

Facility 140. Cooling System
NSF Carderock Historic District
MIHP # M:29-52 -32
Montgomery County
West Bethesda
1945
Public

Facility 140, a Wind Tunnel Cooling System, is located on the roof of Building 138, the Subsonic Wind Tunnel. The system is located in the western portion of the 183.6-acre Naval Support Facility (NSF) Carderock, formerly known as the Naval Surface Warfare Center Carderock Division (NSWCCD). Located approximately 12 miles northwest of Washington, D.C., near Bethesda, Maryland, NSF is situated north of the Potomac River and is bordered by the Clara Barton Parkway to the south and MacArthur Boulevard to the north and east. The installation is composed of 112 buildings and structures that function as research laboratories, administration facilities, and operations and utility structures. At the center of the installation is the David Taylor Model Basin (DTMB) (Buildings 1-4), a group of interconnected buildings that include a model basin, an administration building, a shop building, and a laboratory. The DTMB was listed in the NRHP in 1985 (M: 29-47). In 1996 the NSF Carderock Historic District was determined eligible for the NRHP, and 44 of the 116 buildings were recognized as contributing resources. Building 134 is a contributing resource in the NSF Carderock Historic District.

Facility 140 was built in 1945 as the cooling system for the Subsonic Wind Tunnel Building (Building 138) to control the temperature caused by the test fans and air friction on the tunnel walls. The cooling system consists of a series of metal pipes capped with sprinkler heads that are suspended above the exterior of the wind tunnel. Facility 140 is part of the Subsonic Wind Tunnel Complex at NSF, erected in 1943 as part of the Navy's aeronautical research program.

7. Description

Inventory No. M: 29-52-32

Condition

excellent deteriorated
 good ruins
 fair altered

Prepare both a one paragraph summary and a comprehensive description of the resource and its various elements as it exists today.

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Facility 140 was built in 1945 as the cooling system for the Subsonic Wind Tunnel Building (Building 138) to control the temperature caused by the test fans and air friction on the tunnel walls. The cooling system consists of a series of metal pipes capped with sprinkler heads that are suspended above the exterior of the wind tunnel. When in operation, the sprinklers diffused water on the exterior of the wind tunnel. Evaporative cooling and the constant flow of water down the sides of the tunnel served as the cooling mechanism for the wind tunnel. The system recycled the water with poured concrete catch basins, located below the tunnel, that drained into a large concrete cistern. The water in the cistern was then recirculated through the system (Giglio 1999:7.2; Melhuish 1996b:3).

8. Significance

Inventory No. M: 29-52-32

Period	Areas of Significance	Check and justify below		
<input type="checkbox"/> 1600-1699	<input type="checkbox"/> agriculture	<input type="checkbox"/> economics	<input type="checkbox"/> health/medicine	<input type="checkbox"/> performing arts
<input type="checkbox"/> 1700-1799	<input type="checkbox"/> archeology	<input type="checkbox"/> education	<input type="checkbox"/> industry	<input type="checkbox"/> philosophy
<input type="checkbox"/> 1800-1899	<input checked="" type="checkbox"/> architecture	<input type="checkbox"/> engineering	<input type="checkbox"/> invention	<input type="checkbox"/> politics/government
<input checked="" type="checkbox"/> 1900-1999	<input type="checkbox"/> art	<input type="checkbox"/> entertainment/ recreation	<input type="checkbox"/> landscape architecture	<input type="checkbox"/> religion
<input type="checkbox"/> 2000-	<input type="checkbox"/> commerce	<input type="checkbox"/> ethnic heritage	<input type="checkbox"/> law	<input type="checkbox"/> science
	<input type="checkbox"/> communications	<input type="checkbox"/> exploration/ settlement	<input type="checkbox"/> literature	<input type="checkbox"/> social history
	<input type="checkbox"/> community planning		<input type="checkbox"/> maritime history	<input type="checkbox"/> transportation
	<input type="checkbox"/> conservation		<input checked="" type="checkbox"/> military	<input type="checkbox"/> other: _____

Specific dates	1938-1970	Architect/Builder	U.S. Navy, Bureau of Yards & Docks
Construction dates	1945		

Evaluation for:

National Register

Maryland Register

not evaluated

Prepare a one-paragraph summary statement of significance addressing applicable criteria, followed by a narrative discussion of the history of the resource and its context. (For compliance projects, complete evaluation on a DOE Form – see manual.)

