

Appendix A

Test Results

Test 3

Date: 9-JUN-99

Test Identification: 060999T1

Ignition location: 1/2-inch from compensator terminal block, near ground screw

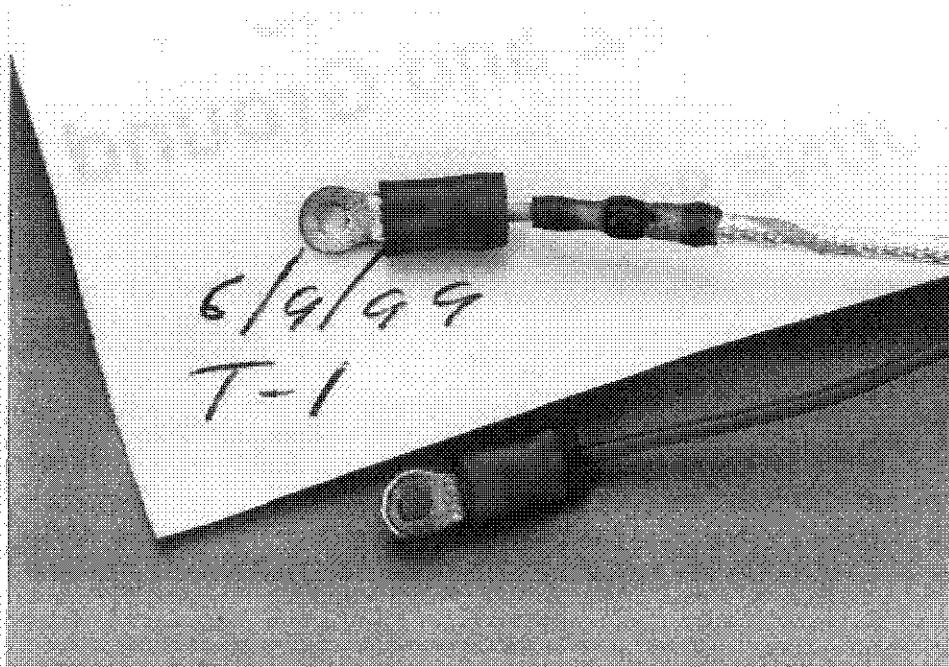
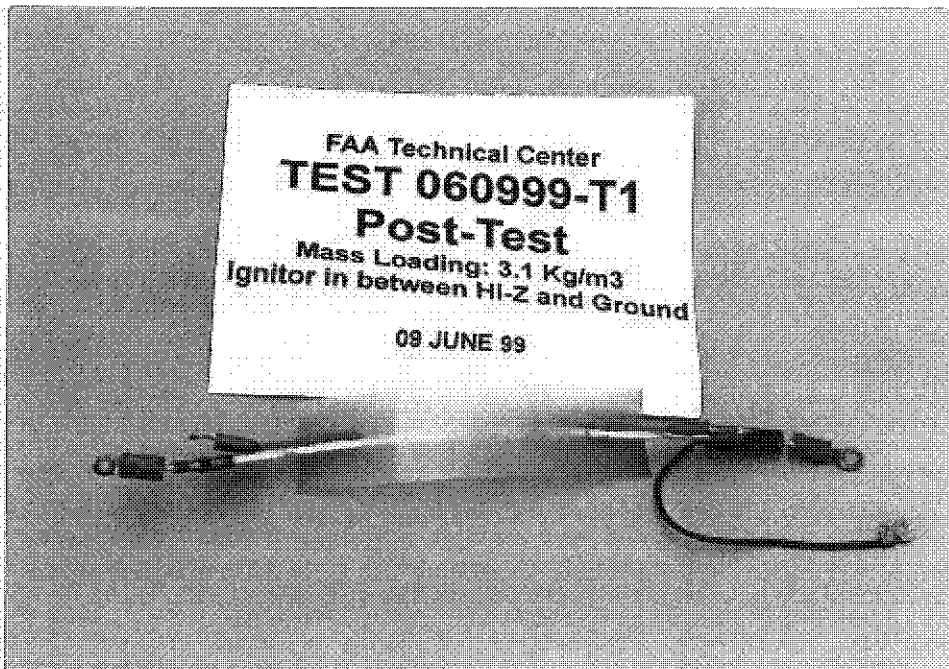
Maximum test container pressure: - psig

Initial fuel temperature (average of two): 83 °F

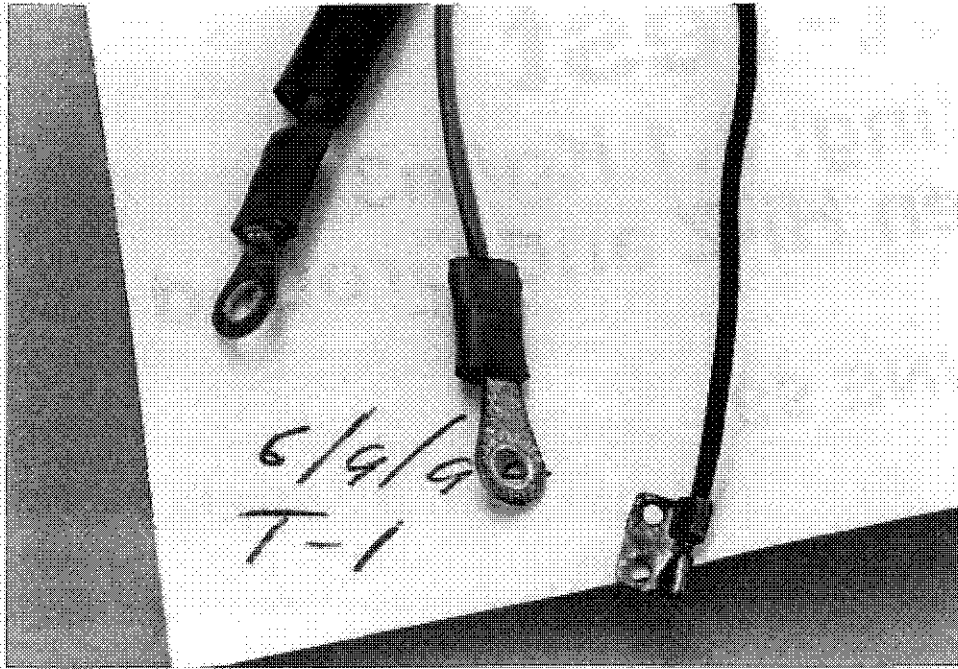
Fuel temperature at time of ignition (average of two): 190 °F

Elapsed time during fuel heating: 55 minutes

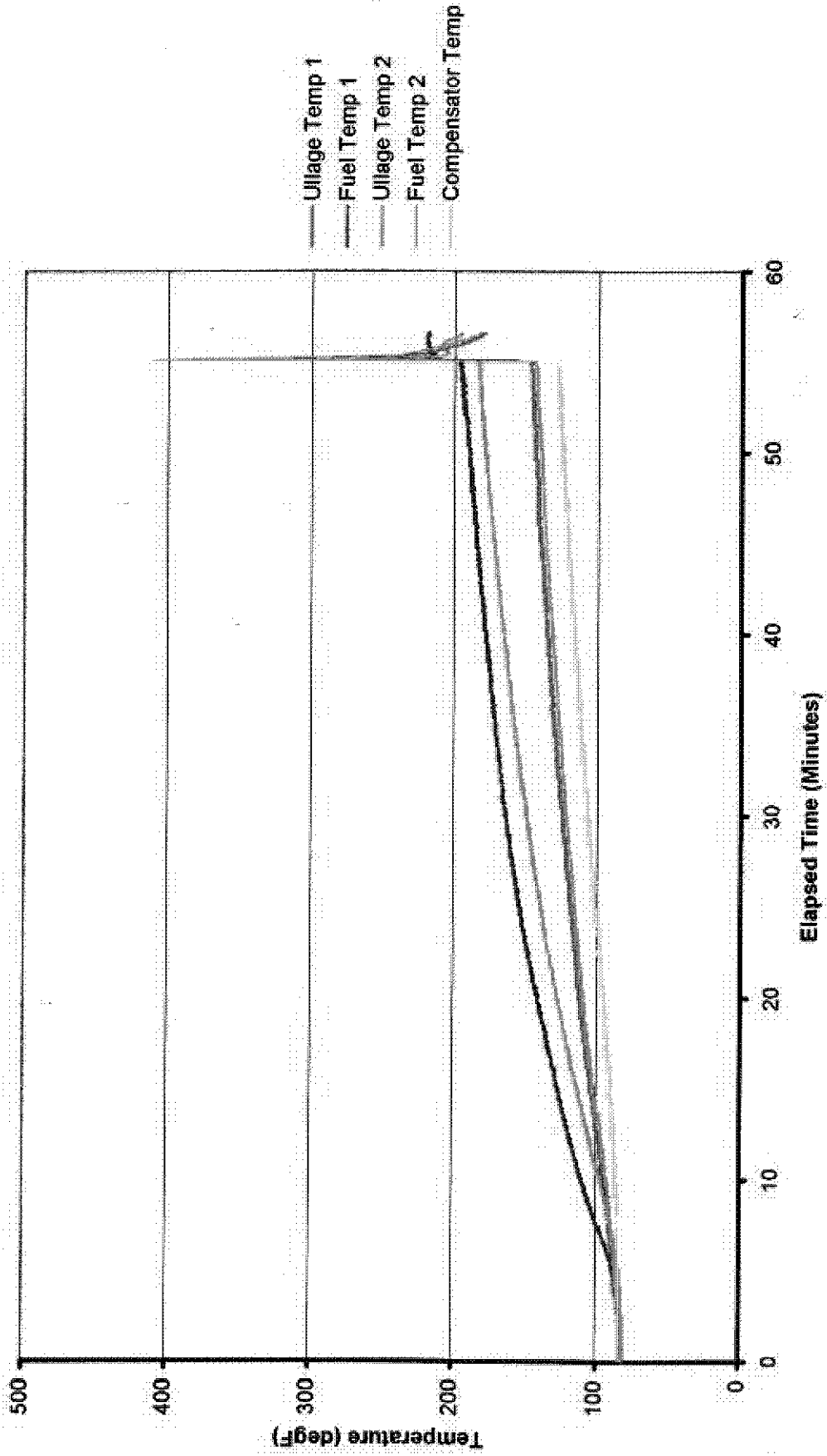
Comments:



Test 3 continued



Test 3 060999T1
Temperature History



Test 4

Date: 9-JUN-99

Test Identification: 060999T2

Ignition location: 1/2-inch from compensator terminal block, near ground screw

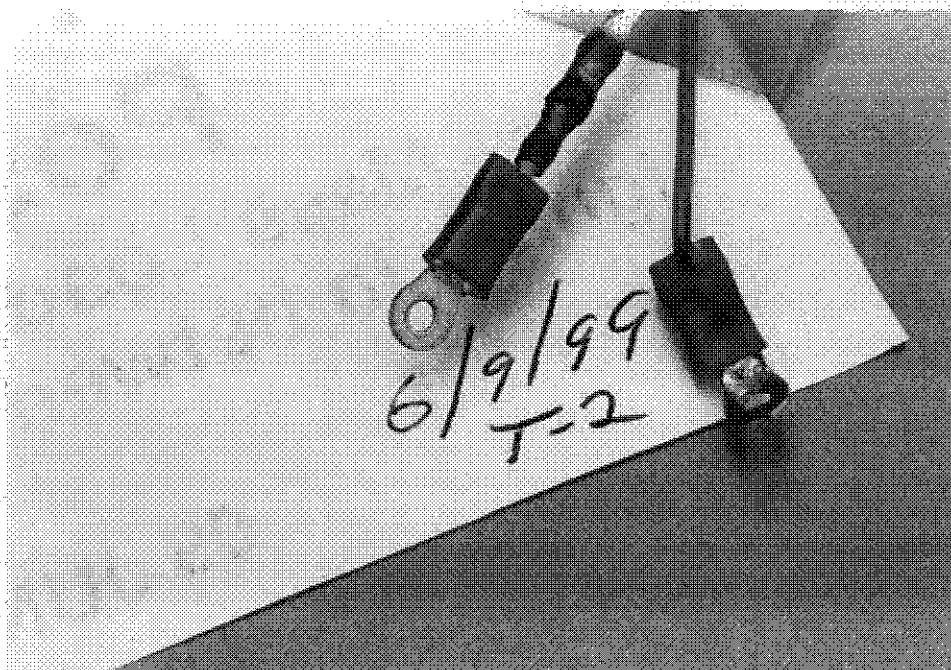
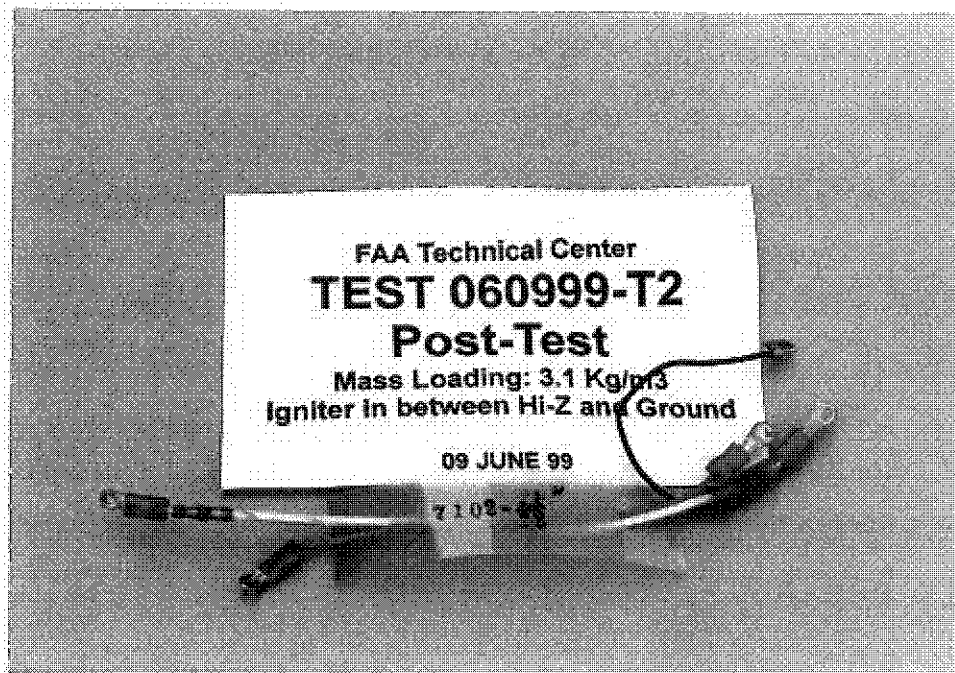
Maximum test container pressure: - psig

Initial fuel temperature (average of two): 89 °F

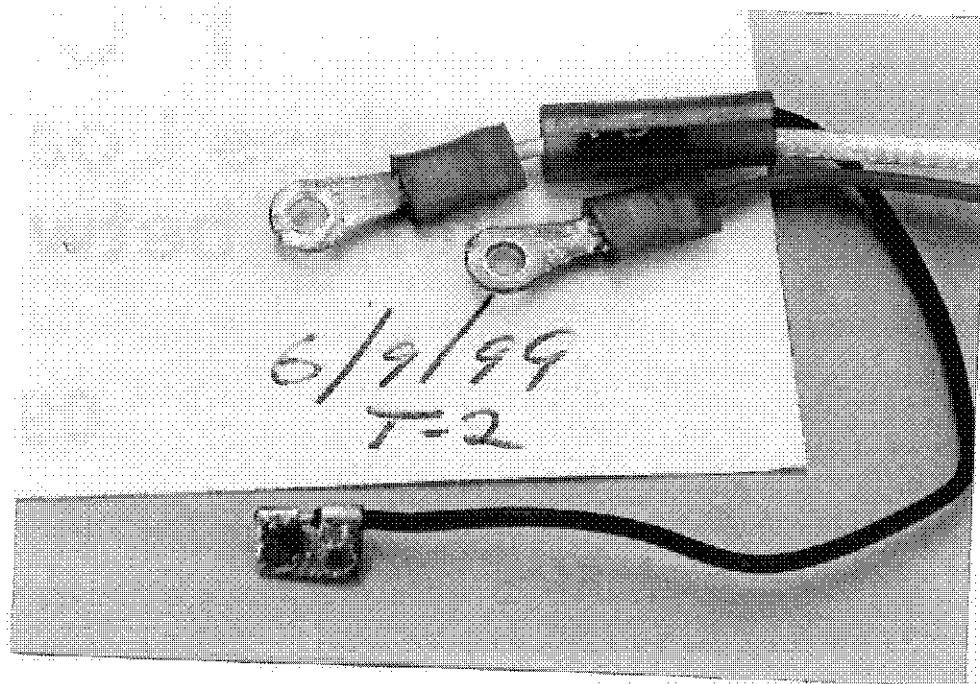
Fuel temperature at time of ignition (average of two): 177 °F

Elapsed time during fuel heating: 50 minutes

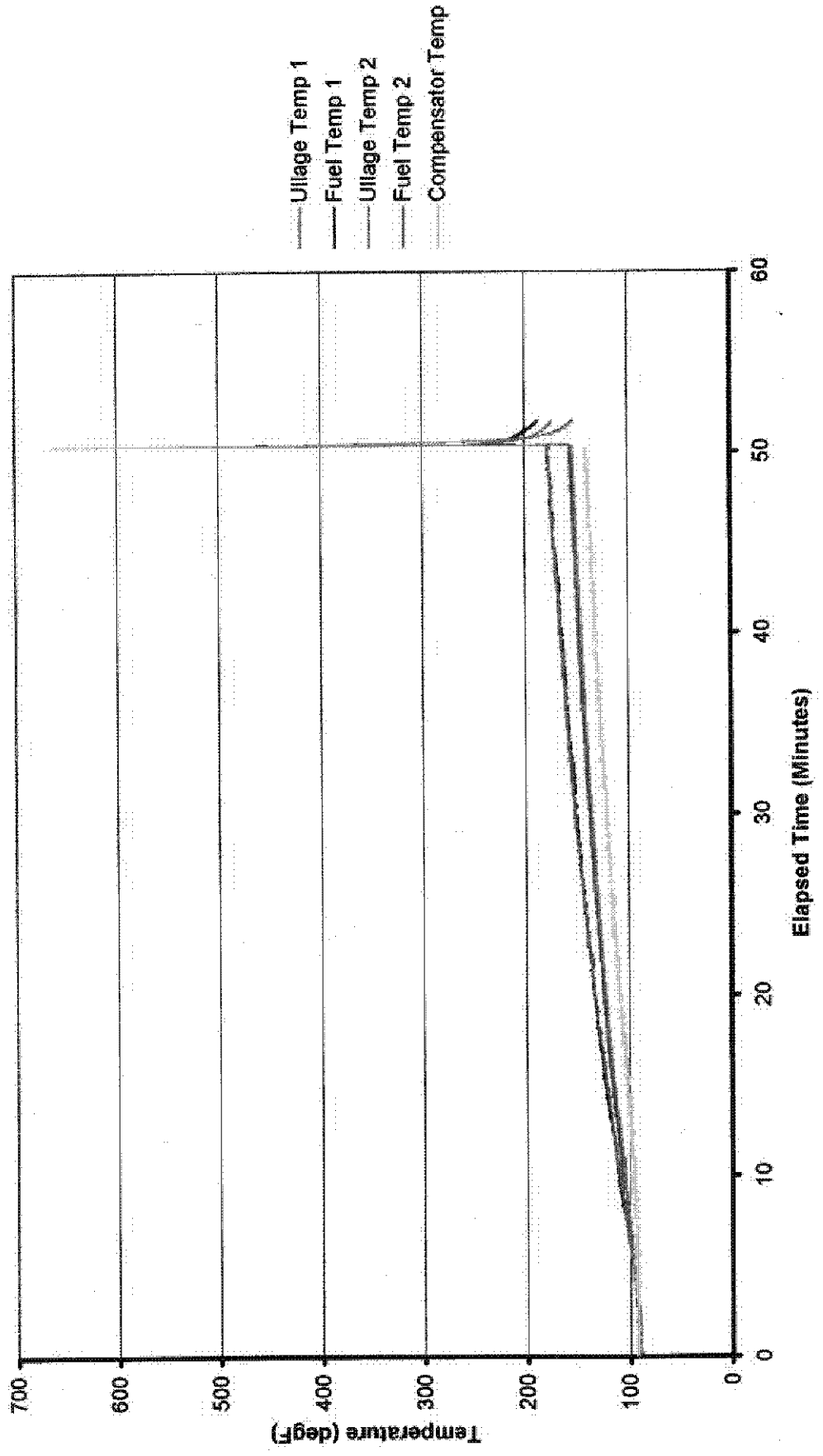
Comments:



