DU **PONT'S**

HALON ALTERNATIVES PROGRAM

TECHNICAL PROGRESS

R. E. Fernandez

April 1991

- Revised Cup Burner Data

- Quantitative Determination *of* Acidic Decomposition Products

  FE-25

  FE-13

- Inerting Concentrations

  FE-25

  FE-13

- Vapor Pressure vs. Composition Data

  FE-13 / FE-232 Blends

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Revised Cup Burner Data

Agent	Fuel	
	Heptane	Methanol
FE-25	9.1 (10.1)	12.4 (13.0)
FE-13	13.0 (14.0)	21.6 (23.8)
FE-232	7.5 (7.2)	11.3 (10.7)
H-1301	3.5 (4.2)	7.7 (8.6)
H-1211	5.2 (6.2)	7.6 (8.5)

( ) = Old values.

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Acidic Decomposition Products

- The Apparatus
- The Experiment
- Analytical
- Results
  - **FE-25**
  - FE-13
  - Comparative Data
- Regression Analysis
- Conclusions

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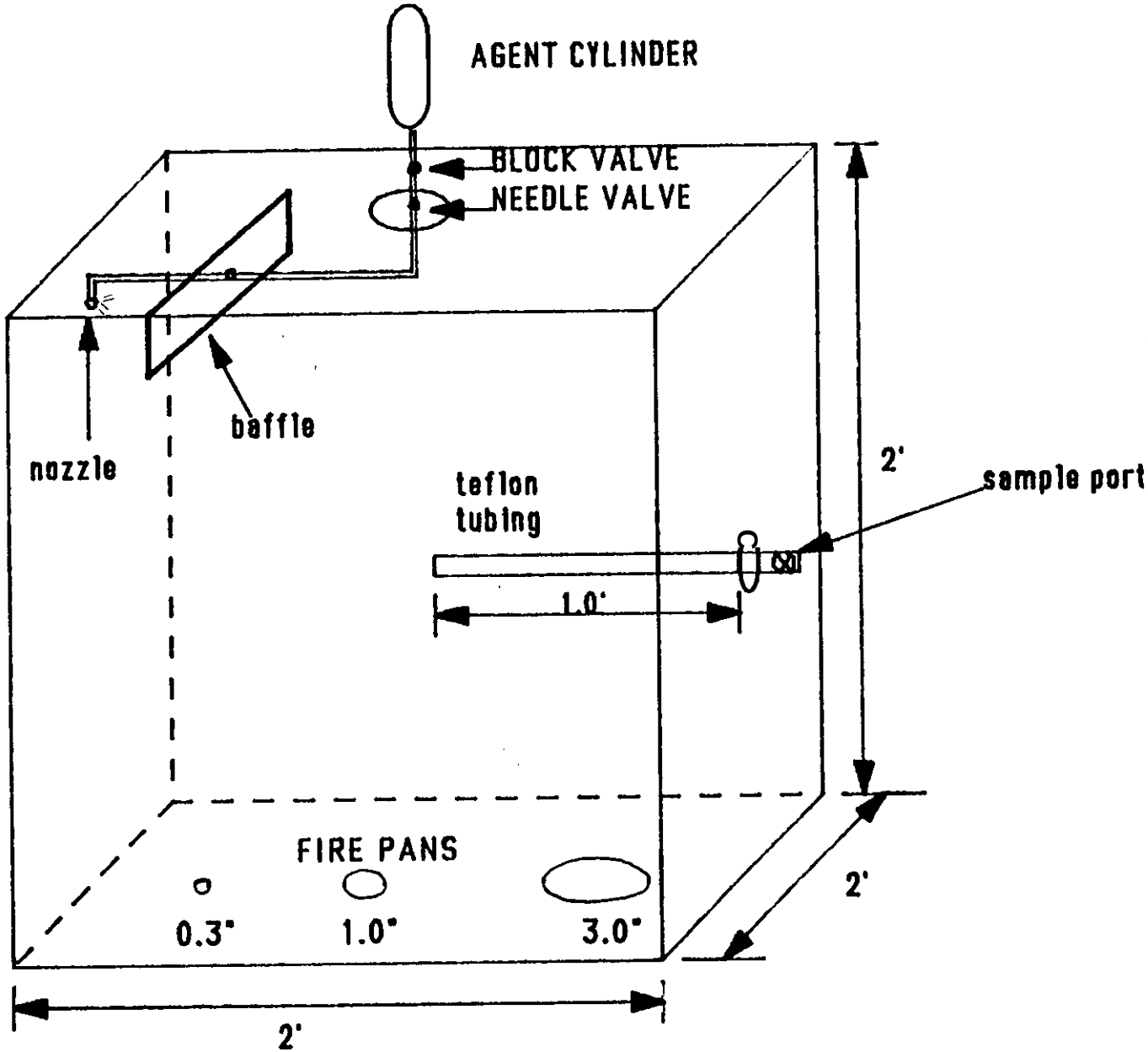
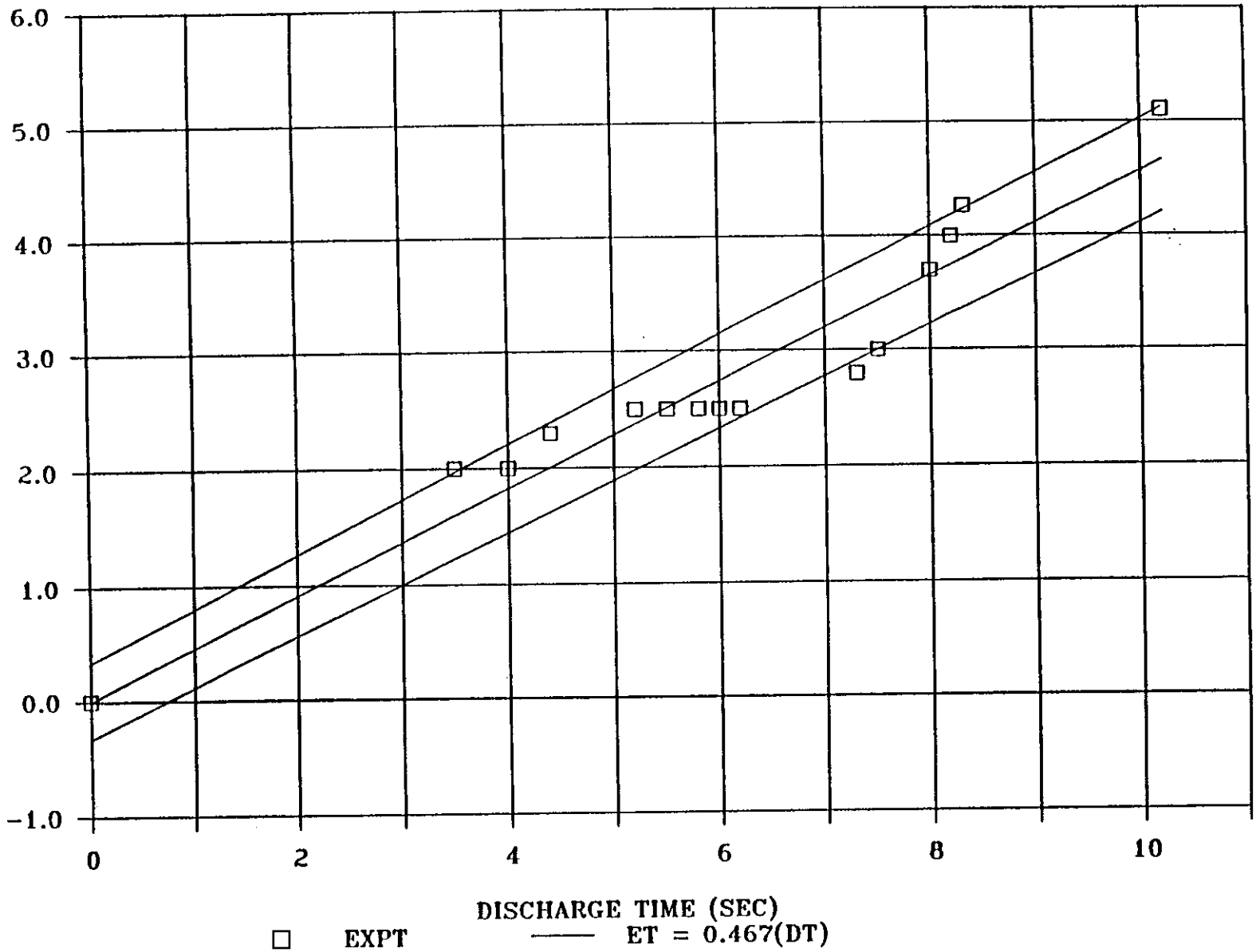


8 cu. ft. Test Chamber

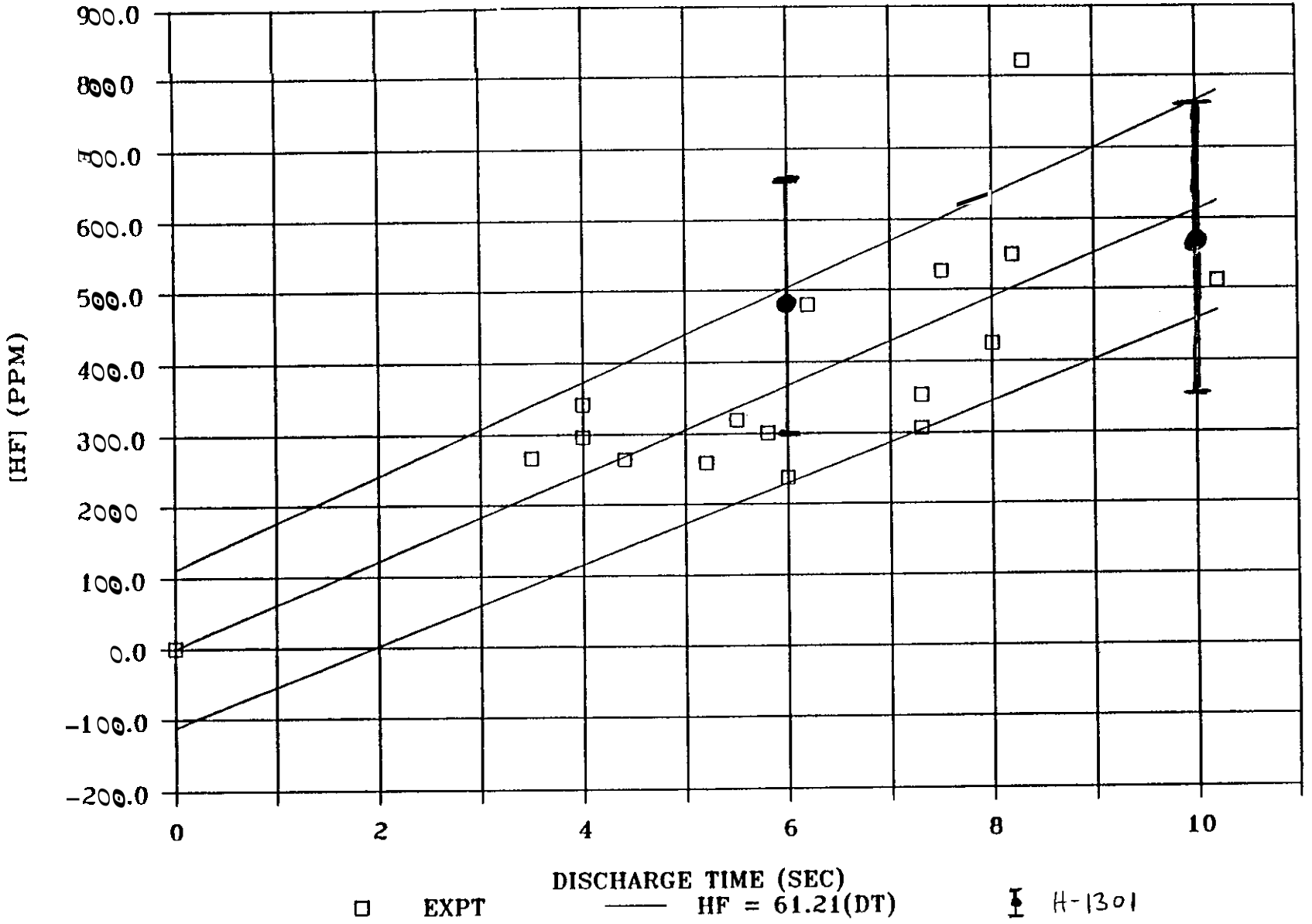
FE-25 BOX TESTS

"VERY LARGE FIRE"



