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U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA

REPORT NO. 1161

TESTS OF SLOTTED TUBE CATAPULTS

8th Partial Report

XC MARK I CATAPULT-HYDROGEN PEROXIDE TESTS

FINAL Report

Task
Assignment NPG-Re5a-37-1-53

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XC Mark 1 Catapult-Hydrogen Peroxide Tests
-----PART ASYNOPSIS

1. The effect of injecting hydrogen peroxide solutions into the chamber of a catapult during burning of the propellant was investigated experimentally in a large-volume closed bomb. Solutions of hydrogen peroxide in water, in concentrations varying from zero to 60 per cent, were tested and oscillograms of pressure and thermocouple temperatures versus time were obtained. Large scale graphs of pressure-time histories for individual rounds are reproduced for detailed study and reference.

2. It is concluded that:

a. Hydrogen peroxide solutions, injected during burning of conventional propellants, exhibit properties both as a propellant and as a coolant to a significant degree. Under closed chamber conditions, a quantity of solution equal in weight to one-half the charge weight can be utilized to maintain the peak pressure with a reduction of the order of four per cent in absolute temperature, to nearly double the pressure with an increase in absolute temperature of only ten per cent, or to yield intermediate effects by adjusting the concentration of the solution between zero and 60 per cent.

b. A solution concentration of ten per cent is ample for the complete elimination of carbon formation in the chamber.

c. Consistent operation of an injection system in service will require a positive means of controlling the time of injection and of insuring that the injector is fully discharged. If gas from the main charge is to ignite the auxiliary charge, the size of ignition passages is an important factor in obtaining uniform injection. Under the conditions of these tests, a 3/16" diameter passage proved to be barely adequate.

d. Synthetic materials used for experimental injector piston seals (Neoprene and Teflon) must be protected from the combined action of hot gases and free oxygen in order to attain satisfactory life. Two relatively simple methods show promise as protective measures: (1) covering the exposed surface with pure aluminum foil, and (2) complete initial submersion of the seal in the liquid.

XC Mark 1 Catapult-Hydrogen Peroxide Tests

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XC Mark 1 Catapult-Hydrogen Peroxide Tests
-----PART BINTRODUCTION

1. AUTHORITY:

The work reported herein was conducted under Task Assignment No. NPG-Re5a-37-1-53 as established by reference (a). Specific authority for the tests is contained in reference (b).

2. REFERENCES:

- a. BUORD ltr Re5a-RMS:djs of 7 August 1952
- b. BUORD ltr S83 Ser 38549; Re5a-EOS:cmj of 30 April 1952
- c. NPG Report No. 999 "XC Mk 1 Water Tests" of 14 July 1952
- d. BUORD Sketch No. 238834-XC Mk 1 Catapult, Test Model
Details
- e. BUORD Sketch No. 329212, XC Mk 1 Catapult Test Model
Water Injector Plug

3. BACKGROUND:

As a means of reducing flame temperatures and secondary explosions in catapults, the injection of water into the chamber during burning has been proposed by the Bureau of Ordnance. The effect of water injection was investigated theoretically by the Atlantic Research Corporation, and in experimental closed bomb tests at the Naval Proving Ground. Injected water was found to cause formation of a heavy residue of carbon in the chamber, and to require an increase in the propellant charge in order to maintain the pressure at the same value as that obtained on firings without injection. As a means of reducing the charge weight and, at the same time preventing carbon formation, it was proposed that water-hydrogen peroxide mixtures be used instead of water alone. By reference (b) the Naval Proving Ground was requested to conduct closed bomb firings to determine the effect of injecting H₂O-H₂O₂ mixtures in concentrations from zero to 60 per cent, with a constant propellant weight and constant weight of injected liquid.

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4. OBJECT OF TESTS:

The object of these tests was to investigate the characteristics of $H_2O-H_2O_2$ injection by firing charges of 16" granulation propellant in a closed chamber, and injecting into the chamber during burning known weights of hydrogen peroxide solution with concentrations of 0, 10, 20, 30, 40, 50 and 60 per cent. Of particular interest was the recording of peak pressures and pressure-time curves during and after firing for all conditions. It was also desired to record such temperature data as could be obtained without delaying the tests. During the course of the experiments, it became necessary also to investigate the design of sealing elements for the injector piston.

5. PERIOD OF TEST:

- | | |
|-------------------------------|----------------|
| a. Date of Project Letter | 7 August 1952 |
| b. Date of Specific Directive | 30 April 1952 |
| c. Date Commenced Test | 5 January 1953 |
| d. Date Test Completed | 8 May 1953 |

XC Mark 1 Catapult-Hydrogen Peroxide Tests
-----PART CDETAILS OF TEST

6. DESCRIPTION OF TEST EQUIPMENT:

a. All rounds were fired in the XC Mk 1 Catapult test chamber. This chamber was used on prior tests with water injection, reported in reference (c). It is essentially a cylindrical closed bomb with an inside diameter of 9.50 and an inside length of 80.0. At one end is a breech cap, which is tapped to receive three electric primers, equally spaced on a 6" diameter circle, one dynamic pressure gage, one probe type thermocouple, and one bleeder plug. At the other end is a closing cap. Appendix (A), Figure 1 is a diagram of the test arrangement. Reference (d) is a detail of the chamber.

b. The water injector is a steel tube 33" long, with an inside diameter of 3" and an outside diameter of 4", and is fitted with a brass piston which divides it into two compartments. The compartment behind the piston, designed to contain an auxiliary charge of powder which yields the pressure required for injection, is pierced with two holes which provide for ignition of this charge. The chamber in front of the piston is designed to contain a quantity of liquid, and terminates in a spray head pierced by ninety-six 1/16" diameter holes which are arranged to spray the liquid upward and forward at an angle of 16° with the horizontal into the catapult chamber. Reference (e) is a detail drawing of the spray head. In operation, the injector is loaded with the liquid solution and smokeless powder and placed inside the catapult chamber together with the main chamber charge. The main chamber charge is ignited by means of three Mk 42 electric primers. When the pressure and temperature in the catapult chamber begin to rise, the hot gases pass through the ignition holes in the injector cylinder and ignite the auxiliary charge. This charge forces the piston forward, thereby forcing the hydrogen peroxide solution out through the holes in the spray head. Appendix (A), Figure 2, is a photograph of the spray injector.

c. The pressure-time and temperature-time records were taken on an electromagnetic recording oscillograph with associated wheatstone bridges and d.c. amplifiers.

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d. A probe thermocouple was constructed for comparative temperature measurements. Number 30 iron-constantan thermocouple wire was passed through a hole 0.046 diameter on the axis of a stainless steel rod (probe) of 1" length and 0.090 diameter and was welded by means of a carbon arc, each wire emerging from the welding bead with no contacts between the welding bead and the asbestos insulation. The welded wires were then pulled back into the 0.052 countersink at the top. A seal against gas pressure was obtained by metallic arc using 25-20 stainless steel electrodes. The end of the probe was machined to a diameter of 0.175 to facilitate this welding. After welding, the enlarged end was ground to approximately 0.090 to increase the speed of response. The probe was not protected during the first three firings (rounds 17, 18 and 19) and was bent to an angle of about 10° in each firing, apparently by the impact of the powder grains. Thereafter, a shield was placed around the probe, which protruded only 1/4", and this prevented the bending observed in previous rounds. Appendix (A), Figures 3, 4 and 5 show the details and photographs of the thermocouple assembly.

8. PROCEDURE:

a. The main charge to be used in all firings was established at six pounds of 16" master standard powder, index IHIC-14, and the weight of injected liquid at three pounds. Three pounds of liquid represent slightly more than half of the injector capacity. The remaining air space was considered necessary to facilitate filling and sealing by personnel who had no previous experience in handling peroxide. With the experience gained on these firings, it should be possible to utilize up to 90 per cent of the full capacity on future tests.

b. Five or more rounds were fired at each of 7 different concentrations of liquid, beginning at zero per cent (distilled water) and increasing the H₂O₂ concentration in increments of ten per cent until a concentration of 60 per cent had been fired. In addition, several rounds were fired without liquid injection for the purpose of comparison. The auxiliary charges used to actuate the injection chamber were composed of from two to six grains (approx. 0.16-0.50 lb.) of the 16" powder. One gram of SR-4990 (pistol powder) was added to each auxiliary charge to aid in ignition. The closing of the firing key, the pressures and the temperatures were recorded with respect to time. Other details of firing procedures are tabulated in Appendix (B), Table I.

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c. Since hydrogen peroxide is corrosive and attacks steel, Fluorolube oil ("S") and Fluorolube heavy grease (Gr544) were used to reduce this corrosive action. Fluorolube oil was used to swab the wall area in front of the piston. Fluorolube heavy grease was used to fill the spray holes in the injector head. These materials have been recommended by the supplier, Buffalo Electro-Chemical Company, Inc., for long time contact with 90 per cent H₂O₂. Some corrosive action occurred on the inside chamber of the spray injector, but the corrosion was not severe enough to affect the operation of the device.

d. The Neoprene seal used on the injector piston withstood the effects of firing at concentrations of 10 and 20 per cent without significant damage. The same seal failed on the first round in which a 30 per cent concentration was used. A new seal was installed before firing the second round at 30 per cent concentration, and was found, after firing, to be badly deteriorated, charred and cracked. The deterioration was most pronounced, in both cases, at the surface which was above the initial level of the liquid. On round 17 a 1/4" thick Teflon seal was used. After firing, the seal was slightly eroded, indicating that gases had escaped around the edges. There were brown discolorations on the area above the liquid level. On round 18, there were additional brown discolorations and the edges were eroded somewhat more. On round 19, about three-fourths of the area of the seal that was originally above the liquid level was eroded and in a concave shape (facing liquid). This seal was unfit for further use. Appendix (A), Figure 6 is a photograph of the conditions of the three seals used on rounds 15-19. New Teflon seals were used on rounds 20 and 21 and were eroded in a similar manner. On round 22, two 1/8" thick Neoprene cup seals facing in opposite directions were used, protected by a stainless steel disc and aluminum foil bolted to the piston, and tucked into the reservoir around the steel disc and Neoprene. The steel disc and aluminum foil were used to protect the Neoprene seals and help dissipate the heat, as well as to form a reservoir for the fluorolube grease and oil. No apparent damage occurred to the seals. A Neoprene buffer ring was installed to protect the disc. After firing, the upper half of this ring was missing. On the following round, the buffer ring was made of copper, and this ring functioned satisfactorily for the remainder of the tests. Figure 7 is a photograph of seals used on rounds 20-24.

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e. The liquid injector was originally provided with two 1/8" diameter holes adjacent to the auxiliary charge position, for ignition of this charge. A third hole of the same diameter was provided at the bottom of the auxiliary chamber, but was ineffective as an ignition hole because it terminated at the chamber wall. Before beginning these tests, one of the ignition holes was enlarged to 3/16" diameter in an attempt to improve the ignition of the auxiliary charge.

9. RESULTS AND DISCUSSION:

a. The results of firing tests with liquid injection are tabulated in Appendix (B), Table II. Table III shows comparative results for a group of similar rounds fired without injection.

b. The effect of H₂O₂ concentration on peak pressure is shown graphically in Appendix (C), Figure 8. Peak pressures of all rounds are plotted as individual points on this graph, and a curve has been faired through the mean values. Reference to Figure 8, and Tables I and II, shows that the injection of a 3-lb. charge of pure water reduces the peak pressure 10 per cent below that obtained without injection. A 10 per cent solution of H₂O₂ is sufficient to restore the pressure to the value obtained without injection and further increases in H₂O₂ concentration produce proportional increases in the peak pressures. The increment of pressure for each one per cent increase in H₂O₂ concentration is 43 psi.

c. The effect of concentration on temperature is shown in Figure 9. Here the mean values of the peak recorded temperatures for each concentration are plotted, together with a vertical line connecting the highest and lowest of the individual readings. Although the trend of the curve is not as well defined as in the case of pressures, a straight line provides a good fit. The injection of pure water reduces the recorded temperature 8 per cent below that obtained without injection, and the addition of H₂O₂ increases the temperature in increments of 2.9°C for each 1 per cent increase in concentration. It is important to note that the peak temperatures recorded are significant only as a means of comparing the relative heating effects under varying conditions. Quantitatively, the temperatures recorded are not those of the combustion products but rather of the thermocouple itself which, because of an inherent time lag, does not reach equilibrium until the gas temperature has dropped below its peak. In the case of closed bomb firings such as these, an analytical method of correcting the thermocouple readings is available, but it has not been applied because the actual readings are equally effective for comparing different rounds fired in the same chamber.

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d. To facilitate detailed study of the burning characteristics under varying injection conditions, pressure-time and temperature-time curves have been plotted for all rounds individually. Two graphs are provided for each round. The first, using a normal time scale, shows the pressure rise, peak, and early stage of decay, covering an interval of two seconds from closing of the firing key. The second uses a compressed time scale in order to accentuate the shape of the decay curve, and shows the pressure and temperature for an interval of 15 seconds from closing of the firing key. The first set of curves is reproduced in Appendix (C), Figures 10-64, inclusive, and the second set in Appendix (D), Figures 65-120, inclusive.

e. The formation of a carbon residue, which had been observed on all firings with water injection and to a lesser extent, on firings without injection, was not observed on any of the firings where H_2O_2 was used. The liquid which remained in the chamber after injecting H_2O_2 was light brown in color, and was readily removed by swabbing and flushing, leaving the metal bright and clean.

f. Operation of the liquid injector is not positive. Variations in its operation are the most probable cause of round-to-round dispersion in pressures and temperatures. However, the consistency of operation during this series of tests was much improved over that of earlier tests. This was due to two factors: (1) the improved ignition achieved by enlargement of one of the ignition holes from $1/8"$ to $3/16"$ diameter, and (2) the use of effective, liquid-tight seals ahead of the spray piston. It was found necessary to increase the auxiliary charge progressively as the concentration of H_2O_2 was increased, to prevent short travel of the piston. Ultimately, the charge was increased to 6 grains of $16"$ powder (0.5 lb.).

g. Of the two materials used as experimental seals for the injector piston, Teflon is more resistant to deterioration than Neoprene; however, neither material has a satisfactory life when used without protection. The flexibility of Neoprene made it more adaptable than Teflon to the special protective measures which finally resulted in a satisfactory seal life, as described in paragraph (8-d). The deterioration of the seals was considerably greater in the area above the liquid level than in the area below. In the case of Teflon, deterioration was almost entirely confined to the upper area. This indicates that the damage occurred before injection, and resulted from impingement of gases from the main charge on this area. These gases, having traversed the surface of the liquid, would be rich in oxygen and very active. This suggests another method of increasing the life of seals: tilting the injector so that the sealing element is initially covered by liquid.

XC Mark 1 Catapult-Hydrogen Peroxide Tests
-----PART DCONCLUSIONS

10. a. Hydrogen peroxide solutions, injected during burning of conventional propellants, exhibit properties both as a propellant and as a coolant to a significant degree. Under closed chamber conditions, a quantity of solution equal in weight to one-half the charge weight can be utilized to maintain the peak pressure with a reduction of the order of four per cent in absolute temperature, to nearly double the pressure with an increase in absolute temperature of only ten per cent, or to yield intermediate effects by adjusting the concentration of the solution between zero and 60 per cent.

b. A solution concentration of 10 per cent is ample for the complete elimination of carbon formation in the chamber.

c. Consistent operation of an injection system in service will require a positive means of controlling the time of injection and of insuring that the injector is fully discharged. If gas from the main charge is to ignite the auxiliary charge, the size of the ignition passages is an important factor in obtaining uniform injection. Under the conditions of these tests, a 3/16" diameter passage proved to be barely adequate.

d. Synthetic materials used for experimental injector piston seals (Neoprene and Teflon) must be protected from the combined action of hot gases and free oxygen in order to attain satisfactory life. Two relatively simple methods show promise as protective measures: (1) covering the exposed surface with pure aluminum foil, and (2) complete initial submersion of the seal in the liquid.

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XC Mark 1 Catapult-Hydrogen Peroxide Tests

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NPG REPORT NO. 1161

**U. S. NAVAL PROVING GROUND
DAHLGREN, VIRGINIA**

**Eighth Partial Report
on
Tests of Slotted Tube Catapults**

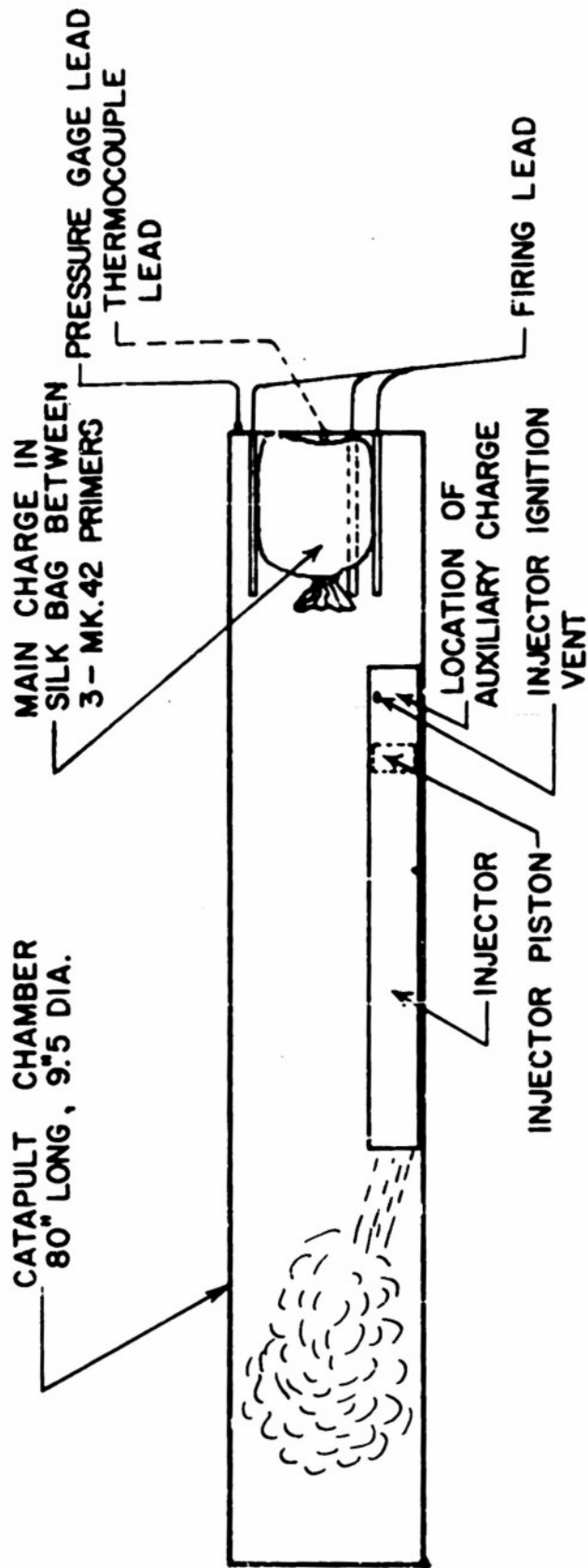
**Final Report
on
XC Mark 1 Catapult-Hydrogen Peroxide Tests**

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**XC MARK I CATAPULT
ARRANGEMENT OF TEST CHAMBER AND INJECTOR**

FIGURE 1

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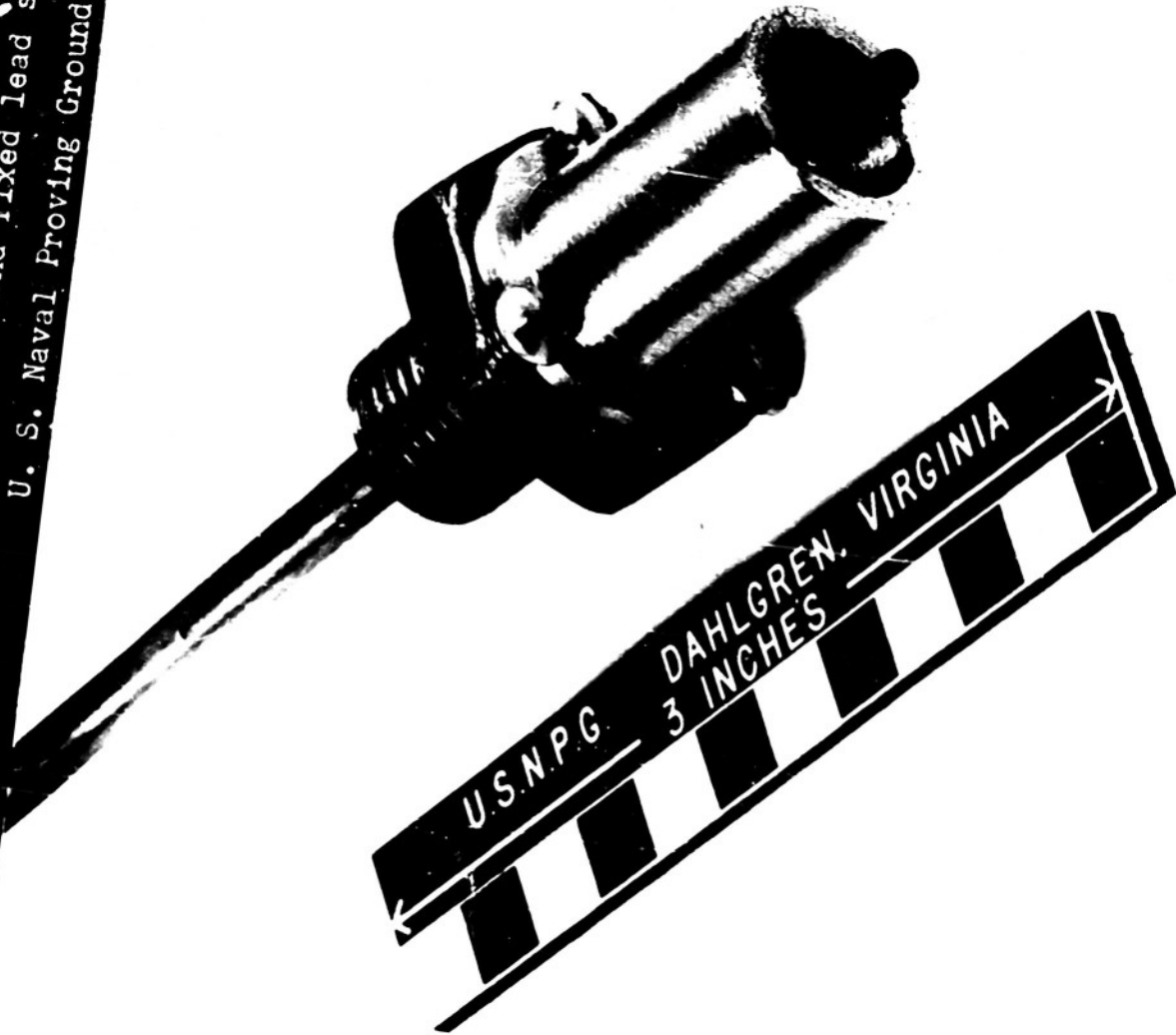
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XC Mark 1 Catapult
Probe Type Thermocouple
Assembly of shield, probe, adapter and fixed lead support.
Figure 5

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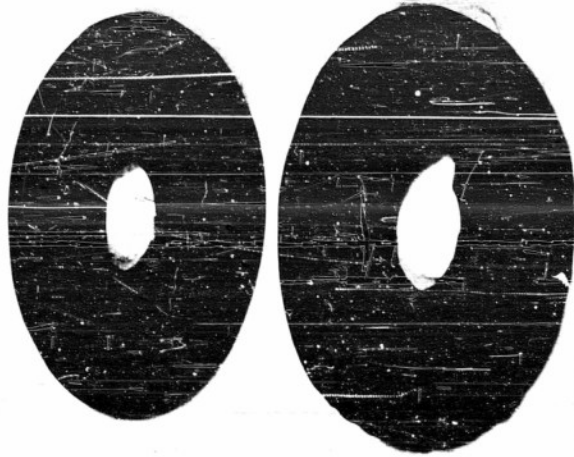
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XC Mark 1 Catapult-Hydrogen Peroxide Tests

TABLE I

XC MARK 1 CATAPULT-HYDROGEN PEROXIDE INJECTION
CHRONOLOGICAL SUMMARY OF TESTS

Main Charge: 6.0 lb. of 16" Powder, Index IHIC-14
 Injection: 3.0 lb. of solution
 Aux. Charge: 16" Powder, Index IHIC-14, as noted.
 Ave. weight per grain: 0.083 lb.
 Igniter for
 Aux. Charge: 1.0 gm. of Pistol Powder SR-4990
 Primers: Three, Mark 42.

1953 Date	Round No.	H ₂ O ₂ Conc. %	Grains Aux. Charge	Travel of Spray Piston	Remarks
1/5	1	0	2	---	Instrumentation Check- Reduced Charge.
1/6	2	0	2	---	" " "
1/7	3	0	2	Full	
1/14	4	10	2	"	Neoprene seal installed before this round.
1/20	5	10	2	Short (1")	
1/22	6	10	4	Full	
"	7	10	4	"	Hangfire. Seal damaged by impact and replaced.
1/28	8	10	4	"	
"	9	10	4	"	
2/4	10	20	4	"	
2/6	11	20	4	"	
2/10	12	20	4	"	
2/19	13	20	4	"	
3/6	14	20	4	"	
3/10	15	30	4	"	Seal partially consumed. See Paragraph 8d.
3/11	16	30	4	"	" " "
3/13	17	30	4	"	Teflon seal used.
3/16	18	30	4	"	
3/17	19	30	4	"	
3/19	20	40	4	Short (2")	
3/21	21	40	4	"	
3/26	22	40	4	Full	
4/1	23	40	4	Short	
4/3	24	40	4	Short	New neoprene seals. See Paragraph 8d.

XC Mark 1 Catapult-Hydrogen Peroxide Tests

TABLE I (Continued)

1953 Date	Round No.	H ₂ O ₂ Conc. %	Grains Aux. Charge	Travel of Spray Piston	Remarks
4/8	25	50	5	Short	
4/10	26	30	5	Full	
"	27	50	6	"	
4/14	28	50	6	"	
"	29	50	6	"	
4/15	30	50	6	"	
4/16	31	60	5	"	
"	32	--	-	---	Fired to test optical pyrometer.
4/17	33	60	5	Full	
"	34	--	-	---	Fired to test optical pyrometer.
4/20	35	60	5	Short	
4/21	36	60	6	Full	
"	37	--	-	---	Fired to test optical pyrometer.
"	38	30	5	Full	
4/22	39	60	6	"	
"	40	--	-	---	Fired to test optical pyrometer.
4/23	41	60	6	Full	
"	42	20	5	"	
4/24	43	20	5	"	
"	44	10	5	"	
4/29	45	10	5	"	
4/30	46	10	5	"	
"	47	--	-	---	
5/1	48	40	6	Full	
5/4	49	40	6	"	
"	50	40	6	"	
5/5	51	40	6	"	
"	52	40	6	"	
5/7	53	0	6	"	Pressure not recorded.
"	54	0	6	"	
"	55	0	6	"	
"	56	0	6	"	
5/8	57	0	6	"	
"	58	0	6	"	

XC Mark 1 Catapult-Hydrogen Peroxide Tests

TABLE IIXC MARK 1 CATAPULT-HYDROGEN PEROXIDE INJECTION
TABULATION OF MAXIMUM PRESSURES AND TEMPERATURE RISE

Weight of Main Charge: 6.0 lb.
Weight of Injected Solution: 3.0 lb.

Conc. of Solution %	Rd. No.	Figures	Temp. Rise of Thermocouple °C.	Mean Temp. Rise, °C	Max. Pres. PSI	Mean P _{max} PSI	Remarks
0	3	17,72	---		3525		Atypical. Injection probably late. Included in mean.
"	54	18,74	735		2860		
"	55	19,75	780		2950		
"	56	20,76	775		2995		
"	57	21,77	785		3065		
"	58	22,78	815	780	3065	3075	
10	4	23,79	---		3400		
"	5	24,80	---		3550		
"	6	25,81	---		3075		
"	8	26,82	---		3325		
"	9	27,83	---		3150		
"	44	28,84	---		3525		
"	45	29,85	750		3495		
"	46	30,86	750	750	3405	3370	
20	10	31,87	---		3850		
"	11	32,88	---		4035		
"	12	33,89	---		3800		
"	13	34,90	---		4000		
"	14	35,91	---		3865		
"	42	36,92	775		4110		
"	43	37,93	905	840	4110	3970	

XC Mark 1 Catapult-Hydrogen Peroxide Tests

TABLE II (Continued)

<u>Conc. of Solution %</u>	<u>Rd. No.</u>	<u>Figures</u>	<u>Temp. Rise of Thermo-couple °C.</u>	<u>Mean Temp. Rise, °C.</u>	<u>Max. Pres. PSI</u>	<u>Mean Pmax PSI</u>	<u>Remarks</u>
30	15	38,94	---		4080		
"	16	39,95	---		4475		
"	17	40,96	985		4575		
"	18	41,97	890		4475		
"	19	42,98	930		4310		
"	26	43,99	855		4600		
"	38	44,100	845	900	4510	4440	
40	20	45,101	835		4600		
"	21	46,102	875		4660		
"	22	47,103	880		4355		
"	23	48,104	880		4600		
"	24	49,105	905		4630		
"	48	50,106	825		4845		
"	49	51,107	890		5030		
"	50	52,108	895		5000		
"	51	53,109	970		5030		
"	52	54,110	925	890	5000	4775	
50	25	55,111	950		5150		
"	27	56,112	885		5150		
"	28	57,113	855		5000		
"	29	58,114	925		5335		
"	30	59,115	905	905	5365	5200	
60	31	---	---		5920		
"	33	60,116	1010		5645		
"	35	61,117	1000		5335		
"	36	62,118	895		5800		
"	39	63,119	940		5950		
"	41	64,120	935	955	5610	5700	

XC Mark 1 Catapult-Hydrogen Peroxide Tests

TABLE III

XC MARK 1 CATAPULT-DRY ROUNDS
TABULATION OF MAXIMUM PRESSURES AND TEMPERATURE RISE

Charge Weight: 6.0 lb., 16"/50 Index IHIC-14

<u>Rd. No.</u>	<u>Figures</u>	<u>Temp. Rise of Thermocouple °C</u>	<u>Mean Temp. Rise °C</u>	<u>Max. Pres. PSI</u>	<u>Mean Pmax PSI</u>	<u>Remarks</u>
32	10,65	845		3465		Fired to check Pyrometer instrumentation.
34	11,66	875		3375		" " "
37	12,67	835		3340		" " "
40	13,68	845		3375		" " "
47	14,69	820	845	3465	3405	Fired to check Ceramic type thermocouple.