Test 4 continued



Test 4 060999T2
Temperature History



Test 5

Date: 10-JUN-99

Test Identification: 061099T1

Ignition location: 1/2-inch from compensator terminal block, near ground screw

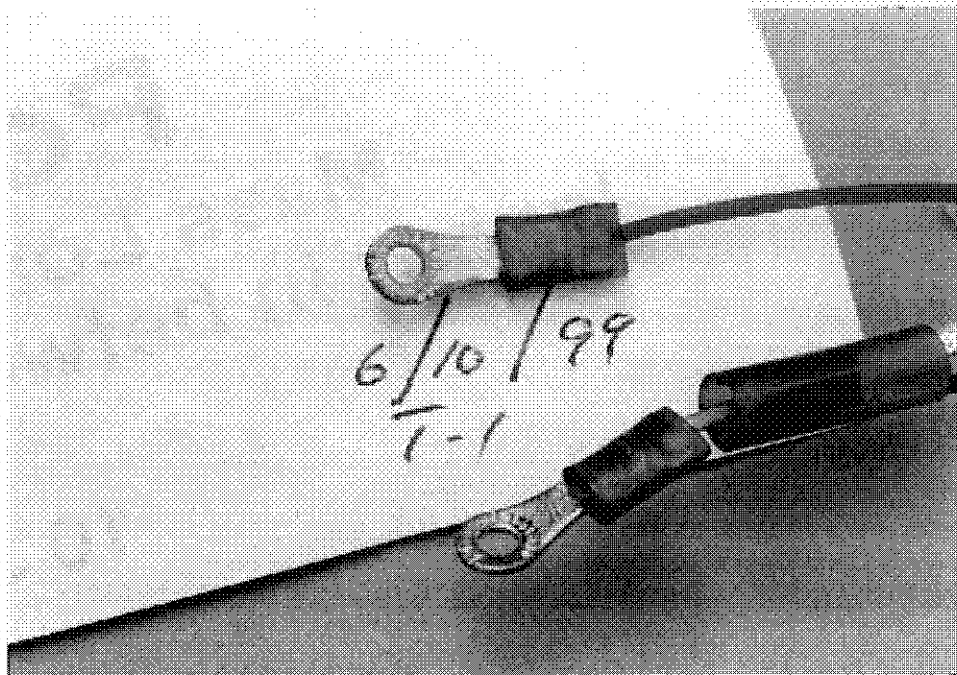
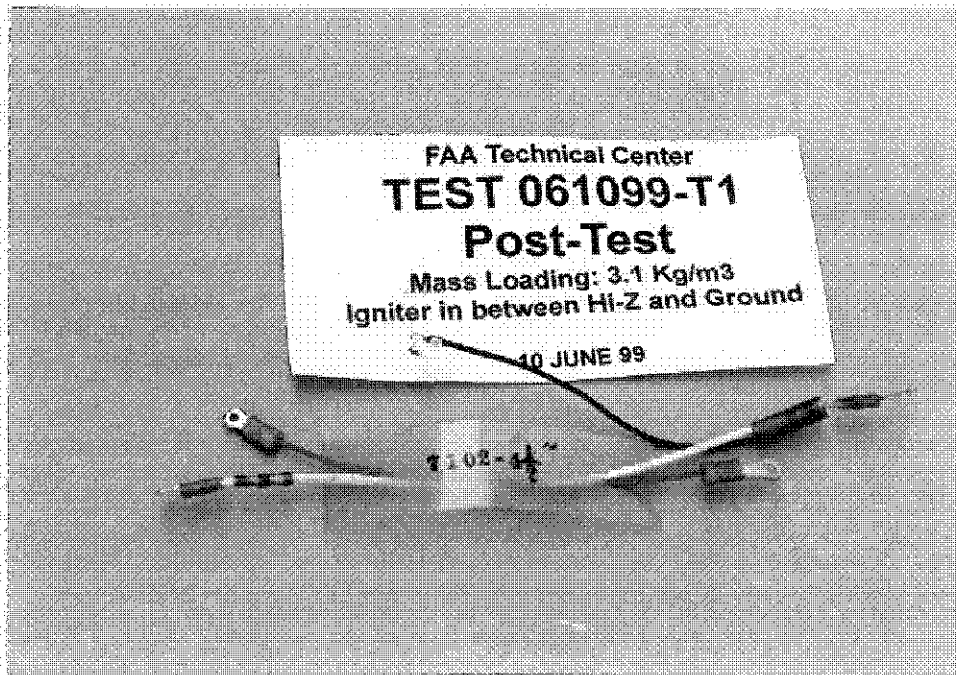
Maximum test container pressure: - psig

Initial fuel temperature (average of two): 79 °F

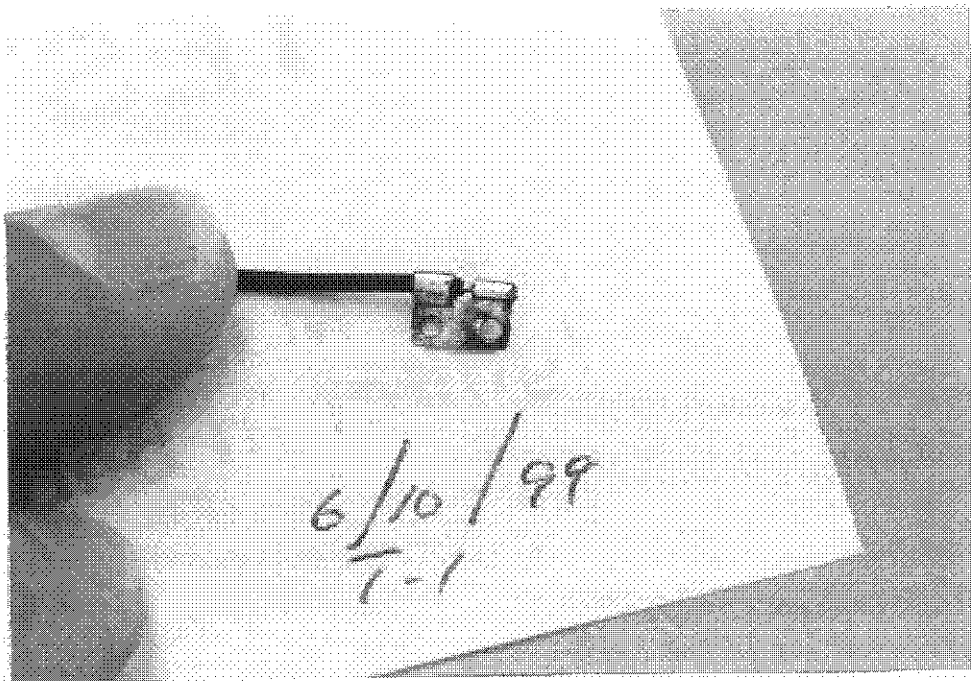
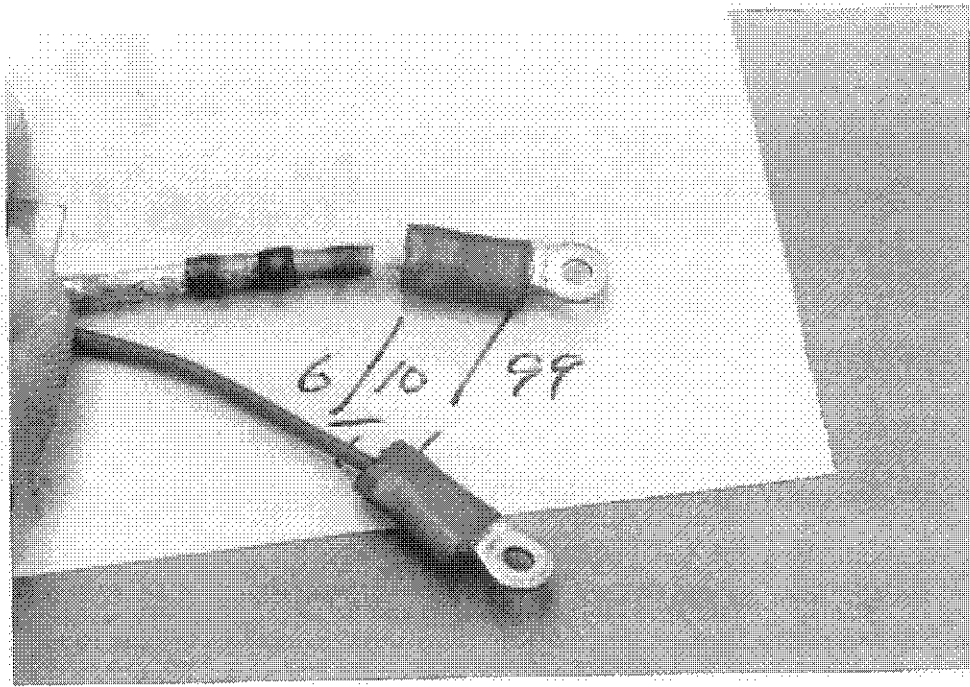
Fuel temperature at time of ignition (average of two): 182 °F

Elapsed time during fuel heating: 56 minutes

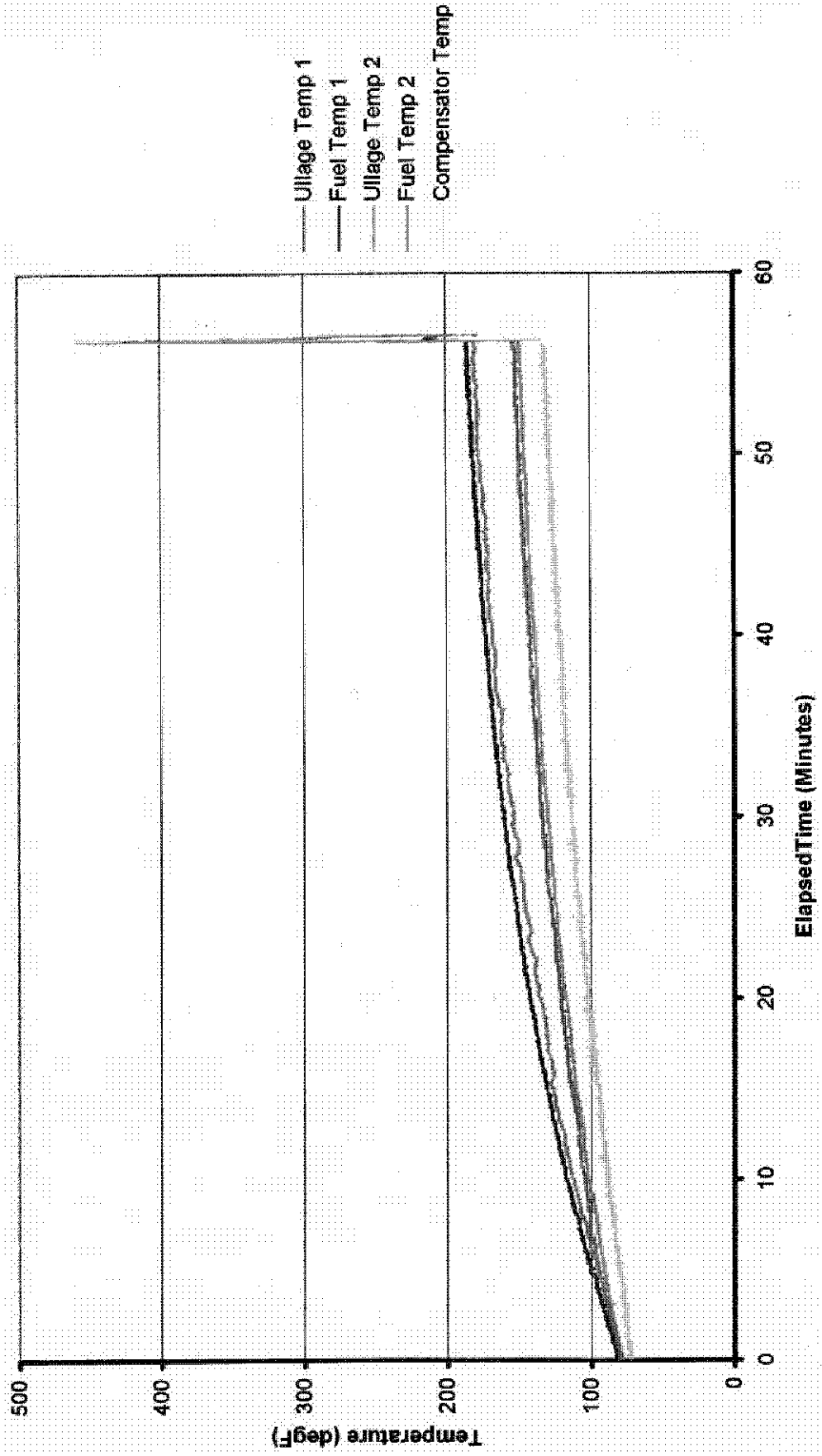
Comments:



Test 5 continued



Test 5 061099T1
Temperature History



Test 6

Date: 11-JUN-99

Test Identification: 061199T1

Ignition location: under compensator

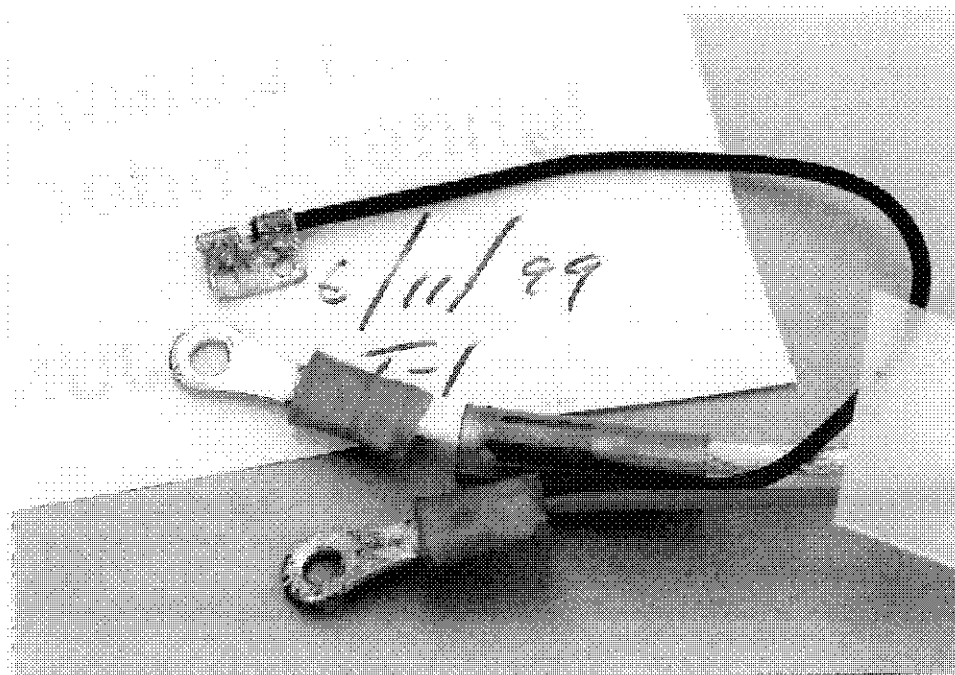
Maximum test container pressure: - psig

Initial fuel temperature (average of two): 79 °F

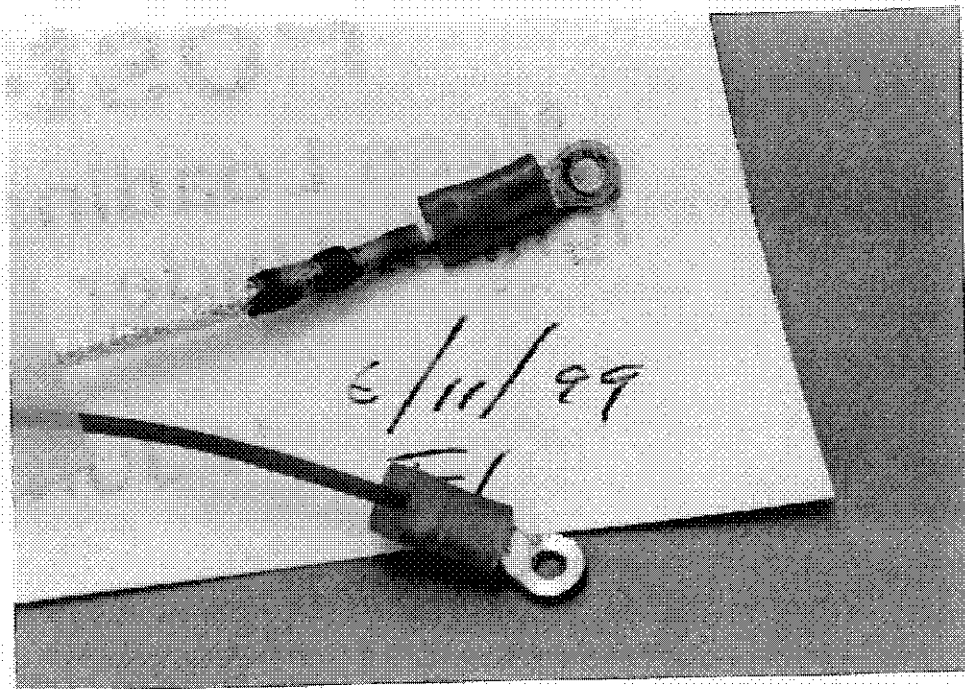
Fuel temperature at time of ignition (average of two): 171 °F

Elapsed time during fuel heating: 75 minutes

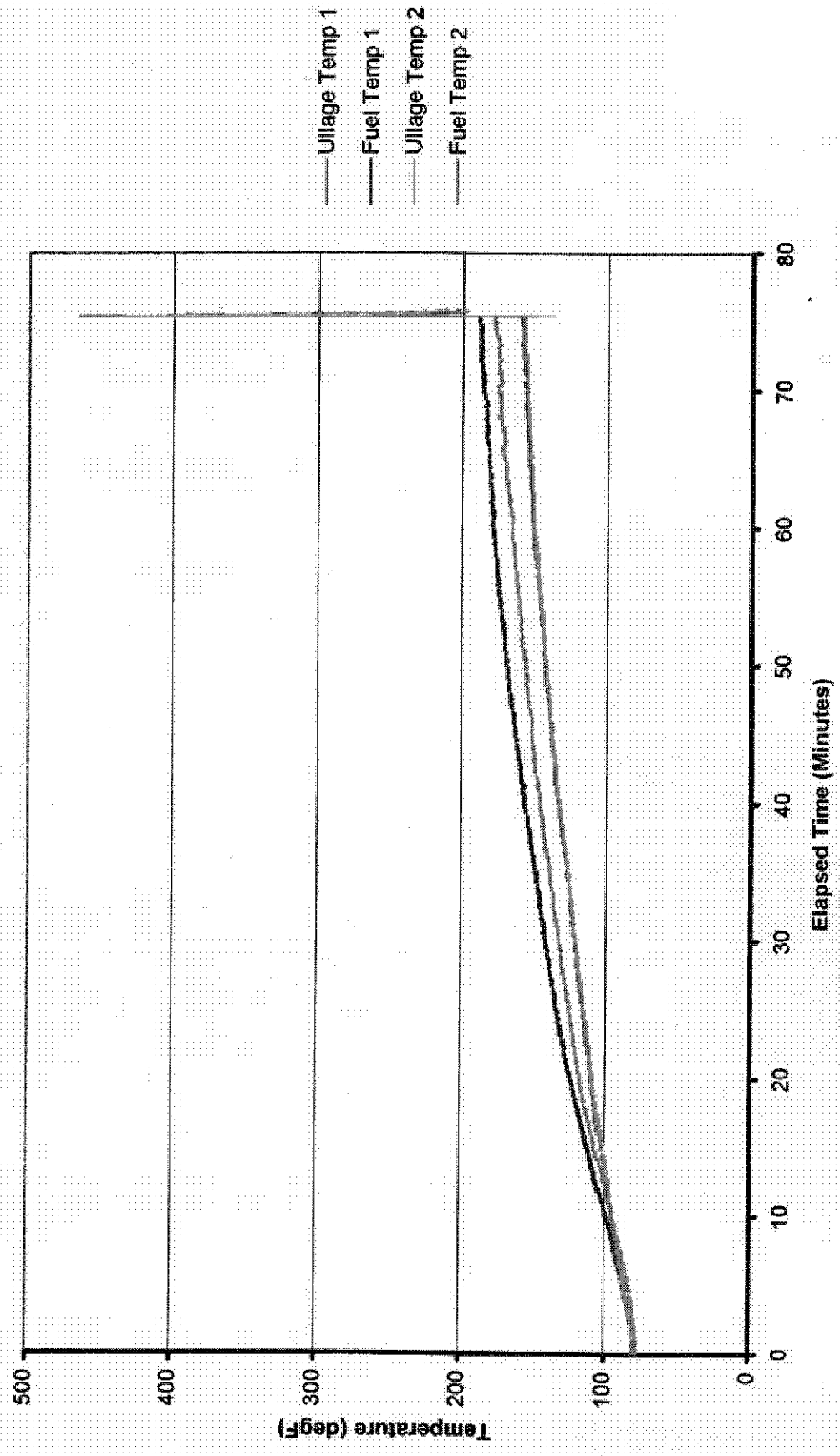
Comments:



Test 6 continued



**Test 6 061199T1
Temperature History**



Test 8

Date: 14-JUN-99

Test Identification: 061499T1

Ignition location: under compensator

Maximum test container pressure: - psig

Initial fuel temperature (average of two): 77 °F

Fuel temperature at time of ignition (average of two): 173 °F

Elapsed time during fuel heating: 75 minutes

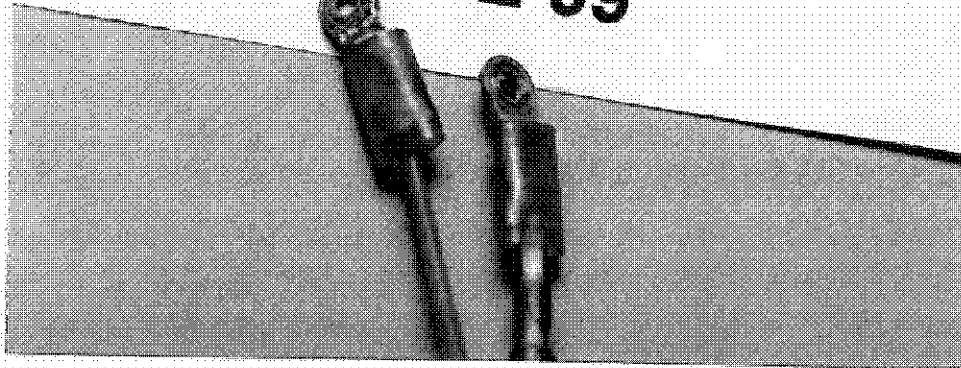
Comments:



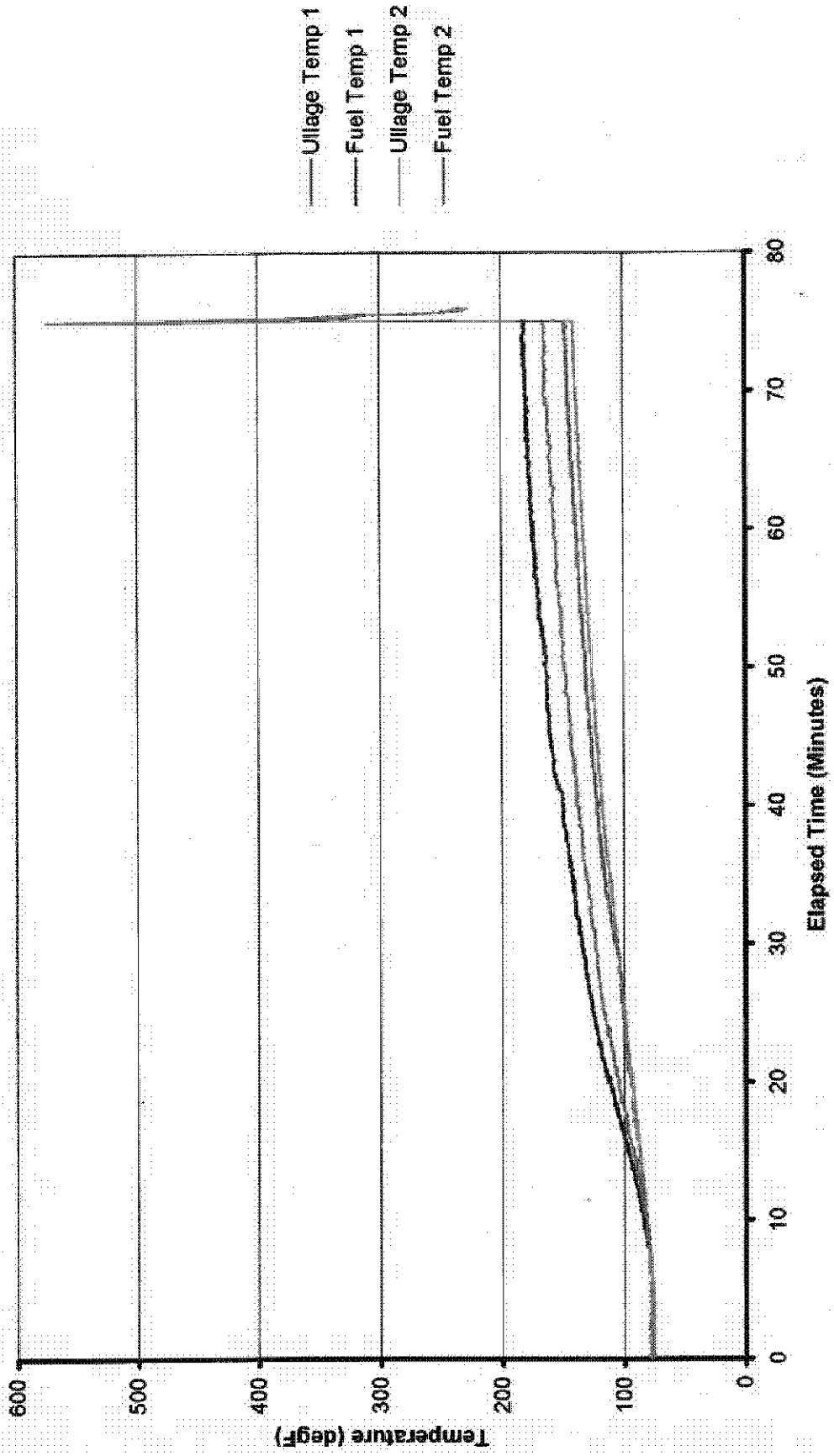
Test 8 continued

Compensato
ISS Loading: 3.1 Kg/m³

14 JUNE 99



Test 8 061499T1
Temperature History



Test 9

Date: 15-JUN-99

Test Identification: 061599T1

Ignition location: under compensator, compensator was installed 0.375-inch from the floor

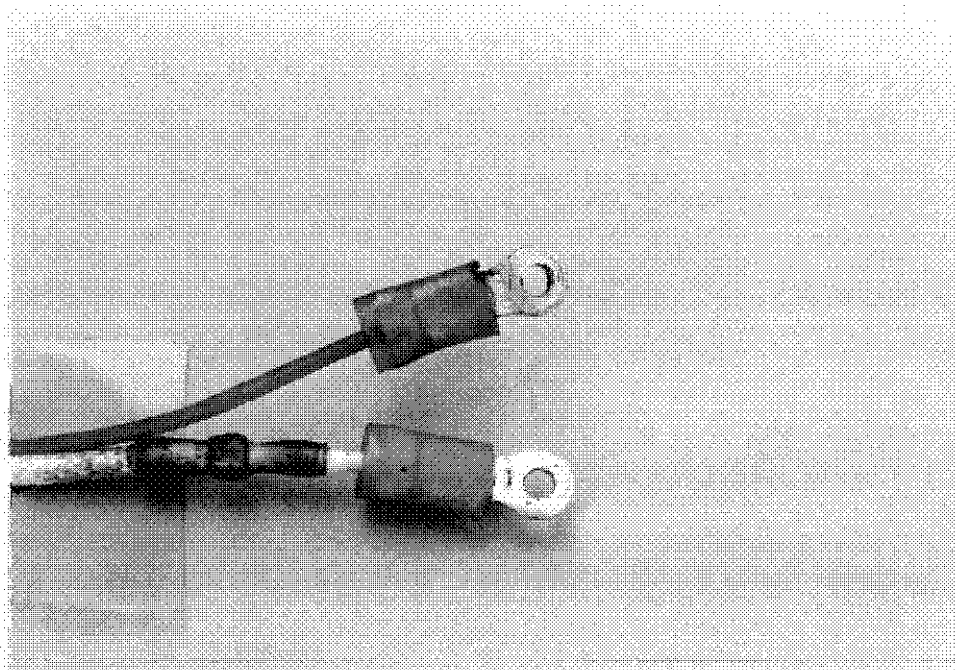
Maximum test container pressure: - psig

Initial fuel temperature (average of two): 79 °F

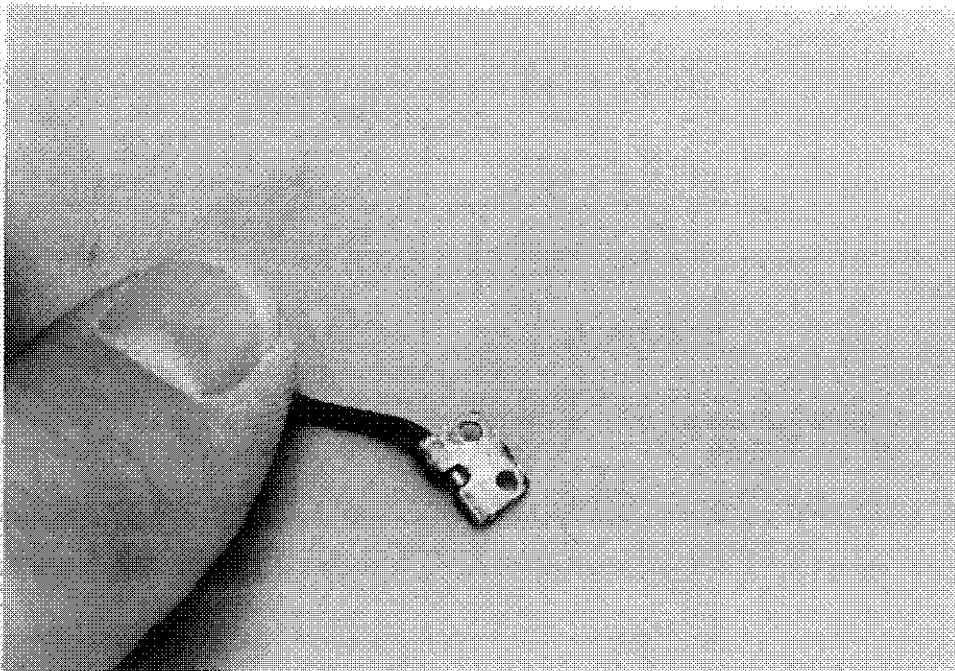
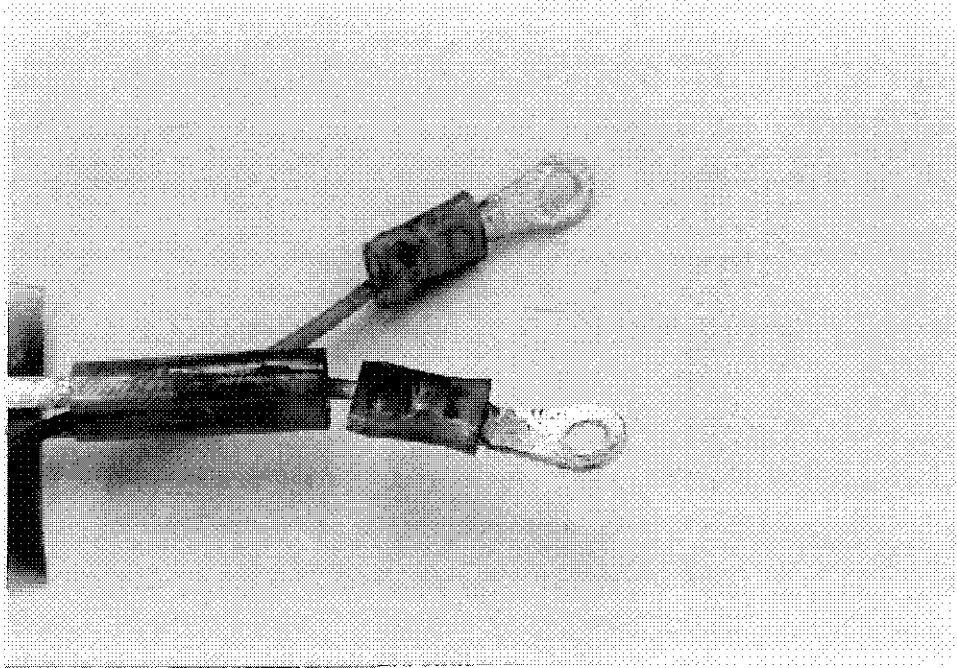
Fuel temperature at time of ignition (average of two): 184 °F

Elapsed time during fuel heating: 70 minutes

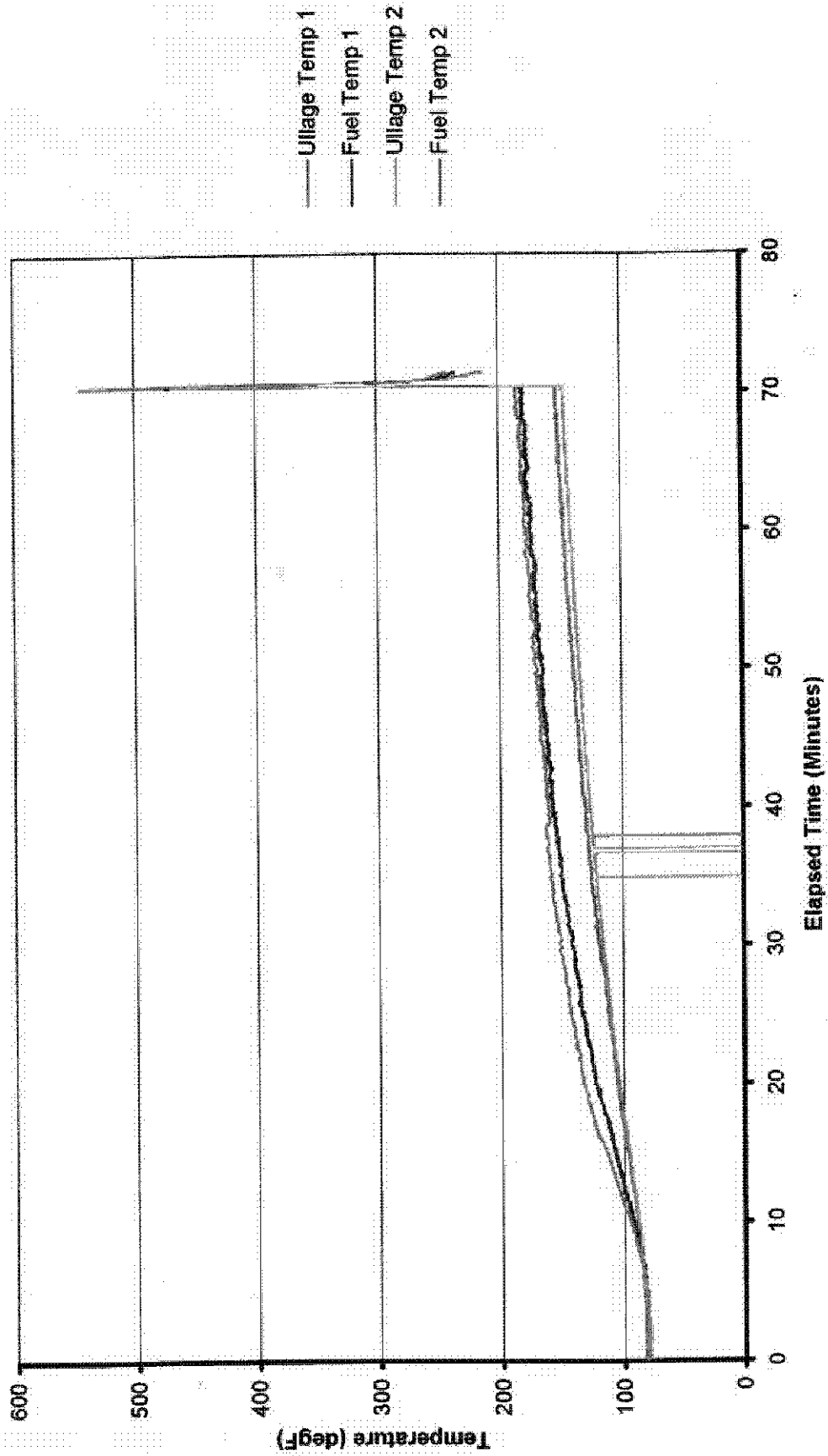
Comments: Unexpected explosion (Determined later to be caused by relay malfunction)



Test 9 continued



Test 9 061599T1
Temperature History



Test 11

Date: 17-JUN-99

Test Identification: 061799T1

Ignition location: under compensator, compensator was installed 0.375-inch from the floor

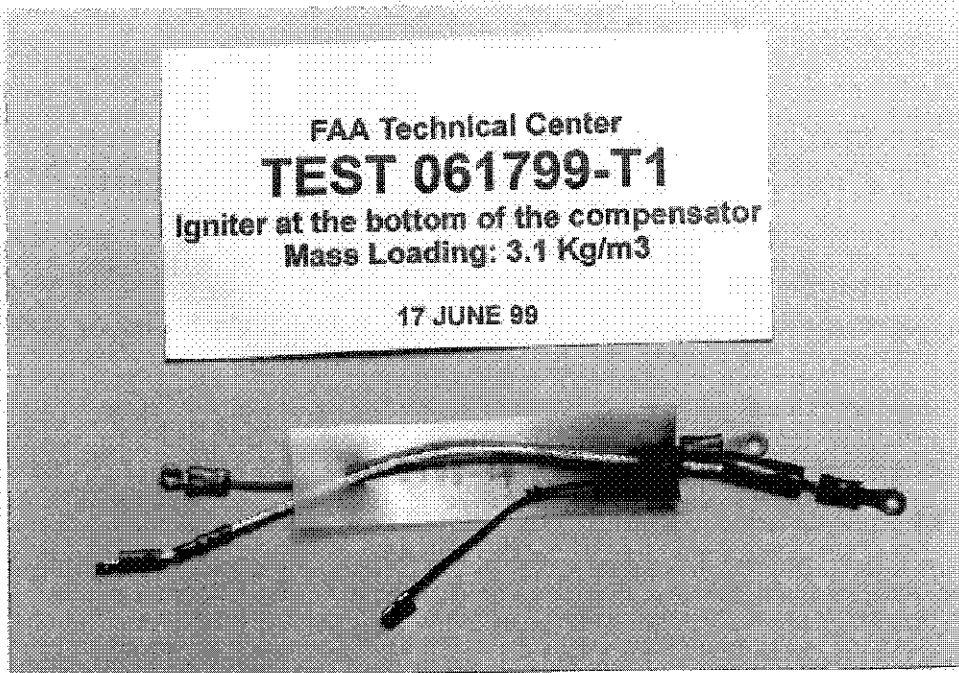
Maximum test container pressure: - psig

Initial fuel temperature (average of two): 99 °F

Fuel temperature at time of ignition (average of two): 184 °F

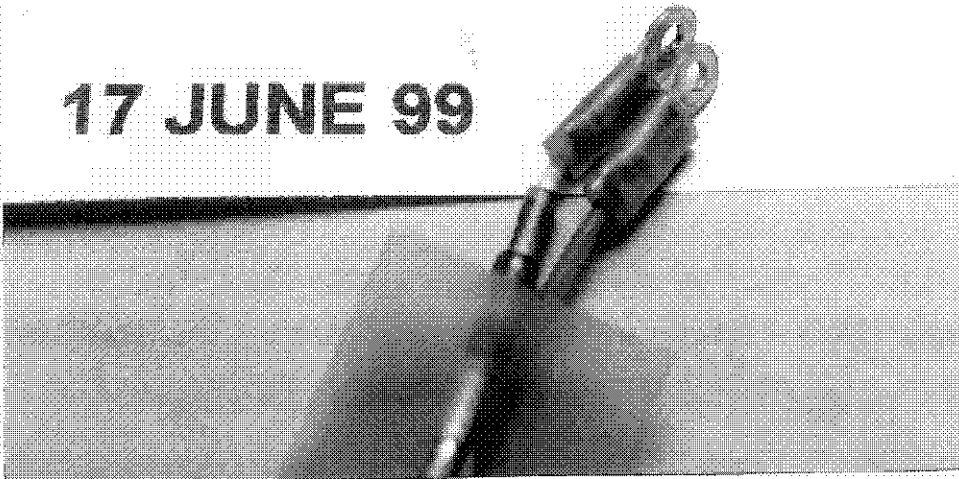
Elapsed time during fuel heating: 94 minutes

