

DOUGLAS MISSILE TEST FACILITY,
SIGMA TEST COMPLEX
West of Security Park Road
Rancho Cordova
Sacramento County
California

HAER CA-2310-E

BLACK AND WHITE PHOTOGRAPHS

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, SIGMA TEST COMPLEX

HAER No. CA-2310-E

Location: Sacramento County, California

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 contained within 1,700-acres located south of White Rock Road, north of Douglas Road, east of Sunrise Boulevard, and west of Grant Line Road in eastern Sacramento County. The Sigma Test Area is to the west of Security Park Road, about a half-mile north of the Alpha Test Complex.

Approximate center of Sigma Test Complex: Latitude 38°34'44.30"N;
Longitude: 121°13'04.15"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 has been determined eligible for listing in the National Register of Historic Places. The Sigma Test Area has been determined eligible under criterion A for its involvement with the Skybolt and Nike Zeus missiles between 1956-69. The remaining structures and landscape at the testing facility reflects architectural qualities unique to this facility, and reflect the specialized uses and development that occurred at the Test Facility (Criterion C). The Sigma Test Complex is best considered and understood as an integral component of 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 facility¹. 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, HAER-CA-2310-A

Douglas Missile Test Facility, Alpha Test Complex, Control Center,
HAER-CA-2310-A-1

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 Equipment 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, Solid Propellant Assembly Area, HAER CA-2310-F

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 EDAA, 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

2. Architect/Engineer: Douglas Aircraft

3. Builder: Douglas Aircraft

4. Original Plans and Construction: The Sigma Test Complex is a small complex of buildings north of the Alpha Test Complex. Constructed in 1956, its purpose was to store and test fire rocket engines that used solid propellants. Buildings in the Sigma Test Area complex included those to house necessary instrumentation and controls for the site, as well as two temperature-conditioned storage units for conditioning solid propellant motors before they were fired. Because of the firings, two large earthen berms surround the Assembly and Test Area and Support buildings as an integral part of the test complex.

5. Alterations and Additions: Later in the 1960s, Douglas modified the test area to remove “aged, spent, or unburned solid propellant from rocket casings.”² Personnel used high-pressure water to ream out rocket boosters; runoff flowed towards a catchment pond west of the Sigma Test Complex.

B. Historical Context: Shortly after their initial purchase of the property, Aerojet leased a portion of the acreage to the Douglas Aircraft Company who began constructing selected buildings in the Solid Propellant Test Area by October 1956, followed by construction at the Sigma Test Area to its immediate south. Initial activities at the Douglas Missile Test Facility included supporting tests of solid-propellant rocket booster engines for the Nike Hercules interceptor missile at the Solid Propellant Assembly Area and the Sigma Test Area.

Work on the developmental Nike Hercules at the Solid Propellant Assembly Area and the Sigma Test Area was likely underway by 1957. In 1961, Douglas conducted more developmental tests for the Nike weapons system at the Solid Propellant Test Area and at the Sigma Test Area.

From 1961-64, the Sigma Test Area was used to support development of the Skybolt and Nike Zeus missiles. Douglas conducted activities for the Nike Zeus in the Solid Propellant Assembly Area and in the Sigma Test Area of its missile test facility at Rancho Cordova during 1961-62. In early 1963, the Sigma Test Area was alternately named the Nike Test Area, and during 1963-64 as the Solid Test Area.

Douglas possibly ran tests for the Nike Zeus at Sigma Test Complex before this date, after transitioning from work on the Nike Hercules. In 1965, the name of the complex was officially changed to the Sigma Test Complex.

² Weitze 2005, p. 52.

Part II. Structural/Design/Equipment Information

A. General Statement:

1. Character: The structures and landscape (including large earthen berms) reflect architectural and engineering characteristics unique to this facility, as they were specifically designed for developmental testing of the Nike Hercules solid-rocket boosters. The Test Control Center of the Complex housed necessary instrumentations and controls for the site. Two temperature-conditioned storage rooms were used to condition solid motors prior to firings. The structures reflect the specialized uses and development that occurred at the Douglas Missile Test Facility. The Sigma Complex was one of seven grouping of facilities within the larger complex.

