HADDAM NECK NUCLEAR POWER PLANT, 115-KV BUILDING
(Connecticut Yankee Nuclear Power Plant, 115-kV Switchyard)
362 Injun Hollow Road
Haddam
Middlesex County
Connecticut

WRITTEN HISTORICAL AND DESCRIPTIVE DATA
REDUCED COPIES OF MEASURED DRAWINGS
FIELD RECORDS

NOTE: The addenda data pages (beginning on page 8) supersede these data pages.

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C Street NW
Washington, DC 20240-0001
Location: 362 Injun Hollow Road
Haddam
Middlesex County
Connecticut

U.S. Geological Survey Haddam & Deep River Quadrangles
UTM Coordinates 18.708748.4595057

Dates of Construction: 1964-1966

Engineers: Westinghouse Electric Company

Present Owners: Connecticut Yankee Atomic Power Company (CYAPCO)
362 Injun Hollow Road
Haddam Neck CT 06424-3022

Present Use: Demolished

Significance: The Haddam Neck Nuclear Power Plant was one of the earliest commercial-scale nuclear power stations in the United States, and was eligible for the National Register of Historic Places. The 115 kV Switchyard received power from three Northeast Utilities substations to run major plant auxiliaries during start-up and shut-down, and to run the reactor coolant pumps during normal operations.

Project Information: CYAPCO ceased electrical generation at the Haddam Neck plant in 1996 and initiated decommissioning operations in 1998, subject to authority of the Nuclear Regulatory Commission (NRC). NRC authority brought the project under the purview of federal acts and regulation protecting significant cultural resources from adverse project effects. 1 This documentation was requested by the Connecticut State Historic Preservation Office to preclude the possibility of any adverse project effects.

HADDAM NECK NUCLEAR POWER PLANT, 115 kV SWITCHYARD
(Connecticut Yankee Nuclear Power Plant, 115 kV Switchyard)
HAER No. CT-185-P

Project Manager and Historian
Michael S. Raber
Raber Associates
81 Dayton Road, P.O. Box 46
South Glastonbury, CT 06073
860/633-9026

Steam and Electric Power Historian
Gerald Weinstein
40 West 77th Street, Apt. 17b
New York, NY 10024
212/431-6100

Industrial Archaeologist
Robert C. Stewart
Historical Technologies
1230 Copper Hill Road
West Suffield, CT 06093
860/668-2928
115 kV Switchyard - Description and Function

The 115 kV System at the Haddam Neck Nuclear Power Plant was an outside source of electrical power for all the important plant auxiliaries during start-up and shut-down, while supplying the four main reactor coolant pumps during normal operations. The 115 kV switchyard was the primary source of on-site station service through lines 1206 and 1772. Most contemporary fossil-fueled plants supplied all their own auxiliary power. The feed water pumps, firing devices, and stack draft fans of coal- and oil-fired stations were driven by electric motors, steam turbines, or a combination of both. Electric power could be tapped from the main generators or station service turbo-generators and could be supplied by diesel generators during startup. Feed pumps could be driven directly by main turbines or by auxiliary steam turbines that could be fed by auxiliary boilers when the plants were starting from cold. The choices were heavily influenced by the Heat Power Balance the designers wished to achieve. At Connecticut Yankee all the major pumps were run by 4160V-electric motors except a portion of the Auxiliary Feed water System. The reactor coolant pumps and steam generator feed pumps alone required 25,000 hp for operation, far more than any backup diesel system could supply. Plant designers may have seen little advantage in installing auxiliary boilers to power turbine-driven auxiliaries in a plant without large fossil fuel input. Only the Northeast Utilities grid could supply the power to run all the critical pumps that had to operate during start-up and shut-down, and many of the pumps required during power run. Off-site power for those pumps insured that they would continue to operate even if steam production stopped and the main generator was tripped.

To ensure continuity of power, two separate feeder lines from the Middletown, Haddam and Montville substations entered the 115 kV Switchyard, immediately east of the containment building. Current was controlled by automatic compressed-air-powered oil circuit breakers before entering two (#389 and #399) Westinghouse “Interaire” transformers which utilized nitrogen gas to reduce oxidation of the cooling/insulating oil. The heated oil was cooled in attached radiators via convection supplemented by cooling fans. The voltage was stepped down to 4160 volts and fed though additional control switches to feed six buses. Two buses fed the reactor coolant pumps during start-up and shut-down. When the main generator was synchronized with the grid, the power was transferred to the #309 transformer wired directly to the main generator. If the generator output tripped out, two of the reactor coolant pumps would have their supplies automatically switched back to the 115 kV System for controlled cool-down of the reactor. Additional transformers in the 115 kV Switchyard further reduced voltage to 480 volts for distribution to Motor Control Centers (MCC) in switchgear facilities.

