

Plowshare Sequential Device Test

L. B. Ballou

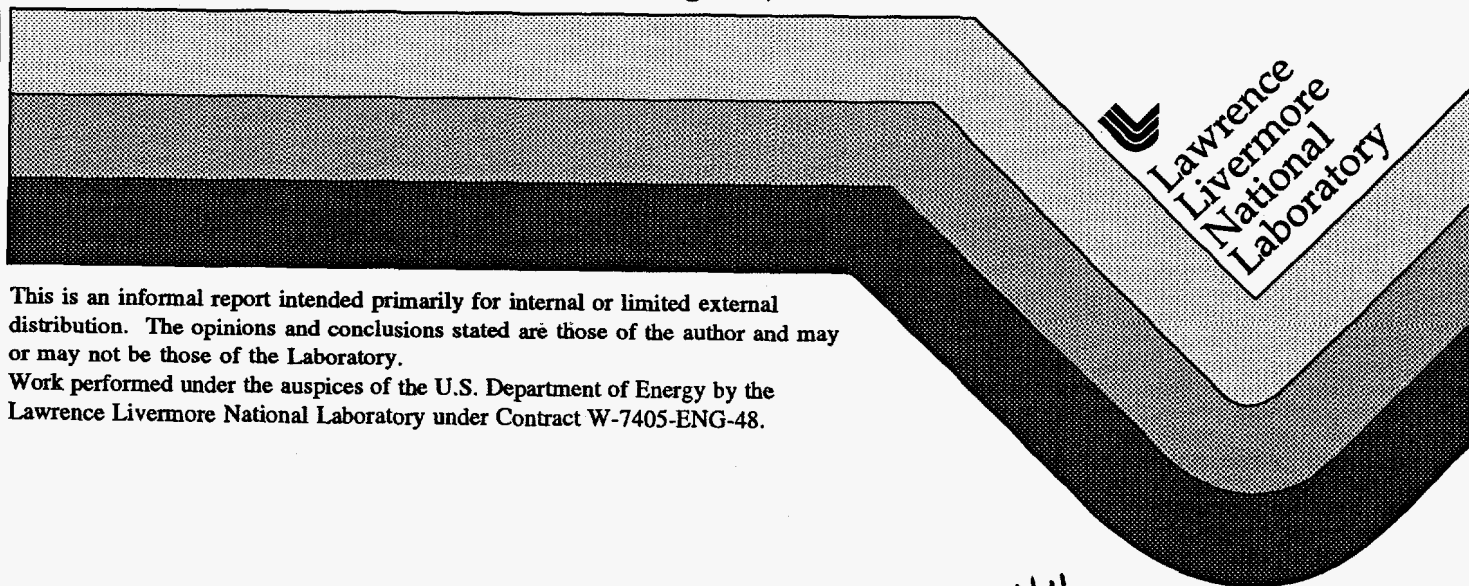
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August 2, 1971

Ballou

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MEMORANDUM

TO: Distribution
FROM: Lynden B. Ballou *Ly Ballou*
SUBJECT: Plowshare Sequential Device Test

With the successful execution of the Miniata test of the Diamond explosive we are now prepared to provide a multiple-explosive device service for simultaneous detonations like the Rio Blanco project. I recognize that several caveats accompany this statement with respect to final design and test of the temperature and pressure control systems.

For over a year we have been advocating the development of a hardened or "ruggedized" version of Diamond which will be suitable for sequential detonation of multiple explosives in one emplacement hole. In March, Dr. May testified to JCAE that, given adequate funding, a test of this design was proposed for FY72. The current indications are that not all the needed funds will be appropriated this year, but about \$1.5 million probably will be and the balance (another million or so) will be funded in FY73. DPNE has requested that we submit a detailed concept for this test. This concept is expected to address the topics of purpose (why?), specific objectives (what?), experimental plan (how?), location (where?), schedule (when?), and estimated cost (how much?). This document is to be completed by 27 August.

In order to get started on this effort, you are invited to a meeting in the Gnome Room (Bldg. 111, Room 209) on 9 August at 1:15 to discuss the topics mentioned above.

To provide a point of departure for the discussion, I have generated a "strawman" for this test which is described in the following paragraphs and attached sketch.

Strawman Concept

General

A Plowshare-sponsored device development test, named "Yacht" is proposed for execution in Area 15 at NTS in late September 1972. The test is designed to evaluate the ability of a ruggedized Diamond-type explosive assembly to withstand the effects of an adjacent nuclear detonation in the same emplacement hole and then be sequentially fired.

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Specific Objectives

The specific objective for this test is to demonstrate the adequacy of a ruggedized design of the Diamond explosive for use in a Wagon Wheel project. That project as defined here consists of 4 each 100-kt explosives at spacings $\geq 7.5 R_c$ at a median depth of $\sim 10,000$ ft in the Wagon Wheel #1 hole of El Paso Natural Gas. The bottomhole pressure (@ 11,600 ft) is about 8000 psi and the maximum temperature is about 225°F. Note that the spacing indicated is greater than that proposed by EPNG but consistent with the LLL recommendations. For the purposes of this test, sequential is defined as 10 minutes between detonations.