CONFIDENTIAL
Security Information

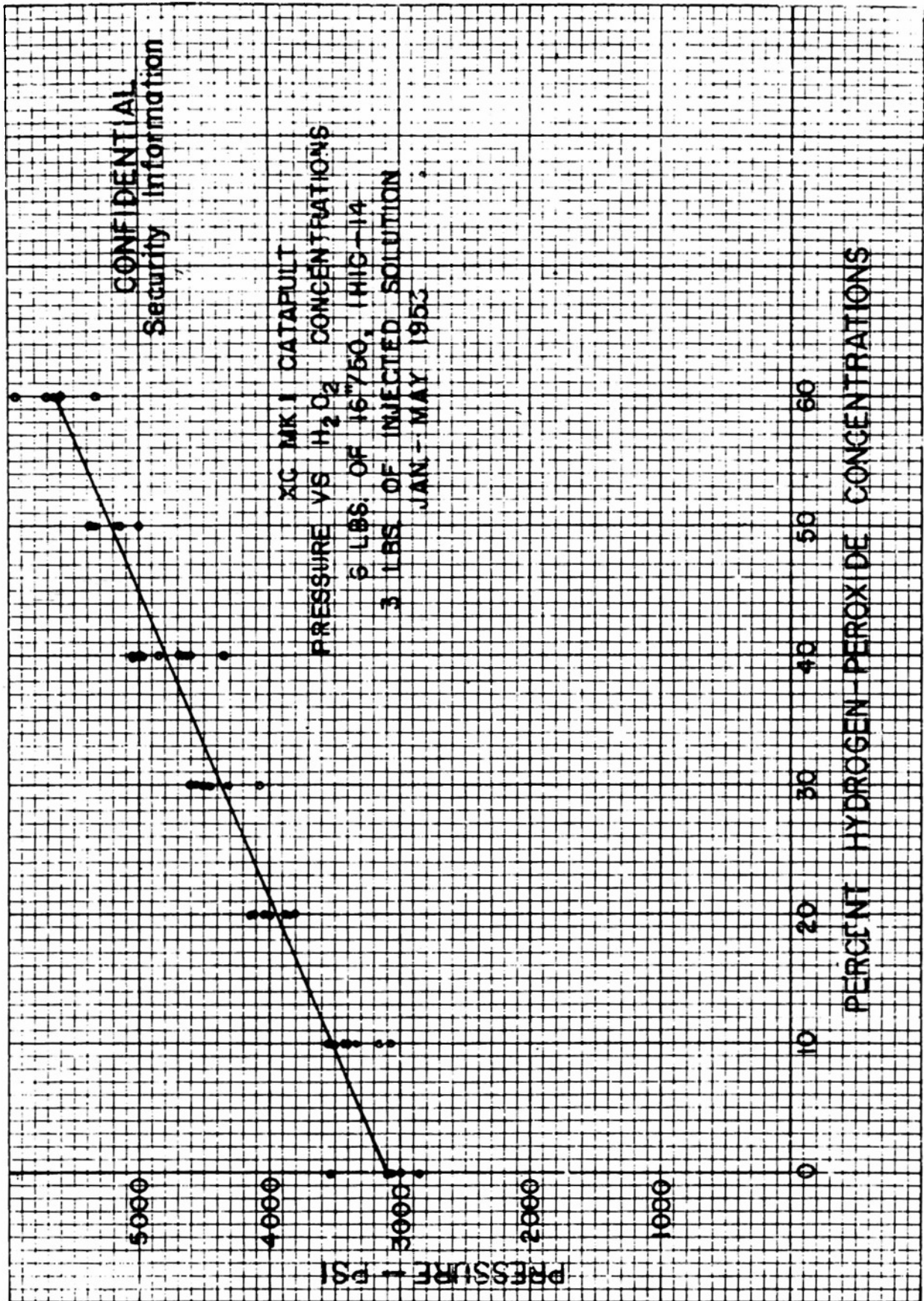


FIGURE 8

CONFIDENTIAL
Security Information

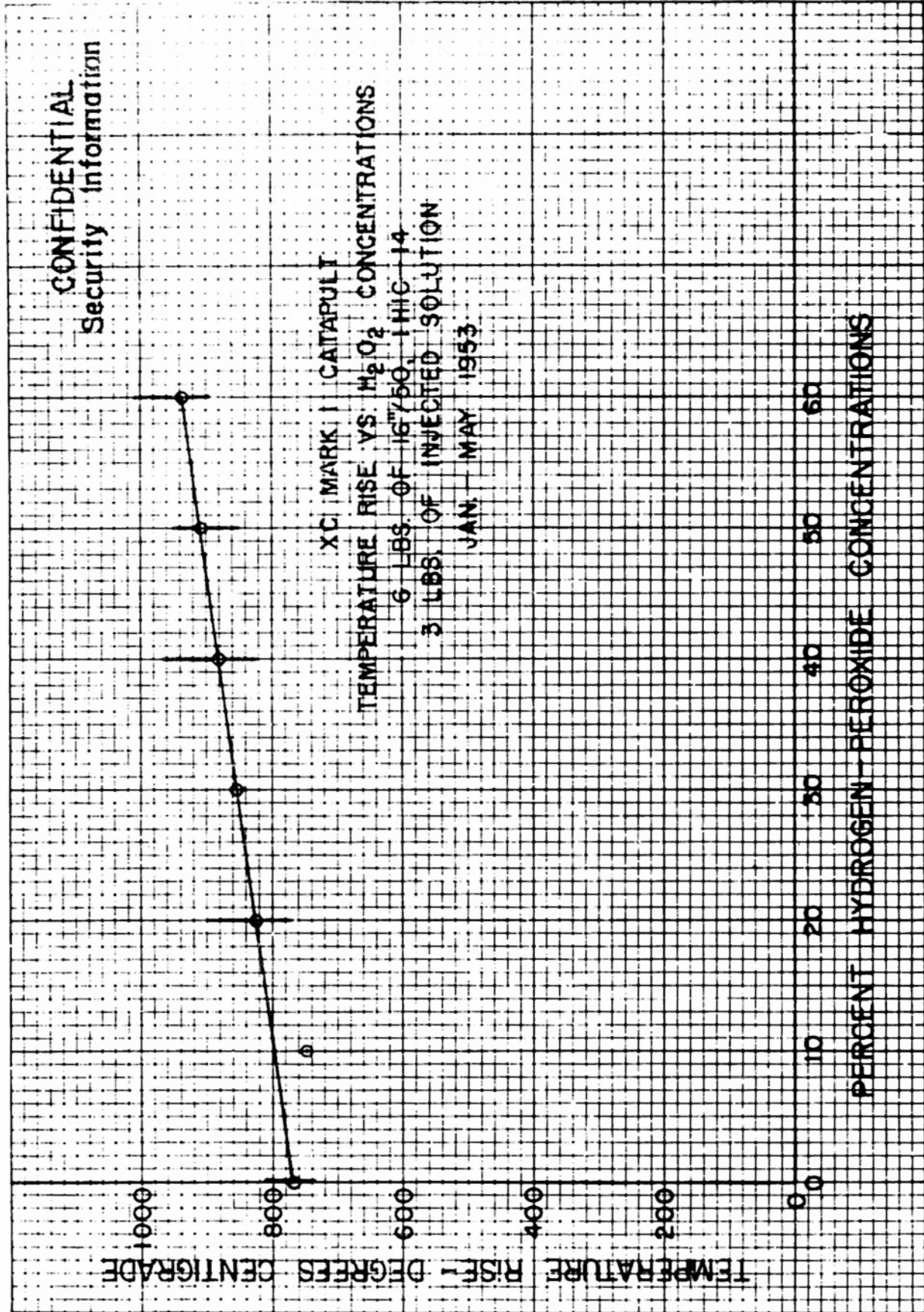


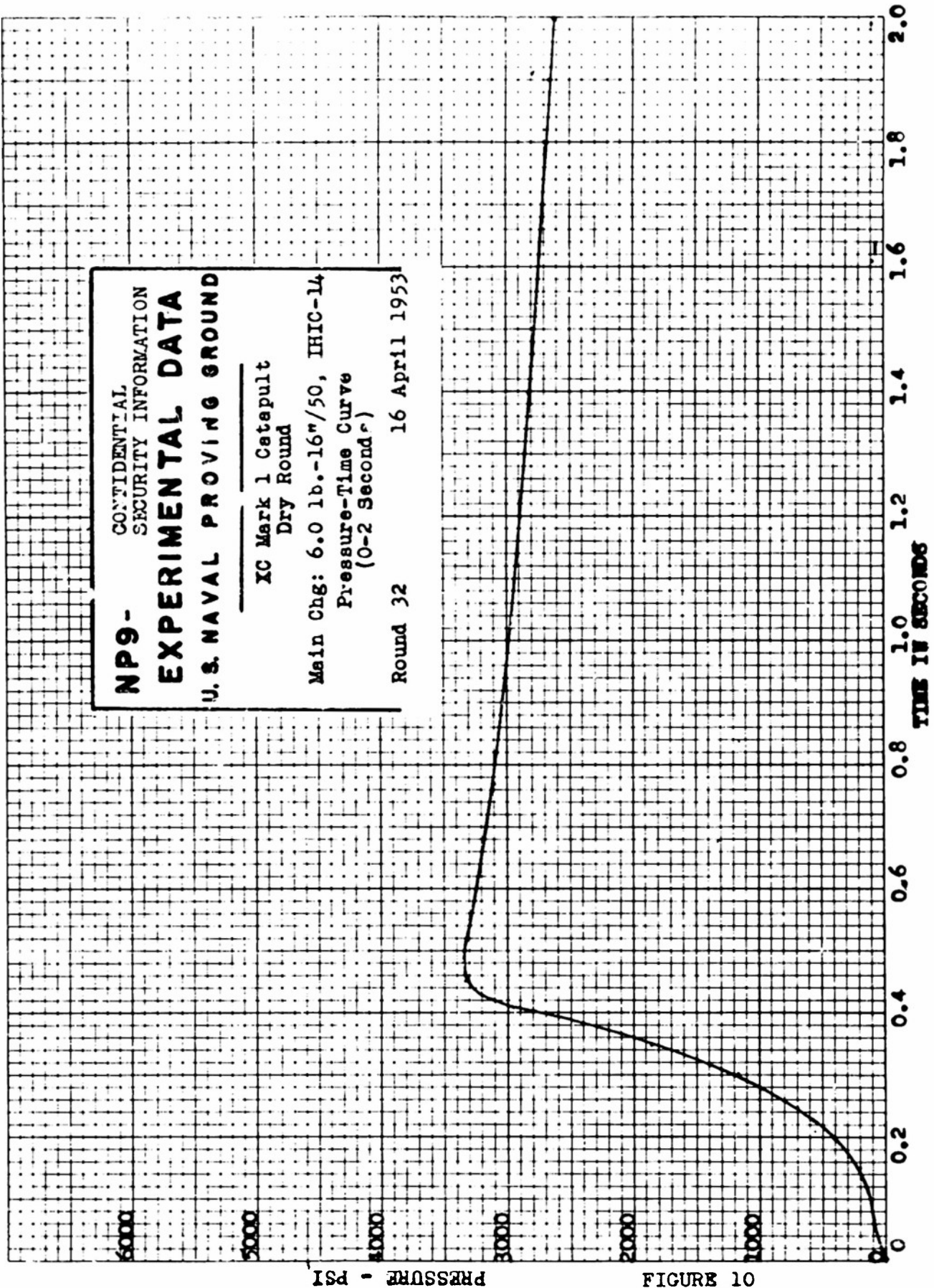
FIGURE 9

NP9 -
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND

**XC Mark 1 Catapult
Dry Round**

Main Chg: 6.0 lb.-16"/50, IHIC-14
Pressure-Time Curve
(0-2 Second^c)

Round 32 16 April 1953



PRESSURE - PSI

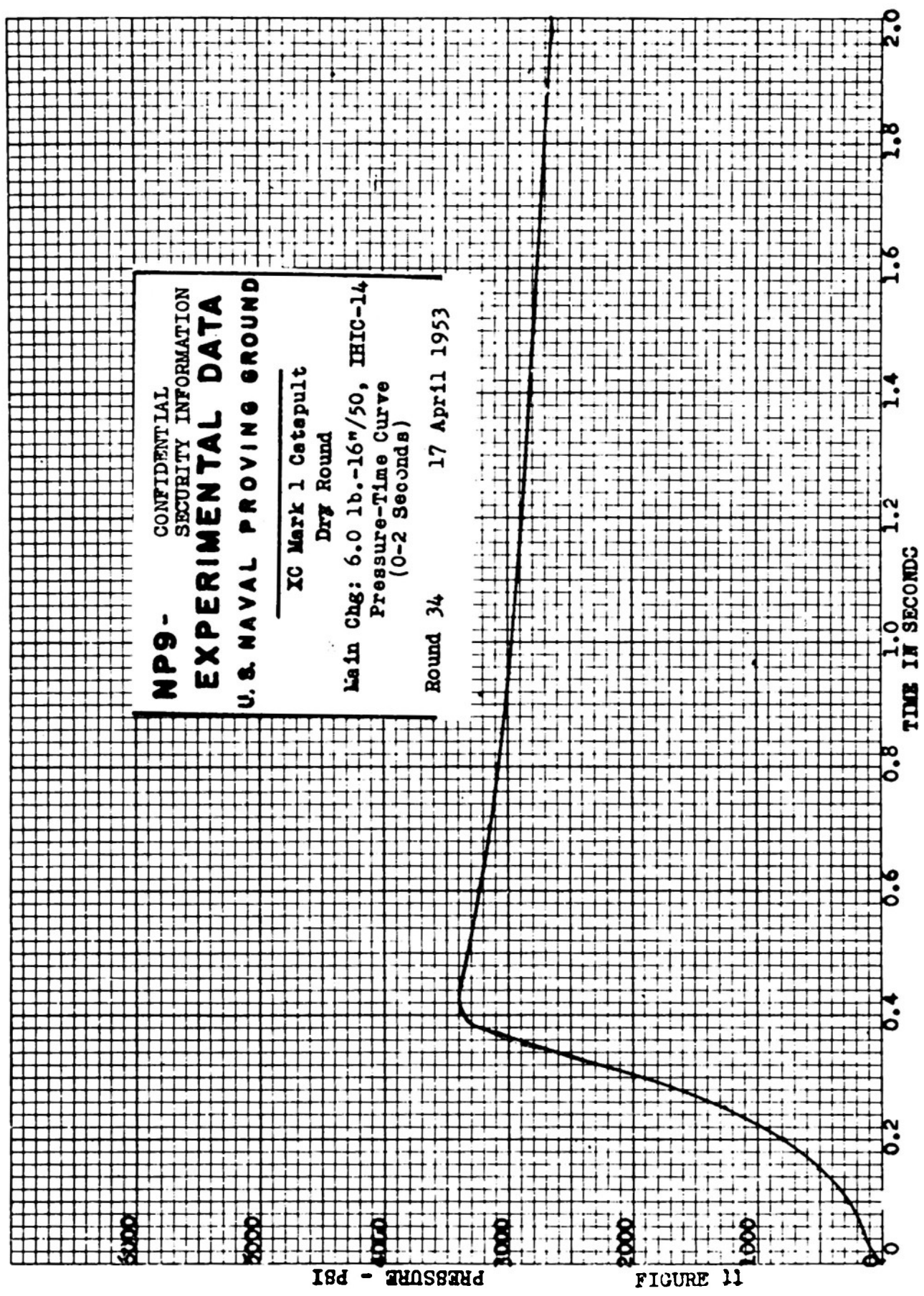
FIGURE 10

NP9 - CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND

IC Mark 1 Catapult
Dry Round

Main Chg: 6.0 lb.-16"/50, IHIC-14
Pressure-Time Curve
(0-2 Seconds)

Round 34 17 April 1953



PRESSURE - PSI

FIGURE 11

TIME IN SECONDS

NP9 -
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA

U. S. NAVAL PROVING GROUND

XC Mark 1 Catapult
Dry Round

Main Chg: 6.0 lb.-16"/50, IHIC-14
Pressure-Time Curve
(0-2 Seconds)

Round 37 21 April 1953

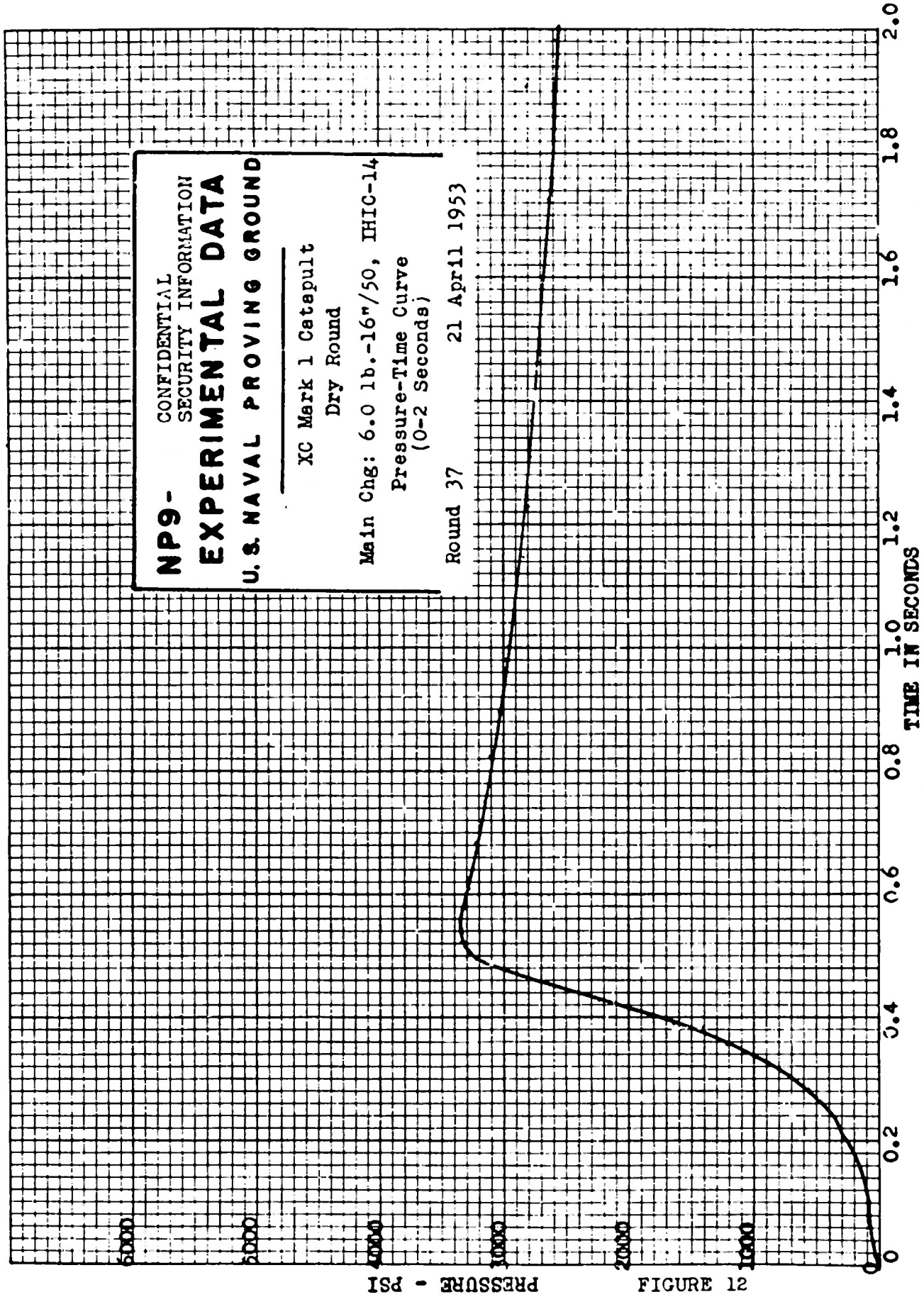
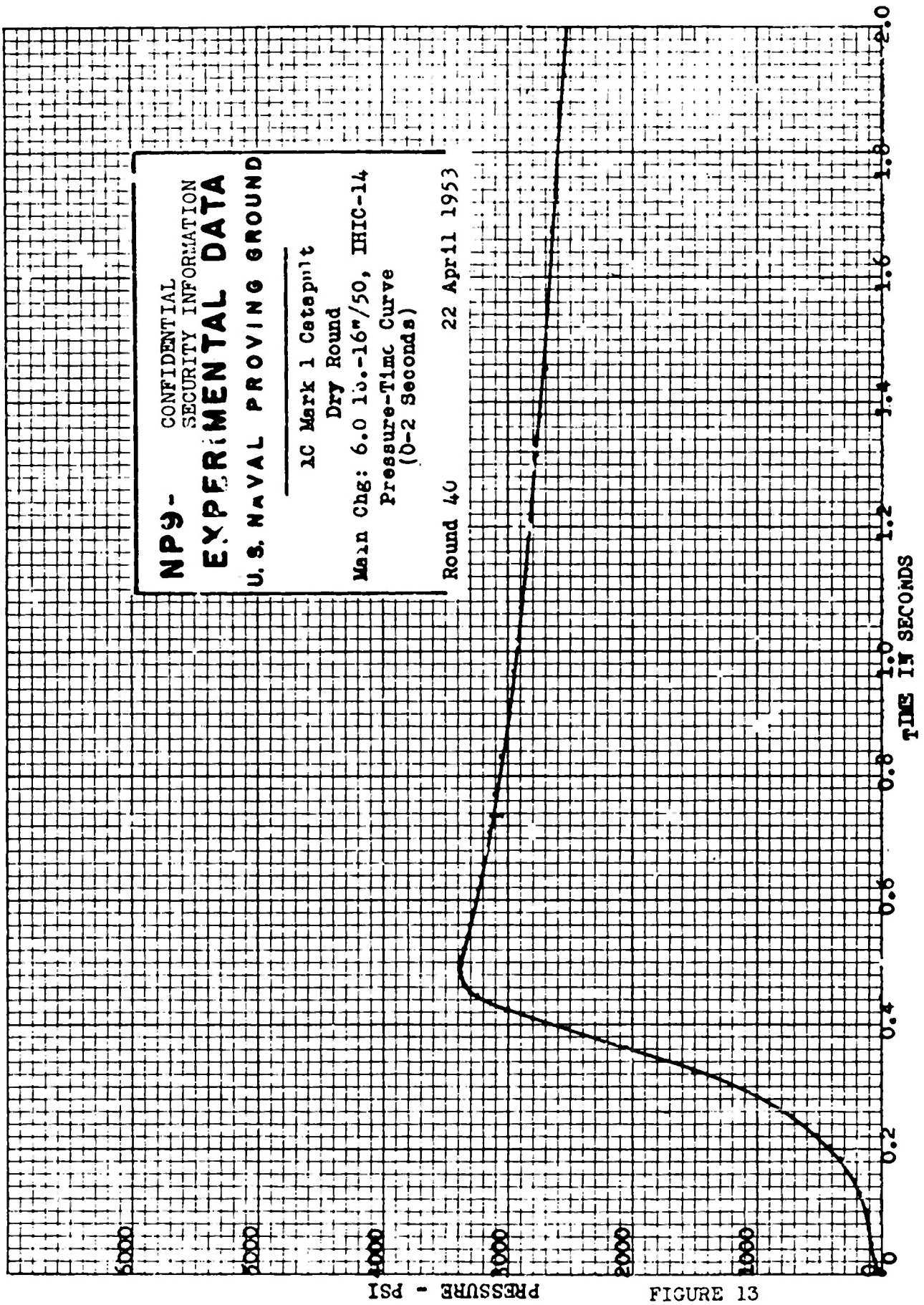


FIGURE 12

PRESSURE - PSI

TIME IN SECONDS



NP9- CONFIDENTIAL
 SECURITY INFORMATION
EXPERIMENTAL DATA
 U.S. NAVAL PROVING GROUND
 1C Mark 1 Catapult
 Dry Round
 Main Chg: 6.0 lb.-16"/50, IHIC-14
 Pressure-Time Curve
 (0-2 Seconds)
 Round 40 22 April 1953

PSI - PRESSURE

FIGURE 13

TIME IN SECONDS

NP9 - CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA

U. S. NAVAL PROVING GROUND

XC Mark 1 Catapult
Dry Round

Main Chg: 6.0 lb.-16"/50, IHIC-14

Pressure-Time Curve
(0-2 Seconds)

Round 47 30 April 1953

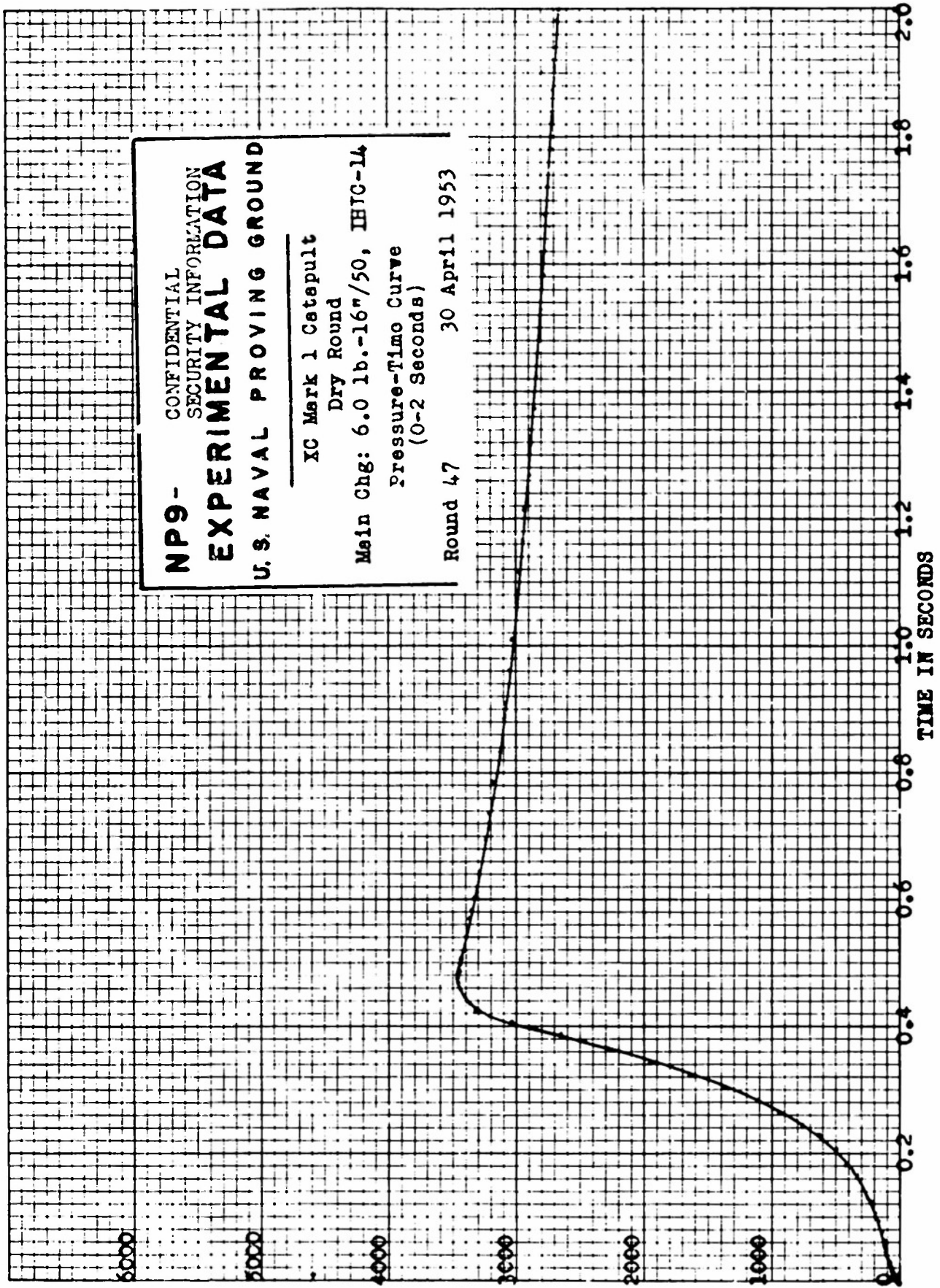


FIGURE 14

FIGURE 14

NP9
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

CONFIDENTIAL
SECURITY INFORMATION

XC Mark 1 Catapult
Water Spray Injection

Main Chg: 4.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)

