DOUGLAS MISSILE TEST FACILITY,
ALPHA TEST COMPLEX, CONTROL TEST CENTER
West of Security Park Drive
Rancho Cordova
Sacramento County
California

HAER CA-2310-A-1

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

U.S. Department of the Interior
National Park Service
Pacific West Regional Office
San Francisco, California

HISTORIC AMERICAN ENGINEERING RECORD

DOUGLAS MISSILE TEST FACILITY, ALPHA TEST COMPLEX, CONTROL CENTER

HAER No. CA-2310-A-1

Location: The Douglas Missile Test Facility is in the City of Rancho Cordova, Sacramento County, California, about twelve miles east of the City of Sacramento. The testing facilities are within 1,700-acres south of White Rock Road, north of Douglas Road, east of Sunrise Boulevard, and west of Grant Line Road in eastern Sacramento County. The Control Center and related structures are part of the Alpha Test Complex, west of Security Park Drive, in the southeastern quadrant of the testing facilities.

Approximate center of Control Center area: Latitude 38°34'16.91"N; Longitude 121°12'58.50"W

USGS 7.5 minute quadrangles Carmichael and Buffalo Creek, California, Photorevised 1992

Present Owner: Elliott Homes and Easton Development Company, LLC

Present Use: Abandoned

Significance: The Douglas Missile Test Facility, including the Alpha Test Complex, has been determined eligible for listing in the National Register of Historic Places as a district under significance criterion A (Events) and criterion C (Design/Construction) for advances in science and technology. The Control Center of the Alpha Test Area has been determined eligible under criterion A for its involvement with the Thor Intermediate-Range Ballistic Missile (IRBM), liquid propellant testing and static acceptance firings of completed missiles (1957-60), and testing of the NASA Saturn S-IV and S-IVB booster engines (1963-69). The Control Center also appears to be eligible under criterion C, for architectural qualities unique to this facility that reflect the specialized uses and development that occurred at the Alpha Test Complex. The Control Center is best considered and understood as an integral component of the Alpha Test Complex, and the larger Douglas Missile Test Facility District.

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Project Information: Elliot Homes currently plans to demolish all facilities associated with the Douglas Missile Test Facility. As part of the permitting process, the Army Corps of Engineers determined that buildings and structures associated with this facility are considered potentially eligible for listing in the National Register of Historic Places, and recommended HAER photo documentation and recordation of this facility. Environmental Science Associates conducted the background historical research, assisted by previous studies of the facility[1]. Robert Hicks provided all HAER quality photographs. Alan Lawrie provided technical expertise.

For additional information, see:
Douglas Missile Test Facility, HAER-CA-2310

Douglas Missile Test Facility, Alpha Test Complex
Douglas Missile Test Facility, Alpha Test Complex, Test Stand No. 1, HAER CA-2310-A-2
Douglas Missile Test Facility, Alpha Test Complex, Test Stand No. 2, HAER CA-2310-A-3

Douglas Missile Test Facility, Beta Test Complex, HAER CA-2310-B
Douglas Missile Test Facility, Beta Test Complex, Terminal Control Room, HAER CA-2310-B-1
Douglas Missile Test Facility, Beta Test Complex, Test Stand No. 3, HAER-CA-2310-B-2

Douglas Missile Test Facility, Gamma Test Complex, HAER CA-2310-C
Douglas Missile Test Facility, Gamma Test Complex, Test Structure, HAER CA-2310-C-1

