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FUEL RESEARCH INSTITUTE

OF SOUTH AFRICA

TEGNIESE MEMORANDUM NO. 4 OF 1961
TECHNICAL

A REPORT OF THE RESULTS OF TWO PERFORMANCE TESTS CARRIED OUT ON A WEMCO-DRUM DENSE MEDIUM WASHING PLANT AT ELANDSBERG COLLIERY IN JANUARY, 1961.

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CONFIDENTIAL

A REPORT OF THE RESULTS OF TWO PERFORMANCE TESTS CARRIED OUT ON A WEMCO-DRUM DENSE MEDIUM WASHING PLANT AT ELANDSBERG COLLIERY IN JANUARY, 1961.

INTRODUCTION:

A WEMCO heavy medium washing plant was installed at this Colliery during the latter half of 1960. The plant is one of the manufacturing company's so-called "Mobil-Mill" units and was supplied and erected by Messrs Fraser and Chalmers S.A. (Pty)Ltd.,

As this was the first drum-type dense medium separator to be installed in this country for coal beneficiation this Institute was naturally very interested in its performance. Through the kind co-operation of the proprietors and suppliers of the washer, arrangements were made for officers of the Institute to carry out a performance test in January, 1961.

DESCRIPTION OF THE PLANT:

The washing plant has a rated capacity of some 100 tp.h. when treating 60 mm x 6 mm feed coal.

The separating vessal is a conventional two-product drum, 8 ft. in diameter and 8 ft. long and operates on a suspension of finely milled natural magnetite in water. The drum rotates as a unit. The speed of rotation can be varied between 0.8 r.p.m. and 2.0 r.p.m. depending on the amount of discards to be extracted. Medium circulation through the separator is of the order of 600 - 700 g.p.m. The clean coal is carried out of the separator by the circulating medium while the discards are elevated by flights attached to the inside of the drum and dropped into a discard launder above the clean coal level.

Medium recovery is done in the conventional manner by means of a magnetic separator. At the time these tests were conducted the plant was not equipped with automatic specific gravity control and the specific gravity in the separating vessel had

to be....2/

to be controlled manually. By lifting or lowering the worm of the densifier unit the amount of make-up overdense medium introduced into the correct density system can be decreased or increased.

TEST PROCEDURE:

A representative of the Western Machinery Company in France who visited the plant, expressed the opinion that for optimum separating efficiency the separator should be operated on a medium suspension containing a fair proportion of coal slimes. He suggested that this state could be attained by deliberately reducing the efficiency of the pre-bath wet screening thus allowing a certain amount of coal fines to enter the separator.

Officers of this Institute did not agree with this method. Previous experience on dense medium plants operating on a suspension of natural magnetite in water led them to the conclusion that, provided the contemplated specific gravity of separation was such that the necessary degree of suspension stability could be maintained by way of demagnetisation, the inclusion of coal slimes - which is invariably accompanied by granular coal particles - could have none but detrimental effects on plant performance in general. As the specific gravity of separation in this particular case was to be of the order of 1.52, there appeared to be no reason why a suspension with a satisfactory degree of stability could not be obtained by demagnetisation alone.

After some discussions it was decided to carry out two parallel tests in order to establish the effect of medium contamination on the separating efficiency of the plant.

Apart from the medium suspension itself the two tests were to be conducted in identical manner.

The test where the medium was to be as free from coal slimes as possible, was carried out first. Thereafter the water sprays on the prebath wet screen ($\frac{1}{8}$" round aperture) were shut off and the plant was operated for some six hours with slimes and slurry entering the separator to get the required contamination.

Both tests were carried out over a period of one hour with a suspension specific gravity of 1.52 in each case. The load in each

test....3/

test was approximately 65 t.p.h. which was the maximum rate the feeder arrangement was capable of delivering.

SAMPLING PROCEDURE:

Sampling procedure was the same for both tests. The various products were sampled in the following manners:-

(a) Feed Coal: Increments of this product were taken from the lip of the pre-bath wet screen at 2 minute intervals. Increments weighed between 10 and 15 lb. each. Only one sample was taken covering both test periods.

(b) Clean Coal: Samples of this product were obtained by taking increments from the discharge lip of the clean coal section of the draining, rinsing and dewatering screen at 1 minute intervals. Each increment weighed approximately 25 lb.

(c) Discards: These samples were taken in the same manner as the clean coal samples from the relevant section of the screen. Increments weighed approximately 25 lb. each.

ANALYSES OF SAMPLES:

All samples were transported to the Fuel Research laboratories in Pretoria by road. On arrival at the laboratory the samples were air-dried, weighed and screened at 60 mm., 35mm, 20 mm., 12 mm., and 6 mm. The results of these screen analyses are reported in Tables 1 and 2.

Each size fraction (with the exception of the -6mm. fractions) was then subjected to individual float and sink analysis in the specific gravity range 1.40 to 1.64 at 0.02 s.g. intervals. The ash content of each specific gravity fraction was determined and cumulative values calculated. These results are shown in Tables 3 to 12.

On the minus 6 mm. size fractions only ash determinations on a whole coal basis were carried out with the results reported in Table 13.

EVALUATION OF RESULTS:

Facilities for weighing of the products were not available and it was therefore necessary to derive the respective yields of

clean....4/

clean coal and discards for the two tests from "ash balances". This was done by using the relevant data in Tables 3-12. Tromp Distribution Factors were then calculated for each size fraction of each test and the Tromp Distribution Factor Curves were plotted (See Figures 1 - 10). From these curves the respective probable errors and specific gravities of separation (cut points) for the various size fractions in each test, were derived.

Washability curves of the reconstituted feed coals for each of the size fractions were drawn. With the assistance of these, the organic efficiencies of the various separations were then calculated using the formula:

$$\text{Organic Efficiency} = \frac{\text{Yield of clean coal obtained} \times 100}{\text{Theoretical Yield of clean coal at ash content of clean coal actually obtained.}}$$

The performance results are summarised in Table 14.

DISCUSSION OF RESULTS:

The performance data given in Table 14 prove conclusively that a better separating efficiency is obtained when the washer is operated on a medium containing a minimum amount of coal fines.

In this particular test the medium suspension was found to be appreciably less stable than as normal for this type of medium suspension at this specific gravity. (It was subsequently established that, during the milling of this batch of magnetite, the ultra-fine size fraction had been deleted). There is reason to believe that the separating efficiency could be further improved by using a suspension of normal stability.

The use of a medium suspension contaminated with coal slurry cannot be recommended, not only because of the poorer separating efficiency obtained but also because higher medium losses (more difficult medium recovery and other operating difficulties may be expected.

(Sgd) B. VAN ECK
SENIOR TECHNICAL OFFICER

Pretoria
14th March, 1961.
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TABLE 1

SCREEN ANALYSIS

TEST 1. (PREBATH WET SCREENING)

SIZE	RAW COAL			WASHED COAL			DISCARD		
	Weight lb.	Fract. %	Cum. %	Weight lb.	Fract. %	Cum. %	Weight lb.	Fract. %	Cum. %
+ 60 mm.	69.25	10.56	10.56	198.25	12.84	12.84	167.0	10.59	10.59
- 60 mm. + 35 mm.	200.5	30.59	41.14	501.25	32.47	45.31	452.75	28.70	39.29
- 35 mm. + 20 mm.	151.75	23.15	64.29	335.0	21.70	67.01	359.5	22.79	62.08
- 20 mm. + 12 mm.	105.25	16.06	80.35	242.75	15.73	82.74	289.0	18.32	80.40
- 12 mm. + 6 mm.	92.75	14.15	94.50	194.50	12.59	95.33	232.5	14.74	95.14
- 6 mm.	30.0	4.58	99.08	63.75	4.13	99.46	71.25	4,53	99.67
Loss	6.0	0.92		8.25	0.53		5.5	0.35	100.02
TOTAL	655.5	100.01	100.00	1543.5	99.99	99.99	1577.5	100.02	

TABLE 2

SCREEN ANALYSIS

TEST II. (PREBATH DRY SCREENING)

SIZE	RAW COAL			WASHED COAL			DISCARD		
	Weight lb.	Fract. %	Cum. %	Weight lb.	Fract. %	Cum. %	Weight lb.	Fract. %	Cum. %
+ 60 mm.	101.75	9.36	9.36	162.75	11.53	11.53	209.5	12.83	12.83
- 60 mm. + 35 mm.	224.75	20.67	30.03	305.75	21.67	33.20	503.25	30.82	43.65
- 35 mm. + 20 mm.	187.25	17.22	47.25	262.5	18.60	51.80	365.0	22.35	66.00
- 20 mm. + 12 mm.	188.0	17.29	64.54	261.25	18.51	70.31	275.25	16.86	82.86
- 12 mm. + 6 mm.	189.5	17.43	81.97	280.0	19.84	90.15	191.0	11.70	94.56
- 6 mm.	191.75	17.64	99.60	136.0	9.64	99.79	86.75	5.31	99.87
LOSS	4.5	0.41		3.0	0.21		2.0	0.12	
TOTAL	1087.5	100.01	100.01	1411.25	100.00	100.00	1632.75	99.99	99.99