FE-25 BOX TESTS

"VERY LARGE FIRE"



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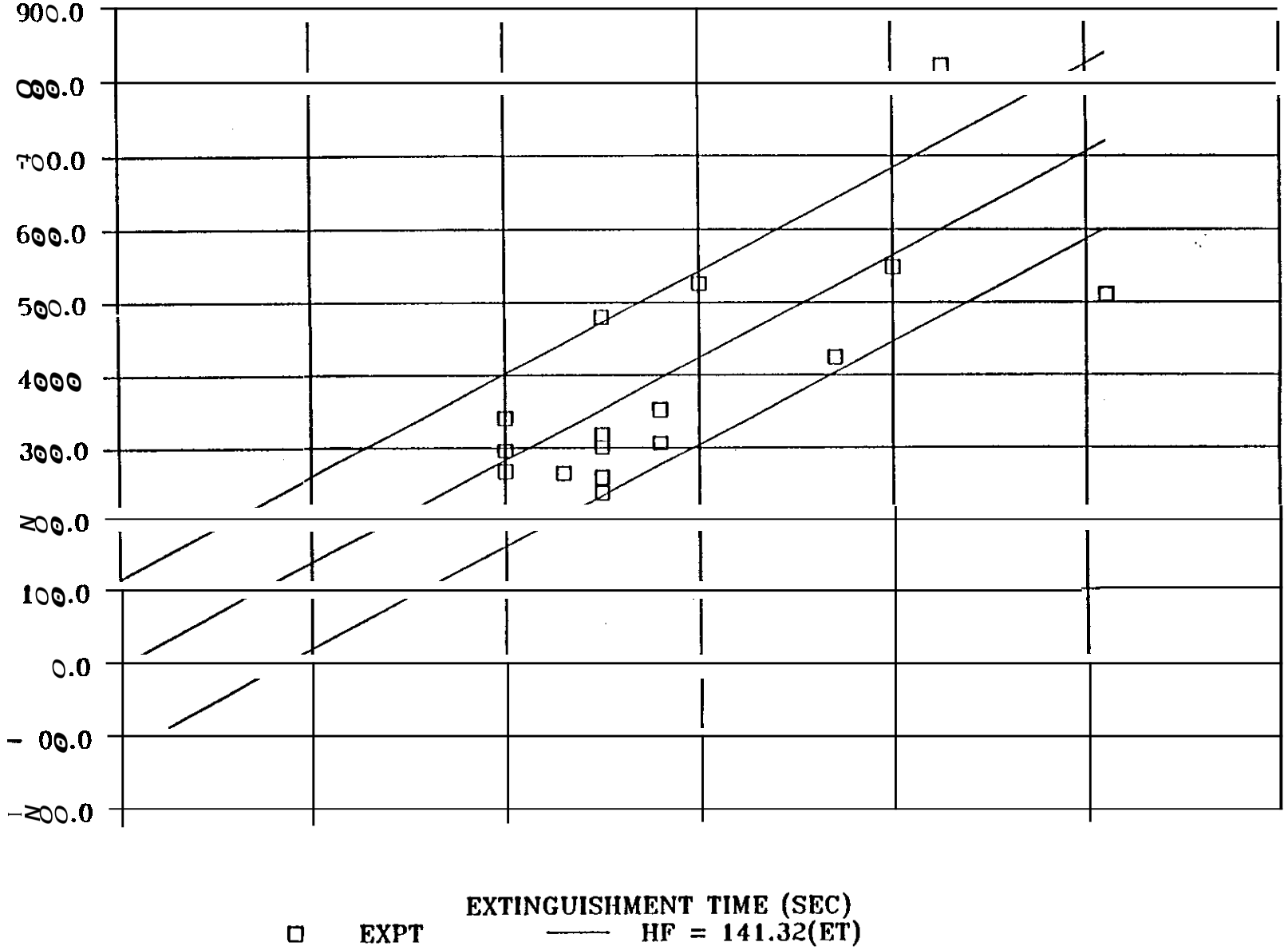
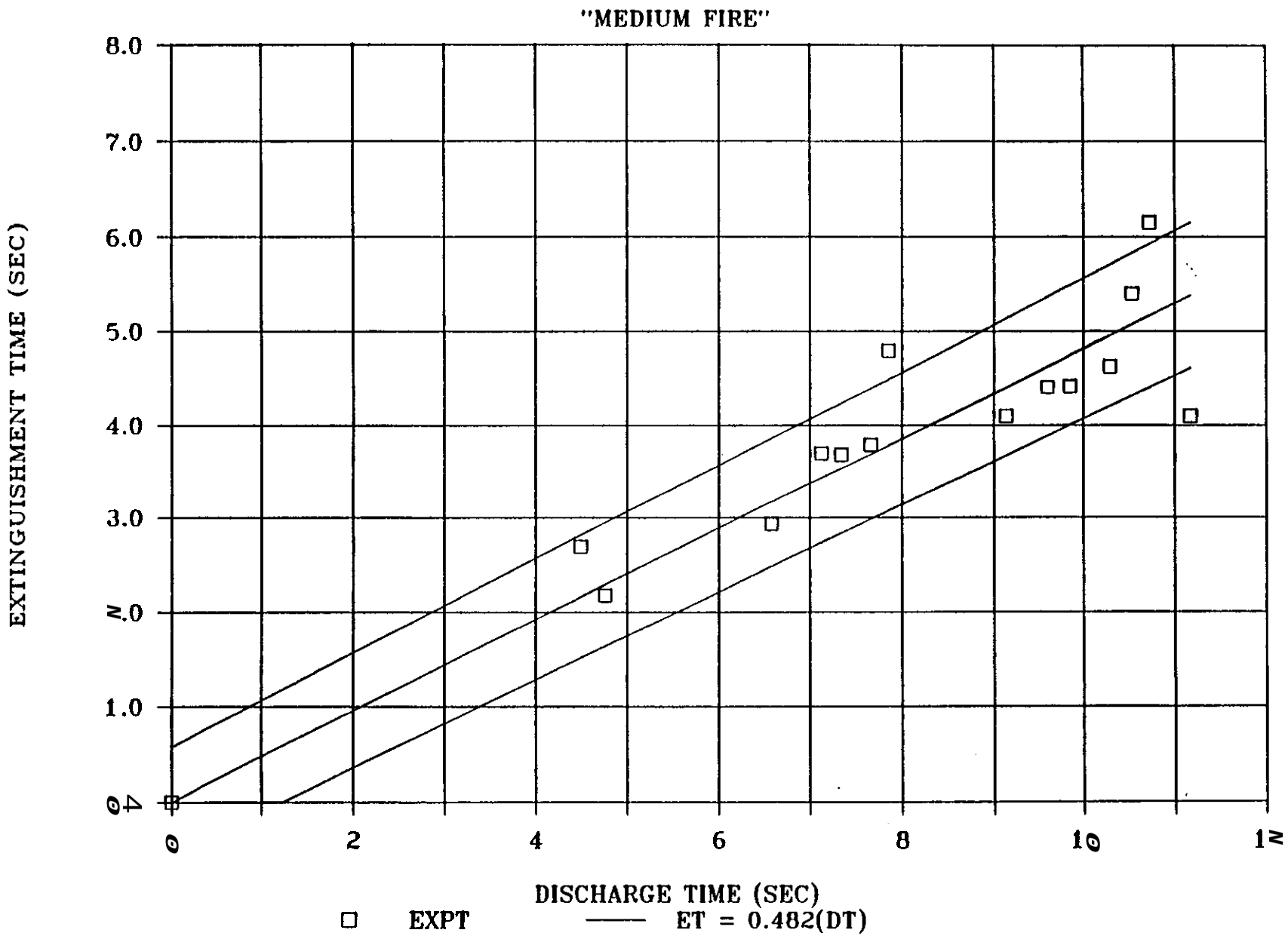
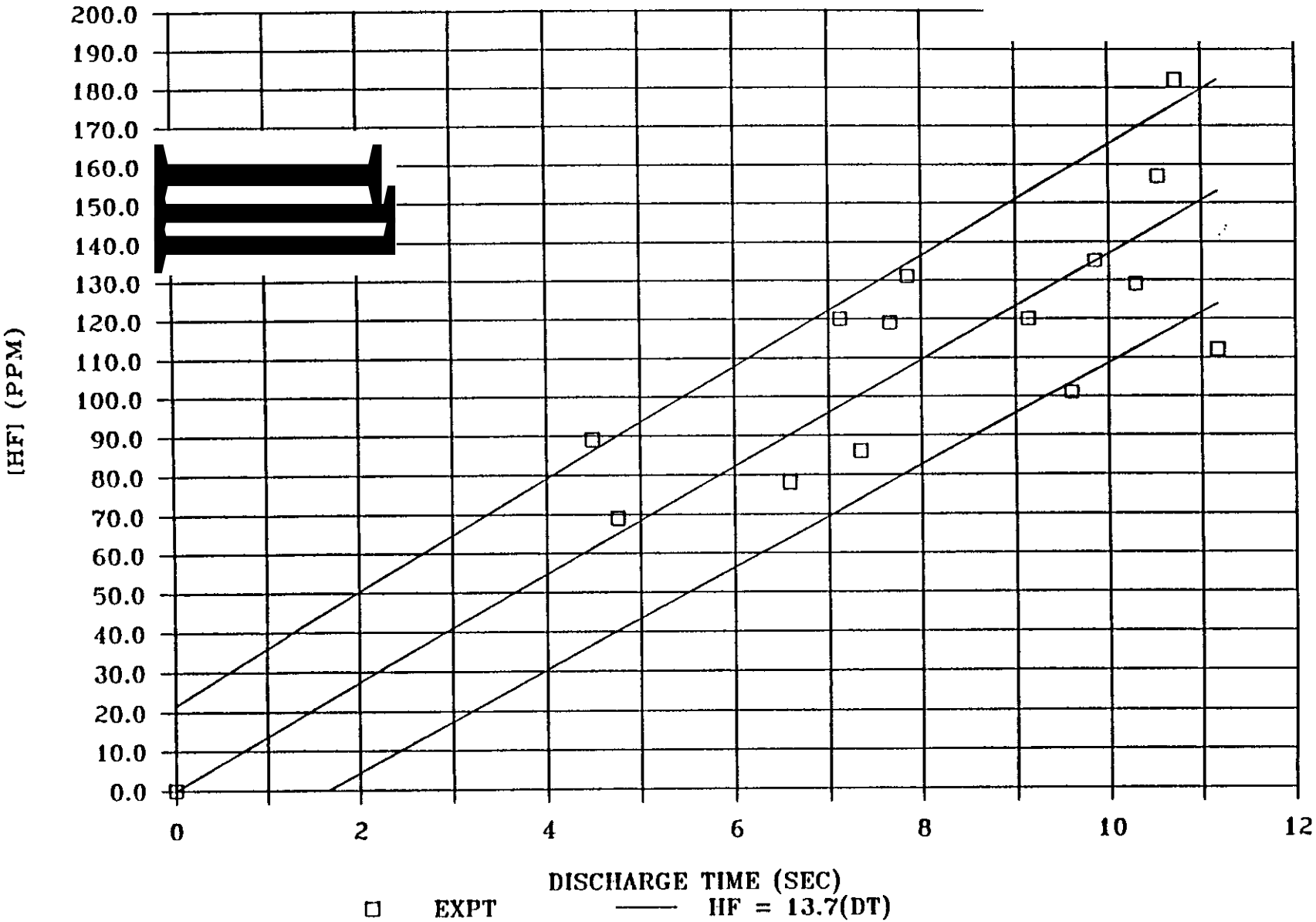