Summary

In 1985 the DTMB and associated buildings (Buildings 1-4) were listed in the National Register. The campus of buildings created at Carderock from 1938 to 1958 was determined eligible for the National Register as the Naval Surface Warfare Center Carderock Division Historic District (NSWCCD) in 1996. The determination of eligibility stated that NSF Carderock possesses the qualities of exceptional significance under Criterion G "within the historic context of military research, design, testing, and evaluation." It also stated that NSF Carderock meets Criteria A for its events that that have made a significant contribution to military technology and Criterion C for its intact collection of RDT&E buildings and facilities. The period of significance for the historic district was determined as beginning in 1938 when the model basin was constructed and ending in 1958, the end date of physical model testing and the official mission change to include computer research and testing. In 1996, 116 resources were recorded at NSF Carderock in 1995 and 44 were determined as contributing to the historic district (Melhuish 1996).

In 2006 Berger updated the ICRMP for NSF Carderock. In October-November 2005 Buildings 16 and 18 were re-evaluated and found to be eligible for the National Register as contributing elements in the historic district. This evaluation also recommended that the period of significance for the historic district (originally 1938 to 1958) warranted expansion to 1970, marking the completion of the Anechoic Test facility and the close of the 20 "Golden Years of Research" at DTMB (Bowers 2005).

The Wind Tunnel Cooling System is considered a contributing element in the National Register eligible NSF Carderock Historic District.

Historic Context

The David Taylor Model Basin (1937 to 1952)

The United States Navy constructed its first laboratory for studying ship construction and technology in 1898 at the Washington Navy Yard. The United States Experimental Model Basin, as it was called, was built under the auspices of Rear Adm. David Watson Taylor. Initial research involved a basin and a carriage that towed wooden ship models. In 1912, as the Navy moved toward aeronautical endeavors, the facility explored wind tunnel technology. The Navy's first wind tunnel was operational by 1914. The Navy soon outgrew these facilities as ship and aircraft testing evolved and no space at the Navy Yard was available for expansion.

In May 1936 Congress appropriated \$3.5 million for land acquisition and construction of a new facility. The site at Carderock was chosen for its location near Washington, D.C., and the Navy headquarters, its access to the Potomac River *in order to fill the basins*, and its bedrock foundation that would support the massive testing mechanisms. In addition, the site was large enough for a 100 percent expansion in 50 years (Carlisle 1998:140).

Maryland Historical Trust

Maryland Inventory of Historic Properties Form

Inventory No. M: 29-52 - 32

Name

Continuation Sheet

Number 8 Page 1

Construction started at the Carderock campus on September 8, 1937, and it was dedicated on November 4, 1939 (Carlisle 1998:145). It was named the David Taylor Model Basin in honor of Rear Adm. David Watson Taylor. Commander Ben Moreell is credited with the design of the new basin. The initial buildings constructed on the campus included an interconnecting administration building, shop, and laboratory building (Nos. 1, 2, and 3) arranged in a linear pattern. These support buildings reflect the influence of the streamlined Art Moderne style favored by the federal government during the 1940s. The model basin was constructed parallel to the three structures and housed a deep water basin, a shallow water and turning basin, and a high speed basin. The main entrance to the interconnecting office buildings, shop, and lab was designed to face south, toward the Potomac River. A large, grassy "meadow" fronted the centered main entrance of Building 2 and extended south toward the river. This vast south lawn added to the open and campus-like feeling of the facility but also allowed for future expansion. In 1985 the DTMB and associated buildings were listed in the National Register.

