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IVY

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~~RESTRICTED DATA~~
~~ATOMIC ENERGY ACT 1948~~

DOCUMENT NUMBER 52 1345 ~~5074~~

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[illegible]/400.112 — 3rd Ind

SUBJECT: Test of Existing Army Structures at Operation IVY

Headquarters, Armed Forces Special Weapons Project, P. O. Box 2610,
Washington, D. C.

2 JUN 1952

TO: Commander, Joint Task Force 132, Washington 25, D. C.

1. In a conference on 21 May between representatives of the Corps of Engineers and of the Armed Forces Special Weapons Project, it was determined that the instrumentation of the structure proposed in paragraph 2 of the 2nd Indorsement was not feasible.

2. It was determined, however, that a project along the lines presented as Inclosure 2 would be feasible and desirable.

3. The Office of the Chief of Engineers will furnish the names of the two individuals to serve as Project Officers, and will furnish any further details.

4. Since the expected overpressures on structures were thoroughly discussed in the above conference and the unavailability of the Sandia Corporation was determined, it was agreed that the conference requested in paragraph 5 of the 2nd Indorsement would not be necessary.

5. It is recommended that the Commander, Joint Task Force 132 approve the project indicated in Inclosure 2 and include it in Operation IVY, provided that it can be accomplished within the limitation of the funds available and does not jeopardize the scope of the approved program.

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2 Incls:
1 - Justification for Test of Existing Army Structures
2 - Project 6.13

HERBERT B. LOPER
Brigadier General, USA
Chief, AFSWP

NMB

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Asst C/S, G-4, DA
RDB
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WITH INCLS.
DATE: 10/18/94

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~~ATOMIC ENERGY ACT 1948~~

3 INDORSEMENTS W/BASIC & BOTH INCLOSURES

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW	
1ST REVIEWER-DATE 6/16/94	DETERMINATION [CIRCLE NUMBER(S)]
AUTHORITY: ☐AOC ☒ADC ☐ADD	1. CLASSIFICATION RETAINED
NAME: M.L. Kolb	2. CLASSIFICATION CHANGED TO: SNSI
2ND REVIEWER-DATE: 7/14/94	3. CONTAINS NO DOE CLASSIFIED INFO
AUTHORITY: ADD	4. COORDINATE WITH: DNA
NAME: D. P. Cannon	5. CLASSIFICATION CANCELLED
	6. CLASSIFIED INFO BRACKETED

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G4/T4 25220 2nd Ind.

SUBJECT: Test of Existing Army Structures at Operation IVY.

Office, Asst. Chief of Staff, G-4, Dept. of the Army, Washington 25, D. C.

TO: Chief, Armed Forces Special Weapons Project, Washington 25, D. C.

1. The Corps of Engineers has reviewed the data furnished in the 1st Ind. and believes that the effects of the large explosion planned on Klugelab Island on Engebi. While the pressure indicated are not asgreat as would be desirable from the standpoint of analyzing structural behavior, there is always the possibility that they will be exceeded. Whether the overpressures are as indicated in the inclosure or greater, it is considered highly desirable to take advantage of this opportunity to determine by actual measurement the diffraction effects and other phenomena incident to the passage of a blast wave around and over a structure of this size. These data are essential in determining the loading on a structure and the Greenhouse tests indicated a considerable variation between predicted and test data in this respect. While shock tube studies and scale model tests of structures exposed to HE blast can do much to aid in determining these effects, the value of obtaining a set of data under full-scale conditions for correlation cannot be overestimated.

2. The Department of the Army recommends that Army Structure 3.1.1 be instrumented to measure pressure versus time at various central points on the exterior of certain of the buildings comprising this structure. No measurements of footing pressures, accelerations, strains or other transient measurements of the structural behavior such as were included in the Greenhouse program are proposed, except for six displacement measurements, i.e., one each at the second floor, third floor and roof of buildings 2 and 3.

3. The proposed instrumentation program would require approximately 50 electronic channels for pressure-time measurements and six channels for displacement-time measurements. The only construction, labor and materials required would be that required to close up three wall openings at the northeast corner of Structure 3.1.1 caused by the failure of two test panels during the Item Shot and necessary labor and equipment required to drill approximately 24 holes through concrete walls and roofs at proposed new gage locations.

4. The total estimated cost of the proposed instrumentation is $175,000, based upon an average of $3,000 per channel. This average unit cost assures completely new recording equipment, instrument installation and data reduction. If the instrumentation is accomplished by the Sandia Corporation, which agency was responsible for the instrumentation of this structure for the Greenhouse tests and is now engaged in similar work at the site, it is possible that this unit cost could be reduced.

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GA/P4 25220
Subject: Test of Existing Army Structures at Operation IVY.

5. It is requested that a conference between the appropriate Corps of Engineer and TF 132 scientific representatives be arranged as soon as possible to discuss the expected overpressures on structures and the availability of Sandia Corporation to conduct the instrumentation for this project. This information is required at the earliest practicable date so that, in the event the Sandia Corporation is unable to provide the instrumentation, the Corps of Engineers can make arrangements with another agency for this support.

6. In the event this project is not incorporated into the IVY program, it is recommended, as a minimum project, that a team of engineer personnel be included in the Task Force organization to make a general damage and photographic survey of the effects of the explosion on the above structures and any other structures or items such as bridging, floating equipment and stands of trees, of interest to the Department of the Army.