FE-25 BOX TESTS



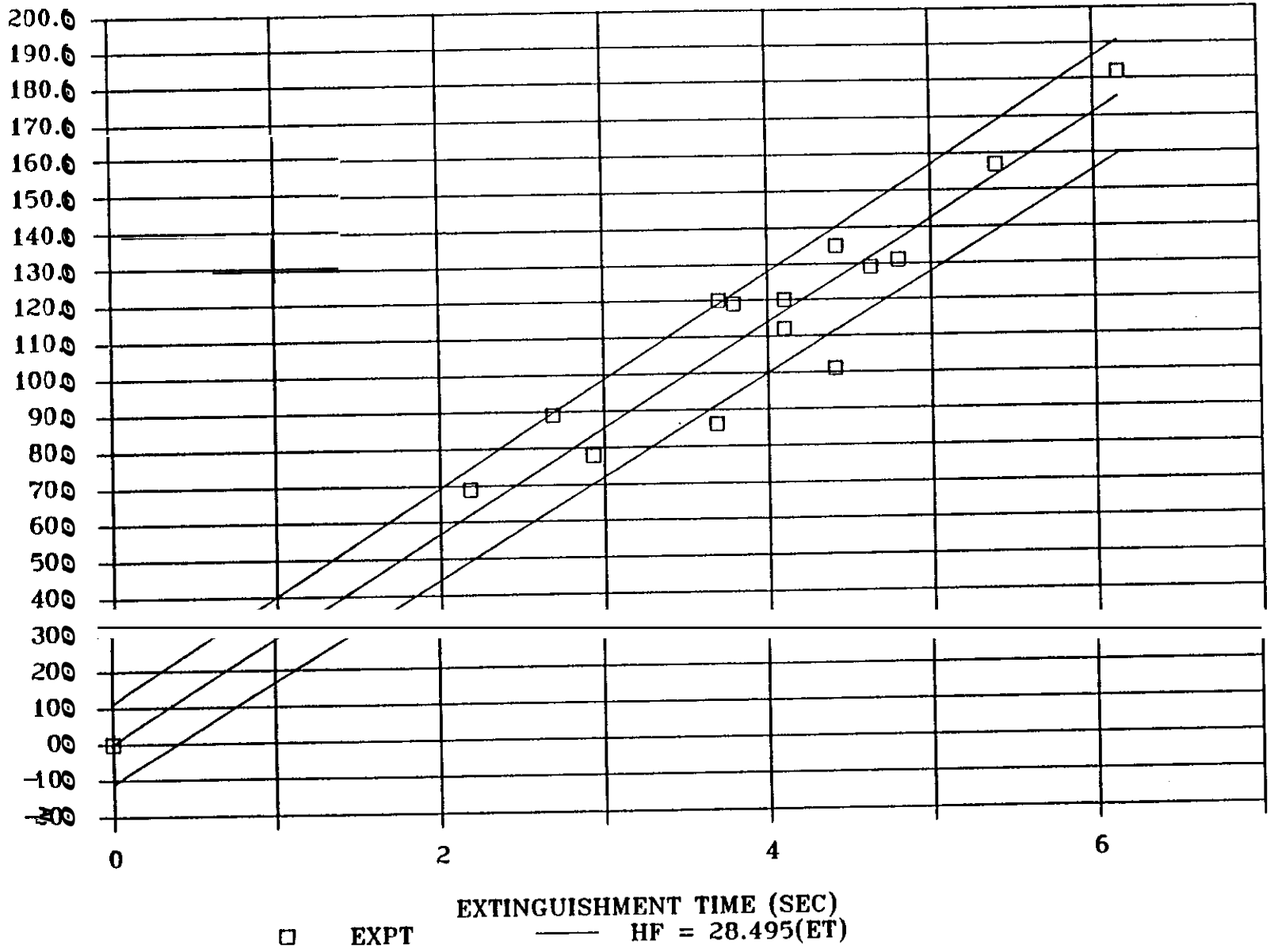
FE-25 BOX TESTS

"MEDIUM FIRE"

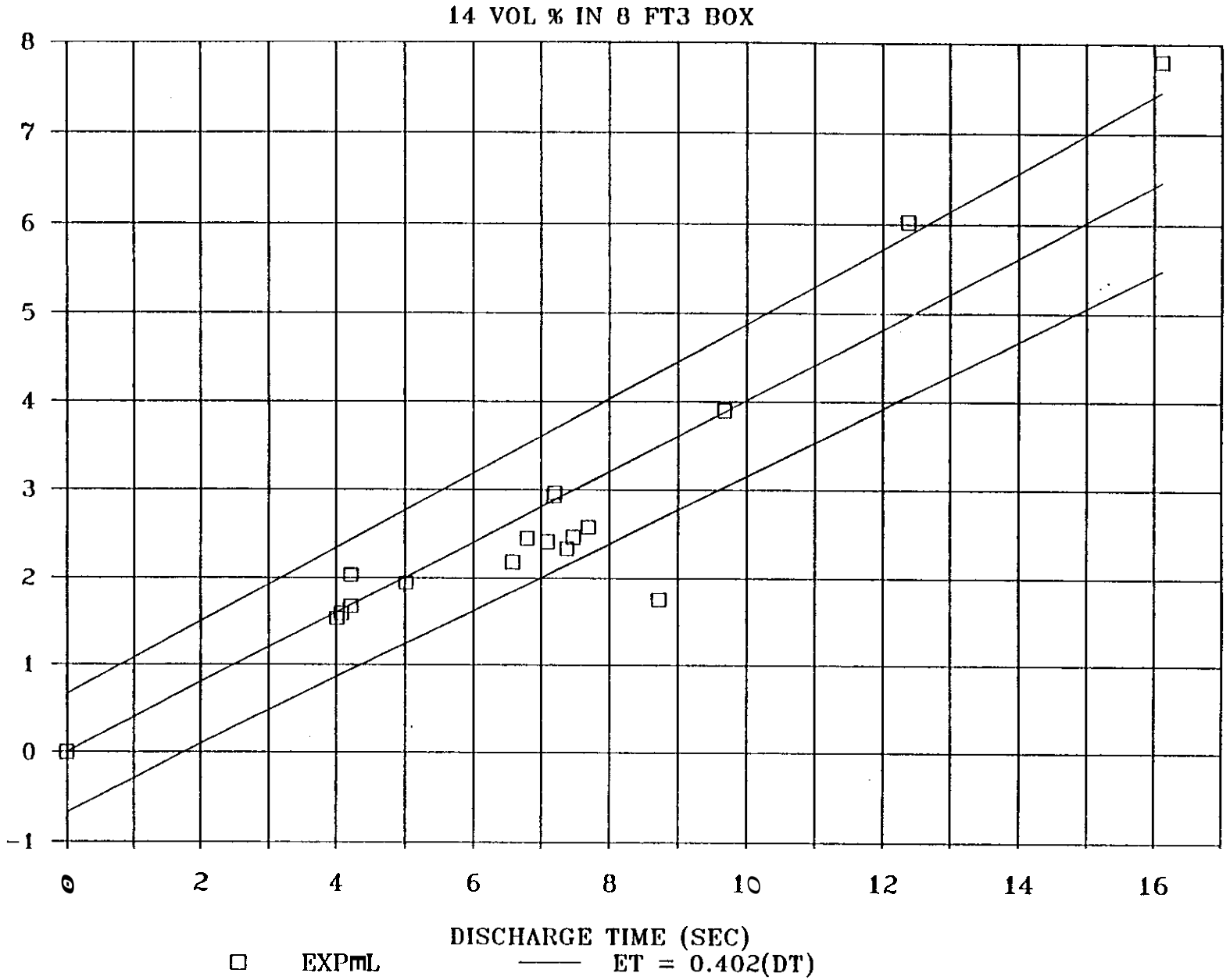


FE-25 BOX TESTS

"MEDIUM FIRE"