The primary mission of the DTMB, as defined by Congress, was to investigate and determine the most suitable and desirable shapes and forms for naval vessels and aircraft (Melhuish 1996). During its first year of operation, the DTMB was mostly involved in design work, but at the outset of World War II, activities at the DTMB were focused on war-related topics. Research became a major directive, and new facilities and staff were added to support research activities. New facilities added to the installation included a research pit for explosion testing (1941), wind tunnels and associated buildings (1942), a pentagonal test pond to test underwater explosives (1943), the Circulating Water Channel to test the angles and drag of submerged towed devices (1942), and two supersonic wind tunnels that had been dismantled in Germany and installed at Carderock (1946) (Melhuish 1996).

During this rapid expansion, careful consideration was given to the overall physical planning and growth of the installation. Under the direction of Capt. H.S. Howard, the installation grew with the addition of 47 acres in 1943 and 55 acres in 1946. Howard wrote in 1945, "Having in mind the architecture of the main building, I visualize something in the nature of a college campus or graduate school grown up around and in front of the main building. A row of buildings might well grow to the east and to the west of the main building toward the south but the central area should be kept free of building so that eventually a U-shaped group is formed with the open end toward the Highway" (Carlisle 1998:192). The campus of buildings created at Carderock during this period was determined eligible for the National Register as the Naval Surface Warfare Center Carderock Division Historic District in 1996.

The "Golden Age of Research" (1952 to 1970)

Expansion of the aerodynamics facilities at Carderock after World War II coincided with a "drastic realignment" of mission that inaugurated a "Golden Age of Research" at DTMB (McCarthy 1993:30, 34). In 1952 the Navy established the Applied Mathematics Department at Carderock and introduced computer-based research, beginning with a Universal Automatic Computer in 1953 and the Livermore Atomic Research Computer in 1960. The basin itself was also improved after World War II: construction began on a new 36-inch water tunnel in 1955 and on a maneuvering basin and a large rotating arm basin (under one roof and called the Maneuvering and Seakeeping [MASK] facility) in 1956. The MASK facility was ready for calibration and use in 1961, and the water tunnel was completed the following year (Brownell 1962:2-3).

Facilities at Carderock expanded again in 1964 with the Acoustics and Vibration Laboratory, which brought together scientists and engineers from several other departments to play a lead Navy role in measurement and diagnosis of full-scale radiated noise signatures from ships and submarines, which was an area of inquiry of paramount importance to the Navy's submarine warfare programs (McCarthy 1993:32). Four years later the Structural Mechanics department obtained a major new facility featuring five high-pressure deep submergence tanks for testing the hulls of underwater vehicles and a test bed for stressing large model ship structures under loads up to 250,000 pounds. On March 31, 1967, the Marine Engineering Laboratory at Annapolis and the Carderock facilities were merged to form the David Taylor Naval Ship Research and Development Center.

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Maryland Inventory of Historic Properties Form

Inventory No. M: 29-52-32

Name
Continuation Sheet

Number 8 Page 2

By 1970 the acoustics department had significantly expanded its capabilities with the addition of acoustic ranges off Washington and California, plus, at Carderock, completion of an Anechoic Data Analysis Center and an anechoic flow facility consisting of a subsonic wind tunnel equipped with an anechoic chamber. That same year the Systems Development Department was created "with the intention of providing a total ship systems, hardware-oriented focus" (McCarthy 1993:32-36). The "Golden Age" of research at DTMB came to an end in the 1970s, as funding declined and the staff was reduced from 3,122 to 2,482 (McCarthy 1993:33).

NSF Carderock (1971 to present)

When funding resumed under the Reagan Administration (1981 to 1989) in the 1980s, it was on a very different basis, as most of the Center's annual budget was contracted to private industry. The Center was increasingly involved in both design and hardware demonstration phases of vehicle development, and there was much less support for "fundamental research, exploratory development, and advanced development investigations" (McCarthy 1993:37, 40). NSF Carderock was established in January 1992 under the U.S. Navy's Laboratory Consolidation Plan. The division was formed by the merger of DTMB and the Naval Ship Systems Engineering Station, Philadelphia.