Comments: Unexpected explosion due to relay malfunction. Problem corrected.



bottom of the compensator
Loading: 3.1 Kg/m3

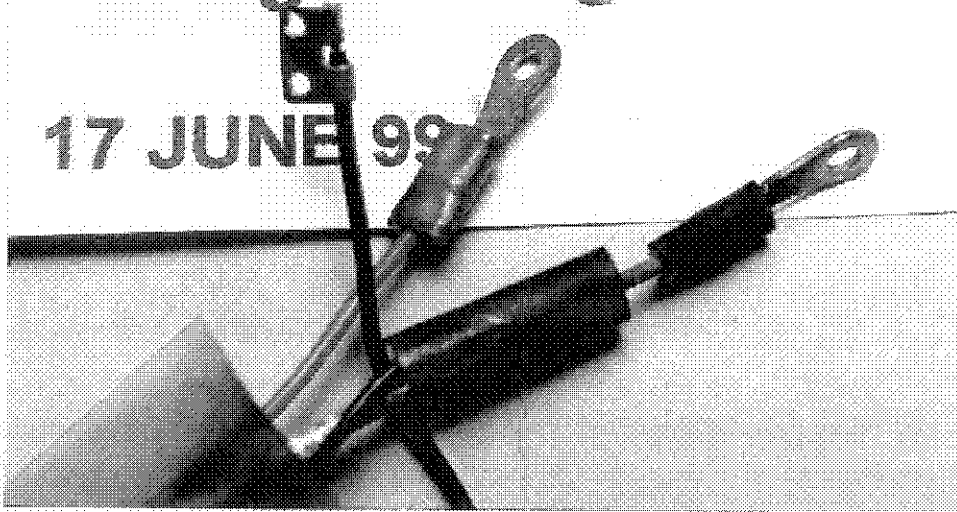
17 JUNE 99



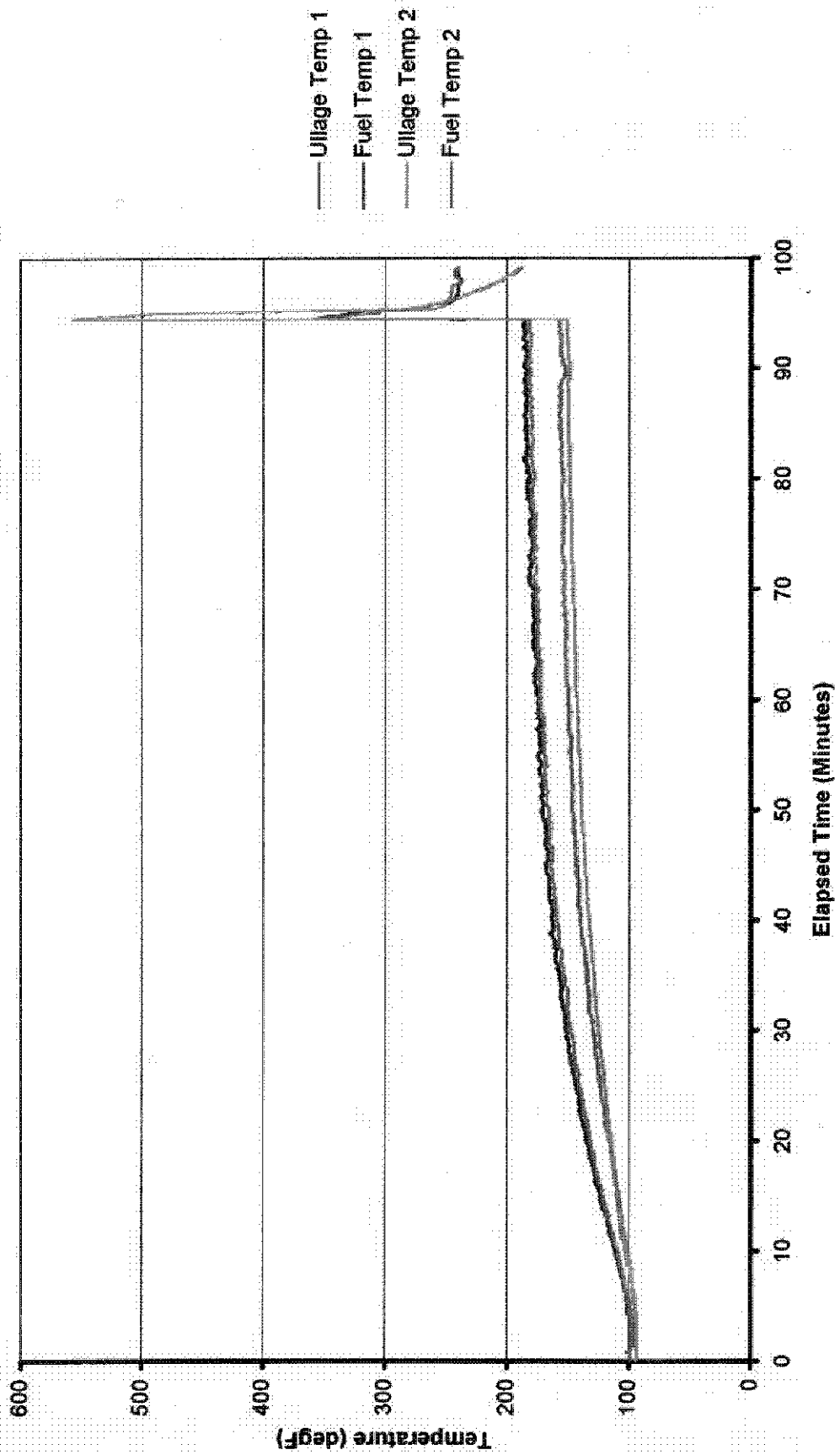
Test 11 continued

Bottom of the compensa
loading: 3.1 Kg/m³

17 JUNE 99



Test 11 061799T1
Temperature History



Test 12

Date: 18-JUN-99

Test Identification: 061899T1

Ignition location: under compensator, compensator was installed 0.375-inch from the floor

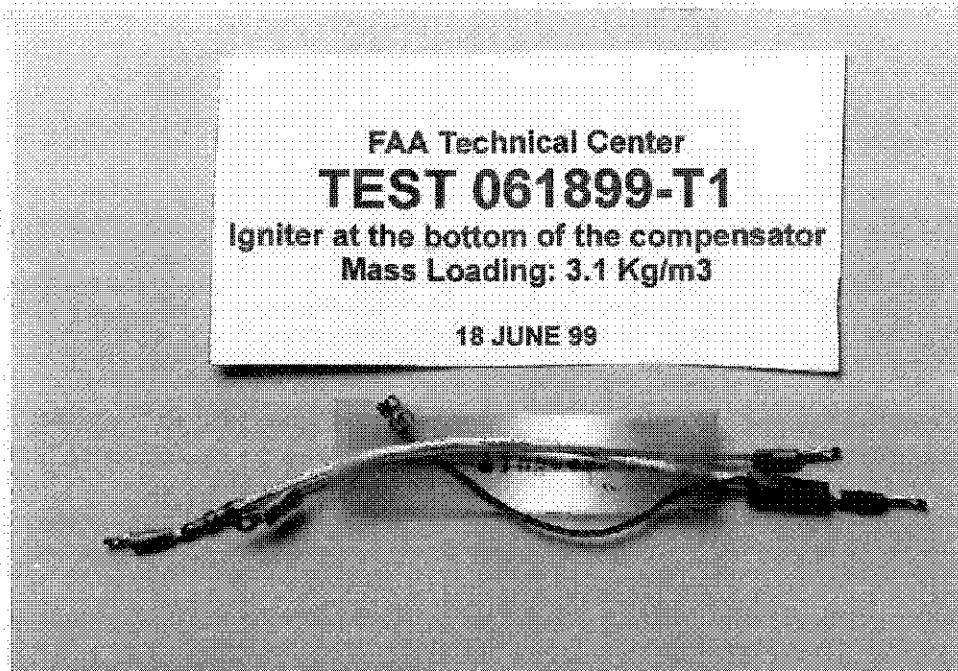
Maximum test container pressure: - psig

Initial fuel temperature (average of two): 76 °F

Fuel temperature at time of ignition (average of two): 185 °F

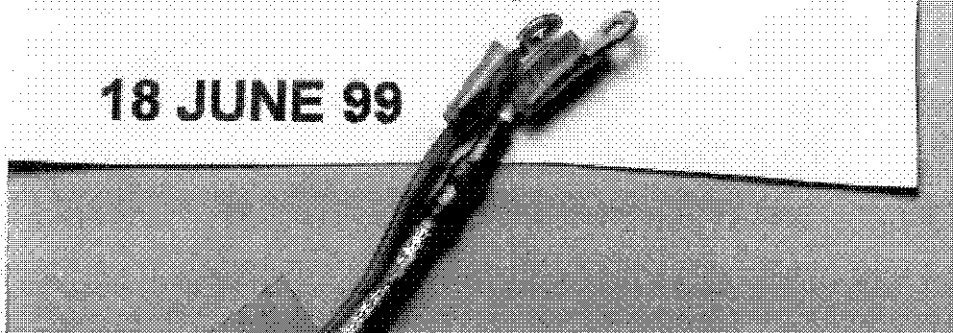
Elapsed time during fuel heating: 70 minutes

Comments: High speed film footage shows combustion flamefront propagate upwards through the inside of compensator tube, and emerge from the top opening.



FAA Technical Center
TEST 061899-T1
Igniter at the bottom of the compensator
Mass Loading: 3.1 Kg/m3

18 JUNE 99



Test 12 continued

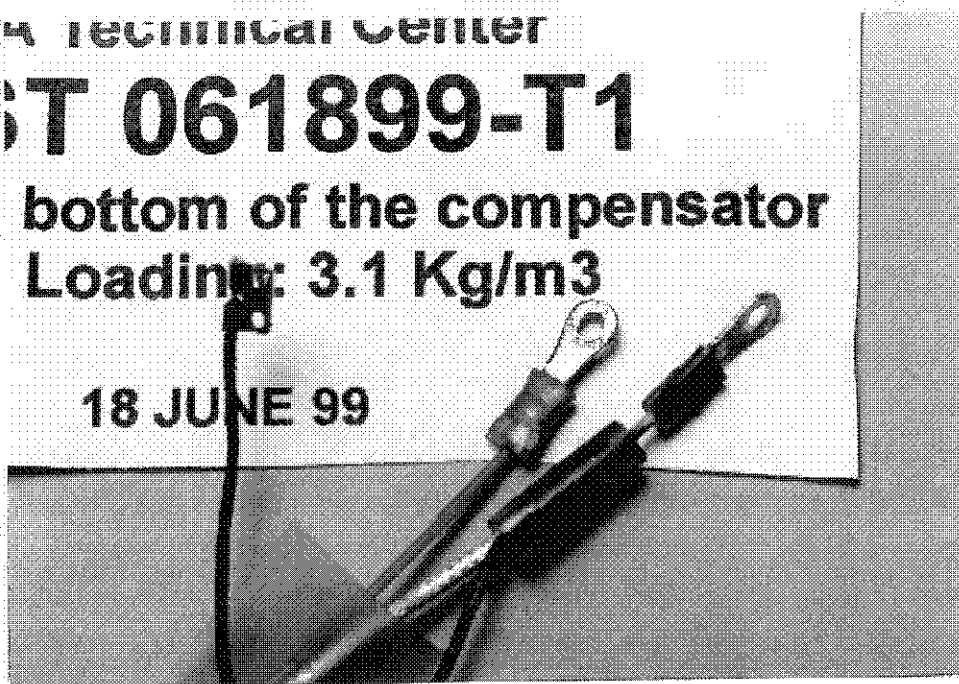
Technical Center

BT 061899-T1

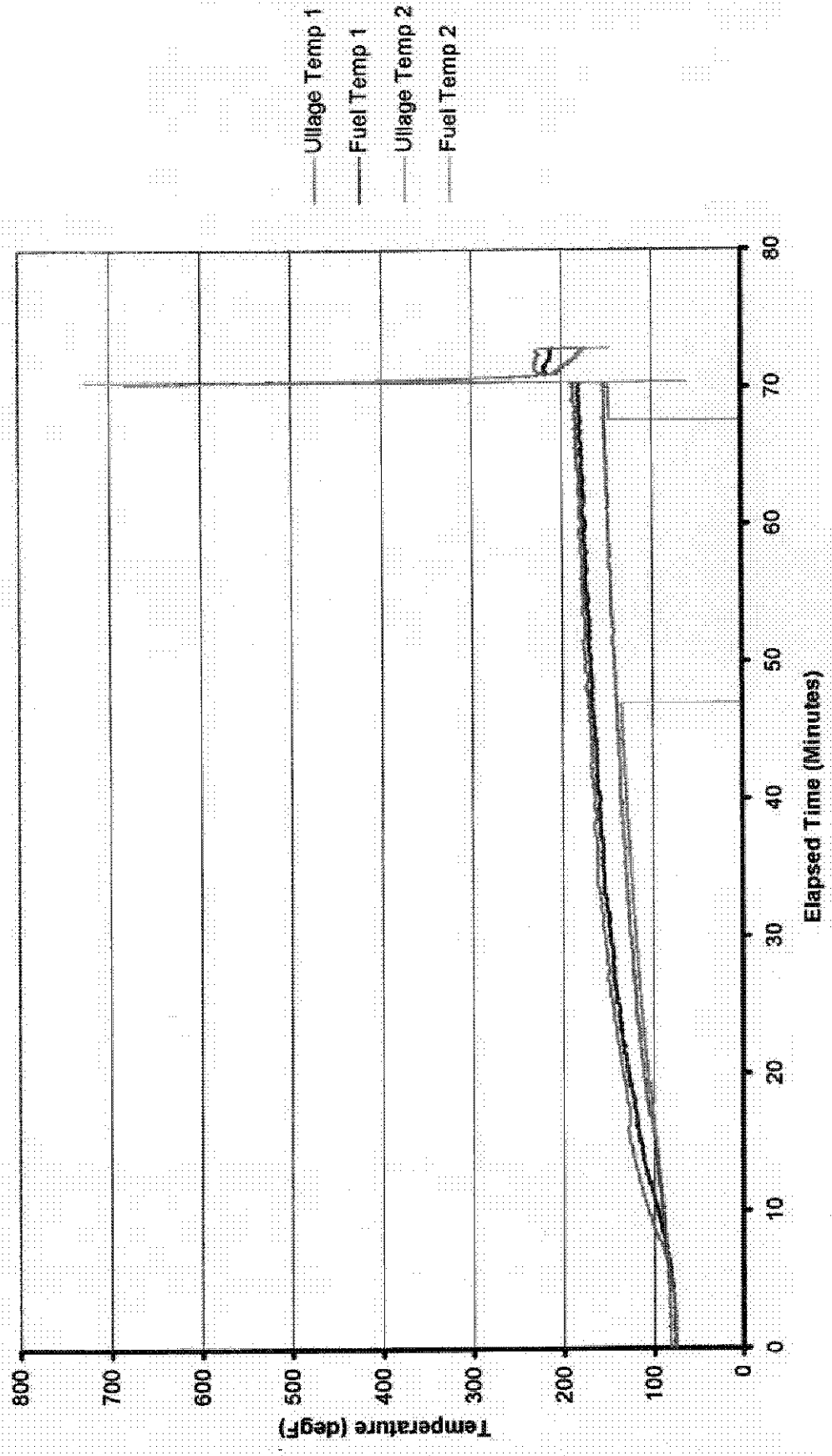
bottom of the compensator

Loading: 3.1 Kg/m³

18 JUNE 99



Test 12 061899T1
Temperature History



Test 13

Date: 21-JUN-99

Test Identification: 062199T1

Ignition location: under compensator, compensator was installed 0.375-inch from the floor

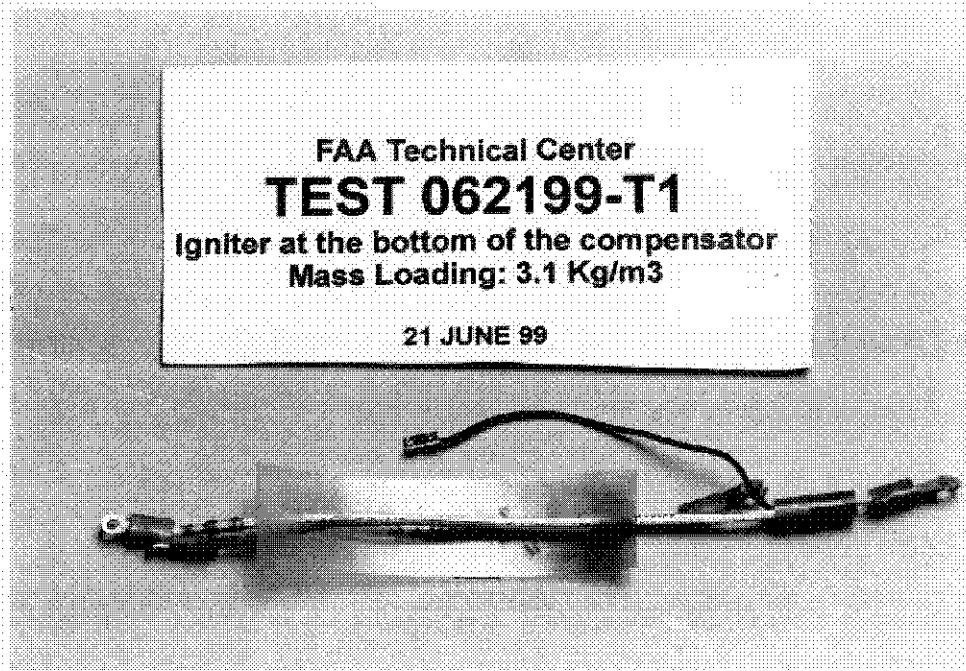
Maximum test container pressure: - psig

Initial fuel temperature (average of two): 76 °F

Fuel temperature at time of ignition (average of two): 192 °F

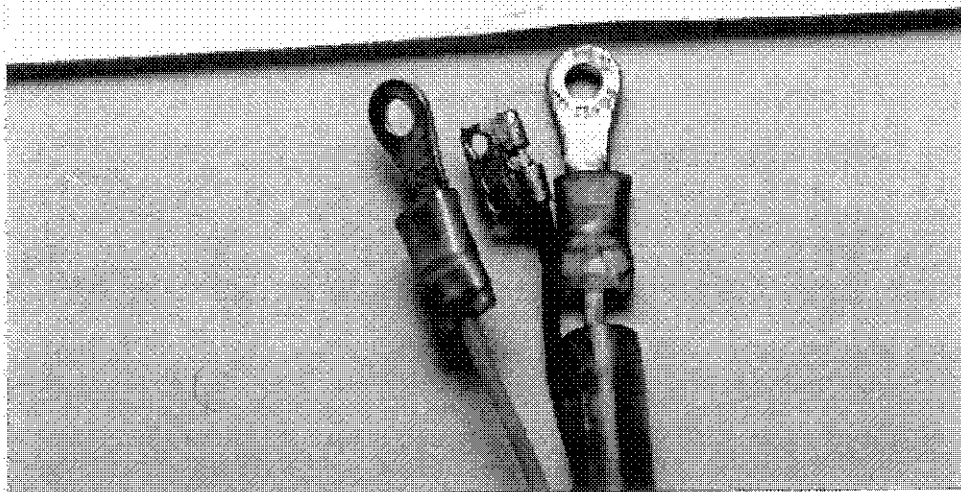
Elapsed time during fuel heating: 69 minutes

Comments: The desired fuel to air ratio was not reached after running the test for more than 1 hour. Even though the hydrocarbon analyzer did not indicate an explosive mixture, an explosion occurred after activating the igniter. The hydrocarbon analyzer was not counting the correct hydrocarbon concentration due to the condensation of fuel in the line section that was not heated. Problem corrected by moving the heated line inside the vessel, and shortening and insulating better the unheated line section.