Douglas Missile Test Facility, Kappa Test Complex, HAER CA-2310-D

Douglas Missile Test Facility, Sigma Test Complex, HAER CA-2310-E

Douglas Missile Test Facility, Solid Propellant Assembly Area, HAER CA-2310-F

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[1] Karen Weitze, Draft Historic Buildings and Structures Inventory Douglas Missile Test Facility Rio del Oro Specific Project Plan. Report to City of Rancho Cordova and U.S. Army Corps of Engineers, Sacramento District, from EDAW, Sacramento, and Weitze Research. (2005); Alan Lawrie, Return to Sacramento: a Review of Saturn Rocket Firings and Explosion. Paper presented at 43rd AIAA/ASME/SE/ASEE Joint Propulsion Conference and Exhibit, July, Cincinnati, Ohio. Published by the American Institute of Aeronautics and Astronautics, manuscript number AIAA 2007-5343. (2007); Rebecca Allen, National Register of Historic Places Evaluation of Structures Associated with the Douglas Missile Test Facility (P-34-4317), Rio del Oro, Rancho Cordova, California. Report to ECORP Consulting, Rocklin, and Elliot Homes, Folsom, from Past Forward, Inc., Garden Valley, California. (2011).

Part I. Historical Information

A. Physical History

1. Date of Construction: 1956-57

2. Architect/Engineer: Aerojet General engineers

3. Builder: Douglas Aircraft Company, Aerojet General

4. Original Plans and Construction: In December 1955, the U.S. Air Force awarded the Douglas Aircraft Company to design, test, and deliver Thor Intermediate Range Ballistic Missile (IRBM). The following year, Douglas Aircraft Company entered into a lease agreement with Aerojet General to develop 1,700 acres on western edge of Aerojet to build the Douglas Missile Test Facility, also known as the Sacramento Test Operations (SACTO) site. Construction began at the Alpha Test Complex before October 1956, and continued through 1957.

5. Alterations and Additions: In April 1960, the U.S. government awarded Douglas the contract to design, build, and test S-IV second stage for the Saturn I booster. Testing occurred at Alpha Test Complex.

From 1973-77, McDonnell Douglas dismantled the majority of steel superstructure on the four test stands in the Alpha Test Complex and Beta Test Complex, and then initiated sales of parcels and buildings in the Administration Area. In 1984, Aerojet bought back the original property from McDonnell Douglas. The complex was mostly derelict by then. The site is currently slated for demolition.

B. Historical Context:

The Alpha Test Complex featured the first large-scale test stands erected for the Douglas Missile Test Facility at Rancho Cordova, and occupied forty-five acres in the southeast quadrant of the facility. The engineers of Aerojet General designed the facilities within the Alpha Test Complex in 1956, with construction underway in 1957. Douglas initiated static firings at the Alpha Test Complex in January 1958. The first missile in test was the Thor IRBM. Both test stands in the Alpha Test Complex were captive firing stands, and both used deluge systems. Douglas used Test Stand No. 1 to static-fire early production line Thor missiles selected from those manufactured in the company's Santa Monica facilities. Test Stand No.2 included two positions, Test Stand No. 2A and Test Stand No. 2B. Douglas fired battleship versions of Rocketdyne's Thor engines on Test Stand No. 2A.

Douglas completed its research-and-development tests of Thor at the Alpha Test Complex in December 1959, and in mid-1960 full-scale Initial Operational Capacity (IOC) testing of Thor moved to Vandenberg Air Force Base in southern California.

Douglas next used Test Stand No. 2A for battleship tests of the Aerojet Titan ICBM second-stage engine. Also in 1960, Douglas initiated activities for NASA at its Rancho Cordova location for developmental testing of the Saturn booster, the DSV-IV, on Alpha Test Stand No. 1. By 1962, activities conducted on Test Stand No.1 were also focused on the Saturn DSV-IV, and included static firings of the A-I and A-3 versions of the RL-10 liquid hydrogen engine placed in a battleship version of the booster. During the 1965-68 years, Douglas conducted acceptance testing of Saturn S-IV boosters on Alpha Test Stand No. 2B for the National Aeronautics and Space Administration (NASA). The company shipped S-IV boosters from its plant in Santa Monica for check-out, firing, and post-firing checks at the missile test facility in Rancho Cordova. After completion of the acceptance testing, Douglas shipped the Saturn S-IV boosters by air to NASA's facilities at Cape Kennedy in Florida.

All static testing ended in 1969, although Douglas maintained the test stands in the complex in a state of readiness into late 1972. After deactivation of the Alpha Test Complex, Douglas dismantled the superstructure of the test stands. McDonnell Douglas used the Control Center for a short time to test aircraft fire suppression systems.