Facility 140, Wind Tunnel Cooling System

The Wind Tunnel Cooling System is part of the Subsonic Wind Tunnel Complex at NSF Carderock, erected in 1943 as part of the Navy's aeronautical research program. Rapid advancements in aerodynamics made the testing facilities at the Washington Navy Yard obsolete, and in March 1941 Congress authorized \$500,000 for the construction of wind tunnels at Carderock, Maryland. At the time of their construction, the facilities were the only wind tunnels owned by the Navy, and therefore they were a general-purpose type so that all branches of the U.S. Navy could use the tunnels for research purposes. The plans for the facility included two similar wind tunnels with 8x10-foot test sections and a laboratory. The tunnels would have the ability to test a wide variety of aircraft, ships, and components (Giglio 1999:8.2).

Construction began in February 1942, and the new facility included a laboratory (Building 7), a model shop, and two subsonic wind tunnels (Buildings 138 and 139). The facilities were operational by September 1944, and the first tests were conducted in April of the same year. After its construction the facility tested scale-model aircraft and airborne equipment that enabled the laboratory to predict the performance of full-scale designs and modify existing equipment. The invention of the jet engine toward the end of World War II increased the operational speeds of aircraft, and high speed facilities were then needed to solve new problems that accompanied increased performance. Throughout the 1950s the facilities provided minor support to aircraft and weapon development programs and were not viewed as a major center or contributor in the research and development of aerodynamic aircraft (Giglio 1999:8.3).

Building 7 (RD&T Innovation Lab), historically the laboratory associated with the Subsonic Wind Tunnel Complex, and Building 138, the *Subsonic Wind Tunnel*, remain extant; however, Building 139, the second Subsonic Wind Tunnel, Facility 141, its cooling system, and Building 163, a compressor house built in 1955, were demolished sometime after 1999.

9. Major Bibliographical References

Inventory No. M: 29-52 - 32

10. Geographical Data

Acreage of surveyed property _____
Acreage of historical setting _____
Quadrangle name _____

Quadrangle scale: _____

Verbal boundary description and justification

The boundary of the property is the footprint of Facility 140 within NSF Carderock located in West Bethesda.

11. Form Prepared by

name/title	Patti Kuhn, Architectural Historian		
organization	The Louis Berger Group, Inc.	date	4/4/2011
street & number	1250 23 rd Street, NW	telephone	202-303-2665
city or town	Washington	state	DC

The Maryland Inventory of Historic Properties was officially created by an Act of the Maryland Legislature to be found in the Annotated Code of Maryland, Article 41, Section 181 KA, 1974 supplement.

The survey and inventory are being prepared for information and record purposes only and do not constitute any infringement of individual property rights.

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Maryland Department of Planning
100 Community Place
Crownsville, MD 21032-2023
410-514-7600

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Maryland Inventory of Historic Properties Form

Inventory No. M: 29-52-32

Name
Continuation Sheet

Number 9 Page 1

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1987 *Where the Fleet Begins: A History of the David Taylor Research Center.* Prepared for the David Taylor Naval Ship R & D Center, Carderock, Maryland, by History Associates Incorporated.

Giglio, W. Patrick

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McCarthy, Justin H.

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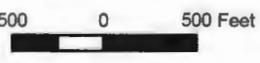
Melhuish, Geoffrey E.

1996 *Historical and Architectural Documentation of the Naval Surface Warfare Center Carderock Division, Maryland: Draft.* Prepared for Engineering Field Activity-Chesapeake, Washington, D.C., by R. Christopher Goodwin and Associates, Inc.