2. Condition of fabric: Extant facilities at the Sigma Test Complex are generally in good to poor condition (further described below). A few structures associated with the Sigma Test Complex were removed prior to this recordation effort (see table below).

B. Description of Facility:

1. Sigma Test Complex: Primary extant features of the Sigma Test Complex are a prefabricated assembly building and the Test Area and Support Building. The table summarizes these structures (which are further described below). It also notes ancillary structures that are no longer present, as described by Weitze.³

| Date of Construction | Common name | Description | Condition |
|-------------------------|--------------------------------|---|-------------------------------------|
| 1956 | Cold conditioning chamber | Collapsed two-bay steel framed structure | poor; collapsed |
| 1956 | Hot conditioning chamber | Two-bay steel framed structure | fair; missing some elements (doors) |
| 1956 | Assembly building | One-story prefabricated metal | exterior good; interior fair |
| 1956-1961 | Test Area and Support Building | Reinforced concrete wall with shed-roof wings | fair |
| Mid-1961 | Destruct pad | Concrete pad | fair |
| Ca. 1963-1964 | Concrete pad | Rectangular pad | fair |
| 1956 | Personnel bunker | Concrete structure | fair |
| <i>No Longer Extant</i> | | | |
| | small storage building | northwest of test control center | n/a |
| | water tank and well | between storage structure and assembly building | n/a |

2. Cold Conditioning Chamber: Now fully collapsed, this was a two-bay steel-frame building sheathed in metal paneling, and adjacent to the hot conditioning chamber. Remaining structural elements indicate that it may have been larger than the hot conditioning chamber. NASA used these chambers for environmental conditioning of solid-rocket during the middle and late 1960s. Motors went

³ Weitze 2005, p. 49.

through a period of conditioning before being static-fired in the other test complexes within the Douglas Missile Test Facility.

3. Hot Conditioning Chamber: Adjacent to the Cold Conditioning Chamber, and used for much the same purpose, this is an 18' x 18' two-bay, steel-frame structure, sheathed in metal paneling and divided equally into two chambers. There is an opening on the south façade, but originally this side featured metal doors (one of the doors lies on the ground adjacent to the chamber). The structure is placed on a concrete pad, and there is a small wooden utility box on metal legs placed at the rear of the structure. Overall, the structure is in fair condition, as it is missing some elements, most notably the doors.

4. Assembly Building: This is a one-story 45' long x 25' wide prefabricated metal building with a gable roof, constructed in 1956. It is of rigid-frame construction, sheathed in corrugated siding, with center-opening, track-mounted east- and west-façade doors. Three sides (east, west, and south) have pairs of wood-frame personnel doors, set near the building's corners. A window is near each door. Distinctive outdoor security lights are placed on the roof, as are ventilation fans. A small utility box and three-sided shed-roof addition has been placed on the north rear elevation. The interior of the building is open, and shows the wood-frame construction of the roof; there is no flooring present. The exterior of the structure is in good condition; the interior is in fair condition, as the structure has been abandoned for many years, but many of the original lighting elements remain. A security chain-link fence now surrounds the structure.

On three sides of the assembly building there is a continuous large earthen berm. Stabilized with rock, the berm is overgrown with grass. On the south side of the building, the berm is free-standing and sits across the access road from the buildings in the Sigma Test Complex.

Douglas constructed the Sigma Test Complex in 1956 (along with the Solid Propellant Test Complex one-half mile to the north). The assembly building was one of three original structures mapped for the area. The structure first supported developmental work on the Nike Hercules, and later the Nike Zeus and Skybolt missiles.

5. Test and Support Building: The building is 40' long (north-south and including extended eaves) x 12' wide, and approximately 10' high. Wooden eaves extend from either side, and the building sits on a concrete pad. A large steel-framed door is found on the west façade. The exterior of the structure is in fair condition.

A continuous earthen berm that surrounds the building on three sides extends to approximately 12-15' in height. Large utility poles with mounted lights are on

either side of the building. A destruct pad, further described below, is in front of the structure. Other utility poles are nearby.

The building was configured for Nike Hercules (DM-14) and Nike Zeus (DM-15) testing. It remains undetermined if the support building is intact, or exists only as a remnant.

