

Use of Nuclear Explosives for Excavation of Sea-Level Canal Across the Negev Desert (Canal Studies Filefolder)

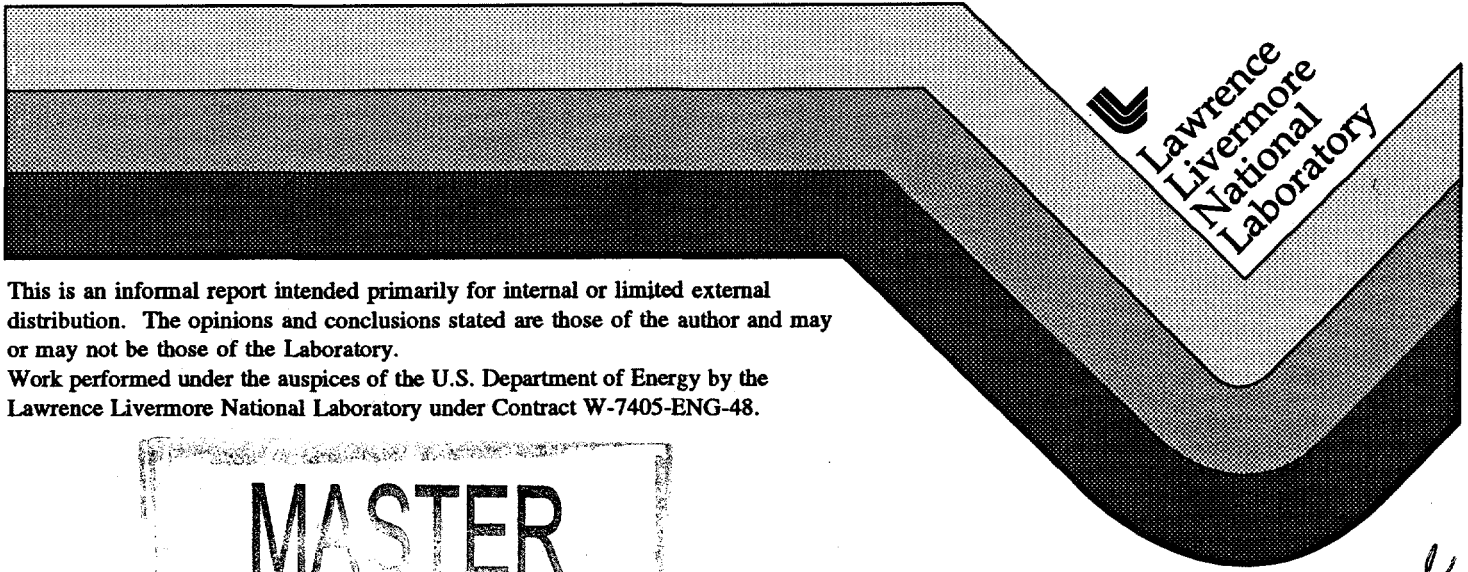
H. D. MacCabee

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J. Knox

July 1, 1963

May 24, 1965

67/299

ASG
10/31/72

MEMORANDUM

TO: G. H. Higgins

FROM: H. D. Maccabee *HDM*

SUBJECT: The Use of Nuclear Explosives for the Excavation of a Sea-Level Canal across the Negev Desert in Israel, connecting the Mediterranean with the Gulf of Aqaba

**DECLASSIFICATION
STAMP ON REVERSE.**

INTRODUCTION

Another interesting application of nuclear excavation would be a sea-level canal 160 miles long across Israel, connecting the Mediterranean with the Gulf of Aqaba (and thus the Red Sea and the Indian Ocean). Such a canal would be a strategically valuable alternate to the present Suez Canal and would probably contribute greatly to the economic development of the surrounding area. The difference in elevation between sea level and the Dead Sea (30 miles away and 1286 feet below sea level) might also be used to generate hydro-electric power.

The maximum depth of excavation to be encountered is on the order of 1500 feet. Conventional methods of excavation of this magnitude are prohibitively expensive, if indeed possible, but it appears that nuclear explosives could be profitably applied to this situation.

CANAL ROUTE

One possible route for such a canal across the Negev desert has been sketched out in Figure 1. The route extends northward from Eilat on a bearing of 5° for 83 miles, then turns westward on a bearing of 295° for 20 miles to pass between two mountains, then turns northward again on a bearing of 348° for 58 miles, to the Mediterranean, passing by Beersheba and the Gaza Strip.

Approximately 130 miles of the 160 mile length of the route are in virtually unpopulated desert wasteland, and are thus amenable to nuclear excavation methods. Conventional methods could be used in the vicinity of the populated areas (Eilat, Beersheba, and the coastal plain near Gaza) for an aggregate distance of 30 miles -- these areas will also be the least difficult to excavate, as they are fairly close to sea level.

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Classification (Declassify on) (Review Date) Changed to:

UNCLASSIFIED

(Insert appropriate classification level or indicate Unclassified)

by authority of R2D2-COPKA-65-12 1/9/96 (date)
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by *Stephen Helled* 5/30/96 (date)
(Signature of person making the change)

verified by *R June Barron* 6/4/96 (date)
(Signature of person verifying this is the correct document or model)

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COSTS

In the absence of accurate profiles of the route and accurate information on costs of mass-produced nuclear explosives, a very crude first approximation to costs of such a canal is given here.

