located on a terrace on Lick Creek at an elevation of 1520 ft amsl and has historic European temporal components. The shop dates to about 1855. The site was recorded by Stephen Trail in 1982.

This site was relocated by CRAI personnel on March 16, 1998. The site lies on a terrace above the location of the Mercer salt works. The site location has linear arrangements of stone lining the slope of a flat narrow terrace. It is possible these stones represent a road cut into the slope of the terrace and stabilized with the aid of the stones. A GPS point was taken near the center of the line of stones. It is assumed that the blacksmith shop should be in close proximity to the stones.

46Su273: The Mercer Salt Works Post Office and Merchandising Store site are located on a terrace on Lick Creek fronting a salt marsh at an elevation of 1520 ft amsl. The post office and store operated from about 1855 to 1906. The site was recorded by Stephen Trail in 1982. Trail (1982a) reported that the post office operated until about 1920.

This site was relocated by CRAI personnel on March 16, 1998 (USACE 1998). A large

square depression was evident which probably represents the cellar of the structure. A GPS point was taken at the center of this depression.

46Su274: The Anderson Shumate House is located on a terrace of Lick Creek just north of the Mercer Salt Works salt spring at an elevation of 1520 ft amsl. It was the site of a two-story unpainted frame house dating to about 1871. The site was recorded by Stephen Trail in 1982. The area was revisited by CRAI personnel on March 16, 1998 (USACE 1998). The site is believed to be north of the Mercer Salt Works (46Su271) and east of the associated blacksmith shop (46Su272). The house site was not relocated. It is possible there is confusion over the locations of the farmstead and the blacksmith shop. There was no GPS point recorded for this site.

46Su275: The site is on a large creek about one-half mile upstream from the confluence of Lick Creek and the New River. This historic industrial site is a salt marsh where salt was extracted located at an elevation of 1520 ft amsl. The site was recorded by Stephen Trail in 1982 and was revisited by CRAI personnel on March 16, 1998 (USACE 1998). A GPS point was taken just ten meters north of an area of ponded water adjacent to a pile of stones believed to be an industrial component of the Mercer Salt Works (46Su271). There were other areas of ponded water in the vicinity, and the locations and depths of these ponds surely change seasonally.

46Su276: The Falling Over Mill site is located on Lick Creek at the first major falls below the Mercer Salt Works at an elevation of 1500 ft amsl. The mill was built about 1840 and was destroyed by a flood around 1890. The large mill race is all that remains. A jeep trail runs over part of the mill race. The site was recorded by Stephen Trail in 1982, and was revisited on March 16, 1998 (USACE 1998). The mill race was relocated, and a GPS point recorded for that location. The GPS location is approximately 100 m northeast of the current site plot on the DNR GIS overlay.

46Su278: The Fort Pond Site is located at an elevation of 2140 ft amsl. The site is a natural bear wallow and is believed to have been used as a reference point to Fort Culbertson. The site is situated directly west of the reported location of Fort Culbertson on a high terrace overlooking Crump's Bottom. The site was recorded by Stephen Trail in 1982. This site was not revisited. The plotted map location lies directly south of the presumed fort location.

46Su279: This village site is located on the broad floodplain of the New River just southeast of the Crump mansion at an elevation of 1460 ft amsl and includes a Late Prehistoric component. A large circular area of darkened earth is reported to have been present at one time. The site was recorded by Stephen Trail in 1982, and was revisited on April 15, 1998 (USACE 1998). The area is currently heavily overgrown, and the field road shown on the contour map cannot be followed. Six shovel tests in the area failed to locate any cultural material. No GPS point was taken during the 1998 relocation survey (USACE 1998).

46Su280: The Shockley's Rock site is located on a ridgetop near Bull Falls at an elevation of 1800 ft amsl and has historic European temporal components. It is a rock outcropping that is the reported site of the killing of a man named Shockley by the Indians. The site was recorded by Stephen Trail in 1982 and the site area was revisited by CRAI on April 17, 1998 (USACE 1998). There is a rock outcrop at that location, and a GPS point was recorded here; however, there is little chance of any archaeological correlates of a 200-year-old murder being preserved.

46Su281: The War Ford Post Office and General Store site is located on a terrace on the New River near the Bull Falls camping area at an elevation of 1441 ft amsl. The foundation is still extant, as well as the ferry anchor which was a large log buried in a fill of medium to large stones. This is the site of a ford and small settlement at the lower end of Crump's Bottom. The site was recorded by Stephen Trail in 1982. On March 10, 1998, the

site was revisited. GPS points were taken five m north of the structure, which is partially overgrown with vegetation.

46Su282: The War Ford Ferry site is located near the Bull Falls Camping Area at an elevation of 1440 ft amsl. All that remains is the stone fill of the anchor post. The War Ford paralleled the ferry, but the ford was considered to be rough and deep. The site was recorded by Stephen Trail in 1982.

This area was revisited on March 10, 1998, by CRAI personnel. The entire bank line where the site was plotted was searched during this relocation survey, without success. It was suggested that the lake level was too high to view the remains (USACE 1998). If so, either the recorded elevation is incorrect, or the lake was at least 30 ft above the normal pool elevation. No GPS point was taken at this location (USACE 1998).

46Su290: The Lafferty's Fort site is located on the east side of the New River at the mouth of Indian Creek at an elevation of 1415 ft amsl. It is the location of a pioneer fort which provided protection from the Indians. The fort is contemporaneous with Farley's Fort and Fort Byrd and is known to have been in use until at least 1781 (McBride, Updike & Bonshire 1991). McBride, Updike & Bonshire's (1991) work at this site consisted of the examination of four areas. The first area, a high point overlooking Indian Creek, contained a stone foundation and a large scatter of bricks. The area was surface collected and five shovel probes excavated. Artifacts recovered suggest a late nineteenth to early middle twentieth-century occupation. Artifacts included ceramic fragments, container and window glass fragments, one wire nail fragment, one post-1830 cut nail, one cut nail fragment, one brick and seven brick fragments, and other miscellaneous hardware items. The bricks were very thick (3 in) and are believed to be of local manufacture. The house was still standing as late as 1924, as it appears on a 1924 West Virginia Power Company map. A metal detector survey on either side of the ford road failed to produce any artifacts predating the mid-twentieth century. These two areas were used as picnic spots and contained much late metal refuse such as soda and beer can tabs. The last area examined was a knoll on the New River/Indian Creek floodplain. The area was walked over and no artifacts were reported (McBride, Updike & Bonshire 1991). The site was recorded by Stephen Trail in 1982.

This area shown on the DNR GIS overlay was revisited by CRAI on April 2, 1998 (USACE 1998). The area visited is presumed to be the location of the ford road. There were no historic artifacts observed in shovel tests at this location; however, lithic debitage was observed. This prehistoric occupation may overlap with the GPS location for 46Su208. No GPS points were recorded for the site of the fort.

46Su306: This open habitation site is located on a terrace on Indian Creek at an elevation of 1520 ft amsl. A major Indian trail is reported to have passed by this site. The site was recorded by Eugene Holland and Stephen Trail in 1983. This site was revisited by CRAI on April 9, 1998 (USACE 1998). The site area as plotted by the WVSHPO lies in pasture. This site is not plotted on the DNR GIS overlay. There were four shovel tests excavated, one of which contained lithic debris. A GPS point was recorded at that location.

46Su308: The Junta I site (46Su308) is an open habitation site located on a terrace overlooking the mouth of Indian Creek at an elevation of 1500 ft amsl. Artifacts recovered include a full groove axe, several points, and flakes. The site was recorded by Eugene Holland and Stephen Trail in 1983, and the area was revisited on April 2, 1998 (USACE 1998). The site area is currently in pasture and five shovel tests were excavated on level ground. The area seems suitable for prehistoric occupation; however, no artifacts were observed. No GPS point was taken during the 1998 relocation survey (USACE 1998).

46Su309: Junta II is an open habitation site located on a high terrace overlooking the confluence of Indian Creek and the New River at an elevation of 1540 ft amsl. The site was

recorded by Eugene Holland and Stephen Trail in 1983, and the area was revisited April 2, 1998 (USACE 1998). The area of the mapped plot was considered too steep to have provided prehistoric occupation. Five shovel tests were excavated in the terrace above and one contained lithic debris. Since the GPS points contained errors, an estimated site plot revision is provided (USACE 1998).

46Su310: This open habitation site is located just north of the mouth of Dickinson Hollow on the east side of the New River at an elevation of 1420 ft amsl. The site was recorded by Eugene Holland and Stephen Trail in 1983. This site area was revisited on April 2, 1998 (USACE 1998). The terrace is currently in pasture and five shovel tests were excavated. No artifacts were observed. The area seems quite suitable for prehistoric habitation and the lack of artifacts probably represents a sparse lithic scatter. No GPS point was taken during the 1998 relocation survey (USACE 1998).

46Su325: The Buck Smith site is a prehistoric open habitation site and historic homestead located on the second terrace south of Joshua's Run at an elevation of 1530 ft amsl. The site has been heavily collected. The site was recorded by the Huntington District in 1983.

On March 11, 1998, CRAI personnel revisited this site. The WVSHPO and DNR GIS site plot appears to roughly conform to a long linear ridge running in a northwest to southeast direction. Sparse lithic debris was visible, as well as fire-cracked rock along the ridge. A GPS point was taken at the center of this ridge. There was no historic material visible in the plowed field and no diagnostics were observed. Site 46Su165 lies to the northeast and contains historic material. Previous collections may have confused these sites, or the boundaries may overlap. One Late Archaic Brewerton Ear-Notched projectile point was recovered from the exposed ground surface.

46Su326: This prehistoric site is reported to be a series of scattered camps with a Euro-American occupation, including a possible Civil War component. The site also has Savannah River cultural components, historic European, Late Prehistoric, and Early and Late Archaic temporal components. The site is located on the second terrace south of Joshua's Run, just south of an unnamed stream at an elevation of 1425 ft amsl. The site was recorded by the Huntington District in 1983, and was revisited on March 11, 1998, by CRAI personnel. Lithic debris was visible in the plowed field in the vicinity of the site plot. A large expanding stem biface probably dating to the Late Archaic was recovered from the surface. A GPS point was taken at the approximate center of the site.

46Su327: This prehistoric open site is located on a high field north of Indian Run at an elevation of 1570 ft amsl. The site was recorded by the Huntington District in 1983, and was revisited on April 2, 1998, by CRAI personnel. The site area is currently in pasture and five shovel tests were excavated on level ground. The area seems suitable for prehistoric occupation, as did 46Su308 to the east; however, no artifacts were observed. No GPS point was recorded for this site.

46Su328: This site is reported to be a series of scattered camps with Euro-American historic material related to the Crump Mansion site. The site is located south of the Crump Mansion site at an elevation of 1520 ft amsl. The site was recorded by the Huntington District. When the site was revisited April 8, 1998 by CRAI personnel, the area had been cultivated and there was excellent ground visibility. Widely-scattered lithic debris was evident over the breadth of the field. A GPS point was taken at the approximate center of the site area.

46Su329: This prehistoric open habitation site is located on a high bench overlooking the southern end of Crump's Bottom at 1610 ft amsl. The site was recorded by the Huntington District in 1983. A field located at the south of Crump's bottom had been cultivated and was pedestrian surveyed. A GPS point was taken where a wide scatter of lithic debris was present. The recorded GPS location is situated well south of the mapped plot of the site

however, and it appears the mapped location of the WVSHPO and DNR GIS overlay sites are not consistent. These site areas should be revisited and a consistent plot recorded. The plots may represent two distinct sites.

46Su330: This prehistoric open habitation site is located on a bench overlooking the southern end of Crump's Bottom at an elevation of 1520 ft amsl and has Brewerton cultural components and Early and Late Archaic temporal components. The site was recorded by the Huntington District. A field located at the south of Crump's Bottom had been cultivated and was pedestrian surveyed. A GPS point was taken where a wide scatter of lithic debris was evident.

46Su331: The Crump Mansion is located at an elevation of 1500 ft amsl. The house was built about 1855 and was part of a plantation that is reported to have contained an ice house, smoke house, apple orchard, slave quarters, granary, and blacksmith shop (Maslowski and Woody 1984). The foundation and chimney stones are all that remain. The house contained 22 rooms and was built by slaves from brick made on the site. The timber in the house was predominantly walnut and cherry and the 40-foot front porch columns were solid poplar. The mansion had a full basement with a dirt floor and a plastered attic on the fourth floor. The four main rooms on the first and second floors each had a fireplace (Browning 1953). The kitchen was at the back of the house, separated from the main structure by a breezeway. The remains of the foundation stone and some of the handmade brick can still be identified and plotted. Some "store bought" brick, once used to build a new flue in the kitchen, is helpful in delineating the location of the kitchen. Reportedly there was a basement under the kitchen that was used as slave quarters. A flagstone path led from the porch to the road (Browning 1953; Maslowski and Woody 1984).

Immediately upriver and to the rear of the main house stood a wooden structure, possibly the original slave quarters, which was later used as a meat house. Two original granaries stood directly behind the house and consisted of a double corn crib with a wheat storage bin on top. The outhouse was off the back porch of the house. A depression from the spring house is still visible today. Water was carried from the spring near the spring house or from a spring in back of the house. A family cemetery was located in an area of tillable pasture nearby (Maslowski and Woody 1984).

This site area was revisited by CRAI personnel on April 9, 1998 (USACE 1998). The site area is now wooded. There was a scatter of handmade bricks evident on the ground surface and a GPS point was taken at that location. The GPS point conforms well to previous WVSHPO and DNR GIS site plots.

46Su345: The Robert Neely Grist Mill site is located on the west side of Pipestem Creek about one mile from the creek's mouth at an elevation of 1480 ft amsl. Some foundation stones and the millstone are still extant and are housed at the West Virginia Department of Natural Resources Bluestone Roadside Park. The mill house was a frame, two-story structure constructed of weather boarding. The mill had a large overshot water wheel made of wood which was approximately 12 feet in diameter. The site was recorded by Stephen Trail in 1984.

The site was also visited during a Phase 1 archaeological survey in 1995. Two foundation/wall remnants were located on the west side of the channel near the waters edge of Pipestem Creek. Both walls were constructed of large, rectangular stone blocks. A short distance downstream from the former walls, a remnant of a less formal wall made of natural stone slabs was identified (Anslinger 1995).

This site was revisited by CRAI personnel on March 16, 1998 (USACE 1998). The relocated structure was a rectangular foundation constructed from rectangular and irregular stones with the use of mortar or cement. A GPS point was taken at the northern end of the rectangular structure. The GPS point is located approximately 500 m south of the WVSHPO plot for this site.

46Su358: The Daniel Cook Cabin site is located on the right bank of Tom's Run on the lower end of Crump's Bottom near the Bull Falls camping area at an elevation of 1520 ft amsl. The cabin was erected around 1801, and was recorded by Stephen Trail in 1985.

The area of the site plot was revisited on March 11, 1998 (USACE 1998). Square stones, which may have been the remnants of a chimney or foundation, exist in association with historic domestic and architectural debris. Artifacts observed consisted of milk glass jar lid liners, container glass, and wire nails, indicating a twentieth-century occupation. This location is south of the plot shown currently for this site. A GPS point was taken and assigned this site name. However, this location may not be the same location as the earlier Daniel Cook cabin.

46Su360: The Captain Matthew Farley Home site represents the site of a double log cabin with a breezeway that was erected about 1770. It is located on the east side of the New River, east of the mouth of Buffalo Creek at an elevation of 1520 ft amsl. The site was recorded by Stephen Trail in 1985.

The jeep trail where this site is believed to be located was traveled during the 1998 relocation survey. The area of the supposed site is steeply graded. The area was surveyed for structural remains and none were visible. It appears unlikely the site is at this location. No GPS point was taken during the 1998 relocation survey (USACE 1998).

46Su375: The Meador Campground is an open habitation site at an elevation of 1480 ft amsl with dimensions of approximately 100 m N S x 50 m E W. Shovel tests were conducted in 1984 by David Fuerst, producing six lithic flakes and one whiteware ceramic sherd. The site was recorded by Stephen Trail in 1986. This site was revisited on March 16 1998, at which time, the site area was inundated due to flooding, as was 46Su189 to the south. No GPS point was taken during the 1998 relocation survey (USACE 1998).

46Su385: The Bluestone River site represents the ruins of a private residence on the north side of the Bluestone River 1.75 miles from the lake located at an elevation of 1560 ft amsl and has Historic European temporal components. The site consists of the remains of a house foundation, fence, spring house, two rock walls, garage, and possible well. The site was recorded by Stephen Trail in 1986. CRAI personnel relocated this site March 3, 1998. The site has structural remains and a GPS point was taken. The site appears to be in good condition.

46Su405: The Sherman Ballard Recreation Area site is an open habitation site located at an elevation of 1560 ft amsl with Late Archaic temporal components. The site was originally reported by Stephen Trail in 1986. The site has produced one quartz scraper and two ferruginous sandstone flakes. The site area lies west of a recreation building associated with the Sherman Ballard Recreation Area, on a terrace overlooking the floodplain of the Bluestone River.

The site was revisited by CRAI personnel in 1998 (USACE 1998). The area was in pasture. Shovel tests located lithic debris, and a GPS point was taken at the estimated center of the site area.

46Su436: This site is located on an upper terrace above the New River at Bertha, near the Bluestone Conference Center, at an elevation of about 1580 ft amsl. The site was originally reported by Stephen Trail in 1988. Trail was shown a full groove axe, some points, and debitage collected by a local resident from the site while constructing a septic tank system.

This site was not revisited by CRAI personnel during the 1998 survey, and was not included in the 1998 survey report (USACE 1998). The 1973 MBL map indicates that 44Gs436 may be within the boundaries of the Huntington District Bluestone Lake property (USACE 1973).

46Su437: The Bertha II site is an open habitation site located on a high terrace overlooking the New River at an elevation of 1620 ft amsl. The site was recorded by the Stephen Trail in 1988, and was revisited by

CRAI personnel on April 9, 1998 (USACE 1998). The soils have been subject to erosion, and there has been disturbance in the area from camping and construction activities associated with the Bertha campground. Sparse lithic debris was observed where the ground surface was exposed. A GPS point was taken at the approximate center of the site.

46Su441: This prehistoric open habitation site is located in the Shanklin Ferry campground at an elevation of 1480 ft amsl. The site has been impacted by camper activity as well as privy installations. The site was originally identified by Stephen Trail in 1988. Trail reported recovering a Kirk projectile point from the site.

This site was revisited by CRAI personnel on March 26, 1998 (USACE 1998). Sparse lithic debris was observed along a dirt road running through a camping area. A GPS point was recorded at the estimated center of the site. The GPS plot is on the northeastern boundary of the DNR GIS overlay of the site.

46Su450: This open habitation site is located on the New River near the southern extremity of Crump's Bottom at an elevation of 1460 ft amsl. A village stain is reported to be evident. The site was recorded by the Stephen Trail in 1989.

When CRAI personnel revisited this site on March 26, 1998, the area was heavily overgrown (USACE 1998). Shovel tests were conducted in the vicinity of the WVSHPO plot. Soil was notably darker and sparse lithic debris was observed in two shovel tests south of the DNR GIS overlay plot. A GPS point was taken at the location where lithic material was observed.

46Su471: The Nathane Lilly Cabin site is located on a terrace just north of Joshua's Run at an elevation of 1520 ft amsl. The site was recorded by the Stephen Trail in 1989.

The site area was revisited March 11, 1998 by CRAI personnel. A pile of stones was located, which may be the remains of chimney fall. Historic debris was noted in one shovel test, including wire nails and plain whiteware. The artifacts suggest a late nineteenth-century origin for the site. A GPS point was taken, as the location was in the vicinity of the map plot. However, the site may post-date the Nathane Lilly cabin. The DNR GIS overlay and the WVSHPO plot cover a very large area.

46Su505: This site is located on a low terrace above the floodplain of Indian Creek, at an elevation of 1520 ft amsl, across from the confluence of Bradshaw Creek and Indian Creek. The site location was based on an interview of local resident Bill Walthall by Stephen Trail in 1989.

This site was revisited by CRAI personnel on April 6, 1998 (USACE 1998). The area of the WVSHPO plot was shovel tested and no artifacts were observed. The site is on the same landform as 46Su306, and it is likely that prehistoric material would be found across the terrace. No GPS point was taken as no artifacts were observed.

46Su506: The Indian Creek Mill is the site of a water-powered grist mill that was erected about 1890. The site is at an elevation of 1489 ft amsl. The mill is reported to have been a one- and one-half-story frame structure that was dressed with weatherboarding. The mill was destroyed during construction of the Bluestone project. The mill is reported to have ground mostly wheat with a water wheel with a diameter of 12-15'. The site was recorded by Stephen Trail in 1989.

This site area was revisited by CRAI personnel on April 1, 1998. The area is overgrown with briers and thick undergrowth, and visibility was extremely poor. A pedestrian reconnaissance was undertaken along Indian Creek and across the floodplain looking for structural remains. No structural remains were identified and no GPS point was recorded. An attempt should be made to relocate this site with a systematic survey because of the extremely poor visibility.

46Su507: The Junta Grist Mill site is located near the mouth of Indian Creek about 100 yards east of the Indian Creek Bridge at an elevation of 1450 ft amsl. The mill is reported to have had a wooden dam instead of an earthen dam so that during flood water

would pass over the dam instead of washing it away. The mill was reported to have been four stories high. It is reported the mill was built around 1890 and operated until about 1930. The site was recorded by Stephen Trail in 1989.

The site area was revisited on April 1, 1998. As with site 46Su506, the vegetation was a dense undergrowth of briars. Pedestrian survey was conducted along the creek bank and the floodplain but no structural remains were observed, and no GPS point was recorded. An attempt should be made to relocate this site with a systematic survey because of the extremely poor visibility.

46Su517: This site number was changed to 46Su601 on the WVSHPO site form. The site does not appear of WVSHPO or DNR GIS overlay plots.

46Su518: This site number was changed to 46Su602 on the WVSHPO site form.

46Su519: This site number was changed to 46Su603 on the WVSHPO site form. The site does not appear on WVSHPO or DNR GIS overlay plots.

46Su531: This site contains historic structural remains and is located on a low terrace above Indian Creek. There was no prehistoric material observed in shovel tests in the pasture. The site was originally reported by Stephen Trail in 1990.

The site was revisited by CRAI personnel on April 6, 1998 (USACE 1998). A GPS point was recorded near historic structural remains. The GPS point is located at the southern edge of the WVSHPO plot. This site does not appear on the DNR GIS overlay.

46Su549: This site contains historic structural remains and is located at the point of a high terrace overlooking Indian Creek. The site was recorded by Stephen Trail in 1992 as the Fowler Plantation Manor. Trail described a mid- to late-nineteenth-century plantation complex with a slave quarter, and included a photocopy of a photograph.

This site was revisited by CRAI personnel on March 19, 1998 (USACE 1998). A GPS point was recorded near the structural remains. The GPS point location conforms well to the WVSHPO plot. This site is not located on the DNR GIS overlay.

46Su592: This prehistoric site was reported by Stephen Trail in 1991. The actual WVSHPO site form locates the site along the shoreline of the New River floodplain between 46Su48 and 46Su50. The DNR GIS map agrees with this location, but places 46Su48 and 46Su50 well to the north of the site. Confusion regarding the location of 46SU48 is included with the previous description 46Su48.

This site was not revisited by CRAI personnel during the 1998 survey, and was not included in the 1998 survey report (USACE 1998). The 1973 MBL map indicates that 46Su592 is within the boundaries of the Huntington District Bluestone Lake property (USACE 1973).

46Su593: This prehistoric site was reported by Stephen Trail in 1991. A light scatter of debitage was noted on the east bank floodplain of the New River, opposite a sharp bend in the river across from the south end of Wylie Island.

This site was not revisited by CRAI personnel during the 1998 survey, and was not included in the 1998 survey report (USACE 1998). The 1973 MBL map indicates that 46Su593 is within the boundaries of the Huntington District Bluestone Lake property (USACE 1973).

46Su601: The previous version of the HPMP stated that this was a prehistoric site located along the bank of Bluestone Lake at an elevation of approximately 1440 amsl (USACE 1998). However, examination of the WVSHPO site form indicates that this is a nineteenth century historic site that was originally reported as 46Su517, but changed to 46Su601 (McBride 1993).

The area was revisited by CRAI personnel on March 10, 1998 (USACE 1998). Shovel tests were excavated in the vicinity of the WVSHPO plot, and no artifacts were observed. No GPS point was taken during the

1998 relocation survey (USACE 1998). The original source of the information identifying a prehistoric component is unknown.

46Su602: The previous version of this HPMP stated that 46Su602 represented the same site as 46Su518 and 46Su519 (USACE 1998), but this is incorrect. The site was reported as 46Su518 by McBride in 1991 (McBride, Updike, and Bonshire 1991), but has subsequently been changed on the WVSHPO site form to 46Su602. Site 46Su519 is actually the same site as 46Su603, a situation which is described below.

This site is described on the WVSHPO site form as a late nineteenth to early twentieth-century historic site; artifacts recovered include a decal porcelain sherd, six milk glass lid liners, one zinc lid, four wire nails, and one late cut nail (McBride 1993).

The site was revisited by CRAI personnel on March 18, 1998. The site, located at the tip of a terrace overlooking lower terraces and the floodplain of Indian Creek, contains substantial historic structural remains that appear to date to the nineteenth century. This plot conforms to WVSHPO plots for 46Su518 and 46Su602. The DNR GIS does not have a plot for this site.

46Su603: This site was previously reported as a prehistoric lithic scatter located on a terrace above Indian Creek, with lithic debris observed in shovel tests across the terrace (USACE 1998). CRAI personnel recorded a GPS point at the approximate center of the site, and the location conformed to the WVSHPO plot of the site location. However, examination of the WVSHPO site form indicates that the site, formerly numbered as 46Su519 but changed to 46Su603 in the site files, was originally reported as a historic domestic site occupied from the late nineteenth to early or middle twentieth century (McBride 1993). Artifacts reported on the WVSHPO site form for 46Su603 were previously reported as being from 46Su519 in the 1998 HPMP (USACE 1998). The artifacts recovered include three plain ironstone ceramic sherds, two plain whiteware sherds, one lustre decorated porcelain sherd, one amethyst "blow off top" fruit jar lip, one clear glass bottle body fragment, six milk glass jar lid liner fragments, one zinc fruit jar lid, one enameled tinware pot/pan handle, four window glass fragments, four modern headed cut nail fragments, nine wire nail fragments, one wood screw, one decorative glass knob, one cast iron stove fragment, one steel file fragment, one wire fragment, one rivet, one rubber washer, one post-1902 U.S. Army button, one composite button, one battery core, and 14 unidentified iron/steel fragments (McBride, Updike & Bonshire 1991).