Part II. Structural/Design/Equipment Information

A. General Statement:

1. Character: The structures and landscape reflect architectural and engineering characteristics unique to this facility, as they were specifically designed to test the Thor and Titan missiles, and Saturn boosters. They reflect the specialized uses and development that occurred at the Douglas Missile Test Facility. The Alpha Complex was one of seven grouping of facilities within the larger complex. The Control Center of the Alpha Complex contained individual firing and facility consoles for Test Stands No. 1 and 2 associated with Alpha Test Complex. Lawrie[2] notes that the center had a "capability of recording 750 channels of data as well as eleven closed loop television circuits." The Control Center was integral to the function of the Alpha Test Complex, which is associated with the Thor Missile, and Saturn S-IVB stages.

2. Condition of fabric: Good to poor, depending upon the specific structure or building. Further information is detailed below.

B. Description of Facility:

1. Control Center Area: In its current configuration, several buildings and landscape features make up the Control Center Area. The buildings in the area are the Control Center itself, a Generator Compressor building, Pump House, and Water Storage Tank. Structural elements include foundations that represent the Helium Storage Area, Liquid Nitrogen Tank area, and a large fuel tank. Elements of the berm features that surround the

[2] Lawrie, 2007, p. 9.

Control Center are still intact, as is the instrumentation tunnel. A modern water system facility has been constructed to the north and west of the Control Center Area. This new system has impacted the historic configuration of the area, although the modern aboveground facility and pipes are visible from the top of the berm. Each of these buildings and structures are described below.

2. **Control Center Building:** The Control Center building is a windowless, rectangular (100′ x 56′), one-story reinforced concrete structure with a flat roof and steel doors. Louvered vents articulate several facades of the building. Extant underground instrumentation tunnels connect the control center to the test stands, but are currently inaccessible for safety reasons. The interior of the building is relatively open, with some offices created with interior partitions. Historically, a large earthen berm buffered the control center and its surrounding buildings at the center of the Alpha Test Complex. Only sections of the berm are extant.

3. Generator Compressor Building: This is a rectangular (62′ x 37′) pre-fabricated corrugated metal structure with a gable metal roof and steel doors. Two shop doors are equally spaced on the east wall. Additional openings are found on the south and western elevations. The interior of the building is divided into two large rooms. Interior furnishings are in disarray. The Generator Compressor building was an ancillary structure, and is best understand as part of the larger Alpha Test Complex.

4. Pump House: The pump house too was ancillary to the function of the Alpha Test Complex. It is a pre-fabricated rectangular (82′ x 24′) corrugated metal structure with a gable metal roof and steel doors. The building has several windows on the north and east walls, and an entrance on the west facade. The interior of the building is a single room. Interior furnishings are in disarray. The large water tank is directly east of this structure.

5. Fuel Tank Footings: The two concrete footings that remain are approximately 8′ long, 1′ wide, and 3′ high. The fuel tank itself is no longer present. These footings are directly east of the water tank. These footings were ancillary structures.

6. Water Tank: The ancillary water tank is a round (approx. 45′ diam.) two-story metal structure constructed from welded panels. There is a ladder on the southwest site of the tank, and other piping as well. The pump house is directly to the west. Its primary function was to provide a deluge system that was an integral part of the captive missile and missile-engine firings that occurred on the test stands of the Alpha complex.

7. Liquid Nitrogen (LN2) Tank and Mountings: This concrete pad and pedestals are adjacent (just west of) the Generator Compressor building. There is a large concrete pad, 62′ x 30′, on which the concrete pedestals are mounted. The two concrete pedestals are approximately 8′ long, 1′ thick, and 3′ high. Its primary function was to provide liquid nitrogen fuel that was an integral part of the captive missile and missile-engine firings that occurred on the test stands of the Alpha complex. When placed on site in 1957,

raised concrete pedestals supported a cylindrical liquid nitrogen tank. Only the pedestal mounts remain today.