/s/ S. R. Mickelsen
S. R. MICKELSEN
Major General, GS
Asst. Deputy ACofS, G-4
for Special Weapons

1 Incl.
n/c

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ATOMIC ENERGY ACT 1946

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SWPWT/400.112 1st Ind.

SUBJECT: Test of Existing Army Structures at Operation IVY.

Headquarters, Armed Forces Special Weapons Project, P. O. Box 2610, Washington, D. C., 26 February 1952.

TO: Office of the Assistant Chief of Staff, G-4, Logistics, Department of the Army, Washington 25, D. C.

1. The ground zero points and the estimated yields of the thermonuclear device and the conventional weapon have now been established by the Atomic Energy Commission. The thermonuclear device will have an approximate yield of 10 megatons with the zero point on Elugelab Island, and the conventional weapon, if detonated, will have an approximate yield of 500 kilotons with the ground zero on Runit Island.

2. It is estimated that the overpressures on Engebi from a 10 megaton explosion on Elugelab will be approximately 10 to 15 psi while the overpressures on Engebi from a 500 KT explosion over Runit will be approximately 1 psi. These values do not appear sufficiently high to warrant any extensive repair or re-instrumentation of the existing Army structures.

3. It is suggested that the above information be brought to the attention of the Office, Chief of Engineers. If, after considering the circumstances, the Chief of Engineers still consider it desirable to instrument the existing structures, a formal proposal, including estimates of required labor and materiel, should be submitted to this headquarters.

/s/ Herbert B. Loper
HERBERT B. LOPER
Brigadier General, USA
Chief, AFSWP

1 Incl:
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DATE: 10/18/94

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ATOMIC ENERGY ACT 1946

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Copy
Letterhead - Department of the Army
Office of the Assistant Chief of Staff, G-4, Logistics
Washington 25, D. C.

G4/74 26 January 1952

SUBJECT: Test of Existing Army Structures at Operation IVY

TO: Chief, Armed Forces Special Weapons Project
The Pentagon, Room 1B 671
Washington 25, D. C.

1. It is requested that certain Army structures remaining intact from Operation GREENHOUSE be tested at Operation IVY under the project title, "Test of Existing Army Structures." Detailed justification for this project appears in inclosure 1.

2. It is contemplated that the Corps of Engineers will determine maximum blast pressures and bomb sizes with distances for which each structure could be useful at Operation IVY. When available evidence indicates these pressures will be materially exceeded, the instrumentation of the structures will be dropped. Otherwise, plans and operations will be carried forward to instrument structures.

3. Funds required are estimated at $150,000.

1 Incl:
Justification for
Test of Existing Army
Structures

/s/S. R. Mickelsen
Brigadier General, GS
Asst. Deputy ACofS, G-4 for
Special Weapons.

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DATE: 10/18/94

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Copy [redacted] JUSTIFICATION FOR No. 2 of 2 Copies, Series B

TEST OF EXISTING ARMY STRUCTURES

The Army structures constructed for the Greenhouse tests consisted of (1) a multi-story structure representative of several types of rigid-frame and rigid-wall building construction with numerous panels to test the effectiveness of various types of curtain walls, and (2) a composite underground shelter structure. These structures are still in such condition that, without additional construction, valuable data could be obtained if they could be subjected to appropriate overpressures created by additional nuclear detonations.

The personnel shelter structure, due to its function, was designed to resist the anticipated blast effects of the Easy shot without hazardous damage to occupants. It did not undergo the shock and blast pressures for which it was designed, therefore, it suffered no damage. It would be highly desirable to subject it to more severe overpressure than it experienced during the Greenhouse tests. It would also be desirable to determine the effect on this structure of varying the amounts of earth cover.

In the case of the multi-story structure most of the wall panels were undamaged and could be tested again with minor preparation. The addition of new panels to replace those which were damaged would be desirable and could be accomplished at moderate cost. The rigid frame buildings were stressed beyond their elastic limits and would probably not survive a loading of the same intensity but would produce some data of value even though they were stressed to failure. The roof of the shear wall (rigid wall) building was slightly deflected and cracked by the Item shot, otherwise no damage was suffered. This building could yield valuable data if subjected to another test and would require only minor repair or strengthening of the roof slab.

The Army structures represent a considerable investment and are uniquely suited to obtain additional valuable data on structural response to larger blast loads than experienced during the Greenhouse tests. These data would supplement the data now available for use in developing design criteria for blast-resistant structures and could be obtained at nominal cost. It is highly desirable that instrumentation to record transient measurement of pressures, accelerations, and other effects be included in order to aid in interpretation of the dynamic behavior of the structures under the greater blast effects anticipated in the proposed new tests.

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Program 6 - Blast Measurements

Project 6.13 **Title:** Damage Survey of Gross Effects on DOD Structures and Other Items

Sponsor: U. S. Army **Organization:** OCE

Objective: To determine the gross effects on the existing Army structures on the Island of Engebi and on other items of interest to the Department of Defense.

Description and Experimental Procedure: Two representatives of the OCE will request still photographs of the existing Army structures and other items of interest prior to the shots and after the shots. The results of those photographs will be compared with the Pressure vs Time Project and the Ground Motion Project to determine the gross effects of the blast wave that eminates from the shots.

Remarks: This project would not involve any construction or instrumentation. It would involve approximately 300 still photographs, the support of two individuals for approximately 3 months in the Eniwetok area, and the support of the final report when it is prepared as part of the IVY Scientific Program. No research and development funds would be necessary, but it is estimated that $10,000 of Extra Military Funds would be needed for the cost of film, travel and reports.

Encl 2

[redacted]