6. Destruct Pad: This is a 31' long x 20' wide concrete pad, 3.5' at its widest, tapering to 1', placed in front of the Test and Support Building. Four pairs of steel rails are embedded into the center. The destruct pad is today in fair condition. It shows some cracking, buckling, and separation of the concrete. Vegetation overgrows the feature.

7. Concrete Pad: This is a smaller, rectangular reinforced concrete pad placed at the southeast of the Test Area and Support Building. The concrete destruct pad is today in fair condition. It shows some cracking, buckling, and separation of the concrete. Vegetation overgrows the feature. The pad is of undetermined historic use.

8. Personnel Bunker: This one-story windowless flat-roofed building has an approximate footprint of 40' long (east-west) x 30' wide (north-south). It sits on a concrete pad that is cracked and overgrown with vegetation. There is one door entry to the structure, with several other small vents. An exterior cupboard with a hinged door opening is on the south facade. Tall weeds surround the building. The exterior of the building is in fair condition (interior was not accessible). According to Weitze, "A map of early 1963 shows a structure of its size and footprint immediately south of the southern arm of the earthen barricade around the test area. Douglas may have moved the structure to its present location for a subsequent use storing explosives..."⁴ The building is associated with support tests for the Nike Hercules, Nike Zeus, and Skybolt missiles, in use from 1956-63. It was later used for storing explosives.

C. Mechanicals/Operation: As part of the Douglas Missile Test Facility, the Sigma Test Area was actively involved in the development and testing of liquid- and solid-propellant rocket booster engines, including for the Nike Hercules after 1956, Nike Zeus interceptor missile, engine development and testing, 1961-1962; and Skybolt interceptor missile, engine development and testing, 1962.

D. Site Information: The Douglas Missile Test Facility was constructed on the outskirts of Sacramento, in 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 earthen berms integral to the testing and captive firings. Additional berms were constructed for this facility. Although additional suburban

⁴ Weitze 2005, p. 57.

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.

Part III. Sources of Information

A. Primary Sources

Douglas Missile & Space System Division, Saturn/Apollo and Manned Orbital Research Laboratory Congressional Record Presentation. Presentation to the Honorable Olin Teague, Chairman, Manned Space Flight Subcommittee, U.S. House of Representatives, Washington, D.C., February 11, 1966. Manuscript, in possession of D.R. Brincka, copy held by Alan Lawrie.

Douglas Missile & Space System Division, Sacramento Test Center Resources Handbook, Douglas Report No. SM 37538 R1, Approved by D.R. Brincka, Director, Technical Operations, December 1966. Manuscript, in possession of D.R. Brincka, copy held by Alan Lawrie.

Douglas Missile & Space System Division, Sacramento Test Center MSSD Beta Complex Facts, prepared by Logistics Support Services, Sacramento Test Center, approved by W.L. Duval, Director, Sacramento Test Center, no date given. Brochure in possession of D.R. Brincka, copy held by Alan Lawrie.

Douglas Missile and Space Systems Division, Saturn Operations Engineering Testing Summary. Sacramento Field Station, 1958-1962. McDonnell Douglas Corporate Records (accessed by Karen Weitze, 2005).

Douglas Missile and Space Systems Division, Sacramento Test Center Resources Handbook. Douglas Report No. SM 37538. Sacramento Test Center, August 1966. McDonnell Douglas Corporate Records (accessed by Karen Weitze, 2005).

B. Secondary Sources

Allen, Rebecca, 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.

Green, Paul, Interim Guidance, Treatment of Cold War Historic Properties for U.S. Air Force Installations. U.S. Air Force, Washington, D.C. Available at <<http://www.afcee.af.mil/shared>>, 1993.

Lawrie, Alan, Return to Sacramento: a Review of Saturn Rocket Firings and Explosion. Published by the American Institute of Aeronautics and Astronautics, manuscript number AIAA 2007-5343, 2007.

Lawrie, Alan, *Saturn 1/1B: The Complete Manufacturing and Test Records*. Apogee Books, Burlington, Ontario, Canada, 2008.

Lawrie, Alan, and Robert Godwin, *Saturn V: the Complete Manufacturing and Test Records plus Supplemental Material*. Apogee Books, Burlington, Ontario, Canada, 2005.

Weitze, Karen, 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.

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.

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.