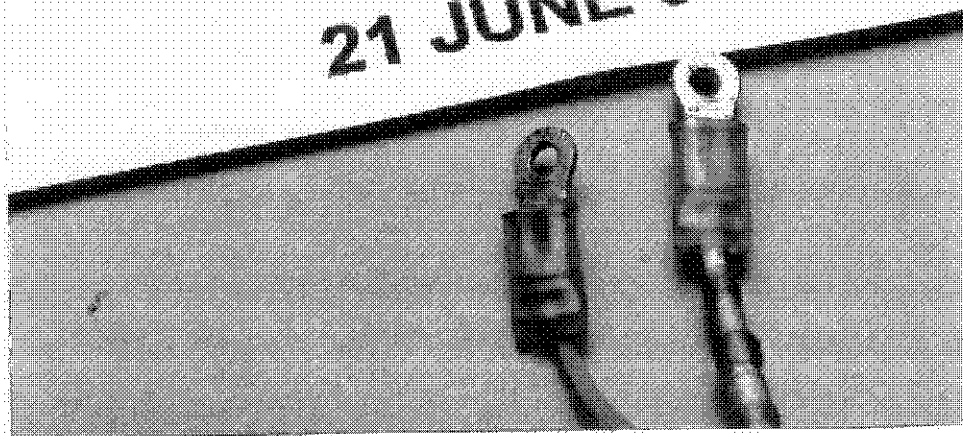
Test 13 continued

21 JUNE 99

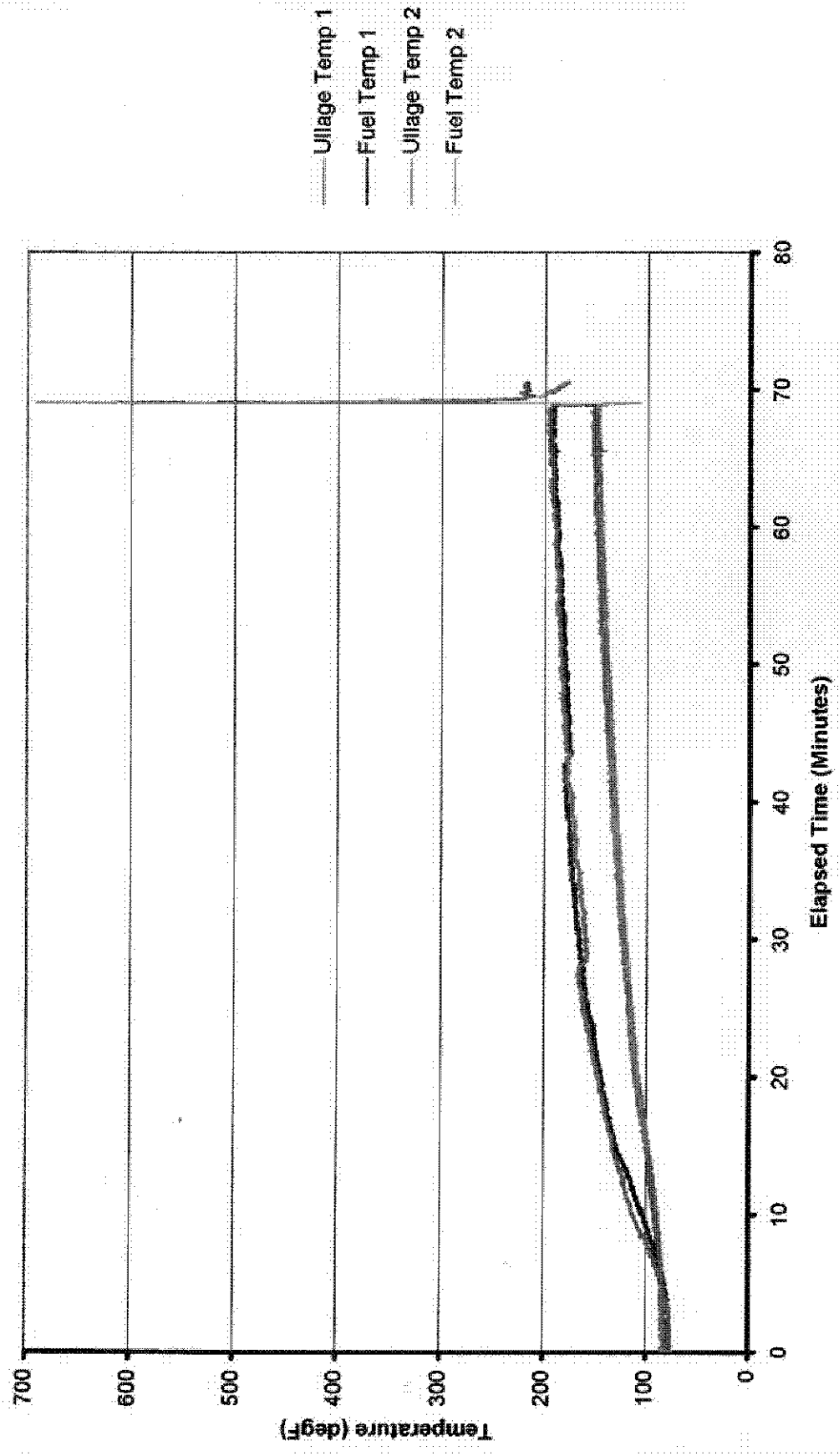


the bottom
mass Loading: 3.1 Kg/m

21 JUNE 99



Test 13 062199T1
Temperature History



Test 14

Date: 22-JUN-99

Test Identification: 062299T1

Ignition location: 1/2-inch from compensator terminal block, near ground screw

Maximum test container pressure: - psig

Initial fuel temperature (average of two): 80 °F

Fuel temperature at time of ignition (average of two): 201 °F

Elapsed time during fuel heating: 62 minutes

Comments: High speed film footage



away from terminal block
Mass Loading: 3.1 Kg/m3

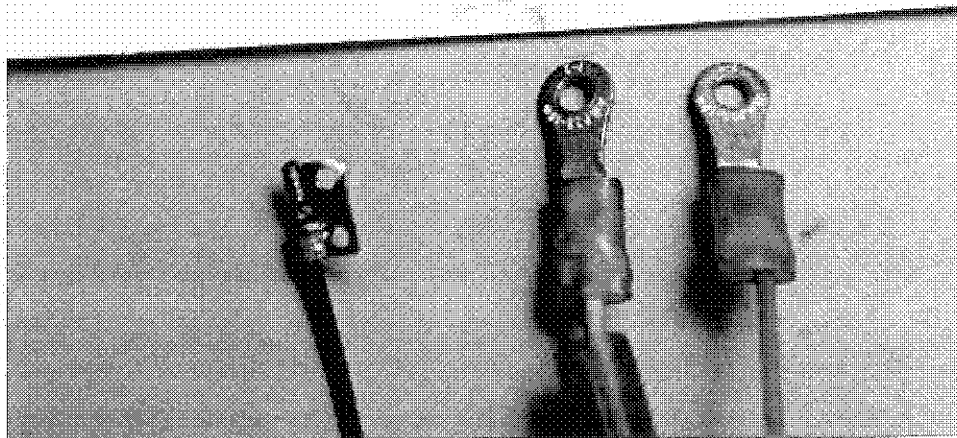
22 JUNE 99



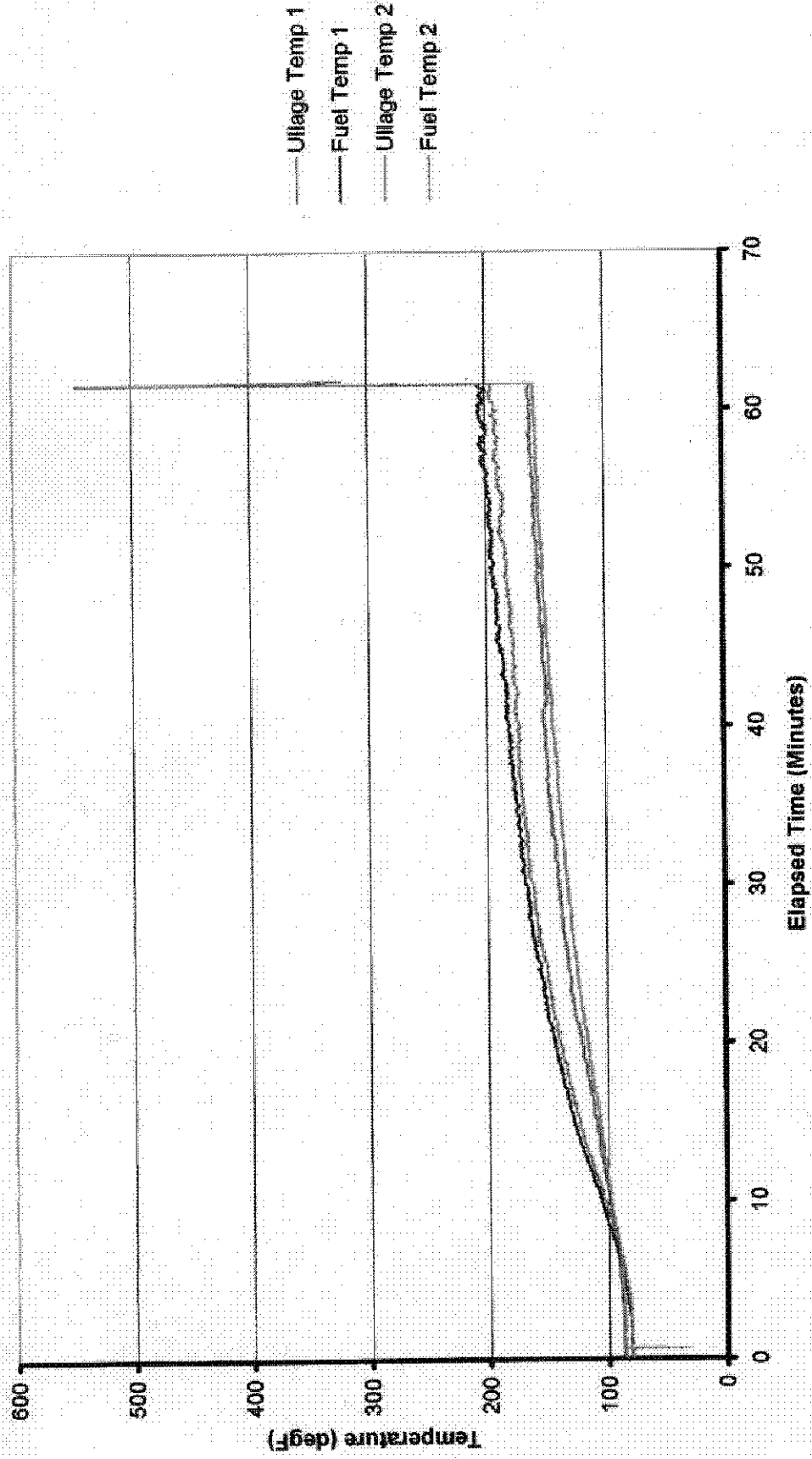
Test 14 continued

Mass Loading

22 JUNE 99



**Test 14 062299T1
Temperature History**



Test 15

Date: 22-JUN-99

Test Identification: 062299T2

Ignition location: 1' from compensator

Maximum test container pressure: 4 psig

Initial fuel temperature (average of two): 84 °F

Fuel temperature at time of ignition (average of two): 203 °F

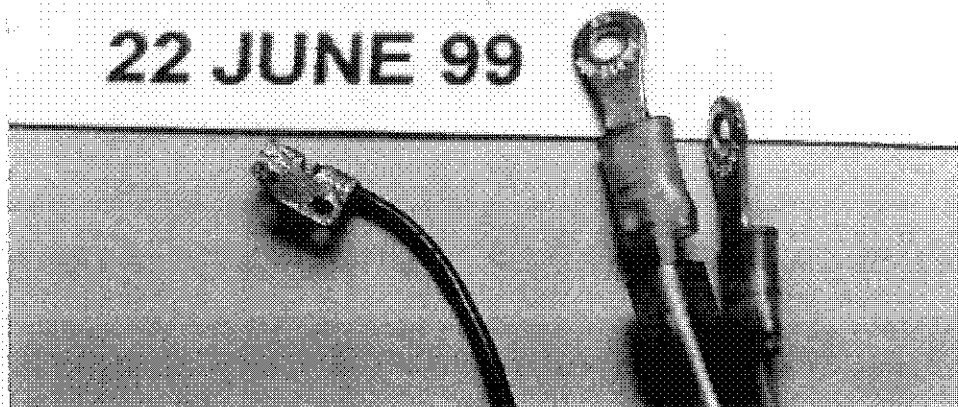
Elapsed time during fuel heating: 42 minutes