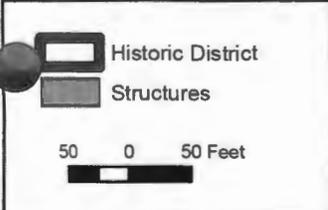
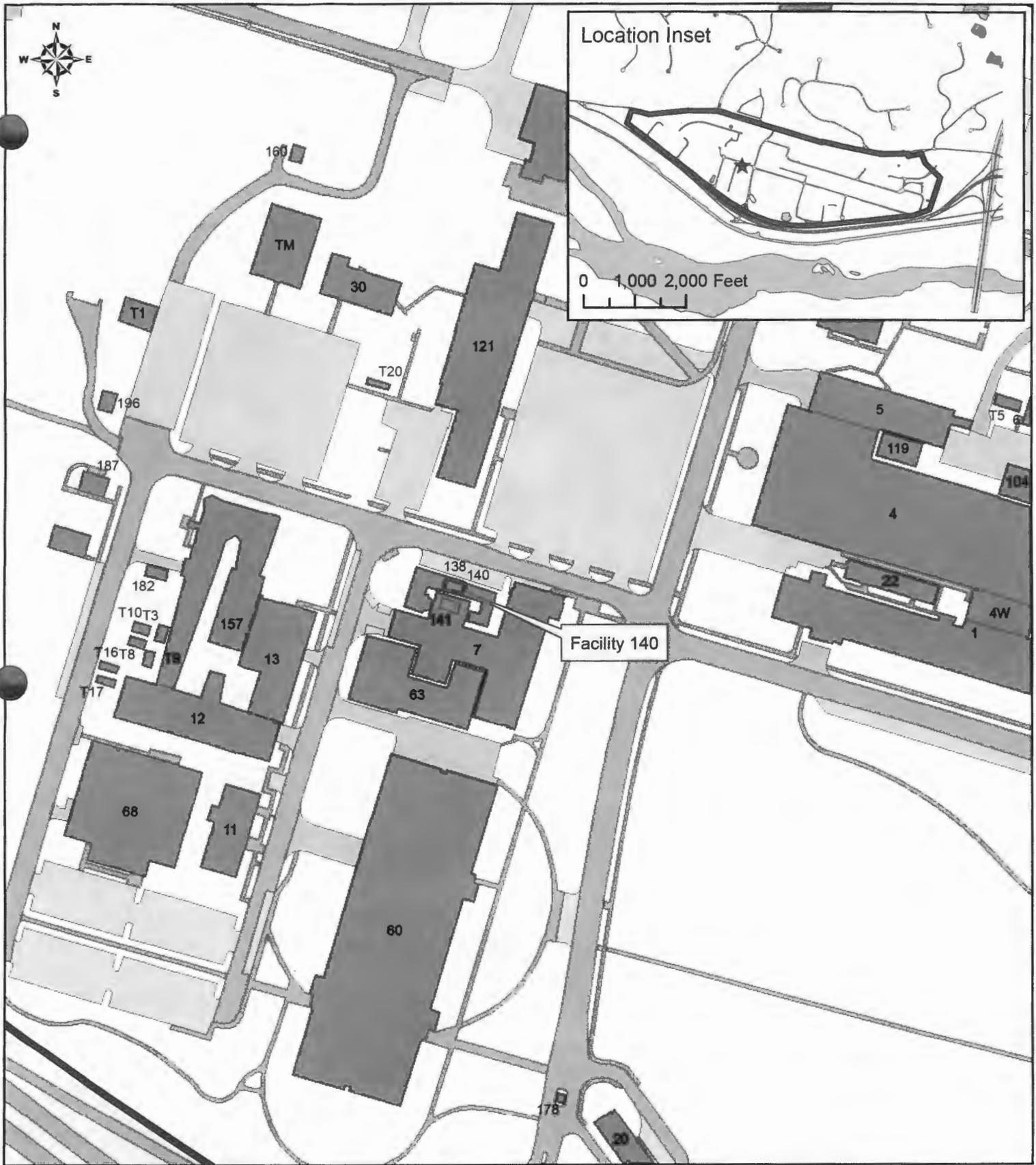
United States Navy

1964 Research Facilities at the David Taylor Model Basin. On file, Naval Surface Warfare Center Carderock Division, Carderock, Maryland.



 Historic District
 500 0 500 Feet

Naval Support Facility, Carderock
 NSWCCD Historic District (MIHP No. M:29-52)32
 Facility Number 140



Naval Support Facility, Carderock
 NSWCCD Historic District (MIHP No. M:29-52) 32
 Facility Number 140



M. 29-52-32

NEWCOED HISTORIC DISTRICT (NSF CARDEROCK)

Facility 140

MONTGOMERY COUNTY, MD

LOUIS BERGER GROUP

2/2011

MD 847D

LOOKING NE

PHOTO 1 OF 1