Assuming (very roughly) an average depth of cut of 750 feet, this dimension controls and leads to a device spacing of 1300 feet (using 2 megaton devices buried at a depth of 1300 feet) in order to get a channel width of 1000 feet in rock.¹

Assuming a hole drilling cost of \$200 per foot for 1300 foot holes, and a shot cost of \$250,000, we are led to a total single shot cost of $\$ 0.5 \times 10^6$, and at a spacing of four shots per mile, a cost of $\$ 2 \times 10^6$ per mile.

Thus; Nuclear Shot Cost: 130 miles \times $\$ 2 \times 10^6$ /mi = $\$ 260 \times 10^6$

Conventional Excavation: 30 miles \times $\$ 3 \times 10^6$ /mi = $\$ 90 \times 10^6$

Engineering,

Auxiliary Construction and Safety Program = $\$ 150 \times 10^6$

15% Allowance for Contingencies = $\$ 75 \times 10^6$

Approximate Total Cost

= $\$ 575 \times 10^6$

CONCLUSION

The results of this crude preliminary investigation indicate that a sea level canal across Israel appears to be within the range of technological feasibility. It is more difficult to judge its economic feasibility, but some information may be gained by noting that the Suez Canal Company was offered $\$ 80 \times 10^6$ as compensation when Egypt nationalized the Suez Canal, and this figure is probably only a percentage of its real value.

Another problem which has not been considered is that of political feasibility, as it is likely that the Arab countries surrounding Israel would object strongly to the construction of such a canal.

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¹ See Table 3.2 p. 3-14 of the Panama Canal Report by Graves et. al.

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NEUTRAL ZONE OF ELGAZA

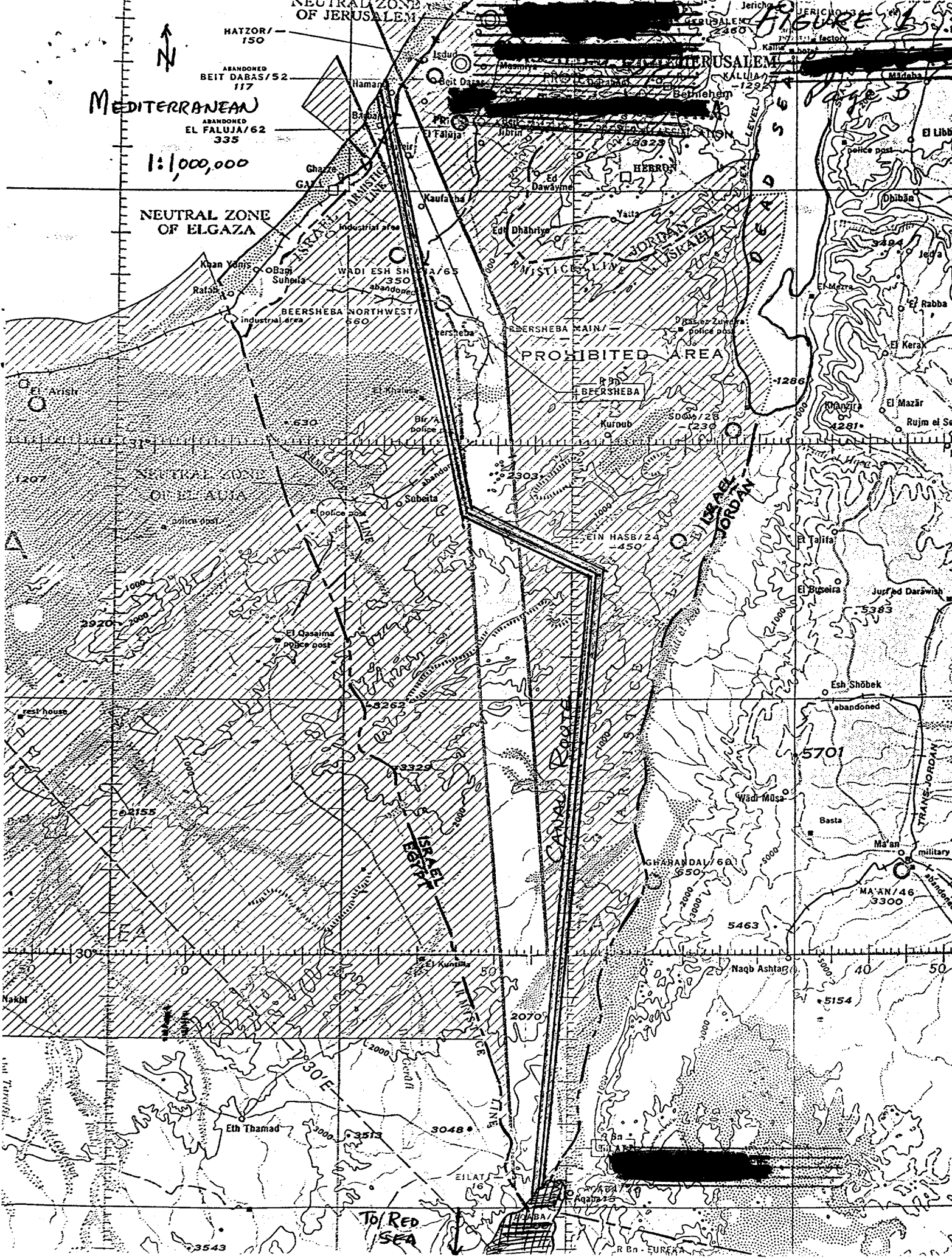
NEUTRAL ZONE OF EL ALYA

NEUTRAL ZONE OF JERUSALEM

PROHIBITED AREA

Jericho JERICHO 490
JERUSALEM 460
Kaliya factory
Mādaba

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