The source of the prehistoric material is unknown. It may be that the 1998 relocation survey (USACE 1998) identified a prehistoric component of the historic site reported by McBride et al. (1991).

46Su616: This prehistoric rockshelter site is located at an elevation of 1600 ft amsl, situated on the east side of a small, unnamed intermittent stream approximately 244 m south of the Bluestone River. Four shovel test pits were excavated, of which three produced cultural material. Material recovered consists of a single projectile point fragment, four flakes, one possible eroded sherd, four small pieces of pelecypod shell, one piece of unburned bone, and several pieces of wood charcoal. A small eroded piece of fired clay was recovered from shovel test pit #2. Shovel test data indicate that intact cultural material of Woodland affiliation extends to a depth of at least 30 cm below surface. The site was considered to be potentially eligible for inclusion on the NRHP, and further testing and evaluation was recommended if project avoidance could not be accomplished (Anslinger 1995).

This site was relocated on April 16, 1998 (USACE 1998). The shelter is positioned within a drainage and it was not possible to take a GPS point at the exact location of the shelter. A point was taken 25 m west of the shelter. This site is not included in the DNR GIS overlay for Bluestone Lake.

46Su617: This open habitation site is located at an elevation of 1540 ft amsl on a

flat ridgetop bench overlooking the confluence of the Bluestone and New rivers and Pipestem Creek. Five shovel tests were excavated. Each produced a small quantity of chert debitage along with a small amount of fire-cracked rock. No evidence of ceramics, formal tools, features, or midden were found. Project avoidance was recommended for this site, and further testing and evaluation was recommended if the site could not be avoided (Anslinger 1995).

This site was revisited April 16, 1998, by CRAI personnel and a GPS point was taken at the estimated center of the site. This site is not included on the DNR GIS overlay for Bluestone Lake.

46Su618: This site is a single rock pile or cairn located on or near the Huntington District property line on the extreme southeast portion of Tract #15. The site is located near the terminus of an upland ridge at an elevation of 1640 ft amsl. The cairn is approximately 15 x 12 ft in size and measures one to two ft in height. There was no evidence of historic or prehistoric artifacts in association with the cairn, and shovel testing failed to produce any cultural remains. A NRHP determination for potential eligibility was not possible (Anslinger 1995).

This site was revisited by CRAI personnel on April 16, 1998 (USACE 1998). A GPS point was taken at the location of the possible rock cairn. This site is not included in the DNR GIS overlay for Bluestone Lake.

46Su633: This site was located during a power line survey for Columbia Power and consists of a lithic scatter on a terrace above Bluestone Lake. This site was revisited by CRAI personnel on April 1, 1998. This site is not present on the DNR GIS overlay for the site. A GPS point was taken where lithic debris was observed on bare ground surface. The GPS point lies 50 m west of the WVSHPO plot.

46Su634: This site was located during a power line survey for Columbia Power. The site consists of historic structural remains that appear to date from the late nineteenth to twentieth century. This site was revisited by CRAI personnel on March 31, 1998 (USACE 1998). The site is not on the DNR GIS overlay for the site. A GPS point reading was taken at the location of the historic structural remains. The GPS reading conforms to the WVSHPO plot for the site.

46Su635: This site consists of a lithic scatter located on a bench above Bluestone Lake. The site was located during a power line survey for Columbia Power. This site was relocated by CRAI on March 31, 1998 (USACE 1998). Shovel tests recovered lithic debris. A GPS point was taken at the estimated center of the site. The position of the GPS point is situated on a lower bench, well south (about 300 m) of the WVSHPO plot for this site. It is possible that the GPS point represents a new site.

46Su636: This site is a historic retaining wall, possibly for a spring, located off an old road bed on a narrow bench high above Bluestone Lake. The site was recorded during a power line survey for Columbia Power. The site was relocated by CRAI personnel on March 31, 1998 (USACE 1998). A GPS point was taken near the retaining wall. The position of the GPS point is lower on the slope than the WVSHPO plot for the site. This site is not shown on the DNR GIS plot of the site.

Curation and Collections

Artifacts from Solecki's survey (1949) and Holland's survey (1970) are housed at the Smithsonian Institution (Table C2, Appendix C). As noted in Chapter 5, some confusion regarding archaeological site numbering was discovered for sites located in Giles County, Virginia, and this confusion is reflected in the Smithsonian accession numbers. Fortunately, 44Gs10 was the only site identified by both Solecki and Holland, and the site number is the same in both Virginia and West Virginia, so the accession numbers for sites associated with Bluestone Lake are not affected.

In 1998, the Huntington District reported that materials curated at the Delf Norona Museum in Moundsville, West Virginia, included about one-half box of materials from

46Su3 equaling approximately 0.6 ft^3 (USACE 1998). Items collected from sites identified by the Huntington District have also been curated "at the Blennerhassett Historical Park Commission in Parkersburg and the West Virginia State Museum at the Division of Culture and History in Charleston, West Virginia" (USACE 1998:68). However, the State of West Virginia has not been accepting materials for curation since at least 1995 due to space limitations. Therefore, collections since at least 1995 (and perhaps prior) likely remain in the possession of the excavator/surveyor. In 1998 and 1999, Andrea Keller of the WVDCH completed an assessment of the Huntington District's collections at the Delf Norona Museum (Keller 2005). These materials are summarized in Table 5-5. It should be noted that artifacts are not accessioned by the State of West Virginia, and are labeled only with the site number rather than an accession number. The most recent site reported in these collections is 46Su208, identified by Stephen Trail in 1981.

Maslowski (1982) notes that a preliminary analysis of the unprovenienced "Martin collection" from the reservoir area was conducted at the Science and Culture Center in Charleston, now the WVDCH. The location of this collection is uncertain.

Keller (2005) also reported that some materials are known to be housed at the University of Pittsburgh, including 57 ft^3 of artifacts recovered by the University of Pittsburgh Cultural Resource Management Program from 46Su3, 46Su9, and 46Su22. These artifacts, as well as human remains, are currently curated at the University's Center for Cultural Resource Research (UPCCRR) near Pittsburgh, Pennsylvania. While plans to move the materials to the Delf Norona Museum are reportedly ongoing, this transfer has not yet occurred.

The curation of artifacts from 46Su633, 46Su634, 46Su635, and 46Su636 (Tidlow et al. 1996; Purtill et al. 1997) were "tentatively" set to occur at the WVDCH. Since these materials were not reported by Keller (2005) in her 1998 assessment of curated Bluestone Lake materials, the current location of these materials is unknown, but assumed to remain with the company conducting the excavations (Gray and Pape, Richmond, Virginia).

A number of unprovenienced artifacts exist in private collections. The Shumate collection is on display at Pipestem State Park. The Martin collection consists of artifacts collected by a local amateur during the 1950s and 1960s, and was at one time housed at the West Virginia Cultural Center (USACE 1979). Another unprovenienced collection in private hands includes the artifacts from 46Su9 discussed in Faulconer (1978).

Table 5-5. An Assessment of the Huntington District Collections at the Delf Norona Museum Through 1998 (Keller 2005)

Site(s)	Box Number	Weight (lbs)	Description of Contents	Condition (as of 1998)
46Su3	1	5	Pottery, shell	Packed in substandard (PVC) plastic with labels that will detach soon.
46Su3	2	28	Ground stone and other stone	Packed with what appears to be a large shredded plastic bag.
46Su3	3	11	No Description	Artifacts in paper bags.
46Su3	4	17	Animal Bone	Packed in substandard plastic bags.
46Su3	5	15	Pottery	Packed in substandard plastic bags - placed in better bags for containment.
46Su3	6	12	Diagnostic Pottery	Fragile. Packed in substandard plastic bags.

Table 5-5. An Assessment of the Huntington District Collections at the Delf Norona Museum Through 1998 (Keller 2005)

Site(s)	Box Number	Weight (lbs)	Description of Contents	Condition (as of 1998)
46Su3	7	11	Animal bone, shell, flint	Fragile. Packed in substandard plastic bags.
46Su3	8	16	Animal bone, pottery, shell, stone	Packed in substandard plastic bags.
46Su3	9	25	Stone (manuports, quartzite, possible hammer stones, primary reduction flakes, etc.)	Some separated in a box. Need padding - not bagged.
46Su3	"West Virginia State Museum Box # 3"	12	Bone, shell, ceramic, lithic	Substandard (PVC) plastic bags. Need to catalog and accession. Artifacts are labeled with site number.
46Su9 (?)	No Box Number	12	No Description	Artifacts not labeled. In paper bags. Includes a WV Geological And Economic Survey memo which states "Crump's Bottom SU9? Donated by Jean Jones". Should be Gene Jones.
46Su9 (?)	No Box Number	22	No Description	Substandard plastic and paper bags. Some belong to Huntington District, some do not. Need to be sorted. Not accessioned or cataloged
46SU009, 46ME019, 46ME020, 46ME021, 46SU020, 46SU022, 46SU028, 46SU047, 46SU048, 46SU049, 46SU050, 46SU052, 46SU053, 46SU055, 46SU056, 46SU208	No Box number	10	No Description	In substandard (PVC) plastic bags. Bags have been placed in other plastic bags in order to retain their labels. Needs padding.
46SU010, 46SU020, 46SU022, 46SU023, 46SU029, 46SU052, 46SU053, 46SU165, 46SU191, 44GS005, 46GS004, 46MC001	No Box Number	15	No Description	In substandard (PVC) plastic bags. Artifacts are not cataloged and accessioned. Robert Maslowski stated that these artifacts were collected by Huntington District archaeologists on field visits to these sites.

Table 5-5. An Assessment of the Huntington District Collections at the Delf Norona Museum Through 1998 (Keller 2005)

Site(s)	Box Number	Weight (lbs)	Description of Contents	Condition (as of 1998)
46SU003, 46SU008/9, 46SU008, 46SU009	No Box Number	14	No Description	In acceptable plastic bags. This box of artifacts was delivered to the collection by Robert Maslowski (Huntington District) in October 1998. It is part of the Gene Jones collection. According to Robert Maslowski, the Gene Jones Collection includes artifacts from Crump's Bottom, which probably consisted of three sites. Gene Jones' field notes should be located and checked - they may be at Marshall University or with Col. Howard MacCord.

Radiocarbon Dates

Radiocarbon dates were calibrated using the 1993 Quaternary Isotope Lab, University of Washington, Calib version 3.0 calibration program (USACE 1998). Samples were entered from the Data Input/Output Menu, with the lab error multiplier being "1."

Table 5-6. Radiocarbon Dates From Bluestone Lake Sites (USACE 1998).

Site	Context	Lab No.	Uncalibrated Date	Calibrated Date
46Su3	Feature B1	UGA-5595	AD 1312	AD 1310, 1360
46Su3	Feature B2	UGA-5596	AD 1541	AD 1460
46Su3	-	SI-3421	AD 1205	AD 1280
46Su3	-	SI-3422	AD 1610	AD 1520
46Su3	-	DIC-1555	AD 1270	AD 1300
46Su3	Feature FI	DIC-1556	AD 1190	AD 1280
46Su3	Feature F24	DIC-1652	AD 1480	AD 1440
46Su3	Feature F26	DIC-1653	AD 1380	AD 1400
46Su3	Feature F33	DIC-1654	AD 340	AD 430
46Su3	Feature F38	DIC-1655	AD 970	AD 1028
46Su9	-	IC-1557	AD 1290	AD 1300
46Su9	-	IC-1558	AD 1220	AD 1286
46Su22	-	IC-1562	AD 1450	AD 1430
46Su22	-	IC-1561	AD 1430	AD 1421
46Su22	-	IC-1557	AD 1410	AD 1410

Chapter 6. Impact Zones, Reservoir and Upland Processes, and the Physical Integrity of Cultural Resources

Introduction

During the twentieth century, the construction and inundation of freshwater reservoirs have undoubtedly impacted and destroyed a large diverse assortment of cultural resources in the United States. In an effort to mitigate impacts to cultural resources resulting from such undertakings, the Reservoir Salvage Act of 1960, as amended in 1974, was established. This piece of legislation requires the Secretary of the Interior to have cultural resource surveys conducted by the Department of the Interior or by the federal agency undertaking the project in advance of construction (Ware 1989). During the 1960s when large amounts of federal dollars were being spent on archaeology, the underlying premise of the Reservoir Salvage Act, i.e., that long term inundation of archaeological resources was a destructive process, came under increasing scrutiny. Although most archaeologists continued to argue for the continuation of survey and salvage efforts, some archaeologists and a growing number of reservoir managers and managing agencies argued that the silt and water column of freshwater reservoirs created conditions favorable or even ideal for the long-term preservation of archaeological resources (Jewell 1961; see Ware 1989).

In an effort to resolve this debate, the National Park Service, the Bureau of Reclamation, the U.S. Army Corps of Engineers, and the Soil Conservation Service, four federal agencies that had been actively involved in the construction of reservoirs, funded a five-year research program designed to conduct basic field and laboratory research on the effects of freshwater inundation on archaeological sites and materials. As discussed by Ware (1989) in a summary of the National Reservoir Inundation Study (NRIS), important conclusions reached by those involved in the study were: 1) that the impacts of freshwater inundation on archaeological sites and materials were overwhelmingly negative, 2) that not all types of deposits and contexts were similarly affected, 3) that only in certain circumstances could in situ preservation be considered a viable alternative to mitigation, and 4) that in order to address the complete range of adverse impacts mitigation plans should be incorporated into the earliest stages of reservoir construction planning (Lenihan et al. 1981; see Ware 1989:3-4).

Impact Zones

Using the NRIS as a model, the Huntington District property at Bluestone Lake was divided into three impact zones. The first zone (Zone A), defined as the conservation pool, is that portion of each reservoir at and below winter drawdown where landforms are permanently inundated (Table 6-1). For Bluestone Lake, the conservation pool is at or below 1406 ft amsl. The second zone (Zone B) is the area impacted by scheduled seasonal fluctuations in pool level, or the littoral zone, which at Bluestone Lake is the area confined to elevations between 1406 ft amsl (the conservation pool) and 1410 ft amsl (the normal pool) (Table 6-2). The third zone (Zone C) consists of the remaining portions of the property above the normal pool, designated as the upland zone (Tables 6-3 and 6-4). This zone includes all land located above 1410 ft amsl and incorporates the floodplain, terrace, upland slope, and hill/ridgetop areas.

The NRIS model does not categorize the area between the normal pool and the maximum flood control pool. During periods of high water, the reservoir is filled to a maximum pool elevation of 1520 ft amsl at Bluestone Lake (Perry n.d.). The maximum flood control pool is marked on all USGS 7.5 minute topographic maps that include the lake. Even though flooding above the normal pool level does not represent an event that is controlled or scheduled by the Huntington District at Bluestone Lake, it does represent a related event that can have both positive and negative impacts upon cultural resources in this zone. For example, information provided in a report by Dunn et al. (1996) indicated that 46Su22 was receiving a net gain in sediment during periods of flood recession. This site was relocated at an elevation of 1450.18 ft amsl (USACE 1998), well above the normal pool but within the maximum flood control pool. Data provided in Dunn et al. (1996) indicate that, during a February 1996 flood event, approximately 3.0 cm of sediment was deposited at a point near the edge of terrace scarp (east side of site), while an area in the southwest part of the site received approximately 1.0 cm during that same event. This indicates that overbank deposition, as described in the following discussion of site disturbance processes, can be an active process during these intermittent, larger-scale flood events. Therefore, cultural resources located in Zone C (above 1410 ft amsl) but still subject to uncontrolled flood events within the maximum flood zone (between 1410 and 1520 ft amsl) will be noted for the purposes of this plan.

The plotted location of a site and the reported elevation data were sometime in conflict. For example, the GPS point taken in 1998 for at 46Su617 places the site well below the 1520 ft amsl contour line and within the maximum flood control pool, in agreement with the plot on the WVSHPO map. However, the same GPS reading that located on the USGS topographic map also returned an elevation of 1531.78 ft amsl, also close to the original reported elevation estimate of 1540 ft amsl and above the elevation of the maximum flood control pool. In cases such as this, where there is disagreement between the reported elevation of a site and its plotted location, the decision was made to rely on the metric data as it currently exists rather than make judgments regarding the validity of the reported locations. In other words, the data will stand on its own until systematic survey is conducted to resolve data conflicts, and the reported elevation was used to categorize whether a site was within or not within any given impact zone. If two reported elevations exist for a given site, the lower elevation was used to assign the impact zone for that site.

Processes of Site Disturbance

Three basic modes of impact have been identified through the study of the effects of freshwater reservoirs on cultural resources (Ware 1989). These impact modes include 1) mechanical, 2) biochemical, and 3) human-related processes. Each process is discussed below.

Mechanical Processes

Mechanical processes that operate at Bluestone Lake can be divided into two broad categories; those that impact sites through physical erosion and those that impact sites through deposition. Processes in these categories may not be mutually exclusive, since some processes of physical erosion can also result in site burial. However, in some instances clear distinctions can be made between processes that operate within the reservoir as opposed to those that operate in the upland environment. Mechanical processes that operate in the conservation pool and littoral zones include the mechanisms of water motion, wave action, and saturation, and slumping of submerged and shoreline alluvial and colluvial units. These processes of physical erosion also play an important role in sedimentation and the redistribution of sediments within the reservoir basin, although silting from backshore runoff and stream inflow are generally cited as the primary processes of sedimentation in freshwater reservoirs. The upland impact zone is typically

not affected by these processes, although other mechanical processes (including mass movement, channel migration, and overbank deposition) have a potential to impact cultural resources.

Water motion. As a process of physical erosion, water motion has the potential to impact sites in each of the three impact zones identified for Bluestone Lake. In the environment of the reservoir physical erosion occurs as a result of nearshore currents and stream inflow. Nearshore currents have the potential to alter topography within the littoral zone of the reservoir. The effects of nearshore currents, which tend to be most prominent in large, broad reservoirs, are often negligible in many small reservoirs.

Another form of water motion at freshwater reservoirs is stream inflow. During winter months when pool levels are lowered, large areas of formerly inundated lake bottom become exposed, with alluvial and lacustrine sediments being susceptible to erosion from free-flowing streams. When reservoirs are at normal pool, the effects of stream inflow within the reservoir proper are diminished. The impacts of water motion on permanently inundated sites in the conservation pool are not well understood, although this process might play an important role in distributing sediment in the reservoir basin and hence site burial. In the upland environment, water motion in the form of free-flowing streams has the potential to impact cultural resources through channel erosion/migration and floodplain scouring and sedimentation during periods of overbank flooding.

Wave action. The mode of physical erosion with the greatest potential to impact archaeological sites located in the littoral zone is wave action. Waves can be generated by wind blowing over the surface of the lake and by human activities such as power boating. Although wave action probably has little if any effect on cultural resources that are deeply submerged, sites located at or in close proximity to a relatively stable shoreline can be impacted as a result of deflation and shoreline retreat. The erosive potential of wave action is conditioned by a number of important variables that include 1) slope and geometry of the shoreline, 2) geological composition of the shoreline, and 3) type and density of vegetation in shallows and along the shoreline. In reservoirs that are not subjected to seasonal fluctuations in pool level, shorelines may achieve a state of equilibrium or stability. This happens when fine-grained sediments eroded from the shoreline are translocated to deep water locations, while coarser-grained or heavier sediments accumulate and form off-shore shoals. Development of shoals changes the topography of the littoral, resulting in a decrease in nearshore wave energy and erosion. However, in flood control reservoirs where the seasonal changes in pool level can be dramatic, shoals are subjected to long periods of erosion and the shoreline may never reach a state of long-term stability. When the reservoir is at winter pool the effects of wave action are probably reduced as a result of smaller, lower energy waves (smaller surface area of lake and less boat traffic) and the presence of a post-inundation silt mantle at the shoreline. The greatest potential for wave action to impact sites in the conservation pool would probably occur during the initial and early period of impoundment before a thick silt mantle develops.

There is no size limit on boats and motors at Bluestone Lake, with boat access provided at six boat ramps and a slide ramp below the dam, clearly indicating an active boating population.

Saturation and slumping. Another process of physical erosion is saturation and slumping. Although not well documented for freshwater reservoirs, subaqueous failures of sloping landforms (e.g., talus slopes, alluvial fans) have been documented. Following impoundment, saturation of sediments can result in liquefaction, with large volumes of sediment being displaced in single, short-term events.

Overbank deposition. The process of overbank deposition takes place when streams overflow their banks and deposit relatively

fine-grained sediments on the valley floor. Under certain conditions, this type of deposition results in the formation of natural levees along the margins of active channels. Although overbank deposition can result in long-term burial of cultural deposits, significant amounts of erosion can also be associated with this process (see water motion above).

Mass movement. This process of erosion consists of the downslope movement of a portion of land surface and can include several specific processes, such as creep, landslide, or slip. The primary agent for movement of mineral, rock, and soil particles is gravity. Mass movement can result in the formation of colluvial fans and aprons at the base of valley walls and other steep slopes. Over long periods of time, this process has the potential to bury cultural deposits located in specific settings in the upland zone.

Biochemical Processes

When sites are inundated, the potential for certain classes of cultural remains (e.g., organic materials) and associated archaeological, geological, and pedological deposits to be differentially preserved or destroyed is related directly to the chemical and biological environment of the freshwater reservoir. Important variables that influence or control lake environments are climate, bedrock geology, soil chemistry, flora and fauna, human activity, and time (Ware 1989). Although significant synchronic, diachronic, and locational differences in water chemistry occur in large reservoirs, the long-term effects of differences on cultural resources is not well understood. In most instances, inundated sites are buried within a sediment matrix that owes its origin to pre-inundation (i.e., alluvial or colluvial) or post-inundation (lacustrine) processes. The depth of site burial within the sediment column will have a significant influence on oxygen-reduction potentials. Sites deeply buried in anaerobic sediments probably support conditions highly favorable for the preservation of many types of archaeological remains, although the effects of long-term burial under these conditions is poorly understood and documented. On the other hand, the decay of organic materials is much greater (or at least more rapid) at sites located in shallow littoral areas of the reservoir where aerobic conditions prevail.

As used for the purposes of this report, the category of biochemical processes for the upland zone is broadly defined to incorporate the plethora of mechanisms that, through biological and/or chemical means, have a potential to impact all or select parts of the archaeological record. Included are various forms of bioturbation, root action, soil/sediment chemistry, and the complex process of pedogenesis. These processes, acting singularly or in various combinations, can have significant impacts on the physical and contextual integrity of archaeological sites.

Human Processes

Included in this category are a wide range of processes that result from human activities. Processes directly related to reservoir construction and use include such large-scale undertakings as dam construction and reservoir clearing. These activities can result in the removal of enormous volumes of soil and sediment, as well as the destruction of all or select categories of cultural features (e.g., razing of historic period structures). Following impoundment, power boating and other recreational activities can increase the intensity and energy of wave action, resulting in an acceleration of shoreline erosion. Also, archaeological sites located in the littoral zone can be impacted by surface collecting and clandestine excavations during periods of pool drawdown, as well as by recreational activities such as off-roading with ATVs or 4X4 vehicles.

In the upland zone, undertakings such as mining, timbering, road and trail construction, agriculture, wildlife management programs, camping, and other developments involving recreational and maintenance facilities represent some of human processes that have a potential to impact archaeological sites. For example, 19 sites in the upland zone are located within or near campground areas. A

total of 34 sites are located within or partially within agricultural fields (Schaefer 1997). In addition, the intentional vandalism of archaeological sites through surface collecting and/or clandestine excavation can negatively impact or destroy site integrity.

Evidence for Impacts to Cultural Resources

The evidence for impacts from some of the processes described above is closely tied to the elevation of the site relative to certain benchmarks, including the conservation pool, the normal pool, and the maximum flood control pool. However, as the site descriptions presented in the previous chapter demonstrate, the location of the recorded sites can be variable, the elevation is based either on an estimated point or a point obtained from a GPS survey unit, and the overall size of most of the sites is unknown. Sites that are have been recorded at an elevation of 1414 ft amsl (46Su187), for example, may, or may not extend into the littoral zone (Zone B) between 1410 and 1406 ft amsl. The extent of these sites is unknown as there has never been a systematic survey of the Huntington District property at Bluestone Lake to record such data. Therefore, the following summary of potential impacts is greatly affected by generally poor location, elevation, and site size data.

Table 6-1. Impacts to Cultural Resources in Zone A (Permanently Inundated).

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Temporal Association	Known and Potential Impacts
46Su2	1400	-	Unknown	Water motion, wave action and saturation, slumping of alluvial deposits

Table 6-2. Impacts to Cultural Resources in Zone B (Seasonally Inundated).