Comments: High speed film footage



ay from the compensat
Loading: 3.1 Kg/m³

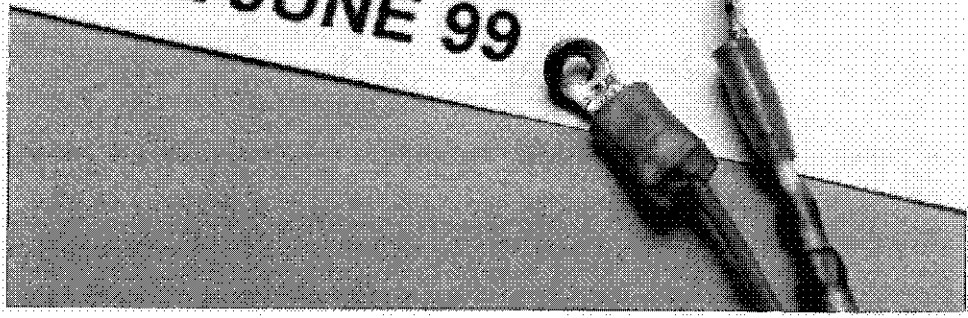
22 JUNE 99



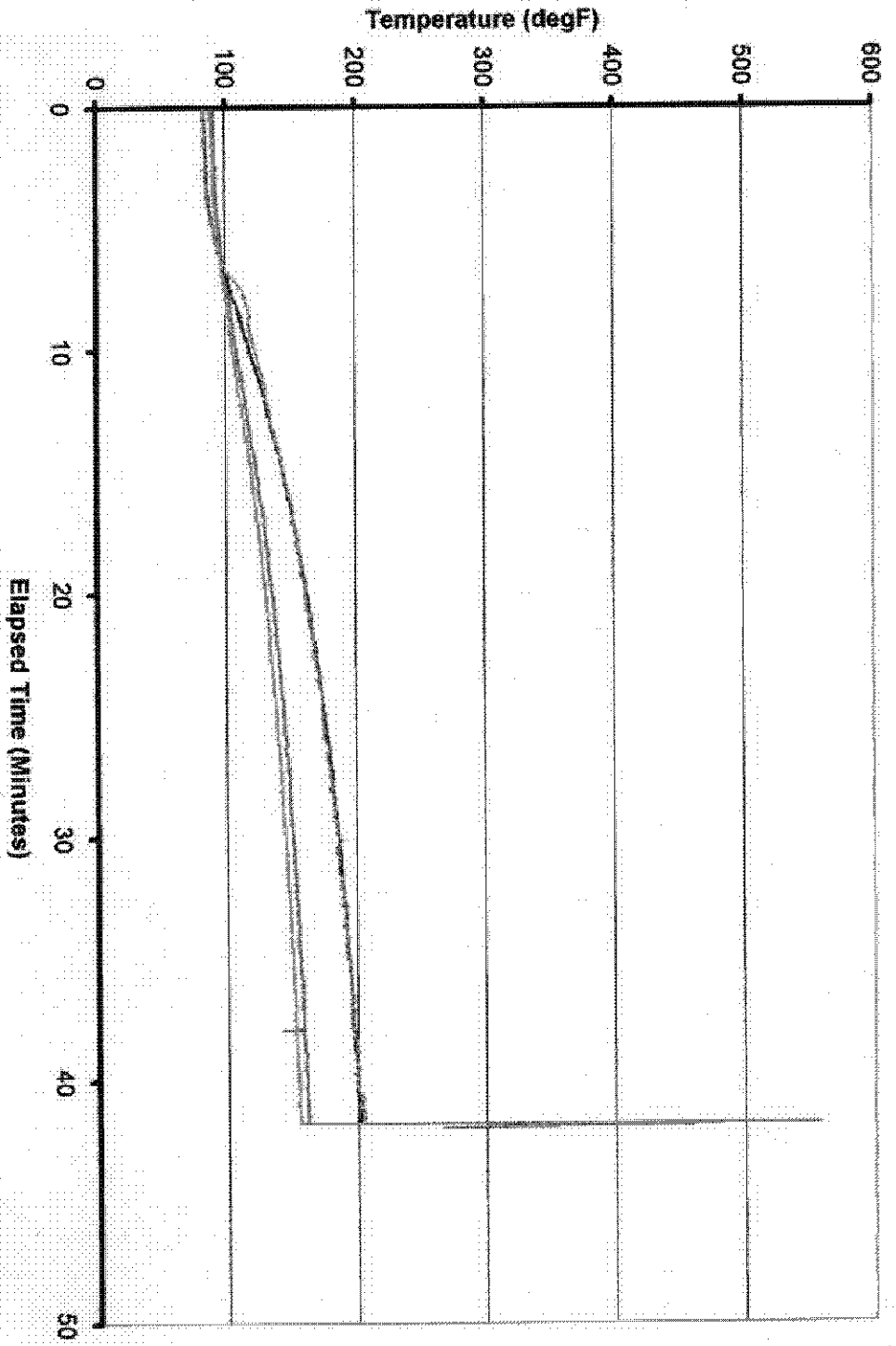
Test 15 continued

4499-T2
away from the compensa
ss Loading: 3.1 Kg/m³

22 JUNE 99



Test 15 062299T2
Temperature History



- Ullage Temp 1
- Fuel Temp 1
- Ullage Temp 2
- Fuel Temp 2

Test 16

Date: 23-JUN-99

Test Identification: 062399T1

Ignition location: on top of compensator

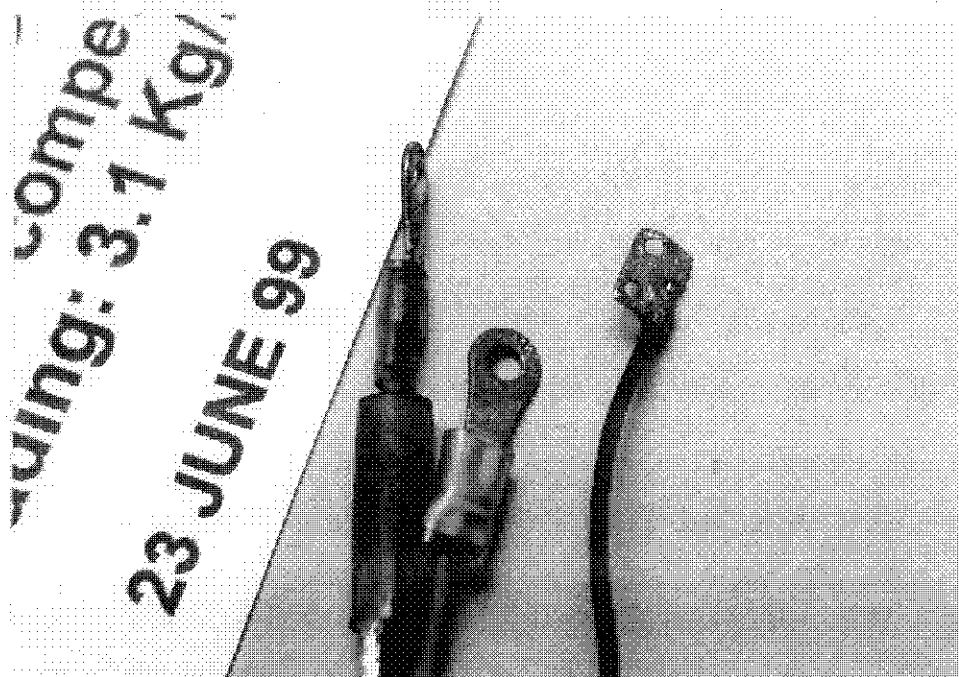
Maximum test container pressure: 7 psig

Initial fuel temperature (average of two): 100 °F

Fuel temperature at time of ignition (average of two): 195 °F

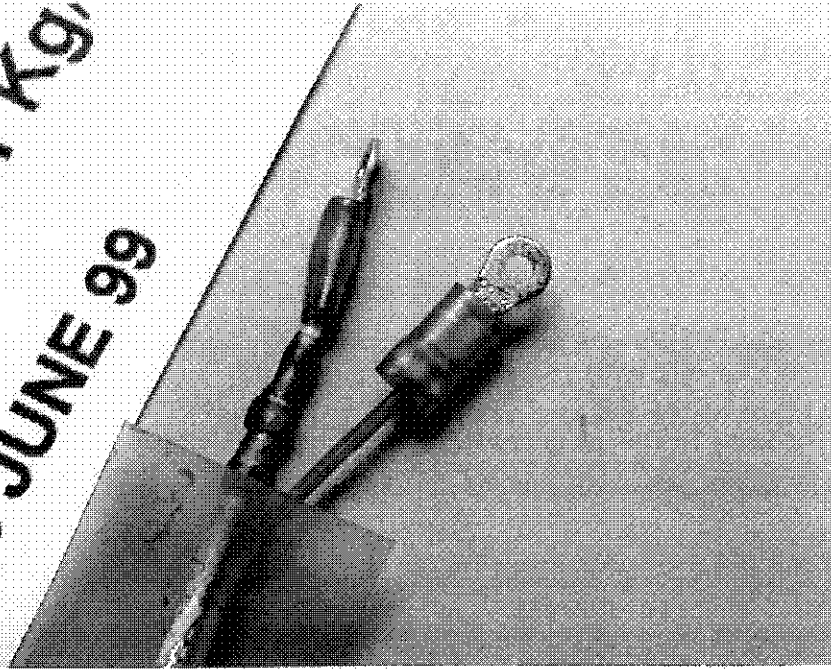
Elapsed time during fuel heating: 28 minutes

Comments: High speed film footage

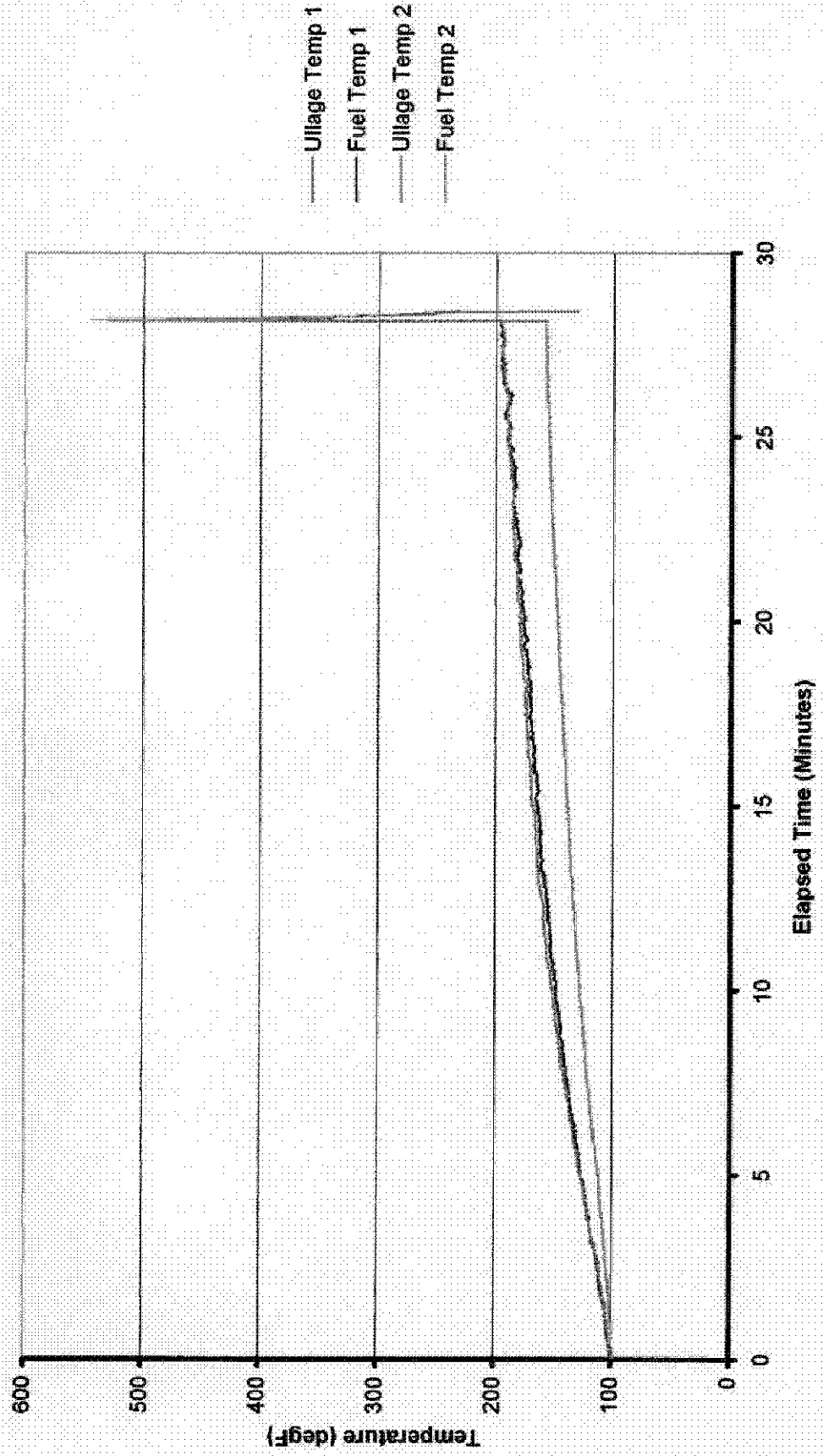


Test 16 continued

g: 3.7 Kg,
23 JUNE 99



Test 16 062399T1
Temperature History



Test 17

Date: 24-JUN-99

Test Identification: 062499T1

Ignition location: 1' from compensator

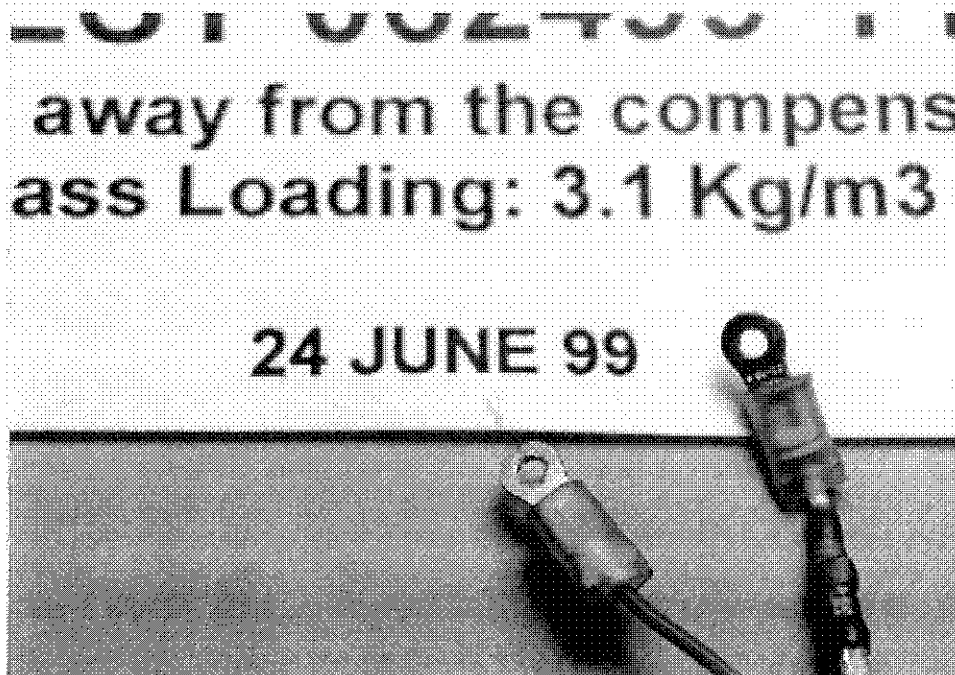
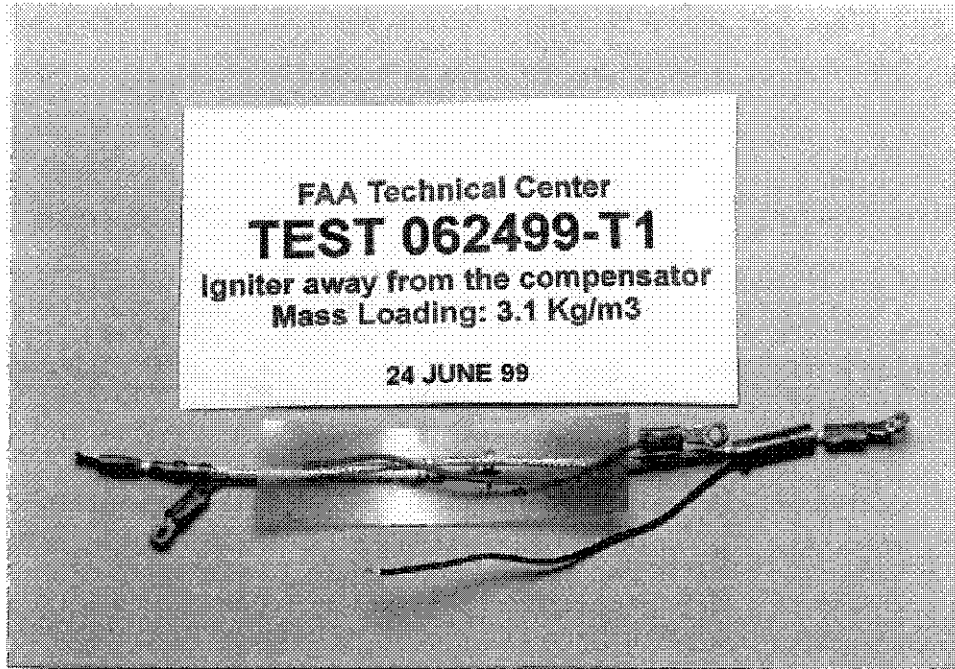
Maximum test container pressure: 4 psig

Initial fuel temperature (average of two): 82 °F

Fuel temperature at time of ignition (average of two): 213 °F

Elapsed time during fuel heating: 82 minutes

Comments:

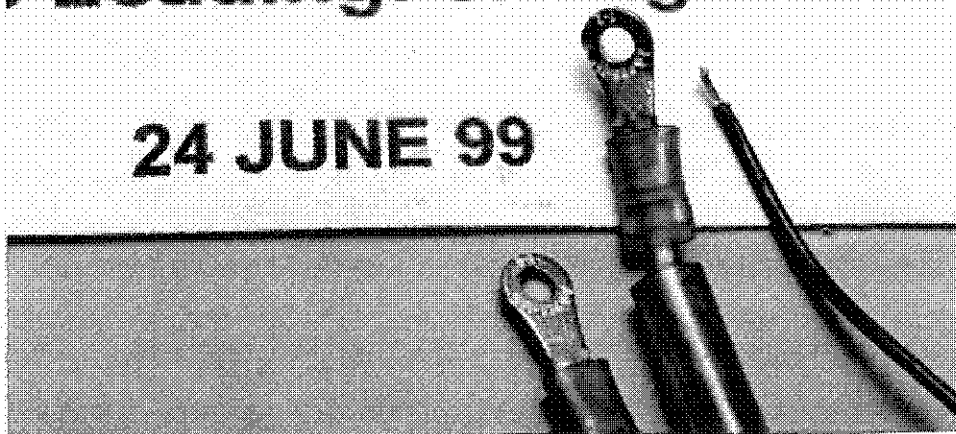


Test 17 continued

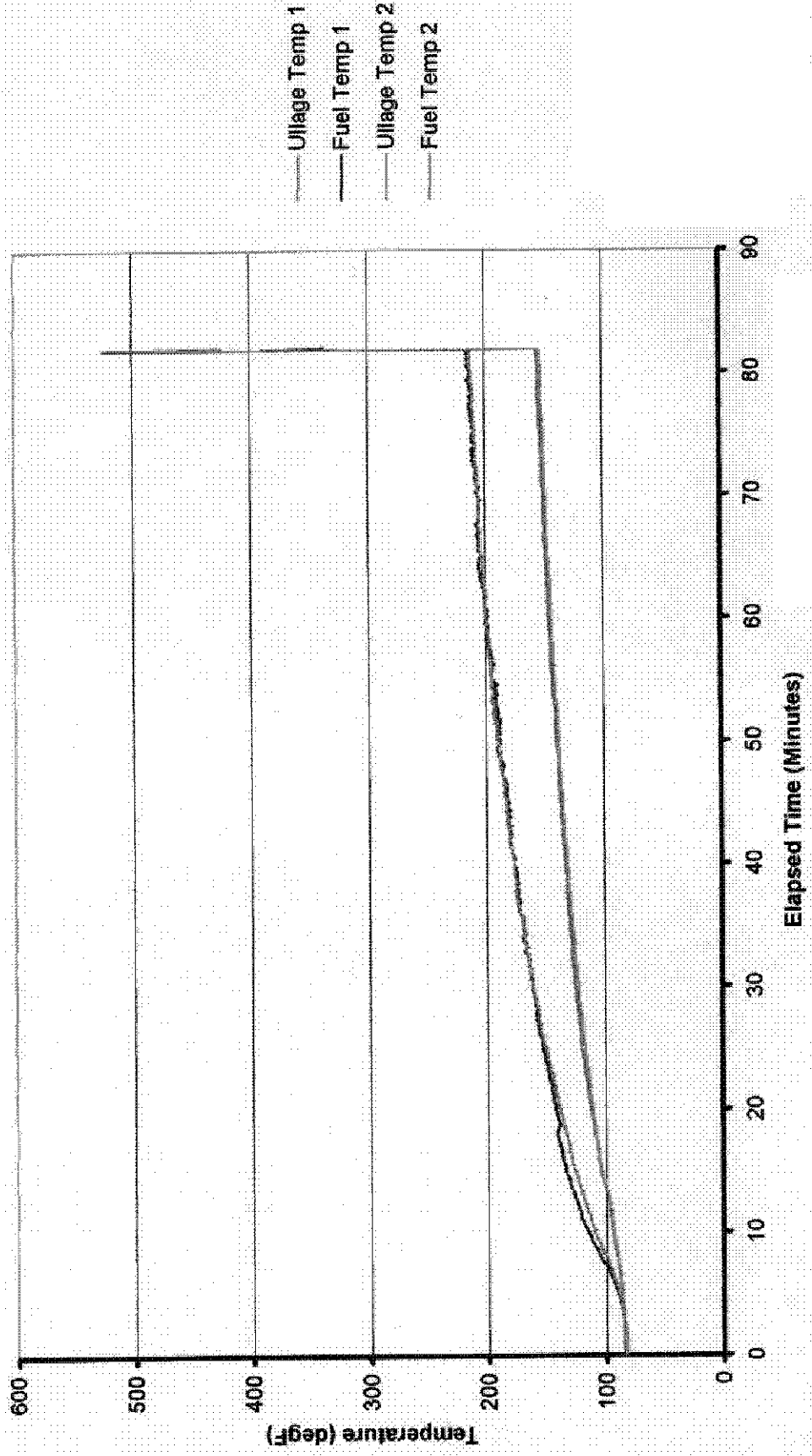
DI 002433-1

ray from the compensatc
Loading: 3.1 Kg/m³

24 JUNE 99



Test 17 062499T1
Temperature History



Test 18

Date: 25-JUN-99

Test Identification: 062599T1

Ignition location: 1' from compensator

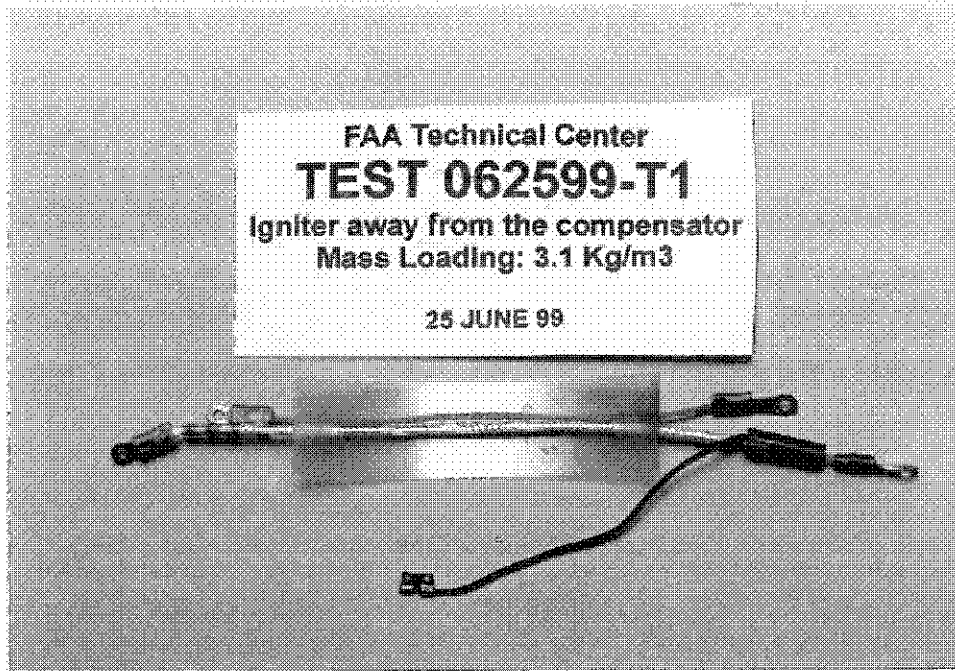
Maximum test container pressure: 5 psig

Initial fuel temperature (average of two): 79 °F

Fuel temperature at time of ignition (average of two): 193 °F

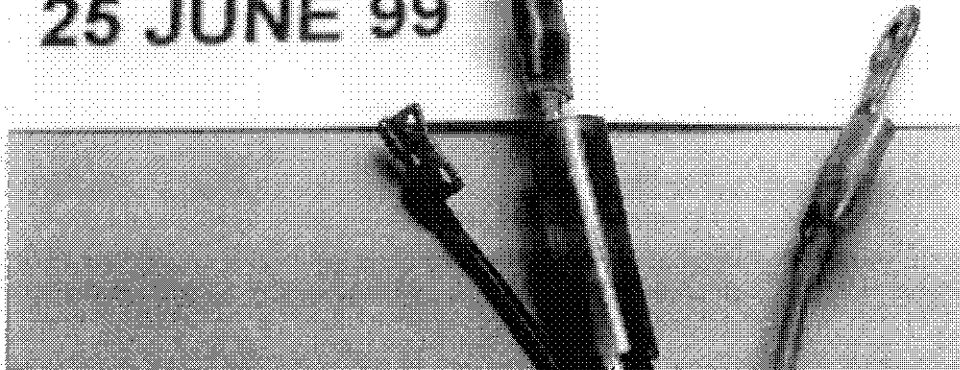
Elapsed time during fuel heating: 72 minutes