Round No. 1 5 January 1953

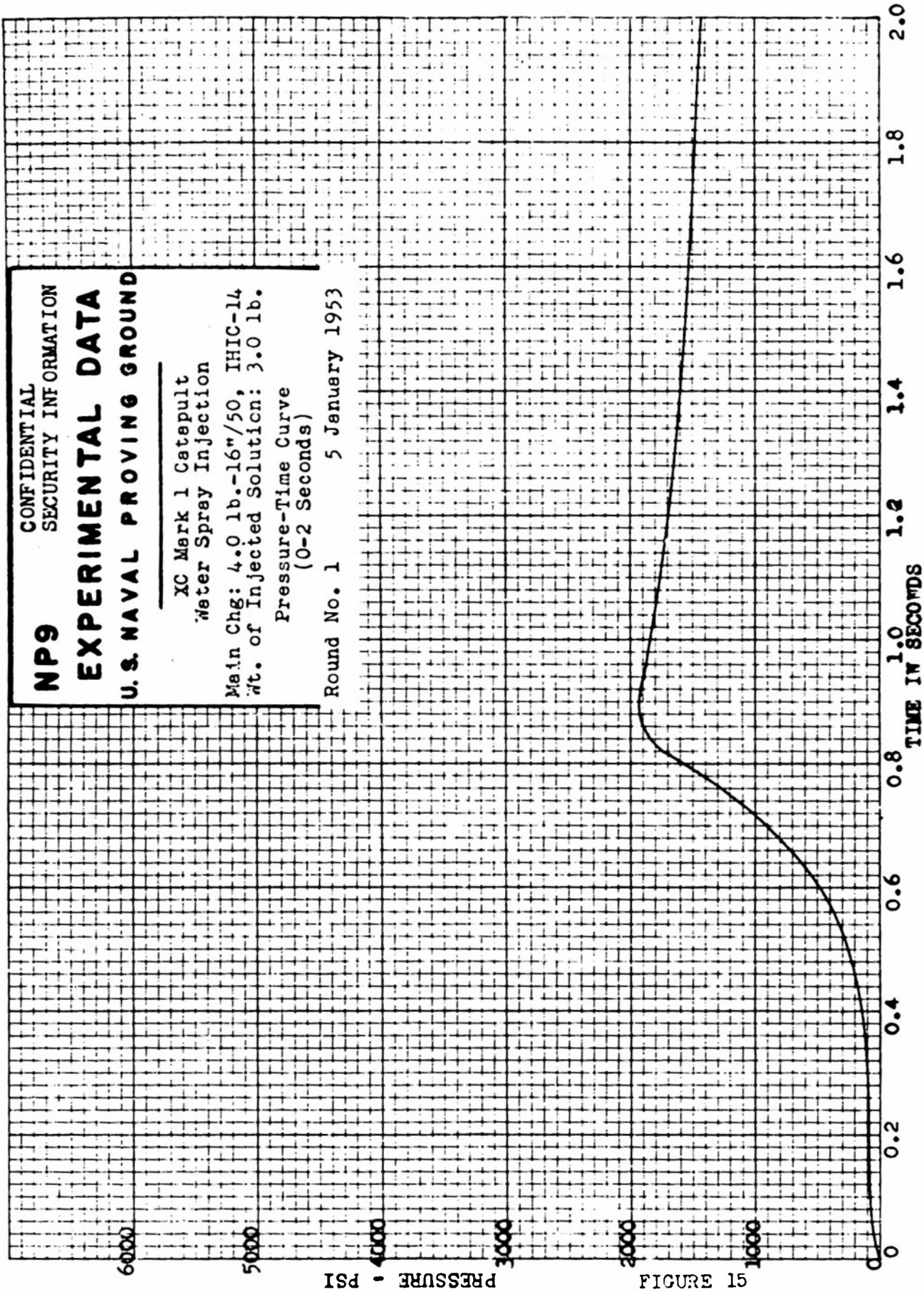


FIGURE 15

PRESSURE - PSI

TIME IN SECONDS

CONFIDENTIAL
SECURITY INFORMATION

NP9

EXPERIMENTAL DATA

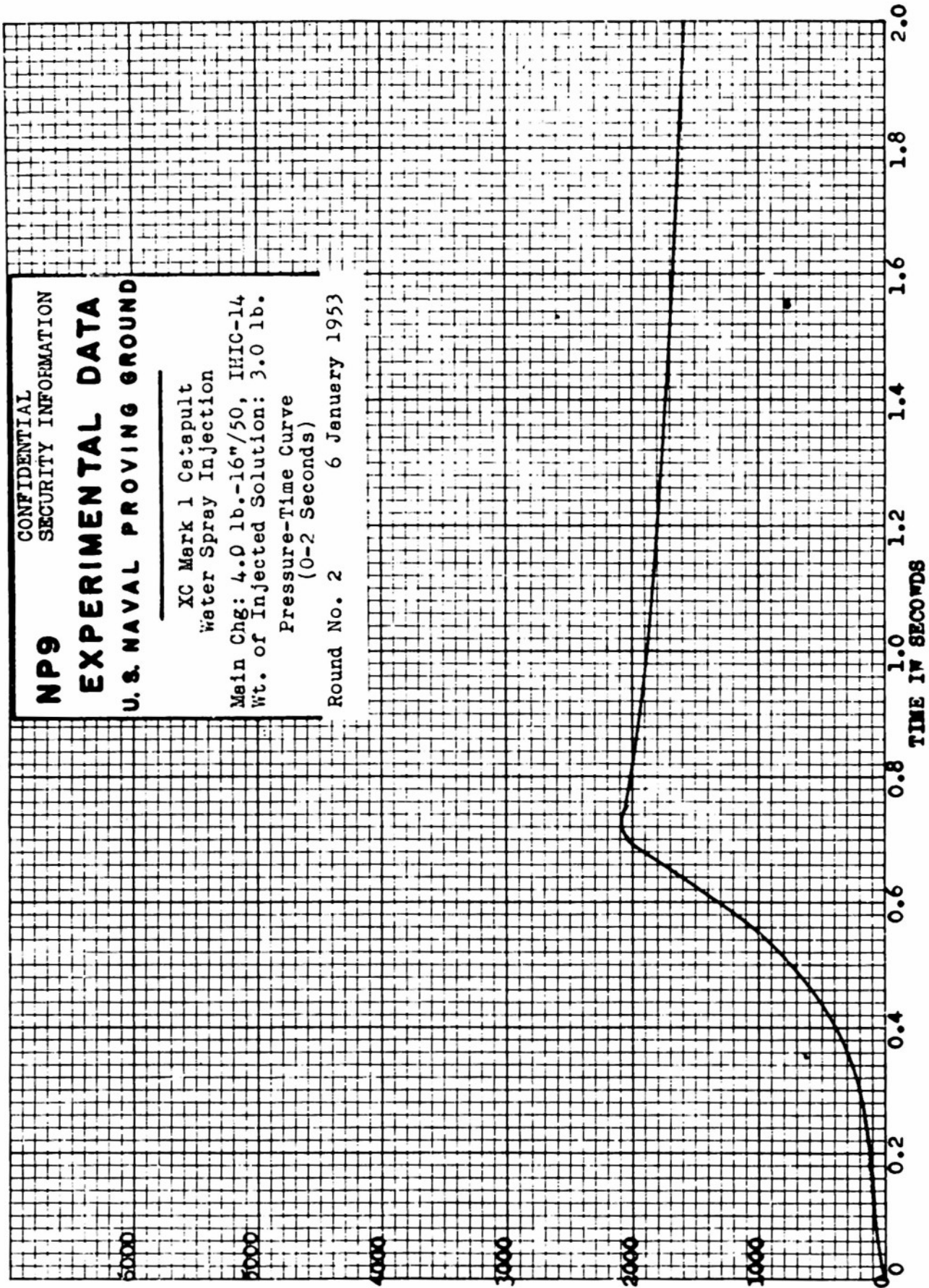
U.S. NAVAL PROVING GROUND

XC Mark 1 Cetapult
Water Spray Injection

Main Chg: 4.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)

Round No. 2 6 January 1953



PSI - PRESSURE

FIGURE 16

CONFIDENTIAL
SECURITY INFORMATION

NP9
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

XC Mark 1 Catapult
Water Spray Injection

Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)

Round No. 3 7 January 1953

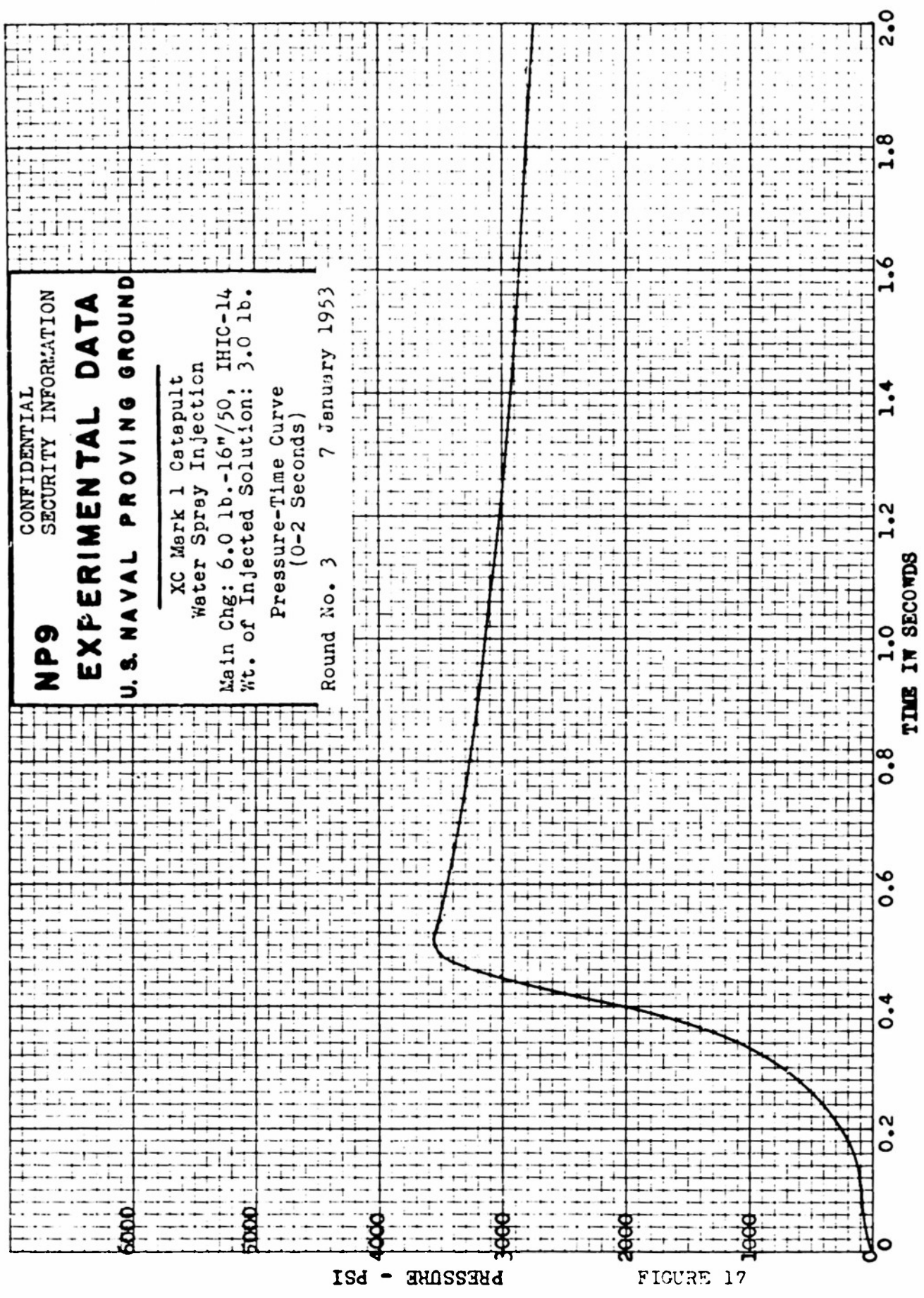


FIGURE 17
PRESSURE - PSI

NP9- CONFIDENTIAL
SECURITY INFORMATION

EXPERIMENTAL DATA

U. S. NAVAL PROVING GROUND

XC Mark 1 Catapult
Water Spray Injection

Main Chg: 6.0 lb.-16"/50, IHIG-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)

Round 54 7 May 1953

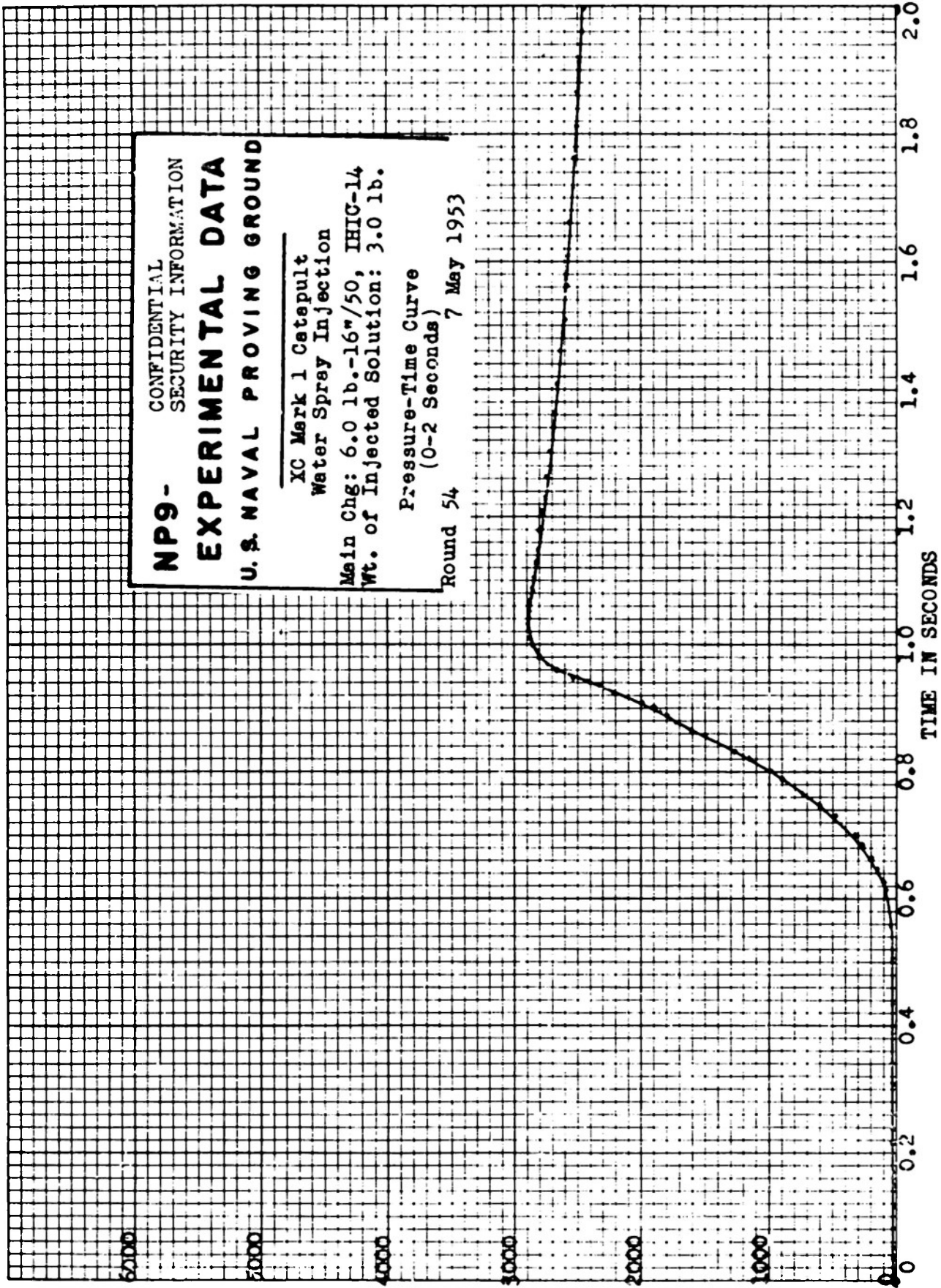
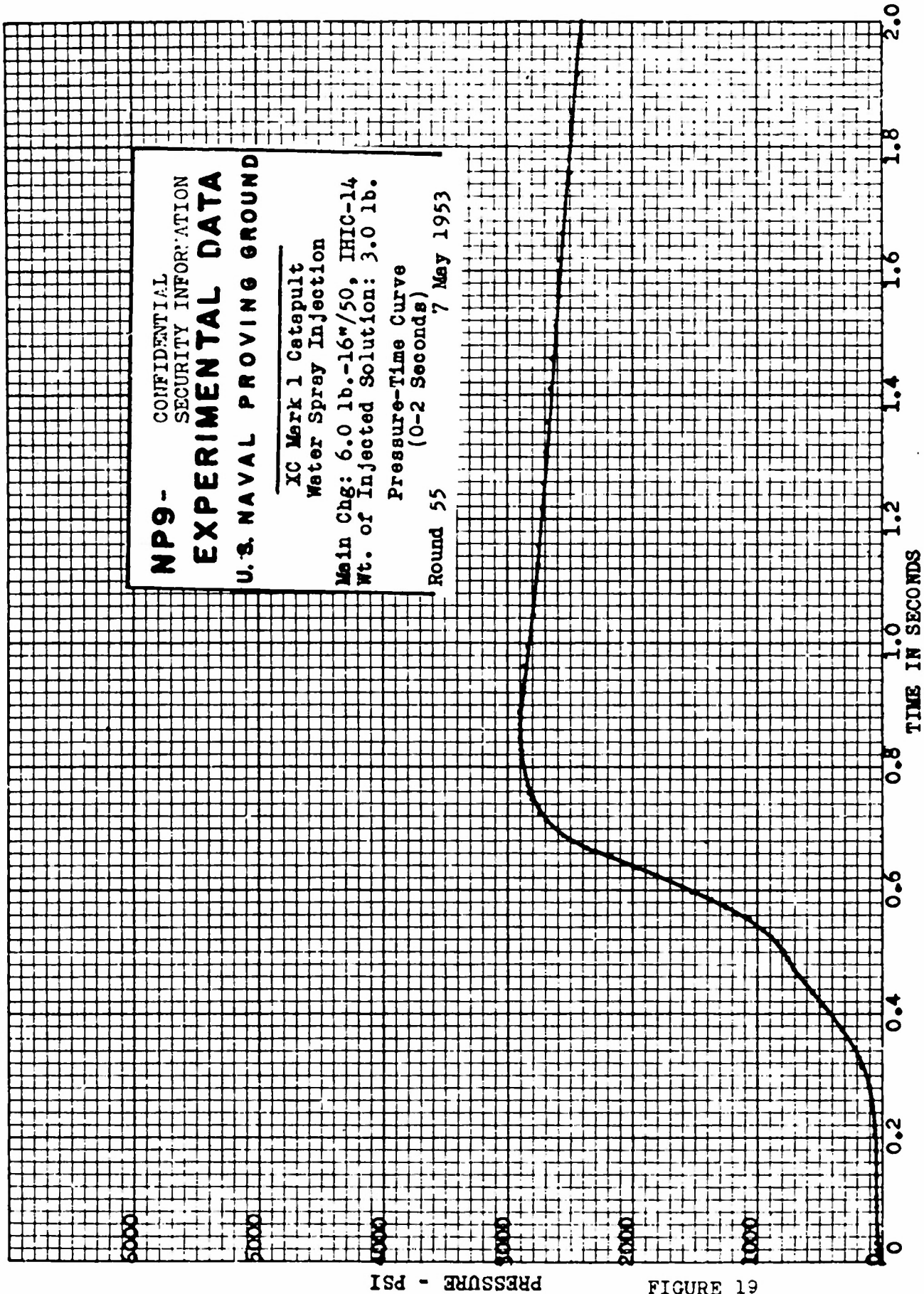


FIGURE 18
PRESSURE - PSI

NP9 - CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

XC Mark 1 Catapult
Water Spray Injection
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-2 Seconds)
Round 55
7 May 1953



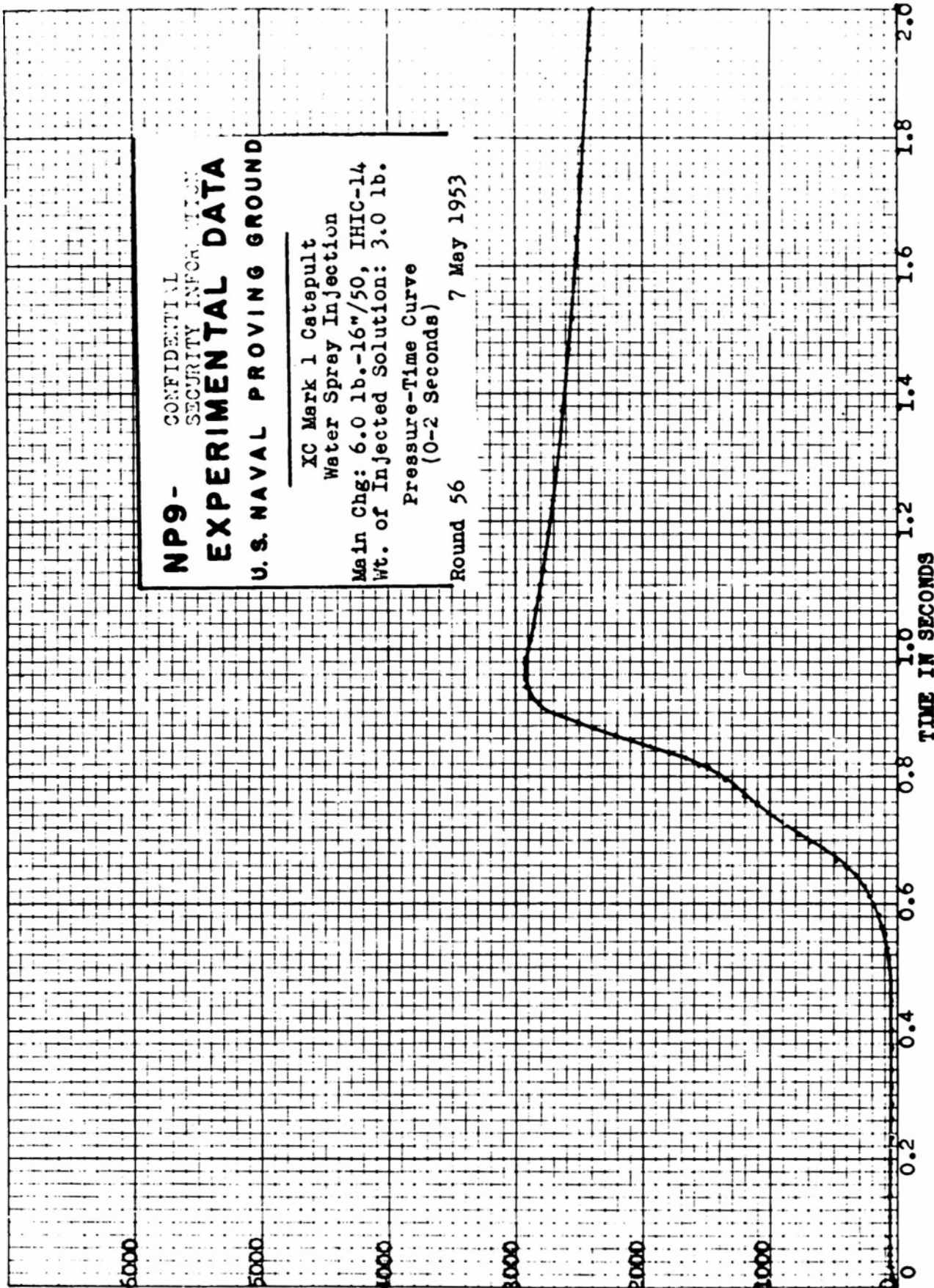
61 ERUJIF
PRESSURE - PSI

FIGURE 19

**NP9 - CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

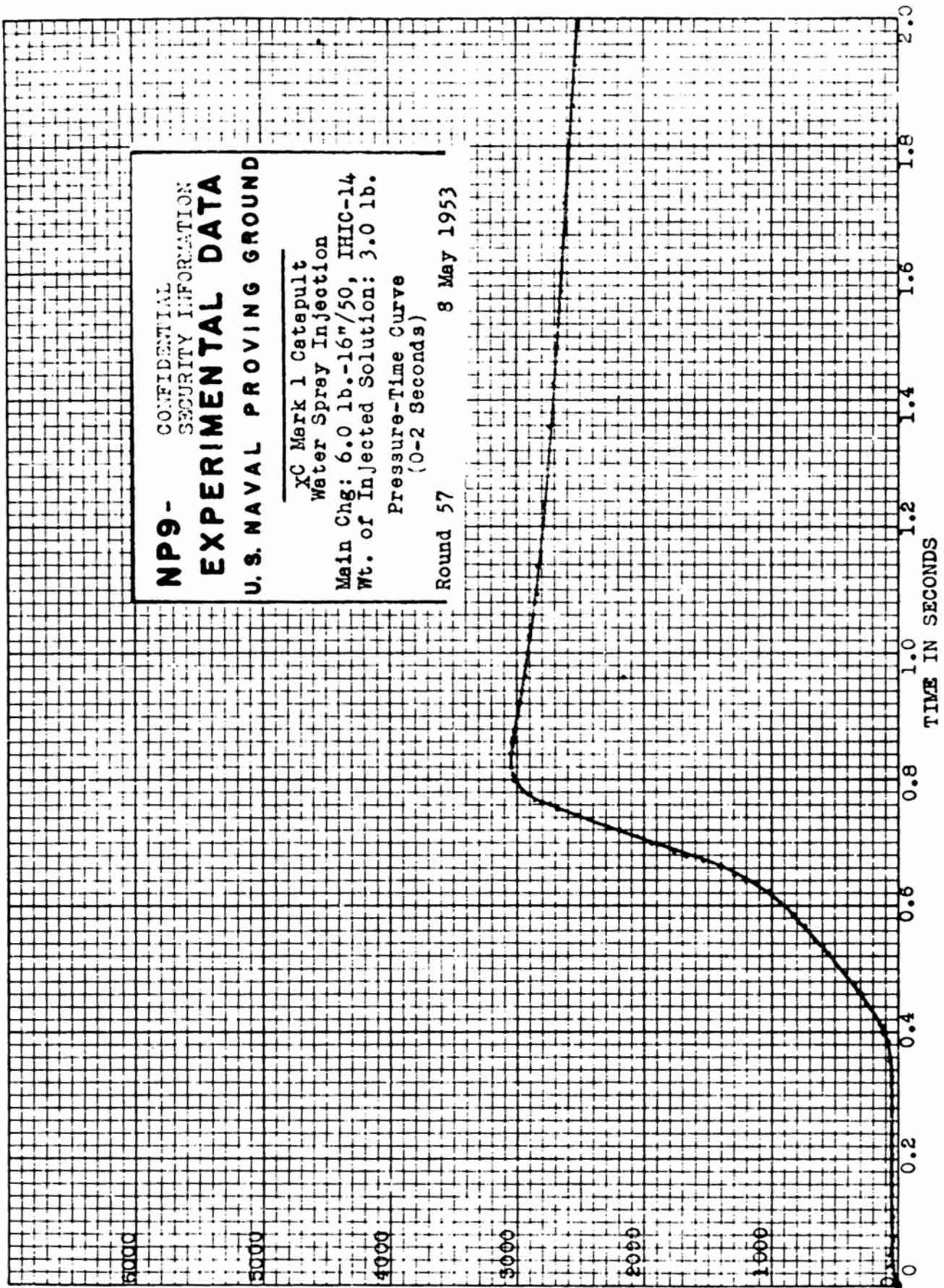
XC Mark 1 Catapult
Water Spray Injection
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)
Round 56 7 May 1953



PSI - PRESSURE

FIGURE 20



PSI - PRESSURE

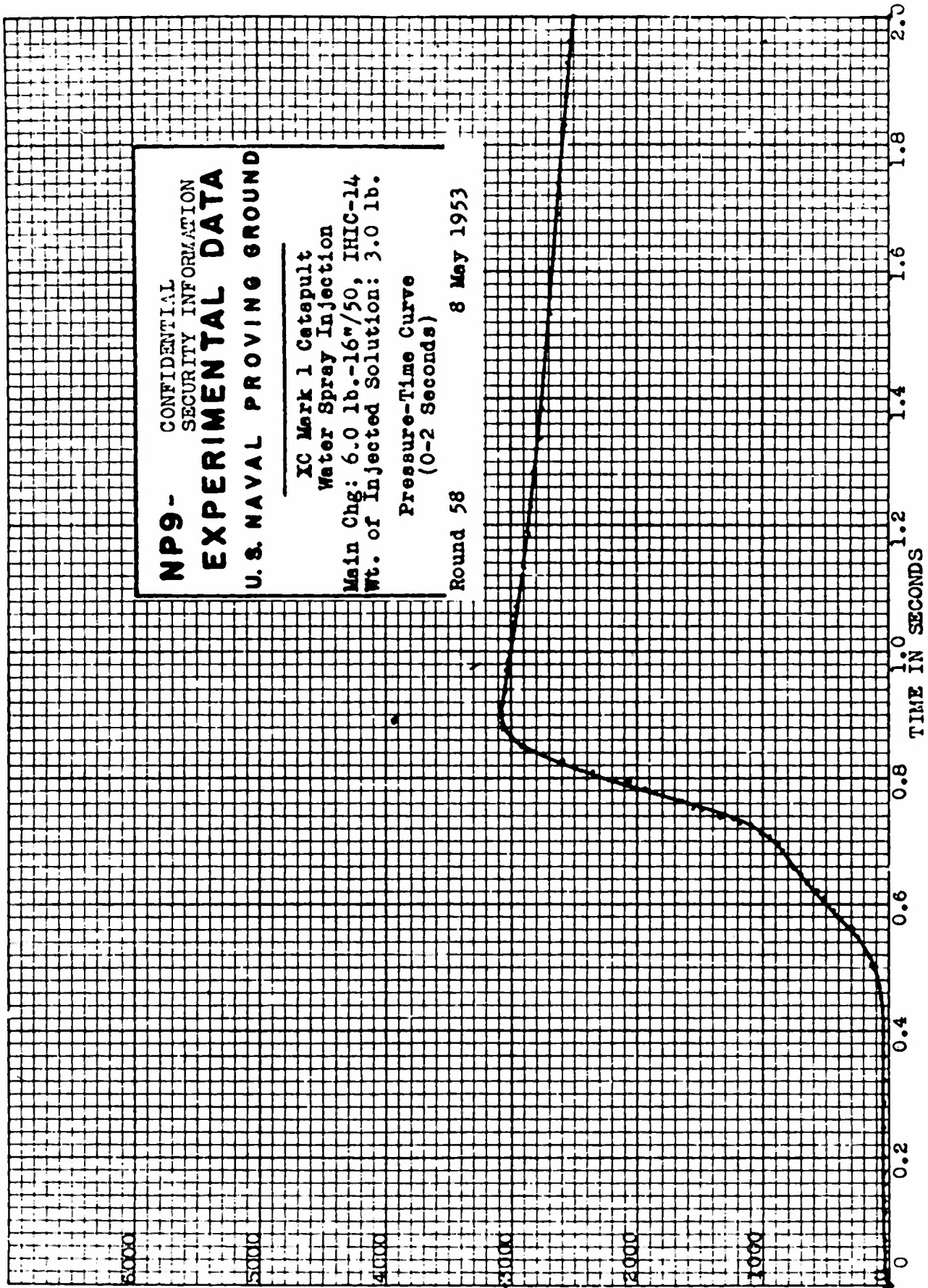
FIGURE 21

NP9 - CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND

XC Mark 1 Catapult
Water Spray Injection
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)