FE-13 TESTING ON "VERY LARGE" FIRES



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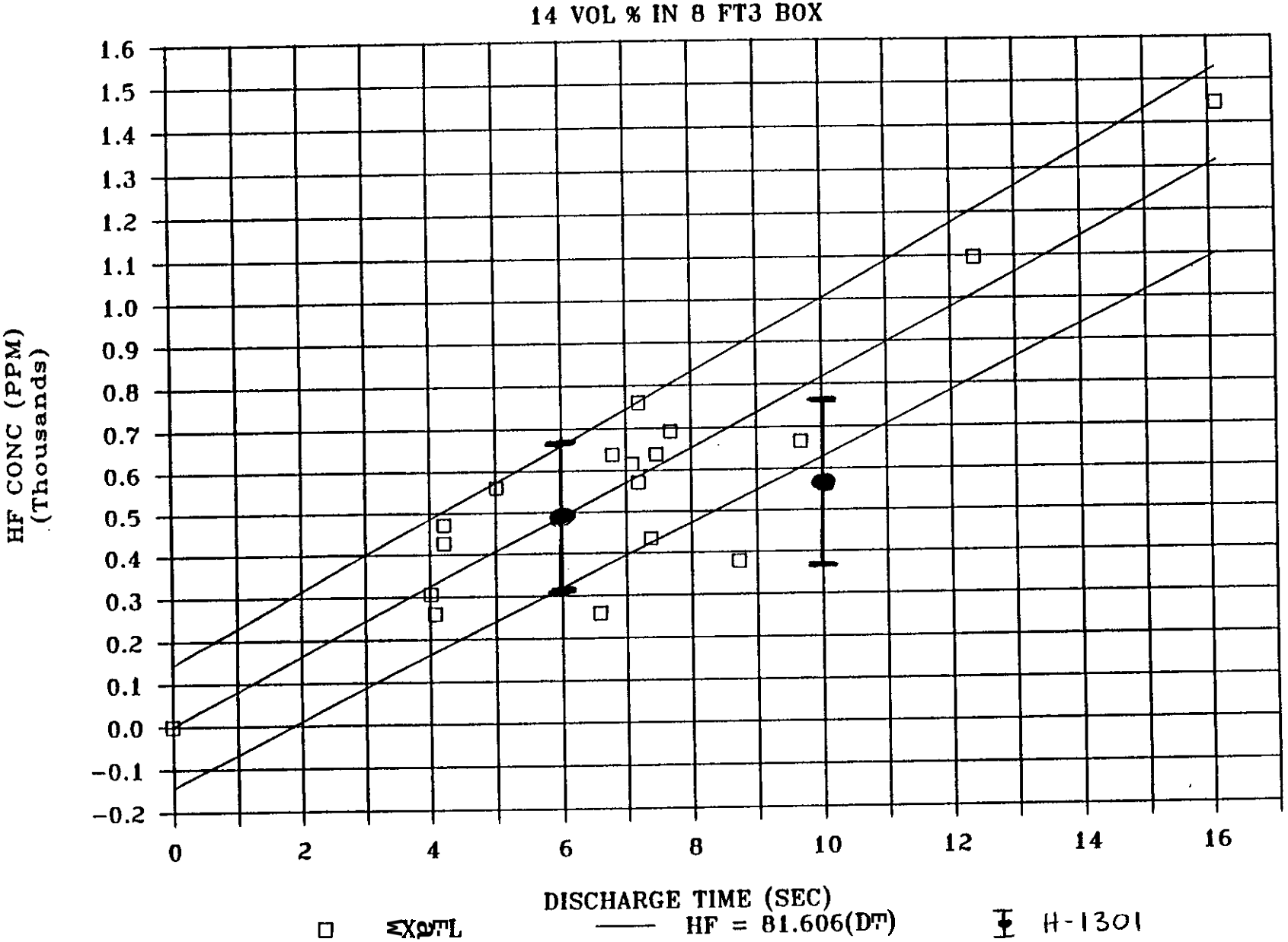
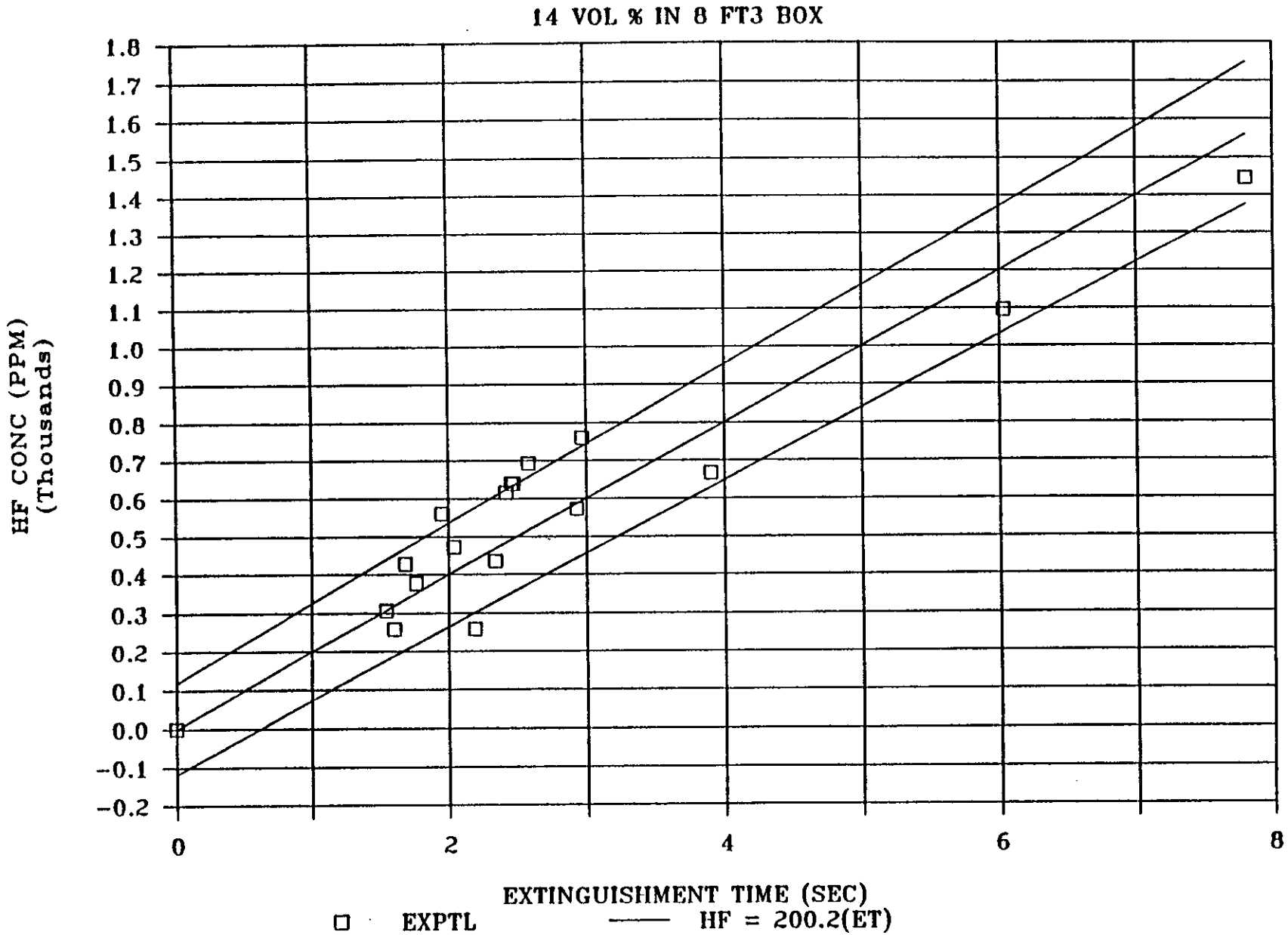


FE-13 TESTING ON "VERY LARGE" FIRES



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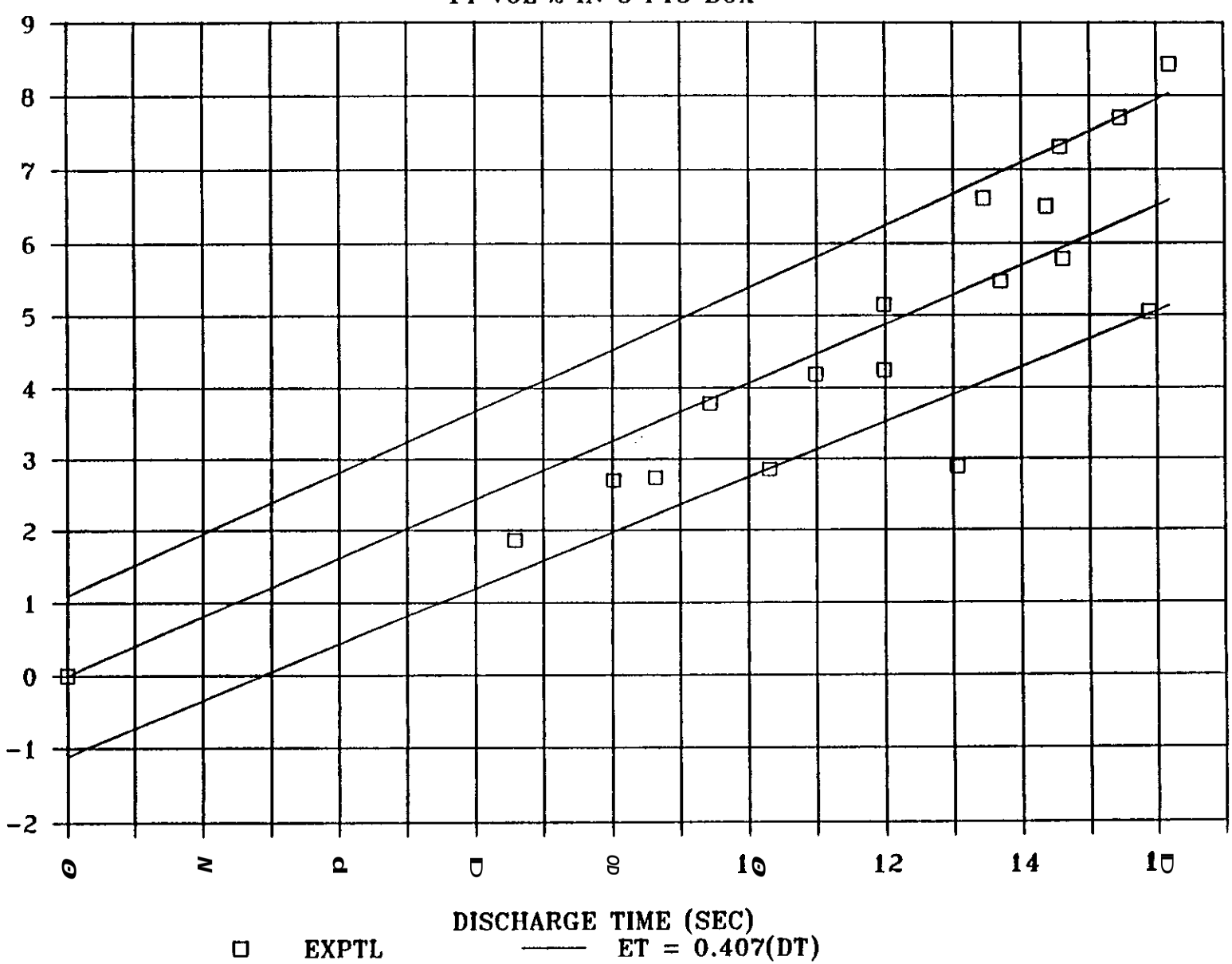
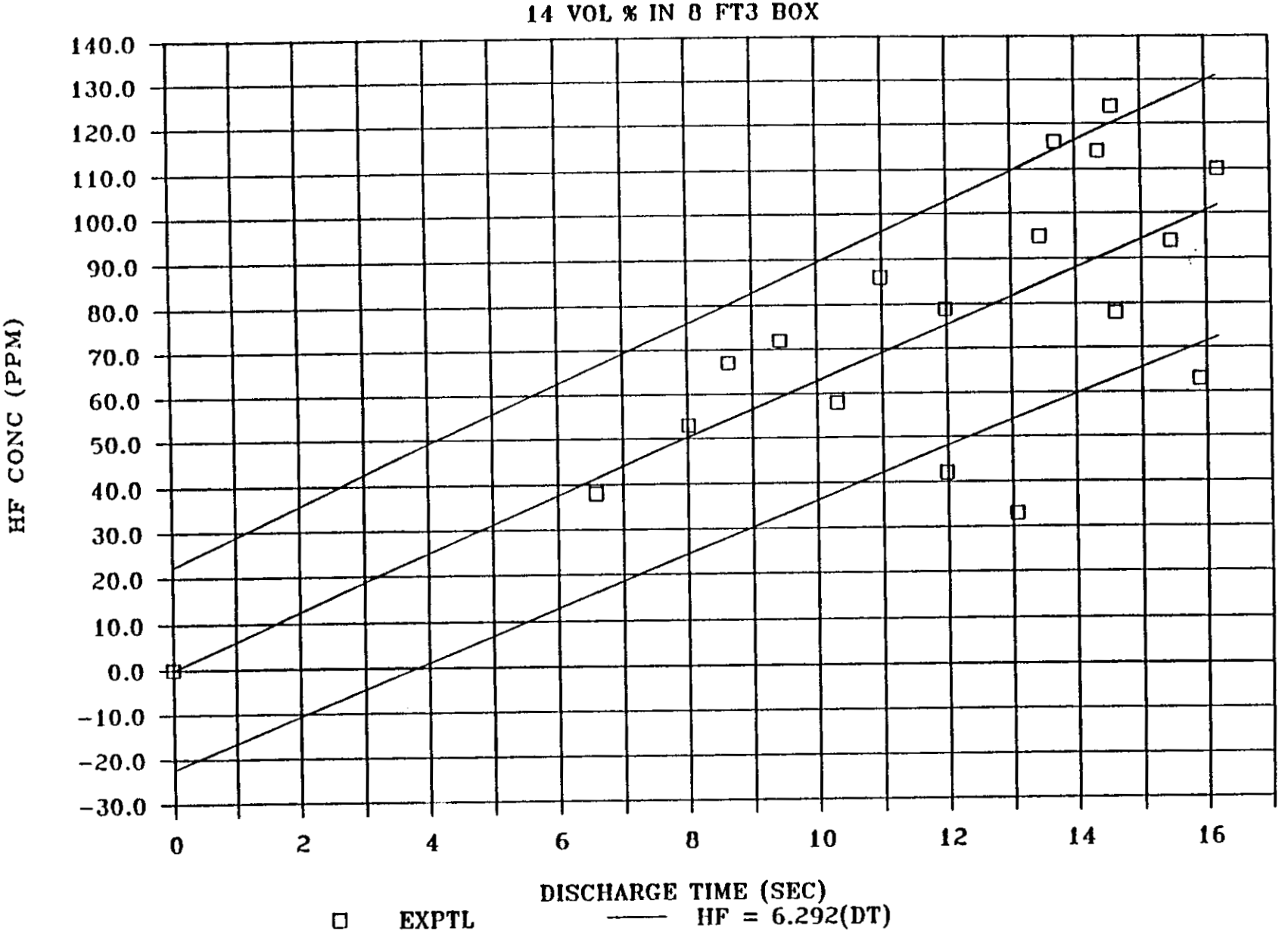