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Temporal Association	Known and Potential Impacts
46Su3	1408	1410.509	LA; LP; PH	Water motion, wave action and saturation; slumping of submerged and shoreline alluvial and colluvial units; natural flooding; unauthorized collecting
46Su60	1410	1413.435	A; LW, LP	Water motion, wave action and saturation; slumping of submerged and shoreline alluvial and colluvial units; natural flooding; unauthorized collecting
46Su61	1410	1439.738	A; MW; LP	Water motion, wave action and saturation; slumping of submerged and shoreline alluvial and colluvial units; natural flooding; unauthorized collecting

A = Archaic; LA = Late Archaic; MW = Middle Woodland; LW = Late Woodland; LP = Late Prehistoric; PH = Protohistoric

Table 6-3. Impacts to Cultural Resources in Zone C (Rarely or Never Inundated) Within or Possibly Within the Maximum Flood Control Zone.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Temporal Association	Known and Potential Impacts
44Gs10	1520	-	LP	Mass movement, channel migration, overbank deposition, natural flooding; unauthorized collecting
44Gs11	1520	-	W/LP	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
44Gs15	1520	1504.941	A; W; LP	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
44Gs17	1515	1526.280	LA; W	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
44Gs20	1505	1482.635	W	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
44Gs22	1520	-	A	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
44Gs28	1523	-	H	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
44Gs41	1480	-	H	Channel migration
44Gs42	1480	-	H	Channel migration
44Gs43	1480	-	H	Channel migration
44Gs44	1480	-	H	Channel migration
44Gs48	1515	-		Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Me19	1470	1494.187	W	Mass movement, channel migration, overbank deposition, camping, natural flooding, unauthorized collecting
46Me20	1470	1485.151	P	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Me21	1470	1482.536	P	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Me103	1460	1486.470	P	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su7	1460	1472.323	LP	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su9	1464	1474.492	EA, LA, MW; LP	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su10	1444	1454.505	LA, W; LP	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su19	1424	-	LP; H	Mass movement, channel migration, overbank deposition, camping, agriculture, natural flooding, unauthorized collecting

Table 6-3. Impacts to Cultural Resources in Zone C (Rarely or Never Inundated) Within or Possibly Within the Maximum Flood Control Zone.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Temporal Association	Known and Potential Impacts
46Su20	1428	1429.187	EA, LA, LW; LP	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su21	1460	1472.487	EA	Mass movement, channel migration, overbank deposition, camping, agriculture, natural flooding, unauthorized collecting
46Su22	1441	1450.184	LA, MW; LP	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su23	1435	1437.454	P; H	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su24	1435	-	LP	Mass movement, channel migration, overbank deposition, camping, agriculture, natural flooding, unauthorized collecting
46Su28	1460	-	PI, LA, W; LP	Mass movement, channel migration, overbank deposition, camping, agriculture, natural flooding, unauthorized collecting
46Su29	1450	-	LP	Mass movement, channel migration, overbank deposition, camping, natural flooding, unauthorized collecting
46Su39	1415	1421.756	PI; EA, MA, LA; EW, MW, LW; LP	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su41	1415	1438.376	PI; EA, LA; EW, MW, LW	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su42	1415	1423.780	PI; LA; MW, LW; LP	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su43	1415	1418.744	MA, LA	Mass movement, channel migration, overbank deposition, camping, natural flooding, unauthorized collecting
46Su44	1415	1424.033	EA, LA; EW, LW; LP	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su45	1415	1438.540	PI; LA; EW, MW, LW; LP	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su47	1475	1473.780	W; LP	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su48	1465	1467.363	MA; W; LP	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su49	1457	-	LW; LP	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su50	1466	1514.879	LP	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su52	1470	1455.824	LA; W/LP	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su53	1430	1430.430	LA	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting

Table 6-3. Impacts to Cultural Resources in Zone C (Rarely or Never Inundated) Within or Possibly Within the Maximum Flood Control Zone.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Temporal Association	Known and Potential Impacts
46Su54	1430	1427.901	EA	Mass movement, channel migration, overbank deposition, camping, natural flooding, unauthorized collecting
46Su56	1490	1471.047	LP	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su58	1485	1492.612	A, LW; LP	Mass movement, channel migration, overbank deposition, camping, agriculture, natural flooding, unauthorized collecting
46Su62	1460	-	W	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su128	1425	1442.796	P	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su165	1414	1441.083	LA, W; H	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su186	1414	1452.773	H	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su187	1414	-	H	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su188	1415	-	P	Mass movement, natural flooding, unauthorized collecting
46Su189	1420	-	P	Mass movement, channel migration, overbank deposition, camping, natural flooding, unauthorized collecting
46Su191	1470	1503.590	A; W	Mass movement, channel migration, overbank deposition, camping, natural flooding, unauthorized collecting
46Su193	1429	-	W/LP	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su194	1460	1461.769	LA; W	Mass movement, channel migration, overbank deposition, camping, agriculture, natural flooding, unauthorized collecting
46Su195	1429	-	W/LP	Mass movement, channel migration, overbank deposition, camping, natural flooding, unauthorized collecting
46Su196	1429	1424.177	LA; W	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su198	1525	1511.208	P	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su202	1429	1469.590	P	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su206	1415	1449.056	P	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su207	1550	1434.984	P; H	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting

Table 6-3. Impacts to Cultural Resources in Zone C (Rarely or Never Inundated) Within or Possibly Within the Maximum Flood Control Zone.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Temporal Association	Known and Potential Impacts
46Su208	1429	1466.191	LA; LP	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su212	1440	1462.933	MA, LA; W; H	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su244	1520	-	P	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su270	1520	-	H	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su271	1520	1503.153	H	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su272	1520	1572.408	H	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su273	1520	1540.341	H	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su274	1520	-	H	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su275	1520	1493.330	H	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su276	1500	1486.162	H	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su279	1460	-	LP	Mass movement, natural flooding, unauthorized collecting
46Su281	1441	1448.698	H	Mass movement, channel migration, overbank deposition, camping, natural flooding, unauthorized collecting
46Su282	1440	-	H	Mass movement, channel migration, overbank deposition, camping, natural flooding, unauthorized collecting
46Su290	1415	-	P; H	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su306	1520	1510.236	P	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su308	1500	-	P	Mass movement, agriculture, natural flooding, unauthorized collecting
46Su310	1420	-	P	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su325	1530	1460.082	LA; H	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting
46Su326	1425	1456.487	EA, LA; LP; H	Mass movement, channel migration, overbank deposition, agriculture, natural flooding, unauthorized collecting

Table 6-3. Impacts to Cultural Resources in Zone C (Rarely or Never Inundated) Within or Possibly Within the Maximum Flood Control Zone.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Temporal Association	Known and Potential Impacts
46Su328	1520	1521.808	H	Mass movement, agriculture, natural flooding, unauthorized collecting
46Su330	1520	1547.044	EA, LA	Mass movement, agriculture, natural flooding, unauthorized collecting
46Su331	1500	1526.939	H	Mass movement, natural flooding, unauthorized collecting
46Su345	1480	1565.459	H	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su358	1520	1489.285	H	Mass movement, channel migration, overbank deposition, camping, natural flooding, unauthorized collecting
46Su360	1520	-	H	Mass movement, natural flooding, unauthorized collecting
46Su375	1480	-	P; H	Mass movement, channel migration, overbank deposition, camping, natural flooding, unauthorized collecting
46Su385	1560	1470.483	H	Mass movement, natural flooding, unauthorized collecting
46Su441	1480	1466.864	EA	Mass movement, channel migration, overbank deposition, camping, natural flooding, unauthorized collecting
46Su450	1460	1473.091	P	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su471	1520	1492.333	H	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su505	1520	-	P	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su506	1489	-	H	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su507	1450	1434.984	H	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su531	-	1498.127	H	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su592	1500	-	P	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su593	1480	-	P	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su601	1440	-	P	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting
46Su634	-	1453.852	H	Mass movement, channel migration, overbank deposition, natural flooding, unauthorized collecting

H = Historic; P = Prehistoric; A = Archaic; EA=Early Archaic; MA = Middle Archaic; LA = Late Archaic; W = Woodland; EW=Early Woodland; MW = Middle Woodland; LW = Late Woodland; LP = Late Prehistoric; PH = Protohistoric

Table 6-4. Impacts to Cultural Resources in Zone C (Rarely or Never Inundated) Above the Maximum Flood Control Zone.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Cultural Components	Known and Potential Impacts
46Me121	1600	-	None	Mass movement, unauthorized collecting
46Su1	1565	-	LW	Mass movement, unauthorized collecting
46Su5	1525	-	LA; H	Mass movement, unauthorized collecting
46Su6	1560	-	EA, LA, MW, LP	Mass movement, unauthorized collecting
46Su8	1535	1563.648	LP; H	Mass movement, unauthorized collecting
46Su12	1525	-	None	Mass movement, unauthorized collecting
46Su13	1540	-	None	Mass movement, unauthorized collecting
46Su55	1550	1583.589	W	Mass movement, agriculture, unauthorized collecting
46Su199	1525	1526.388	A, W, LP; H	Mass movement, unauthorized collecting
46Su200	1525	-	A; W	Mass movement, unauthorized collecting
46Su280	1800	2056.587	None	Mass movement, unauthorized collecting
46Su309	1540	-	P	Mass movement, unauthorized collecting
46Su327	1570	-	P	Mass movement, agriculture, unauthorized collecting
46Su329	1610	1578.081	P	Mass movement, agriculture, unauthorized collecting
46Su390	1600	-		Mass movement, unauthorized collecting
46Su405	1560	1567.858	LA	Mass movement, unauthorized collecting
46Su436	1600	-		Mass movement, unauthorized collecting
46Su437	1620	1618.169	P	Mass movement, camping, unauthorized collecting
46Su549	-	1593.140	H	Mass movement, unauthorized collecting
46Su602	-	1540.860	H	Mass movement, unauthorized collecting
46Su603	-	1522.297	P	Mass movement, unauthorized collecting
46Su616	1600	1565.594	P	Mass movement, unauthorized collecting
46Su617	1540	1531.782	P	Mass movement, unauthorized collecting
46Su618	1640	1726.532	None	Mass movement, unauthorized collecting
46Su633	-	1587.113	P	Mass movement, unauthorized collecting
46Su635	-	1532.766	P	Mass movement, unauthorized collecting
46Su636	-	1605.974	H	Mass movement, unauthorized collecting

H = Historic; P = Prehistoric; A = Archaic; EA=Early Archaic; MA = Middle Archaic; LA = Late Archaic; W = Woodland; EW=Early Woodland; MW = Middle Woodland; LW = Late Woodland; LP = Late Prehistoric; PH = Protohistoric

The Physical Integrity and Accessibility of Archaeological Sites

The known historic resources at Bluestone Lake are clustered in several areas (Figure 2-1). In West Virginia, these areas include sites at the New River/Bluestone River confluence and upstream along the Bluestone River. Along the New River, sites are clustered near the south end of the winter pool, in lower Crump's Bottom at Bull Falls, in middle Crump's Bottom at Joshua's Run, in Crump's Bottom at the mouth of Indian Creek, in upper Crump's Bottom, from Lick Creek to Island Creek, at Wylie Island, and from Wylie Island to the Virginia state line, as well as in the upper reaches of Indian Creek. In Virginia, sites are clustered along the New River from Wylie Falls to Smith Branch, and at Glen Lyn and Rich Creek. This clustering is attributable in part to the lack of systematic survey on the Huntington District property. Past surveys and informant-based site reporting have focused on easily accessible river floodplains, broad stream terraces, and river/stream confluences. These areas are often used for the development of recreational facilities, and the cultural resources in these areas often bear more direct impacts (e.g., campgrounds) than elsewhere. Other areas, such as the uplands surrounding the lake and less accessible terraces, are under-surveyed. The following discussion of physical integrity and accessibility will begin at the Bluestone Dam near Hinton, and proceed upstream to the end of the Huntington District Bluestone Lake property in Giles County, Virginia.

The physical integrity and accessibility of the archaeological sites will be examined within each of these 12 areas (Figures 6-1 through 6-12). Since little has been reported for most of these sites with regard to physical integrity, this section will focus primarily on issues of accessibility.

For the maps that appear in this chapter, the site locations are based first on the GPS points recorded during the 1998 relocation survey. If the site was not relocated during the 1998 relocation survey, then the most representative point based on the WVSHPO map, the DNR GIS overlay, and the site elevation reported in the WV Archaeological Site Form is reported as the site location.

Bluestone River/New River Confluence

Thirteen archaeological sites have been identified within Huntington District property along the Bluestone River to its confluence with the New River at Bluestone Lake (Figure 6-1, Table 6-5). All but one of these sites is within the upland zone (Zone C) above 1410 ft amsl. Site 46Su2 represents a permanently inundated rockshelter in Zone A.

Pipestem Creek and the Bluestone River share this confluence at Bluestone Lake, with State Route 20 crossing the Bluestone River just west of Pipestem Creek. Bluestone State Park is situated along the north side of the Bluestone River, and includes numerous trial heads, access roads, and camping sites. Cabins, park buildings, and access roads are situated on the ridge above Surveyors Branch near 46Su128. The Meador Camping Area includes trails, campsites, parking, and other facilities at the location of 46Su189 and 46Su375. A picnic area and marina are located at the mouth of Pipestem Creek near 46Su2, 46Su187, 46Su617, and 46Su618. The road to the marina off of Route 20 provides easy access to 46Su345. The East Shore Camping Area, accessible only by boat, is located near 46Su1 and 46Su188.

Site 44Su2 is a rockshelter originally identified by Solecki in 1949, when the conservation pool was still at 1391 ft amsl. The elevation on the WVSHPO site form of 1400 ft amsl suggests that it should be now be inundated, and in fact the site could not be relocated during surveys in 1995 (Anslinger 1995) and in 1998 (USACE 1998). The site location, as it currently appears on mapping available at WVSHPO, is well upstream on Pipestem Creek and at a much higher elevation from where Solecki (1949) indicated that it should be, and is probably not

Table 6-5. Archaeological sites Within Huntington District Property Along the Bluestone River to Its Confluence with the New River at Bluestone Lake.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Impact Zone	Landform	Function	Cultural Components
46Su1	1565	-	C	Rockshelter	Rockshelter	LW
46Su2	1400	-	A	Rockshelter	Rockshelter	None
46Su128	1425	1442.796	C	River Floodplain Terrace	Unknown	P
46Su186	1414	1452.773	C	River Floodplain Terrace	Unknown	H
46Su187	1414	-	C	River Floodplain Terrace	Unknown	H
46Su188	1415	-	C	Upland Bench	Unknown	P
46Su189	1420	-	C	River Floodplain Terrace	Unknown	P
46Su345	1480	1565.459	C	Stream Terrace	Mill	H
46Su375	1480	-	C	River Floodplain Terrace	Unknown	P; H
46Su385	1560	1470.483	C	River Floodplain Terrace	Residential	H
46Su616	1600	1565.594	C	Rockshelter	Rockshelter	P
46Su617	1540	1531.782	C	Upper River Terrace	Unknown	P
46Su618	1640	1726.532	C	Ridgetop	Pile Of Rocks	None

correct. Originally recorded at an elevation of 1400 ft amsl, the rockshelter should be permanently inundated.

Site 46Su128 was originally plotted on WVSHPO maps and the DNR GIS overlay upstream from the mouth of Surveyor's Branch. The 1998 Huntington District relocation survey described this area as precluding any prehistoric occupation (USACE 1998). The survey instead identified this prehistoric site nearby at the mouth of Surveyor's Branch where it enters the Bluestone River, and it is presented in this plan as likely representing the true location of this site.

Sites 46Su187, 46Su188, 46Su189, 46Su375, were revisited by CRAI in 1998, but were apparently inundated. These sites could not be relocated at the time, nor could a GPS point be taken for the survey (USACE 1998). As shown in Appendix A, these sites are all above the normal pool elevation within Zone C, but within the maximum flood zone at an elevation of less than 1520 ft amsl.

Site 46Su186 was relocated at the edge of Bluestone Lake during the 1998 survey (USACE 1998). Although the elevation recorded during the survey is well above the normal pool elevation, the elevation estimate recorded on the WVSHPO forms prior to this survey are very close to the normal pool elevation. The proximity of this site to the current lake edge and the lower elevations of earlier estimates suggest that there may be an area of lower elevation for each of these sites that may fall within the seasonally inundated littoral zone (Zone B).

WVSHPO maps and the DNR GIS overlay locate 46Su385 within the Huntington District Bluestone Lake boundaries, but subsequent survey in 1998 (USACE 1998) obtained a GPS point outside of the boundaries, as shown on Figure 6-1. Since this site may actually be located on Huntington District property, it is included in this plan.

Site 46Su2, a rockshelter near the confluence of these rivers, has the lowest recorded elevation of any site at Bluestone Lake, and has likely been inundated since the construction of the dam. Nine sites are within or possibly within the maximum flood control pool. Sites located above the maximum flood

control pool include two rockshelters (46Su1 and 46Su616), an upland terrace site (46Su617), and a ridgetop site (46Su618).

New River, Bend at the South End of the Winter Pool

Sixteen archaeological sites have been identified within Huntington District property along the New River at the bend near the south end of the winter pool (Figure 6-2, Table 6-6). All but three of these sites are within the upland zone (Zone C) above 1410 ft amsl. Sites 46Su3, 46Su60, and 46Su61 are within the littoral zone (Zone B).

Numerous small, intermittent drainages flow down from Wolf Creek Mountain and across the floodplain on the outer bend of the river. The Bluestone Conference Center is located on the upper terraces above the river. The Bertha campground, consisting of 55 primitive sites, is located near 46Su42. The conference center, improved roads, and jeep trails provide easy access to the sites on the east bank. Sites 46Su60, 46Su61, 46Su634, 46Su635, and 46Su636 on the west bank are less accessible, but 46Su60 and 46Su61 represent two of the three sites at Bluestone Lake known to be within the littoral zone (Zone B). Site 46Su3, located on what is now an island in the lake represents the third Zone B site.

Table 6-6. Archaeological Sites Within Huntington District Property Along the New River, the Bend Near the South End of the Winter Pool.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Impact Zone	Landform	Function	Cultural Components
46Su3	1408	1410.509	B	Island	Unknown; Village	LA; LP, PH
46Su39	1415	1421.756	C	River Floodplain Terrace	Dense Camp Areas	PI; EA, MA, LA; EW, MW, LW; LP
46Su41	1415	1438.376	C	River Floodplain Terrace	Dense Camp Areas	PI; EA, LA; EW, MW, LW
46Su42	1415	1423.780	C	River Floodplain Terrace	Dense Camp Areas	PI; LA; MW, LW; LP
46Su43	1415	1418.744	C	River Floodplain Terrace	Dense Camp Areas	MA, LA
46Su44	1415	1424.033	C	River Floodplain Terrace	Dense Camp Areas	EA, LA; EW, LW; LP
46Su45	1415	1438.540	C	River Floodplain Terrace	Dense Camp Areas	PI; LA; EW, MW, LW; LP
46Su60	1410	1413.435	B	River Floodplain Terrace	Dense Camp Areas	A; MW; LP
46Su61	1410	1439.738	B	River Floodplain Terrace	Village/Hamlet	LP
46Su436	1600	-	C	Upper River Terrace	Unknown	A
46Su437	1620	1618.169	C	Upper River Terrace	Unknown	P
46Su633	-	1587.113	C	Upper River Terrace	Unknown	P
46Su634	-	1453.852	C	River Floodplain Terrace	Unknown	H
46Su635	-	1532.766	C	Upland Bench	Unknown	P
46Su636	-	1605.974	C	Upland Bench	Retaining Wall	H

Sites 46Su39 and Su41-Su45 are situated in a near-continuous fashion on a terrace along an outer bend of the New River north of Crump's Bottom. Surveys by the Huntington District in 1977 and 1978 (USACE 1979) recovered a wide range of artifacts from these six sites, including diagnostic artifacts from every prehistoric cultural period from Paleoindian through Late Prehistoric. Two similar sites are located at 46Su60 and 46Su61 on a terrace opposite and just upstream from 46Su41. These sites are all located at the edge of the normal pool, and artifacts were reported eroding from the bank at nearly all of these sites (USACE 1998).

Sites located on the New River floodplain terraces (46Su3, 46Su39, 46Su41, 46Su42, 46Su43, 46Su44, 46Su45, 46Su60, 46Su61, and 46Su633) are all within the maximum flood control pool. Sites located on upper terraces (46Su390, 46Su436, 46Su437, and 46Su633) and upland benches (46Su635 and 46Su636) are all above the maximum flood control pool.

New River, Lower Crump's Bottom at Bull Falls

Twelve archaeological sites have been identified within Huntington District property along the New River in lower Crump's Bottom near Bull Falls (Figure 6-3, Table 6-7). All of these sites are within the upland zone (Zone C) above 1410 ft amsl.

The Bull Falls waterfall was drowned by construction of Bluestone Lake. Upstream from this bend at Bull Falls, the New River opens out into Crump's Bottom, a wide, fertile area rich in archaeological remains. The Bull Falls Campground, located near 46Su24, 46Su54, and 46Su281, consists of 25 primitive campsites. As Crump's Bottom opens upstream to the east, the wide floodplains have proven suitable for modern agriculture, and many sites are in field or pasture.

Site 46Su282, known as the War Ford Ferry site, was noted in the 1993 Huntington District cultural resources reconnaissance report as being located near the Bull Falls Camping Area, but the site location does not appear on WVSHPO maps or the DNR GIS overlay. Since the site was not relocated in 1998 (USACE 1998), its exact location is uncertain and could not be plotted on Figure 6-3. Site 46Su280 is a rock outcrop that may represent the site of a historic event, as described in Chapter 5, but has no identifiable archaeological components. Campground roads and trails associated with the Bull Falls Camping Area provide easy and ample access to the eight sites situated on the broad floodplain along the west side of the New River. Jeep trails across the floodplain at the mouth of Buffalo Creek provide access to 46Su62 and 46Su360. All of the sites are within the maximum flood control pool except 46Su280, located adjacent to the improved access road to the Bull Falls campground.

Table 6-7. Archaeological Sites Within Huntington District Property Along the New River, Lower Crump's Bottom at Bull Falls.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Impact Zone	Landform	Function	Cultural Components
46Su19	1424	-	C	River Floodplain Terrace	Unknown; 18th C. Fort	LP; H
46Su20	1428	1429.187	C	River Floodplain Terrace	Unknown; Village	EA, LA, LW; LP
46Su24	1435	-	C	River Floodplain Terrace	Village	LP
46Su53	1430	1430.430	C	River Floodplain Terrace	Unknown	LA
46Su54	1430	1427.901	C	River Floodplain Terrace	Unknown	EA
46Su62	1460	-	C	River Floodplain Terrace	Unknown	W
46Su280	1800	2056.587	C	Ridgetop	Rock Outcrop	None
46Su281	1441	1448.698	C	River Floodplain Terrace	War Ford (Post Office/Store)	H
46Su282	1440	-	C	River Floodplain Terrace	War Ford Ferry	H
46Su358	1520	1489.285	C	River Floodplain Terrace	Cabin	H
46Su360	1520	-	C	Upland Bench	Unknown	H
46Su601	1440	-	C	River Floodplain Terrace	Unknown	P

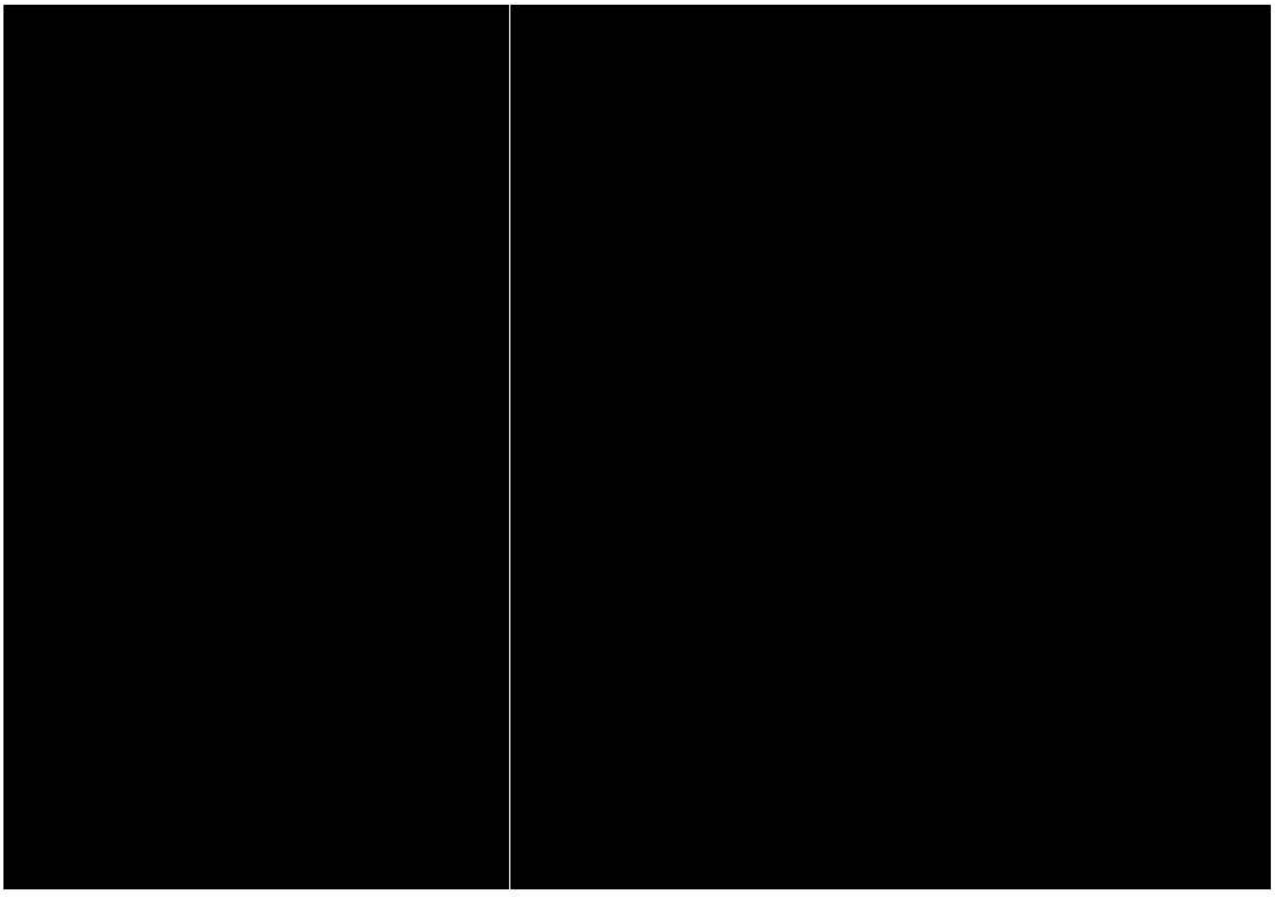
New River, Middle Crump's Bottom at Joshua's Run

Eight archaeological sites have been identified within Huntington District property along the New River at Middle Crump's Bottom at Joshua's Run (Figure 6-4, Table 6-8). All of these sites are within the upland zone (Zone C) above 1410 ft amsl.

Wide floodplains at the base of steep bluffs are common in this area, and many of the sites are in agricultural fields or pasture. Route 20 and other unimproved roads provide access to the fields and the sites contained within them. All of the sites are within the maximum flood control pool.

Table 6-8. Archaeological Sites Within Huntington District Property Along the New River, Middle Crump's Bottom at Joshua's Run.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Impact Zone	Landform	Function	Cultural Components
46Su23	1435	1437.454	C	River Floodplain Terrace	Unknown; 18th C. Fort	P; H
46Su165	1414	1441.083	C	River Floodplain Terrace	Unknown; Farm	LA, W; H
46Su195	1429	-	C	River Floodplain Terrace	Unknown	W/LP
46Su310	1420	-	C	River Floodplain Terrace	Unknown	P
46Su325	1530	1460.082	C	River Floodplain Terrace	Unknown	LA; H
46Su326	1425	1456.487	C	River Floodplain Terrace	Unknown	EA, LA; LP; H
46Su471	1520	1492 333	C	Stream Terrace	Residence	H



New River, Crump's Bottom at Indian Creek

A total of 21 archaeological sites have been identified within Huntington District property along the New River in Crump's Bottom at Indian Creek (Figure 6-5). All of these sites are within the upland zone (Zone C) above 1410 ft amsl. Although 23 sites appear in Table 6-9, two of these sites (46Su517 and 46Su518) are in fact the same site as 46Su602.