TABLE 3

Test 1

FLOAT AND SINK ANALYSIS OF + 60 mm. MATERIAL

S.G.	RAW COAL				WASHED COAL (0.6761)				DISCARD (0.3239)				DIST. FACTOR (TromP)
	YIELD		ASH		YIELD		ASH		YIELD		ASH		
	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	
Float 1.40	-	-	-	-	-	-	-	-	-	-	-	-	-
1.40 - 1.42	1.65	1.65	5.3	5.30	2.22	2.22	4.6	4.60	-	-	-	-	100,0
1.42 - 1.44	15.58	17.23	5.8	5.75	25.86	28.08	5.7	5.61	-	-	-	-	100.0
1.44 - 1.46	10.98	28.21	6.6	6.08	14.12	42.20	7.1	6.11	-	-	-	-	100.0
1.46 - 1.48	9.80	38.01	7.2	6.37	20.80	63.00	7.5	6.57	-	-	-	-	100.0
1.48 - 1.50	11.45	49.46	9.9	7.19	18.67	81.67	9.2	7.17	-	-	-	-	100.0
1.50 - 1.52	14.23	63.69	10.6	7.95	15.89	97.56	11.1	7.81	4.86	4.86	11.2	11.20	87.2
1.52 - 1.54	5.90	69.59	9.8	8.11	2.43	99.99	8.7	7.83	16.04	20.90	12.5	12.20	24.8
1.54 - 1.56	5.02	75.61	14.3	8.41	-	-	-	-	15.98	36.88	14.3	13.11	-
1.56 - 1.58	6.85	81.46	13.4	8.93	-	-	-	-	9.97	46.85	19.5	14.47	-
1.58 - 1.60	2.24	83.70	18.2	9.18	-	-	-	-	6.17	53.02	19.6	15.07	-
1.60 - 1.62	1.48	85.18	17.8	9.33	-	-	-	-	5.59	58.61	21.6	15.69	-
1.62 - 1.64	1.83	87.01	21.3	9.58	-	-	-	-	5.35	63.96	24.5	16.43	-
Sink 1.64	12.99		41.7		-	-	-	-	36.04		43.3		-
TOTALS:	100.00			13.75	99.99			7.83	100.00			26.11	

TABLE 4

TE T 1

FLOAT AND SINK ANALYSES OF -60 mm + 35 mm MATERIAL

S.G.	RAW COAL				WASHED COAL (0.6113)				DISCARD (0.3887)				
	YIELD		ASH		YIELD		ASH		YIELD		ASH		
	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	DIST. FACTOR (Tromp)
Float 1.40	-	-	-	-	-	-	-	-	-	-	-	-	-
1.40-1.42	2.23	2.23	5.2	5.20	2.53	2.53	4.5	4.50	-	-	-	-	100.0
1.42-1.44	10.64	12.87	6.2	6.03	20.46	22.99	5.7	5.57	-	-	-	-	100.0
1.44-1.46	12.04	24.91	7.2	6.60	18.86	41.85	6.4	5.94	-	-	-	-	100.0
1.46-1.48	10.91	35.82	7.9	7.00	19.36	61.21	7.3	6.37	0.14	0.14	4.4	4.40	99.6
1.48-1.50	10.12	45.94	9.4	7.53	21.40	82.61	9.1	7.08	0.31	0.45	11.1	9.02	99.1
1.50-1.52	10.03	55.97	9.3	7.85	13.81	96.42	10.7	7.60	3.82	4.27	10.8	10.61	85.1
1.52-1.54	8.13	64.10	9.4	8.05	3.44	99.86	11.9	7.75	13.73	18.00	11.6	11.37	28.2
1.54-1.56	8.11	72.21	10.6	8.34	0.14	100.00	10.0	7.75	14.02	32.02	14.0	12.52	0.2
1.56-1.58	4.34	76.55	14.2	8.67	-	-	-	-	8.94	40.96	17.1	13.52	-
1.58-1.60	2.92	79.47	16.8	8.97	-	-	-	-	7.85	48.81	19.7	14.51	-
1.60-1.62	2.68	82.15	19.6	9.32	-	-	-	-	7.54	56.35	20.0	15.24	-
1.62-1.64	2.06	84.21	23.2	9.66	-	-	-	-	4.88	61.23	24.8	16.00	-
Sink 1.64	15.79		42.0		-	-	-	-	38.77		41.3	5.81	-
TOTAL	100.00	100.00		14.77	100.00			7.75	100.00			25.81	

TABLE 5

TEST 1

FLOAT AND SINK ANALYSIS OF -35mm + 20mm MATERIAL

S.G.	RAW COAL				WASHED COAL (0.6083)				DISCARD (0.3917)				DIST. FACTOR (TROMP)
	YIELD		ASH		YIELD		ASH		YIELD		ASH		
	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	
Float 1.40	0.03	0.03	4.5	4.50	-	-	-	-	-	-	-	-	-
1.40 - 1.42	2.05	2.08	4.7	4.70	4.03	4.03	4.5	4.50	-	-	-	-	100.0
1.42 - 1.44	9.33	11.41	5.2	5.11	20.17	24.20	5.3	5.17	0.04	0.04	6.9	6.90	99.8
1.44 - 1.46	9.98	21.39	6.0	5.53	21.07	45.27	6.5	5.79	0.05	0.09	7.0	7.00	99.8
1.46 - 1.48	11.82	33.21	7.7	6.30	18.23	63.50	7.3	6.22	0.10	0.19	7.5	7.26	99.6
1.48 - 1.50	9.57	42.78	9.6	7.04	19.27	82.77	8.9	6.84	0.61	0.80	9.9	9.27	98.0
1.50 - 1.52	9.00	51.78	9.4	7.45	12.85	95.62	9.9	7.25	3.98	4.78	10.6	10.38	83.4
1.52 - 1.54	9.06	60.84	8.9	7.67	4.03	99.65	10.7	7.39	11.82	16.60	9.9	10.04	34.1
1.54 - 1.56	8.17	69.01	9.6	7.90	0.26	99.91	13.9	7.41	12.93	29.53	12.9	11.29	3.1
1.56 - 1.58	4.52	73.53	13.5	8.24	0.09	100.00	16.4	7.42	9.71	39.24	16.9	12.68	1.3
1.58 - 1.60	3.86	77.39	17.7	8.71	-	-	-	-	7.29	46.53	19.1	13.94	-
1.60 - 1.62	2.85	80.24	19.7	9.10	-	-	-	-	6.92	53.45	22.0	14.98	-
1.62 - 1.64	3.27	83.51	25.9	9.76	-	-	-	-	5.67	59.12	24.5	15.89	-
Sink 1.64	16.49	-	43.5		-	-	-	-	40.88	-	44.5		-
TOTAL	100.00			15.32	100.00			7.42	100.00			27.59	

TABLE 6

TEST I

FLOAT AND SINK ANALYSIS OF -20 mm + 12 mm MATERIAL

S.G.	RAW COAL				WASHED COAL (0.5519)				DISCARD (0.4481)				DIST. FACTOR (TROMP)
	YIELD		ASH		YIELD		ASH		YIELD		ASH		
	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	
Float 1.40	0.08	0,08	4.0	4.00	0.01	0.01	4.3	4.30	-	-	-	-	100.0
1.40 - 1.42	1.44	1.52	4.7	4.66	3.84	3.85	4.5	4.50	0.01	0.01	4.5	4.50	100.0
1.42 - 1.44	6.64	8.16	5.3	5.18	15.65	19.50	5.1	4.98	0.04	0.05	6.5	4.80	99.8
1.44 - 1.46	9.03	17.19	6.0	5.61	20.20	39.70	6.6	5.80	0.10	0.15	6.8	6.13	99.6
1.46 - 1.48	10.81	28.00	7.2	6.22	20.40	60.10	7.7	6.44	0.26	0.41	7.7	7.13	98.9
1.48 - 1.50	8.62	36.62	8.4	6.73	18.05	78.15	8.6	6.94	0.76	1.17	9.9	8.93	96.7
1.50 - 1.52	8.21	44.83	8.7	7.09	14.17	92.32	9.1	7.27	3.08	4.25	9.2	9.13	85.0
1.52 - 1.54	10.68	55.51	8.5	7.36	6.15	98.47	10.3	7.46	8.68	12.93	10.1	9.78	46.6
1.54 - 1.56	8.14	63.65	9.8	7.67	1.20	99.67	11.9	7.51	12.15	25.08	12.1	10.90	10.8
1.56 - 1.58	5.27	68.92	12.8	8.06	0.22	99.89	15.7	7.53	8.69	33.77	15.1	11.98	3.0
1.58 - 1.60	3.70	72.62	16.6	8.50	0.06	99.85	21.2	7.54	7.20	40.97	17.7	12.98	0.9
1.60 - 1.62	2.87	75.49	18.9	8.90	0.04	99.99	29.0	7.55	6.40	47.37	19.9	13.91	0.7
1.62 - 1.64	2.74	78.23	22.9	9.39	-	-	-	-	6.06	53.43	23.6	15.01	-
Sink 1.64	21.76		45.4		-	-	-	-	46.55		45.4		-
TOTAL	99.99	99.99		17.23	99.99	99.99		7.55	99.98	99.98		29.15	

