

In reply refer to
ASESB 557-58/1

16 July 1958

From: Chairman, Armed Services Explosives Safety Board
To: Chief of Ordnance, Department of the Army

Subj: Tests of Nike-Hercules Underground Magazines

- Ref: (a) OCO ltr ORDGU-SA 00/8S 7068-RD, 17 Jun 58
- (b) ASESB ltr ASESB-482-58/5, 13 Jun 58
- (c) OCO ltr ORDGU-SA 00/7S 7485-RD, 13 Jun 57
- (d) ASESB 1st Ind ASESB-581-57/6 on ref (c), 25 Jul 57
- (e) OCO 2nd Ind on ref (c), 22 Aug 57
- (f) ASESB Staff Study Concerning Storage Requirements for Nike Hercules, 12 Sep 57
- (g) ASESB 3d Ind ASESB-867-57/6 on ref (c), 30 Oct 57
- (h) Minutes of the 182d Meeting of the ASESB, 12 Jun 58

1. Reference (a) stated that the first sentence of paragraph 3b of reference (b), namely, "subsequent requests for Staff analyses were on the basis that 25,000 pounds of high explosives would be subject to mass detonation," was incorrect and requested that the Board's records and paragraph 3b of reference (b) be changed "to show the actual basis upon which reconsideration of the original decisions and recommendations was made."

2. Reference (c) requested that the ASESB review, on a priority basis, certain unclassified drawings pertaining to magazines and other structures for Nike Hercules. In paragraph 2 of this letter the basis for analysis was given as a "25,000 pound quantity of high explosives contained in a completely underground structure." The Board in reviewing the plans, reference (d), did not concur in the 75% reduction in unbarricaded inhabited building distance. However, certain recommendations were made as follows:

"a. That all missiles remain underground except for true alerts.

"b. That determination be made by test, or by evaluation of available data, as to the relative overall contribution of the booster, in equivalency of TNT, when the warhead detonates.

"c. Determine by tests the minimum separation between warheads to prevent simultaneous detonation,"

and further stated that "If, as a result of tests, a lesser unit than 25,000 pounds of explosives is determined to mass detonate at one time, appropriate inhabited building distances may be computed on the basis of the largest of the individual units." Reference (e) requested reconsideration of the above decision, stating in effect that 25,000 pounds of high explosives were not concentrated at one point, that peak pressures would be lower,

UNCLASSIFIED

Classified by Chairman, DSEB
 SUBJECT TO GENERAL DECLASSIFICATION
 SCHEDULE OF EXECUTIVE ORDER 11652
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 DECLASSIFY ON 31 December 1973 3721

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defined the separation distances between the various component explosives which made up the weapon, etc. The quantities of explosives in an individual weapon were broken down as follows:

600 pound high explosives charge in the warhead

3000 pounds of Class 9 double base propellant in the booster

276 pounds TNT equivalent in the 2300 pound solid propellant sustainer motor

1 1/4 pounds in the igniter detonating cord, etc.

Total - 4020 pounds of high explosive subject to mass detonation per missile

With six missiles per underground structure, there would be a total of 24,120 (approximately 25,000) pounds of high explosives in each underground structure. Notwithstanding the weights of individual HE components and the separation distances between missiles in their underground structure, the Board was not advised to use or consider a lesser total quantity than 25,000 pounds of HE subject to mass detonation as previously specified in reference (c). Reference (f), a Staff study of the request for reconsideration, specifically stated that 25,000 pounds of high explosives was the amount being considered in the study. Reference (g), the Board reply to reference (e), and based on the Staff Study, reference (f), stated that one of the Board decisions was as follows: "Based upon a total quantity of 25,000 pounds of high explosives in each underground box, 528 feet, 1/4 of the total unbarricaded distance specified in the DOD Directive for inhabited building separation distance, even in this special use, is insufficient to insure adequate safety." There should have been no doubt that 25,000 pounds of high explosives was the total quantity being considered by the Board. Furthermore, in a recent special meeting of the Board, the minutes, reference (h), have been carefully reviewed and again leave no doubt that 25,000 pounds of high explosives subject to mass detonation was the quantity under consideration in each underground box.