The Mouth of Indian Creek campground consists of two widely separated areas of primitive camping. One of these campgrounds is located near 46Su194 and 46Su212, and the other is located downstream of 46Su196. Access to this dense area of archaeological sites is provided via trails, dirt access roads, and improved roads. The archaeological sites are densely concentrated, many of them located on a series of floodplain and upper terraces now used for agriculture or pasture. Fourteen sites are located or possibly located within the maximum flood control pool at 1520 ft amsl or below (Table 6-9). Seven other sites are located on upper terraces, ridgetops, or within rockshelters above the maximum flood control pool.

[redacted]

Table 6-9. Archaeological Sites Within Huntington District Property Along the New River, Crump's Bottom at Indian Creek.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Impact Zone	Landform	Function	Cultural Components
46Su6	1560	-	C	Upper River Terrace	Unknown	EA, LA, MW, LP
46Su10	1444	1454.505	C	River Floodplain Terrace	Unknown; Village	LA, W; LP
46Su12	1525	-	C	Rockshelter	Rockshelter w/Pictograph	None
46Su22	1441	1450.184	C	River Floodplain Terrace	Unknown; Village	LA, MW; LP
46Su52	1470	1455.824	C	River Floodplain Terrace	Unknown	LA; W/LP
46Su193	1429	-	C	River Floodplain Terrace	Unknown	W/LP
46Su194	1460	1461.769	C	River /Stream Terrace	Unknown	LA; W
46Su196	1429	1424.177	C	River Floodplain Terrace	Unknown	LA; W
46Su202	1429	1469.590	C	River Floodplain Terrace	Unknown	P
46Su206	1415	1449.056	C	River Floodplain Terrace	Unknown	P
46Su207	1550	1434.984	C	River /Stream Terrace	Unknown	P; H
46Su208	1429	1466.191	C	River /Stream Terrace	Unknown	LA; LP
46Su212	1440	1462.933	C	River /Stream Terrace	Unknown	MA, LA; W; H
46Su278	2140	-	C	Ridgetop	Bear Wallow	None

Table 6-9. Archaeological Sites Within Huntington District Property Along the New River, Crump's Bottom at Indian Creek.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Impact Zone	Landform	Function	Cultural Components
46Su290	1415	-	C	River /Stream Terrace	Unknown; 18th C. Fort	P; H
46Su308	1500	-	C	Upper River Terrace	Unknown	P
46Su309	1540	-	C	Stream Terrace	Unknown	P
46Su327	1570	-	C	Upper River Terrace	Unknown	P
46Su507	1450	1434.984	C	Stream Terrace	Mill	H
46Su518	-	-	-	-	changed to 46Su602	-
46Su519	-	-	-	-	changed to 46Su602	-
46Su549	-	1593.140	C	Stream Terrace	Unknown	H
46Su602	-	1540.860	C	Stream Terrace	Residence	H

New River, Upper Crump's Bottom

Eight archaeological sites have been identified within Huntington District property along the New River at upper Crump's Bottom (Figure 6-6, Table 6-10). All of these sites are within the upland zone (Zone C) above 1410 ft amsl.

Most of these sites are located on a series of terraces within a sharp inner (western) bend in the river. These terraces are often used for agriculture and pasture, with several improved and unimproved roads providing access. Agriculture is also practiced on the wide, outer floodplain south of the bend. Cedar Branch campground is located on this side of the river, in the vicinity of 46Su28 and 46Su29. Only 46Su328 and 46Su329 (on the inner bend) are located on terraces high enough to be above the maximum flood control pool.

Table 6-10. Archaeological Sites Within Huntington District Property Along the New River, Upper Crump's Bottom.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Impact Zone	Landform	Function	Cultural Components
46Su28	1460	-	C	River Floodplain Terrace	Unknown; Village	PI, LA, W; LP
46Su29	1450	-	C	River Floodplain Terrace	Unknown	LP
46Su279	1460	-	C	Upper River Terrace	Village	LP
46Su328	1520	1521.808	C	Upper River Terrace	Residential Outbuildings	H
46Su329	1610	1578.081	C	Upper River Terrace	Unknown	P
46Su330	1520	1547.044	C	Upper River Terrace	Unknown	EA, LA
46Su331	1500	1526.939	C	Upper River Terrace	Residential	H
46Su450	1460	1473.091	C	River Floodplain Terrace	Unknown	P

[redacted]

Upper Indian Creek

Eleven archaeological sites have been identified within Huntington District property along upper Indian Creek (Figure 6-7, Table 6-11). All of these sites are within the upland zone (Zone C) above 1410 ft amsl.

Many of these sites are cluster around the town of Indian Mills, including 46Su198 near the Indian Mills campground. Sites are commonly located within the agricultural fields and pastures on stream terraces, with easy access provided by roads (improved and unimproved) and jeep trails. Despite being located well upstream from the mouth of Indian Creek at the New River, all but four of these sites are within the maximum flood control pool below 1520 ft amsl.

Table 6-11. Archaeological Sites Within Huntington District Property Along Upper Indian Creek.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Impact Zone	Landform	Function	Cultural Components
46Su5	1525	-	C	Upper Stream Terrace	Unknown; Eighteenth Century Fort	LA; H
46Su13	1540	-	C	Rockshelter	Rockshelter	None
46Su191	1470	1503.590	C	Stream Terrace	Unknown	A; W
46Su198	1525	1511.208	C	Stream Terrace	Unknown	P
46Su199	1525	1526.388	C	Stream Terrace	Unknown	A, W, LP; H
46Su200	1525	-	C	Stream Terrace	Unknown	A; W
46Su306	1520	1510.236	C	Stream Terrace	Unknown	P

Table 6-11. Archaeological Sites Within Huntington District Property Along Upper Indian Creek.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Impact Zone	Landform	Function	Cultural Components
46Su505	1520	-	C	Stream Terrace	Unknown	P
46Su506	1489	-	C	Stream Terrace	Mill	H
46Su531	-	1498.127	C	Stream Terrace	Unknown	H
46Su603	-	1522.297	C	Stream Terrace	Unknown	P

[redacted]

New River and Lick Creek to Island Creek

Eleven archaeological sites have been identified within Huntington District property along the New River and Lick Creek upstream to Island Creek (Figure 6-8, Table 6-12). All of these sites are within the upland zone (Zone C) above 1410 ft amsl.

Saltwell Ridge is a prominent feature on the landscape separating these two creeks and overlooking the New River, but the ridge has never been surveyed. On the east bank of the lake across from the steep Saltwell Ridge is an area of wide river floodplains and several unnamed tributaries flowing into the lake. This area is known as the Sherman Ballard Recreation area, and includes one portion of the Shanklins Ferry Campground near 46Su21. Shanklins Ferry Campground consists of three widely separated areas of primitive camping; the other two areas are located upstream. On the west side of the New River, a jeep trail provides access to seven sites on the stream terraces of Lick Creek.

[redacted]

Table 6-12. Archaeological Sites within Huntington District Property along the New River and Lick Creek Upstream to Island Creek.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Impact Zone	Landform	Function	Cultural Components
46Su21	1460	1472.487	C	River Floodplain Terrace	Large Camp Site	EA
46Su55	1550	1583.589	C	Upper River Terrace	Unknown	W
46Su56	1490	1471.047	C	River Floodplain Terrace	Unknown	LP
46Su244	1520	-	C	River Floodplain Terrace	Unknown	P
46Su270	1520	-	C	Stream Terrace	Residential/Farm	H
46Su271	1520	1503.153	C	Stream Terrace	Salt Works	H
46Su272	1520	1572.408	C	Stream Terrace	Salt Works (Blacksmith Shop)	H
46Su273	1520	1540.341	C	Stream Terrace	Salt Works (Post Office/Store)	H
46Su274	1520	-	C	Stream Terrace	Residential	H
46Su275	1520	1493.330	C	Stream Terrace	Salt Works	H
46Su276	1500	1486.162	C	Stream Terrace	19th C. Mill	H
46Su405	1560	1567.858	C	Upper River Terrace	Unknown	LA

Only two sites are definitely above the maximum flood control pool, situated on upper terraces above the New River floodplain (46Su55 and 46Su405). Sites 46Su272 and 46Su273 are located on the edge of the maximum flood control pool, and may be at least partially within it.

New River at Wylie Island

Eight archaeological sites have been identified within Huntington District property along the New River at Wylie Island (Figure 6-9, Table 6-13). All of these sites are within the upland zone (Zone C) above 1410 ft amsl.

Shanklins Ferry Campground consists of three widely separated areas of primitive camping, one of which is located in the vicinity of 46Su58 on the eastern floodplain of the New River across from Wylie Island. Access to this site is provided only by a jeep trail. The other seven sites are located on the floodplain terrace along the western bank of the New River. Sites 46Su9, 46Su47, 46Su48, 46Su49, and 46Su50 identified within agricultural fields along this floodplain. The floodplain is too narrow for agriculture further upstream at 46Su592, and 46Su8 is situated on an upper terrace.

Although access to this area is very limited, the very remoteness of the area has made it easier for unauthorized collecting to go undetected. For example, 46Su9, a Late Prehistoric village, has proven particularly susceptible to impacts from unauthorized collecting. Over the course of three years, two individuals excavated 153 burials from this village (USACE 1983). A report contained within a Huntington District cultural resources reconnaissance summary (USACE 1979) described the removal of the burials at 46Su9 (Rich 1979).

All but one of these sites are situated on floodplain terraces within the maximum flood control pool (below 1520 ft amsl); 46Su8 is located on an upper terrace above the maximum flood control pool.

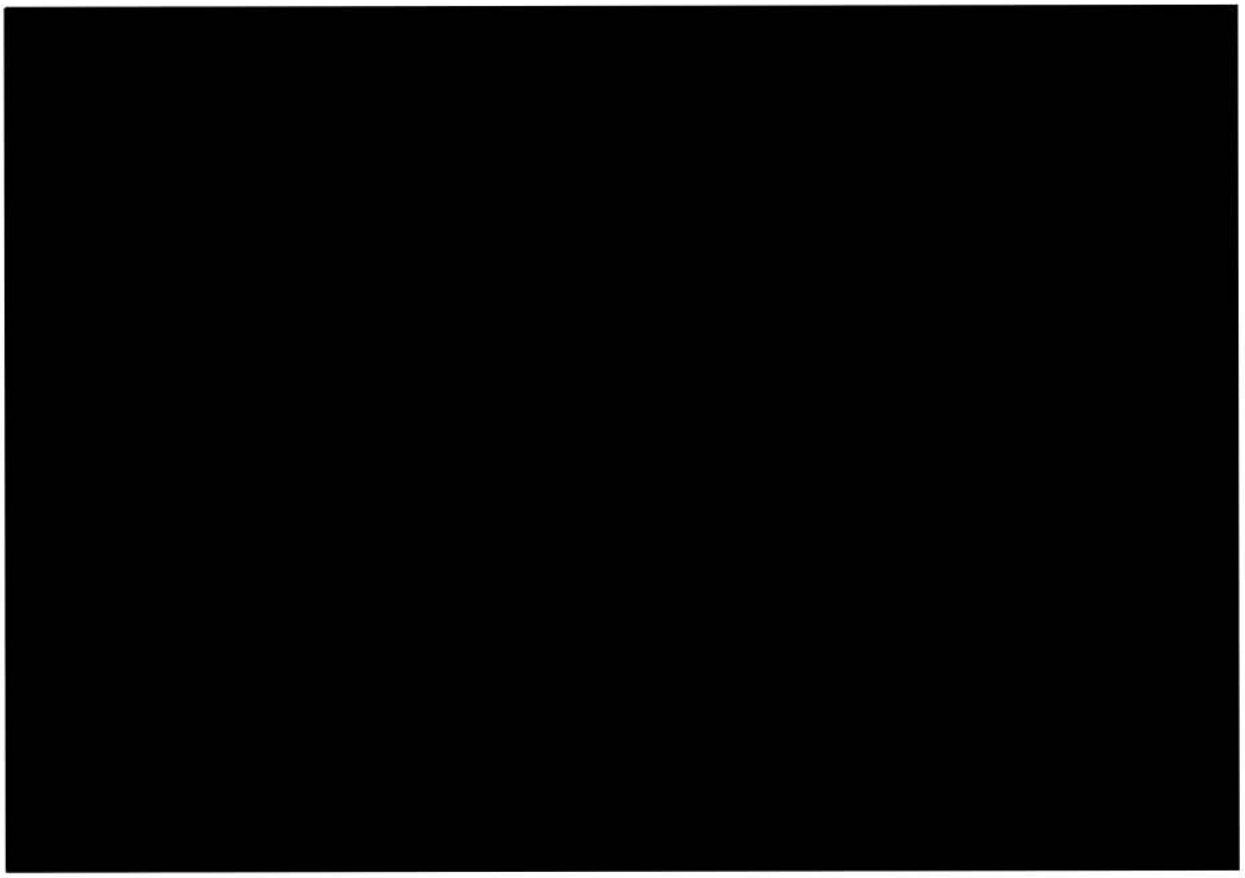


Table 6-13. Archaeological Sites Within Huntington District Property Along the New River at Wylie Island.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Impact Zone	Landform	Function	Cultural Components
46Su8	1535	1563.648	C	Upper River Terrace	Unknown	LP; H
46Su9	1464	1474.492	C	River Floodplain Terrace	Unknown; Village	EA, LA, MW; LP
46Su47	1475	1473.780	C	River Floodplain Terrace	Unknown	W; LP
46Su48	1465	1467.363	C	River Floodplain Terrace	Unknown	MA; W; LP
46Su49	1457	-	C	River Floodplain Terrace	Hamlet	LW; LP
46Su50	1466	1514.879	C	River Floodplain Terrace	Hamlet	LP
46Su58	1485	1492.612	C	River Floodplain Terrace	Unknown; Hamlet	A, LW; LP
46Su592	1500	-	C	River Floodplain Terrace	Unknown	P

New River from Wylie Island to Roundbottom Creek

Eight archaeological sites have been identified within Huntington District property along the New River from Wylie Island to the Virginia State Line (Figure 6-10, Table 6-14). All of these sites are within the upland zone (Zone C) above 1410 ft amsl.

Site 46Su7 is located on the west bank floodplain of the New River, at the mouth of Roundbottom Creek. Site 46Su121 is a rockshelter at the mouth of Ford Hollow, above the eastern bank opposite 46Su7. Both sites are accessible by jeep trails or unimproved roads. The remaining six sites are spread out in agricultural field along the eastern bank floodplain. One of the three widely separated areas of primitive camping associated with Shanklins Ferry Campground is located in the vicinity of 46Su441 and 46Me19.

All of these sites except the rockshelter (46Me121) are located within the maximum flood control pool below 1520 ft amsl.

Table 6-14. Archaeological Sites Within Huntington District Property Along the New River from Wylie Island to Roundbottom Creek.

Site	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Impact Zone	Landform	Function	Cultural Components
46Me19	1470	1494.187	C	River Floodplain Terrace	Unknown	W
46Me20	1470	1485.151	C	River Floodplain Terrace	Unknown	P
46Me21	1470	1482.536	C	River Floodplain Terrace	Unknown	P
46Me103	1460	1486.470	C	River Floodplain Terrace	Series of Small Camps	P
46Me121	1600	-	C	Rockshelter	Rockshelter	None
46Su7	1460	1472.323	C	River Floodplain Terrace	Unknown	LP
46Su441	1480	1466.864	C	River Floodplain Terrace	Unknown	EA
46Su593	1480	-	C	River Floodplain Terrace	Unknown	P

[redacted]

New River from Wylie Falls to Smith Branch

Five archaeological sites have been identified within Huntington District property along the New River from Wylie Falls to Smith Branch (Figure 6-11, Table 6-15). The floodplain terraces of the New River are more tightly restricted and difficult to access as the river twists and turns through a series of falls and rapids beneath steep-sided bluffs southward towards The Narrows.

While all of these sites are technically within the upland zone (Zone C) by definition (above 1410 ft amsl), four of these five sites represent navigations sluices or cuts for navigation sluices within the river bedrock itself and have been assigned to Zone A. Only 46Su20, located on a river floodplain at the mouth of Smith Branch, is not located within the river itself. An unimproved road provides access to 46Su20.

All of these sites are located within the maximum flood control pool below 1520 ft amsl.

Table 6-15. Archaeological Sites Within Huntington District Property Along the New River from Wylie Falls to Smith Branch.

Site (VDHR)	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Elevation (ft) amsl of Relocated Sites (USACE 1998)	Impact Zone	Landform	Function	Cultural Components
44Gs20	44Gs11	1505	1482.635	C	River Floodplain Terrace	Unknown	W
44Gs41	-	1480	-	A	River	Cut for Proposed Navigation	H
44Gs42	-	1480	-	A	River	Navigation Sluice	H
44Gs43	-	1480	-	A	River	Navigation Sluice	H
44Gs44	-	1480	-	A	River	Navigation Sluice	H

New River at Glen Lyn and Rich Creek

Seven archaeological sites have been identified within Huntington District property along the New River at Glen Lyn and Rich Creek (Figure 6-12, Table 6-16). All of these sites are within the upland zone (Zone C) above 1410 ft amsl.

Site 44Gs28 is a historic cemetery located on a west bank floodplain terrace at Glen Lyn at the Route 460 bridge crossing. A total of 15 marked and unmarked plots were noted in an area described as "to be disturbed by construction" (MacCord 1972). The site form refers to notes from excavations in 1972, so it may be that the cemetery was relocated in advance of construction. These notes could not be relocated during archival research at VDHR.

Three sites are situated on east bank floodplains beneath Route 460, 464Gs15 at Glen Lyn and 44Gs11 and 44Gs22 at Rich Creek. Site 44GS22 is located within a Virginia Department of Transportation (VDOT) roadside Park. MacCord (1974) reports a deep test at the site by unknown persons that identified an Archaic level beneath river alluvium at a depth of four feet.

Two sites (44Gs48 and 44Gs17) are located on a narrow west bank floodplain beneath Route 649, near the mouth of Limestone Creek. Upstream from these two sites, 44Gs10 represents a major Late Prehistoric village located on a broad, inner bend floodplain below the town of Lurich. Unauthorized collecting has a long history at 44Gs10, where Solecki related local reports that "many collections" had been made at the site (1949:376). Collins (1965) also reports that a few local people knew about the site and collected from it, with some hinting that a small amount of digging had been done. All of these sites are located within the maximum flood control pool below 1520 ft amsl.

Table 6-16. Archaeological Sites Within Huntington District Property at Glen Lyn and Rich Creek.

Site (VDHR)	WVSHPO Elevation (ft amsl)	USACE 1998 Elevation (ft amsl)	Elevation (ft) amsl of Relocated Sites (USACE 1998)	Impact Zone	Landform	Function	Cultural Components
44Gs10	44Gs10	1520	-	C	River Floodplain Terrace	Village	LP
44Gs11	44Gs1	1520	-	C	River Floodplain Terrace	Unknown	W/LP
44Gs15	44Gs5	1520	1504.941	C	River Floodplain Terrace	Unknown	A; W; LP
44Gs17	44Gs7	1515	1526.280	C	River Floodplain Terrace	Unknown	LA; W
44Gs22	-	1520	-	C	River Floodplain Terrace	Unknown	A
44Gs28	-	1523	-	C	River Floodplain Terrace	Cemetery	H
44Gs48	-	1515	-	C	River Floodplain Terrace	Unknown	LW; LP

Chapter 7. Site Evaluations and the Identification of Archaeologically Sensitive Landforms

Introduction

This chapter begins with a summary of previously reported evaluations regarding the significance of archaeological sites at Bluestone Lake. This summary is followed by a discussion of the potential of certain landforms to contain intact cultural deposits.

A summary of archaeological site evaluations allows property managers and managing agencies to use information presented in previous chapters (including location, physical condition, and active and potential impacts) in the development of effective management plans for sites that are eligible or potentially eligible for the NRHP. In similar fashion, the identification of archaeologically-sensitive areas or landforms provides information important for the design and implementation of long-term development plans and other projects that involve earthmoving or activities that have a potential to impact sites.

Site Evaluations

All archaeological sites do not have the potential to provide important information. Criteria for evaluation to the NRHP are stated in 36CFR sec. 60.4 (also see page 2 of *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*). The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that: A) are associated with events that have made a significant contribution to the broad patterns of our history; B) are associated with the lives of persons significant in our past; C) embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction; or D) have yielded, or may be likely to yield, information important in prehistory or history.

Criterion D is usually used to nominate archaeological sites to the NRHP because of their potential to address important research questions about human history through the analysis of material remains and contexts. However, a property must meet two requirements to be nominated under this criterion. First, the property must have, or have had, information to contribute to our understanding of human history or prehistory, and second, the information must be considered important. In order for these requirements to be met, a site must 1) retain sufficient physical/contextual integrity to yield the expected important information, and 2) retain sufficient data, in the form of artifacts and other cultural deposits. Sites meeting the above criteria are eligible for the NRHP and must be protected.

Sites for which NRHP evaluations have been conducted are listed in Table A-2 of Appendix A. Four levels of determination are summarized: ***1) eligible, 2) potentially eligible, 3) not eligible, and 4) unknown.*** For a site to be considered ***eligible*** it would need to have, or have had, important information to contribute to our understanding of human history or prehistory. It would also be necessary to demonstrate that a site retained a sufficient amount of physical integrity and data content to enable important research

questions to be answered. A determination of ***potentially eligible*** indicates that the site had a potential to provide important information. A determination of ***not eligible*** indicates that the site has been destroyed, or that existing information clearly demonstrates that the physical integrity and data content were not sufficient to address important research questions. Finally, a determination of ***unknown*** indicates that existing information is not sufficient to make one of the aforementioned determinations.

There are no archaeological sites at Bluestone Lake listed on the NRHP. Currently, three Late Prehistoric villages (46Su3, 46Su9, and 46Su22) have been determined eligible for inclusion on the NRHP. Two prehistoric sites (a rockshelter at 46Su616 and an open-air site at 46Su617) have been determined potentially eligible for listing to the NRHP. Two prehistoric (46Su633 and 46Su635) and two historic sites (46Su634 and 46Su636) have been determined not eligible. The eligibility could not be determined for 46Su618. This site is represented by a rock outcropping that may, or may not, represent the location of a historical event for which no archaeological materials are expected (see Chapter 5). The eligibility of the remaining 118 sites is unknown. While some sites with an "unknown" eligibility are likely eligible for the NRHP (notably some of the more prominent Late Prehistoric villages), based in the information presented in various sources, none have been formally evaluated with regard to their NRHP eligibility.

Although they do not have assigned archaeological site numbers, determinations of NRHP eligibility assessments have been conducted for both the Bluestone Dam and a section of Route 23 (which runs along the east side of the New River from Hinton southward) (Heritage Resources Inc. 1997). The Bluestone Dam is considered eligible for the NRHP under Criterion A. Route 23 was determined to be not eligible for the NRHP.

There are no extant structures at Bluestone Lake listed on the NRHP. Buildings related to the construction of the Bluestone Dam have been mentioned in some historical documents; given that the dam itself is considered eligible for the NRHP, it is likely that related buildings would be eligible as well. For example, prior to the beginning of the dam construction, the resident engineer for the Bluestone project and four other officials paid a visit to Hinton to study the construction site and to select a location for the office building that would house the Corps' engineering staff during construction of the dam. Construction began on this two-story wood-frame office building on November 28, 1941 (Hardlines Design 2002:39). This office building was located "about 1,000 yards below the site of the $22,000,000 New River flood control and hydro-electric project" (Perry n.d.:16).

The construction of nine buildings below the dam site to be used by the Dravo Corporation was to begin shortly after the February 18, 1942 (Perry n.d.:19). During the construction of these buildings, Dravo officials used an old frame building adjoining the new engineer's office building as their temporary headquarters. These nine buildings comprised part of the overall dam construction plant (Figure 7-1), as described by Hardlines Design (2002:40-43):

> The first train crossed over to the construction site on April 14, 1942. The following months were spent building the construction plant and other facilities necessary for the dam's construction. The construction plant was located on the east side of the Bluestone River on a 400-foot wide section of plain (see fig. 14). The facility was laid out according to a linear plan along small-gauge railroad tracks that led to the dam site. The construction plant consisted of 29 buildings, including personnel-related facilities, a concrete mixing plant, storage buildings, and various shop structures. Highlights of the portion of the plant immediately north of the dam included a multi-story concrete mixing plant immediately adjacent to the dam site, a series of shops and locker rooms

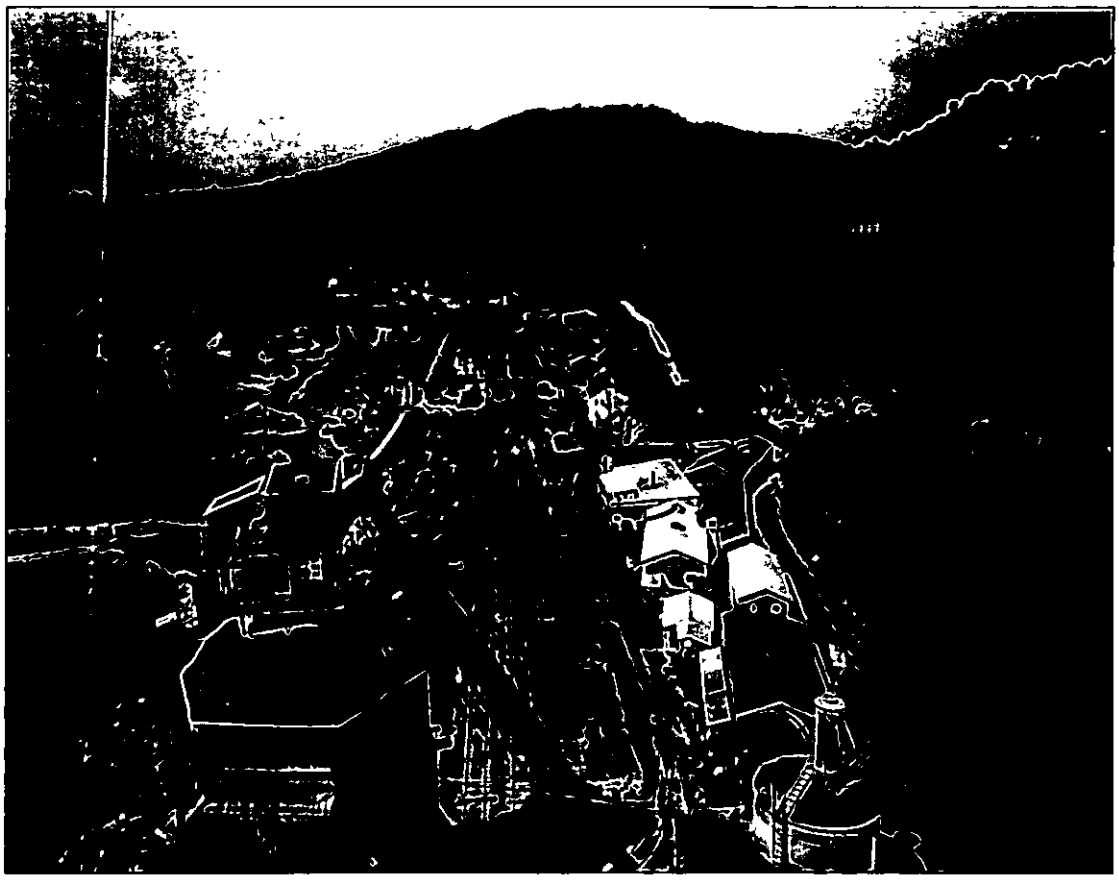


Figure 7-1. Historic View of the Bluestone Dam Construction Plant. View was probably taken from dam during later phases of construction (Hardlines Design 2002:41).

north of the concrete plant, and the contractor's office. The northern half of the plant featured U.S. Army Corps of Engineers offices, storage facilities, a sawmill, a large platform for carpentry layout and assembly, a boiler house, and a tractor and truck repair garage. Most of the construction plant buildings were hastily constructed wood-frame structures. Since electrically powered cranes, vibrators, and other equipment were to be used in the dam's construction, an electrical line was run to the site, and four electrical substations were built as part of the construction plant.