TABLE 7

TEST I

FLOAT AND SINK ANALYSIS OF -12mm + 6 mm MATERIAL

S.G.	RAW COAL				WASHED COAL (0.5674)				DISCARD (0.4326)				DIST. FACTOR (Tromp
	YIELD		ASH		YIELD		ASH		YIELD		ASH		
	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	
Float 1.40	0.04	0.04	3.8	3.80	0.27	0.27	3.6	3.60	-	-	-	-	
1.40 - 1.42	1.61	1.65	4.2	4.19	3.95	4.24	4.2	4.14	0.03	0.03	5.3	5.30	99.6
1.42 - 1.44	6.75	8.40	5.3	5.08	14.49	18.73	4.7	4.57	0.09	0.12	6.5	6.20	99.5
1.44 - 1.46	8.25	16.65	5.7	5.39	18.64	37.37	6.1	5.33	0.17	0.29	7.4	6.90	99.3
1.46 - 1.48	10.07	26.72	6.5	5.81	17.63	55.00	6.7	5.77	0.31	0.60	9.1	8.04	98.7
1.48 - 1.50	9.11	35.83	7.7	6.29	15.91	70.91	8.0	6.27	0.85	1.45	9.0	8.60	96.1
1.50 - 1.52	7.93	43.76	8.3	6.65	14.79	85.70	8.5	6.65	2.27	3.72	9.0	8.84	89.5
1.52 - 1.54	10.18	53.94	8.0	6.90	9.12	94.82	9.2	6.90	6.72	10.44	9.1	9.01	64.0
1.54 - 1.56	8.25	62.19	9.8	7.28	3.55	98.37	10.9	7.04	10.20	20.64	10.9	9.94	31.3
1.56 - 1.58	5.14	67.33	12.5	7.68	1.01	99.38	14.4	7.11	8.12	28.76	13.9	11.06	14.0
1.58 - 1.60	4.18	71.51	15.3	8.13	0.35	99.73	16.7	7.14	7.67	36.43	16.5	12.21	5.7
1.60 - 1.62	3.75	75.26	18.9	8.67	0.12	99.85	20.5	7.16	7.06	43.49	19.2	13.34	2.2
1,62 - 1.64	3.11	78.37	22.3	9.21	0.07	99.92	21.7	7.16	5.93	49.42	22.9	14.49	1.5
Sink 1.64	21.64		45.4		0.10		28.4		50.58		45.2		0.3
TOTAL	100.01	100.01		17.06	100.02	100.02		7.18	100.00	100.00		30.02	

TABLE 8

TEST II

FLOAT AND SINK ANALYSIS OF + 60 mm MATERIAL

S.G.	RAW COAL				WASHED COAL (0.6819)				DISCARD (0.3181)				DIST. FACTOR (TROMP)
	YIELD		ASH		YIELD		ASH		YIELD		ASH		
	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	
Float 1.40	-	-	-	-	-	-	-	-	-	-	-	-	-
1.40 - 1.42	1.65	1.65	5.3	5.30	3.82	3.82	5.8	5.80	-	-	-	-	100.0
1.42 - 1.44	15.58	17.23	5.8	5.75	26.30	30.12	6.3	6.24	2.14	2.14	5.7	5.70	96.3
1.44 - 1.46	10.98	28.21	6.6	6.08	21.68	51.80	6.9	6.52	3.47	5.61	7.6	6.88	93.1
1.46 - 1.48	9.80	38.01	7.2	6.37	9.49	61.29	8.7	6.86	2.66	8.27	9.1	7.59	88.4
1.48 - 1.50	11.45	49.46	9.9	7.19	16.69	77.98	10.5	7.64	4.37	12.64	12.5	9.29	89.1
1.50 - 1.52	14.23	63.69	10.6	7.95	8.93	86.91	9.7	7.85	6.94	19.58	12.1	10.29	73.4
1.52 - 1.54	5.90	69.59	9.8	8.11	12.14	99.05	9.0	7.99	9.70	29.28	10.3	10.29	72.8
1.54 - 1,56	5.02	75.61	14.3	8.41	0.27	99.32	6.4	7.99	8.46	37.74	14.1	11.14	6.3
1.56 - 1.58	6.85	81.46	13.4	8.93	0.68	100.00	6.1	7.98	10.46	48.20	14.2	11.80	1.2
1.58 - 1.60	2.24	83.70	18.2	9.18	-		-	-	5.56	53.76	15.0	12.12	-
1.60 - 1.62	1.48	85.18	17.8	9.33	-		-	-	3.61	57.37	23.0	12.81	-
1.62 - 1.64	1.83	87.01	21.3	9.58	-		-	-	5.94	63.31	23.3	13.79	-
Sink 1.64	12.99		41.7		-		-	-	36.69		47.4		-
TOTAL	100.00	100.00		13.75	100.00	100.00		7.98	100.00	100.00		26.12	

TABLE 9

TEST II

FLOAT. AND SINK ANALYSIS OF -60 mm + 35 mm MATERIAL.

S.G.	RAW COAL				WASHED COAL (0.3931)				DISCARD (0.6069)				dist. factor (Tromp)
	YIELD		ASH		YIELD		ASH		YIELD		ASH		
	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	
Float 1.40	-	-	-	-	-	-	-	-	-	-	-	-	-
1.40 - 1.42	2.23	2.23	5.2	5.20	5.07	5.07	5.1	5.10	0.24	0.24	4.9	4.90	93.0
1.42 - 1.44	10.64	12.87	6.2	6.03	21.74	26.81	5.5	5.42	4.64	4.88	5.3	5.28	75.2
1.44 - 1.46	12.04	24.91	7.2	6.60	15.88	42.69	6.1	5.57	5.16	10.04	6.1	5.70	66.6
1.46 - 1.48	10.91	35.82	7.9	7.00	11.47	54.16	8.4	6.25	3.70	13.74	8.3	6.40	66.7
1.48 - 1.50	10.12	45.94	9.4	7.53	15.88	70.04	9.8	7.05	5.34	19.08	9.4	7.24	65.8
1.50 - 1.52	10.03	55.97	9.3	7.85	12.92	82.96	9.2	7.38	8.24	27.32	8.8	7.71	50.4
1.52 - 1.54	8.13	64.10	9.4	8.05	11.86	94.82	7.8	7.43	11.26	38.58	8.0	7.79	40.6
1.54 - 1.56	8.11	72.21	10.6	8.34	4.15	98.97	9.4	7.51	12.21	50.79	10.1	8.35	18.0
1.56 - 1.58	4.34	76.55	14.2	8.67	0.76	99.73	12.5	7.55	8.20	58.99	13.7	9.09	5.7
1.58 - 1.60	2.92	79.47	16.8	8.97	0.27	100.00	21.7	7.59	5.24	64.23	16.8	9.72	5.3
1.60 - 1.62	2.68	82.15	19.6	9.32	-	-	-		4.64	68.87	20.3	10.43	-
1.62 - 1.64	2.06	84.21	23.2	9.66	-	-	-		5.18	74.05	24.3	11.40	-
Sink 1.64	15.79		42.0		-	-	-		25.95		42.3		-
TOTAL	100.00	100.00		14.77	100.00	100.00		7.59	100.00	100.00		19.42	