FE-13 TESTING ON "MEDIUM" FIRES



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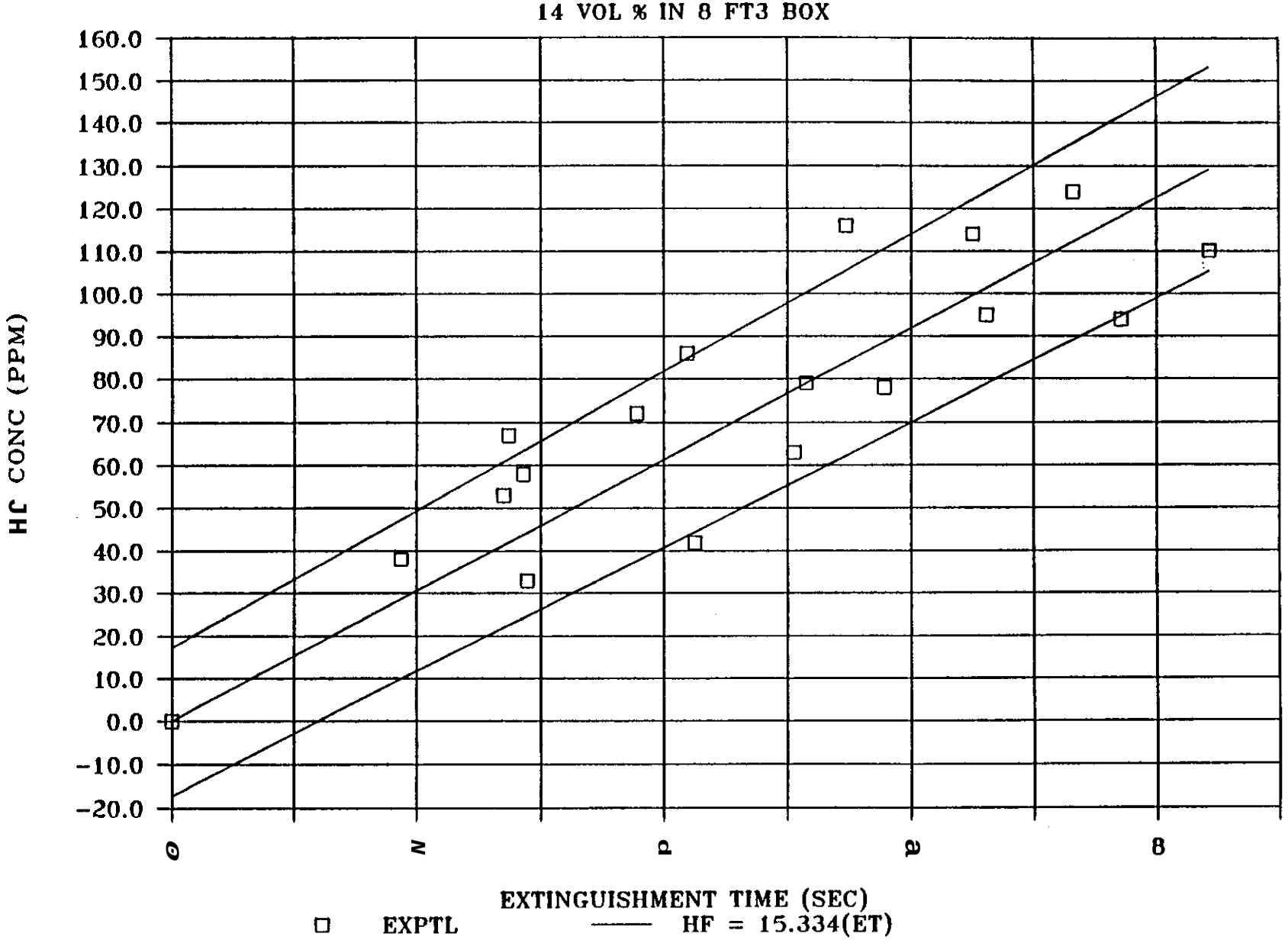

Comparative Data

Very Large Heptane Fires

Agent	DT (Sec)	ET (Sec)	HF (ppm)
FE-25	10.0	4.55 +/- 0.45	612 +/- 154
FE-13	10.0	4.05 +/- 0.85	816 +/- 187
H-1301	10.0	3.0 +/- 1	555 +/- 204

Medium Heptane Fires

Agent	(Sec)	(Sec)	(ppm)
FE-25	10.0	4.05 +/- 0.75	137 +/- 28
FE-13	10.0	4.1 +/- 113	63 +/- 27

Small Heptane Fires

FE-25	< 5 ppm HF
FE-13	< 5 ppm HF

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Regression Analysis

- FE-25 "Very Large" Fires

  ET = [0.457 (+/- 0.0125) X DT] +/- 0.330

  HF = [61.21 (+/- 4.223) X DT] +/- 111.43

  HF = [141.32 (+/- 4.13) X ET] +/- 119.05

- FE-25 "Medium" Fires

  ET = [0.482 (+/- 0.0177) X DT] +/- 0.571

  HF = [13.70 (+/- 0.671) X DT] +/- 21.650

  HF = [28.495 (+/- 0.710) X ET] +/- 11.148

- FE-25 "Small" Fires

  < 5 ppm all cases

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Regression Analysis

- FE-13 "Very Large" Fires

  ET = [0.402 (+/- 0.020) X DT] +/- 0.661

  HF = [81.606 (+/- 4.362) X DT] +/- 143.85

  HF = [200.212 (+/- 8.681) X ET] +/- 117.60

- FE-13 "Medium" Fires

  ET = [0.407 (+/- 0.021) X DT] +/- 1.109

  HF = [6.292 (+/- 0.429) X DT] +/- 22.311

  HF = [15.334 (+/- 0.797) X ET] +/- 17.280

- FE-13 "Small" Fires

  < 5 ppm all cases

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Box Testing Conclusions

- Longer Discharge times gives Longer extinguishant times.
- Longer extinguishant times gives larger HF concentrations.
- Extinguishant times are less than Discharge times.
- FE-25 and FE-13 give slightly longer extinguishant times vs. H-1301.
- FE-25, FE-13 and H-1301 gives comparable HF concentrations.