Dravo Corporation finished removal of its construction plant and completed site cleanup in January 1949 (Hardlines Design 2002). If any of these or any other dam-related buildings (including archaeological remains) still exist, they have not been documented or evaluated under NHRP criteria. Although the Bluestone Dam itself was evaluated under these criteria in 1997 and found to be eligible, the adjacent properties have not been evaluated (Heritage Resources Inc.:1997). Within the USACE boundaries of the Bluestone Reservoir, the properties on which these buildings are mostly likely situated are on the east side of the river just below (north) of the dam (Figure 2-1).

Identification of Archaeologically Sensitive Landforms

The identification of archaeologically sensitive landforms is important to property managers and managing agencies because it enables cultural resource potential to be considered within the scope of a comprehensive management plan for the property and in the formulation of long-term

development plans. However, the effectiveness of such planning is limited by the type, scope, and inherent biases of the archaeological surveys and reporting that have been conducted on the property. Older surveys, intermittent reporting by members of the WVAS, occasional informant-based reporting and site projection, and small-scale, focused cultural resource management surveys have combined to form a patchwork of non-systematic survey at Bluestone Lake that can be as confusing as it is informative. As the 1998 relocation survey demonstrated, many previously reported sites appear to be located well away from their reported location, or could not be relocated at all, at least through the low-impact, non-systematic methods employed during the survey to relocate the sites as expediently as possible (USACE 1998).

All of these factors combine to make a comprehensive summation of archaeologically sensitive landforms at Bluestone Lake difficult. Nevertheless, the cumulative effect highlights several areas that are of clear concern for management purposes.

The floodplain terraces of the New River clearly represent perhaps the most archaeologically-sensitive landform within the Huntington District boundaries at Bluestone Lake. An important component of this apparent sensitivity is that these floodplains comprise much of the flat or relatively flat land within the Huntington District boundaries at Bluestone Lake, and most of the land that is easily accessible to survey. A total of 66 archaeological sites have been identified on such landforms at Bluestone Lake, accounting for 52 percent of all sites identified to date (Table 7-1). If we include the upper river terraces above the floodplains along the New River, the frequency rises to 64% (n=82). Specific areas of concern along river terraces include areas that have been obvious for some time – the Bluestone/New River confluence, the Bertha area below the Bluestone Conference Center, the Indian Creek/New River confluence, Crump's Bottom, and the terraces downstream from The Narrows. Some of these areas exhibit near-continuous distribution of artifacts on the surface, and many of the sites represent large villages containing burials.

Tributary stream floodplains and terraces are often sensitive as well, accounting for 17% of the sites (n=22) at Bluestone Lake. Rockshelters have been identified less frequently, and are usually recorded simply because they represent possible shelters rather than for the presence of artifacts. Nevertheless, these can also represent highly sensitive areas, as illustrated by Solecki's (1949) excavations at the Sandstone Rockshelter (46Su17, north of Bluestone Lake and outside of the Huntington District boundaries) and Anslinger's (1995) results at 46Su616, a rockshelter that is potentially eligible for the NRHP. Upland benches and ridgetops have rarely been surveyed, so it is uncertain whether the low frequencies of sites on these landforms are typical or not.

Table 7-2 summarizes the temporal components identified at various sites within the Huntington District boundaries at Bluestone Lake by landform. Roughly 10,000 years of human history are represented by the temporal components identified at archaeological sites located on New River floodplain terraces. Archaic (27%), Woodland (24%), and Late Prehistoric (18%) components have been identified at similar frequencies on these landforms. Sites with identifiable temporal components on upper river terraces are far less numerous (due to the presence of fewer of these landforms), but include Archaic, Woodland, and Late Prehistoric components, as do the river/stream terraces at Indian Creek. Historic period sites tend to occur on the river floodplains and on stream terraces. Archaeological sites at Bluestone Lake have, to date, been most frequently identified on river floodplain terraces, regardless of temporal period.

Table 7-1. Landforms for Archaeological Sites Within Huntington District Property.

Landform	Total Sites	Percent
River Floodplain Terrace	66	52
Stream Terrace	22	17
Upper River Terrace	15	12
Rockshelter	6	5
River/Stream Terrace	5	4
River	4	3
Upland Bench	4	3
Ridgetop	3	2
Upper Stream Terrace	1	1
Island (former river floodplain)	1	1
	127	100

Table 7-2. Archaeological Components by Landform.

Landform	PI	EA	MA	LA	A	EW	MW	LW	W	W/LP	LP	PH	P	H	None
River Floodplain Terrace	5	9	3	18	4	4	7	9	11	4	24	0	15	14	0
Upper River Terrace	0	2	0	3	0	0	1	0	1	0	3	0	6	3	0
River/Stream Terrace	0	0	1	3	0	0	0	0	2	0	1	0	2	3	0
Stream Terrace	0	0	0	0	3	0	0	0	3	0	1	0	5	15	0
Upper Stream Terrace	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0
Island (former river floodplain)	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0
River	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0
Rockshelter	0	0	0	0	0	0	0	1	0	0	0	0	1	0	4
Upland Bench	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0
Ridgetop	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Total	5	11	4	26	7	4	8	10	17	4	30	1	31	42	7

H = Historic; P = Prehistoric; A = Archaic; EA=Early Archaic; MA = Middle Archaic; LA = Late Archaic; W = Woodland; EW=Early Woodland; MW = Middle Woodland; LW = Late Woodland; LP = Late Prehistoric; PH = Protohistoric

Chapter 8. Management Priorities, Recommendations, and General Policies

Introduction

Data generated during this survey were used to identify processes of archaeological disturbance, to assess the physical integrity and information potential of some of the sites, and to update earlier HPMP documents concerning Huntington District property at Bluestone Lake. Collectively, this body of information provides the basis for the development of cultural resources management priorities and the recommendations for future investigations. Management priorities, recommendations, and general policies must take into account the body of federal and state law and regulations which govern the protection of historic resources. Pertinent federal and state legislation is summarized below, followed by a list of management priorities, recommendations for achieving those priorities, and general policies to guide the Huntington District's long-term management of historic properties at Bluestone Lake.

Federal and State Laws, Regulations, and Orders

A number of federal and state laws and regulations control the management of cultural resources on public land or property subject to federal jurisdiction. The Huntington District explicitly defines historic properties in Paragraph 4a of Engineer Regulation (ER) 1130-2-438 as "any prehistoric or historic district, site, building, structure, or object included or eligible for inclusion in the National Register of Historic Places" (Dunn et al. 1996:8). Relevant federal laws, regulations, and executive orders are summarized below.

Federal Level

The Antiquities Act of 1906 (16 U.S.C. 431-433)

The Antiquities Act of 1906 (the nation's earliest historic preservation law) prohibits the unauthorized excavation, removal, or vandalism of "objects of antiquity" on federal land and authorizes the president to withdraw land from multiple use status for purposes of creating national monuments. Congress passed additional legislation to address cultural resources after 1974, when the Ninth Circuit Court of Appeals declared the prohibition on removal of "objects of antiquity" as unconstitutionally vague because it did not specify what constituted such an object (449 F.2d 113 [9th Cir. 1974] cited in King 1998:21).

The Historic Sites Act of 1935 (16 USC 461-467), (as amended)

The Historic Sites Act established the National Park Service (NPS) as the federal government's paramount historic preservation advocate (King 1998:270). This act authorizes the NPS to identify, register, describe, document, and acquire full or partial title to historic properties determined to have national significance in the interpretation and commemoration of the nation's history (King 1998:14). While this act has no regulatory provisions, it provided the framework for the later establishment of the National Historic Preservation Act (NHPA). Under the general provisions of this act, the NPS created the National Historic Landmarks (NHL) and Historic American Buildings Survey (HABS) programs.

The Federal Records Act of 1950 (44 U.S.C 2101-2118, 2301-2308, 2501-2506, 2901-2909, 3101-3106, 3301-3324), (as amended)

The Federal Records Act (FRA) is intended to ensure the proper management of records produced by or in the possession of the federal government, including books, papers, maps, photographs, machine-readable material, and other documentary materials; its central purpose is to preserve evidence of the government's organization, functions, policies, decisions, operations, and activities, as well as basic historical and other information (King 1998:273). Implementation of the FRA is overseen by the National Archives and Records Administration, whose extensive regulations (36 CFR 1222-1238) require agencies to establish internal procedures for compliance, develop retention and disposal schedules, and manage records accordingly.

The FRA is one of the few cultural resource laws that carry fines and jail sentences. A federal official who violates the FRA can receive a sentence of up to three years in jail, a fine of $2,000.00, or both.

The Reservoir Salvage Act of 1960 (16 U.S.C. 469), (as amended)

The Reservoir Salvage Act authorizes the NPS to fund salvage archaeology in USACE reservoirs, specifically providing for the preservation of historical and archaeological data (including artifacts) which may be irreparably lost or destroyed as the result of "flooding, the building of access roads, the erection of workmen's communities, the relocation of railroads and highways, and other alterations of the terrain caused by the construction of a dam" by any federal agency, or by any private person or corporation holding a license issued by any such agency (16 U.S.C. 469).

In 1974, the Archaeological Data Preservation Act (also known as the Moss-Bennett Act or the Archaeological and Historic Preservation Act) amended the Reservoir Salvage Act of 1960, to apply to all federal undertakings (including any federal construction project or federally licensed activity or program) that may result in any alteration of the terrain. It instructs the agencies to pay attention to their impacts on archaeological, historical, and scientific data and to fund the recovery of such data themselves or to support the NPS in doing so, authorizing the transfer of up to one percent of the cost of such a project to the NPS to defray its costs (King 1998:272).

The National Historic Preservation Act of 1966 (16 U.S.C 470 et seq.), (as amended)

The NHPA establishes the statutory responsibilities of federal agencies to manage cultural resources under their jurisdiction and provides for the creation of State Historic Preservation Officers (SHPO) to administrate state historic preservation programs and facilitate the implementation of federal cultural resource policy at the state level. The Secretary of the Interior is authorized to maintain a NRHP and the regulations (36 CFR Part 60) set forth the procedural requirements for listing properties on the NRHP.

The NHPA defines an "undertaking" as any "project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency" (16 U.S.C. 470w [7]). By design, the National Register serves as a planning tool for use by federal agencies with undertakings that may have effects on properties listed in or eligible for listing in the NRHP. The NHPA establishes the criteria for the evaluation process as well as procedures to be followed in removing properties from the NRHP. The regulations also detail tax benefits and grants-in-aid that owners of listed properties may use to maintain the integrity of historic properties.

Section 101 of the NHPA requires the development of preservation programs in a manner that ensures the consideration of tribal values to the extent feasible. Section 101 also recognizes that properties of traditional religious and cultural importance to American Indian tribes or Native Hawaiian organizations may be determined to be eligible for inclusion

on the NRHP and created the position of the Tribal Historic Preservation Officer (THPO) to serve as the SHPO on tribal lands.

Section 106 of the NHPA requires federal agencies to "take into account the effect of the undertaking on any district, site, building, structure or object that is included in or eligible for inclusion" in the NRHP (16 U.S.C. 470f). The NHPA, under Title II, established the Advisory Council on Historic Preservation (ACHP), whose role is to require and encourage agencies to consider, and where feasible, to adopt measures that will preserve historic properties that would otherwise be damaged or destroyed. Section 106 allows the ACHP to comment on federal undertakings as they pertain to historic properties, although it does not have the authority to halt or abandon projects that will affect historic properties. Its regulations (36 CFR 800) emphasize consultation among the federal agency, the SHPO, American Indian tribes, and other interested parties to agree upon ways to address adverse effects to affected properties.

Section 110 of the NHPA outlines agency responsibilities with respect to historic properties and requires preservation responsibilities to be balanced in a manner consistent with the federal agency's mission; these responsibilities include the establishment of, in consultation with the ACHP, the SHPO/THPO, local governments, American Indian tribes, and interested public, a program to include the identification, evaluation, and nomination of historic properties to the NRHP.

The 2000 amendment to this act altered Section 110 so that all federal agencies shall assume responsibility for the preservation of historic properties owned or controlled by those agencies. In accordance with Executive Order 13006, each federal agency shall use, to the most feasible extent, historic properties available to that agency prior to acquiring, constructing, or leasing buildings for agency use. The 2000 amendment also changed wording in Section 110(1) relating to undertakings subject to Section 106 which adversely affect properties included in or eligible for inclusion in the NRHP. Other changes extend the authorizations for the Historic Preservation Fund and the ACHP through 2005.

The National Environmental Policy Act of 1969 (42 U.S.C. 4330 et seq.)

The National Environmental Policy Act (NEPA) establishes, in Section 101(a), a national policy to "create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans" (Sec. 101 [42 U.S.C. 4331]). NEPA establishes a policy for all agencies of the federal government to use all practicable means to preserve important historic, cultural, and natural aspects of our national heritage, and to maintain, wherever possible, an environment which supports, for present and future generations, the widest range of beneficial uses, among other considerations, with diversity and variety of individual choice and without undesirable and unintended consequences (Sec. 101(b) [42 U.S.C. 4331]). Federal agencies are directed to report on adverse environmental effects that cannot be avoided should the proposed work be implemented, to detail the environmental impacts of proposed actions, and to provide alternatives to the proposed action. NEPA also requires the Council on Environmental Quality to govern the manner in which federal agencies carry out procedural requirements, in addition to conducting investigations, studies, surveys, research, and analyses relating to ecological systems and environmental quality, including cultural resources, so that "presently unquantified environmental amenities and values may be given appropriate consideration in decision making along with economic and technical considerations" (Sec. 102 [42 U.S.C. 4332]). The NEPA process provides an avenue to facilitate compliance with other statutory and regulatory requirements for cultural resources, although its applicability must be considered independently of these other requirements.

NEPA deals with cultural resources in the following ways:

- For cultural resources, it requires the determination of whether or not an undertaking has an adverse impact on a significant property.
- It requires documentation.
- It serves as a vehicle for laws, including cultural resource laws and mandates, without implementing guidelines.
- It does not apply exclusively to new undertakings; it applies if there are impacts, whether beneficial or adverse.
- Analysis must be site specific and scoped to the undertaking; the range of actions, alternatives, and impacts (including sociocultural aspects of the environment) are to be considered in an analytical fashion, not influenced by political or financial reasons, or for simplicity.
- Although analysis is site specific and scoped to the action, Section 1508.25 on project scoping protects against segmentation, wherein the significance of the environmental impacts of an action would not be evident if the action were to be broken into component parts and the impacts of those parts analyzed separately.

NEPA assessments include Categorical Exclusions, Environmental Assessments, and Environmental Impact Statements (EIS). Categorical Exclusions are a category of actions determined by a federal agency to not have, individually or cumulatively, a significant effect on the human environment or in procedures adopted by that agency to implement these regulations; such procedures must "provide for extraordinary circumstances in which a normally excluded action may have a significant effect" (40 CFR 1508.4; King 1998:38). An Environmental Assessment provides analysis and sufficient evidence to warrant an EIS or finding of "no significant impact," assists an agency's compliance with the act when an EIS is not necessary, and aids in the preparation of the EIS when necessary (40 CFR 1508.27; King 1998:44-45). The EIS is required for any federal action that will result in a significant effect on the human environment; it provides a detailed description of the environment that will be impacted in the undertaking, an analysis and description of all reasonable alternatives to actions involving the undertaking, and the direct, indirect, and cumulative environmental impact of each (King 1998:52).

The Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa-mm)

The Archaeological Resources Protection Act (ARPA) establishes that archaeological resources are accessible, irreplaceable, and endangered parts of the nation's heritage and provides for the protection of archaeological resources that are at least 100 years old on public and American Indian lands. The act clarifies and outlines provisions for managing disturbances of archaeological resources and orders a permitting process for the excavation or removal of these resources from public or American Indian lands; it further authorizes the Secretary of the Interior to establish regulations for the custody and care of archaeological materials excavated or removed from these lands. In addition, the law details prohibited acts and establishes criminal and civil penalties for violations of ARPA.

ARPA calls for federal land managers to maintain confidentiality regarding the nature and location of archaeological sites, except where such disclosure would further the purposes of ARPA or the amended Reservoir Salvage Act (16 U.S.C. 469-469c-1); it authorizes federal land managers to provide such information to the governor of any state, upon request, provided the governor states a commitment to adequately protect the confidentiality of such information in order to protect the resource from commercial exploitation.

The Native American Graves Protection and Repatriation Act of 1990 (P.L. 101-601)

The intent of the Native American Graves Protection and Repatriation Act (NAGPRA) is to ensure the protection and rightful disposition of Native American cultural items and burials located on federal or American Indian lands, and in the federal government's possession or control. NAGPRA applies to all federal and state agencies receiving federal funds, including museums (excepting the Smithsonian Institution), universities, and repositories, and it establishes protocols for the return of ancestral human remains and associated cultural items to federally recognized tribes that can demonstrate genetic or cultural affiliation with such material (King 1998:273). The law addresses the removal or excavation of American Indian human remains or cultural items from federal or tribal lands, including the inadvertent discoveries of such remains or items, and makes it illegal to traffic in such materials. NAGPRA applies fines and imprisonment for violations of various sections of the law.

The American Indian Religious Freedom Act of 1978 (42 U.S.C. 1996)

The American Indian Religious Freedom Act establishes a policy for the federal government to protect and preserve the inherent rights of Native Americans to exercise their traditional religions. This law specifically allows American Indians, Eskimos, Aleuts, and Native Hawaiians to possess and use sacred objects and to access traditional sites for religious purposes. By the usual interpretation of this law, agencies must consult with, but not necessarily accede to the requests of, tribal organizations when planning any action that might affect the practice of traditional native religions (King 1998:272).

Protection and Enhancement of the Cultural Environment (Executive Order 11593)

This executive order, signed by President Richard Nixon in 1971, establishes policy for the federal government to provide leadership in preserving, restoring, and maintaining the historic and cultural environment of the nation. Executive Order 11593 orders federal agencies to treat historic properties eligible for inclusion on the NRHP as though already included and charges the NPS with issuing guidelines for how to make such determinations (King 1998:271). The executive order establishes specific responsibilities of federal agencies and the Secretary of the Interior to carry out its policies; it directs federal agencies to administer cultural properties under their control in a spirit of stewardship and trusteeship for future generations, to initiate measures for programs and plans to preserve, maintain, and restore significant cultural resources for the benefit of the public, and to insure that federal plans contribute to the preservation and enhancement of non-federally owned, significant cultural resources in consultation with the ACHP's instituted procedures (E.O. 11593).

Federal Space Management (Executive Order 12072)

This executive order, signed by President Jimmy Carter in 1978, relates to the consideration of cultural resources of all kinds in the context of urban centers. It directs federal agencies to prioritize locating their activities in central business areas in order to "conserve existing urban resources and encourage the development and redevelopment of cities" and requires the consideration of both the positive and negative cultural effects of such site selections, providing a legal basis for some social impact assessments (typically absorbed into the NEPA analyses) (E.O. 12072; King 1998:270).

Locating Federal Facilities on Historic Properties in Our Nation's Central Cities (Executive Order 13006)

This executive order, signed in 1996 by President William Clinton, emphasizes the revitalization of historic districts and supplements the NHPA and Executive Order 12072 by requiring federal agencies to

prioritize the use of historic buildings in historic districts within central business areas (King 1998:271). The executive order further states that "any rehabilitation or construction that is undertaken pursuant to this order must be architecturally compatible with the character of the surrounding historic district or properties" and, where no such appropriate property exists, federal agencies shall consider other developed or undeveloped sites within historic districts (E.O. 13006).

Protection and Accommodation of Access to "Indian Sacred Sites" (Executive Order 13007)

This executive order, signed by President William Clinton in 1996, assigns each executive branch agency that has federal land management responsibilities with the mandate to accommodate access to and ceremonial use of sacred sites by federally recognized American Indian tribes. In this case, sacred sites are defined as any location on federal land identified by an American Indian individual or tribe as representative of, or as sacred by virtue of its established religious significance to, or ceremonial use by an American Indian religion. The executive order also directs that federal agencies avoid adverse effects to the physical integrity of these sites. The scope of Executive Order 13007 differs from that of the NHPA in that these sacred sites may not necessarily be historic properties (King 1998:273).

Consultation and Coordination with Indian Tribal Governments (Executive Order 13175)

This executive order, signed by President William Clinton in 2000, recognizes the unique legal relationship of the federal government with American Indian tribal governments (as domestic dependent nations under the protection of the U.S. Government) and mandates that federal agencies consult and collaborate with federally recognized tribes as part of a process to strengthen government-to-government relationships with these tribes through "regular and meaningful consultation and collaboration" (E.O. 13175). The executive order establishes policies for reviewing applications for waivers of statutory or regulatory requirements by tribes and also establishes accountability practices for federal agencies in collaborating and consulting with tribal governments.

36 CFR Part 60

36 CFR Part 60 authorizes the Secretary of the Interior to establish and maintain the NRHP pursuant to Section 101 of the NHPA (16 U.S.C. 470a(a)) and sets forth the process and specific criteria by which properties may be added to or removed from the National Register, as well as the effects of listing properties under federal law. This part also specifies that federal agencies undertaking a project having an effect on an eligible or listed property must provide the ACHP a reasonable opportunity to comment pursuant to Section 106 of the NHPA and that, having complied with the ACHP's commenting responsibility (36 CFR Part 800), the federal agency must take into account and incorporate the ACHP's comments into its decisions regarding the property.

36 CFR Part 63

36 CFR Part 63 establishes a process for federal agencies to identify and evaluate the eligibility of properties for inclusion in the NRHP pursuant to the Historic Sites Act of 1935 (16 U.S.C. 462(K) and Section 101 of the NHPA (16 U.S.C 470a(l)). The regulations explain how to request a Determination of Eligibility from the Secretary of Interior under Executive Order 11593 and the regulations established by the ACHP (36 CFR Part 800).

36 CFR Part 79

36 CFR Part 79 establishes definitions, standards, procedures, and guidelines to be followed by federal agencies to preserve collections of prehistoric and historic material remains and associated records recovered under the authority of the Antiquities Act of 1906 (16 U.S.C. 431-433), the Reservoir Salvage Act of 1960 (16 U.S.C. 469-469c), Section 110 of the NHPA (16 U.S.C. 470h-2), and the ARPA (16 U.S.C. 470aa-mm). Such collections generally include those resulting

from an archaeological resource survey, excavation, or other study conducted in association with a federal action, assistance, license, or permit. Federal agency officials maintain responsibility for the long-term management and preservation of preexisting and new collections, subject to these regulations, and shall place these materials in a repository with adequate long-term curatorial capabilities appropriate to the nature and content of the collections (36 CFR 79.9).

36 CFR Part 800

The ACHP's regulations, 36 CFR 800, implement Section 106 of the NHPA and serve as the basic regulations that explain how federal agencies must account for the effects of their undertakings on historic properties listed in or eligible for listing in the NRHP. The regulations define how federal agencies are to identify historic properties, consult with the SHPO/THPO and other consulting parties, to establish NRHP eligibility of historic properties, to assess the effects of projects on historic properties, and to develop measures to avoid, minimize, or mitigate adverse effects on properties listed on or eligible for the NRHP.

33 CFR Part 325

Appendix C of 33 CFR Part 325 outlines procedures for the consideration of historic properties by the USACE in the processing of Department of the Army permits. These procedures fulfill the requirements set forth by NHPA, other applicable historic preservation laws, and presidential directives as they relate to the regulatory program of the USACE (33 CFR Parts 320-334), as well as NEPA (as outlined in 33 CFR Part 325, Appendix B) and the USACE's public interest review requirements (33 CFR 320.4). According to these regulations, the district engineer must consider historic properties in the decision to issue permits and will require, in most cases, that the applicant conduct any necessary investigation at his expense. The district engineer must request specific information concerning properties known to exist in the project vicinity which may be eligible for the NRHP or known sensitive areas likely to contain such resources, particularly where these determinations have a basis in data collected from other, similar areas within the general vicinity.

U.S. Army Regulation 200-4

U.S. Army Regulation 200-4, effective November 1, 1998, replaces Army Regulation 420-40 (1984) and updates the U.S. Army's policy for managing cultural resources to meet legal compliance requirements with regulations set forth in NEPA, NHPA, ARPA, NAGPRA, the American Indian Religious Freedom Act, 36 CFR 79, Executive Order 13007, Executive Order 11593, and the Presidential Memorandum on Government-to-Government Relations with Native American Tribal Governments, as well as those published by the ACHP and NPS. The regulation provides guidance for the implementation of policy requirements and defines all areas of applicability and responsibility under these requirements, provides summaries of the pertinent cultural resource laws, executive orders, memoranda, and regulations, and discusses the development of agreements, memoranda, funding activities, and installation management plans (Department of the Army 1998).

EP 1130-2-540

Chapter 6 of the Project Operations-Environmental Stewardship Operations and Maintenance Guidance and Procedures Engineer Pamphlet, EP 1130-2-540, provides detailed guidelines for managing the preservation, collection, and curation of cultural resources from USACE civil works water resource projects and outlines a Historic Preservation Program for construction, operations, and maintenance activities at these locations according to 33 CFR Part 325, Appendix C.

State Level

State statutes protecting archaeological resources have been compiled by Carnett (1995). The list of statutes for West Virginia presented in this publication was updated

through consultation of the West Virginia State Code. At the state level, the following must be considered:

Municipal and County Historic Landmarks Commissions (WVC §8-26A-1, §8-26A-4, §8-26A-5, §8-26A-9).

These articles in the West Virginia Code establish municipal and county historic landmark commissions.