TABLE 10

TEST II

FLOAT AND SINK ANALYSIS OF -35 mm + 20 mm MATERIAL

S.G.	RAW COAL				WASHED COAL (0.5249)				DISCARD (0.4752)				DIST. FACTOR (TROMP)
	YIELD		ASH		YIELD		ASH		YIELD		ASH		
	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	
Float 1.40	0.03	0.03	4.5	4.50	0.10	0.10	4.6	4.60	-	-	-	-	
1.40 - 1.42	2.05	2.08	4.7	4.70	5.26	5.36	4.7	4.70	1.45	1.45	5.1	5.10	80.6
1.42 - 1.44	9.33	11.41	5.2	5.11	15.04	20.40	5.5	5.29	5.03	6.48	5.3	5.26	76.8
1.44 - 1.46	9.98	21.39	6.0	5.53	12.30	32.70	6.9	5.90	4.51	10.99	6.1	5.60	75.1
1.46 - 1.48	11.82	33.21	7.7	6.30	9.79	42.49	8.0	6.38	3.93	14.92	8.0	6.23	73.3
1.48 - 1.50	9.57	42.78	9.6	7.04	13.03	55.52	8.8	6.95	4.78	19.70	8.4	6.76	75.1
1.50 - 1.52	9.00	51.78	9.4	7.45	13.37	68.89	8.6	7.27	7.95	27.65	8.5	7.26	65.0
1.52 - 1.54	9.06	60.84	8.9	7.67	14.67	83.36	8.5	7.48	9.92	37.57	8.5	7.59	61.7
1.54 - 1.56	8.17	69.01	9.6	7.90	8.07	91.43	10.9	7.78	8.28	45.85	10.3	8.08	51.9
1.56 - 1.58	4.52	73.53	13.5	8.24	3.62	95.05	13.4	7.99	6.06	51.91	10.6	8.37	39.7
1.58 - 1.60	3.86	77.39	17.7	8.71	2.02	97.07	17.1	8.18	4.64	56.55	17.6	9.13	32.5
1.60 - 1.62	2.85	80.24	19.7	9.10	1.45	98.52	18.9	8.34	4.26	60.81	20.4	9.92	27.3
1.42 - 1.64	3.27	83.51	25.9	9.76	0.61	99.13	23.3	8.43	5.05	65.86	25.8	11.14	11.8
Sink 1.64	16.49		43.5		0.88		28.7		34.14		45.1		2.8
TOTAL	100.00	100.00		15.32	100.01	100.01		8.61	100.00	100.00		22.73	

TABLE 11

TEST II

FLOAT AND SINK ANALYSIS OF -20 mm + 12 mm MATERIAL

S.G.	RAW COAL				WASHED COAL (0.6043)				DISCARD (0.3957)				DIST. FACTOR (TROMP)
	YIELD		ASH		YIELD		ASH		YIELD		ASH		
	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	
Float 1.40	0.08	0.08	4.0	4.00	0.07	0.07	4.4	0.40	0.04	0.04	4.2	4.20	
1.40 - 1.42	1.44	1.52	4.7	4.66	2.41	2.48	4.5	4.50	2.20	2.24	4.7	4.69	62.7
1.42 - 1.44	6.64	8.16	5.3	5.18	10.92	13.40	5.4	5.23	4.91	7.15	5.3	5.11	77.3
1.44 - 1.46	9.03	17.19	6.0	5.61	11.19	24.59	6.5	5.76	5.30	12.45	6.4	5.66	76.3
1.46 - 1.48	10.81	28.00	7.2	6.22	8.94	33.53	7.3	6.17	4.00	16.45	7.7	6.16	77.4
1.48 - 1.50	8.62	36.62	8.4	6.73	9.51	43.04	8.1	6.60	5.48	21.93	7.6	6.52	72.6
1.50 - 1.52	8.21	44.83	8.7	7.09	12.91	55.95	8.0	6.92	7.79	29.72	7.6	6.80	71.7
1.52 - 1.54	10.68	55.51	8.5	7.36	13.29	69.24	8.2	7.17	6.85	36.57	8.7	7.16	74.8
1.54 - 1.56	8.14	63.65	9.8	7.67	10.50	69.74	10.5	7.61	5.95	42.52	11.4	7.75	73.3
1.56 - 1.58	5.27	68.92	12.8	8.06	5.38	85.12	13.5	7.98	4.22	46.74	14.4	8.35	66.1
1.58 - 1.60	3.70	72.62	16.6	8.50	3.97	89.09	16.4	8.36	3.43	50.17	18.1	9.02	63.8
1.60 - 1.62	2.87	75.49	18.9	8.90	3.09	92.18	19.9	8.75	3.39	53.56	21.2	9.79	58.3
1.62 - 1.64	2.74	78.23	22.9	9.39	2.29	94.47	24.1	9,12	3.50	57.06	26.0	10.78	50.0
Sink 1.64	21.76		45.4		5.54		33.3		42.93		49.9		16.5
TOTAL	99.99	99.99		17.23	100.00	100.01		10.46	99.99	99.99		27.57	

TABLE 12

TEST II

FLOAT AND SINK ANALYSIS OF - 12 mm + 6 mm MATERIAL

S.G.	RAW COAL				WASHED COAL (0.5905)				DISCARD (0.4095)				DIST. FACTOR. (TROMP)
	YIELD		ASH		YIELD		ASH		YIELD		ASH		
	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	Fract. %	Cum. %	
Float 1.40	0.04	0.04	3.8	3.80	0.02	0.02	4.0	4.00	0.07	0.07	4.3	4.30	
1.40 - 1.42	1.61	1.65	4.2	4.19	1.90	1.92	4.6	4.59	2.23	2.30	5.7	5.66	55.2
1.42 - 1.44	6.75	8.40	5.3	5.08	8.61	10.53	4.9	4.84	5.20	7.50	5.1	5.27	70.5
1.44 - 1.46	8.25	16.65	5.7	5.39	10.00	20.53	5.8	5.31	5.94	13.44	6.1	5.64	70.9
1.46 - 1.48	10.07	26.72	6.5	5.81	8.32	28.85	6.9	5.77	4.77	18.21	7.1	6.02	71.6
1.48 - 1.50	9.11	35.83	7.7	6.29	7.52	36.37	7.1	6.04	6.15	24.36	7.7	6.44	63.8
1.50 - 1.52	7.52	43.76	8.3	6.65	10.95	47.32	7.2	6.31	7.74	32.10	7.4	6.67	67.1
1.52 - 1.54	10.18	53.94	8.0	6.90	12.77	60.09	7.9	6.65	7.65	39.95	8.8	7.09	70.1
1.54 - 1.56	8.25	62.19	9.8	7.28	9.63	69.72	10.2	7.14	5.73	45.68	11.8	7.68	70.7
1.56 - 1.58	5.14	67.33	12.5	7.68	6.28	76.00	13.0	7.62	4.46	50.14	15.3	8.36	67.0
1.58 - 1.60	4.18	71.51	15.3	8.13	4.31	80.31	16.0	8.07	3.39	53.53	17.8	8.96	64.7
1.60 - 1.62	3.75	75.26	18.9	8.67	4.31	84.62	20.0	8.68	3.18	56.71	19.9	9.57	66.2
1.62 - 1.64	3.11	78.37	22.3	9.21	5.55	90.17	26.1	9.75	3.08	59.79	24.1	10.32	72.2
Sink 1.64	21.64		45.4		9.85		39.2		40.20		42.9		26.1
TOTAL	100.01	100.01		17.06	100.02	100.02		12.65	99.99	99.99		23.42	

TABLE 13

ANALYSIS OF - 6 mm MATERIAL

TEST	RAW COAL	WASHED COAL	DISCARD
	ASH %	ASH %	ASH %
I	17.0	7.4	28.1
II	17.0	14.4	23.9

TABLE 14

PLANT PERFORMANCE DATA

TEST NO.	SIZE	RAW COAL	WASHED COAL		DISCARD		S.G. OF SEPARATION	PROBABLE ERROR	ORGANIC EFFICIENCY
		ASH %	YIELD %	ASH %	YIELD %	ASH %			
I Clean Medium	+60mm	13.75	67.6	7.83	32.4	26.11	1.52	0.009	99.0
	-60mm + 35mm	14.77	61.1	7.75	38.9	25.81	1.52	0.009	99.0
	-35mm + 20mm	15.32	60.8	7.42	39.2	27.59	1.52	0.010	98.7
	-20mm + 12mm	17.23	55.2	7.55	44.8	29.15	1.53	0.012	98.6
	-12mm + 6mm	17.06	56.7	7.18	43.3	30.02	1.54	0.016	98.4
	-6mm	17.0	-	7.4	-	28.1	-	-	-
II Contami-nated medium	+60mm	13.75	68.2	7.98	31.8	26.12	1.54	0.016	92.4
	-60mm + 35mm	14.77	39.3	7.59	60.7	19.42	1.51	0.039	84.9
	-35mm + 20mm	15.32	52.5	8.61	47.5	22.73	1.55	0.080	78.4
	-20mm + 12mm	17.23	60.4	10.46	39.6	27.57	Not determined		-
	-12mm + 6mm	17.06	59.1	12.65	40.9	23.42	Not determined		-
	-6mm	17.0	-	14.4	-	23.9	-	-	-