Comments:



Igniter away from the compensator
Mass Loading: 3.1 Kg/m3

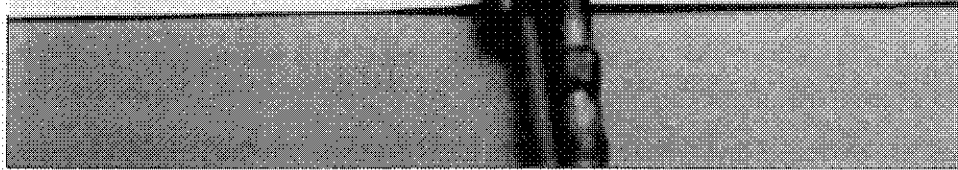
25 JUNE 99



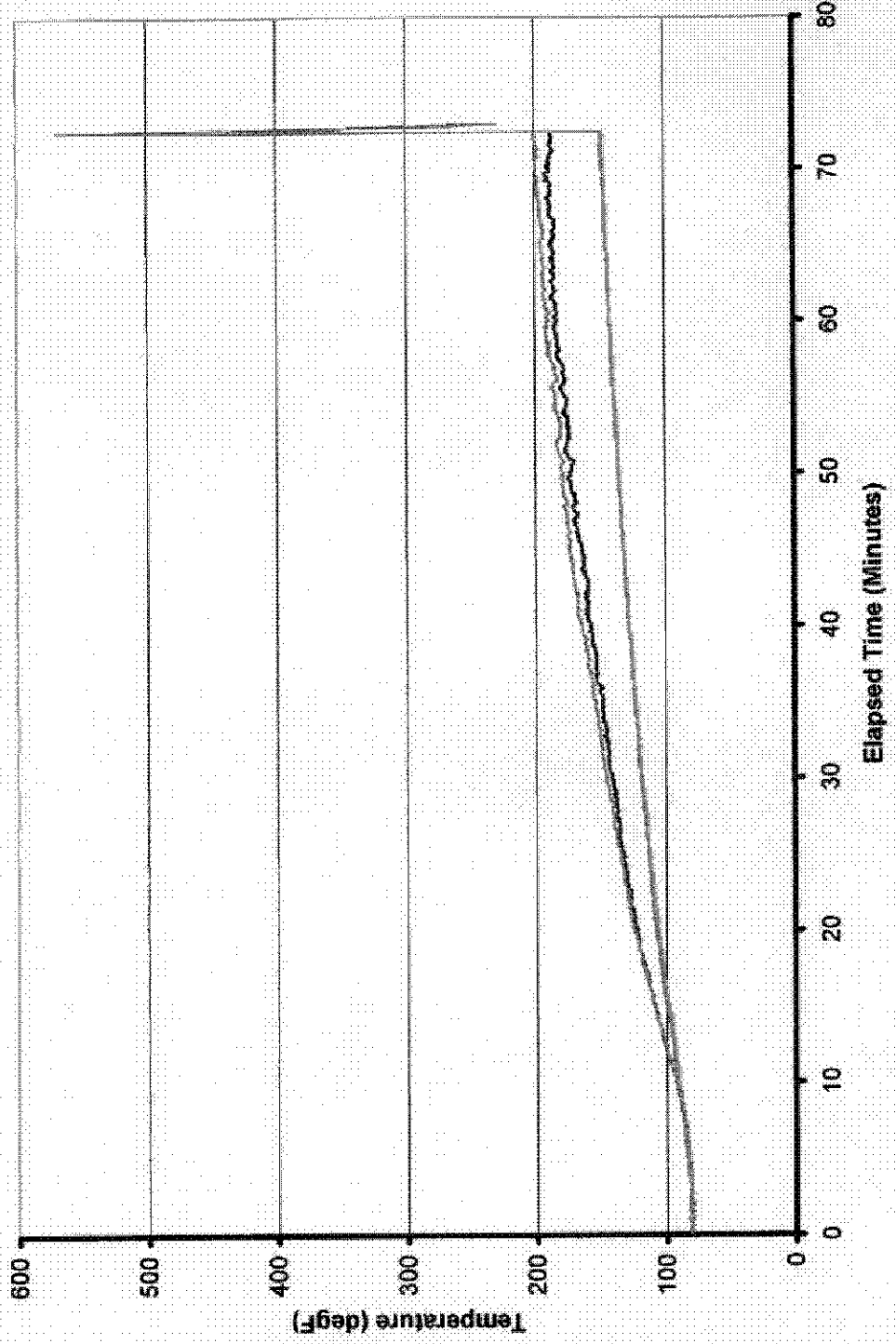
Test 18 continued

**from the compensator
loading: 3.1 Kg/m³**

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Test 18 062599T1
Temperature History



Ullage Temp 1
Fuel Temp 1
Ullage Temp 2
Fuel Temp 2

Test 19

Date: 28-JUN-99

Test Identification: 062899T1

Ignition location: 1' from compensator

Maximum test container pressure: - psig

Initial fuel temperature (average of two): 81 °F

Fuel temperature at time of ignition (average of two): 197 °F

Elapsed time during fuel heating: 68 minutes

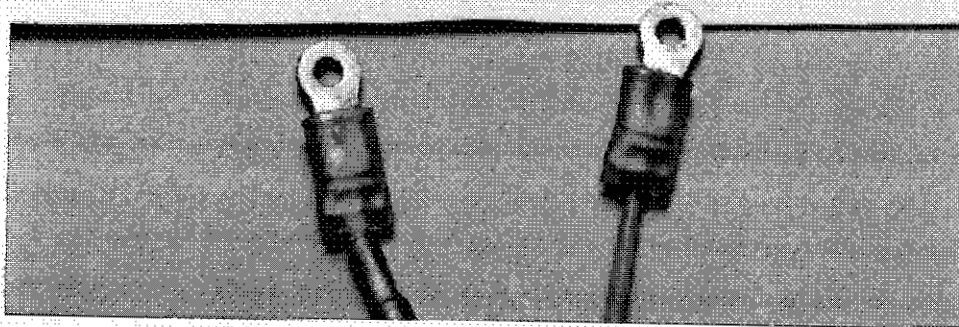
Comments:



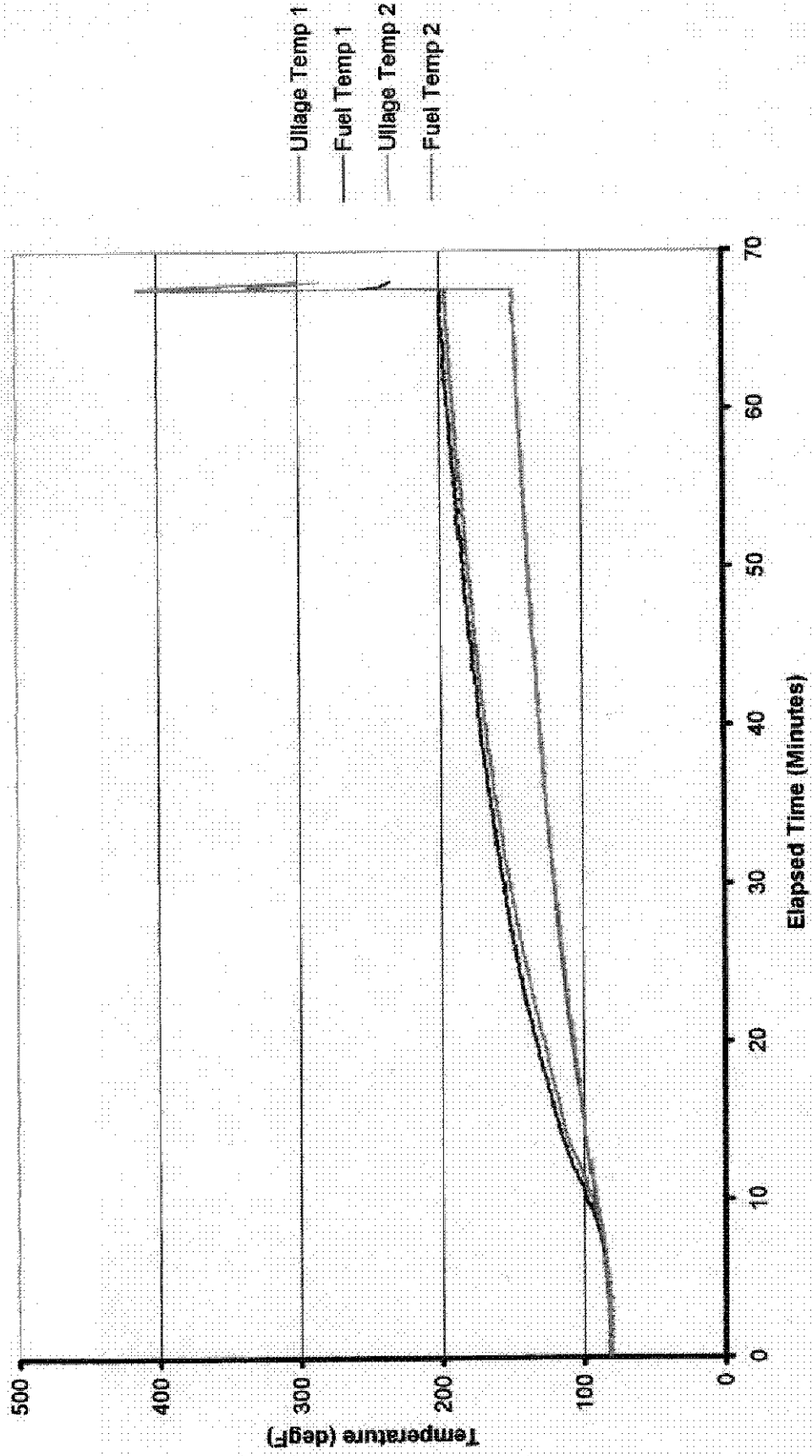
Test 19 continued

away from the compensa
ss Loading: 3.1 Kg/m³

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Test 19 062899T1
Temperature History



Test 20

Date: 28-JUN-99

Test Identification: 062899T2

Ignition location: 1' from compensator

Maximum test container pressure: 5 psig

Initial fuel temperature (average of two): 105 °F

Fuel temperature at time of ignition (average of two): 203 °F

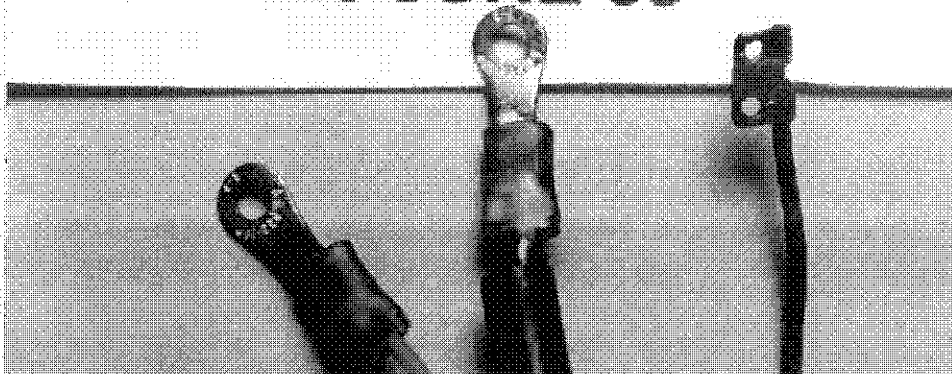
Elapsed time during fuel heating: 61 minutes

Comments: Sampling line (attached to the tank-side solenoid) was found to be disconnected for the first 15 minutes of the test. Technician forgot to connect the line back into place after clearing the lines. Problem corrected as soon as it was found. It did not impact the test.



Igniter away from the compensator
Mass Loading: 3.1 Kg/m3

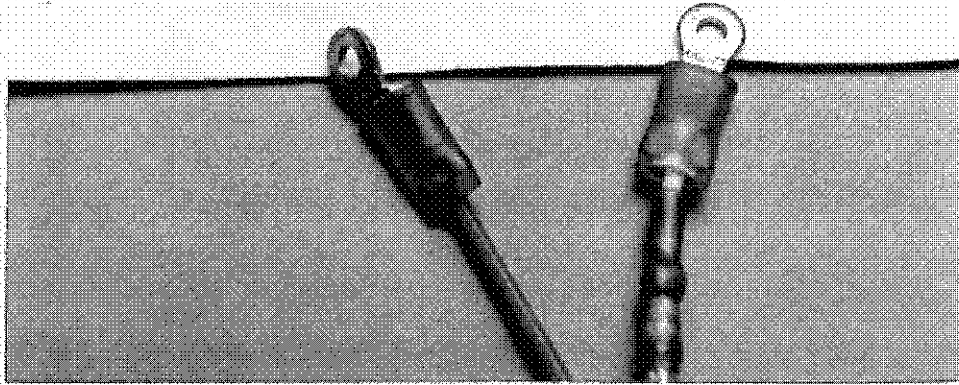
28 JUNE 99



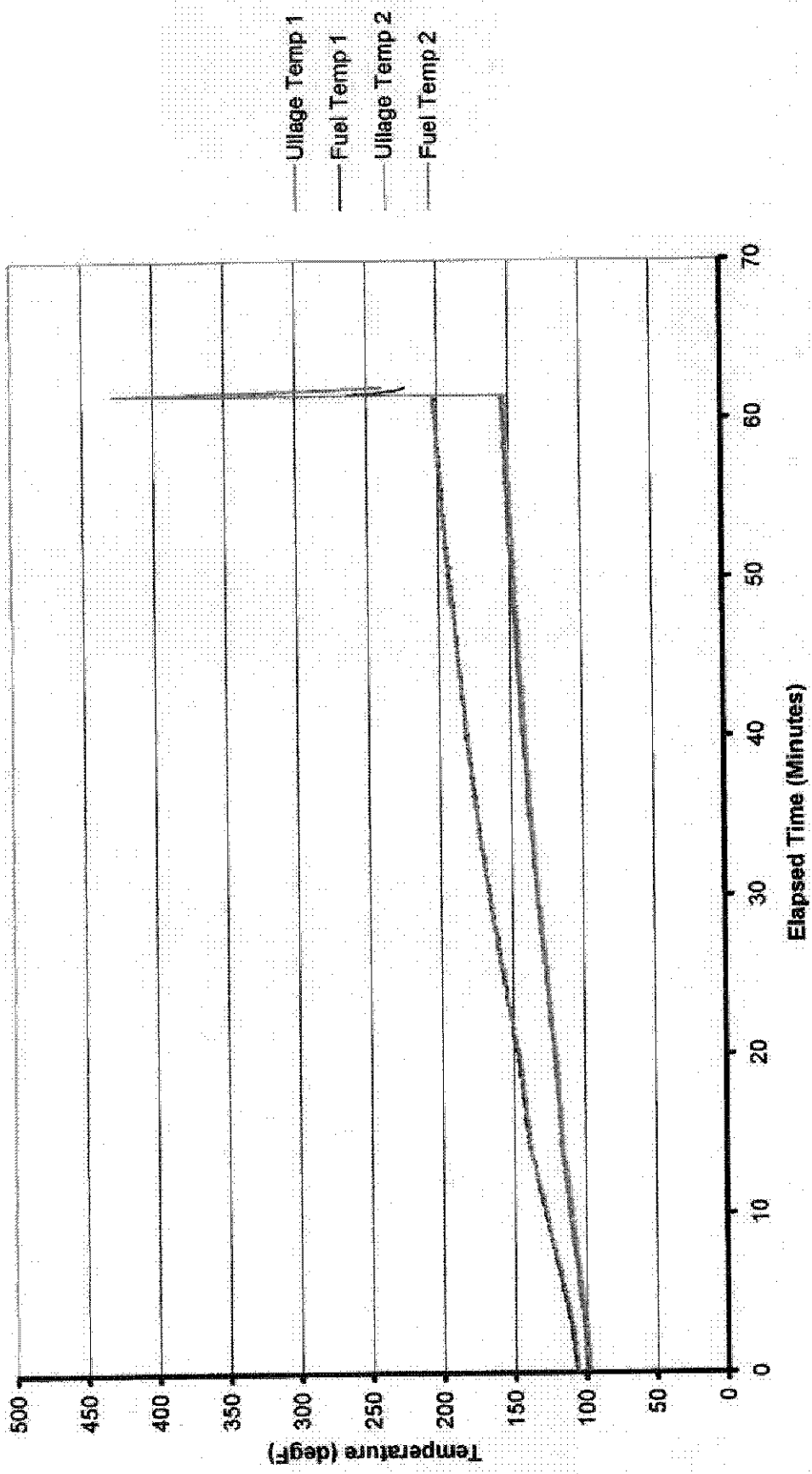
Test 20 continued

ss Loading: 3.1 Kg/m³

28 JUNE 99



Test 20 062899T2
Temperature History



Test 23

Date: 2-JUL-99

Test Identification: 070299T1

Ignition location: on top of compensator

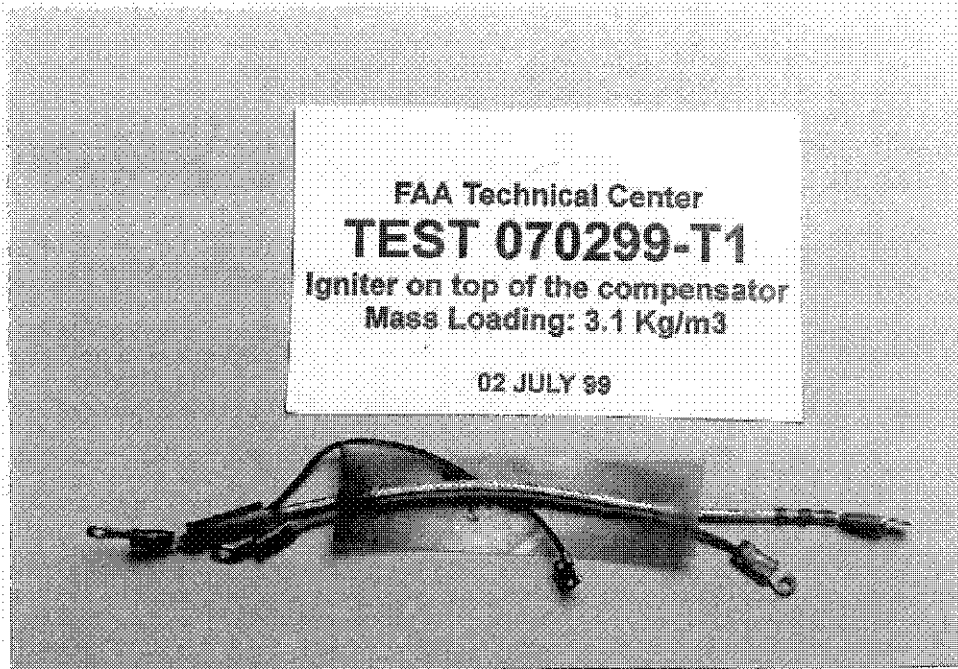
Maximum test container pressure: 3 psig

Initial fuel temperature (average of two): 81 °F

Fuel temperature at time of ignition (average of two): 195 °F

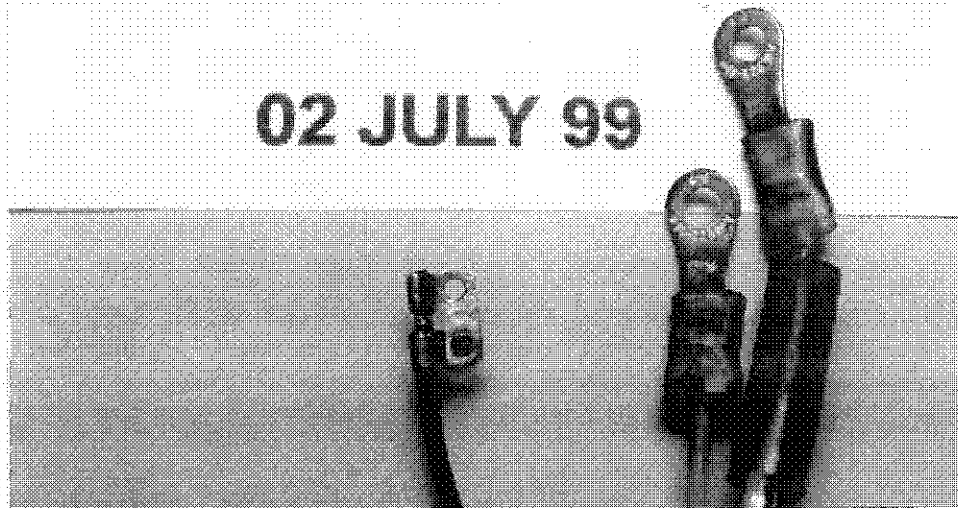
Elapsed time during fuel heating: 79 minutes

Comments: New igniter used – pulse generator; sampling line not bled; ullage thermocouples placed at 11.5" and 9" from the tank floor.