3. On a recent survey of Nike installations by one of the Staff Safety Engineers, personnel at the installation were considering, in accordance with Army directive, approximately 6,000 pounds of high explosives, subject to mass detonation, in each Nike Hercules missile. As a matter of information, the survey engineer advised the personnel at the site in that they should consider 4020 pounds only as the total quantity of high explosives involved in accordance with the weights of the various components specified by Army Ordnance to the ASESB while the underground storage problem was under review.

[REDACTED]

4. In view of the above, the statement as made in reference (b) is considered correct and no changes to this statement would be in order.

FOR THE ARMED SERVICES EXPLOSIVES SAFETY BOARD:

SIGNED

W. T. JENKINS
Captain, USN
Chairman

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[REDACTED]

RED BANK REGISTER

Established 1878

REGISTER BUILDING, 40-42 BROAD STREET

RED BANK, NEW JERSEY

TELEPHONE SHadyside 1-0010

July 1, 1958

Armed Services
Explosives Safety Board,
Department of Defense,
The Pentagon, Washington, D. C.

Gentlemen: Re: NIKE AJAX BASE, Chapel Hill, Middletown, New Jersey

Location of Battery B, 526th Anti-Aircraft Missile Battalion is directly adjacent to a Navy railroad over which extremely large quantities of high explosive ammunition are carried from the Earle Naval Ammunition Depot to the Navy docks at Leonardo.

It was at this base, May 22, that eight of fourteen exposed Nike Ajax missiles chain exploded, killing ten men and injuring three. Metal debris was spread over the civilian area nearby.

From the standpoint of public security, we ask your co-operation in supplying us with details concerning the Board's original consideration of Chapel Hill as a site for this base. We would like to know if it is a fact that the Board did not approve the location and, if so, what were the reasons?

We also would like to know if approval was given for (and the current status of) other Nike bases in Monmouth County, New Jersey -- Batteries C, Fort Hancock, and D, Holmdel.

Thanking you for any enlightenment you may be able at this time to shed upon this matter, I am

Sincerely yours,

James J. Hogan
James J. Hogan
Editor

RED BANK REGISTER

cc: Rep. James C. Auchincloss
Brig. Gen. Robert A. Hewitt

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AWH/bjm/l

In reply refer to
ASESB 549-58/1

8 July 1958

AR *[Signature]*

CM *[Signature]*

Comd Div
DU LAG

Informed

CINFO - *[Signature]*

Mr. James J. Hogan, Editor
Red Bank Register
40-42 Broad Street
Red Bank, New Jersey

Dear Mr. Hogan:

In response to your query of July 1, 1958, the selection or approval of specific locations for Nike Ajax sites is not made by the Armed Services Explosives Safety Board, but all sites are constructed to meet certain safety requirements.

In regard to the specific inquiries in your letter: A careful review of Board records and informal queries of Staff personnel have confirmed that the Board was not involved in the original consideration, selection or approval of Chapel Hill as a site for a base, nor in the selection of other Nike bases in Monmouth County, N. J., inasmuch as the selection of tactical sites is not a function of the Board.

Additional information of possible interest is that a recent explosives safety survey of the Chapel Hill Nike Ajax Base, made by a representative of this Board, has verified that, based on the maximum quantities of explosives handled, the distances to the Navy railroad, to facilities of the Earle Naval Ammunition Depot, to the Navy docks and to the nearest houses, all comply with the explosives safety distance requirements covering military explosives.

