

27
7-19-77
252711S

MHSMP-77-181

Dist. Category

UC-45

PERFORMANCE AND SENSITIVITY TESTING OF TATB

Paul E. Kramer

DEVELOPMENT DIVISION

JANUARY - MARCH 1977

Process Development
Endeavor No. 106



Mason & Hanger-Silas Mason Co., Inc.
Partex Plant

P. O. BOX 30020
AMARILLO, TEXAS 79177
806-335-1581

operated for the
ENERGY RESEARCH AND DEVELOPMENT ADMINISTRATION
under
U. S. GOVERNMENT Contract EY 76 C 04 0487

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

NOTICE

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Energy Research and Development Administration, nor their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately-owned rights.

Printed in the United States of America
Available from
National Technical Information Service
U. S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161
Price: Printed Copy \$3.50 ; Microfiche \$2.25

PERFORMANCE AND SENSITIVITY TESTING OF TATB

Paul E. Kramer

DEVELOPMENT DIVISION

Process Development
Endeavor No. 106

NOTICE
This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Energy Research and Development Administration, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately owned rights.

ABSTRACT

Routine gap testing (25 mm diameter) of the LLL blends of RX-03-BB continued with Blends 12, 13, and 14. Blend 14 was distinctly the most sensitive one tested thus far. All three were formulated with Cordova TATB.

Two lots of RX-03-BB formulated with Rocketdyne TATB were also tested and displayed no unusual behavior.

Testing of LLL thermally conditioned samples of RX-03-BB Blend 2 continued. It appears that the sensitivity of some groups is not as great as would be expected based upon the final densities.

DISCUSSION

Blend 9 was the last of the LLL blends of RX-03-BB to be formulated with ordinary Pantex produced TATB. Blend 10 was formulated entirely with machining waste. Since then, Cordova TATB has been used. Blend 11 was a little above normal in sensitivity but this was not startling because a few percent of solvent extractable impurities were present.

In subsequent Cordova lots, there were no known impurity problems and test results for Blends 12 and 13

were as expected. However, Blend 14 is the most sensitive RX-03-BB tested to date except for two small lots known to contain impurities. Results are given in Table I.

RX-03-BB formulations of two Rocketdyne TATB lots were also tested. One of the lots was very off-color (brown). Nonetheless, both tests indicated normal sensitivity. These were the most pressable lots of RX-03-BB evaluated in the course of TATB gap testing. Densities of 1.92 g/cm³ were obtained using the standard RX-03-BB cycle.

MASTER

Table I. RX-03-BB Gap Test Results

| Lot | Density (g/cm ³) | G ₅₀ (mm of Brass) | |
|-------------------|---------------------------------|-------------------------------|----------|
| | | Predicted | Observed |
| LLL Blend 11 | 1.899 ± 0.001 | 2.0 | 2.41 |
| LLL Blend 12 | 1.898 ± 0.001 | 2.0 | 1.96 |
| LLL Blend 13 | 1.899 ± 0.001 | 2.0 | 2.03 |
| LLL Blend 14 | 1.901 ± 0.001 | 1.9 | 2.54 |
| Lot 6257-145-01* | 1.920 ± 0.001 | 1.1 | 1.19 |
| Lot 6257-145-02** | 1.918 ± 0.002 | 1.2 | 1.19 |

*Rocketdyne TATB Lot PR-2 (Brown)

**Rocketdyne TATB Lot PR-1

Testing of the LLL thermally conditioned specimens continued with ambient controls, 4-month 80 C and 100 C groups and a 150-day thermally cycled group. All results obtained thus far are shown in Table II. All treated samples exhibited dimensional growth; the higher the temperature, the greater the growth. The cycled samples grew considerably more than those which were simply heated.

In the usual region of interest, the shock sensitivity of an HE will vary

inversely with its density. Thus, the sensitivities of these various groups were expected to increase in proportion to their dimensional growth, and indeed this was observed. Predicted sensitivities were based upon results obtained for (thermally) untreated samples pressed to various densities. The only real exceptions thus far are the 2- and 4-month 100 C groups and the 150-day cycled group. Each of these displayed less sensitivity increase than was expected based upon the final density.

Table II. Gap Test Results for Thermally Conditioned RX-03-BB

| Treatment | Final Density (g/cm ³) | G ₅₀ (mm of Brass) | |
|-----------------------|---------------------------------------|-------------------------------|----------|
| | | Predicted | Observed |
| Ambient Control | 1.900 ± 0.001 | 1.9 | 1.73 |
| 2 Months ^a | 1.887 ± 0.002 | 2.7 | 2.36 |
| 4 Months ^a | 1.886 ± 0.003 | 2.7 | 2.16 |
| 4 Months ^b | 1.893 ± 0.001 | 2.2 | 1.91 |
| 30 Days ^c | 1.858 ± 0.004 | 4.9 | ~ 4.7 |
| 150 Days ^c | 1.851 ± 0.003 | 5.5 | 4.95 |

^aHeated to 100 C and held for specified time.

^bHeated to 80 C and held for specified time.

^cCycled from -50 C to 92 C and back. Cycle requires 60 hours.

FUTURE WORK

The 8-month samples will be tested in the near future; the next group after that is planned at 16 months.

Preparations are being made for the large capacitor to be received from LLL which will provide the capability to conduct flyer initiation studies for TATB.