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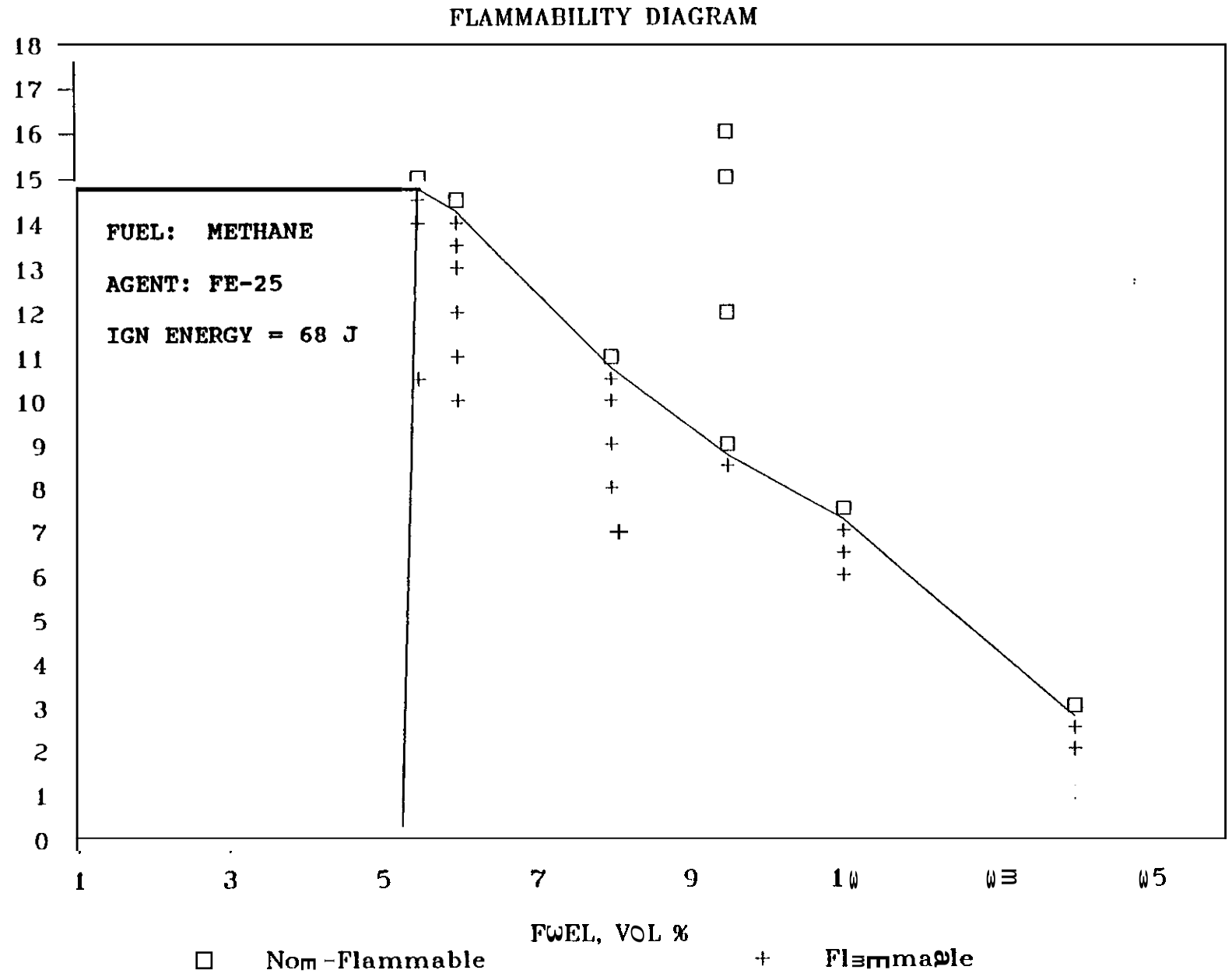
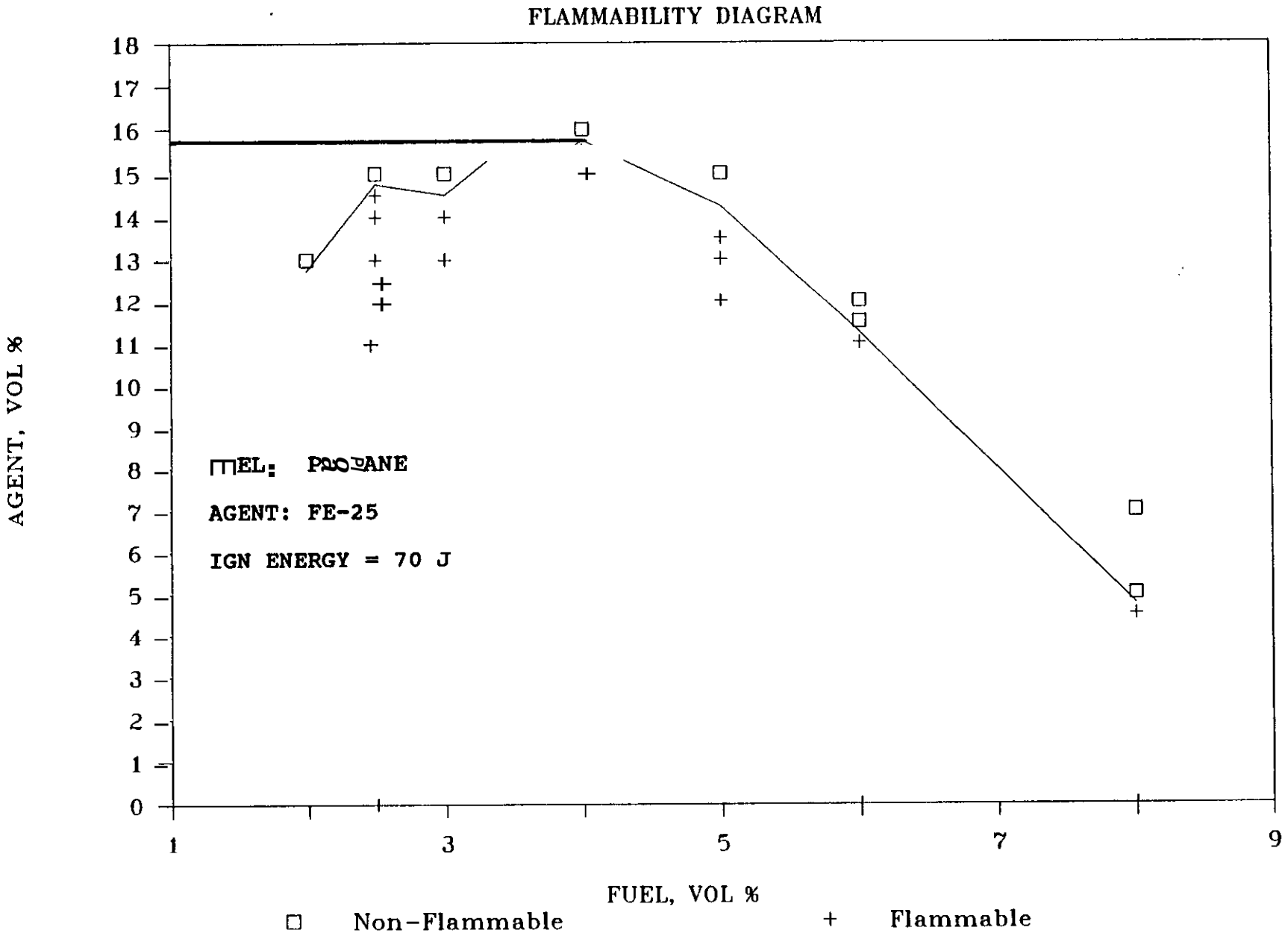
HALON ALTERNATIVE EVALUATION



HA ON ALTERNATIVE EVALUATION



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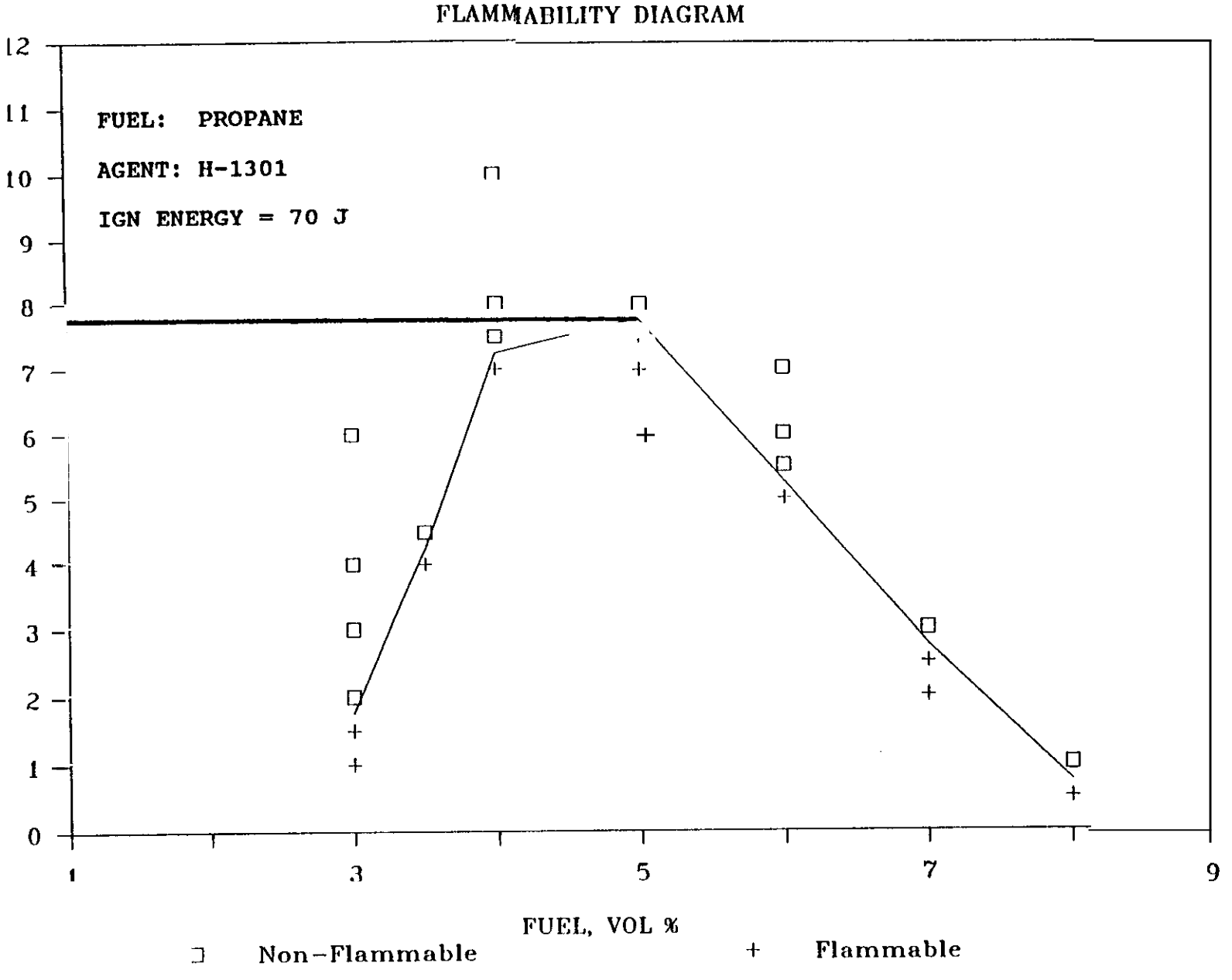