8. Helium Storage Area: Aerojet General designed the helium storage area during 1956-57 as a component of its overall engineering for the Alpha Test Complex. Only the reinforced barricade wall remains on the site, immediately west of the Generator Compressor building. Douglas constructed the helium storage area to support static firings at Test Stands No. 1 and No. 2. The paved area featured a reinforced concrete barricade wall on its eastern periphery, placed between the stored tanks and a boiler. The helium storage area historically contained three large tanks and two tall tanks of helium gas. The length of the tall barricade wall in Unit 68 is 120′ long; its height is approximately 10′. Two concrete footings, each approximately 10′ long, are to the west of the barricade wall. Overall the barricade wall and two footings occupy an area approximately 30′ across. A third concrete footing is parallel to the barricade wall and berm, adjacent to the east side of the wall. A large earthen berm buffered the north, west, and south sides of the storage area. The berms were part of a larger protective earthen unit that surrounded the central control area of the Alpha Test Complex.

9. Concrete Pads. Weitze[3] noted that the weather station and power substation were no longer present. To the south of the pump house and tank is a flat concrete pad, approximately 24′ by 18′. Its location and evident aboveground wires and features suggest that this pad is location of the former weather station and power substation.

C. Mechanicals/Operation: Tests conducted in The Douglas Missile Test Facility developed propellant and missile launchers during the Cold War era. When it operated as the Sacramento Test Operations (SACTO), the facility played a critical role in the conversion of missile technology to battleship readiness. The Thor missile was the first Intermediate Range Ballistic Missile (IRBM) in the arsenal of the United States Air Force. The Douglas Missile Test Facility supported captive test firings of early Thor missiles and engines. Firing stages for Saturn rockets, developed as part of the 1960s era space quest to explore the moon, were also developed and tested at this facility.

D. Site Information: The Douglas Missile Test Facility was constructed on the outskirts of Sacramento, in what was a suburban area known as Rancho Cordova. The Facility was situated south of the main highway (today known as Highway 50), amongst the remains of large numbers of dredge tailings, which in part provided existing berms integral to the testing and captive firings. Although additional suburban shopping areas and commercial development now exist in the area south of Highway 50, this development has not encroached upon the main Douglas Missile Test Facility.

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[3] Weitze, 2005.

Part III. Sources of Information

A. Primary Sources

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B. Secondary Sources

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C. Likely Sources Not Yet Investigated

According to Alan Lawrie, he originally wrote the AIAA (2007) paper as part of his research on the Saturn rockets because the Douglas Missile Test Facility, Sacramento Test Operations, as well as events that took place at the Facility, that had not been previously documented. He noted that Don Brincka, retired Director of Technical Operations at the SACTO facility, had managed to retain some documentation, but more importantly was able to answer some of Lawrie's more obscure questions. Mr. Brincka passed all of his papers over to Mr. Lawrie. Mr. Lawrie also stated that he had researched primary source material at the National Archives and Record Administration in Atlanta, Georgia.

Rebecca Allen contacted Ralph H. Allen, Historic Preservation Officer, Marshall Space Flight Center, Huntsville, Alabama. Mr. Allen noted that sources of information on the SACTO facility held by Marshall were limited. After further conversation, and a visit to the Sacramento area, Mr. Allen mailed Rebecca Allen two CD discs of information that he knew were available at the

Marshall facility, including "Facility Inventory Sheets, Liquid Chemical Propulsion Test Facility Inventory," September 1986, completed by Aerojet (96 pages). This paper also details future plans for a facility that was never built. Mr. Allen also provided a CD of historic (unlabelled) photographs. Additional information may be at Marshall Space Flight Center.

The California History Room, California State Library, recently found a box of photographs concerning the Douglas Missile Test Facility that seem to have originated from Douglas archives. The 50+ photographs were indexed, but did not contain additional views critical to the current interpretation and documentation of the facility.

Several buildings associated with the Administrative Area were not recorded as part of this current project. These buildings remain standing, and are being actively used for other purposes.