Sincerely yours,

SIGNED

W. T. JENKINS
Captain, USN
Chairman

Copy to:
Rep. James C. Auchincloss
#111# Brig. Gen. Robert A. Hewitt



File 1

CHOICE OF SITE FOR TEST OF
NIKE UNDERGROUND MAGAZINES

The choice of a site for these tests was dictated by four considerations:

- a. The necessity for an isolated, level test area approximately two miles square to allow proper photographic and air blast coverage.
- b. The availability of manpower for conducting the test.
- c. Availability of instrumentation, including high speed camera coverage.
- d. Electrical power for cameras and instrumentation.

The first consideration immediately excluded Aberdeen Proving Ground as a test site, since no such test area exists there. The choice of a site was therefore narrowed to either Yuma Test Station or White Sands Proving Ground, which do have suitable test areas within their boundaries.

Representatives of White Sands Proving Ground were contacted regarding the proposed tests and asked to furnish information regarding the last three considerations mentioned above. They indicated that a majority of the instrumentation required for the test, adequate manpower for the field testing, and adequate electrical power sources were all available at their Proving Ground. Since the total amount of instrumentation and manpower considerably exceeded that available at Yuma Test Station, it was decided that White Sands Proving Ground should be the site for the proposed tests. It was also indicated by representatives of OCE that they preferred the White Sands location for their participation in the tests. They estimated that the costs of constructing the test magazines and target houses would be about 20% cheaper at White Sands than at Yuma, and also stated that they could more easily coordinate the tests at White Sands, operating from their Albuquerque office.

ESTIMATE OF COSTS OF TESTS OF NIKE

UNDERGROUND MAGAZINES

I	Preliminary testing and calibration	
	A. Shock measurement by photographic technique	\$ 3,000
	B. Piezo gage calibration (16 gages)	1,000
	C. Beam gage calibration	2,000
	D. Check-out of piezo recording equipment	700
	TOTAL	\$ 6,700
II	Equipment not available at APG or WSPG which must be purchased prior to test	
	A. 16-channel piezo recorder*	\$ 55,000
	B. Electrical cable	
	1. 11,000 ft. of RG62U coaxial cable	1,100
	2. 12,000 ft. of four conductor shielded cable	1,200
	3. 10,000 ft. of twisted pair	100
	C. Piezo blast gages (16 gages)	3,200
	D. Cantilever beam gages (8 gages)	1,000
	E. Four 35mm Fastax cameras (with necessary accessories)	12,000
	F. Four 16mm, 64 frame/sec cameras	2,800
	G. Four Consolidated pressure gages	1,000
	H. Field communications equipment	2,000
	TOTAL	\$ 79,400
III	Operating costs for conducting one test at WSPG	
	A. Estimate of WSPG costs	
	1. Direct labor, plus overhead	\$ 40,000
	2. Materials	20,000
	TOTAL	\$ 60,000
	B. Estimate of D&PS costs	
	1. Planning and liaison visit, one engineer two trips of 7 days duration (salary, 20% overtime, overhead, trans., per diem)	\$ 1,600
	2. Field instrumentation	
	a. Four trailer operators, full time	19,200
	b. Two engineers, part time	2,600
	c. Data analyst, part time	1,300
	d. Miscellaneous	3,200
	3. Data reduction - 650 manhours at \$10/manhour	6,500
	TOTAL	\$ 34,400

*This is commercial, high-frequency response equipment which can be delivered within 60 days of receipt of order.

C. Estimate of BRL costs	
1. Travel and per diem, planning visit	\$ 1,300
2. Two physicists (sal., trans., per diem, overhead)	6,300
3. One physical science aid	2,500
4. One trailer operator	3,000
5. Overtime (20% of basic salaries)	1,800
TOTAL	<u>\$ 14,900</u>

Total Cost, one test \$ 195,400

IV Operating costs for conducting three tests at WSPG

A. Estimate of WSPG costs	
1. Direct labor, plus overhead	\$ 60,000
2. Materials	40,000
TOTAL	<u>\$ 100,000</u>

B. Estimate of D&PS costs	
1. Planning and liaison visits	\$ 1,600
2. Field instrumentation	52,600
3. Data reduction	19,500
TOTAL	<u>\$ 73,700</u>

C. Estimate of BRL costs	
1. Travel (Planning)	\$ 2,600
2. Salaries and travel, test personnel	27,200
3. Overtime	6,000
TOTAL	<u>\$ 35,800</u>

Total Cost, three tests \$ 295,600

DISPOSITION FORM

SECURITY CLASSIFICATION (if any)

FILE NO.