FIGURE 1. +60 TEST I

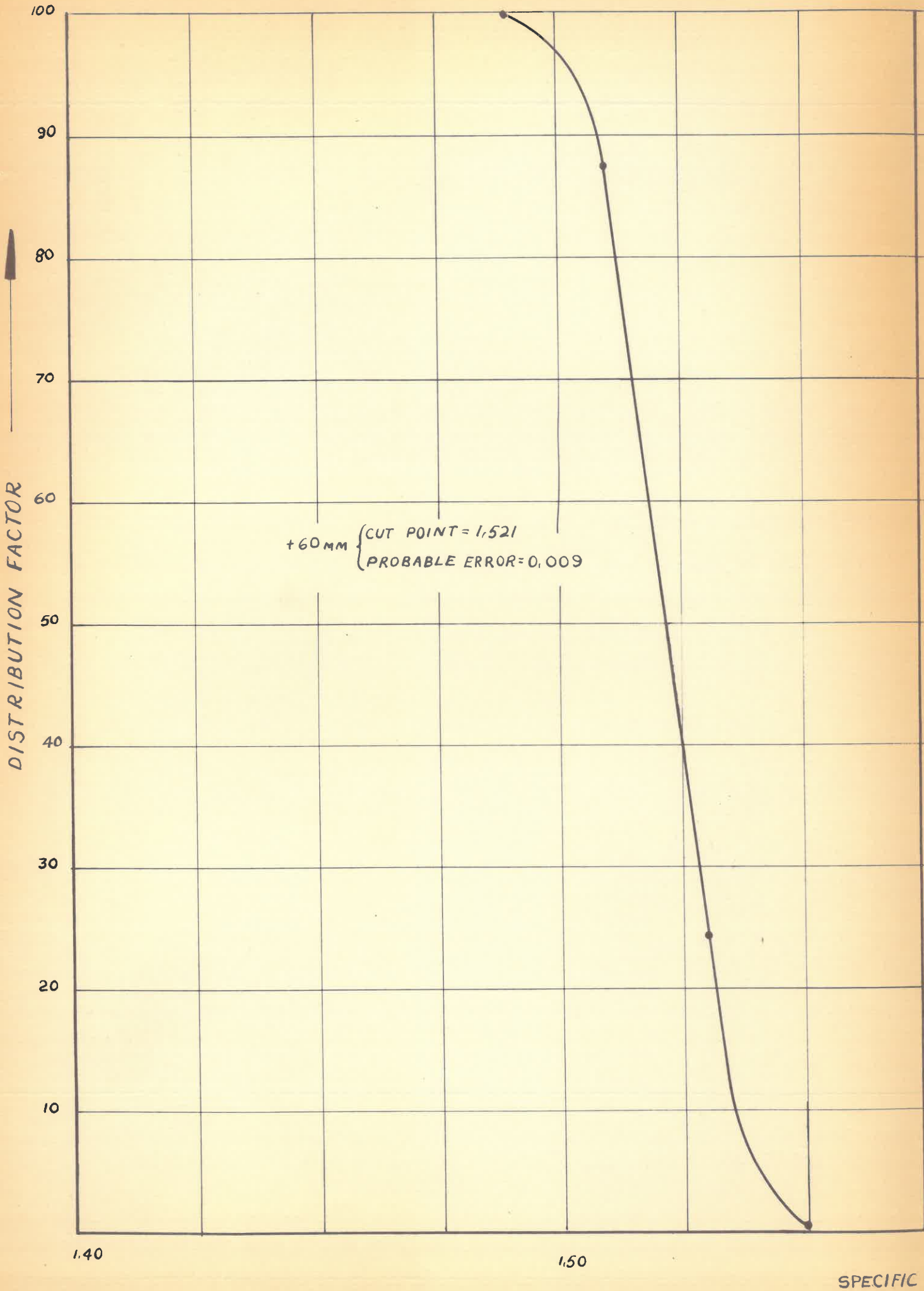


FIGURE 2 +60 TEST II

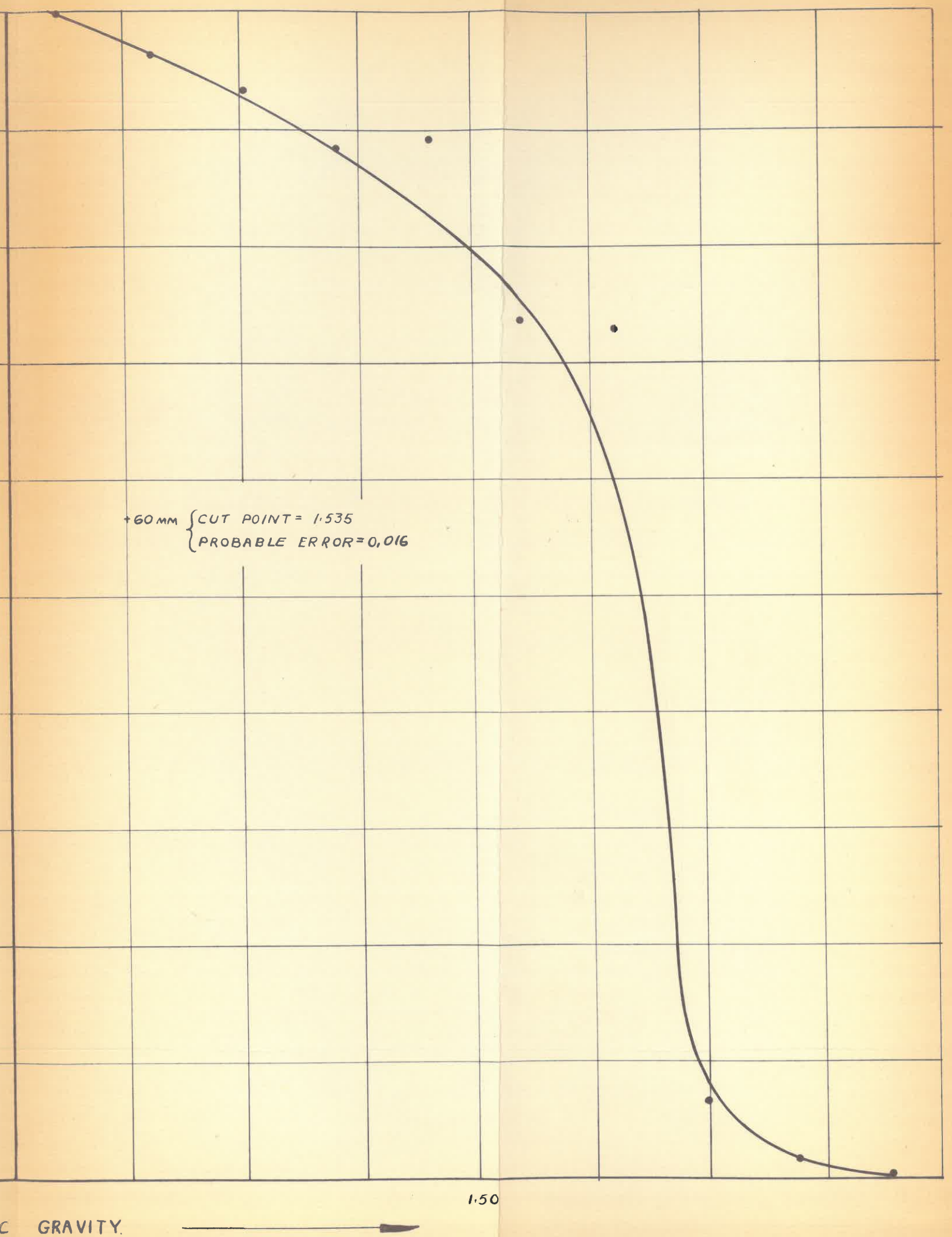


FIGURE 3. -60 + 35 TEST I