Igniter on top of the compensator
Mass Loading: 3.1 Kg/m3

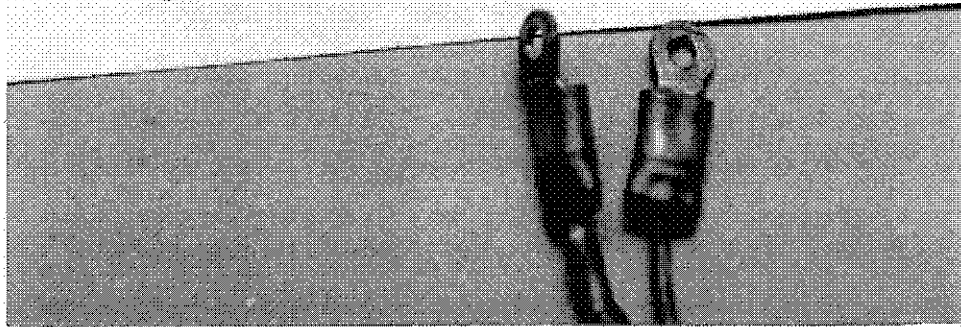
02 JULY 99



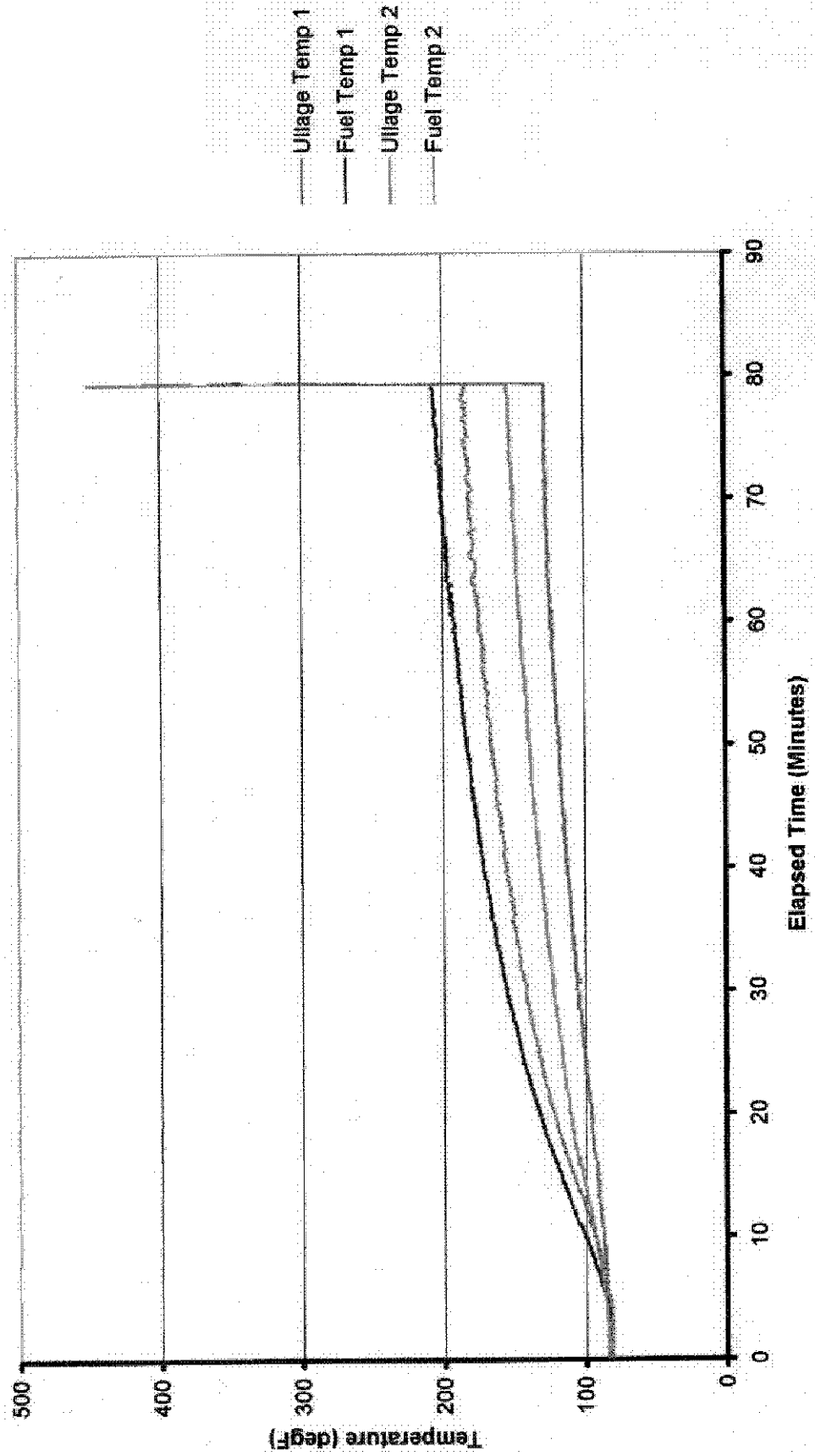
Test 23 continued

top of the compensation
Loading: 3.1 Kg/m³

02 JULY 99



Test 23 070299T1
Temperature History



Test 24

Date: 2-JUL-99

Test Identification: 070299T2

Ignition location: on top of compensator

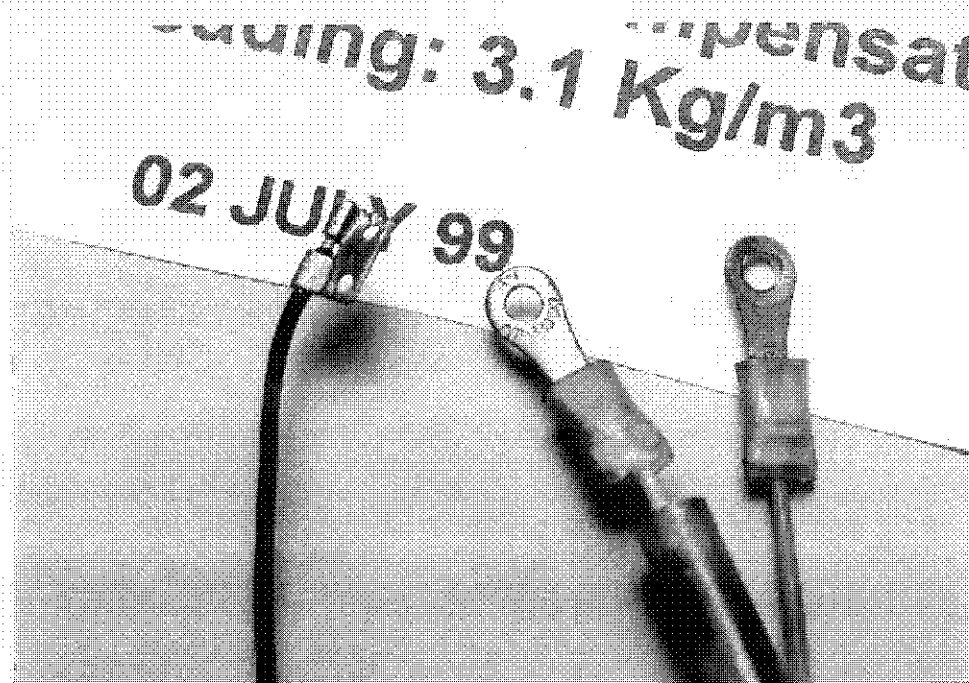
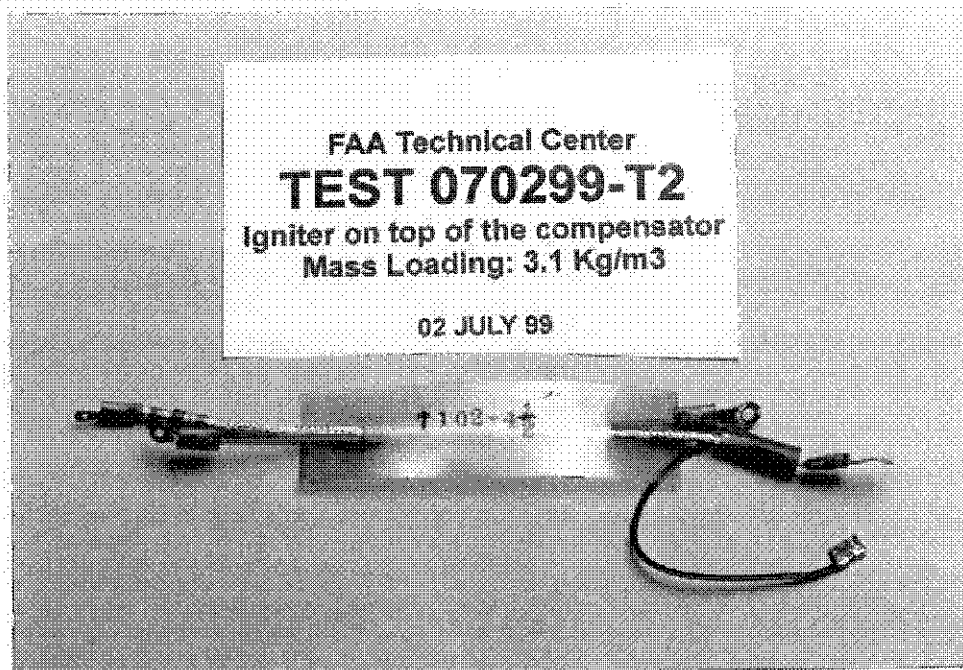
Maximum test container pressure: 5 psig

Initial fuel temperature (average of two): 88 °F

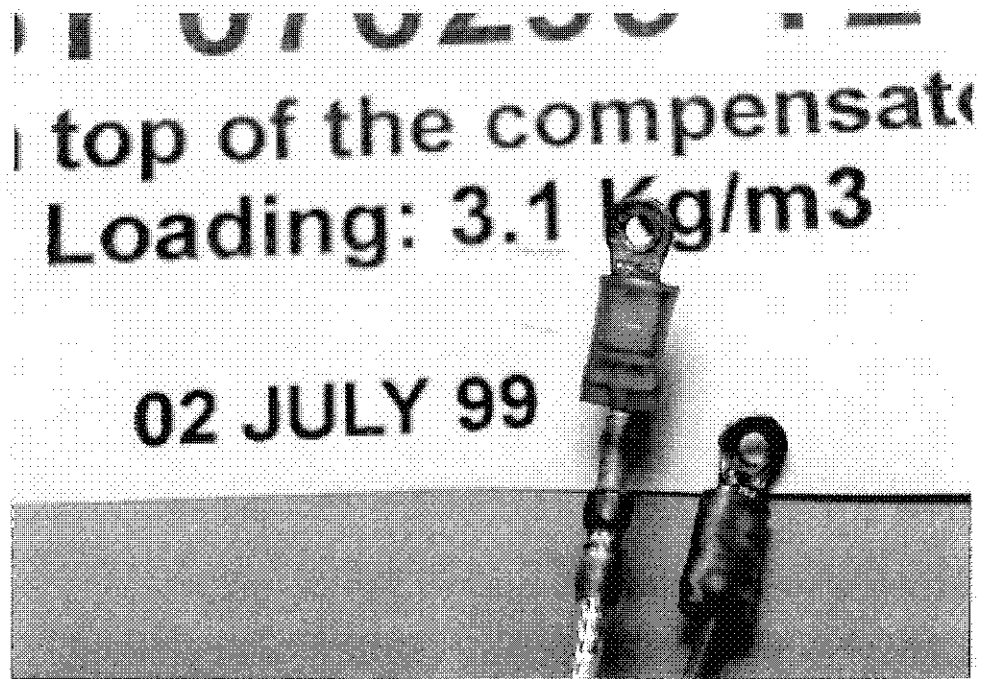
Fuel temperature at time of ignition (average of two): 199 °F

Elapsed time during fuel heating: 67 minutes

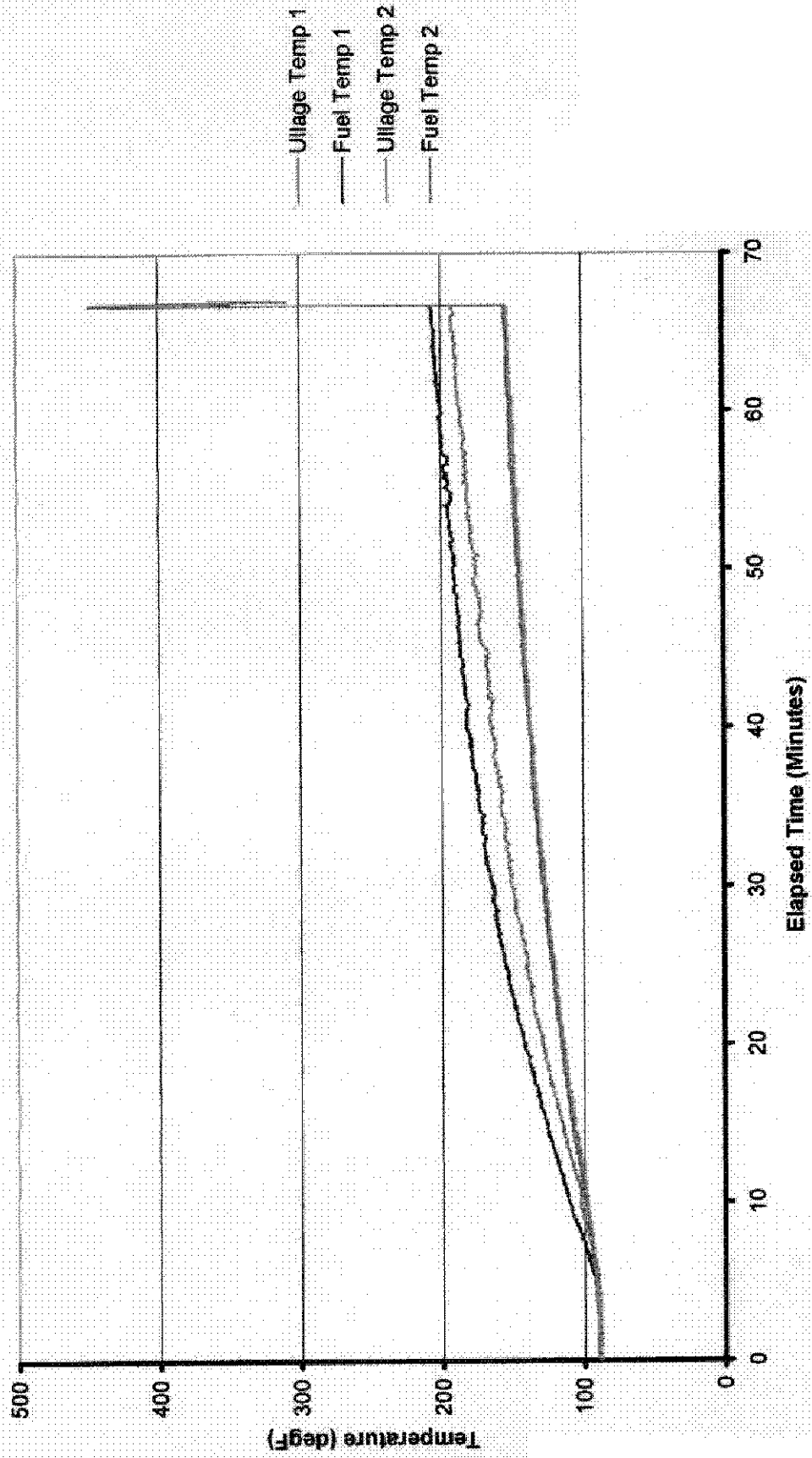
Comments:



Test 24 continued



Test 24 070299T2
Temperature History



Test 25

Date: 6-JUL-99

Test Identification: 070699T1

Ignition location: under the compensator

Maximum test container pressure: 5 psig

Initial fuel temperature (average of two): 92 °F

Fuel temperature at time of ignition (average of two): 209 °F

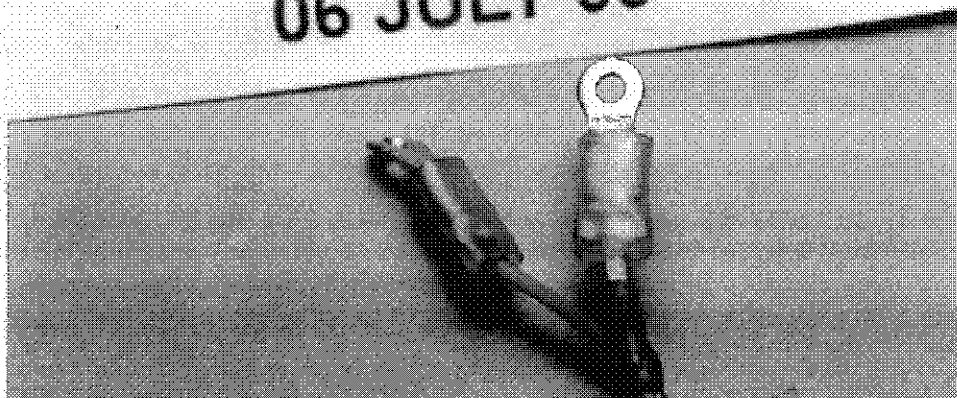
Elapsed time during fuel heating: 73 minutes

Comments:



the bottom of the compensator
Mass Loading: 3.1 Kg/m³

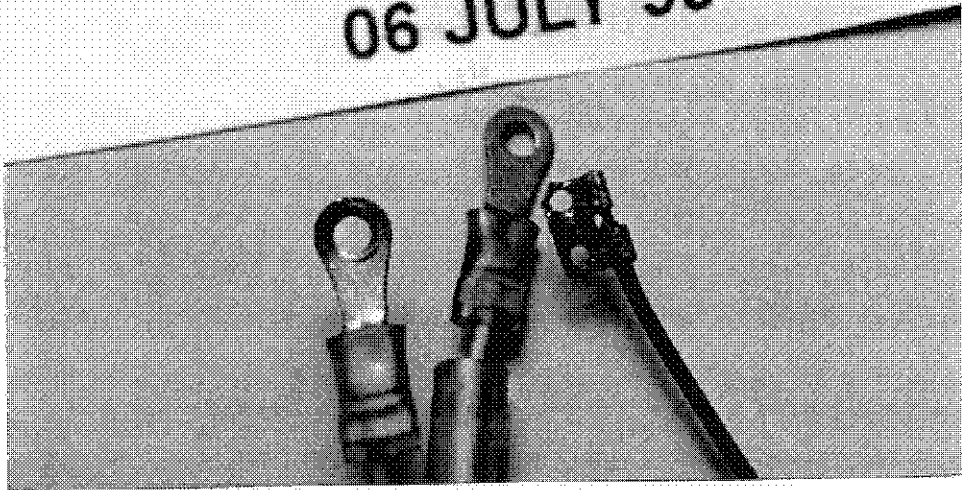
06 JULY 99



Test 25 continued

Mass Loading: 3.1 kg

06 JULY 99



Test 25 070699T1
Temperature History