Archaeology, Cave Protection and Permits for Excavation (WVC §20-7A-5)

This section of the West Virginia Code requires a person to obtain a permit from the Director of Natural Resources in order to excavate or remove a historic or prehistoric ruin, burial ground, archaeological or paleontological site, including saltpeter workings, relics, or inscriptions, fossilized footprints, bones, or other such features that may be found in a cave.

Historic Preservation (WVC §29-1-1, §29-1-6, §29-1-8, §29-1-12, §29-1-1a, and §29-1-1b)

These sections of the West Virginia Code create the State Historic Preservation Office (SHPO) within the Division of Culture and History and grants to it a number of duties, including the ability to locate, survey, investigate, register, identify, preserve, and protect historic, architectural, archaeological, and cultural sites, structures, and objects worthy of preservation. It also gives the section the ability to review all undertakings permitted, funded, licensed, or otherwise assisted by the state in order to protect historic resources.

Protection of Human Skeletal Remains, Grave Artifacts and Grave Markers (WVC §29-1-8a)

This section of the West Virginia Code prohibits a person from excavating, removing, destroying, or disturbing any historic or prehistoric ruin, burial ground, archaeological site, or human skeletal remains, unmarked grave, grave artifact, or grave marker of historic significance without a valid permit issued by the director of the SHPO of the Division of Culture and History.

Protection of historic and prehistoric sites (WVC §29-1-8b)

This section of the West Virginia Code prohibits the disturbance or destruction, unless permitted by the SHPO, of historic and prehistoric landmarks, sites, and districts on lands owned or leased by the state, or on private lands where the development rights have been acquired by the state.

Exemptions (WVC §29B-1-4a(6))

This section of the West Virginia Code establishes categories of information that are specifically exempt from disclosure, including records, archives, documents, or manuscripts describing the locations of undeveloped historic, prehistoric, archaeological, paleontological, and battlefield sites or constituting gifts to any public body upon which the donor has attached restrictions on usage or the handling of which could irreparably damage such record, archive, document, or manuscript.

Removal, Transfer and Disposition of Remains in Graves Located Upon Privately Owned Lands (WVC §37-13-1 through 7)

These sections of the West Virginia Code give the circuit court of any county jurisdiction and authority to permit and order the removal, transfer, and reinterment, or other disposition, of remains in any graves located upon privately-owned land within the boundaries of such county.

Management Priorities

As discussed by Thorne et al. (1987:6) the overall policy of the Huntington District with respect to cultural resources can be summarized as follows:

- The information contained within such cultural resources lies within the public interest as defined by legislation.

- The Huntington District has responsibility for the cultural resources on the lands it owns or manages.
- The preservation of cultural information in situ is an alternative management option to data recovery through excavation.
- Costs of such preservation activities are specifically authorized by legislation and regulations.
- Such cultural resources to be preserved should be significant, i.e., listed in the NRHP or eligible for such listing.

The issue of management of historic properties on lakeshores and in drawdown zones of federal reservoirs has been addressed more recently by two technical reports (Dunn 1996; Dunn et al. 1996). The first examined the impact of drawdown on historic properties, while the second report addressed effective management techniques for impacted historic resources. Historic properties are explicitly defined in Paragraph 4a of Engineer Regulation (ER) 1130-2-438 as "any prehistoric or historic district, site, building, structure, or object included or eligible for inclusion in the National Register of Historic Places" (Dunn et al. 1996:8).

Dunn et al. (1996) reaffirm that the Huntington District is required by federal law and its own regulations to protect historic properties on federal land, citing Section 110(a)(2) of the National Historic Preservation Act (NHPA), which clearly states that all cultural resources be evaluated for the NRHP (Dunn et al. 1996:8). However, their research indicated that this requirement has often been narrowly interpreted to mean that only those historic properties potentially affected by a Section 106 undertaking should be evaluated. Thus, funding for the evaluation of sites occurs only rarely, when sites will be affected by an impending construction project or permit application. Dunn et al. (1996) emphatically state that this stance is a distortion of the law. The applicable regulation for the inventory of eligible sites (recordation and evaluation) on federally-owned or managed properties is Section 110, not Section 106.

A review of data submitted for their research into effective management of historic properties in reservoir drawdown zones revealed that 63 percent of all archaeological sites documented on land managed by the Huntington District (in 1995) have never been evaluated for potential eligibility to the NRHP (Dunn et al. 1996). At Bluestone Lake, 92% (n=118) have never been evaluated for potential eligibility. This statistic is revealing because a site cannot be termed a 'historic property,' until it has been declared eligible. It cannot be determined eligible until it has been evaluated properly. Until the eligibility or potential eligibility of all cultural resources present on lands managed by the Huntington District is determined, the Huntington District cannot fulfill its legal responsibility.

With respect to its responsibility for cultural resources at Bluestone Lake, the Huntington District has undertaken several reports concerning cultural resources on their property (USACE 1979, 1983, 1993, 1996, and 1998), discussed in greater detail in Chapter 4. Based on the information at hand, it is possible to develop a list of management priorities and long-term goals for Bluestone Lake that are important for the preservation and management of cultural resources.

Priorities

These priorities are established to satisfy immediate concerns and to meet existing regulatory compliance requirements. These are defined as:

Priority 1: *Finalize and implement this HPMP.*

Priority 2: *Determine which sites at Bluestone Lake are historic properties.*

Priority 3: *Identify NRHP-listed and -eligible properties in need of preservation, protection, and maintenance.*

Priority 4: *Determine which NRHP-listed or -eligible properties will not be maintained due to programmatic reasons and to complete the*

necessary Section 106 and 110 consultations and documentation.

Priority 6: *Develop a maintenance/preservation plan for NRHP-listed and -eligible properties that takes into account the architectural, archaeological, and/or scientific elements that contribute to the eligibility of a property.*

The first priority, finalizing and implementing the HPMP, is important because the Huntington District will demonstrate its commitment to complying not only with the letter of the law but with the spirit of the law. To satisfy this goal, Huntington District management, the SHPO, the ACHP, and other interested parties, if warranted, must review and accept the HPMP.

Before the second priority can be met, all cultural resources at Bluestone Lake must be identified. Therefore, an immediate goal of the Huntington District should be the undertaking of a systematic cultural resource survey (archaeological and historic architectural survey) to inventory and accurately locate all cultural resources present on federally-owned or managed lands at Bluestone Lake (Phase I survey in West Virginia). This inventory should include, but not be limited to, archaeological sites, historic structures, buildings, and objects. The category of objects would encompass any architectural drawings, maps, and plans associated with the development and implementation of reservoir construction.

Priorities 3, 4, and 5 are part of a single process that involves the proper management and disposition of historical and archaeological properties in accordance with the NHPA, once these properties have been identified. Under the third priority, the Huntington District should protect sites that are eligible or potentially eligible for the NRHP (i.e. important cultural resources). As discussed previously, three sites at Bluestone Lake have been determined to be eligible, but none have actually been listed. However, based on the extant record, eligibility has not been determined for the majority of sites at Bluestone Lake. Once this has been established, the Huntington District must determine how best to preserve, protect, and maintain each site. Sites like 46Su3, for example, are seasonally inundated, but are accessible to unauthorized collecting at other times. Once sites have been determined to be historic properties, nominations can be prepared by the Huntington District, reviewed and approved by the WVSHPO, and ultimately accepted by the Keeper of the National Register.

Recommendations

It is recommended that all federal holdings at this reservoir not previously investigated should be subject to a Phase I survey to identify sites that are eligible or potentially eligible for the NRHP.

- The survey must be comprehensive, systematic, and designed to identify all cultural resources within the Huntington District boundaries at Bluestone Lake. Subsurface testing and, when possible, controlled surface collection should be sufficient to determine site boundaries, systematically sample artifact classes, and indicate the presence or absence of subsurface in situ cultural horizons.
- During this survey, close attention should be paid to those sites previously identified solely on the basis of collections or information provided on WVSHPO Archaeological Site Forms. Sites should be located in the field and systematically surveyed to determine their potential eligibility.
- The results of this survey should be directly compared with the paper records at the WVSHPO to resolve and correct errors.

It is recommended that Phase II assessment survey be undertaken at 46Su617 and 46Su618, as these sites have been determined to be potentially eligible for nomination to the NRHP.

It is recommended that all historic cemeteries within the Bluestone Reservoir area be documented.

It is recommended that site conditions should be reviewed periodically for 46Su3, 46Su9, and 46Su22, which have already been determined as historic properties.

It is recommended that no further work be done for 46Su633, 46Su634, 46Su635, and 46Su636, as these sites have been determined not eligible.

It is recommended that signage noting the legal consequences of unauthorized collecting at all park facilities in terms of ARPA and regulations set forth at 36 CFR 79, educational outreach programs on the archaeology of Bluestone Lake, and regular assessment of historic properties be considered as methods of protecting cultural resources.

It is also recommended that important historic documentation be archived in an appropriate collection facility. This includes maps, plans, blueprints, reports, articles, and other documentation associated with the construction of Bluestone Dam.

Long Term Goals

Long-term goals are established to ensure the proper management of cultural resources located on federal lands at Bluestone Lake, compliance with cultural resource laws and regulations, and the implementation of this HPMP. Long-term goals include:

- Maintaining compliance with cultural resource laws and regulations through the implementation of the methods and procedures contained within this HPMP (see below);
- Continuing to improve the effectiveness and efficiency of the Huntington District's cultural resources management program established by this HPMP; and
- Reevaluating Huntington District's federal properties for NRHP eligibility on a periodic basis.

Compliance with environmental laws and regulations that provide for protection of sensitive resources, including cultural resources, continues to be a major concern of the Huntington District and its management. Once finalized and implemented, the HPMP will serve as the standard for cultural resource compliance activities and the mechanism by which the Huntington District will maintain regulatory compliance at its facilities. The process of implementing the HPMP is anticipated to stimulate changes in the cultural resources management program to meet the needs and missions of the Huntington District, thereby creating an environment in which the second long-term goal will be satisfied. The third long-term goal will involve reevaluating Huntington District federal properties for NRHP eligibility as the age of the properties begins to reach the 50-year age criterion of the NRHP.

Methods and Procedures for Compliance

For all Huntington District undertakings at Bluestone Lake requiring and/or involving consultation with the SHPO, ACHP, Native American tribes, local governments, or other interested parties regarding cultural resources, the CRM coordinator for Bluestone Lake shall be the key point of contact. The level or degree of consultation and resulting documentation required for undertakings shall be dictated by the circumstances associated with the undertakings (e.g., the nature, extent, and proposed location of undertakings and the number and types of cultural resources that would be affected).

Consultation with the SHPO

In general, initial consultation activities for undertakings shall involve contact by the CRM coordinator or his/her designee with the SHPO either by telephone or in writing. Consultation with the SHPO shall involve (but not be limited to):

- Seeking the SHPO's guidance in identifying any individuals, organizations, or groups that may have a special interest in Bluestone Lake undertakings affecting cultural resources of which the Huntington District may not be aware;

- Notifying the SHPO that the Huntington District has identified an undertaking that could have an adverse effect on NRHP-listed or eligible properties;
- Notifying the SHPO that the Huntington District has identified an undertaking at Bluestone Lake that could affect NRHP-listed or eligible properties and, therefore, shall be applying the Criteria of Effect and Adverse Effect (36 CFR 800.9) to the undertaking;
- Contacting the SHPO to determine if a survey should be initiated for an undertaking at Bluestone Lake pursuant to 36 CFR 800, Section 5.1.1.3, Item C;
- Providing the SHPO with information regarding new surveys initiated and completed by the Huntington District at Bluestone Lake and requesting that the SHPO review and concur with survey reports and associated documentation (if any);
- Seeking the SHPO's concurrence with the Huntington District's determinations of effect for historic properties at Bluestone Lake pursuant to 36 CFR 800, Section 5.1.1.3, Items A.2.b.(1), A.2.b.(2), C.2.b.(1), and/or C.2.a.(2), and entering into MOAs with the Huntington District as warranted;
- Identifying and resolving ways to avoid or reduce effects to NRHP-listed or eligible properties at Bluestone Lake in accordance with 36 CFR 800, Section 5.1.4.2 and pursuant to Section 5.1.1.3, Items A.2.b(1), A.2.6.(2), C.2.b.(1), and/or C.2.a.(2); and
- Requesting that the SHPO, after agreeing with the Huntington District on how effects of undertakings at Bluestone Lake shall be taken into account, enter into an MOA with the Huntington District pursuant to 36 CFR 800.5(e)(4).

Consultation with ACHP

Consultation with the ACHP shall be conducted in the same manner as consultation with the SHPO in that the Huntington District's CRM coordinator for Bluestone Lake shall contact the ACHP either by telephone or in writing. However, the procedures set forth in 36 CFR 800, Section 5.1.1 above have been designed to streamline the Section 106 process and, therefore, to minimize the need for consultation with the ACHP (i.e., rely on the SHPO more heavily for guidance and compliance with cultural resource laws and regulations). Consultation with the ACHP shall involve, but not be limited to, the following:

- Seeking the ACHP's guidance on measures to avoid or minimize effects of undertakings on NRHP-listed or eligible properties at Bluestone Lake as warranted;
- Notifying the ACHP that the Huntington District has consulted with the SHPO and intends to prepare an MOA; and
- Requesting the ACHP's acceptance and/or participation in MOAs involving Huntington District undertakings at Bluestone Lake.

Consultation with Native American Tribes

The Huntington District shall make special efforts to consult with Native American tribes for undertakings at Bluestone Lake that are determined to have the potential to affect Native American cultural remains (e.g., mound sites). Consultation with Native American tribes shall involve, but not be limited to, the following:

- Notifying Native American tribes that the Huntington District has identified an undertaking at Bluestone Lake that could affect Native American cultural remains and seeking their guidance and/or input to avoid or mitigate adverse effects to the remains;
- Notifying Native American tribes when cultural remains have been located by a survey at Bluestone Lake and requesting their assistance in identifying the

affiliation and significance of the remains or material; and

- Requesting that Native American tribes participate in MOAs for undertakings at Bluestone Lake that affect or may affect Native American cultural remains.

Consultation with Interested Parties

Should the Huntington District, in consultation with the WVSHPO, identify an undertaking at Bluestone Lake that warrants consultation with organizations other than those internal to the Huntington District, the SHPO, ACHP, or Native American tribes, the Huntington District shall identify the interested parties (e.g., individuals, organizations, local government, and historical societies) and initiate consultation either by phone or in writing. Consultation with interested parties shall involve, but not be limited to, the following:

- Notifying interested parties that the Huntington District has identified an undertaking at Bluestone Lake that could be of special interest to the parties;
- Seeking input and/or comments from interested parties regarding undertakings at Bluestone Lake and incorporating their concerns or suggestions into the undertakings, as warranted; and
- Requesting that interested parties participate in Huntington District MOAs, as warranted.

General Policies

In addition to the specific recommendations discussed above, there are some general policies that would help insure the protection of important historic properties at Bluestone Lake. These policies include:

1) Designation of a Cultural Resources staff member for each reservoir.

- This individual should be trained in up-to-date historic preservation laws and regulations.
- This individual should have access to GIS mapping of each reservoir that includes a cultural resources data layer. This layer will allow an overview of cultural resources to be made for any federal undertaking, yearly updating of the conditions of historic properties, and provide any other pertinent information that will assist in the management of historic properties at each reservoir.
- This individual should work with other Huntington District staff and local and regional law enforcement agencies to protect those historic properties most vulnerable to vandalism.

2) All activities conducted within federal property at Bluestone Lake, whether they be maintenance of existing facilities or new constructions, should be examined for their potential to negatively impact historic properties.

- New constructions should be designed to avoid historic properties if possible.
- The preferred option for NRHP eligible sites is in situ preservation, with appropriate measures being taken to insure the long-term protection of the site and its information potential. This might include the use of riprap, geotextile filter cloth, or other preservation techniques.
- Historic properties selected for preservation should be examined annually to document their present status and evaluate the need for alternative preservation techniques.
- Training of Huntington District staff to recognize and conduct initial evaluations of archaeological resources at the lake.

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n.d. Historic Preservation.

WVC (West Virginia Code) (§29-1-8a)
n.d. Protection of human skeletal remains, grave artifacts and grave markers.

WVC (West Virginia Code) (§29-1-8b)
n.d. Protection of historic and prehistoric sites.

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APPENDIX A

Chapters 6-8 F OF EP 1130-2-540

CHAPTER 6 - CULTURAL RESOURCES STEWARDSHIP

6-1. Purpose. This chapter establishes the policy for the management and protection of cultural resources at operating civil works water resources projects for which the U. S. Army Corps of Engineers is responsible.

6-2. Policy.

a. Curation and Management of Archaeological Collections.

(1) Mandatory Center of Expertise (MCX). The Corps MCX for Curation and Management of Archaeological Collections at St. Louis District shall manage Corps-wide curation needs assessments and design services for the curation of archaeological collections. The MCX shall review the status of Corps-wide curation of collections and associated documents and ensure USACE compliance with the provisions of 36 CFR Part 79 (Curation of Federally-Owned and Administered Archaeological Collections). Costs for compliance with the Native American Graves Protection and Repatriation Act (NAGPRA) will be handled through the annual budget request process established by the MCX. The MCX in coordination with the Curation Field Review Group (CFRG) will review these requests, prioritize them, and provide funding to districts based on the funding priorities established. The MCX has established standard operating procedures which detail its responsibilities.

(2) Data and Material. Data and material from historic properties (defined as any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places) that could be impacted as a result of civil works undertakings shall be investigated, evaluated, recovered, and preserved. Specific guidance on collection management is provided in EP 1130-2-540.

(3) Collection Availability. District commanders shall ensure that collections are available for scientific and educational uses by qualified professionals, including access for study, loan, and use for such purposes as in-house and traveling exhibits, teaching, public interpretation, scientific analysis and scholarly research. Human skeletal material shall not be placed on display or exhibited for public viewing in any fashion. At the discretion of the Commander, collections may also be loaned for religious uses by interested groups with a demonstrated affiliation to the materials in the collection. District commanders are also responsible for consultation with Native Americans and repatriation of human remains and associated funerary objects to appropriate Indian tribes or Native Hawaiian organizations as required by NAGPRA.

(4) Cost Estimates. Line item cost estimates for collections management and curation shall be included in all cost estimates prepared for investigations that will result in collection of material remains and associated records.

(5) Tribal Consultation.

(a) Consistent with PL 95-341, American Indian Religious Freedom Act and PL 103-141, Religious Freedom Restoration Act of 1993, commanders shall consult with affected tribes, groups, or individuals regarding appropriate action for project effect upon sacred sites, important to the practice of traditional Native American religion. Native American consultation topics may

include, but not be limited to, access to sites, use and possession of sacred objects, freedom to worship unburdened except when there are compelling government interests, and suitable preservation measures.

(b) NAGPRA requires Federal agencies to compile documentation on specific materials in archaeological collections and consult with recognized Indian tribes on these efforts. Section 3 of the Act also requires tribal consultation when cultural items, as defined by the Act, are inadvertently discovered in federally controlled or owned lands.

(c) Tribal consultation pursuant to cultural resource law may require, but not be limited to, Native American and/or Native Hawaiian attendance at meetings, on-site visits, and the sharing of information akin to intellectual property. Commanders shall ensure that Native Americans/Hawaiians who are invited to participate, by the Corps, in consultation proceedings receive appropriate compensation for their activities. Existing authorities allow for the preparation of Invitational Travel Orders and the issuance of purchase orders, not exceeding $2,500.00, for the purpose of sharing critical information important for the furtherance or completion of consultations required by Federal laws.

(6) Repatriation.

(a) Cultural items, as defined by NAGPRA, may be repatriated or provided for reinterment to recognized Indian tribes or Native Hawaiian Organizations. Prior to repatriation, commanders must meet the procedural requirements established by NAGPRA and repatriation claims must satisfy the conditions of authenticity established by the Act. At the request of a recognized Indian tribe or Native Hawaiian Organizations, the Corps of Engineers may assist in the reinterment of NAGPRA cultural items.

(b) Undertakings by the Corps which may result in the discovery of cultural items are subject to the provisions of Section 3 of NAGPRA, including the potential for repatriation and reinterment of specific items. Specific guidance on repatriation and reinterment of human remains and associated funerary objects is provided in EP 1130-2-540 and 43 CFR Part 10, Final Rule implementing NAGPRA.

(7) State of Origin. Except as may be required by special management purposes, every effort shall be made to curate and manage archaeological collections within their state of origin.

b. Cultural Resources Management Plans. In accordance with provisions of the Archaeological Resources Protection Act (ARPA) of 1979, as amended, and the National Historic Preservation Act (NHPA) of 1966, as amended, district commanders shall ensure that a Cultural Resources Management Plan (CRMP), where appropriate, is developed for USACE projects. Specific guidance on the content and format of the plan is presented in EP 1130-2-540.

(1) Lands Held In Fee Title. Consistent with the CRMP or other management requirements, the District Commander shall implement a program, upon availability of funds, to accomplish an inventory of historic properties and site evaluation at each civil works water resource project under his/her jurisdiction and administration to comply with Section 110(a)(2) of the NHPA. Historic properties located on civil works water resource project fee owned lands shall be managed and maintained in a way that considers the preservation of their historic, archaeological, architectural and cultural values in compliance with Section 106 of the NHPA and

gives special consideration to the preservation of such values when historic properties have significance.

(2) Lands Held In Less Than Fee Ownership. On lands held in less than fee by the Federal government, but under Corps of Engineers jurisdiction, the District Commander shall give full consideration in planning for the preservation of historic properties that may be potentially affected by Corps activities. If Corps action will impact the property, the Corps shall be empowered to acquire necessary real estate interests to enable it to carry out the intent of Congress in mitigating adverse impacts to historic properties resulting from Corps activities.

c. Surveys on Corps Leased Lands. The responsibility for compliance with ER 405-1-12 rests with the Corps when real estate grants are proposed for lands that have not been examined for historic properties. However, the District Commander may allow or require the grantee to conduct necessary surveys at his own convenience and expense. Where the grantee assumes responsibility for conducting such investigations, the proposed plan of action and choice of investigator shall be approved by the District Commander.

d. Historic Properties FDM. When the construction of new, or major modification of existing, civil works projects will result in major impacts on significant historic properties, a Feature Design Memorandum (FDM) shall be required. This FDM shall be a major management tool guiding the proper treatment of historic properties throughout the Construction and initial Operational phases. FDMs shall be fully coordinated with Construction, Operations, Real Estate, and other Divisions to ensure compatibility among these elements. It is expected that a Historic Properties FDM may be required only in the event of one or more of the following:

(1) the project will require mitigation of an unusually large number, or a number of unusually complex, historic properties beyond that previously anticipated; or

(2) a significant Post-Authorization Change (PAC) in the project which dramatically alters the anticipated number or type of historic properties to be affected; or dramatically increases the estimated cost or scope of the anticipated historic properties mitigation plan; or increases mitigation costs above the one percent limitation such that specific Congressional authorization or waiver of the one percent limitation is required.

6-3. Cultural Resources Protection Policy.

a. Site Location Disclosure. In accordance with Section 9 of the ARPA (16 USC 470 hh) and Section 304 of the NHPA (16 USC 470 w-3), commanders shall restrict access to associated records that contain information relating to the nature, location, or character of a prehistoric or historic resource unless the commander determines that such disclosure would not create a risk of harm, theft, or destruction to the resource or to the area or place where the resource is located.

b. ARPA Permits. Requests by other agencies or persons to conduct historic or archaeological investigations of any type on Corps managed or controlled lands, sites, or properties, shall be in accordance with the requirements of guidance which implements the permit requirements of ARPA. Procedures for the development of permit requests as well as review and approval of permits for these investigations can be found in ER 405-1-12.

(1) Although not subject to the civil or criminal penalties of ARPA, the collection of

arrowheads or other artifacts from the surface of the land for private purposes without a permit shall be prohibited.

(2) ARPA permits are not required by Corps personnel acting in an official capacity, or by Corps contractors pursuant to contract requirements.

c. Enforcement.

(1) Violators of protected properties shall be prosecuted under 36 CFR Part 327, 14(a), which provides protection for historic properties and public property, or ARPA.

(2) Enforcement under 36 CFR Part 327, Title 36, Part 327.14(a), provides protection for historic properties and public property, although the maximum fine for the offense, if convicted, is $5000.00 and/or six months imprisonment. Since the value of historic properties and associated costs resulting from unauthorized activities sometimes exceed the maximum fine under Title 36, the enforcement actions necessary to investigate, prepare cases, and apprehend violators may be more appropriately handled by others under provisions of the Archaeological Resources Protection Act.

(3) ARPA provides for criminal penalties up to $100,000 and/or five years imprisonment, and allows for forfeiture to the Federal government of equipment and vehicles used in unauthorized activities. In addition, civil penalties may be assessed to recover Federal costs in repairing or restoring historic properties, accomplishing research, and preparing reports. For ARPA enforcement actions and investigations, commanders shall follow procedures outlined in ER 190-1-50 to obtain services of the Criminal Investigation Command (CID). Commanders may also seek counsel and assistance from the appropriate U.S. Attorney and obtain services of the appropriate U.S. Marshal for immediate attention to suspected or known felony acts.

d. Use of Metal Detectors on Water Resource Projects. The use of metal detectors shall be allowed on beaches, or other previously disturbed areas, that do not contain or would not reasonably be expected to contain archaeological, historical, or paleontological resources. Digging shall be limited to hand tools that can be used by one hand only. Hand tools shall be limited to four (4) inches wide and twelve (12) inches long. District commanders are authorized to restrict metal detector use in these areas, until completion of a cultural resources survey. If upon completion of the survey, archaeological, historical, or paleontological resources are found, district commanders are authorized to restrict the use of metal detectors in these areas.

e. Found Items. Nonidentifiable items, such as coins (of nominal value less than $25) that are found, with or without the aid of a metal detector, do not need to be deposited with the Operations Project Manager or a Ranger. All identifiable items, such as rings, watches, etc., or items of greater than nominal value (i.e., $25 or greater) shall be deposited with the Operations Project Manager or a Ranger for disposition in accordance with 36 CFR Part 327.15, 36 CFR Part 327.16, and subsequent revisions. All archaeological, historical, or paleontological items found shall be deposited with the Operations Project Manager or a Ranger.

f. In addition to the requirements of ARPA, the Federal land manager should refer to the Native American Graves Protection and Repatriation Act (PL 101-601) and its implementing regulations (43 CFR Part 10) for the disposition of the lawful removal of human remains and the items (funerary objects, objects of cultural patrimony, and sacred objects) as defined in the Act

and for the procedures to follow those cases where human remains are discovered.