Round 58 8 May 1953



PSI - PRESSURE

FIGURE 22

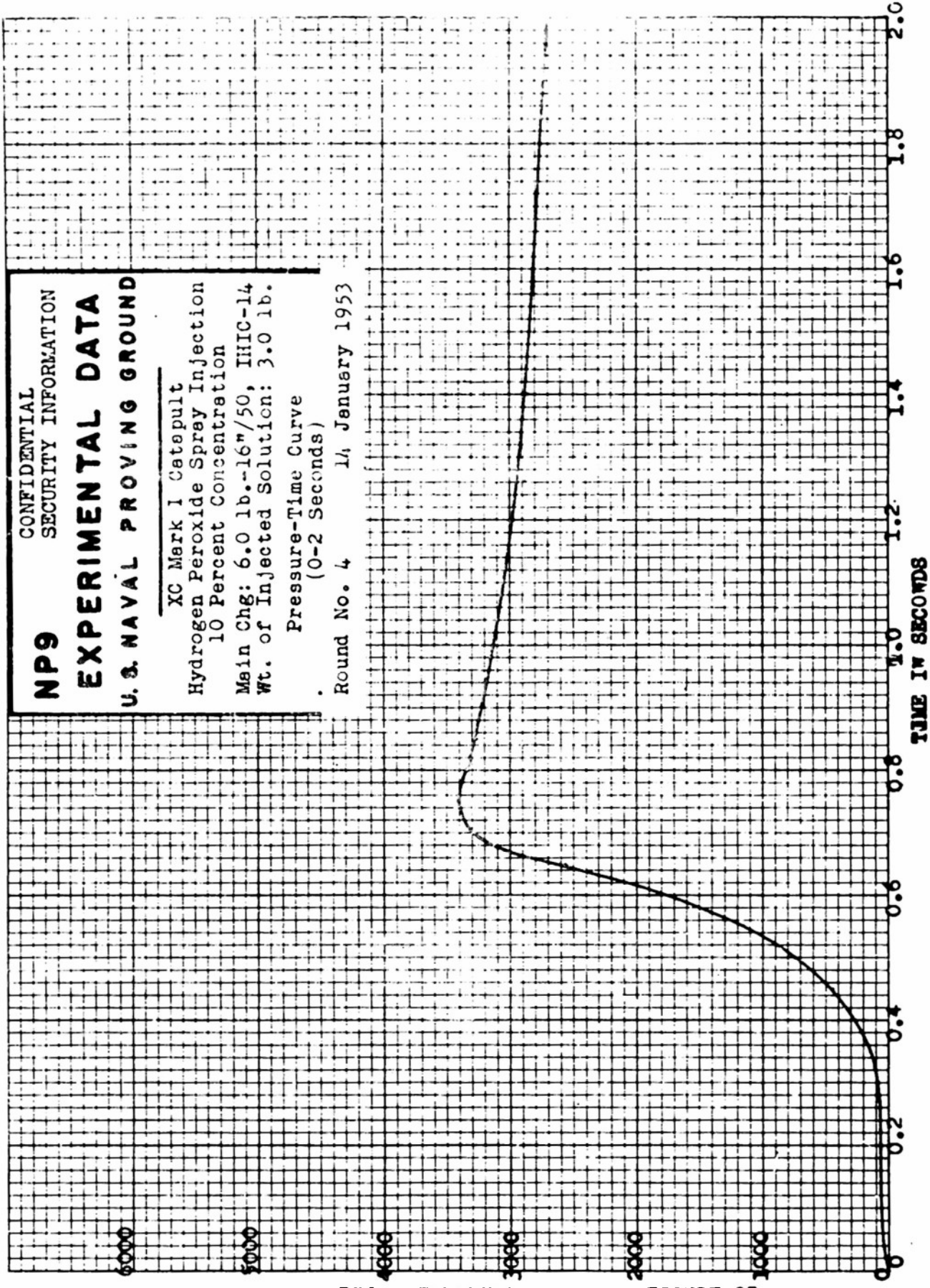
CONFIDENTIAL
SECURITY INFORMATION

NP9
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
10 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)

Round No. 4 14 January 1953



27 ERRURE - PSI

FIGURE 23

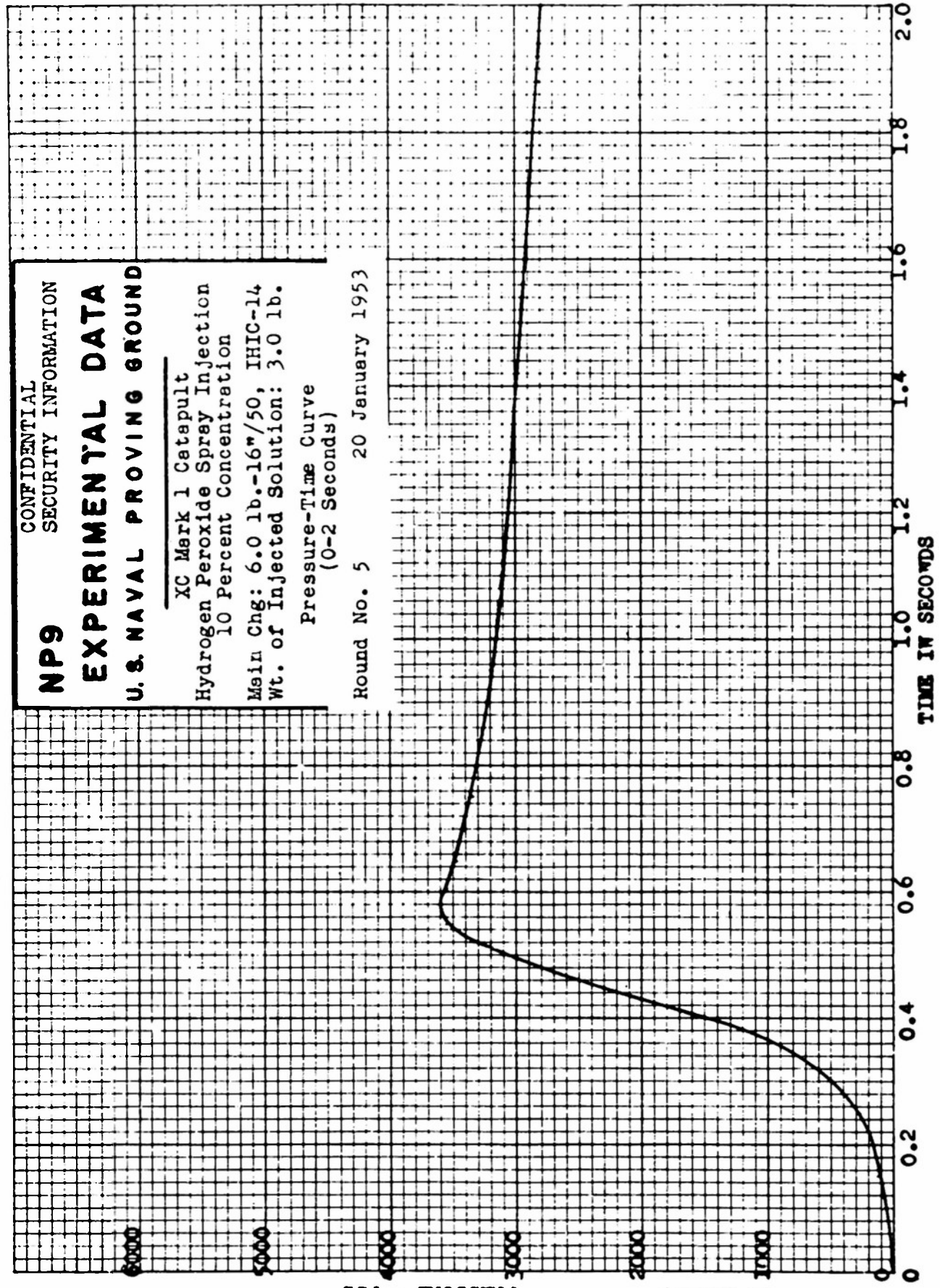
CONFIDENTIAL
SECURITY INFORMATION

**NP9
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND**

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
10 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)

Round No. 5 20 January 1953



PSI - PRESSURE

FIGURE 24

TIME IN SECONDS

CONFIDENTIAL
SECURITY INFORMATION

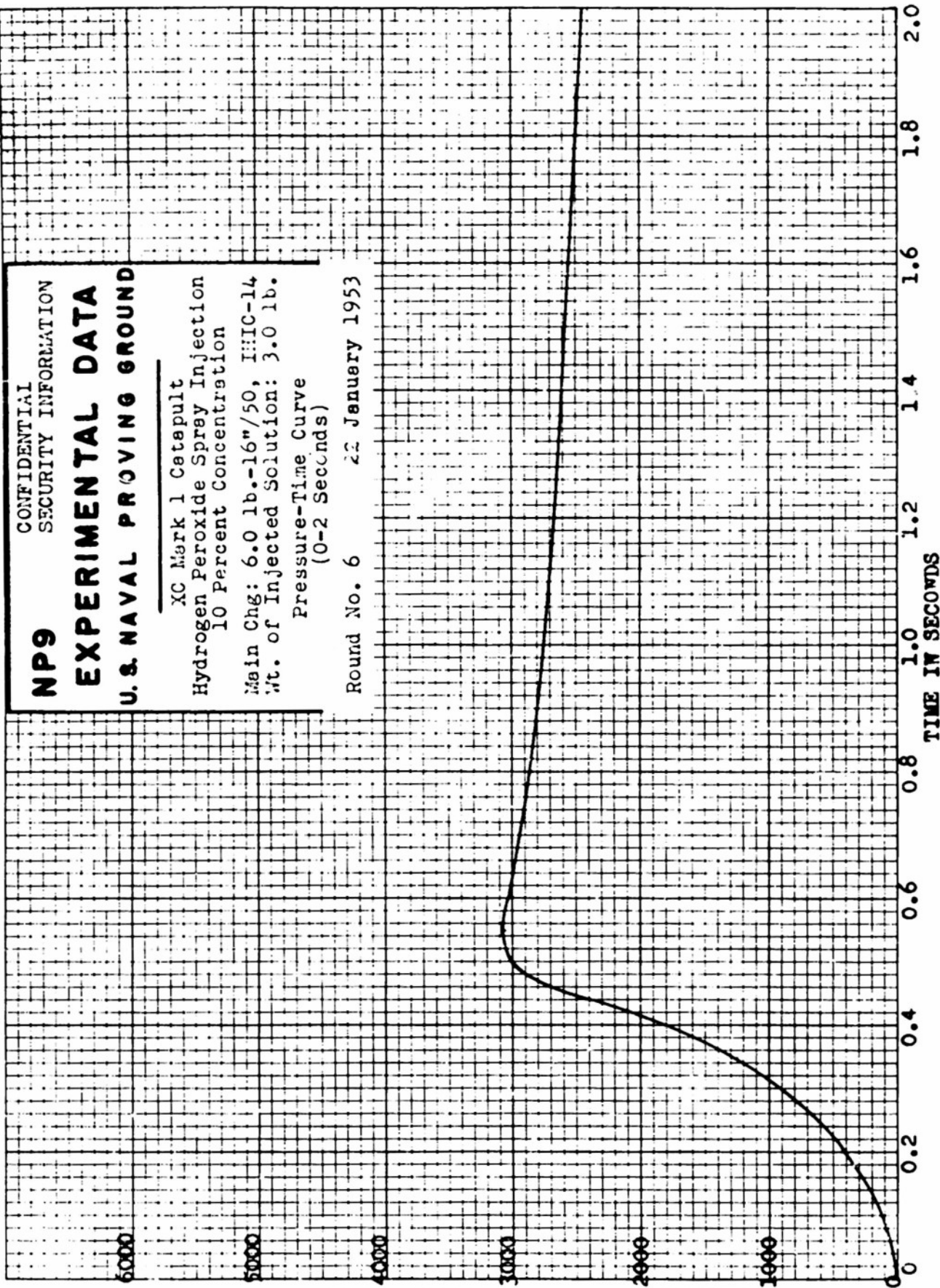
NP9

EXPERIMENTAL DATA

U.S. NAVAL PROVING GROUND

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
10 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IIC-14
Wt. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-2 Seconds)

Round No. 6 22 January 1953



52 ENRIF
PRESSURE - PSI

FIGURE 25

CONFIDENTIAL
SECURITY INFORMATION

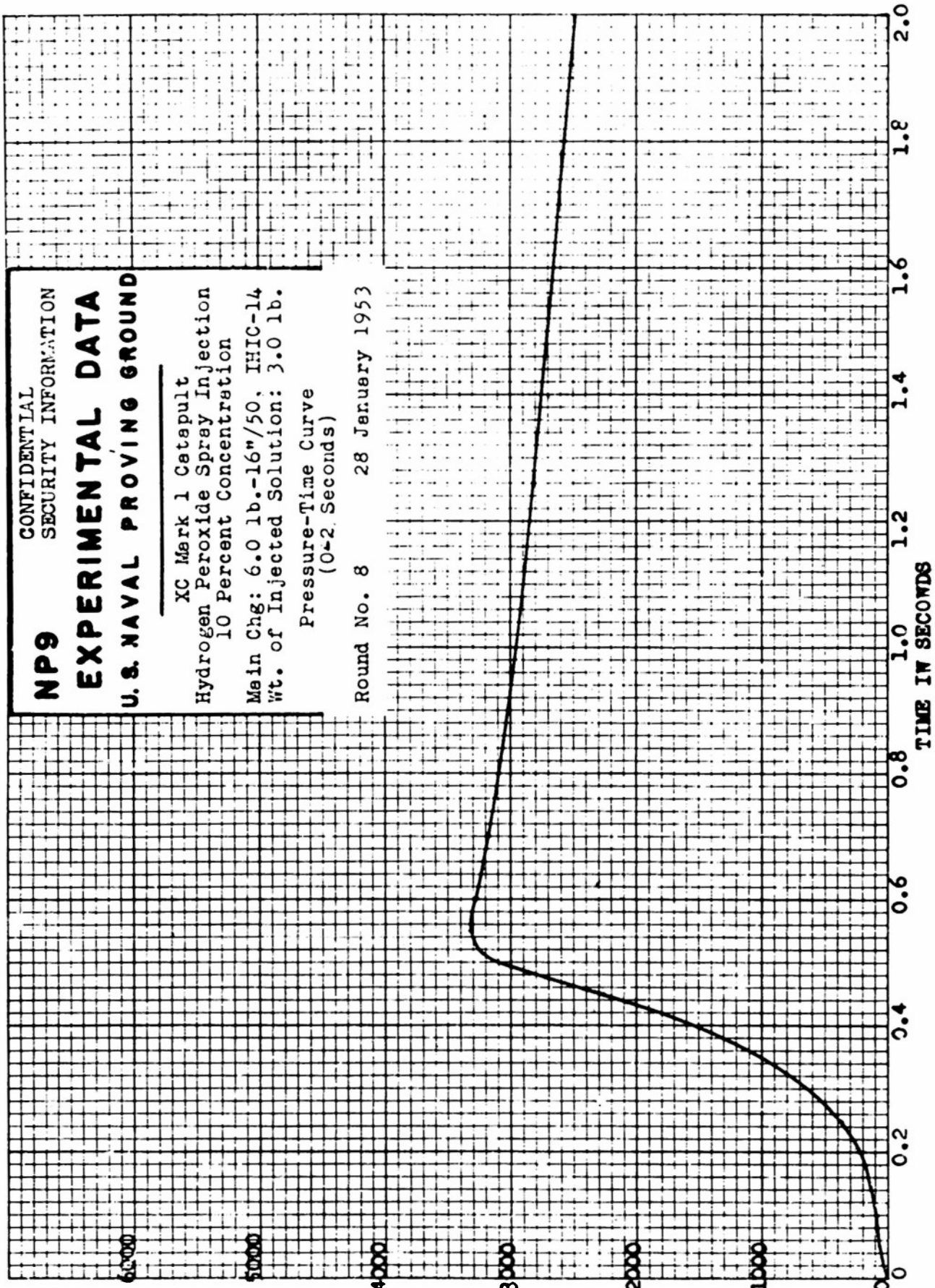
**NP9
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
10 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)

Round No. 8 28 January 1953

FIGURE 26
PRESSURE - PSI

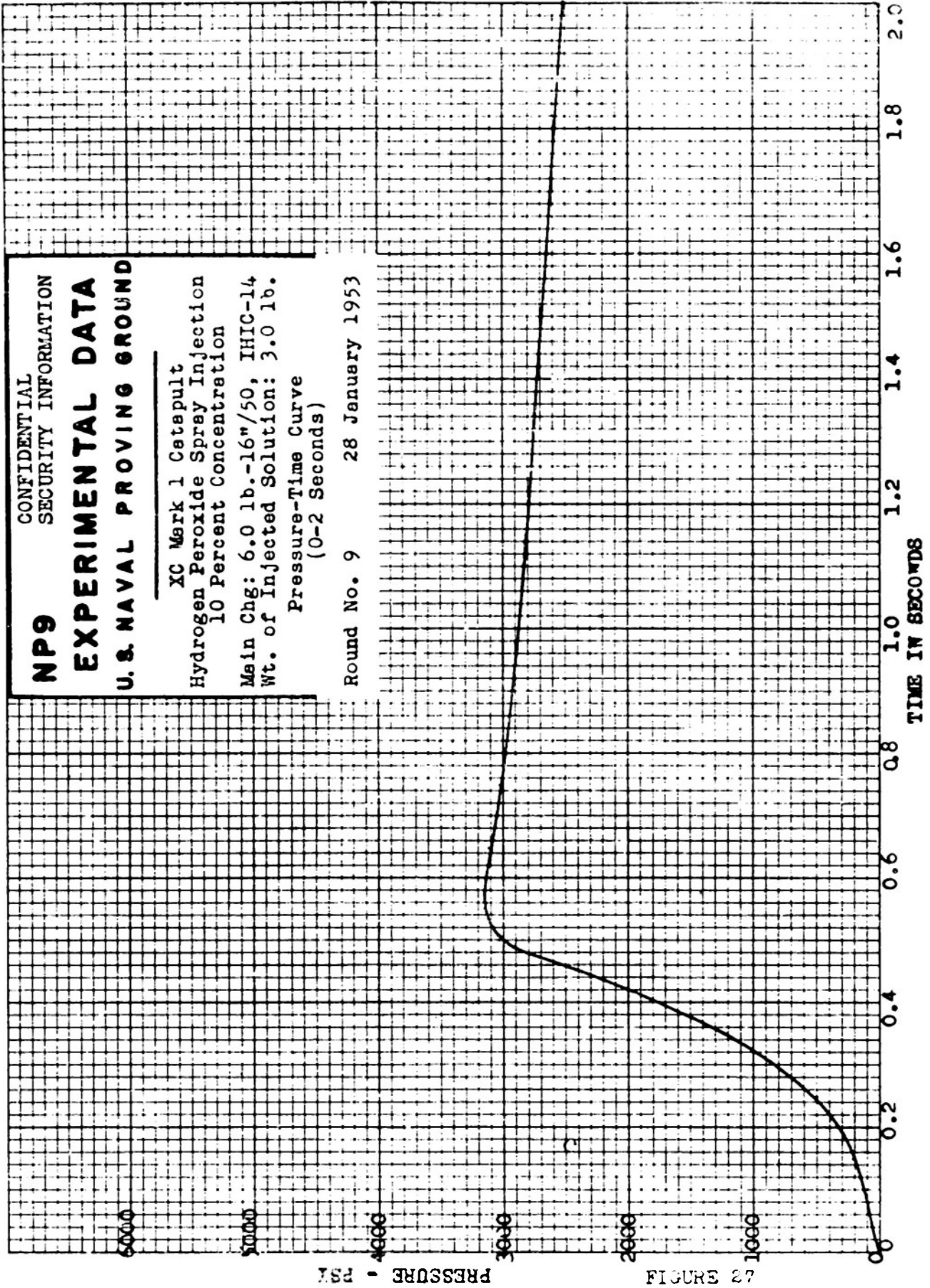


CONFIDENTIAL
SECURITY INFORMATION

**NP9
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND**

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
10 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-2 Seconds)

Round No. 9 28 January 1953



PSI

27 ENRIF

NP9 -
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND

CONFIDENTIAL
SECURITY INFORMATION

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
10 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)
Round 44 24 April 1953

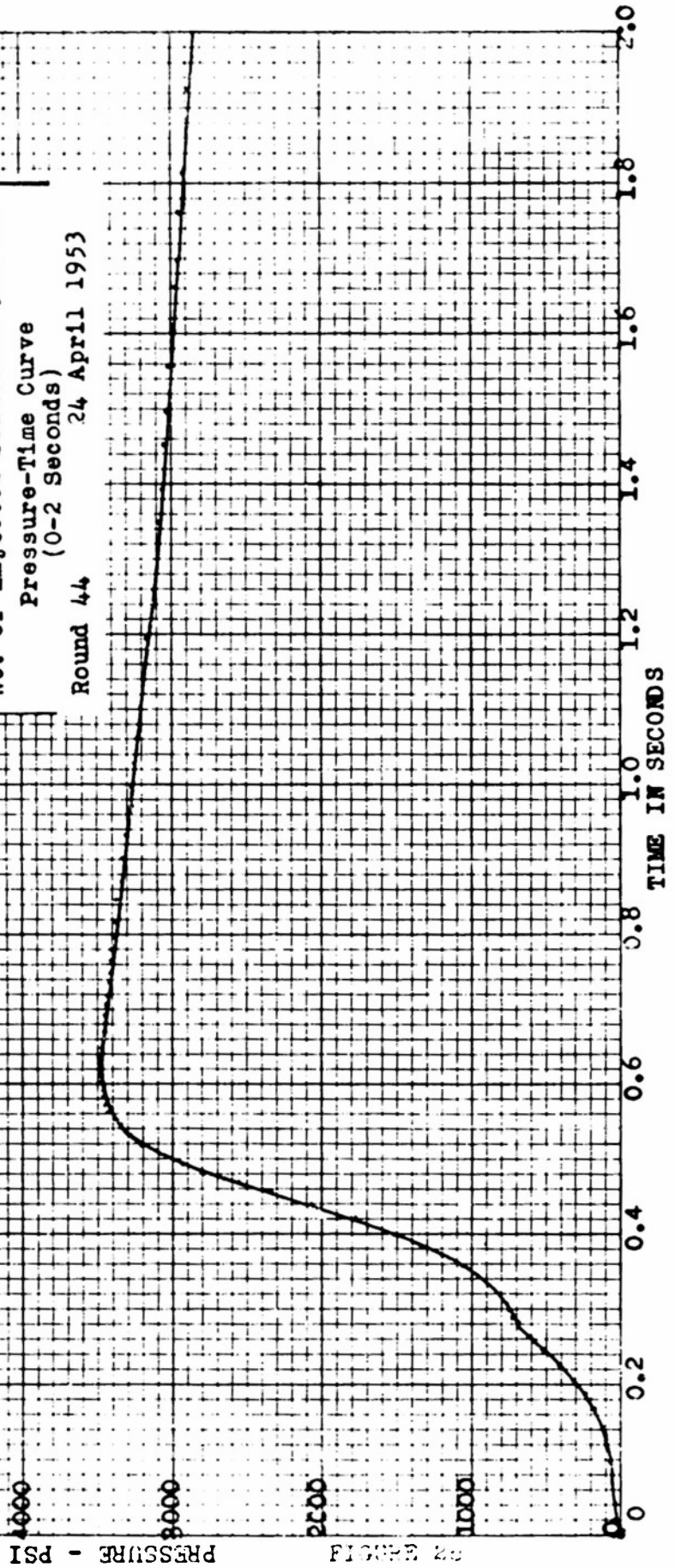


FIGURE 26
PRESSURE - PSI

**NP9- CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND**

**XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
10 Percent Concentration**

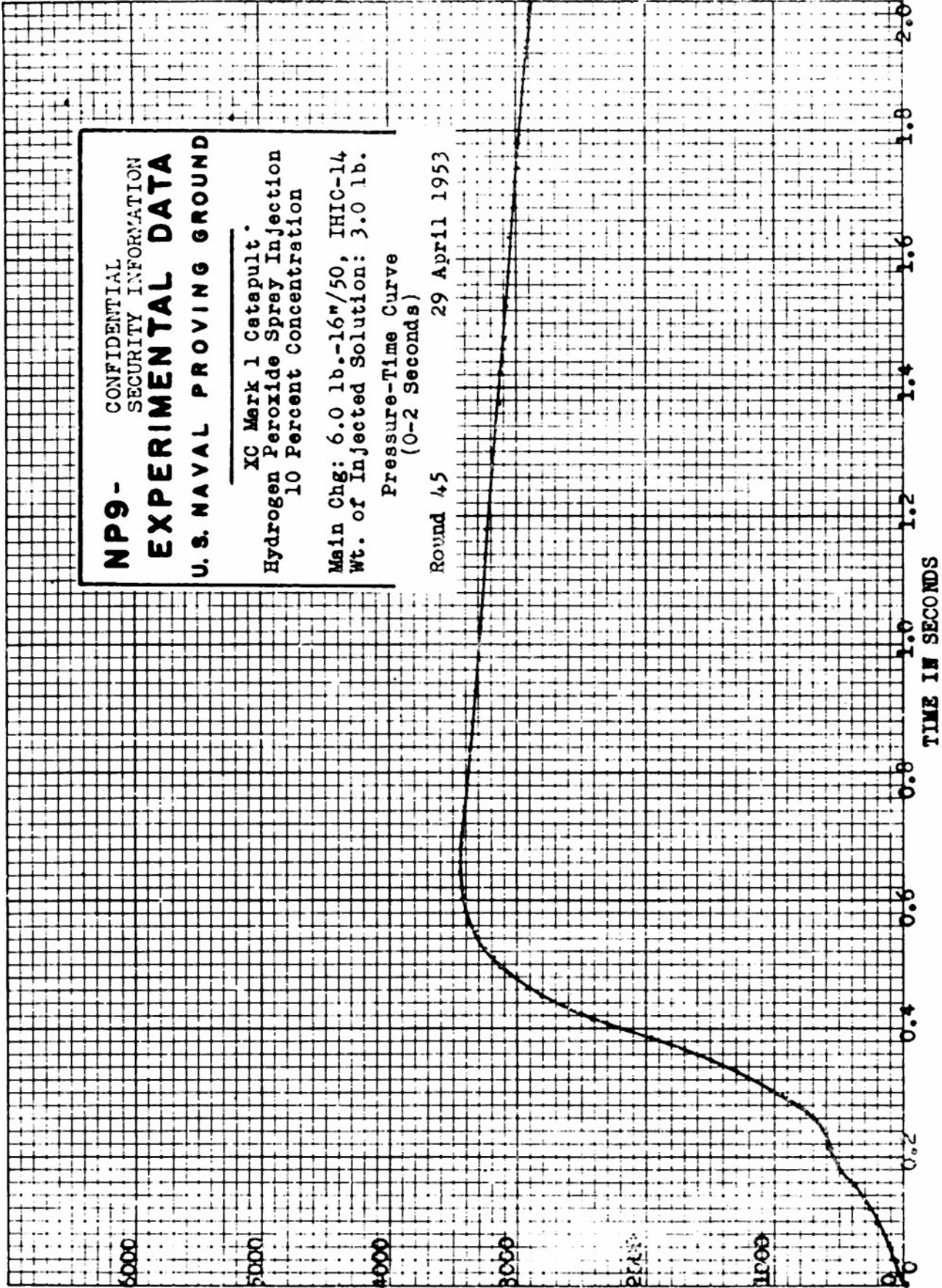
**Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.**