---

Particular underlining indicates: Bus, busses was short for bus bars: solid copper bar conductors used to transmit current from generators to switchboards and out to transmission lines. Derivation from Omnibus is unclear (Oxford English Dictionary 1989: 2, 188)
which powered smaller motors throughout the plant. Lighting for the plant was stepped down from the 480V system to 120 or 208 volts.

It was essential that equipment could trip out during malfunctions and accidents in an orderly way. AC equipment requiring absolute control reliability was powered by banks of batteries in the switchgear rooms feeding inverters which turned the DC output to AC. Components of less importance were supplied by the semi-vital bus from AC lines backed up by emergency diesel generators.

**SOURCES OF INFORMATION/BIBLIOGRAPHY**

**A. Engineering Drawings**
Drawings are archived as part of the Connecticut Yankee Atomic Power Company, Haddam Neck Plant Records Collection, Archives & Special Collections, Thomas J. Dodd Research Center, University of Connecticut Libraries.

Connecticut Yankee Atomic Power Company/Stone & Webster Engineering Corp.

**B. Historic Views**
A limited number of photographs showing HAER No. CT-185-C are archived as part of the Connecticut Yankee Atomic Power Company, Haddam Neck Plant Records Collection, Archives & Special Collections, Thomas J. Dodd Research Center, University of Connecticut Libraries.

**C. Bibliography**

Connecticut Yankee Atomic Power Company (CYAPCO)

HADDAM NECK NUCLEAR POWER PLANT, 115 kV SWITCHYARD
(Connecticut Yankee Nuclear Power Plant, 115 kV Switchyard)
HAER No. CT-185-P
(Page 5)

Dunham, R. H., Durfee, C. D., and Lewis, R. R.
1966 Design Concept of TVA’s Paradise Steam Plant 1150-MW Unit NO. 3.
Chicago: Illinois Institute of Technology. Technology Center.

Jonelis, R. E. and Scheibel, R. F.
1966 Kincaid Station Reservoir Development and Plant Design Features.
Proceedings of the American Power Conference. 28: 370-382. Chicago:
Illinois Institute of Technology. Technology Center.

Tylinski, Gary (CYAPCO plant electrical engineer)
HADDAM NECK NUCLEAR POWER PLANT, 115 kV SWITCHYARD
(Connecticut Yankee Nuclear Power Plant, 115 kV Switchyard)
HAER No. CT-185-P
(Page 6)
NOTES:


3 Tylinski 2006: personal communication.


5 Connecticut Yankee Atomic Power Company 1966-1974: 9.4-4
ADDENDUM TO:
HADDAM NECK NUCLEAR POWER PLANT, 115-KV BUILDING
(Connecticut Yankee Nuclear Power Plant, 115-kV Switchyard)
362 Injun Hollow Road
Haddam
Middlesex County
Connecticut

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
U.S. Department of the Interior
1849 C Street NW
Washington, DC 20240-0001
This report is an addendum to a 7-page report previously transmitted to the Library of Congress in 2010.

Location: 362 Injun Hollow Road  
Haddam  
Middlesex County  
Connecticut  

U.S. Geological Survey Haddam & Deep River Quadrangles  
UTM Coordinates 18.708748.4595057

Dates of Construction: 1964-1966

Engineers: Westinghouse Electric Company

Present Owners: Connecticut Yankee Atomic Power Company (CYAPCO)  
362 Injun Hollow Road  
Haddam Neck CT 06424-3022

Present Use: Demolished

Significance: The Haddam Neck Nuclear Power Plant was one of the earliest commercial-scale nuclear power stations in the United States, and was eligible for the National Register of Historic Places. The 115 kV Switchyard received power from three Northeast Utilities substations to run major plant auxiliaries during start-up and shut-down, and to run the reactor coolant pumps during normal operations.

Project Information: CYAPCO ceased electrical generation at the Haddam Neck plant in 1996 and initiated decommissioning operations in 1998, subject to authority of the Nuclear Regulatory Commission (NRC). NRC authority brought the project under the purview of federal acts and regulation protecting significant cultural resources from adverse project effects. This documentation was requested by the Connecticut State Historic Preservation Office to preclude the possibility of any adverse project effects.

