

ARNOLD ENGINEERING DEVELOPMENT CENTER, TN UTILITY SYSTEM DESCRIPTIONS

General Base Description:

Arnold AFB is located in middle Tennessee, just off of Interstate 24 and halfway between Nashville and Chattanooga; it is 7 miles SE of Manchester, TN. The base covers approximately 40,000 acres, straddling Coffee and Franklin counties and situated in the tri-city triangle composed of Tullahoma, Manchester, and Winchester. Arnold's primary mission is the Arnold Engineering Development Center (AEDC), which supports the development of aerospace systems by testing hardware in facilities that simulate flight conditions. This heavy industrial center operates aerodynamic and propulsion wind tunnels, rocket motor and turbine engine test cells, space environmental chambers, arc heaters, ballistic ranges and other specialized units. There are approximately 300 facilities on Arnold AFB, most located in the AEDC industrial area supporting the industrial mission. Arnold Village is a small, 40-unit military family housing complex, VOQ, recreation area, conference/leadership facility, club, and golf course located at the Woods Reservoir. Key to successful test operations is timely, accurate delivery of utility services. Utility operation is fully integrated in plant management through a single Tactical Integration Group (TIG) in the AEDC operations center. Utility operators are envisioned to be full-time, on-site partners in the TIG. Test operations fluctuate daily, even hourly, with a high percentage of schedule change occurring. Maintenance and Repair (M&R) requires close coordination with operations to ensure availability and safety. Ultimately, utility service delivery may not be allowed to negatively impact test scheduling and test operation.

System Descriptions: The following information is only an estimate and is subject to change.

Electric System - Electricity is provided to the base by the Tennessee Valley Authority (TVA) via two 161 kV circuits from TVA's Franklin Substation. The primary power at 161 kV enters the base from the southwest. It terminates at the dead-end structure, which is located in the government-owned 161 kV switching station. The main switching station is constructed in a main and transfer scheme consisting of four oil-filled and nine SF6-filled 161 kV power circuit breakers. The main switching station provides power to two 161-13.8 kV TCUL power transformers which in turn each feed a 15 kV class metal enclosed switchgear utilizing vacuum breakers. The 13.8 kV 3-wire service from the metal enclosed switchgear provides electricity to ten (predominately overhead construction) distribution circuits feeding mainly facility power to the site, including five 13.8 kV breakers (123,946 feet of overhead and 127,304 feet of underground wire service). In addition to the 13.8 kV circuits, there are twelve 161 kV oil insulated underground circuits from the main switching station which feed 27 power transformers located at eight locations throughout the test site area, with an additional five SF6-filled 161 kV power circuit breakers and fifteen 161 kV circuit switchers. Annual consumption varies widely from 789,737 MWH (1994) to 361,615 MWH (1991). Consumption averaged 607,968 MWH over past five

calendar years. Peak power requirements vary widely from 605,952 KW (1994) to 356,544 KW (1996). Street lighting is provided along the primary roads with pole mounted lights.

Natural Gas System - The natural gas distribution system receives gas from a gate station at 100 psig for distribution throughout the base. There are pressure reducing stations in the system. The system has approximately 10,000 feet of steel pipe, which is protected by a cathodic protection system. The pipe sizes range from 12-inches to 3-inches in diameter. Annual consumption is approximately 600-800 million cubic feet. The primary use of the gas is for testing purposes, fuel for the steam plants and heating.

Potable Water Treatment Plant and Supply System - The water treatment facility receives water from Woods Reservoir via a secondary reservoir. The treatment plant has a maximum capacity of 2.25 million gallons per day. The treatment plant consists of two coagulation and sedimentation basins, three gravity filters, three chemical feeders, three distribution pumps, and one laboratory for operational monitoring. Treated water is stored in two 250,000-gallon clear wells and one elevated tank. The base water distribution system consists of approximately 25 miles of piping, 50 percent of which is 6-inches in diameter and below. The remainder of the piping system is larger than 6-inches (up to 14-inches). The pressure in the distribution averages 60-70 psi. There are approximately 145 fire hydrants.

Sanitary Sewer Collection System - The sanitary sewer system consists of 16 lift stations and approximately 55,000 feet of collection lines, which are mostly vitrified clay pipe. The system flow discharges into the one of the base's wastewater treatment facilities, of which there are two. The main plant (plant 1) supports the AEDC industrial area. A smaller plant (plant 2) supports Arnold Village area. Plant 1 is a standard rate trickling filter plant which consists of primary settling tanks, trickling filter, various pumps, aerobic digesters, and drying beds with a plant design capacity of 660,000 gpd. Effluent is discharged into Rowland Creek. Plant 2 is package type extended aeration design, with a capacity of 30,000 gpd. It's effluent is discharged in Woods Reservoir.

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