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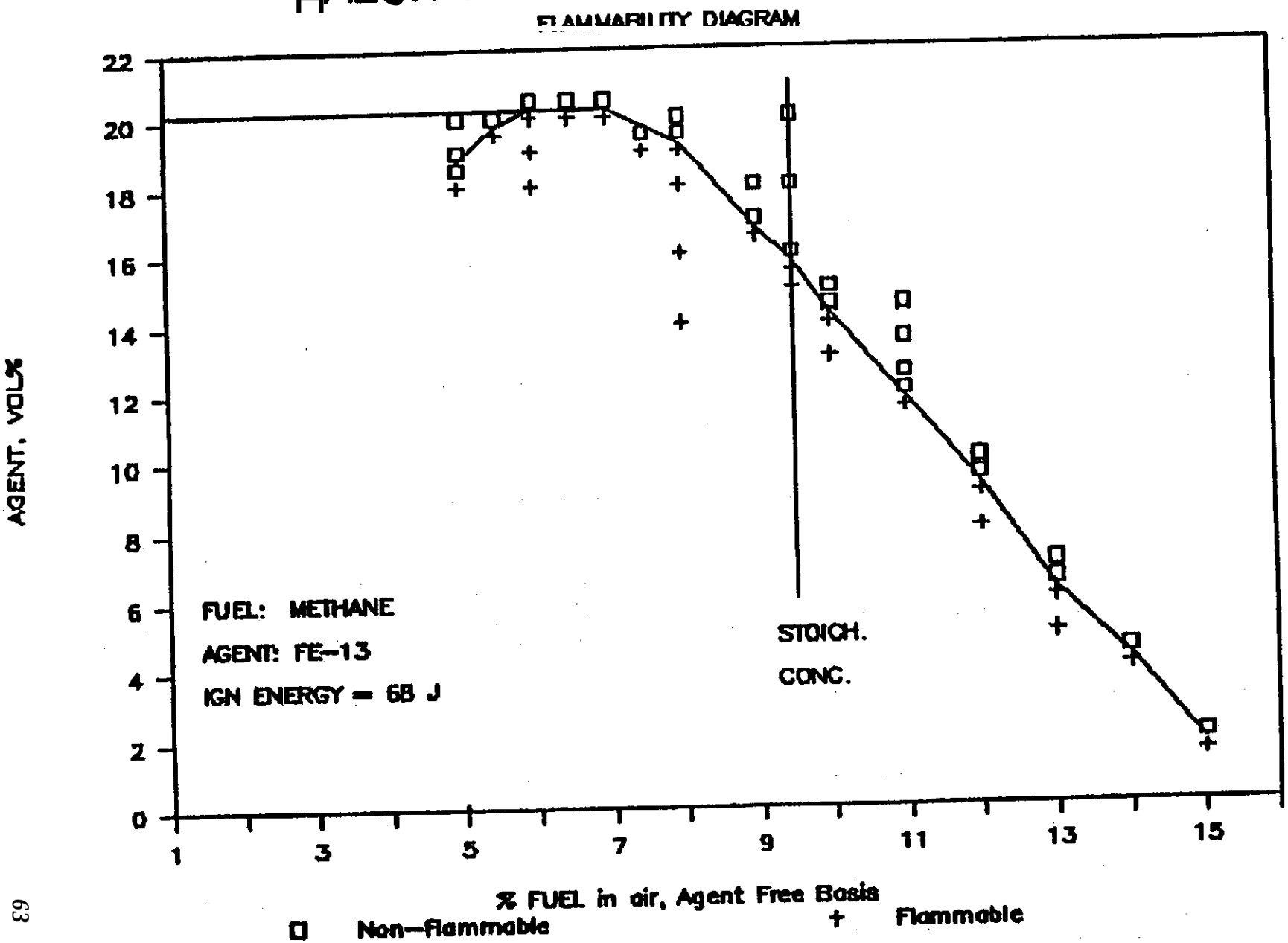

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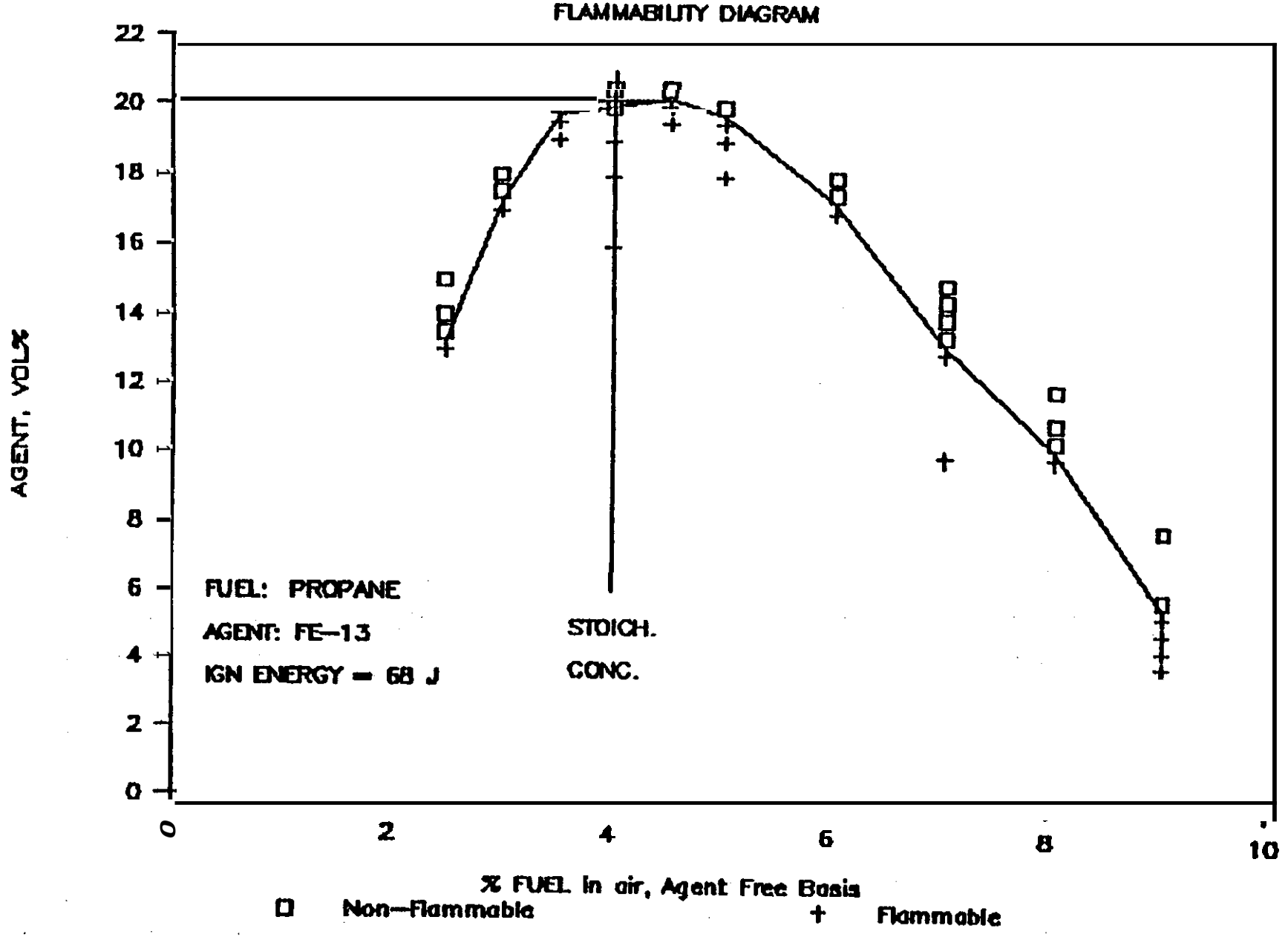

Inerting Concentrations

Agent	Fuel	
	Methane	Propane
FE-25	15	16
FE-13	20	20
H-1301	7*	a

* From NFPA 12A

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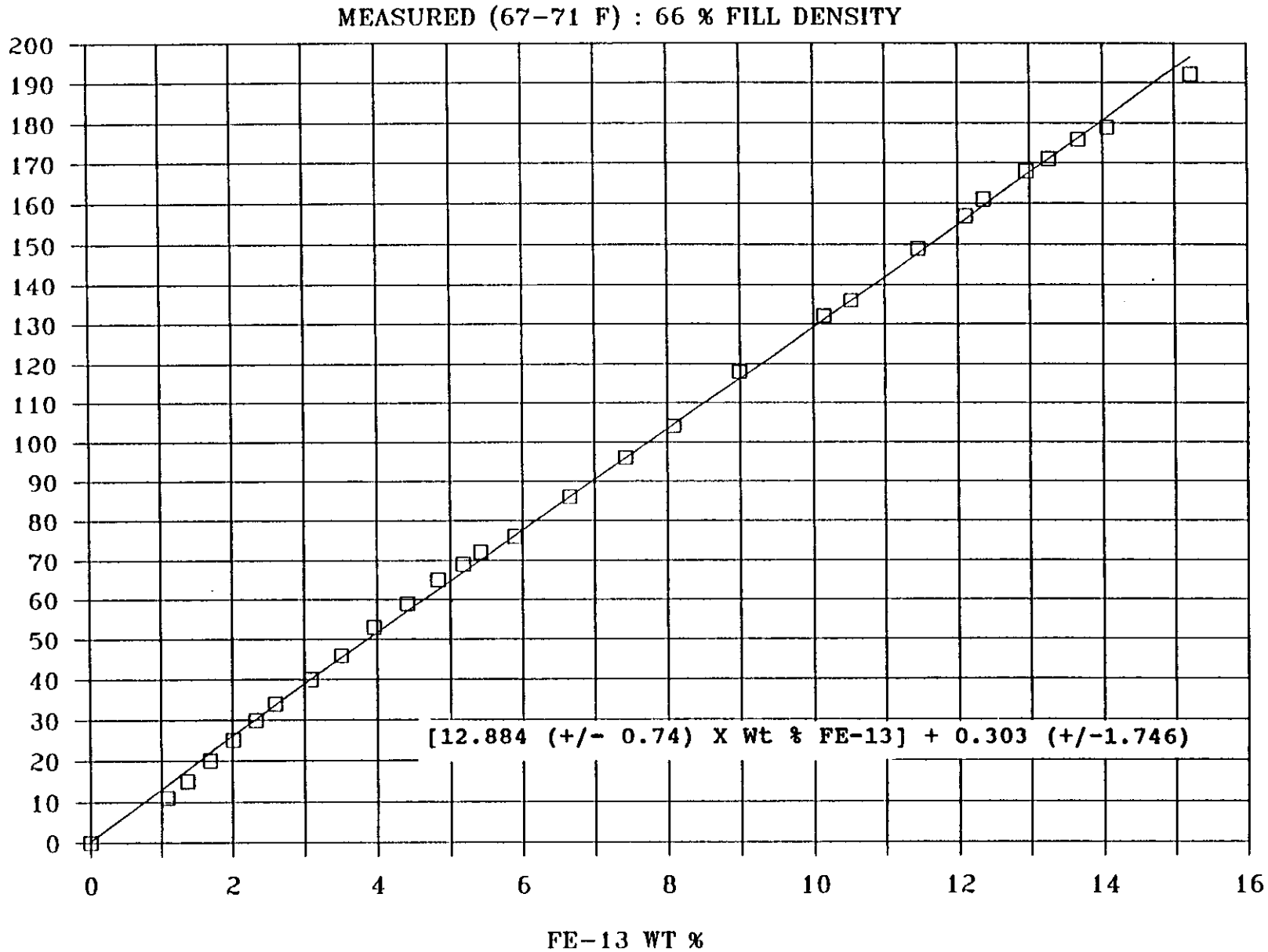
V.P. OF FE-13/FE-232 BLENDS