**Pressure-Time Curve
(0-2 Seconds)**

Round 45 29 April 1953

62 ENGINE
PRESSURE - PSI

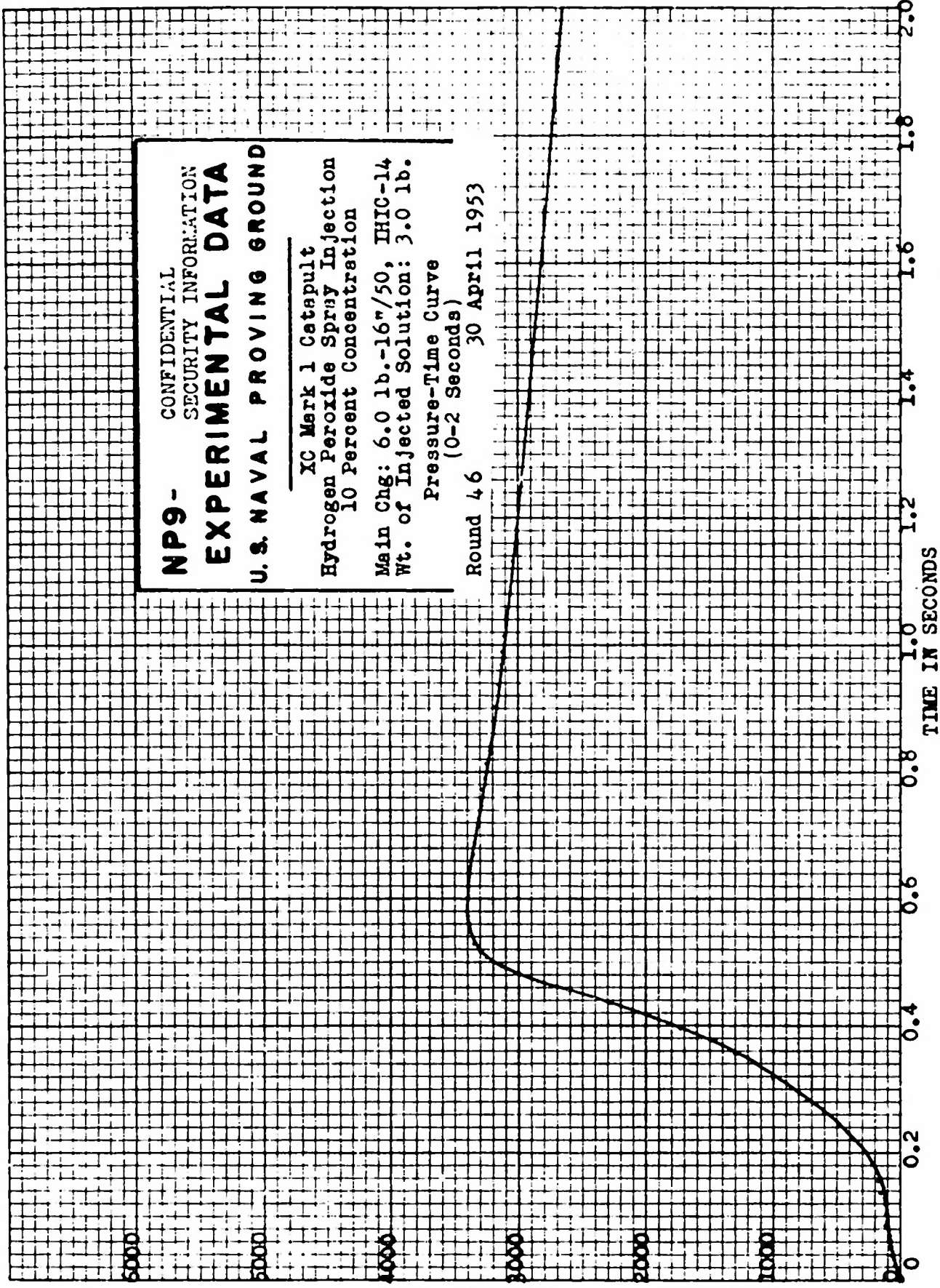
FIGURE 29



NP9 - CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
10 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)
Round 46 30 April 1953



PRESSURE - PSI

FIGURE 3C

CONFIDENTIAL
SECURITY INFORMATION

NP9
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

XC Merk 1 Catapult
Hydrogen Peroxide Spray Injection
20 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-time Curve
(0-2 Seconds)

Round No. 10 4 February 1953

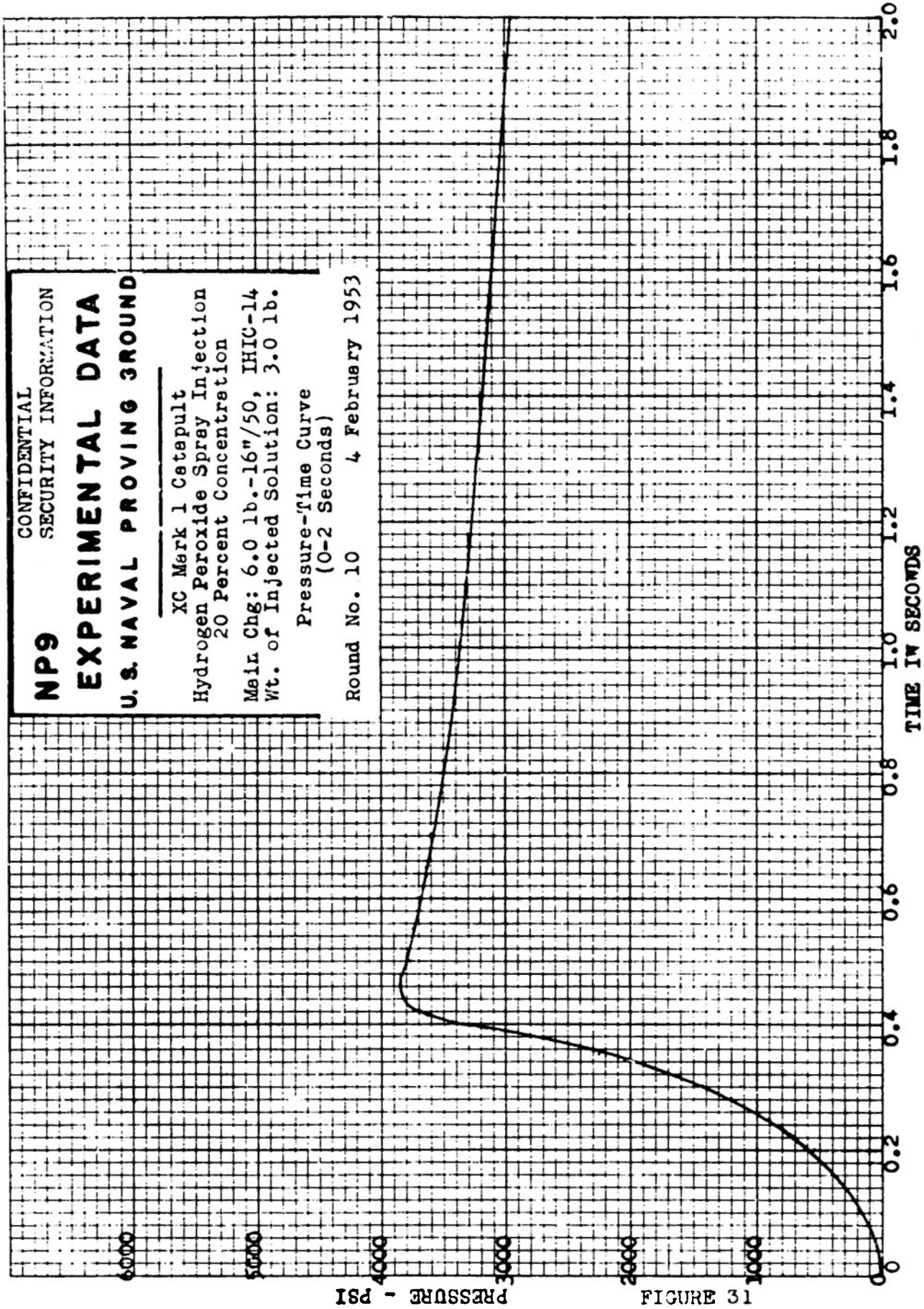


FIGURE 31
PRESSURE - PSI

TIME IN SECONDS

CONFIDENTIAL
SECURITY INFORMATION

NP9

EXPERIMENTAL DATA

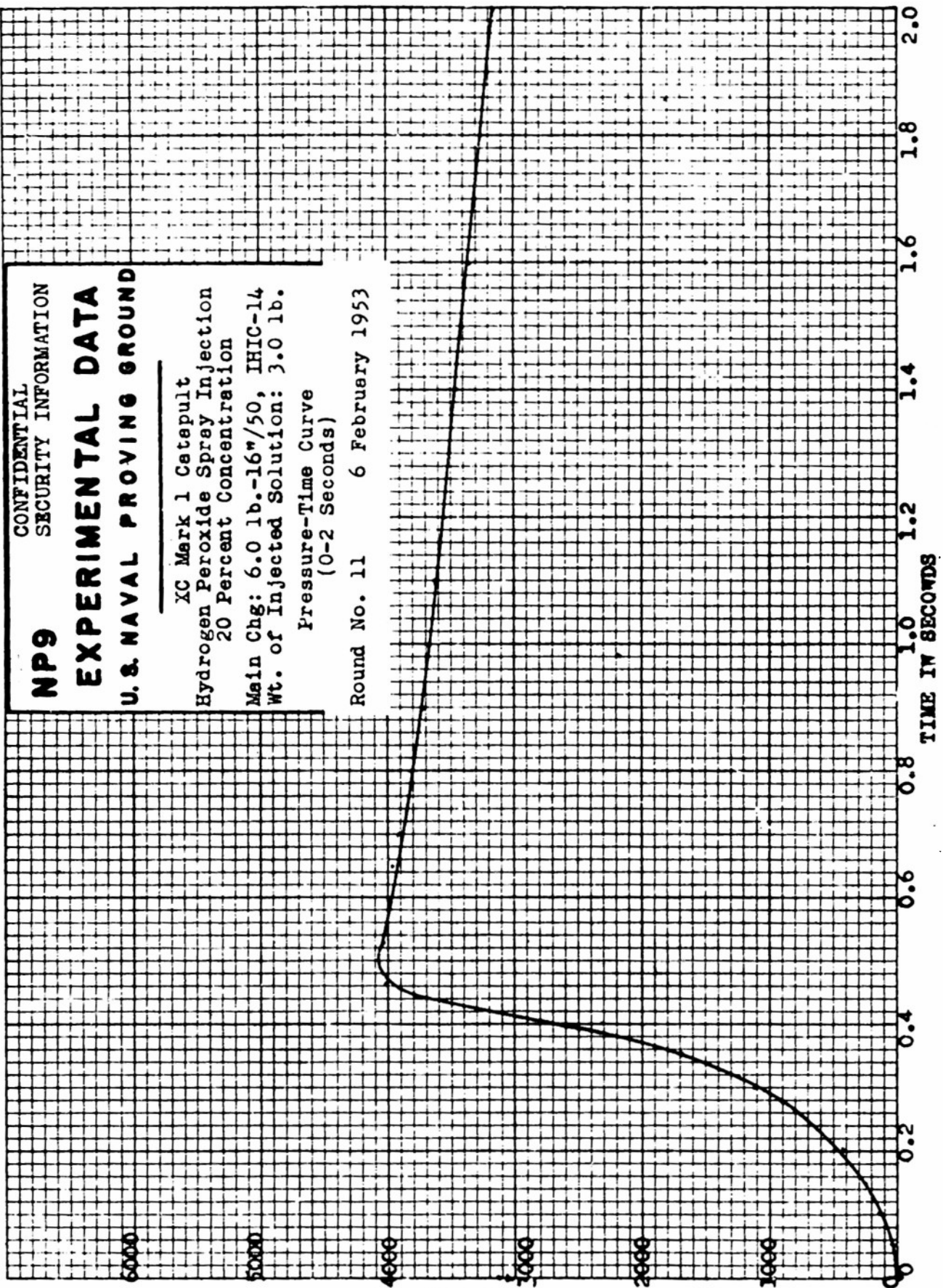
U. S. NAVAL PROVING GROUND

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
20 Percent Concentration

Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)

Round No. 11 6 February 1953



PSI - PRESSURE

FIGURE 32

NP9 -
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
20 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-2 Seconds)

Round No. 12 1C February 1953

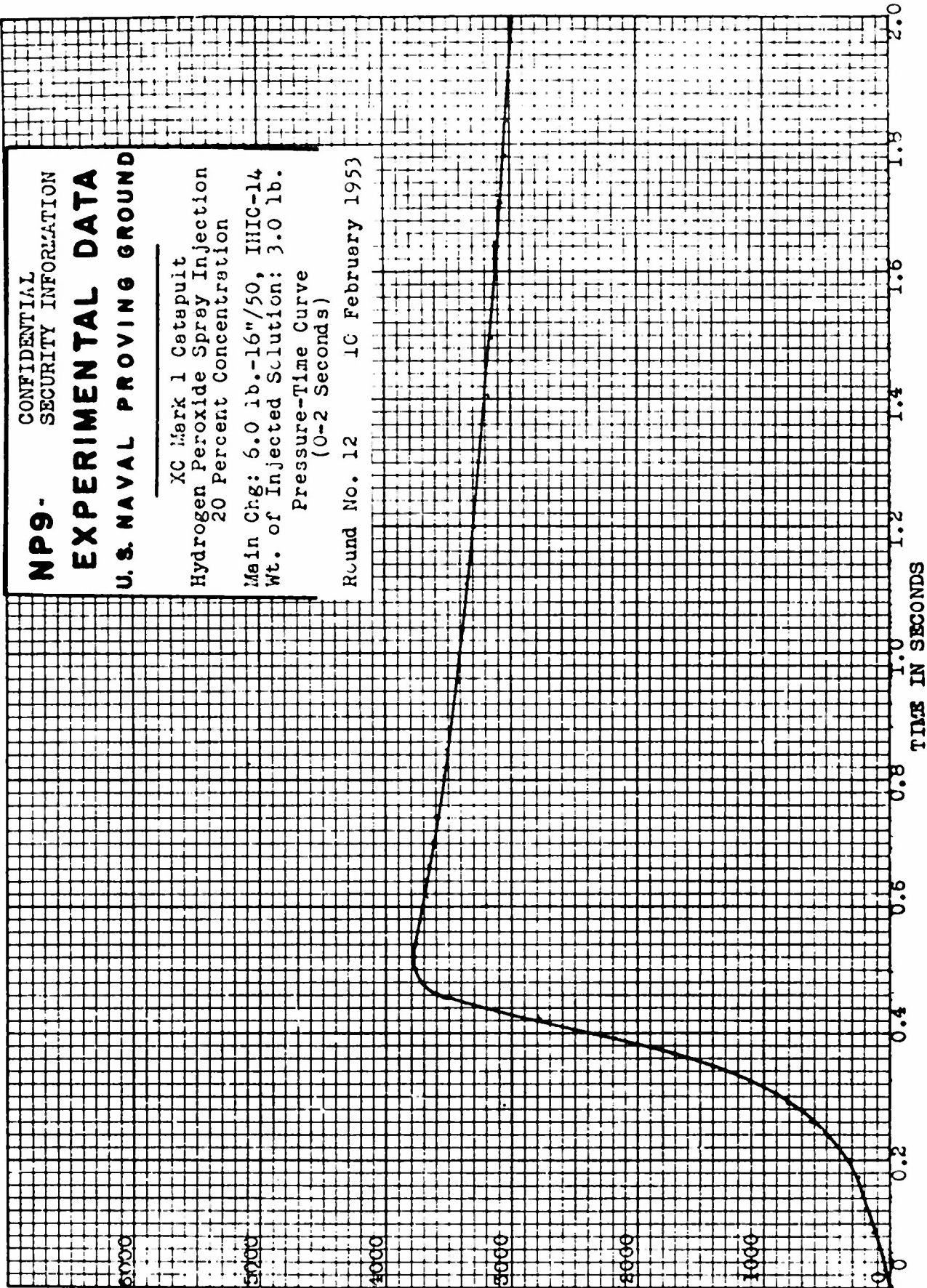


FIGURE 33
PRESSURE - PSI

TIME IN SECONDS

NP9 -
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
20 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-2 Seconds)

Round No. 13 19 February 1953

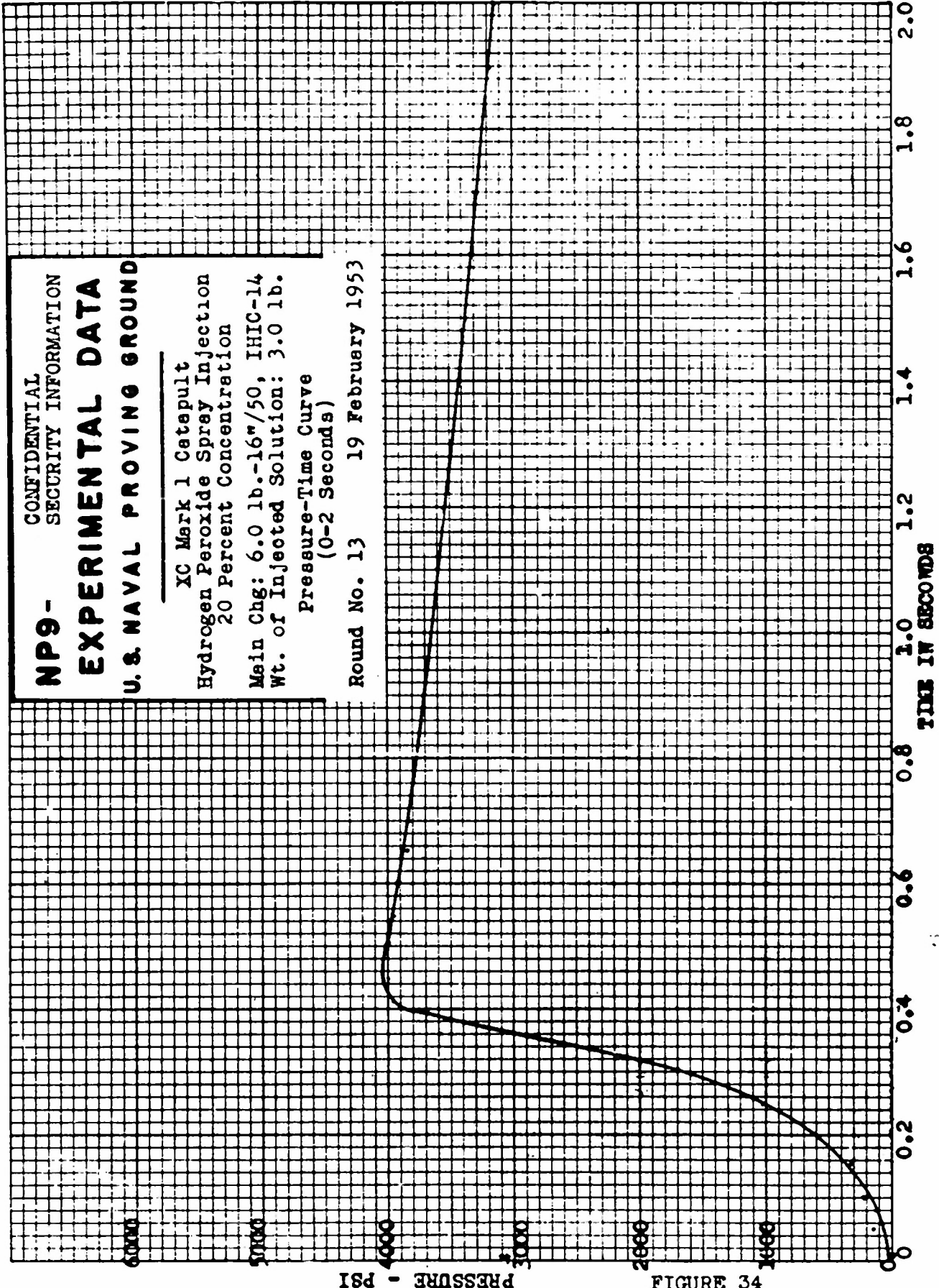


FIGURE 34
PRESSURE - PSI

NP9
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND

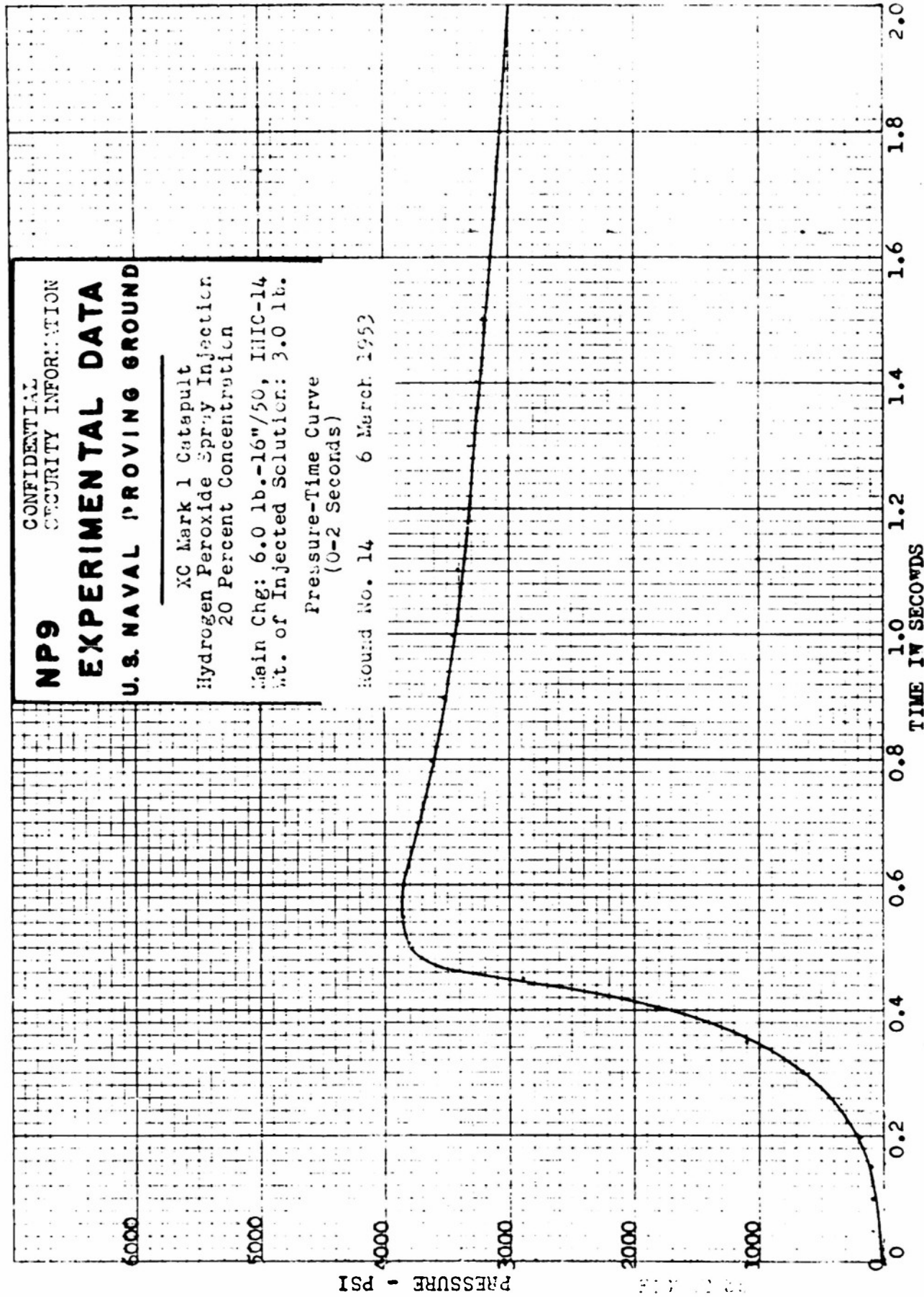
CONFIDENTIAL
SECURITY INFORMATION

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
20 Percent Concentration

Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)

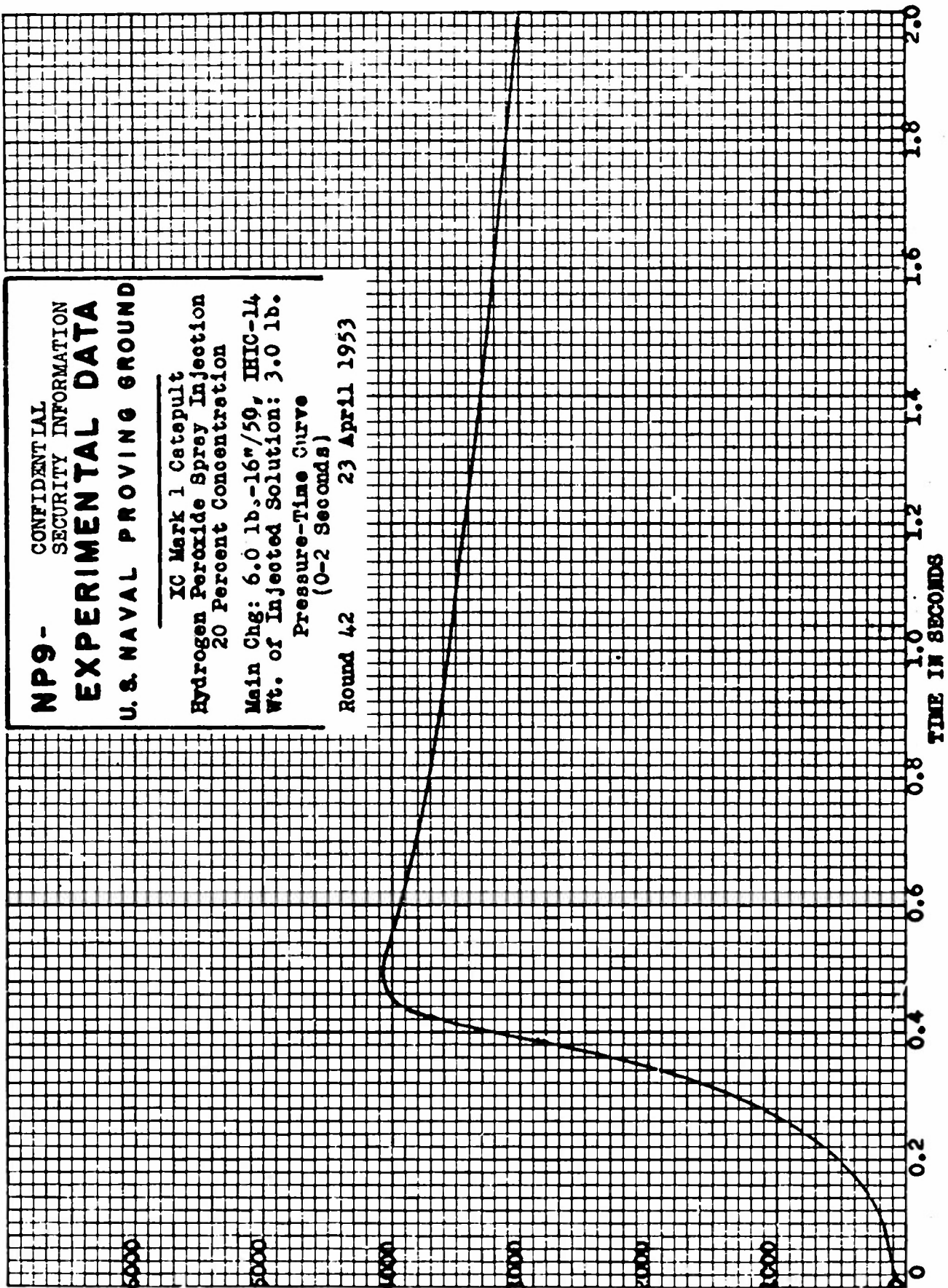
Round No. 14 6 March 1953



NP9 -
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

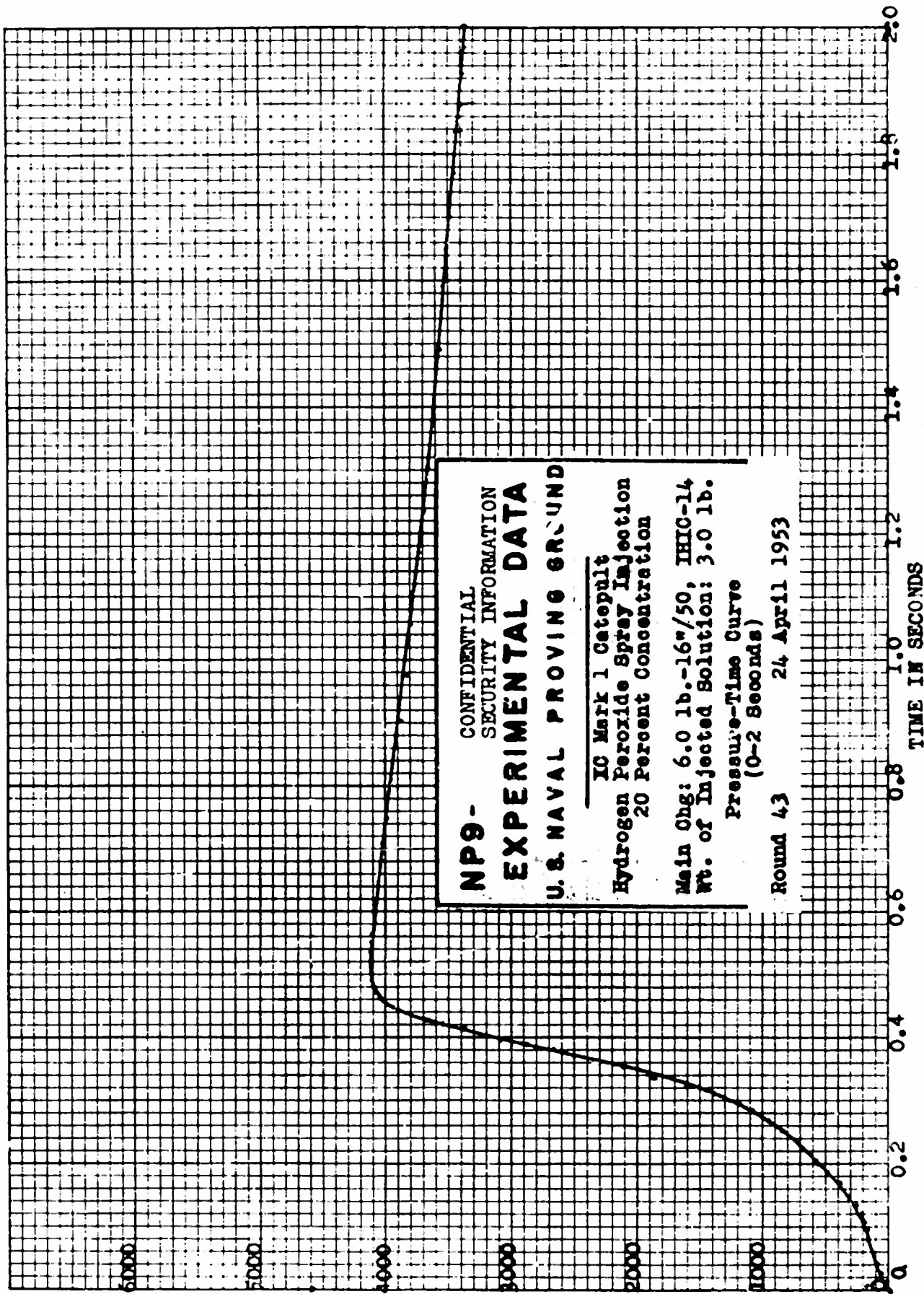
IC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
20 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-2 Seconds)