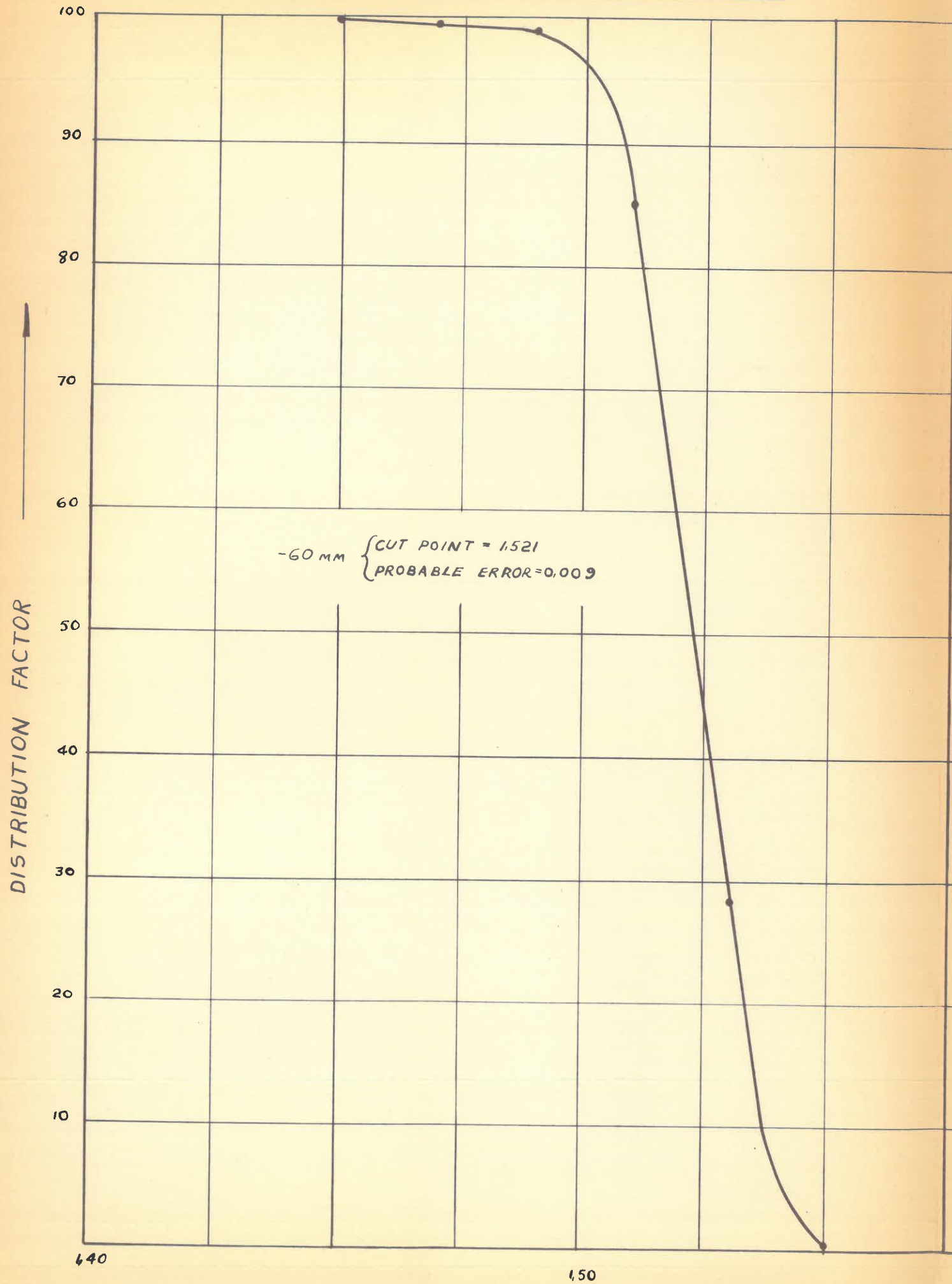


FIGURE 4 -60 + 35 TEST II

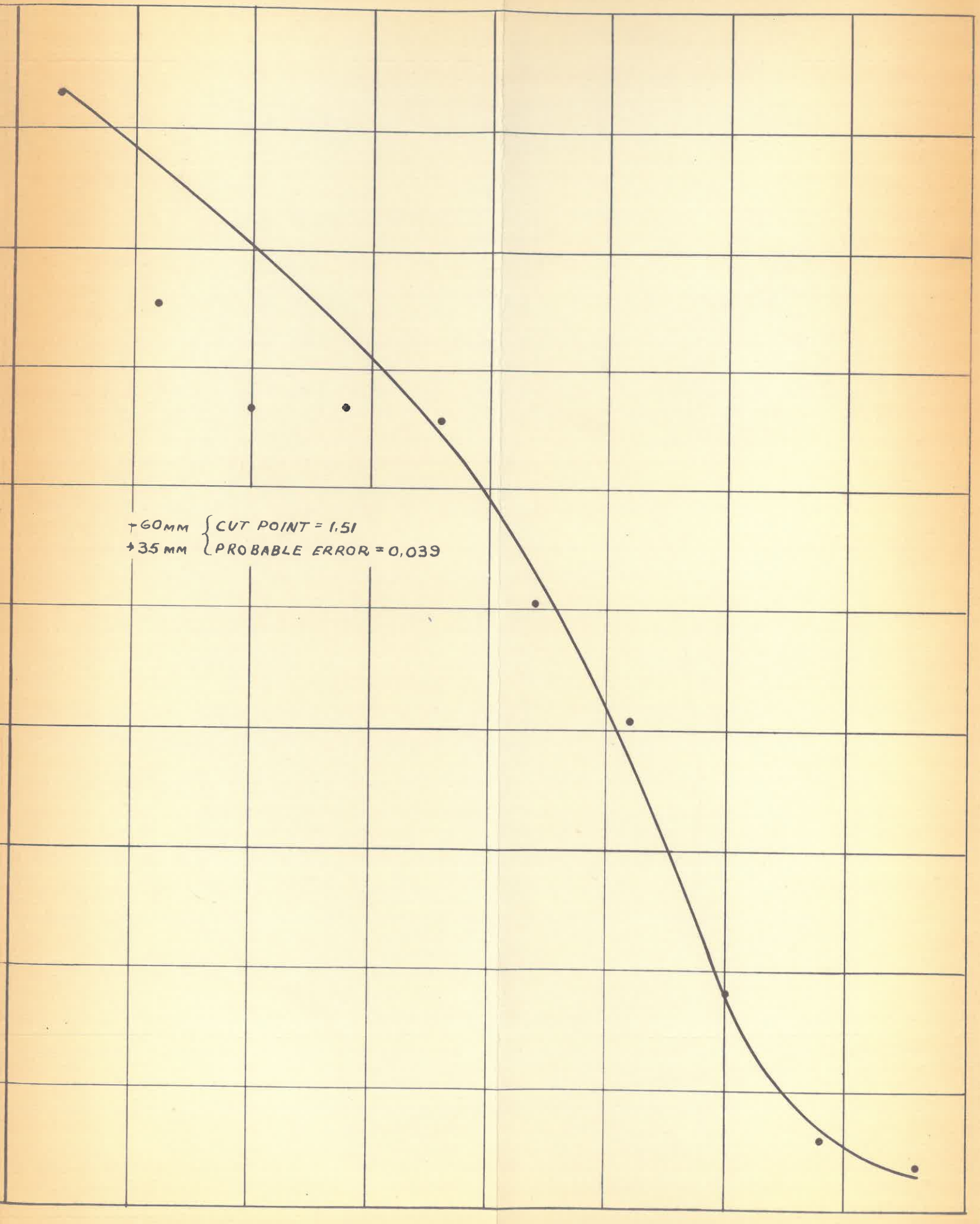


FIGURE 7 -20 + 12. TEST I.