FOR THE COMMANDER:

1 APPENDIX
See Table of Contents

OTIS WILLIAMS
Colonel, Corps of Engineers
Chief of Staff

APPENDIX C

Summary Tables Describing General Site Information, Eligibility, Curatorial Facility, and Accession Numbers for Archaeological Sites Located in USACE-Managed Areas at Bluestone Lake

Table C-1: General Site Information

Table C-2. Location, NRHP Eligibility, Curatorial Facility, and Accession Numbers.

Table C-1. General Site Information for Archaeological Sites Located in USACE-Managed Areas at Bluestone Lake.

Site	Figure Reference	WVSHPO Elevation (ft.amsl)	USACE 1998 Elevation (ft.amsl)	Impact Zone	Context	Landform	Within Maximum Flood Zone?	Function	Cultural Components
44Gs10		1520	-	C	New River	River Floodplain Terrace	Yes	Village	LP
44Gs11		1520	-	C	New River	River Floodplain Terrace	Yes	Unknown	W/LP
44Gs15		1520	1504.941	C	New River	River Floodplain Terrace	Yes	Unknown	A; W; LP
44Gs17		1515	1526.280	C	New River	River Floodplain Terrace	Possibly	Unknown	LA; W
44Gs20		1505	1482.635	C	New River/Smith Branch	River Floodplain Terrace	Yes	Unknown	W
44Gs22		1520	-	C	New River	River Floodplain Terrace	Yes	Unknown	A
44Gs28		1523	-	C	New River	River Floodplain Terrace	No	Cemetery	H
44Gs41		1480	-	C	New River	River	Yes	Navigation Sluice	H
44Gs42		1480	-	C	New River	River	Yes	Navigation Sluice	H
44Gs43		1480	-	C	New River	River	Yes	Navigation Sluice	H
44Gs44		1480	-	C	New River	River	Yes	Navigation Sluice	H
44Gs48		1515	-	C	New River	River Floodplain Terrace	Yes	Unknown	LW
46Me19		1470	1494.187	C	New River	River Floodplain Terrace	Yes	Unknown	W
46Me20		1470	1485.151	C	New River	River Floodplain Terrace	Yes	Unknown	P
46Me21		1470	1482.536	C	New River	River Floodplain Terrace	Yes	Unknown	P
46Me103		1460	1486.470	C	New River	River Floodplain Terrace	Yes	Series of Small Camps	P
46Me121		1600	-	C	Ford's Hollow Branch	Rockshelter	No	Rockshelter	None
46Su1		1565	-	C	New River	Rockshelter	No	Rockshelter	LW
46Su2		1400	-	A	Pipestem Creek	Rockshelter	Yes	Rockshelter	None
46Su3		1408	1410.509	B	New River	Island	Yes	Unknown; Village	LA; LP, PH
46Su5		1525	-	C	Indian Creek	Upper Stream Terrace	No	Unknown; 18th C. Fort	LA; H
46Su6		1560	-	C	New River/Indian Creek	Upper River Terrace	No	Unknown	EA, LA, MW, LP
46Su7		1460	1472.323	C	New River/Roundbottom Creek	River Floodplain Terrace	Yes	Unknown	LP
46Su8		1535	1563.648	C	New River	Upper River Terrace	No	Unknown	LP; H

Table C-1. General Site Information for Archaeological Sites Located in USACE-Managed Areas at Bluestone Lake.

Site	Figure Reference	WVSHPO Elevation (ft.amsl)	USACE 1998 Elevation (ft.amsl)	Impact Zone	Context	Landform	Within Maximum Flood Zone?	Function	Cultural Components
46Su52		1470	1455.824	C	New River/Horse Fork Branch	River Floodplain Terrace	Yes	Unknown	LA; W/LP
46Su53		1430	1430.430	C	New River	River Floodplain Terrace	Yes	Unknown	LA
46Su54		1430	1427.901	C	New River	River Floodplain Terrace	Yes	Unknown	EA
46Su55		1550	1583.589	C	New River	Upper River Terrace	No	Unknown	W
46Su56		1490	1471.047	C	New River	River Floodplain Terrace	Yes	Unknown	LP
46Su58		1485	1492.612	C	New River	River Floodplain Terrace	Yes	Unknown; Hamlet	A, LW; LP
46Su60		1410	1413.435	B	New River	River Floodplain Terrace	Yes	Dense Camp Areas	A; MW; LP
46Su61		1410	1439.738	B	New River	River Floodplain Terrace	Yes	Village/Hamlet	LP
46Su62		1460	-	C	New River	River Floodplain Terrace	Yes	Unknown	W
46Su128		1425	1442.796	C	Bluestone River/Surveyor's Branch	River Floodplain Terrace	Yes	Unknown	P
46Su165		1414	1441.083	C	New River	River Floodplain Terrace	Yes	Unknown; Farm	LA, W; H
46Su186		1414	1452.773	C	Bluestone River	River Floodplain Terrace	Yes	Unknown	H
46Su187		1414	-	C	Bluestone River	River Floodplain Terrace	Yes	Unknown	H
46Su188		1415	-	C	New River	Upland Bench	Yes	Unknown	P
46Su189		1420	-	C	Bluestone River	River Floodplain Terrace	Yes	Unknown	P
46Su191		1470	1503.590	C	Indian Creek	Stream Terrace	Yes	Unknown	A; W
46Su193		1429	-	C	New River/Indian Creek	River Floodplain Terrace	Yes	Unknown	W/LP
46Su194		1460	1461.769	C	New River/Indian Creek	River /Stream Terrace	Yes	Unknown	LA; W
46Su195		1429	-	C	New River	River Floodplain Terrace	Yes	Unknown	W/LP
46Su196		1429	1424.177	C	New River	River Floodplain Terrace	Yes	Unknown	LA; W
46Su198		1525	1511.208	C	Indian Creek	Stream Terrace	Possibly	Unknown	P
46Su199		1525	1526.388	C	Indian Creek	Stream Terrace	No	Unknown	A, W, LP; H
46Su200		1525	-	C	Bradshaw Creek	Stream Terrace	No	Unknown	A; W
46Su202		1429	1469.590	C	New River/Indian Creek	River Floodplain Terrace	Yes	Unknown	P

Table C-1. General Site Information for Archaeological Sites Located in USACE-Managed Areas at Bluestone Lake.

Site	Figure Reference	WVSHPO Elevation (ft. amsl)	USACE 1998 Elevation (ft. amsl)	Impact Zone	Context	Landform	Within Maximum Flood Zone?	Function	Cultural Components
46Su327		1570	-	C	New River/Indian Creek	Upper River Terrace	No	Unknown	P
46Su328		1520	1521.808	C	New River	Upper River Terrace	Possibly	Residential Outbuildings	H
46Su329		1610	1578.081	C	New River	Upper River Terrace	No	Unknown	P
46Su330		1520	1547.044	C	New River	Upper River Terrace	Possibly	Unknown	EA, LA
46Su331		1500	1526.939	C	New River	Upper River Terrace	Possibly	Residential	H
46Su345		1480	1565.459	C	Pipestem Creek	Stream Terrace	Possibly	Mill	H
46Su358		1520	1489.285	C	New River/Tom's Run	River Floodplain Terrace	Yes	Cabin	H
46Su360		1520	-	C	New River	Upland Bench	Yes	Unknown	H
46Su375		1480	-	C	Bluestone River	River Floodplain Terrace	Yes	Unknown	P; H
46Su385		1560	1470.483	C	Bluestone River	River Floodplain Terrace	Yes	Residential	H
46Su405		1560	1567.858	C	New River	Upper River Terrace	No	Unknown	LA
46Su436		1600	-	C	New River	Upper River Terrace	No	Unknown	A
46Su437		1620	1618.169	C	New River	Upper River Terrace	No	Unknown	P
46Su441		1480	1466.864	C	New River	River Floodplain Terrace	Yes	Unknown	EA
46Su450		1460	1473.091	C	New River	River Floodplain Terrace	Yes	Unknown	P
46Su471		1520	1492.333	C	Joshua's Run	Stream Terrace	Yes	Residence	H
46Su505		1520	-	C	Indian Creek	Stream Terrace	Yes	Unknown	P
46Su506		1489	-	C	Indian Creek	Stream Terrace	Yes	Mill	H
46Su507		1450	1434.984	C	Indian Creek	Stream Terrace	Yes	Mill	H
46Su517		-	-	-	-	-	-	changed to 46Su601	-
46Su518		-	-	-	-	-	-	changed to 46Su602	-
46Su519		-	-	-	-	-	-	changed to 46Su603	-
46Su531		1600	1498.127	C	Indian Creek	Stream Terrace	Yes	Unknown	H
46Su549		1560	1593.140	C	Indian Creek	Stream Terrace	No	Unknown	H

Table C-1. General Site Information for Archaeological Sites Located in USACE-Managed Areas at Bluestone Lake.

Site	Figure Reference	WVSHPO Elevation (ft. amsl)	USACE 1998 Elevation (ft. amsl)	Impact Zone	Context	Landform	Within Maximum Flood Zone?	Function	Cultural Components
46Su592		1500	-	C	New River	River Floodplain Terrace	Yes	Unknown	P
46Su593		1480	-	C	New River	River Floodplain Terrace	Yes	Unknown	P
46Su601		1440	-	C	New River	River Floodplain Terrace	Yes	Unknown	H
46Su602		-	1540.860	C	Indian Creek	Stream Terrace	No	Residence	H
46Su603		-	1522.297	C	Indian Creek	Stream Terrace	No	Unknown	H
46Su616		1600	1565.594	C	Bluestone River	Rockshelter	No	Unknown	P
46Su617		1540	1531.782	C	New River/Pipestem Creek	Upper River Terrace	No	Unknown	P
46Su618		1640	1726.532	C	Upland	Ridgetop	No	Pile Of Rocks	None
46Su633		-	1587.113	C	New River	Upper River Terrace	No	Unknown	P
46Su634		-	1453.852	C	New River	River Floodplain Terrace	Yes	Unknown	H
46Su635		-	1532.766	C	New River	Upland Bench	No	Unknown	P
46Su636		-	1605.974	C	New River	Upland Bench	No	Retaining Wall	H

H = Historic; P = Prehistoric; A = Archaic; EA=Early Archaic; MA = Middle Archaic; LA = Late Archaic; W = Woodland; EW=Early Woodland; MW = Middle Woodland; LW = Late Woodland; LP = Late Prehistoric; PH = Protohistoric

Table C-1. General Site Information for Archaeological Sites Located in USACE-Managed Areas at Bluestone Lake.

Site	Figure Reference	WVSHPO Elevation (ft.amsl)	USACE 1998 Elevation (ft.amsl)	Impact Zone	Context	Landform	Within Maximum Flood Zone?	Function	Cultural Components
46Su206		1415	1449.056	C	New River/Indian Creek	River Floodplain Terrace	Yes	Unknown	P
46Su207		1550	1434.984	C	New River/Indian Creek	River /Stream Terrace	Possibly	Unknown	P; H
46Su208		1429	1466.191	C	New River/Indian Creek	River /Stream Terrace	Yes	Unknown	LA; LP
46Su212		1440	1462.933	C	New River/Indian Creek	River /Stream Terrace	Yes	Unknown	MA, LA; W; H
46Su244		1520	-	C	New River/Lick Creek	River Floodplain Terrace	Yes	Unknown	P
46Su270		1520	-	C	Lick Creek	Stream Terrace	Yes	Residential/Farm	H
46Su271		1520	1503.153	C	Lick Creek	Stream Terrace	Yes	Salt Works	H
46Su272		1520	1572.408	C	Lick Creek	Stream Terrace	Possibly	Salt Works (Blacksmith Shop)	H
46Su273		1520	1540.341	C	Lick Creek	Stream Terrace	Possibly	Salt Works (Post Office/Store)	H
46Su274		1520	-	C	Lick Creek	Stream Terrace	Yes	Residential	H
46Su275		1520	1493.330	C	Lick Creek	Stream Terrace	Yes	Salt Works	H
46Su276		1500	1486.162	C	Lick Creek	Stream Terrace	Yes	19th C. Mill	H
46Su278		2140	-	C	Uplands	Ridgetop	No	Bear Wallow	None
46Su279		1460	-	C	New River	Upper River Terrace	Yes	Village	LP
46Su280		1800	2056.587	C	New River/Tom's Run	Ridgetop	No	Rock Outcrop	None
46Su281		1441	1448.698	C	New River/Tom's Run	River Floodplain Terrace	Yes	War Ford (Post Office/Store)	H
46Su282		1440	-	C	New River	River Floodplain Terrace	Yes	War Ford Ferry	H
46Su290		1415	-	C	New River/Indian Creek	River /Stream Terrace	Yes	Unknown; 18th C. Fort	P; H
46Su306		1520	1510.236	C	Indian Creek	Stream Terrace	Yes	Unknown	P
46Su308		1500	-	C	New River/Indian Creek	Upper River Terrace	Yes	Unknown	P
46Su309		1540	-	C	Indian Creek	Stream Terrace	No	Unknown	P
46Su310		1420	-	C	New River	River Floodplain Terrace	Yes	Unknown	P
46Su325		1530	1460.082	C	New River	River Floodplain Terrace	Possibly	Unknown	LA; H
46Su326		1425	1456.487	C	New River	River Floodplain Terrace	Yes	Unknown	EA, LA; LP; H

Table C-1. General Site Information for Archaeological Sites Located in USACE-Managed Areas at Bluestone Lake.

Site	Figure Reference	WVSHPO Elevation (ft.amsl)	USACE 1998 Elevation (ft.amsl)	Impact Zone	Context	Landform	Within Maximum Flood Zone?	Function	Cultural Components
46Su9		1464	1474.492	C	New River	River Floodplain Terrace	Yes	Unknown; Village	EA, LA, MW; LP
46Su10		1444	1454.505	C	New River	River Floodplain Terrace	Yes	Unknown; Village	LA, W; LP
46Su12		1525	-	C	New River	Rockshelter	No	Rockshelter w/Pictograph	None
46Su13		1540	-	C	Indian Creek	Rockshelter	No	Rockshelter	None
46Su19		1424	-	C	New River	River Floodplain Terrace	Yes	Unknown; 18th C. Fort	LP; H
46Su20		1428	1429.187	C	New River	River Floodplain Terrace	Yes	Unknown; Village	EA, LA, LW; LP
46Su21		1460	1472.487	C	New River	River Floodplain Terrace	Yes	Large Camp Site	EA
46Su22		1441	1450.184	C	New River	River Floodplain Terrace	Yes	Unknown; Village	LA, MW; LP
46Su23		1435	1437.454	C	New River/Joshua's Run	River Floodplain Terrace	Yes	Unknown; 18th C. Fort	P; H
46Su24		1435	-	C	New River/Tom's Run	River Floodplain Terrace	Yes	Village	LP
46Su28		1460	-	C	New River	River Floodplain Terrace	Yes	Unknown; Village	PI, LA, W; LP
46Su29		1450	-	C	New River/Cedar Branch	River Floodplain Terrace	Yes	Unknown	LP
46Su39		1415	1421.756	C	New River	River Floodplain Terrace	Yes	Dense Camp Areas	PI; EA, MA, LA; EW, MW, LW; LP
46Su41		1415	1438.376	C	New River	River Floodplain Terrace	Yes	Dense Camp Areas	PI; EA, LA; EW, MW, LW
46Su42		1415	1423.780	C	New River	River Floodplain Terrace	Yes	Dense Camp Areas	PI; LA; MW, LW; LP
46Su43		1415	1418.744	C	New River	River Floodplain Terrace	Yes	Dense Camp Areas	MA, LA
46Su44		1415	1424.033	C	New River	River Floodplain Terrace	Yes	Dense Camp Areas	EA, LA; EW, LW; LP
46Su45		1415	1438.540	C	New River	River Floodplain Terrace	Yes	Dense Camp Areas	PI; LA; EW, MW, LW; LP
46Su47		1475	1473.780	C	New River	River Floodplain Terrace	Yes	Unknown	W; LP
46Su48		1465	1467.363	C	New River	River Floodplain Terrace	Yes	Unknown	MA; W; LP
46Su49		1457	-	C	New River	River Floodplain Terrace	Yes	Hamlet	LW; LP
46Su50		1466	1514.879	C	New River	River Floodplain Terrace	Yes	Hamlet	LP

Table C-2. Location, NRHP Eligibility, Curatorial Facility, and Accession Numbers for Archaeological Sites Located in USACE-Managed Areas at Bluestone Lake.

Site	NRHP Eligibility	Place of Curation	Accession #	References
44Gs10	Unknown	SI; VDHR	187541(SI), 298894 (SI); None	River Basin Surveys 1948; Solecki 1949;Holland 1970
44Gs11	Unknown	SI	187541	River Basin Surveys 1948; Solecki 1949
44Gs15	Unknown	SI	187541	River Basin Surveys 1948; Solecki 1949
44Gs17	Unknown	SI	187541	River Basin Surveys 1948; Solecki 1949
44Gs20	Unknown	SI	187541	River Basin Surveys 1948; Solecki 1949
44Gs22	Unknown	Unknown	None	MacCord 1972
44Gs28	Unknown	Unknown	None	MacCord 1972
44Gs41	Unknown	N/A	N/A	Trout 1983; Trout 2003
44Gs42	Unknown	N/A	N/A	Trout 1983; Trout 2003
44Gs43	Unknown	N/A	N/A	Trout 1983; Trout 2003
44Gs44	Unknown	N/A	N/A	Trout 1983; Trout 2003
44Gs48	Unknown	VDHR	None	MacCord 1984
46Me19	Unknown	WVDHC	None	WVDCH Site Files
46Me20	Unknown	WVDHC	None	WVDCH Site Files
46Me21	Unknown	WVDHC	None	WVDCH Site Files
46Me103	Unknown	Unknown	Unknown	Trail 1989
46Me121	Unknown	Unknown	Unknown	Trail 1989
46Su1	Unknown	SI	187541	River Basin Surveys 1948; Solecki 1949
46Su2	Unknown	N/A	N/A	River Basin Surveys 1948; Solecki 1949
46Su3	Eligible	SI; UPCCRR; WVDCH	187541 (SI); None	River Basin Surveys 1948; Solecki 1949; Applegarth et al. 1978; Adavasio et al. 1980; Johnson et al. 1980; Marwitt 1982; Johnson 1984; Maslowski 1985b; USACE 1998
46Su5	Unknown	SI	187541	River Basin Surveys 1948; Solecki 1949
46Su6	Unknown	SI	187541	River Basin Surveys 1948; Solecki 1949
46Su7	Unknown	SI	187541	River Basin Surveys 1948; Solecki 1949
46Su8	Unknown	SI	187541	River Basin Surveys 1948; Solecki 1949

Table C-2. Location, NRHP Eligibility, Curatorial Facility, and Accession Numbers for Archaeological Sites Located in USACE-Managed Areas at Bluestone Lake.

Site	NRHP Eligibility	Place of Curation	Accession #	References
46Su56	Unknown	WVDHC	None	WVDCH Site Files
46Su58	Unknown	Unknown	Unknown	Dobbins 1979
46Su60	Unknown	Unknown	Unknown	Dobbins 1979
46Su61	Unknown	Unknown	Unknown	Dobbins 1979
46Su62	Unknown	Unknown	Unknown	WVDCH Site Files
46Su128	Unknown	Unknown	Unknown	WVDCH Site Files
46Su165	Unknown	Unknown	Unknown	WVDCH Site Files
46Su186	Unknown	Unknown	Unknown	WVDCH Site Files
46Su187	Unknown	Unknown	Unknown	WVDCH Site Files
46Su188	Unknown	Unknown	Unknown	WVDCH Site Files
46Su189	Unknown	Unknown	Unknown	WVDCH Site Files
46Su191	Unknown	Unknown	Unknown	Trail 1981
46Su193	Unknown	Unknown	Unknown	Trail 1981
46Su194	Unknown	Unknown	Unknown	Trail 1981
46Su195	Unknown	Unknown	Unknown	Trail 1981
46Su196	Unknown	Unknown	Unknown	Trail 1981
46Su198	Unknown	Unknown	Unknown	Trail 1981
46Su199	Unknown	Unknown	Unknown	Trail 1981
46Su200	Unknown	Unknown	Unknown	Trail 1981
46Su202	Unknown	Unknown	Unknown	Trail 1981
46Su206	Unknown	Unknown	Unknown	Trail 1981
46Su207	Unknown	Unknown	Unknown	Trail 1981
46Su208	Unknown	WVDHC	None	Trail 1981
46Su212	Unknown	Unknown	Unknown	Trail 1981
46Su244	Unknown	Unknown	Unknown	Trail 1982
46Su270	Unknown	Unknown	Unknown	Trail 1982
46Su271	Unknown	Unknown	Unknown	Trail 1982
46Su272	Unknown	Unknown	Unknown	Trail 1982

Table C-2. Location, NRHP Eligibility, Curatorial Facility, and Accession Numbers for Archaeological Sites Located in USACE-Managed Areas at Bluestone Lake.

Site	NRHP Eligibility	Place of Curation	Accession #	References
46Su273	Unknown	Unknown	Unknown	Trail 1982
46Su274	Unknown	Unknown	Unknown	Trail 1982
46Su275	Unknown	Unknown	Unknown	Trail 1982
46Su276	Unknown	Unknown	Unknown	Trail 1982
46Su278	Unknown	Unknown	Unknown	Trail 1982
46Su279	Unknown	Unknown	Unknown	Trail 1982
46Su280	Unknown	Unknown	Unknown	Trail 1982
46Su281	Unknown	Unknown	Unknown	Trail 1982
46Su282	Unknown	Unknown	Unknown	Trail 1982
46Su290	Unknown	Unknown	Unknown	Trail 1982
46Su306	Unknown	Unknown	Unknown	Holland and Trail 1983
46Su308	Unknown	Unknown	Unknown	Holland and Trail 1983
46Su309	Unknown	Unknown	Unknown	Holland and Trail 1983
46Su310	Unknown	Unknown	Unknown	Holland and Trail 1983
46Su325	Unknown	Unknown	Unknown	USACE 1983
46Su326	Unknown	Unknown	Unknown	USACE 1983
46Su327	Unknown	Unknown	Unknown	USACE 1983
46Su328	Unknown	Unknown	Unknown	USACE 1983; McBride and McBride 2000
46Su329	Unknown	Unknown	Unknown	USACE 1983
46Su330	Unknown	Unknown	Unknown	USACE 1983
46Su331	Unknown	Unknown	Unknown	Maslowski and Woody 1984
46Su345	Unknown	Unknown	Unknown	Trail 1984
46Su358	Unknown	Unknown	Unknown	Trail 1985
46Su360	Unknown	Unknown	Unknown	Trail 1985
46Su375	Unknown	Unknown	Unknown	Trail 1986
46Su385	Unknown	Unknown	Unknown	Trail 1986
46Su405	Unknown	Unknown	Unknown	Trail 1986
46Su436	Unknown	Unknown	Unknown	Trail 1988

Table C-2. Location, NRHP Eligibility, Curatorial Facility, and Accession Numbers for Archaeological Sites Located in USACE-Managed Areas at Bluestone Lake.

Site	NRHP Eligibility	Place of Curation	Accession #	References
46Su9	Eligible	SI; ; UPCCRR; WVDCH	187541 (SI); None	River Basin Surveys 1948; Solecki 1949; Adavasio et al. 1980; Johnson et al. 1980; Marwitt 1982 Johnson 1984;
46Su10	Unknown	SI	187541	River Basin Surveys 1948; Solecki 1949
46Su12	Unknown	N/A	None	River Basin Surveys 1948; Solecki 1949
46Su13	Unknown	N/A	None	River Basin Surveys 1948; Solecki 1949
46Su19	Unknown	SI	187541	River Basin Surveys 1948; Solecki 1949
46Su20	Unknown	SI; WVDHC	187541; None	River Basin Surveys 1948; Solecki 1949
46Su21	Unknown	SI	187541	River Basin Surveys 1948; Solecki 1949
46Su22	Eligible	SI; UPCCRR; WVDCH	187541 (SI); None	River Basin Surveys 1948; Solecki 1949; Adavasio et al. 1980; Johnson et al. 1980; Marwitt 1982 Johnson 1984
46Su23	Unknown	SI	187541	River Basin Surveys 1948; Solecki 1949; Faulconer 1975
46Su24	Unknown	SI	187541	River Basin Surveys 1948; Solecki 1949
46Su28	Unknown	SI; WVDCH	187541; None	River Basin Surveys 1948; Solecki 1949
46Su29	Unknown	SI	187541	River Basin Surveys 1948; Solecki 1949
46Su39	Unknown	Unknown	Unknown	USACE 1979; Applegarth and Davis 1982
46Su41	Unknown	Unknown	Unknown	USACE 1979; Applegarth and Davis 1982
46Su42	Unknown	Unknown	Unknown	USACE 1979; Applegarth and Davis 1982
46Su43	Unknown	Unknown	Unknown	USACE 1979
46Su44	Unknown	Unknown	Unknown	USACE 1979
46Su45	Unknown	Unknown	Unknown	USACE 1979
46Su47	Unknown	WVDHC	None	WVDCH Site Files
46Su48	Unknown	WVDHC	None	WVDCH Site Files
46Su49	Unknown	WVDHC	None	WVDCH Site Files
46Su50	Unknown	WVDHC	None	WVDCH Site Files
46Su52	Unknown	WVDHC	None	WVDCH Site Files
46Su53	Unknown	WVDHC	None	WVDCH Site Files
46Su54	Unknown	Unknown	Unknown	USACE 1979
46Su55	Unknown	WVDHC	None	WVDCH Site Files

Table C-2. Location, NRHP Eligibility, Curatorial Facility, and Accession Numbers for Archaeological Sites Located in USACE-Managed Areas at Bluestone Lake.