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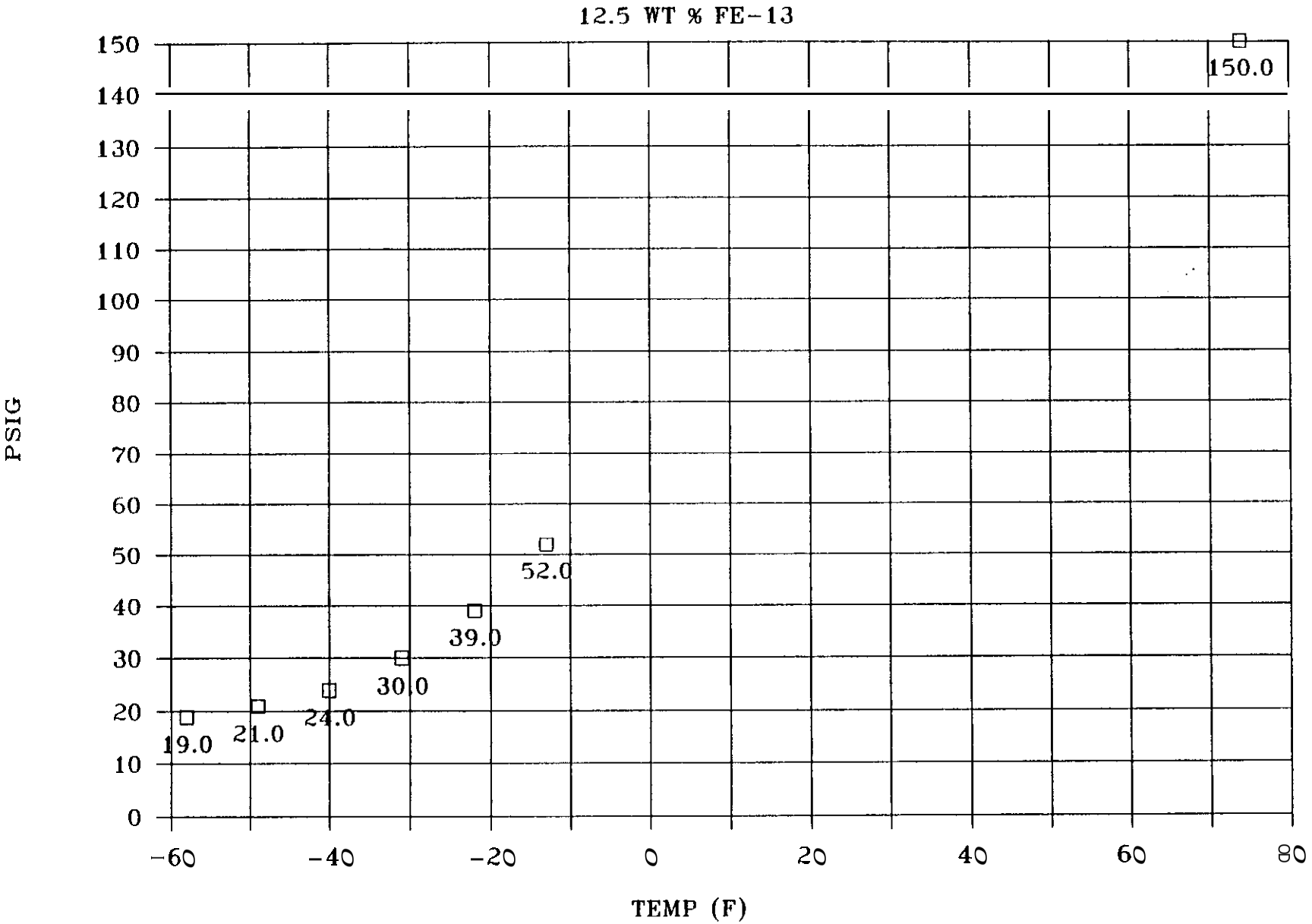

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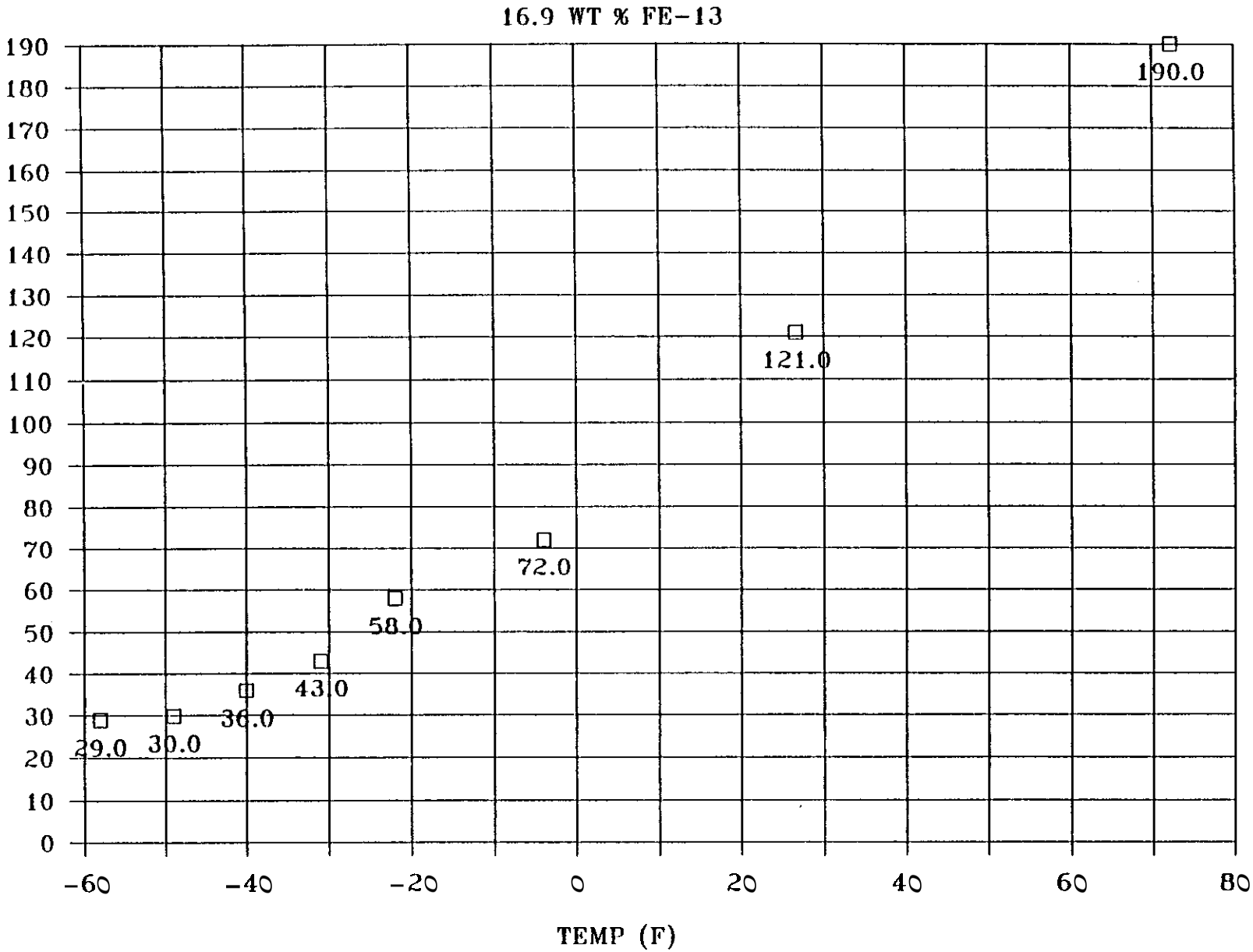

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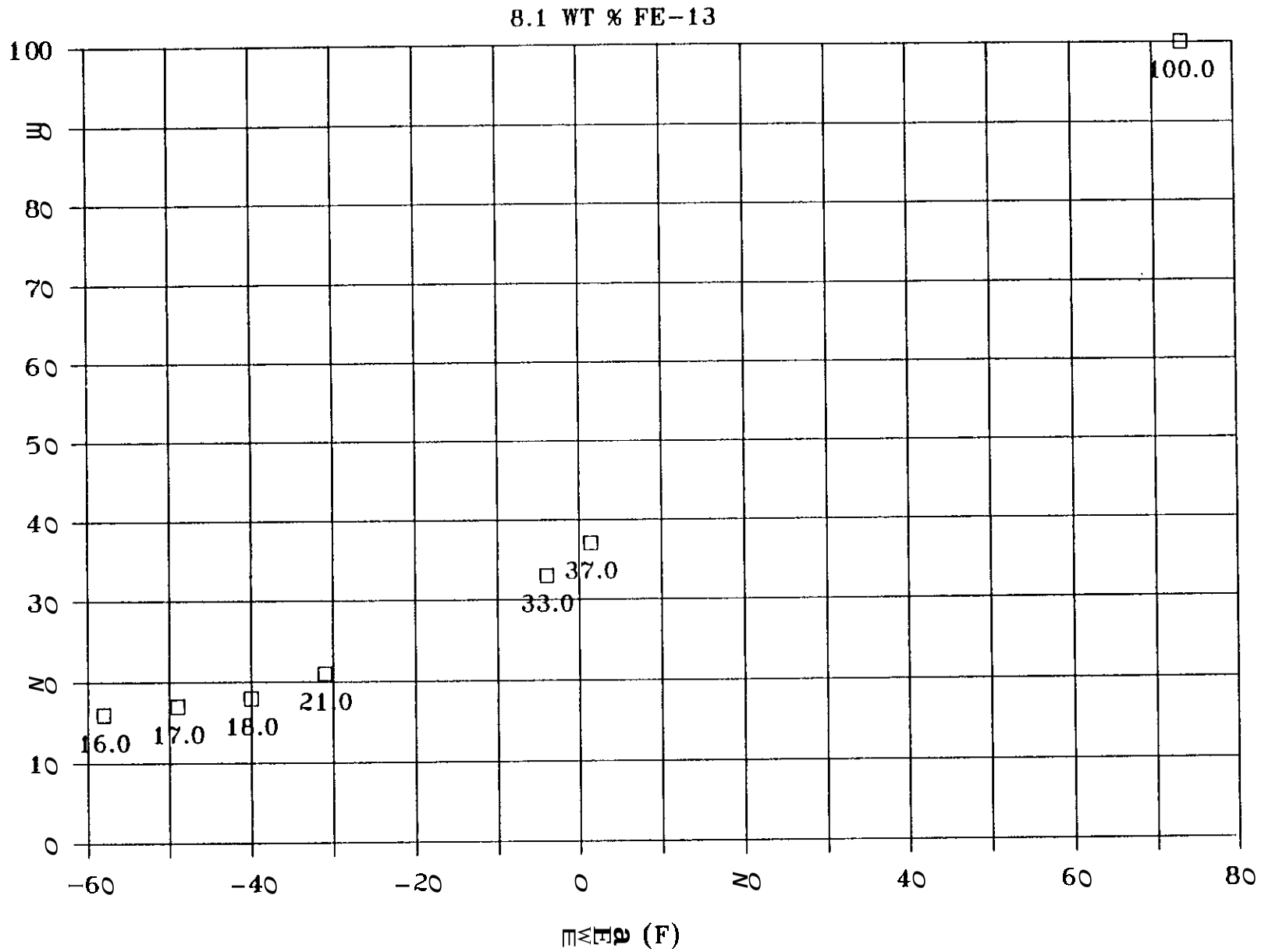

V.P. OF FW-13
FROM MATHESON
PSIG
TEMP (F)
80
40
0
-40
-80
-120
-160
-200
0
100
300
500
600