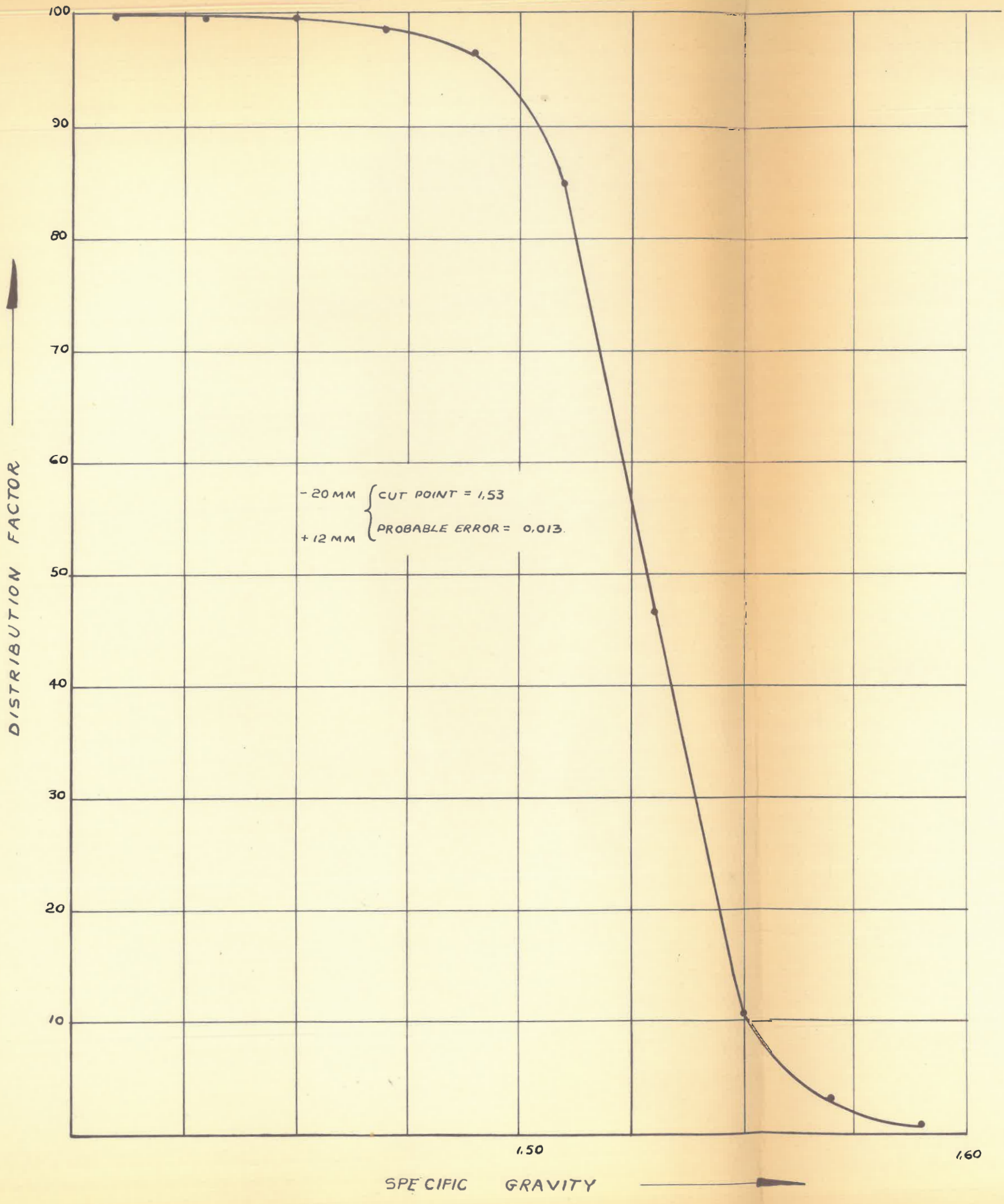


FIGURE 8 -20 + 12 TEST II

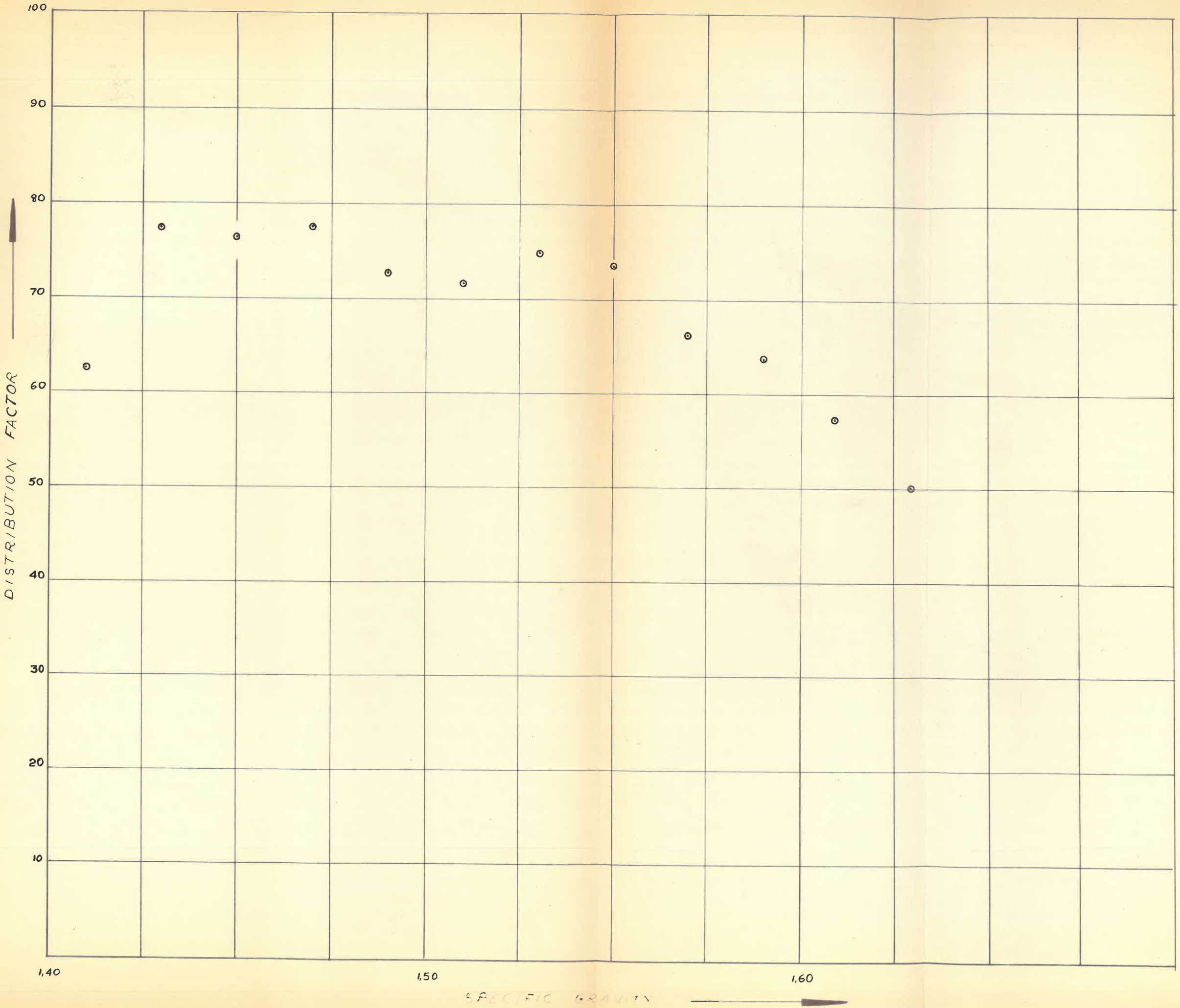
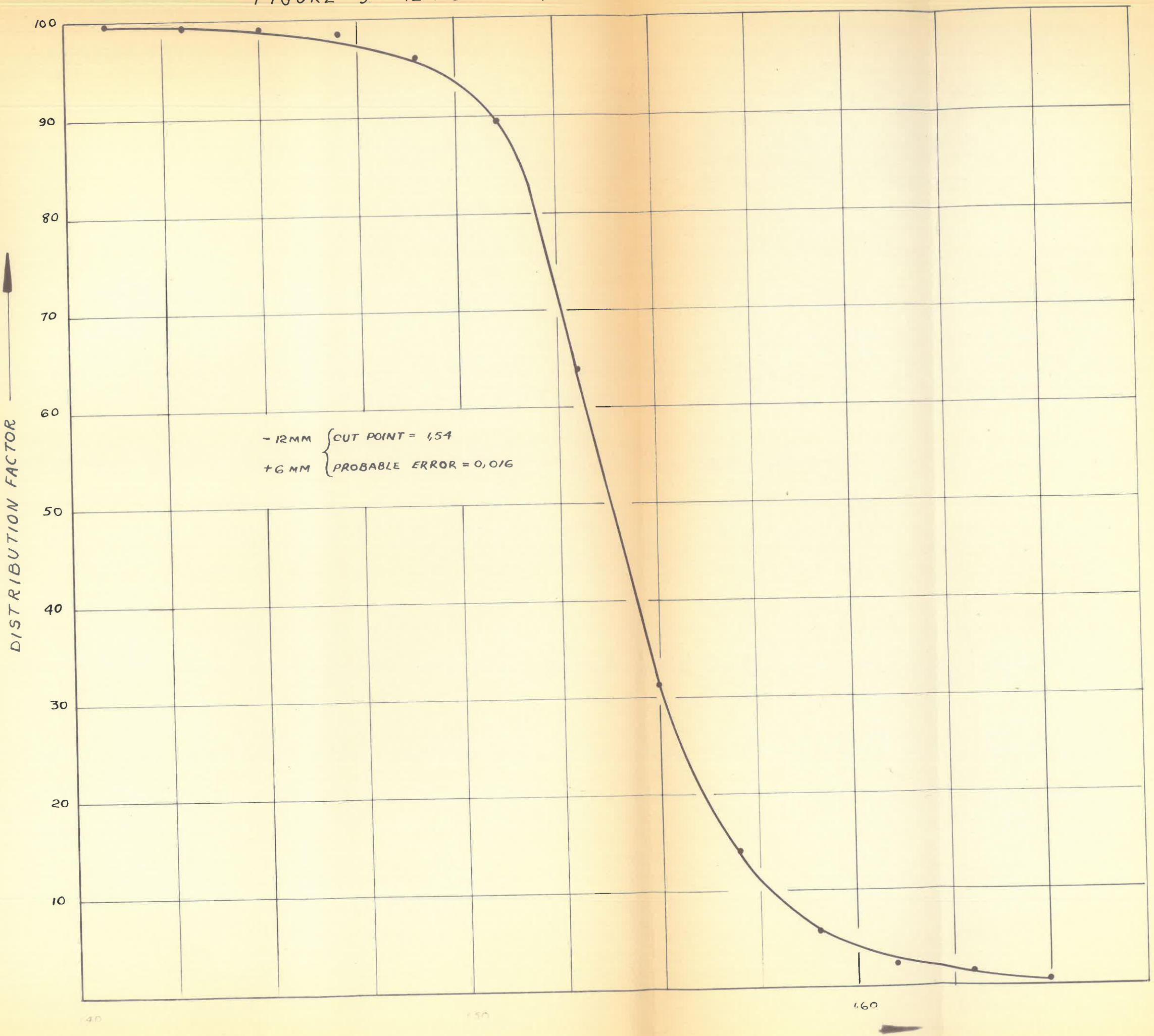


FIGURE 9 -12 + 6 TEST I.