Site	NRHP Eligibility	Place of Curation	Accession #	References
46Su437	Unknown	Unknown	Unknown	Trail 1988
46Su441	Unknown	Unknown	Unknown	Trail 1988
46Su450	Unknown	Unknown	Unknown	Trail 1988
46Su471	Unknown	Unknown	Unknown	Trail 1988
46Su505	Unknown	Unknown	Unknown	Trail 1989
46Su506	Unknown	Unknown	Unknown	Trail 1988
46Su507	Unknown	Unknown	Unknown	Trail 1988
46Su519	Unknown	Unknown	Unknown	McBride, Updike, and Bonshire 1991
46Su531	Unknown	Unknown	Unknown	Trail 1990
46Su549	Unknown	Unknown	Unknown	Trail 1992
46Su592	Unknown	Unknown	Unknown	Trail 1993
46Su593	Unknown	Unknown	Unknown	Trail 1993
46Su601	Unknown	Unknown	Unknown	McBride, Updike, and Bonshire 1991; McBride 1993
46Su602	Unknown	Unknown	Unknown	McBride, Updike, and Bonshire 1991; McBride 1993
46Su603	Unknown	Unknown	Unknown	McBride, Updike, and Bonshire 1991; McBride 1993
46Su616	Potentially Eligible	CRAI-WV	None	Anslinger 1995
46Su617	Potentially Eligible	No Material Collected	None	Anslinger 1995
46Su618	Indeterminate	No Material	None	Anslinger 1995
46Su633	Not Eligible	GP	None	Tidlow et al. 1996; Purtill et al. 1997
46Su634	Not Eligible	GP	None	Tidlow et al. 1996; Purtill et al. 1997
46Su635	Not Eligible	GP	None	Tidlow et al. 1996
46Su636	Not Eligible	GP	None	Tidlow et al. 1996

SI = Smithsonian Institution; VDHR = Virginia Department of Historic Resources; WVDCH = West Virginia Division of Culture and History; UPCCRR = University of Pittsburgh Center for Cultural Resource Research; GP = Gray and Pape, Inc., Richmond, Virginia; CRAI-WV = Cultural Resource Analysts, Inc., West Virginia Office.

APPENDIX D

Scope of Work

SCOPE OF WORK
HISTORIC PROPERTIES MANAGEMENT PLAN
Bluestone, Grayson, Paint Creek,
and North Fork Pound Lakes

1. Background.

The Huntington District, Corps of Engineers proposes to develop new or updated Historic Properties Management Plans (HPMPs) for Bluestone Lake (update) in West Virginia, Grayson Lake (update) in Kentucky, Paint Creek Lake (new) in Ohio, and North Fork Pound Lake (new) in Virginia at which the District has fee-owned property and easements.

2. Services Required.

The services required of the Contractor shall consist of completing four Historic Properties Management Plans incorporating information on all known cultural resources on lands in Bluestone Lake, Grayson Lake, Paint Creek Lake, and North Fork Pound Lake project areas owned in fee by the Corps of Engineers or subject to easements to which the Corps of Engineers is the grantee. The HPMPs shall comply with requirements set forth in Chapter 6-8 f of EP 1130-2-540, a copy of which is attached, and shall fully address the following topics: project Description and Background; Environmental Setting; Culture History; History of Cultural Resource Investigations; Cultural Resource Descriptions; Curation, Collections and Radiocarbon Dates; Impact Zones, Upland and Reservoir Processes and the Physical Integrity of Cultural Resources; Site Evaluations and the Identification of Archaeologically Sensitive Landforms; Management Priorities, Recommendations and General Policies. The HPMPs shall be of a quality and depth of coverage consistent with HPMPs prepared by the contractor for Dillon Lake (Church 2004) and Flannigan Reservoir (Morgan 2004).

Research for the HPMPs shall include a literature and records search, review of all contract reports, publications, papers, and other documents pertaining to cultural resources at the four reservoirs.

3. Materials provided by the Government.

The Huntington District will provide the contractor with the following:

A. Available maps depicting the project areas
B. Copy of the 1998 Bluestone HPMP document and copy of the 1998 Grayson HPMP document held by the Huntington District office and access to pertinent files and maps at that office
C. Access to pertinent documents at the reservoir office.

4. Reports.

A. The Contractor shall prepare a draft report for each of the four named lakes for the District and other agency review, and a final report for each of the four named lakes that addresses all the comments resulting from the review and comment process.

C. Both draft and final reports shall be printed on 8 $^1/_2$ x 11 inch paper with 1 inch top and bottom margins, and a 1 $^1/_4$ inch binding margin. The text shall be in an easily readable type such as 10 or 12 point Arial or Times New Roman. The final report text shall be single-spaced and pagination shall conform to standard front-to-back printing requirements. The final report shall be printed on fully white, 20 lb. offset paper. The reports shall be carefully proofread and edited by the Contractor to be reasonably free of error.

D. Photographs and illustrations shall be included when appropriate. All photographs included in the final reports shall be good quality; the draft reports may use good quality photocopy reproductions. Oversized figures shall be formatted to an 11 x 17-inch page size with adequate margins.

E. Report submittal. Three (3) copies of each of the four draft reports (two bound and one unbound) shall be submitted to the District for review and comment. One original unbound final copy and five (5) bound final copies of each of the four reports shall be submitted to the District. Each of the four final reports shall be accompanied by one floppy disk, zip disk or CD, formatted on an IBM compatible computer, containing a copy of the report using Microsoft Word software.

F. Publishing Restrictions. Neither the Contractor nor his representative shall release or publish any sketch, photograph, report, or other material of any nature obtained or prepared under this contract without specific written approval of the Contracting Officer or his authorized representative. Records of site locations are considered to be internal documents and are not for public distribution. All reports, drawings, maps, photographs, notes, and other material developed in the performance of this contract shall be and remain the sole properties of the Government and may be used on any other work without additional compensation to the Contractor. The contractor agrees not to assert any rights and not to establish any claim with respect thereto.

5. Schedule of Work.

The contractor shall follow this schedule:

Notice to Proceed	Begin Work
January 27, 2006	Submit Draft Reports
March 31, 2006	Submit Final Reports

6. REFERENCES CITED

Church, Flora
2004 Historic Properties Management Plan for Dillon Lake in the Muskingum River Watershed, Ohio. Cultural Resource Analysts, Inc. Hurricane, WV.

Morgan, Vera E.
2004 Historic Properties Management Plan for John Flannagan Reservoir, Dickenson County, Virginia. Cultural Resource Analysts, Inc., Lexington, KY.

Determination of Eligibility Assessments of Bluestone Dam and County Route 23, Vicinity of Hinton, Summers County, West Virginia

January 15, 1997

Prepared for:

U.S. Army Corps of Engineers
Huntington District
Huntington, WV

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ABSTRACT

Determination of Eligibility Assessments were conducted for Bluestone Dam and for an abandoned section of the former County Route 23, both located in the vicinity of Hinton, Summers County, West Virginia. The purpose of this investigation was to evaluate these structures according to the minimum requirements for inclusion to the National Register of Historic Places. The research and field visit for these eligibility assessments were completed in July and August of 1996.

Bluestone Project was authorized in 1935 by Executive Order 7183-A, signed by President Franklin D. Roosevelt, as a multipurpose project for flood control and generation of hydroelectric power. (Authorization was later expanded to include recreation and fish and wildlife enhancement.) Due to litigation (U.S. *v.* Appalachian Power Co.), dam construction did not commence until January 1942. The dam was completed in 1948. This dam was the first flood control dam built in West Virginia by the U.S. Army Corps of Engineers, Huntington District. Tygart Dam, built near Grafton by the Pittsburgh District of the U.S. Army Corps of Engineers, was the first flood control dam built in West Virginia.

Bluestone Project includes the dam, the reservoir (Bluestone Lake) and adjacent lands. The determination of eligibility was performed for Bluestone Dam, a feature of the Bluestone Project. Features of the dam include a concrete gravity dam, spillway, stilling basin and outlet works. The dam is a concrete gravity structure with a maximum height above stream channel of 165 feet. The overall top length is 2,048 feet at elevation 1,535 feet. All work was completed for the Bluestone Project, to which recreational purposes had also been added, in 1952.

The Bluestone Dam has saved hundreds of millions of dollars as a direct result of flood control in the New River and Kanawha River Valleys. Bluestone Project employed many of the people from the region during its construction and continues to have a positive economic impact by attracting over one million visitors a year. Bluestone Dam is eligible for the National Register under Criterion A for the themes of law, politics and government, economics, and conservation. Additional work is recommended to identify contributing and non-contributing resources associated with the Bluestone Project and identify boundaries if impacted.

County Route 23 was originally a secondary road that provided a transportation thorofare for people living in the rural areas along the east side of the New River from Hinton southward. The road was built prior to 1873. The section of County Route 23 under study was paved with concrete sometime between 1908 and 1937. The road surface is a concrete slab measuring up to 9 feet wide, 4 inches thick, and approximately 0.2 miles long. The road was modified during construction of the Bluestone Project (1935-52). The road is not associated with an event (Criterion A) or person (Criterion B) important to the region. The road will not significantly add to our understanding of road construction technology

(Criterion C) nor will it significantly contribute to our understanding of the history of the region (Criterion D). Therefore, the road does not appear to meet the minimum criteria for listing on the National Register of Historic Places. No additional work is recommended for this structure.

2.0 BLUESTONE DAM DETERMINATION OF ELIGIBILITY

2.1 Summary Statement

Bluestone Dam is a concrete gravity dam located on the New River approximately 0.7 miles upstream from the mouth of the Greenbrier River in Summers County, West Virginia (Figure 1). Bluestone Dam and Reservoir (Bluestone Lake) and some adjacent property is owned by the U.S. Army Corps of Engineers. The dam, reservoir and adjacent properties comprise the Bluestone Project. The determination of eligibility was performed for the dam, not for Bluestone Project. Bluestone Dam was the first flood control dam built by the Huntington District of the U.S. Army Corps of Engineers in West Virginia, and is still the longest concrete gravity dam operated in the state by the district. Tygart Dam, built by the Pittsburgh District of the U.S. Army Corps of Engineers, was the first flood control dam built in West Virginia. The Bluestone Project was authorized by Executive Order of President Franklin D. Roosevelt on September 12, 1935, and the Flood Control Acts of June 22, 1936, and June 28, 1938, as a multipurpose project that included flood control and production of hydroelectric power (U.S. Army Corps of Engineers 1950). Currently, Bluestone Dam provides flood control downstream along the New River, and with other dams on the Gauley and Elk Rivers, flood control throughout the Kanawha River Valley. The topography of the region above and below the dam is characterized generally by deep stream valleys and steeply sloping hillsides. The setting of the Bluestone Reservoir is similar to a Norwegian fjord in terms of appearance and beauty (Lady 1983). Dravo Corporation was awarded the contract to build the dam in January 1942. Due to other strategic demands from World War II, work on the Bluestone Project was suspended from March 1944 to January 1946 (U.S. Army Corps of Engineers 1950:3). The dam was completed in November 1948 but other work relating to the project was not completed until 1952 at a total cost of about $28.6 million (U.S. Army Corps of Engineers 1950:3; 1981). Bluestone Dam is approximately 2,048 feet long, 165 feet high, 16 feet wide at the top and 200 feet wide at the base. Water discharge is controlled by 16 sluices, 21 crest gates, and a stilling basin. Six penstocks for future hydroelectric power generation were built into the dam but are not utilized as power is not generated. Operating purposes of the project were modified by the Flood Control Act of 1944 (PL 78-534) to include recreational activities and by the Fish and Wildlife Coordination Act of 1958 (PL 85-624) to include fish and wildlife enhancement. Neither of these later purposes have affected the dam itself. A few minor modifications have been made to the dam since its completion. These changes have not affected the integrity of the dam, which is excellent.

2.2 Description of Bluestone Dam

Bluestone Dam is a concrete gravity dam with an ogee spillway (U.S. Army Corps of Engineers 1949:4). The dam is on the New River just south of Hinton in Summers County, West Virginia. The dam was designed for flood control and hydroelectric power generation. Bluestone was one of four proposed dam sites recommended to control

3.0 COUNTY ROUTE 23 DETERMINATION OF ELIGIBILITY

3.1 Summary Statement

A section of County Route 23 (Route 23) is located on the east side of the New River between Bellepoint and Bluestone Dam in Summers County, West Virginia. This road section, lying wholly within the U.S Army Corps of Engineers property, is approximately 0.2 miles in length. It extends from the south end of Cedar Avenue in Bellepoint southward to a bridge across Packs Branch, an intermittent stream which empties into the New River (Figure 5). This abandoned road section is not shown on most recent maps (Figure 1). This north-south trending road was cut into the side slope of hills lining the New River Valley. Bluestone Dam and its reservoir inundated most of Route 23 between Bluestone Dam and the mouth of Indian Creek to the south. The U.S. Army Corps of Engineers built a new road to service the area formerly accessed by Route 23 as part of the work associated with constructing the Bluestone Project. This small section of Route 23 under evaluation was below the dam itself and was not inundated. The road section can be accessed on its southern end from a U.S. Army Corps of Engineers service road. The north end is blocked off by a guard rail which prevents access from Bellepoint by motorized vehicles. This section of Route 23 is reputed to be the first concrete road in Summers County (Saunders 1984). The road has a 2- to 3-foot-wide berm on the west side and a 3-foot-wide drainage ditch along the east side. The concrete surface varies in width between 8.5 to 9.0 feet and is 4 inches thick. The concrete is comprised of a high proportion of large, angular aggregate material. Currently, various portions of the road are either undercut by erosion, broken-off, cracked, and/or grass covered. This section of Route 23 was paved sometime between 1908 and 1937 and has been unchanged by man since 1952 when the Bluestone Project was completed.

3.2 Description of County Route 23

This section of County Route 23 is approximately 0.2 miles in length running from the south end of Cedar Avenue in Bellepoint southward to a bridge across a small stream referred to as Packs Branch. Approximately 14 to 15 feet of hillslope was leveled to create this road including up to 9 feet for the road surface, 3 feet for a drainage ditch along the east side of the road, and up to 3 feet for a berm on the west side of the road. The road lies just above the floodplain of the New River at an elevation of 1,410 feet to 1,425 feet Above Mean Sea Level. The concrete slab forming the road varied from 8.5 feet to 9.0 feet in width. This road width appears to be atypical since sections of West Virginia Route 3, located nearby and paved between 1917 and 1930, varied in width from 16 to 30 feet (State Roads Commission of West Virginia 1941: 481). A narrow (9-foot-wide) road would have made it difficult for two-way traffic. Therefore, this road section probably had a light volume of traffic. The drainage ditch observed along the east side of the road edge would have been necessary to prevent runoff from the hillslope from washing out the road. Portions of the road base on this side have been washed away,

4.0 SUMMARY

Determination of Eligibility Assessments were conducted on Bluestone Dam and an abandoned section of the former County Route 23, both located in the vicinity of Hinton, Summers County, West Virginia. The purpose of this investigation was to evaluate whether these structures meet the minimum requirements for inclusion to the National Register of Historic Places. The research and field visit for the eligibility studies were done in July and August, 1996.

Bluestone Project was authorized in 1935 by an Executive Order 7183-A signed by President Franklin D. Roosevelt as a multipurpose project that included flood control and generation of hydropower. Due to legal complications, the actual work on the dam did not commence until January 1942. The litigation (U.S. *v.* Appalachian Power Co.) led to a landmark decision by the U.S. Supreme Court which expanded the control of the Federal government over the nation's waterways. During this interim period of litigation, work was restricted to land acquisition, field studies, land clearing, project design and modeling studies. The dam was not completed until 1948 due to a work suspension during part of World War II.

This dam was the first flood control dam built in West Virginia by the U.S. Army Corps of Engineers, Huntington District. The dam is a concrete gravity dam measuring 2,048 feet wide and 165 feet high. All work for the Bluestone Project, except for the hydropower component but including recreational facilities, was completed in 1952. The Bluestone Dam has saved hundreds of millions of dollars as a direct result of its flood control in the New River and Kanawha River Valleys. The Bluestone Project employed many people from the region during its construction and continues to have an additional positive economic impact by attracting over one million visitors a year.

Bluestone Dam is eligible for the National Register under Criterion A for the themes of law, politics and government, economics, and conservation. Additional work is recommended to identify contributing and non-contributing resources associated with the Bluestone Project and identify boundaries if impacted.

County Route 23 was originally a secondary road that provided an early thorofare for people living in the rural areas on the east side of the New River from Hinton southward. The road was built prior to 1873. The small section of County Route 23 in this investigation was paved with concrete sometime between 1908 and 1937, making it one of three paved roads in the county in 1937. The road surface is a concrete slab measuring up to 9 feet wide, 4 inches thick, and approximately 0.2 miles long. The road was modified during design and construction of the Bluestone Project (1935-52).

The road is not associated with an event (Criterion A) or person (Criterion B) important to the region. The road will not significantly contribute to our understanding of road construction technology (Criterion C) nor to our understanding of the history of the region

(Criterion D). Therefore, the road does not appear to meet minimum criteria for listing on the National Register of Historic Places. No additional work is recommended for this structure.

WEST VIRGINIA DIVISION OF
CULTURE AND HISTORY

October 8, 1997

Mr. James S. Everman
Chief, Planning Division
Dept. of the Army
502 Eighth Street
Huntington, WV 25701-2070

RE: Bluestone Dam and County Route 23

FR# 94-314-SU

Dear Mr. Everman:

We have received the above referenced project for review as required by Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties."

We accept the recommendations of the Determination of Eligibility Assessments of Bluestone Dam and County Route 23 with one qualification. The report does not directly discuss the application of Criterion C for the Dam. In Section 2.6 it is recommended that a study be undertaken to identify contributing and non-contributing resources and to evaluate appropriate boundaries. We concur with that suggestion. This study should include the evaluation of Criterion C for the dam. In conclusion, we concur that the Dam is eligible and that County Road 23 is not. We appreciate the opportunity to be of service. If you have any questions, please contact me.

Sincerely,

Susan M. Pierce

Susan M. Pierce
Deputy State Historic Preservation
Officer for Resource Protection

SMP:ts

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WEST VIRGINIA DIVISION OF
CULTURE AND HISTORY

July 14, 2000

Mr. A. B. Borda, Jr.
U.S. Army COE
Attn: CEORH-PD-B
502 Eighth Street
Huntington, WV 25701

RE: Bluestone Dam and County Route 23
FR#: 94-314-SU-12

Dear Mr. Borda:

We have reviewed "Determination of Eligibility Assessments of Bluestone Dam and County Route 23, Vicinity of Hinton, Summers County, West Virginia" report for the above mentioned project to determine its effects to cultural resources. As required by Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations, 36 CFR 800: "Protection of Historic Properties," we submit our comments.

The current project was the subject of a meeting held on July 11, 2000 at the Bluestone Dam and attended by Ms. Susan M. Pierce and Mr. Marc Holma, both of the West Virginia State Historic Preservation Office, and Dr. Robert Maslowski and Messrs. David Eskridge and Sandy Nessmith, all of the Army Corps of Engineers. At this meeting the representatives from the WV SHPO concurred with the subject report that states the Bluestone Dam is eligible for listing in the National Register under Criterion A for its significance in the themes of law, politics, government, economics, and conservation. The assembled parties also agreed that the proposed improvements to the resource constitute an *Adverse Effect* and that a Memorandum of Agreement (MOA) is necessary in order to mitigate the undertaking's impacts to the Bluestone Dam.

The follow stipulations were discussed and tentatively consented to at the July 11th meeting.

Stipulation 1: Development of a detailed history of Bluestone Dam covering its planning, engineering, construction, and significance in the above referenced themes.

Stipulation 2: Revision of the Corps of Engineers' web site to include historical information and historic photographs of the Bluestone Dam.

Stipulation 3: Development of a brochure on the history of Bluestone Dam for distribution to visitors and school groups.

Stipulation 4: Upgrade and improvement of displays at the Visitors Center once these projects are complete.

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Stipulation 5: Incorporate into the new design an area where visitors can view Bluestone Lake from the dam once the project is complete.

Please submit the draft MOA for our review and comment at your earliest convenience.

We appreciate the opportunity to be of service. *If you have questions regarding our comments or the Section 106 process, please call Marc Holma, Senior Structural Historian for Review and Compliance, at (304) 558-0220, Ext. 723.*

Sincerely,

Susan M. Pierce

Susan M. Pierce
Deputy State Historic Preservation Officer

SMP: mh

cc: Dr. Robert Maslowki
Archaeologist
U. S. Army Corps of Engineers
502 8th Street
Huntington, West Virginia 25701

1997 Phase I Cultural Resources Report

94-314-54-1

Phase IA Cultural Resources Investigation for the Bluestone Dam Safety Assurance Program

by

Gloria Gozdzik
Shelley C. Birdsong
L. Jesse Rouse

Prepared for

the U.S. Army Corps of Engineers
Huntington District
Huntington, WV

Prepared by

Horizon Research Consultants
Rt. 4, Box 320
Morgantown, WV 26505
(304) 599-5799

September 30, 1997

EXECUTIVE SUMMARY

The U.S. Army Corps of Engineers (COE), Huntington District, proposes to modify the Bluestone Dam, Hinton, West Virginia, so that it will safely accommodate the probable maximum flood. Three alternatives are under consideration. An Environmental Impact Statement is being written to assess the effect of each alternative. The National Historic Preservation Act of 1966, Section 106, requires that the COE "take into account" how the proposed modifications could affect historic properties located in the study area. This Phase IA cultural resources investigation was conducted to determine baseline conditions for the study area. The study area extends from Narrows, Virginia, to Point Pleasant, West Virginia.

Materials researched for this literature review include the archeological and historic site files at the West Virginia Division of Culture and History, Historic Preservation Office (WVDCH), and the Virginia Department of Historic Resources (VDHR). Additionally, the COE database of archeological sites from the Bluestone Reservoir was reviewed. Several cultural resource management reports from Phase I, II, and III investigations in and near the area encompassed by the Bluestone Dam Safety Assurance (DSA) Program study area were reviewed to gain an understanding of the type of identified sites which may be affected.

Library searches were conducted at the Wise and Colson Libraries at West Virginia University, the Hillman Library at the University of Pittsburgh, and the National Park Service New River Gorge Park Office Library at Glen Jean, West Virginia. Materials researched included journals and magazines such as *West Virginia Archeologist*, various numbers of the *Proceedings of the New River Symposium*, *Goldenseal*, *Pennsylvania Archeologist*, *Wonderful West Virginia*, and *American Antiquity*. Several local and county histories were reviewed as well. References were supplemented by the use of various sources on the Internet, including the World Wide Web and its menu-driven text browser, Gopher. Other libraries and collections were accessed via these electronic sources and searched for relevant materials (e.g., the West Virginia Archeological Research Library, the National Archeological Database, and the National Center for Preservation Technologies and Training (NCPTT) Gopher site).

U.S. Geological Survey (USGS) 7.5 Minute Series quadrangle maps, West Virginia State Historic Preservation Office site files, Virginia Department of Historic Resources site files, and county files containing location data for archeological sites and historic structures in the study area were examined. The locations and agency designations of all recorded archeological resources and National Register historic districts were transferred to project maps. Site forms for prehistoric properties were reviewed, and National Register properties were reviewed and tabulated. A field review was not conducted to discover or assess other potentially eligible prehistoric or historic properties which could be located within the study area.

Many cultural resource surveys have been conducted in the region downstream of Bluestone Dam extending to the Ohio River, but only one has been conducted upstream of the dam (Solecki, 1949). To date, only three archeological sites (46SU3, 46SU9 and 46SU22) have been significantly tested in the upstream area. The most recent test excavations of these sites are from the 1970s and provide the only source of interpretation on the prehistoric use of the upstream area.

The study area contains a full range of cultural resources, including prehistoric and historic archeological sites, historic structures, and designated historic districts. The study area has been divided into four geographic areas which are identified as Reconnaissance Areas 1, 2, 3, and 4. Within Reconnaissance Area 1 there are 235 prehistoric and historic archeological sites, 3 historic districts, and 14 historic properties. Within Reconnaissance Area 2 there are 24 prehistoric and historic archeological sites, 1 historic district, and 26 historic properties. Within Reconnaissance Area 3 there are 133 prehistoric and historic archeological sites, 7 historic districts, and 67 historic properties. Within Reconnaissance Area 4 there are 154 prehistoric and historic archeological sites, 2 historic districts, and 112 historic properties.

5.0 CONCLUSIONS

The Bluestone Dam was evaluated by the U.S. Army Corps of Engineers (COE) to determine if it complied with state-of-the-art design criteria with respect to hydrologic and seismic adequacy. The COE proposes to modify the dam so that it will safely accommodate the probable maximum flood (PMF). In the event of the PMF, the proposed modifications could cause changes in inundation patterns in Virginia and West Virginia.

This literature review was performed to identify cultural resources which could be potentially impacted by modifications to Bluestone Dam and subsequent inundation in the event of the PMF. The review consisted of a compilation of pertinent literature related to archeological and historical research in and near the study area, which extends from Narrows, Virginia, to Point Pleasant, West Virginia. Limits of the study area and major features identified during this study are indicated on the maps provided in Attachment 8-II.

According to information in "The New River in the Bluestone Project Area Narrows, VA-Bluestone Lake, WV," prepared in 1993, "[t]he cultural features of the New River in the Bluestone Project Area are not as well known as those on other sections of that river," (National Committee for the New River, 1993: 22). In addition, authors of the "New River Parkway Concept Plan" stated: "The settlements and farms in the remote ridges, valleys, and narrow bottoms remain much as they were many years ago. The history of this region is evident in the cultural and natural landscape of today," (New River Parkway Authority, 1991: 17).

The study area contains a full range of cultural resources including prehistoric and historic archeological sites, historic structures, and designated historic districts. Based upon records maintained by the West Virginia State Historic Preservation Office, the Virgina Department of Historic Resources, the National Register of Historic Places, and other published and unpublished literature, these cultural resources are distributed throughout the study area. Although many cultural resource surveys have been completed in the downstream area, only one has been conducted upstream of the dam (Reconnaissance Area 1) (Solecki, 1949). Excavations of these upstream sites from the 1970s provide the only source of interpretation on the historic use of the area.

The study area was divided into four geographic areas identified as Reconnaissance Area 1, 2, 3 and 4. Within Reconnaissance Area 1 there are 235 prehistoric and historic archeological sites, 3 historic districts and 14 historic properties. Within Reconnaissance Area 2 there are 24 prehistoric and historic archeological sites, 1 historic district and 26 historic properties. Within Reconnaissance Area 3 there are 133 prehistoric and historic archeological sites, 7 historic districts and 67 historic

properties. Within Reconnaissance Area 4 there are 154 prehistoric and historic archeological sites, 2 historic districts and 112 historic properties.

WEST VIRGINIA DIVISION OF
CULTURE AND HISTORY

February 2, 1998

Mr. James S. Everman
Chief, Planning Division
Dept. Of the Army
502 Eighth Street
Huntington, WV 25702-2070

RE: Bluestone Safety Assurance Program;
Phase IA Cultural Resources Study
FR: 94-314-SU

Dear Mr. Everman,

We have reviewed the following final report: "Phase IA Cultural Resources Investigation for the Bluestone Dam Safety Assurance Program", submitted by Horizon Research Consultants. In accordance with Section 106 of the National Historic Preservation Act, we submit our comments on the above referenced project.

We find the final report to be comprehensive and acceptable. We look forward to working with the Huntington District to the completion of this Project.

We appreciate the opportunity to review this project. If you have any questions, please contact Patrick Trader, Senior Archaeologist.

Sincerely,

Susan M Pierce

Susan M. Pierce
Deputy State Historic Preservation
Officer for Resource Protection

SMP:PDT

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