Round 42 23 April 1953



PSI - PRESSURE

FIGURE 36



68 ERUPT - 281

FIGURE 37

**NP9 - CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND**

**IC Mark 1 Cetepult
Hydrogen Peroxide Spray Injection
20 Percent Concentration**

**Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.**

**Pressure-Time Curve
(0-2 Seconds)**

Round 43 24 April 1953

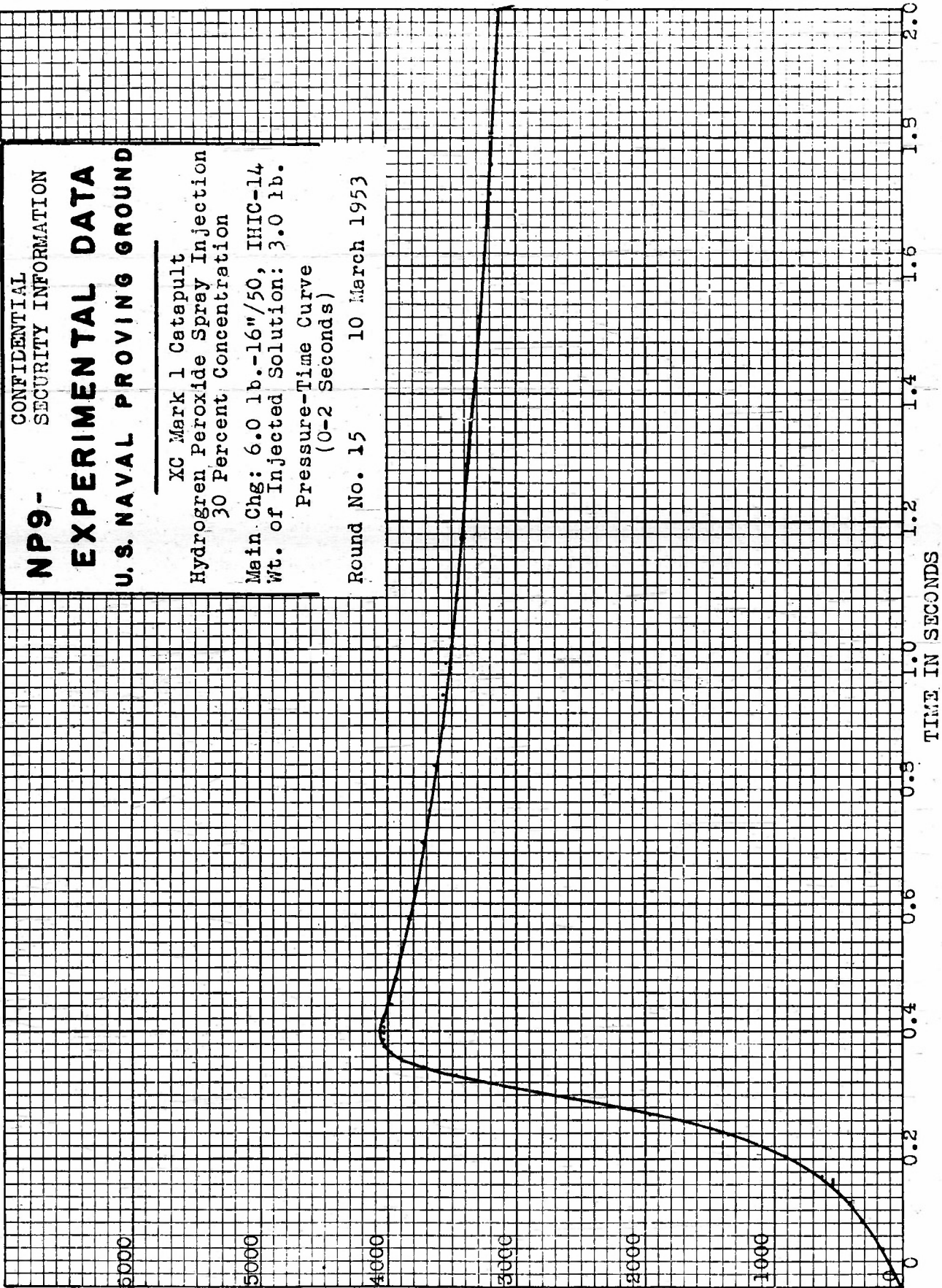
CONFIDENTIAL
SECURITY INFORMATION

**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

XC Mark 1 Catapult
Hydrogren Peroxide Spray Injection
30 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)

Round No. 15 10 March 1953



PSI - PRESSURE

FIGURE 38

NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

CONFIDENTIAL
SECURITY INFORMATION

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
30 Percent Concentration
Main Cng: 6.0 lb.-16"/50, IMIC-14
Wt. of Injected Solution: 3.0 il.

Pressure-Time Curve
(0-2 Seconds)

Round No. 16 11 March 1953

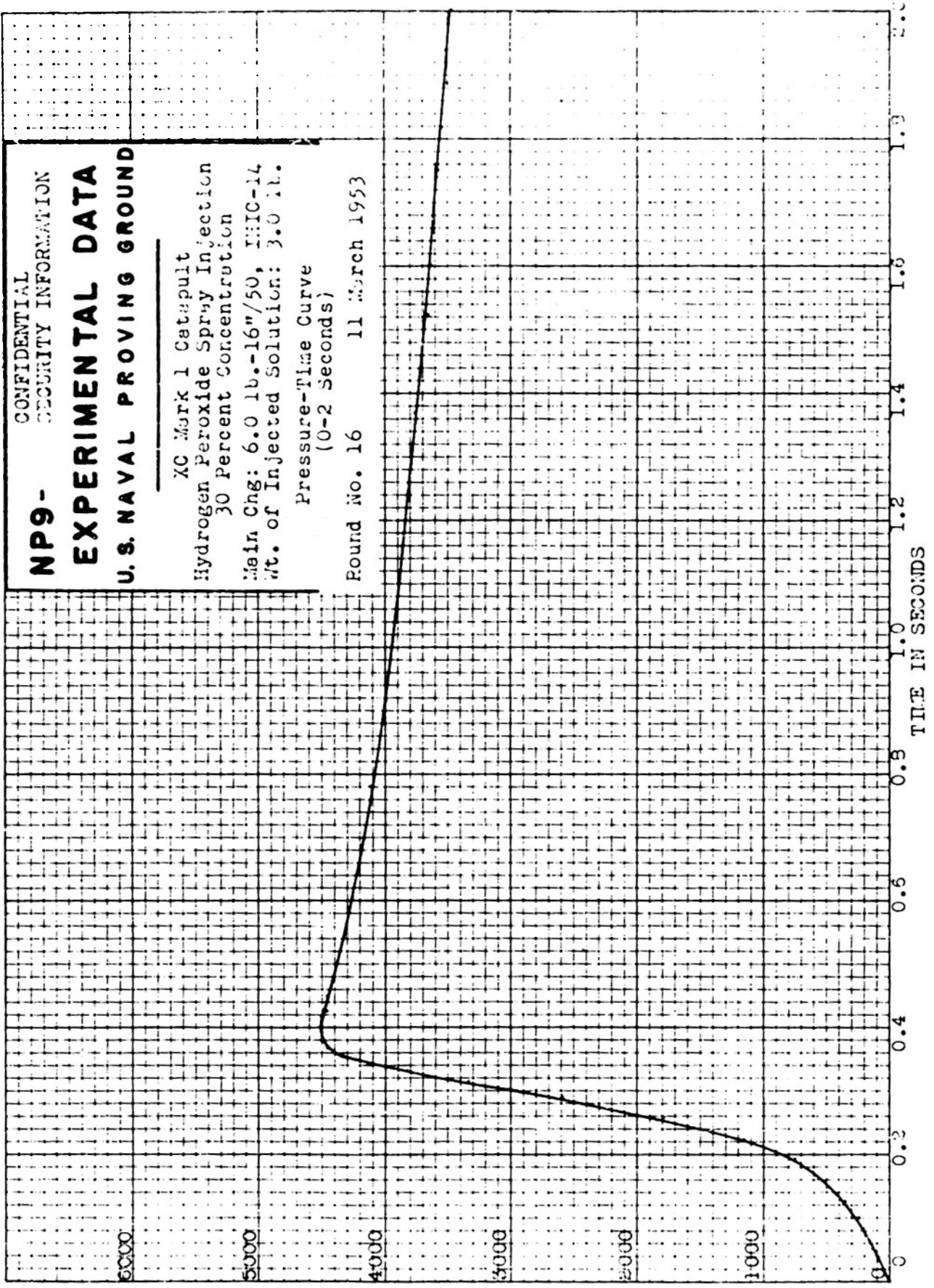


FIGURE 39

FIGURE 39

CONFIDENTIAL
SECURITY INFORMATION

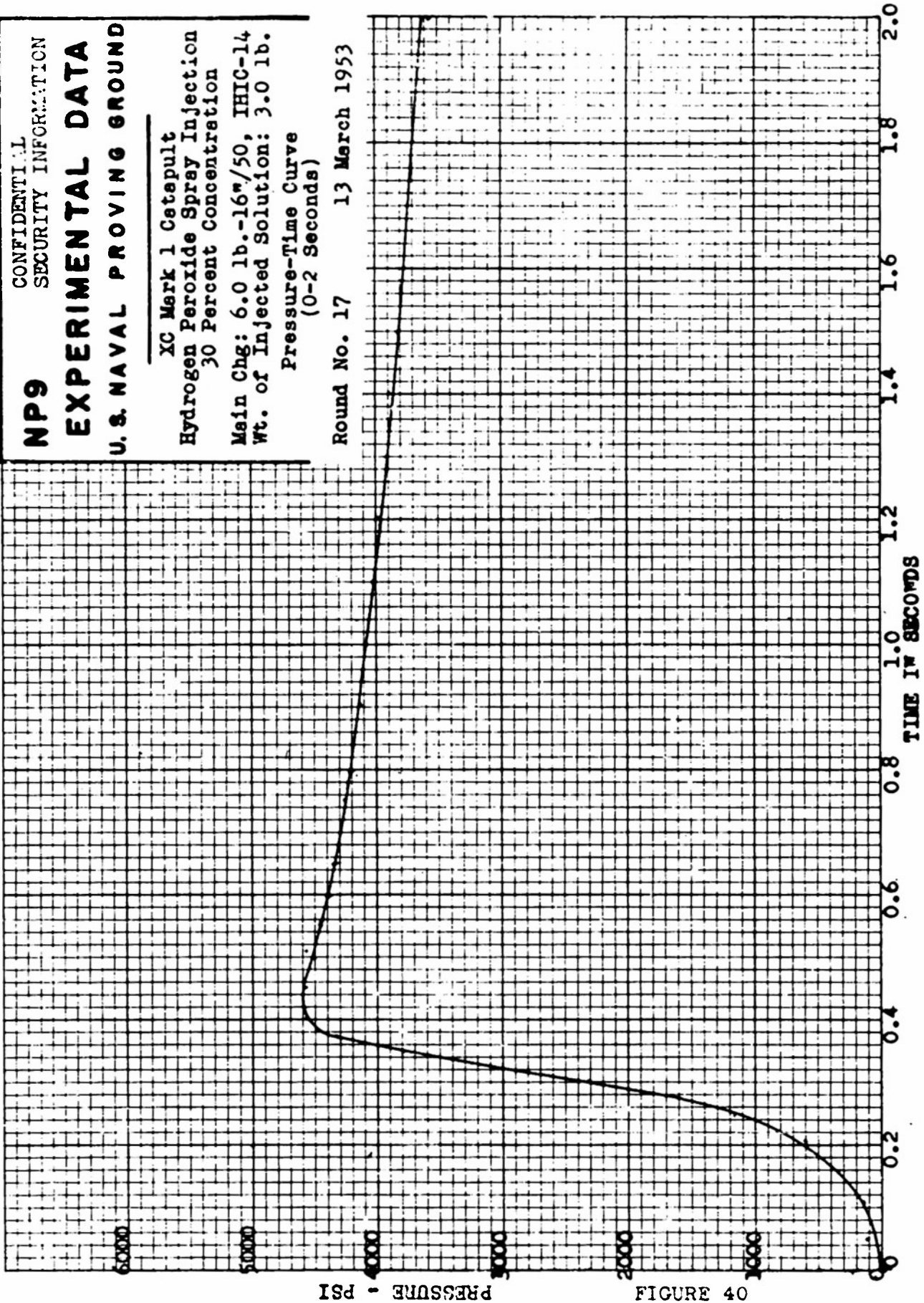
NP9 EXPERIMENTAL DATA

U. S. NAVAL PROVING GROUND

XC Mark 1 Cetepult
Hydrogen Peroxide Spray Injection
30 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)

Round No. 17 13 March 1953



PSI - PRESSURE

FIGURE 40

CONFIDENTIAL
SECURITY INFORMATION

**NP9
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND**

IC Mark 1 Cetapult
Hydrogen Peroxide Spray Injection
30% Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)

Round No. 18 16 March 1953

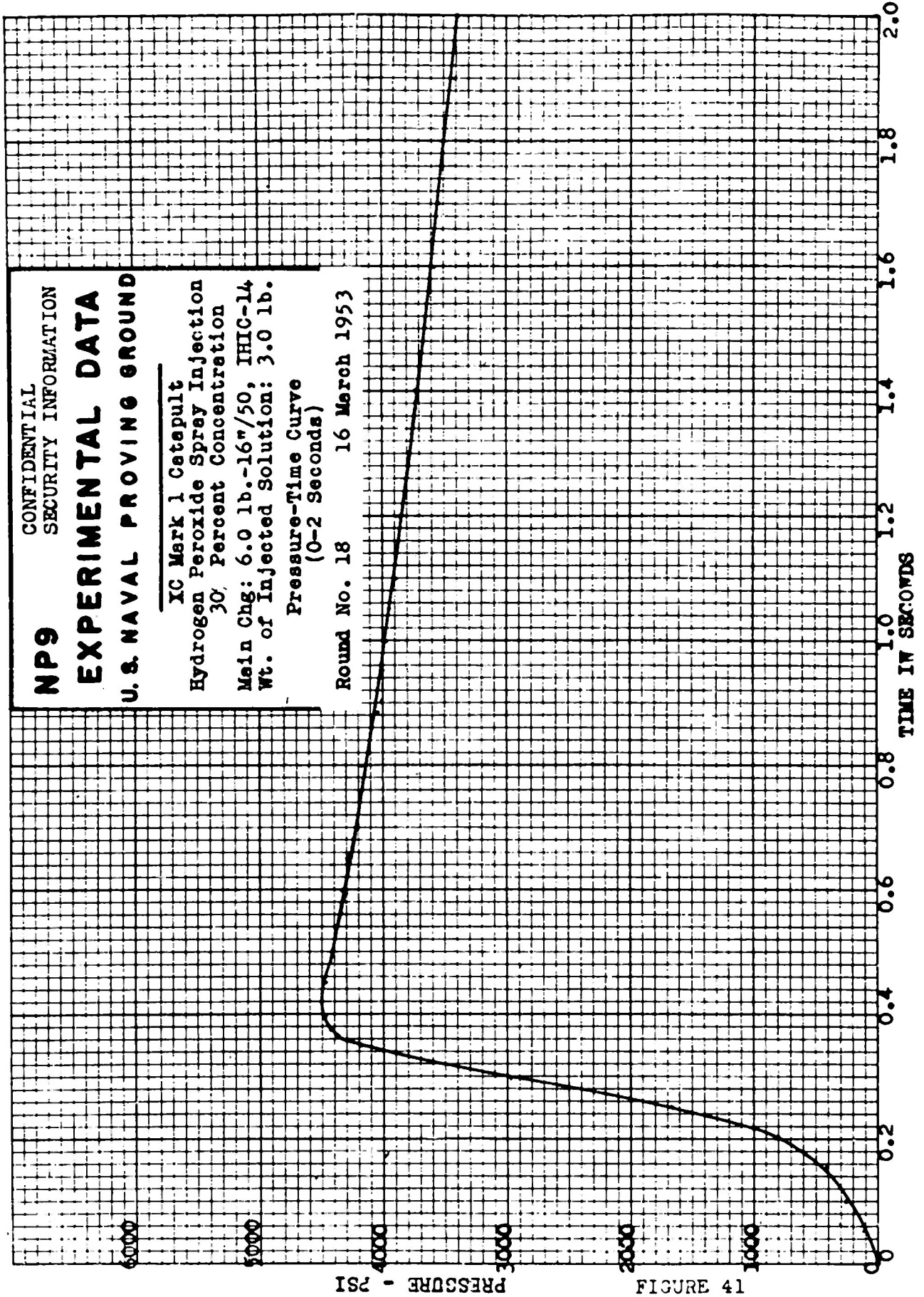


FIGURE 41

PRESSURE - PSI

TIME IN SECONDS

CONFIDENTIAL
SECURITY INFORMATION

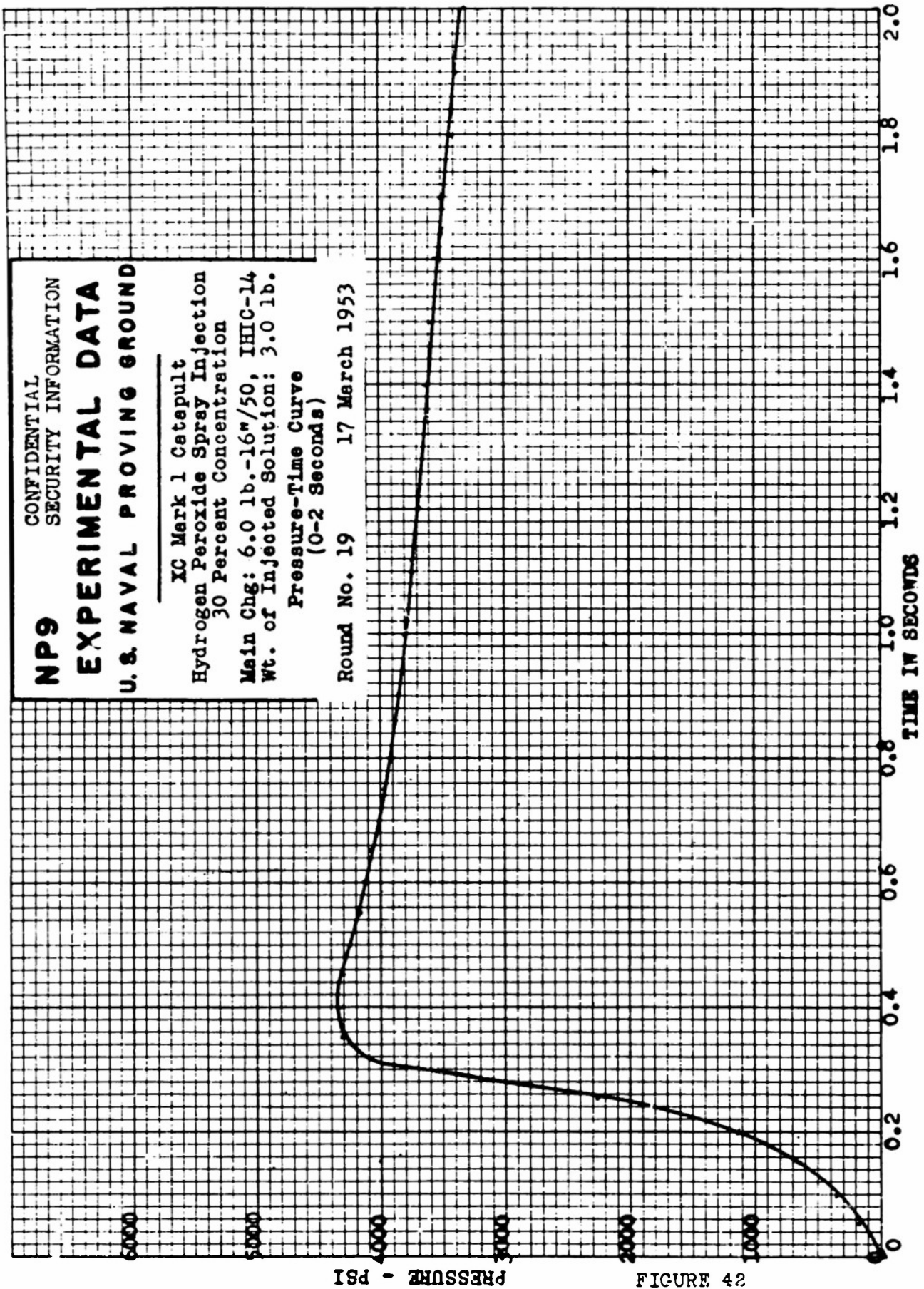
NP9 EXPERIMENTAL DATA

U.S. NAVAL PROVING GROUND

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
30 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)

Round No. 19 17 March 1953



PSI - PRESSURE

FIGURE 42

CONFIDENTIAL
SECURITY INFORMATION

**NP9 -
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND**

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
30 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-2 Seconds)

Round No. 26 10 April 1953

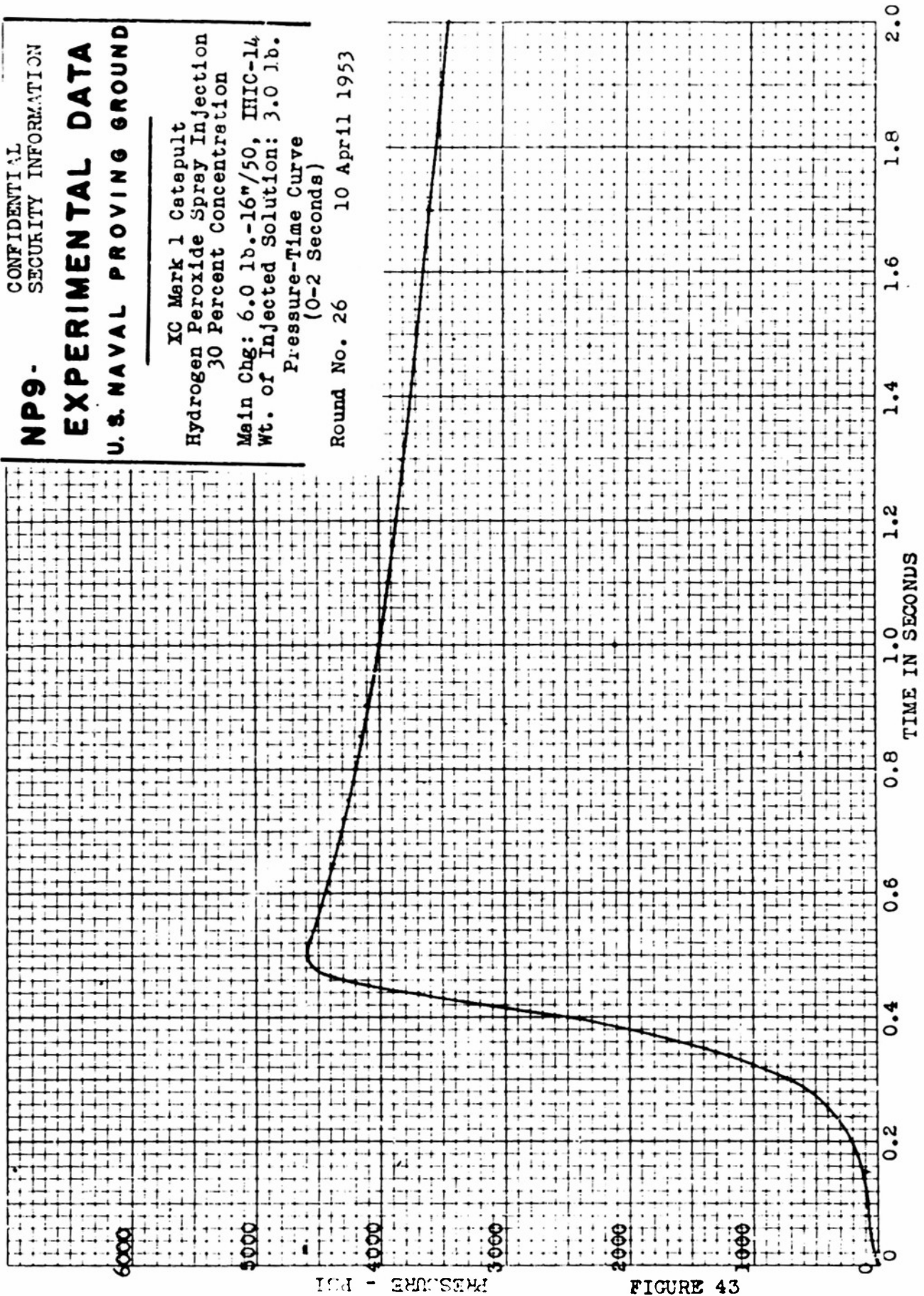


FIGURE 43

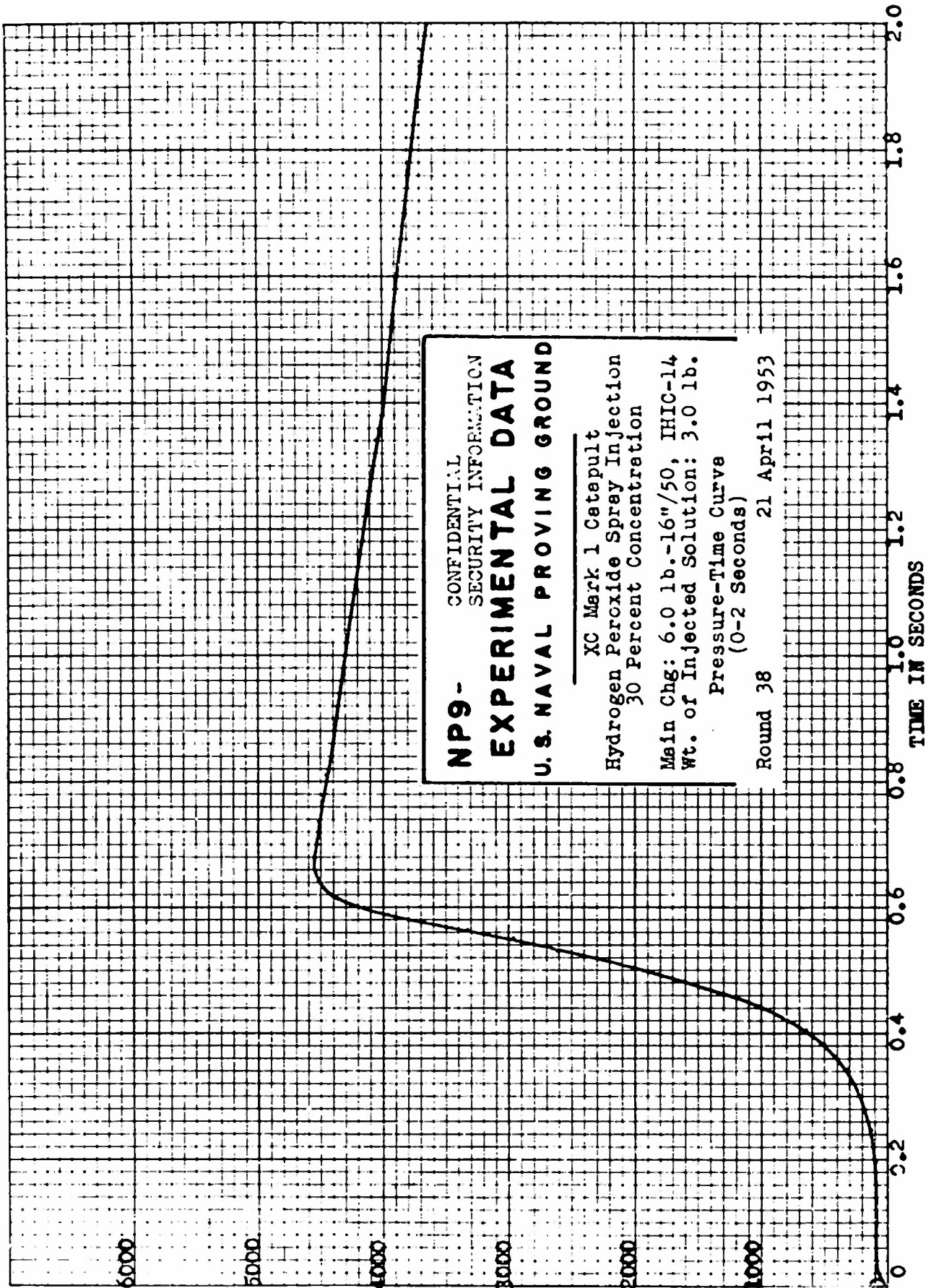
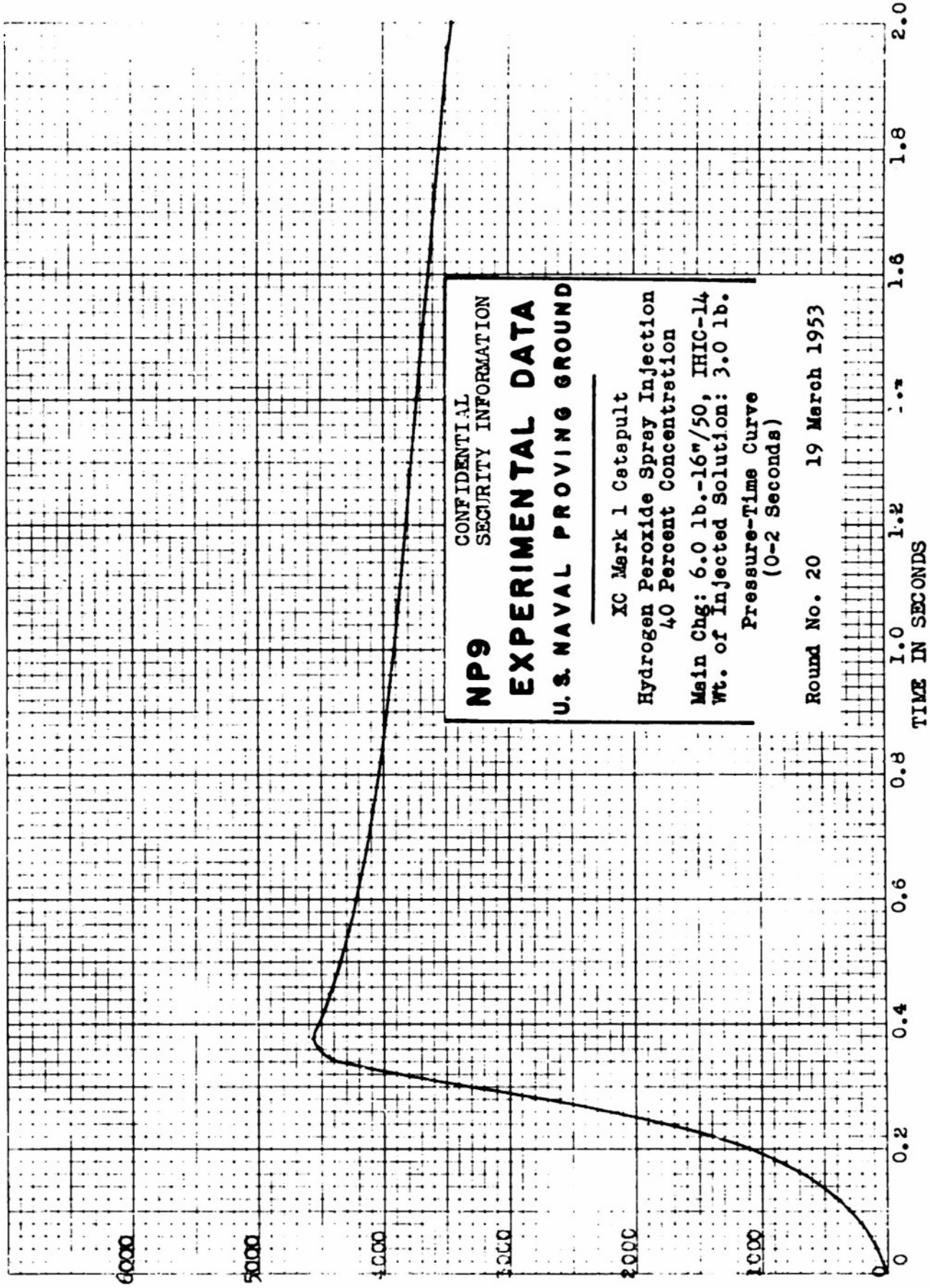