---

Project Manager and Historian
Michael S. Raber
Raber Associates
81 Dayton Road, P.O. Box 46
South Glastonbury, CT 06073
860/633-9026

Nuclear, Steam and Electric Power Historian
Gerald Weinstein
40 West 77th Street, Apt. 17b
New York, NY 10024
212/431-6100

Industrial Archaeologist
Robert C. Stewart
Historical Technologies
1230 Copper Hill Road
West Suffield, CT 06093
860/668-2928
115 kV Switchyard - Description and Function

The 115 kV System at the Haddam Neck Nuclear Power Plant was an outside source of electrical power for all the important plant auxiliaries during start-up and shut-down, while supplying the four main reactor coolant pumps during normal operations.¹ The 115 kV Switchyard was the primary source of on-site station service through incoming lines #1206 and #1772. Most contemporary fossil-fueled plants supplied all their own auxiliary power. The feed water pumps, firing devices, and stack draft fans of coal- and oil-fired stations were driven by electric motors, steam turbines, or a combination of both. Electric power could be tapped from the main generators or station service turbo-generators and could be supplied by diesel generators during startup. Feed pumps could be driven directly by main turbines or by auxiliary steam turbines that could be fed by auxiliary boilers when the plants were starting from cold.² The choices were heavily influenced by the Heat Power Balance the designers wished to achieve. At Connecticut Yankee all the major pumps were run by 4160V-electric motors except a portion of the Auxiliary Feed water System. The reactor coolant pumps and steam generator feed pumps alone required 25,000 hp for operation, far more than any back-up diesel system could supply. Plant designers may have seen little advantage in installing large enough auxiliary boilers to power turbine-driven auxiliaries in a plant without large fossil fuel input. Only the Northeast Utilities grid could supply the power to run all the critical pumps that had to operate during start-up and shut-down, and many of the pumps required during power run. Off-site power for those pumps insured that they would continue to operate even if steam production stopped and the main generator was tripped.³

To ensure continuity of power, two separate feeder lines from the Middletown, Haddam and Montville substations entered the 115 kV Switchyard, immediately east of the containment building. Current was controlled by automatic compressed-air-powered oil circuit breakers before entering two (#389 and #399) Westinghouse “Interaire” transformers which utilized nitrogen gas to reduce oxidation of the cooling/insulating oil.⁴ The heated oil was cooled in attached radiators via convection supplemented by cooling fans. The voltage was stepped down to 4160 volts and fed though additional control switches to feed six buses.⁵ Two buses fed the reactor coolant pumps during start-up and shut-down. When the main generator was synchronized with the grid, the power was transferred to the #309 transformer wired directly to the main generator. If the generator output tripped out, two of the reactor coolant pumps would have its supply automatically switched back to the 115 kV System for controlled cool-down of the reactor. Additional transformers in the 115 kV Switchyard further reduced voltage to 480 volts for distribution to Motor Control Centers (MCC) in switchgear facilities which powered smaller motors throughout the plant. Lighting for the plant was stepped down from the 480V system to 120 or 208 volts.

It was essential that equipment could trip out during malfunctions and accidents in an orderly way. AC equipment requiring absolute control reliability was powered by banks of batteries in the switchgear rooms feeding inverters which turned the DC output to AC.⁶ Components of less importance were supplied by the semi-vital bus from AC lines backed up by emergency diesel generators.

---

¹ Bus, busses was short for bus bars: solid copper bar conductors used to transmit current from generators to switchboards and out to transmission lines. Derivation from Omnibus is unclear (Oxford English Dictionary 1989: 2, 188)
NOTES:


3 Tylinski 2006: personal communication.


5 Connecticut Yankee Atomic Power Company 1966-1974: 9.4-4
SOURCES OF INFORMATION/BIBLIOGRAPHY

A. Engineering Drawings

Drawings are archived as part of the Connecticut Yankee Atomic Power Company, Haddam Neck Plant Records Collection, Series I, Archives & Special Collections, Thomas J. Dodd Research Center, University of Connecticut Libraries.

Connecticut Yankee Atomic Power Company/Stone & Webster Engineering Corp.

B. Historic Views

A limited number of photographs showing HAER No. CT-185-P are archived as part of the Connecticut Yankee Atomic Power Company, Haddam Neck Plant Records Collection, Series VI, Archives & Special Collections, Thomas J. Dodd Research Center, University of Connecticut Libraries.

Connecticut Yankee Atomic Power Company

C. Bibliography and Personal Communications


Connecticut Yankee Atomic Power Company (CYAPCO)


Dunham, R. H., Durfee, C. D., and Lewis, R. R.

Jonelis, R. E. and Scheibel, R. F.

Tylinski, Gary (CYAPCO plant electrical engineer)
Figure 1. 115 KV SWITCHYARD LOCATION AT MAIN PLANT AREA
Source: Stone & Webster Drawing No. 10899-FY-1N
Figure 2. 1972 VIEW WEST INCLUDING 115 kV SWITCHYARD (RIGHT CENTER FOREGROUND), REACTOR CONTAINMENT (RIGHT CENTER), TURBINE BUILDING (LEFT), AND SERVICE BUILDING (CENTER).

SOURCE: Source: Connecticut Yankee Atomic Power Company n.d.a [historic views]-Photo No. 250