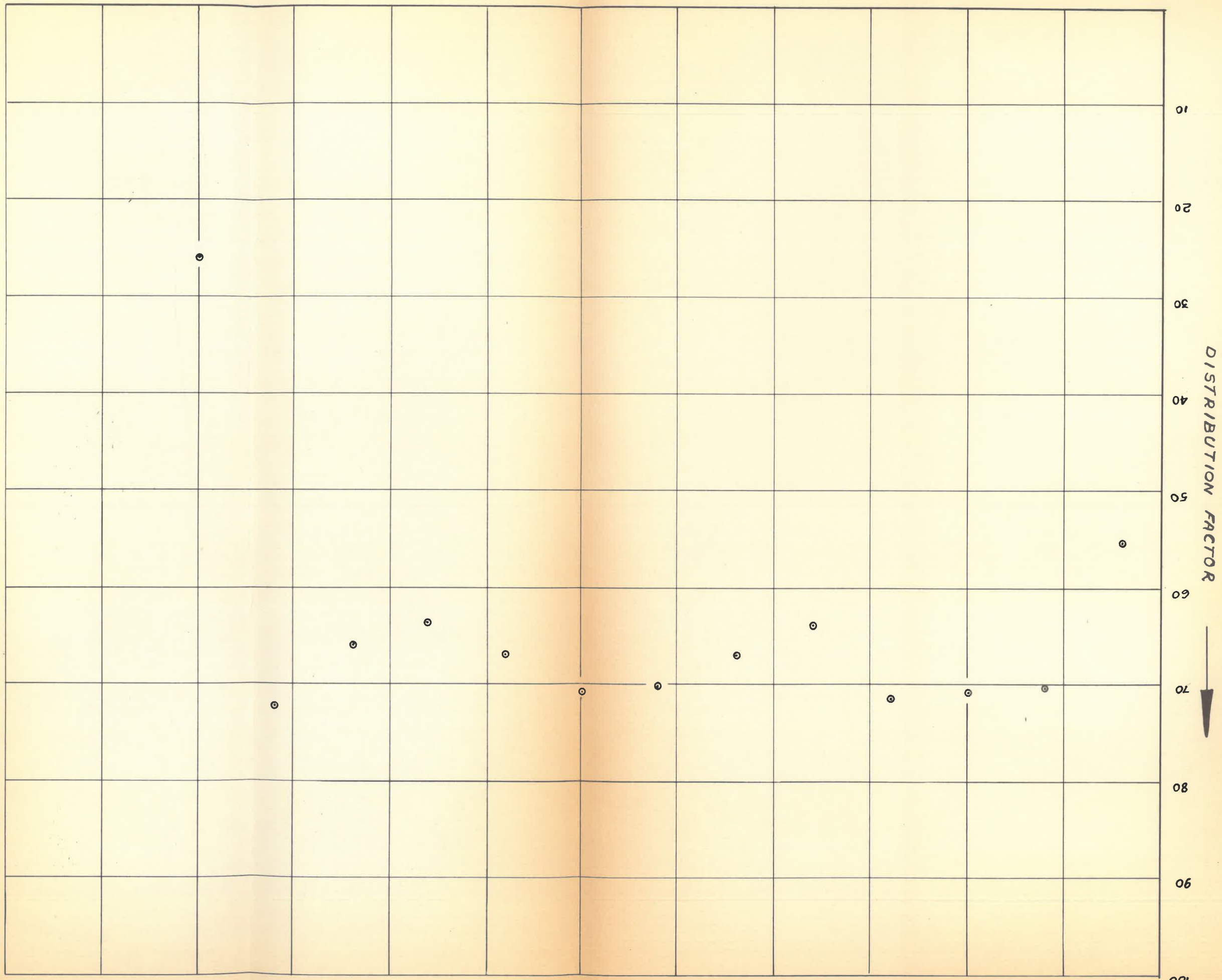


FIGURE 10 -12+ 6 TEST II

FIGURE 5 -35 + 20. TEST I

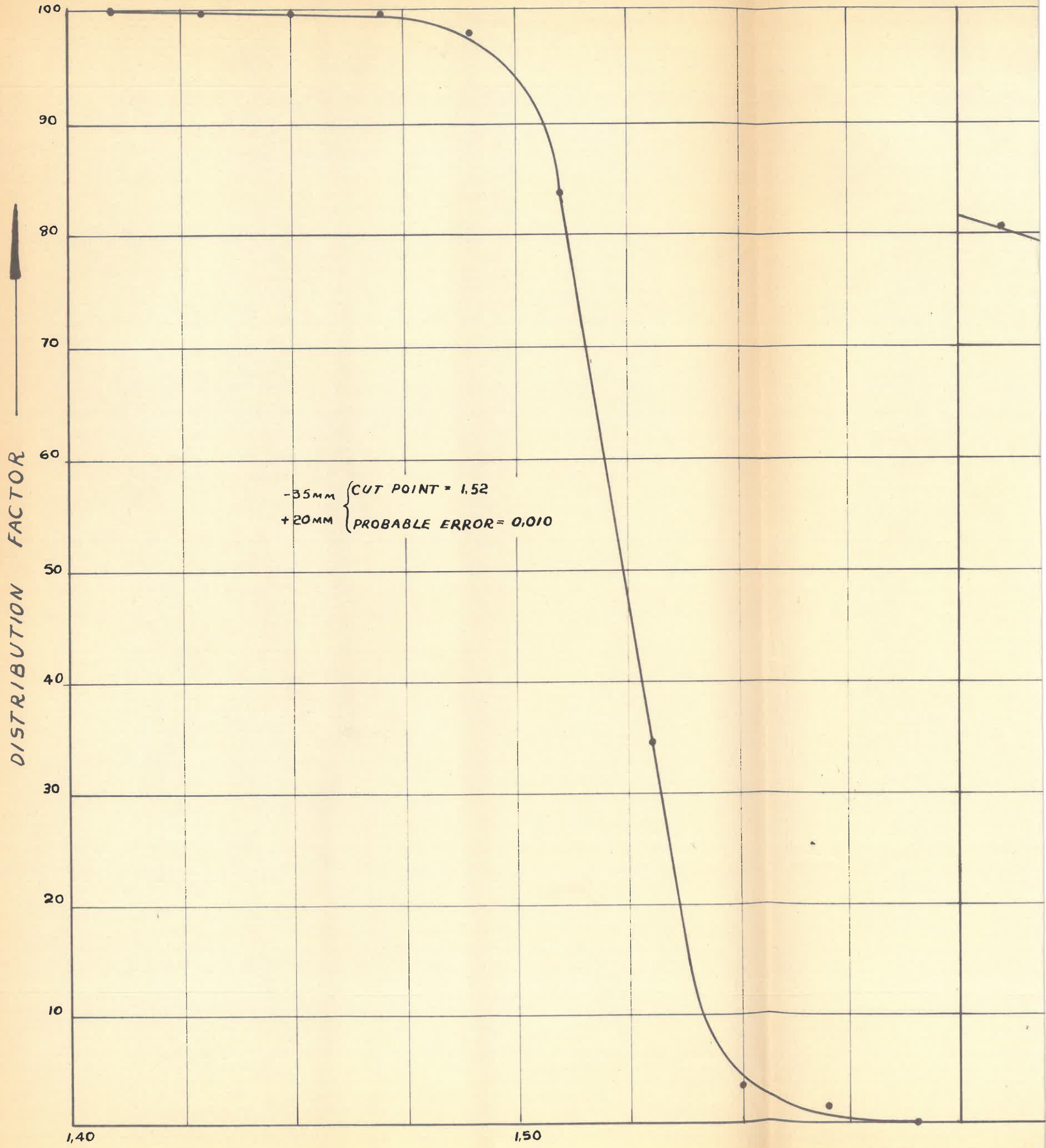


FIGURE 6 -35 + 20 TEST II