FIGURE 44
PRESSURE - PSI

NP9 - CONFIDENTIAL
 SECURITY INFORMATION
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND
 XC Mark 1 Catapult
 Hydrogen Peroxide Spray Injection
 30 Percent Concentration
 Main Chg: 6.0 lb.-16"/50, IHIC-14
 Wt. of Injected Solution: 3.0 lb.
 Pressure-Time Curve
 (0-2 Seconds)
 Round 38 21 April 1953



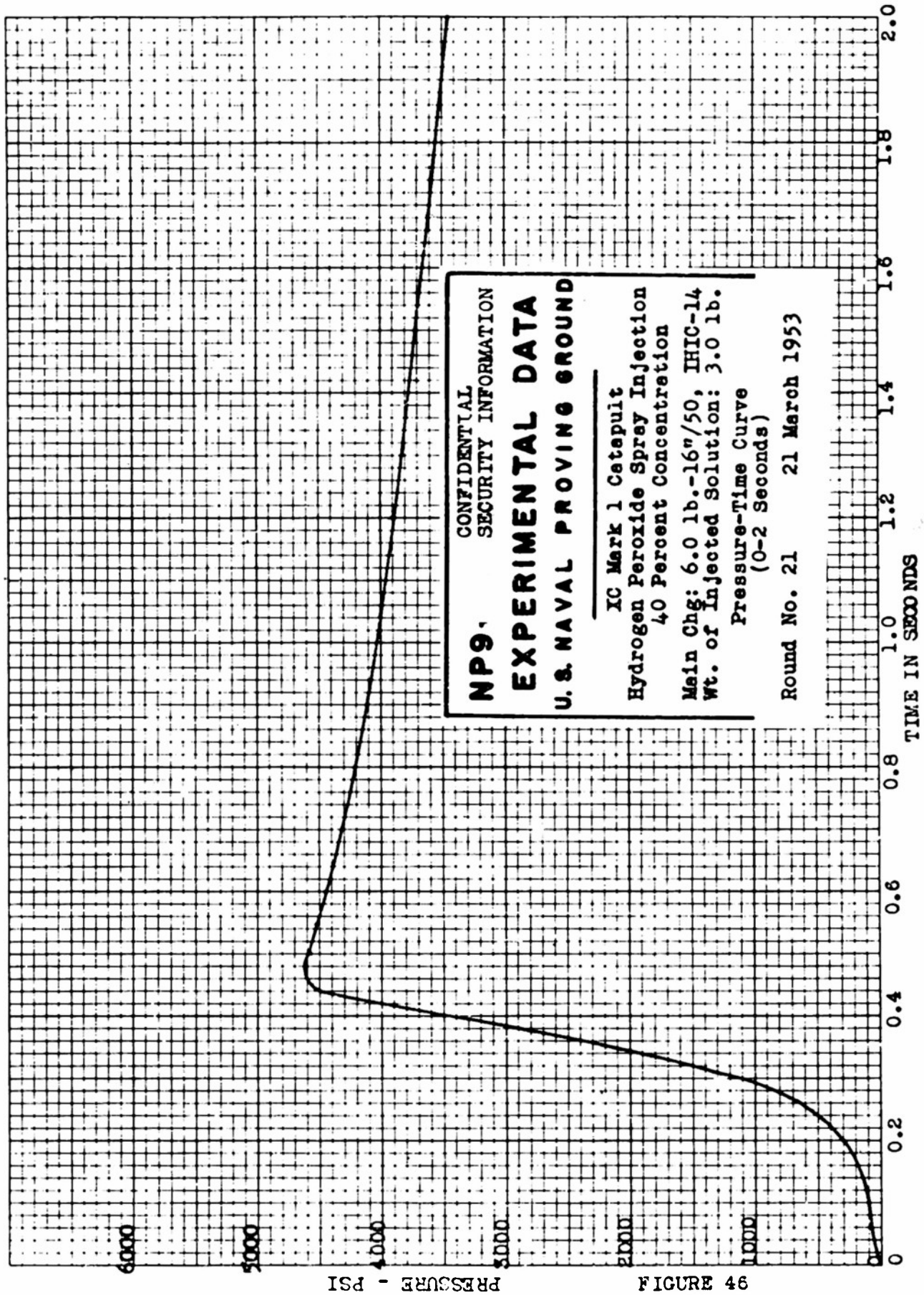
NP9
 CONFIDENTIAL
 SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

XC Mark 1 Cetapult
 Hydrogen Peroxide Spray Injection
 40 Percent Concentration
 Main Chg: 6.0 lb.-16"/50; IHIC-14
 Wt. of Injected Solution: 3.0 lb.
 Pressure-Time Curve
 (0-2 Seconds)

Round No. 20 19 March 1953

FIGURE 45 - PRESSURE - PSI

FIGURE 45



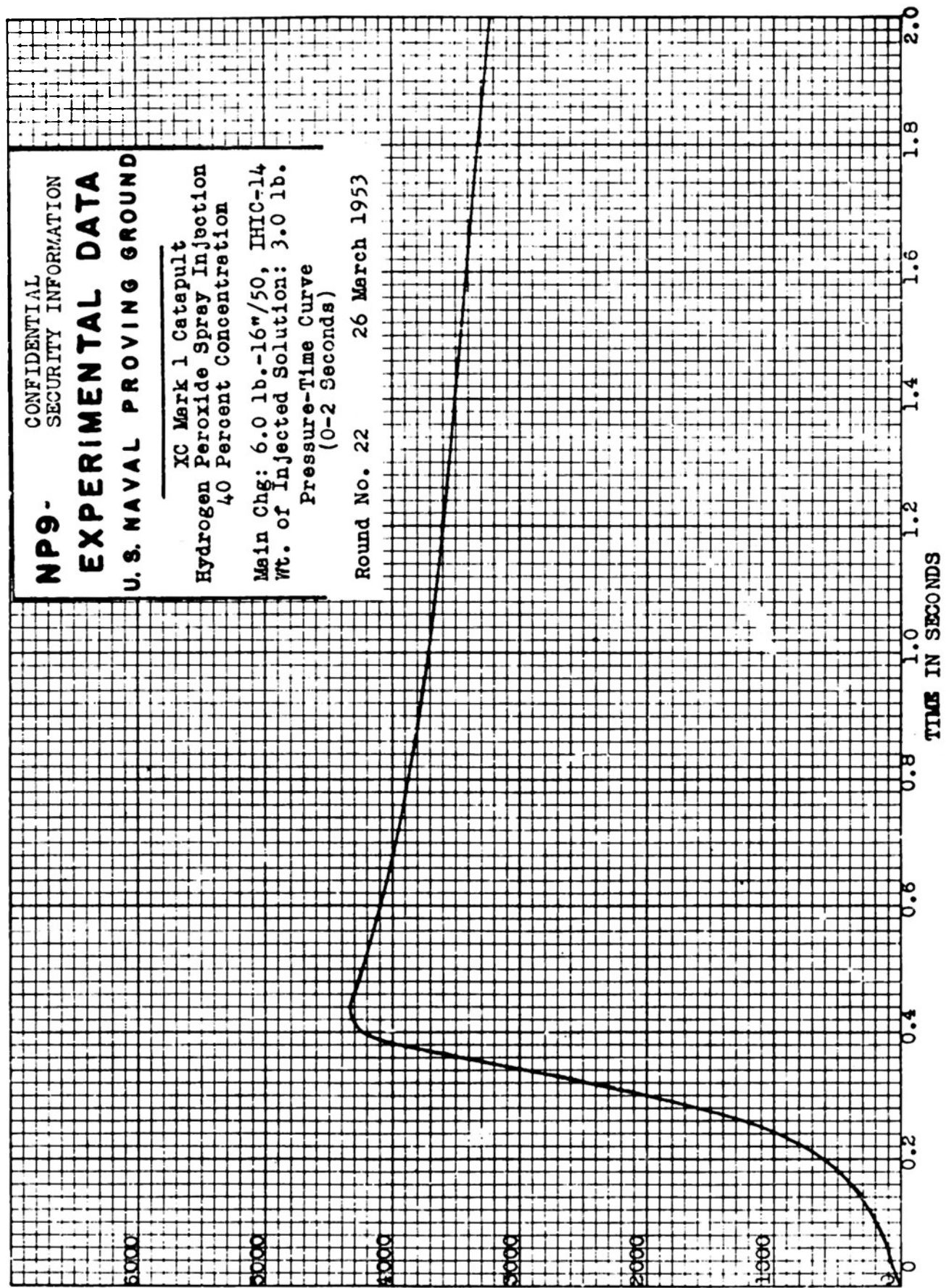
94 ENR1F
PRESSURE - PSI

FIGURE 46

NP9 -
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND

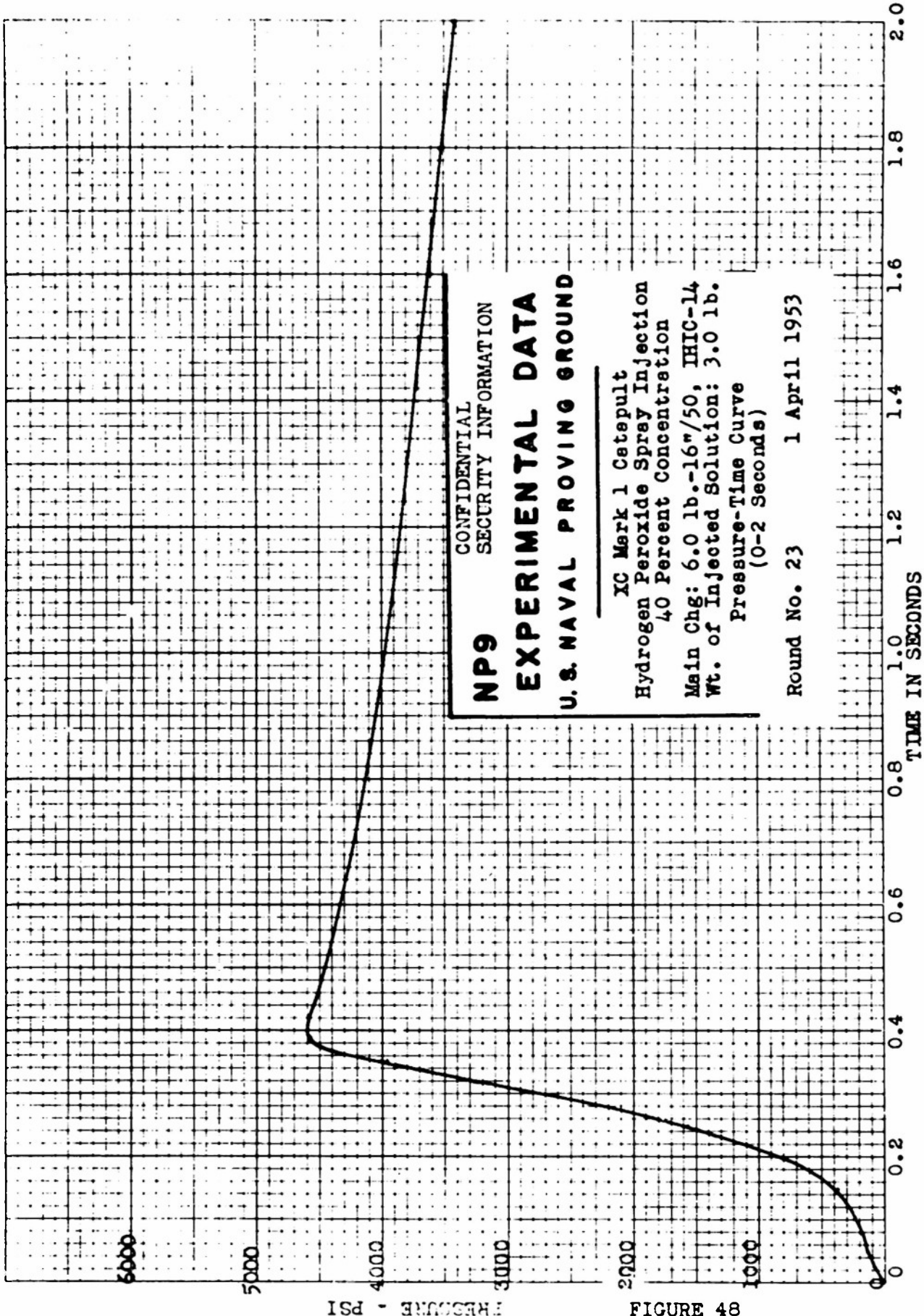
XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
40 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-2 Seconds)

Round No. 22 26 March 1953



PSI - PRESSURE

FIGURE 47



CONFIDENTIAL
SECURITY INFORMATION

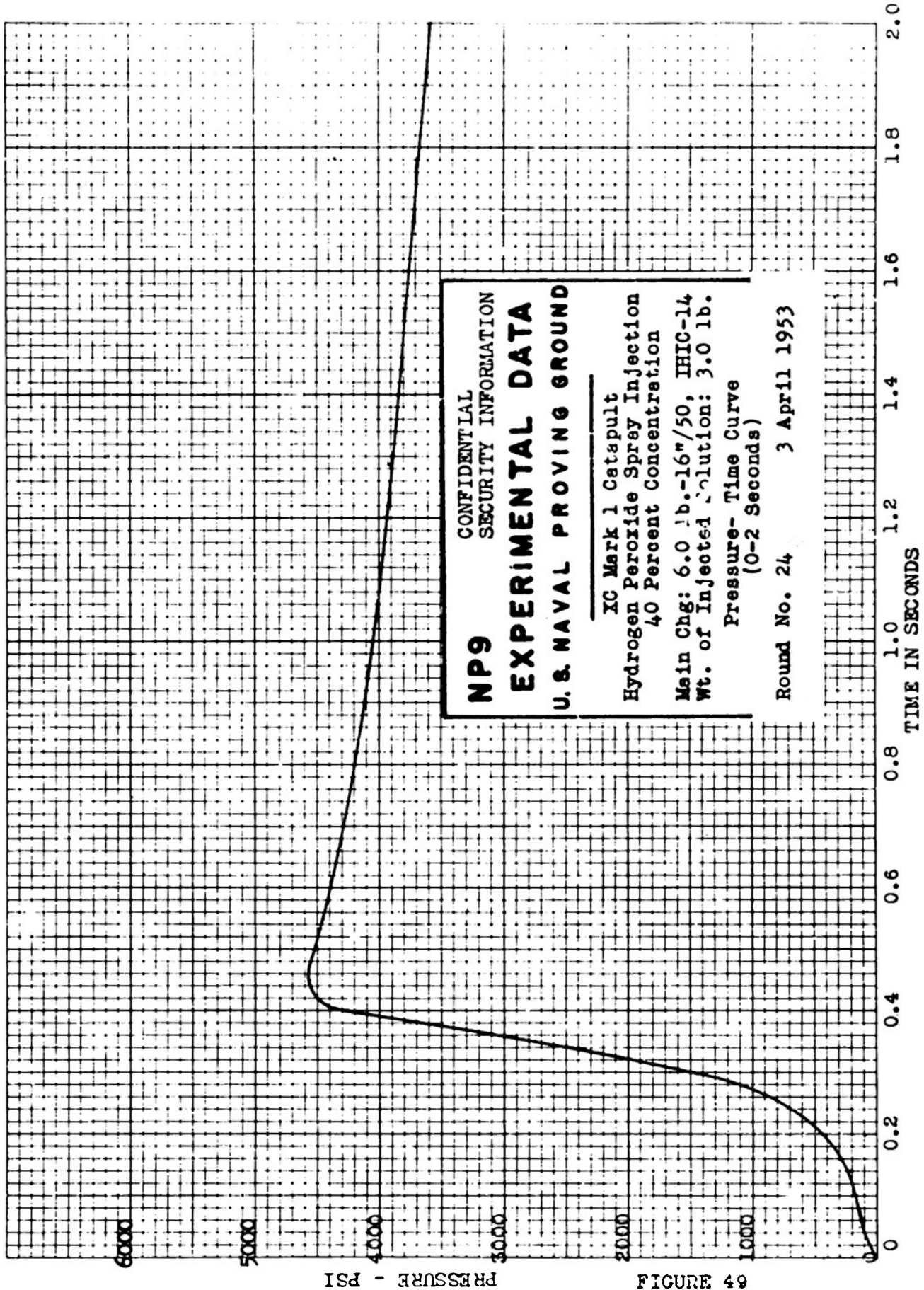
NP9
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

XC Mark 1 Catepult
Hydrogen Peroxide Spray Injection
40 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-2 Seconds)

Round No. 23 1 April 1953

84 ENGINE - PSI

FIGURE 48



CONFIDENTIAL
 SECURITY INFORMATION
NP9
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND

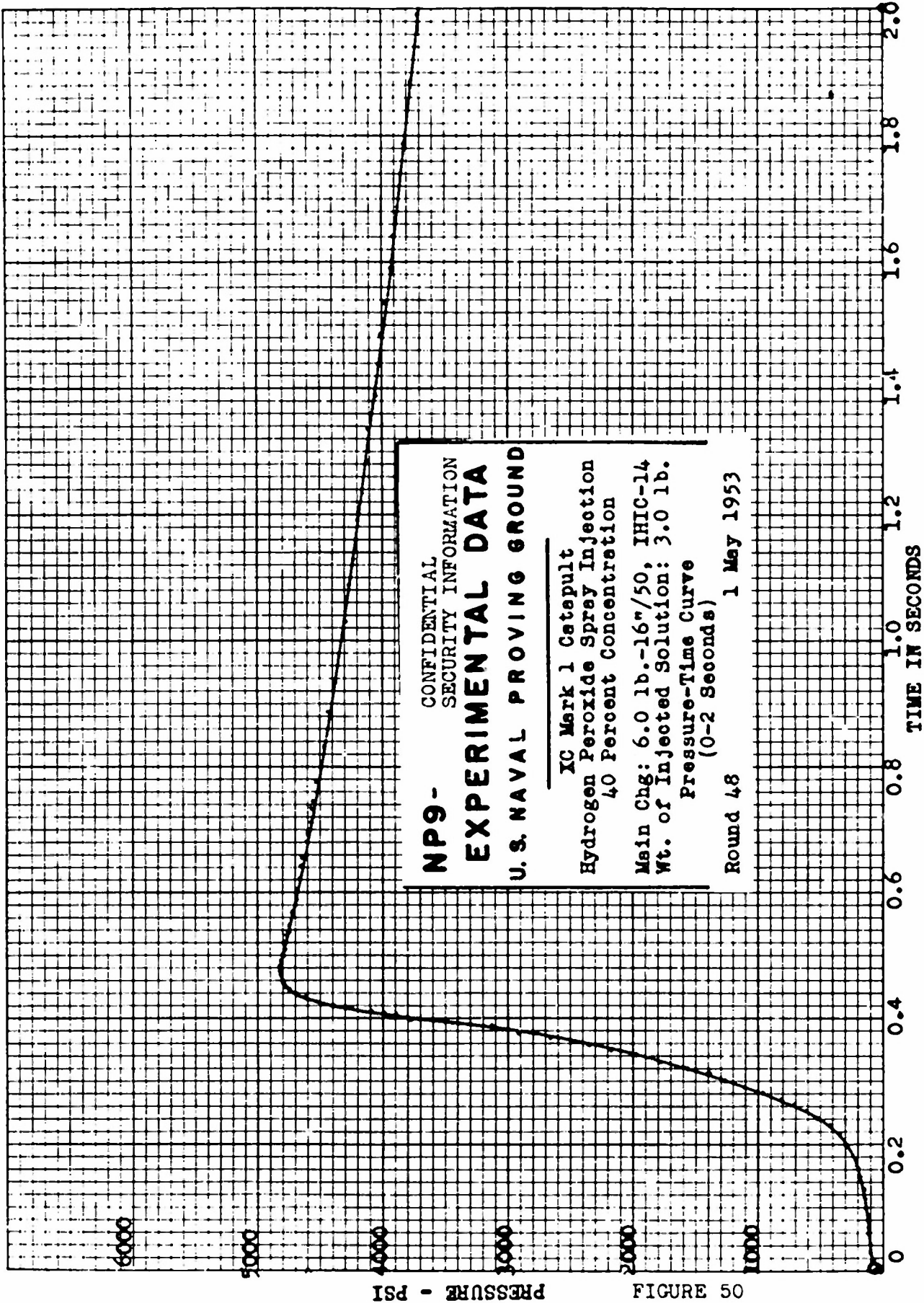
IC Mark 1 Catapult
 Hydrogen Peroxide Spray Injection
 40 Percent Concentration
 Main Chg: 6.0 lb.-16"/50, IHIC-14
 Wt. of Injected Solution: 3.0 lb.
 Pressure- Time Curve
 (0-2 Seconds)

Round No. 24 3 April 1953

FIGURE 49

PRESSURE - PSI

TIME IN SECONDS



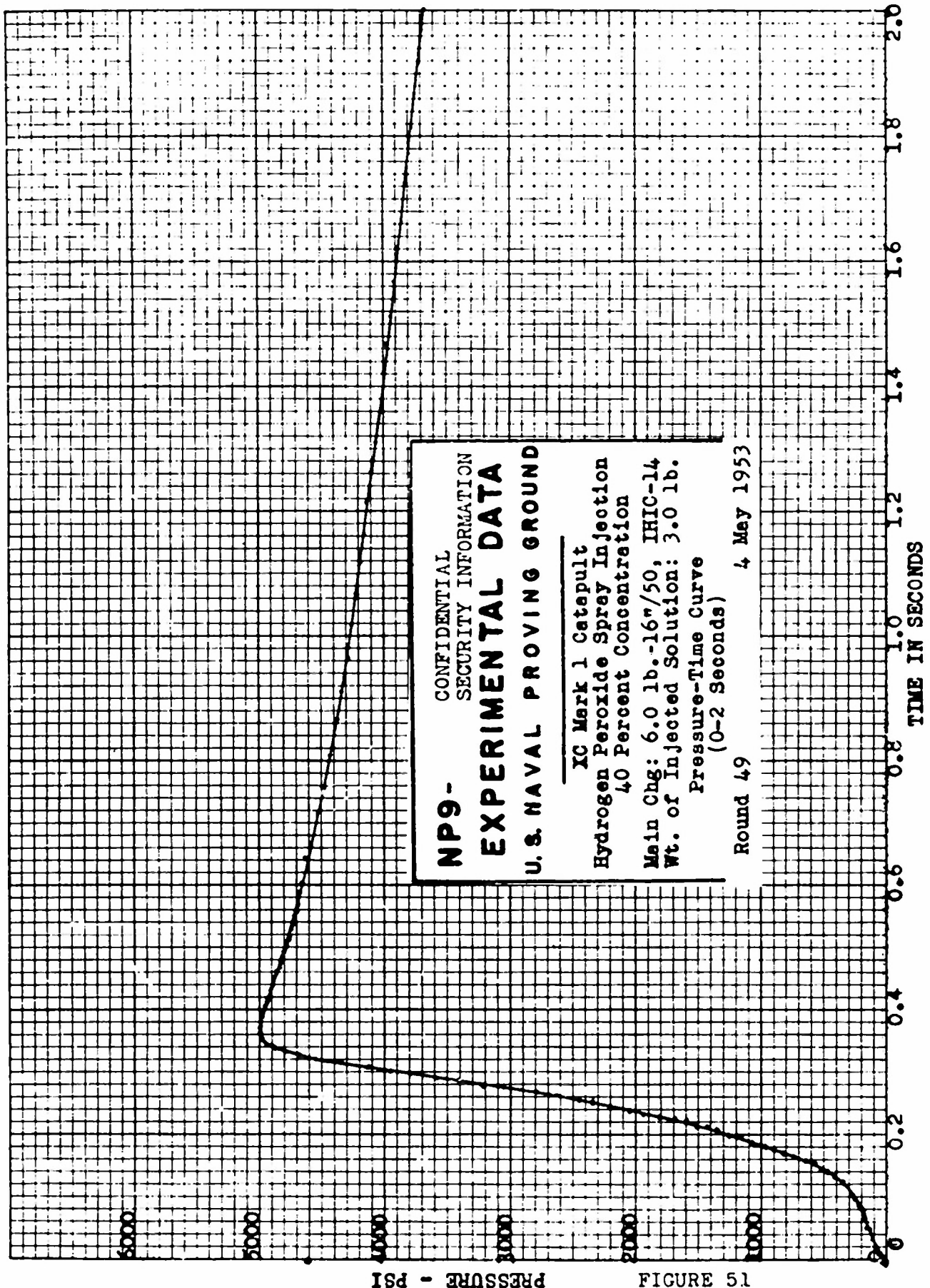
NP9 - CONFIDENTIAL
 SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

IC Mark 1 Catapult
 Hydrogen Peroxide Spray Injection
 40 Percent Concentration
 Main Chg: 6.0 lb.-16"/50, IHIC-14
 Wt. of Injected Solution: 3.0 lb.
 Pressure-Time Curve
 (0-2 Seconds)