ENGEM

SUBJECT

Storage Requirements for NIKE HERCULES

TO CofOrd

ATTN: ORDGU-SA

FROM CofEngrs

DATE 13 May 1958

COMMENT NO. 1

Mr. Hansen/77456/ld

1. Reference: Comment #2 (S), LOG/M4 18169, 28 April 1958, subject: "Storage Requirements for NIKE HERCULES (U)".

2. Cost estimates for four combinations of test facilities are attached (Incl 1).

3. The attached is based upon the assumption that construction will be accomplished sequentially. It is possible that construction of two or more magazines under a single contract would result in appropriate cost savings. The saving in time, on the other hand is great. If authorization to build any facilities beyond the first magazine is deferred until the first test is performed, then a delay of 120 days would occur between the second authorization and a second test. By authorizing multiple facilities initially, tests after the first could be conducted at 30-day intervals.

4. The estimates include costs for construction of instrument shelters and target fences. When this office receives the complete plan of test it can be determined whether any other costs in connection with installation of instrumentation will be incurred.

FOR THE CHIEF OF ENGINEERS:

1 Incl
Cost Est

MORTON SOLOMON
Colonel, Corps of Engineers
Assistant for Engineering and Contracts
Military Construction

CONSTRUCTION COSTS FOR EXPLOSIVES TESTS

1. ASSUMPTIONS:

a. Expedited construction will be employed. Authorization for over-time and for negotiation of construction contract with two or more contractors will be forthcoming.

b. Each underground storage structure will be in all structural respects identical to those of Type B in the field. Drainage, waterproofing, mechanical ventilation, the elevator, and all electrical work except minimum lighting will be omitted.

c. Eight typical houses will be exposed to effects of each test. Four will be brick, four frame. Designs used will be like those exposed to previous tests under Federal Civil Defense programs; they provide for two stories and basement.

d. For each test after the first, two of the houses may be reuseable.

2. Basic Unit Costs for Construction.

a. Each underground structure	\$ 100,000
b. Each brick house	20,000
c. Each frame house	18,000

The above figures include allowances for design, engineering, and contingencies; also for access road for construction.

3. Total Costs, Various Multiples.

The unit costs stated in section B are used. Minor savings due to letting of a larger single contract are possible but uncertain, and are excluded.

Scheme A - One magazine, 8 houses	252,000
B - Two magazines, 14 houses	466,000
C - Three magazines, 20 houses	680,000
D - Five magazines, 30* houses	1,070,000

*Two additional houses from first three tests assumed reuseable.

4. Construction Time

Under the assumptions of para. 1, the following times are estimated as minimum from the time funds are made available until beneficial use:

Scheme A - 120 days
B - 150 "
C - 180 "

If separate contracts are executed for individual test units, the time of 120 days would apply to each unit. It is possible, however, to let a contract for

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two or more units, stipulating completion of one unit in 120 days, plus portions of the second and third units. By this means successive tests could be performed at 30 day intervals.

5. Instrumentation Costs, Corps of Engineers. In support of the instrumentation, Corps of Engineers will construct shelters for vans containing recording equipment. Two such shelters are required per magazine, but one can be located for re-use. Target fences are also to be provided for each magazine. Unit costs are estimated at \$3,200 per instrument shelter and \$4,800 for target fences. For the schemes listed in paragraph 3, add the following:

Scheme A	\$ 11,000
B	19,000
C	27,000
D	45,000

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filed in classified book