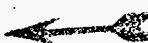
Experimental Plan

The proposed test is a "tandem" geometry with a reliable (tested) ~ 20 -kt "source" located at the bottom of a ~ 2000 ft deep hole in Area 15 granite. The test device is located about 350 ft above the source and is contained in a section of 10 3/4 inch casing (like Wagon Wheel #1). The design yield of the test device is ~ 50 -kt. Included with the device is appropriate dynamic instrumentation to document the motions and overpressures experienced by the test assembly prior to detonation. The test device will be subjected to the Wagon Wheel environment by pressurizing and heating the 10 3/4 casing simultaneously to simulate the deep emplacement sequence. The casing will be cemented in place to simulate the coupling to the rock. Obviously, an operational explosive cooling system is required.

The acquisition of prompt reaction-history diagnostics (without developing a "rugged" diagnostic system) on the test device may be limited to "O. Krause-type" measurements on a rugged coax cable near the device. Failure diagnostics are probably very hard to get.

LBB:sbj

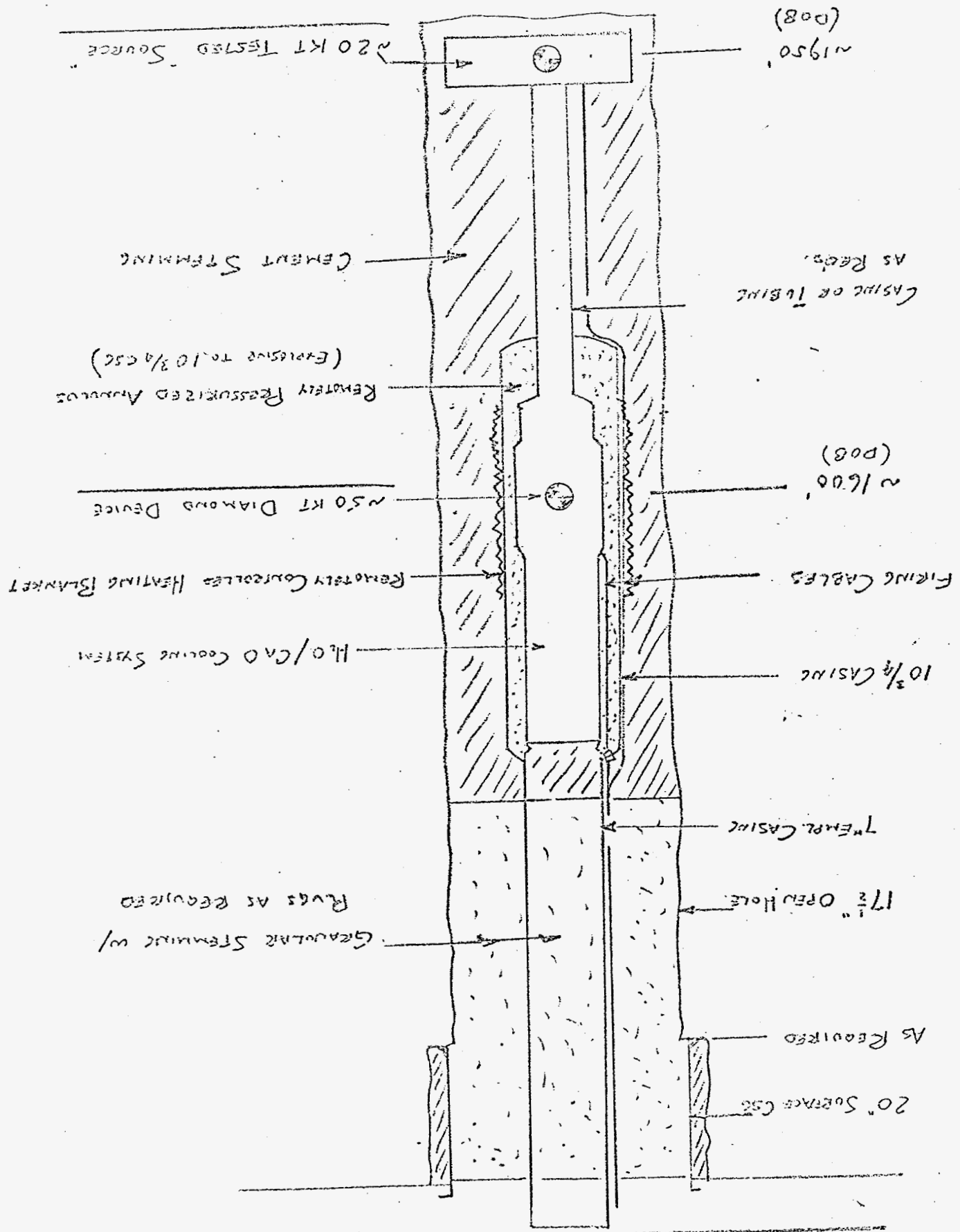
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CASING OR TUBING AS REQD.

1600 (008)

FIRING CABLES

10 3/4\"/>

7\"/>

17 1/2\"/>

AS REQD.

20\"/>

STEAMWAY YACHT CONCEPT

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