Round 48 1 May 1953

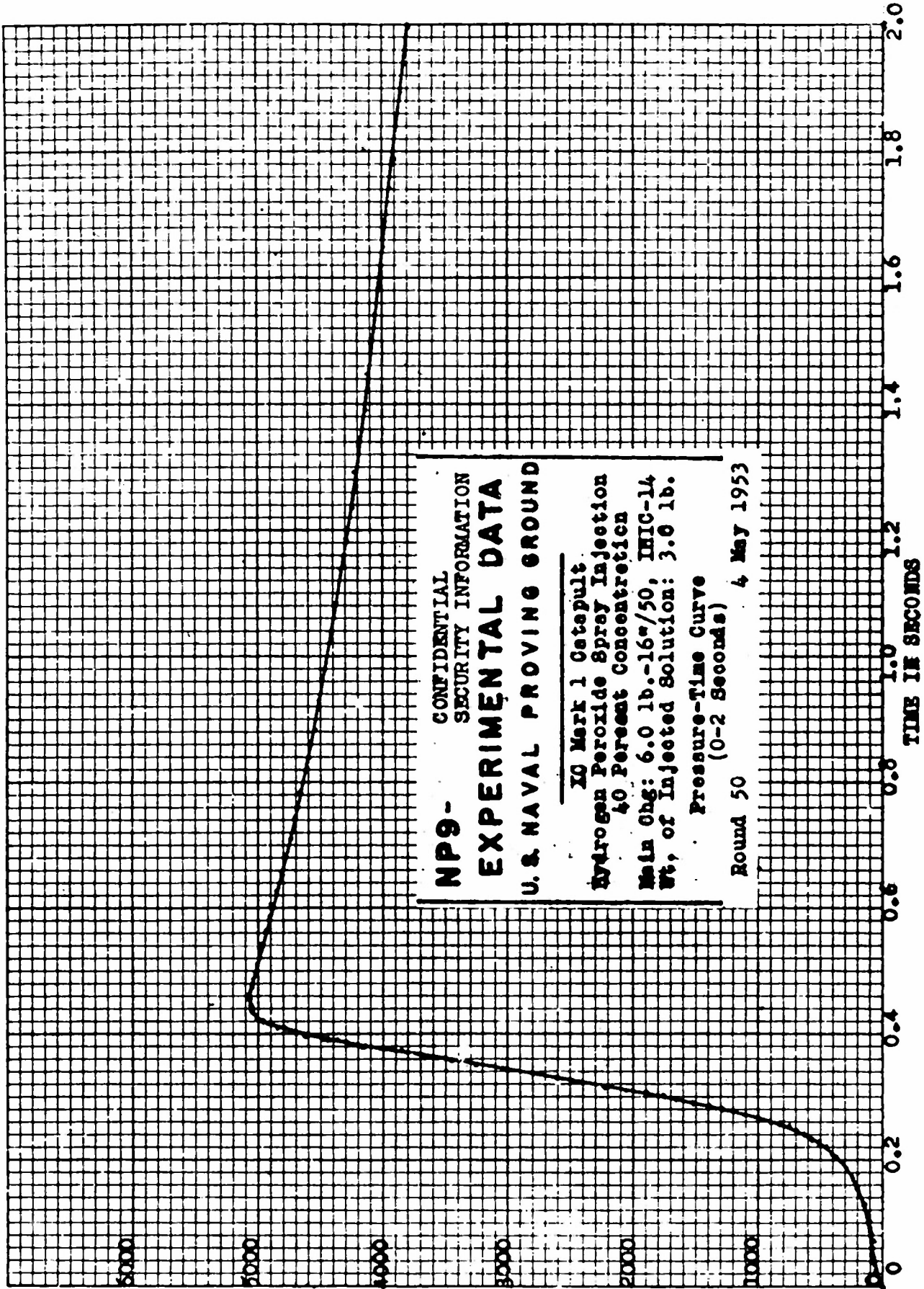
FIGURE 50
 PRESSURE - PSI

CONFIDENTIAL - SECURITY INFORMATION



PSI - PRESSURE

FIGURE 1



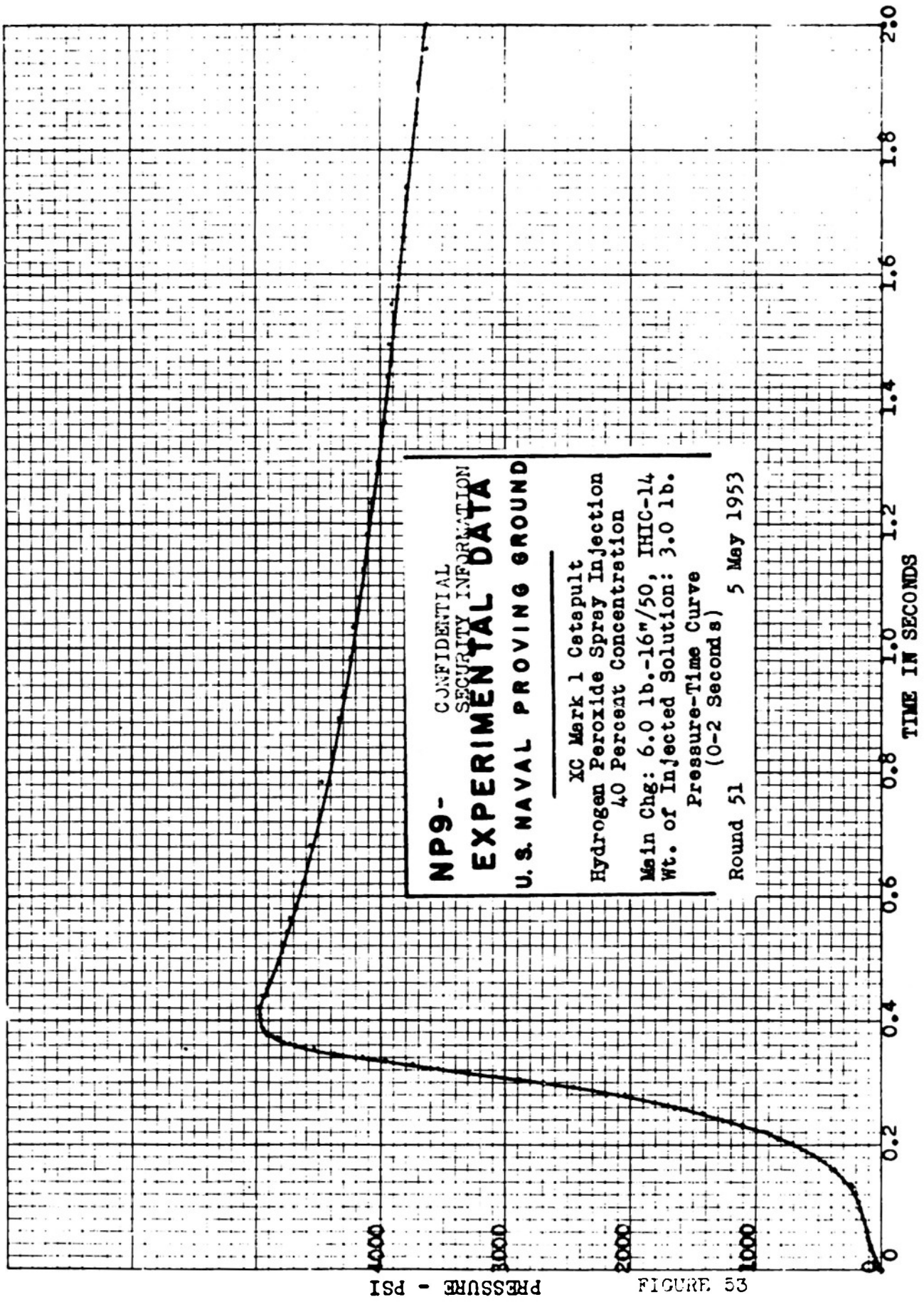
PSI - PRESSURE

FIGURE 52

NP9 - CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

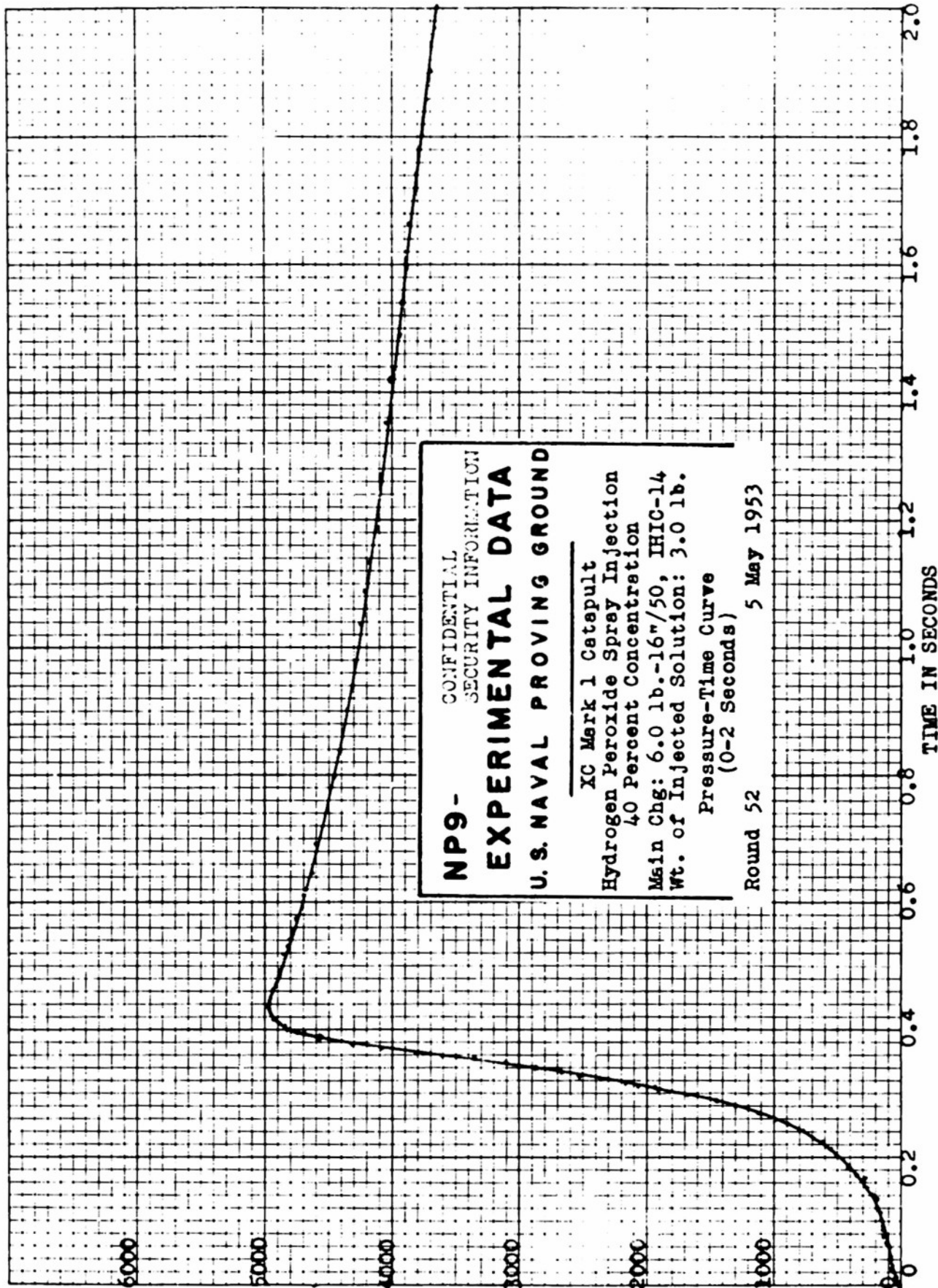
XG Mark 1 Catapult
 Hydrogen Peroxide Spray Injection
 40 Percent Concentration
 Main Chg: 6.0 lb.-16"/50, IHIC-14
 Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
 (0-2 Seconds)
 Round 50 4 May 1953



NP9 -
 CONFIDENTIAL
 SECURITY INFORMATION
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND
 XC Mark 1 Catapult
 Hydrogen Peroxide Spray Injection
 40 Percent Concentration
 Main Chg: 6.0 lb.-16"/50, IHIC-14
 Wt. of Injected Solution: 3.0 lb.
 Pressure-Time Curve
 (0-2 Seconds)
 Round 51 5 May 1953

FIGURE 13
PRESSURE - PSI



NP9 - CONFIDENTIAL
 SECURITY INFORMATION
EXPERIMENTAL DATA
 U. S. NAVAL PROVING GROUND

XC Mark 1 Catapult
 Hydrogen Peroxide Spray Injection
 40 Percent Concentration
 Main Chg: 6.0 lb.-16"/50, IHIC-14
 Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-2 Seconds)

Round 52 5 May 1953

45 ERUCLF PRESSURE - PSI

FIGURE 54

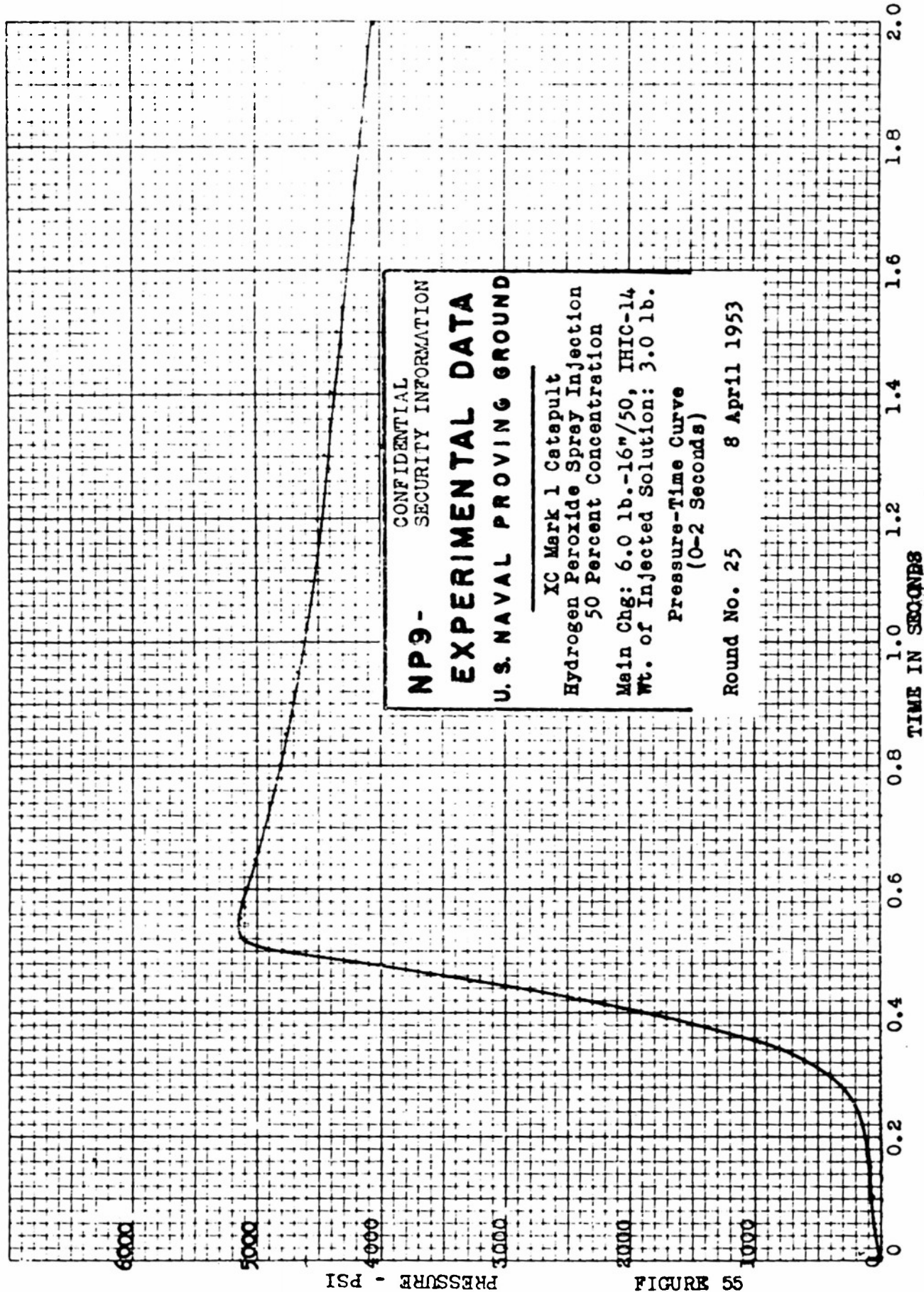
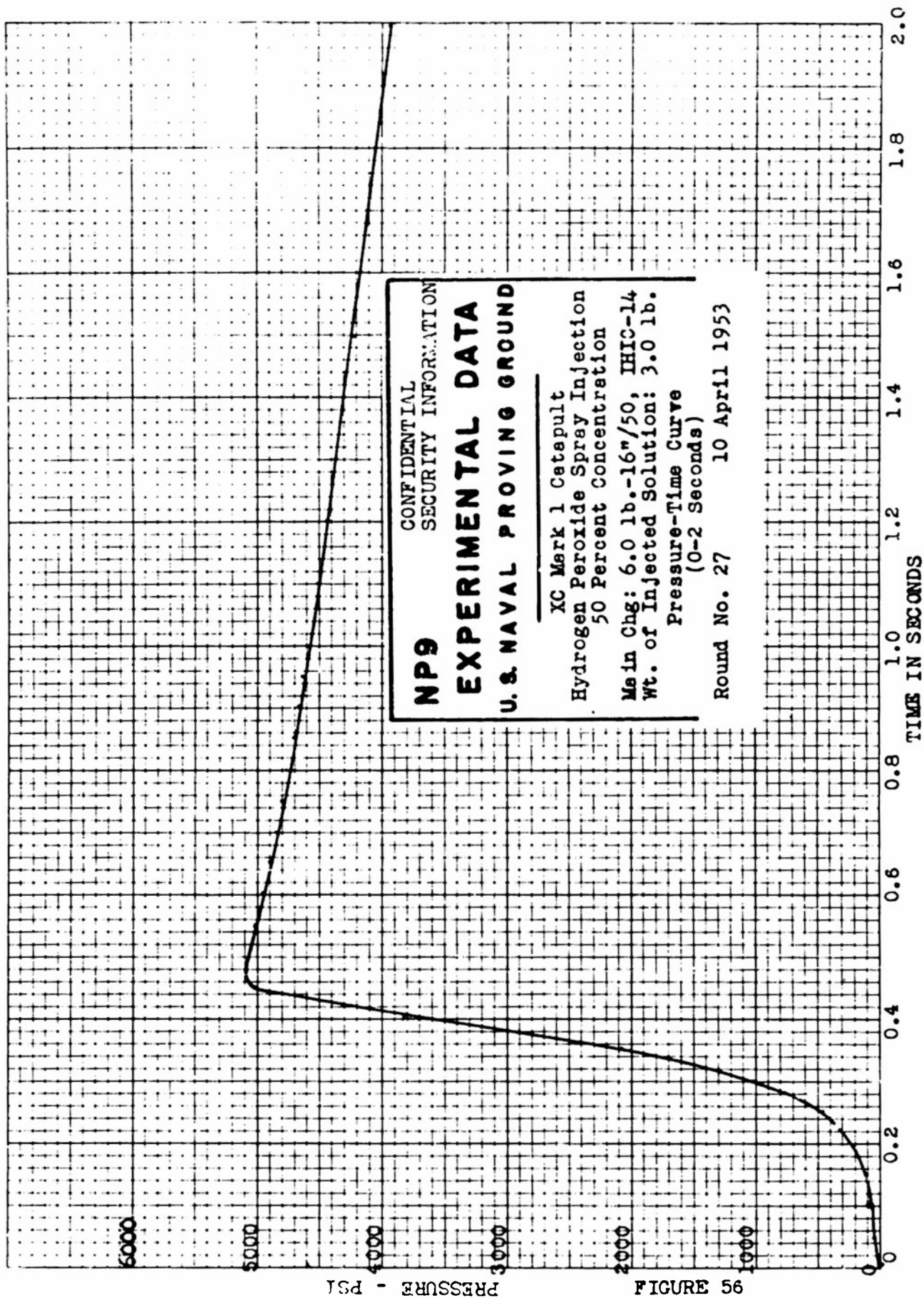


FIGURE 55

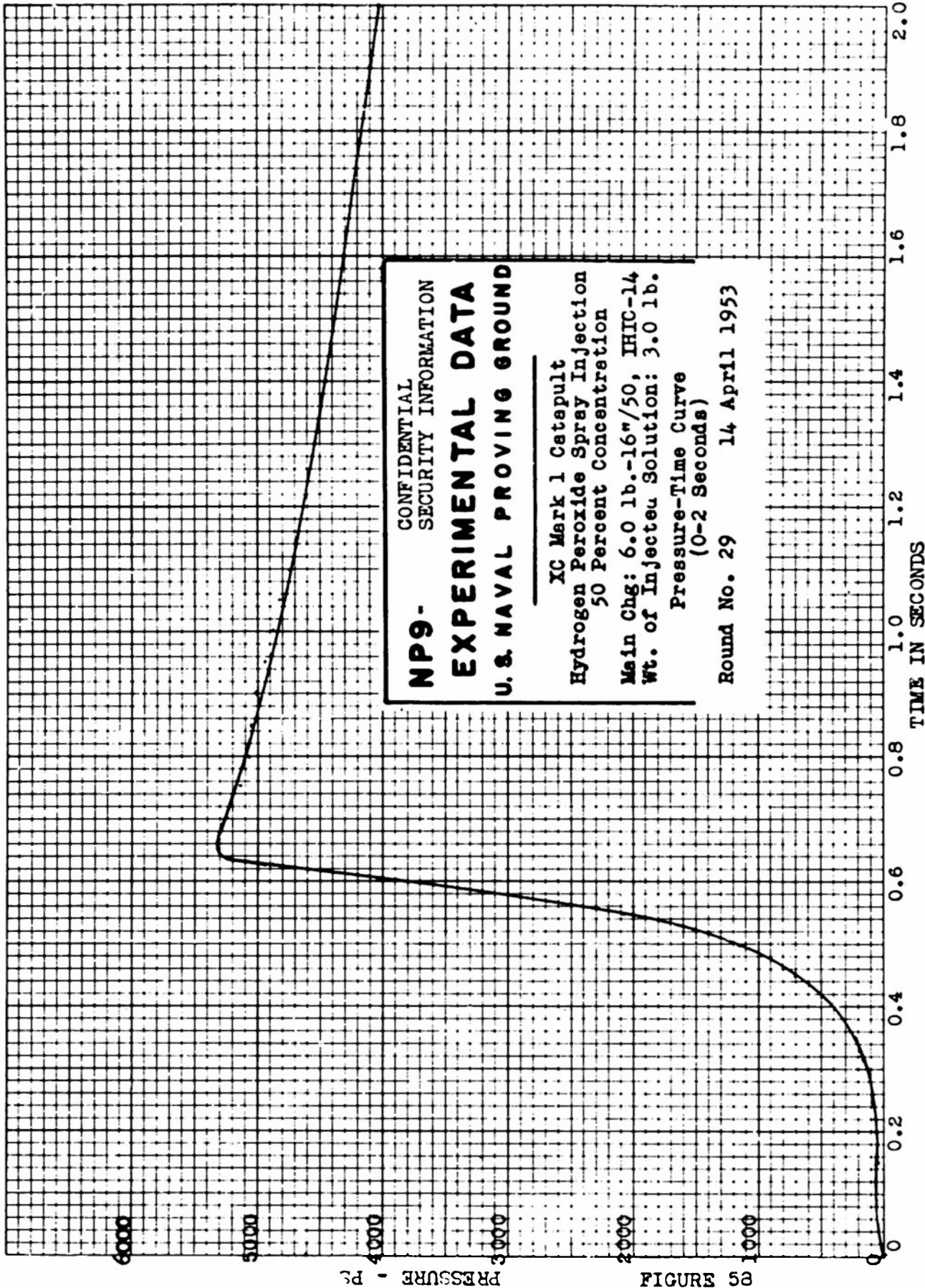
NP9 -





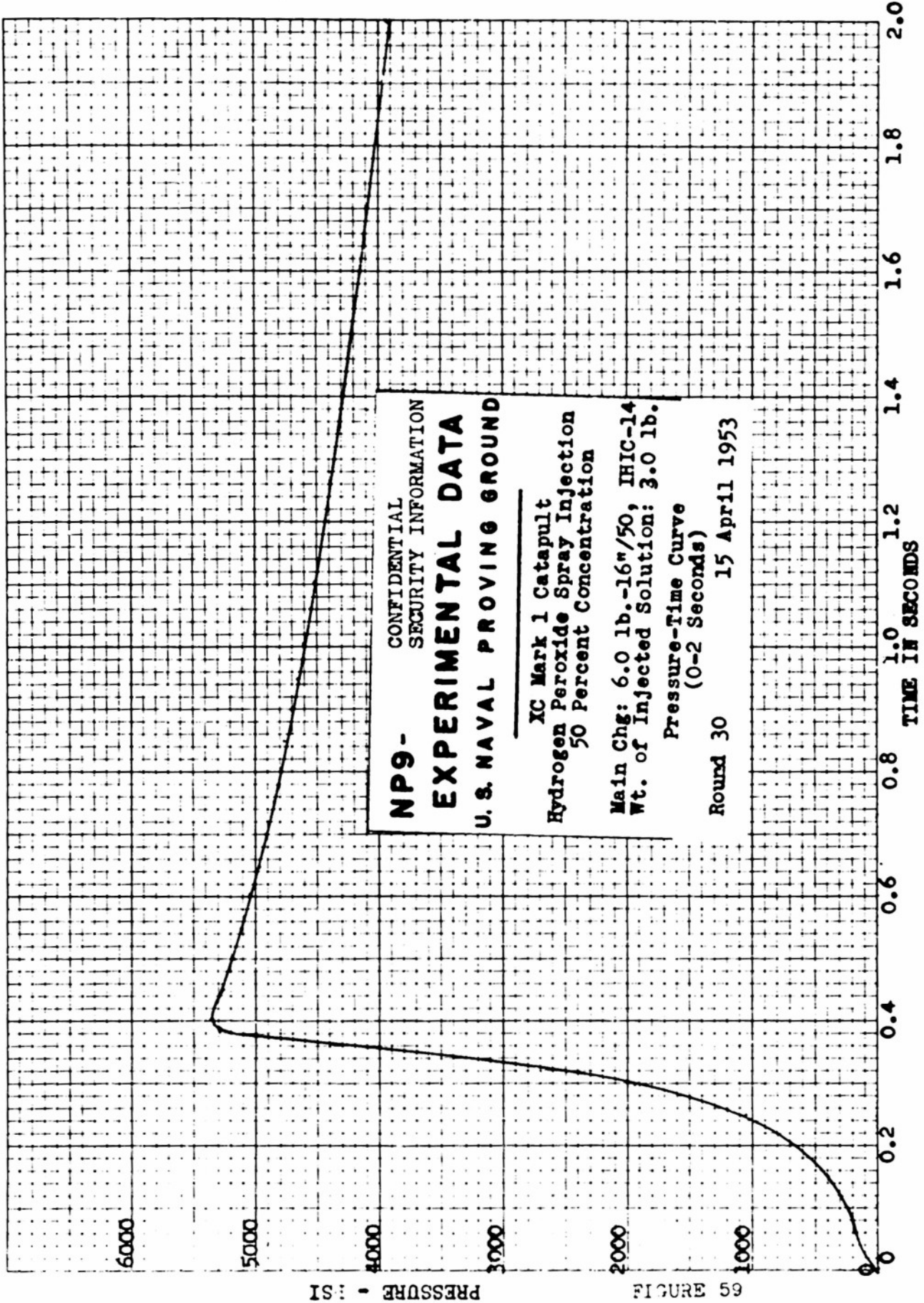
PSI - PRESSURE

FIGURE 57



ES ERRURE - PS

FIGURE 95



65 ENGINE - SI

65 ENGINE

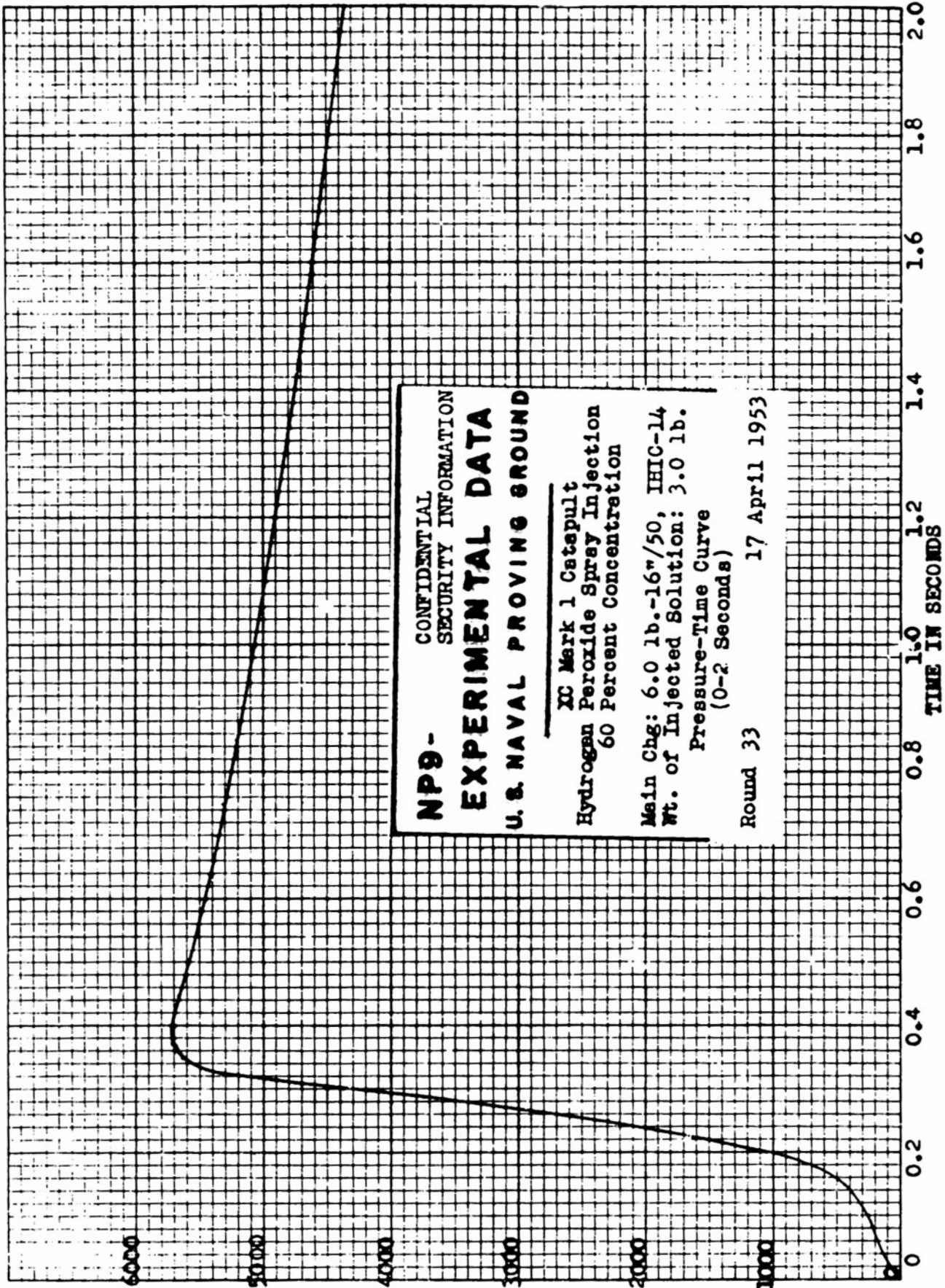


FIGURE 69 PRESSURE - PSI

NP9- CONFIDENTIAL
SECURITY INFORMATION

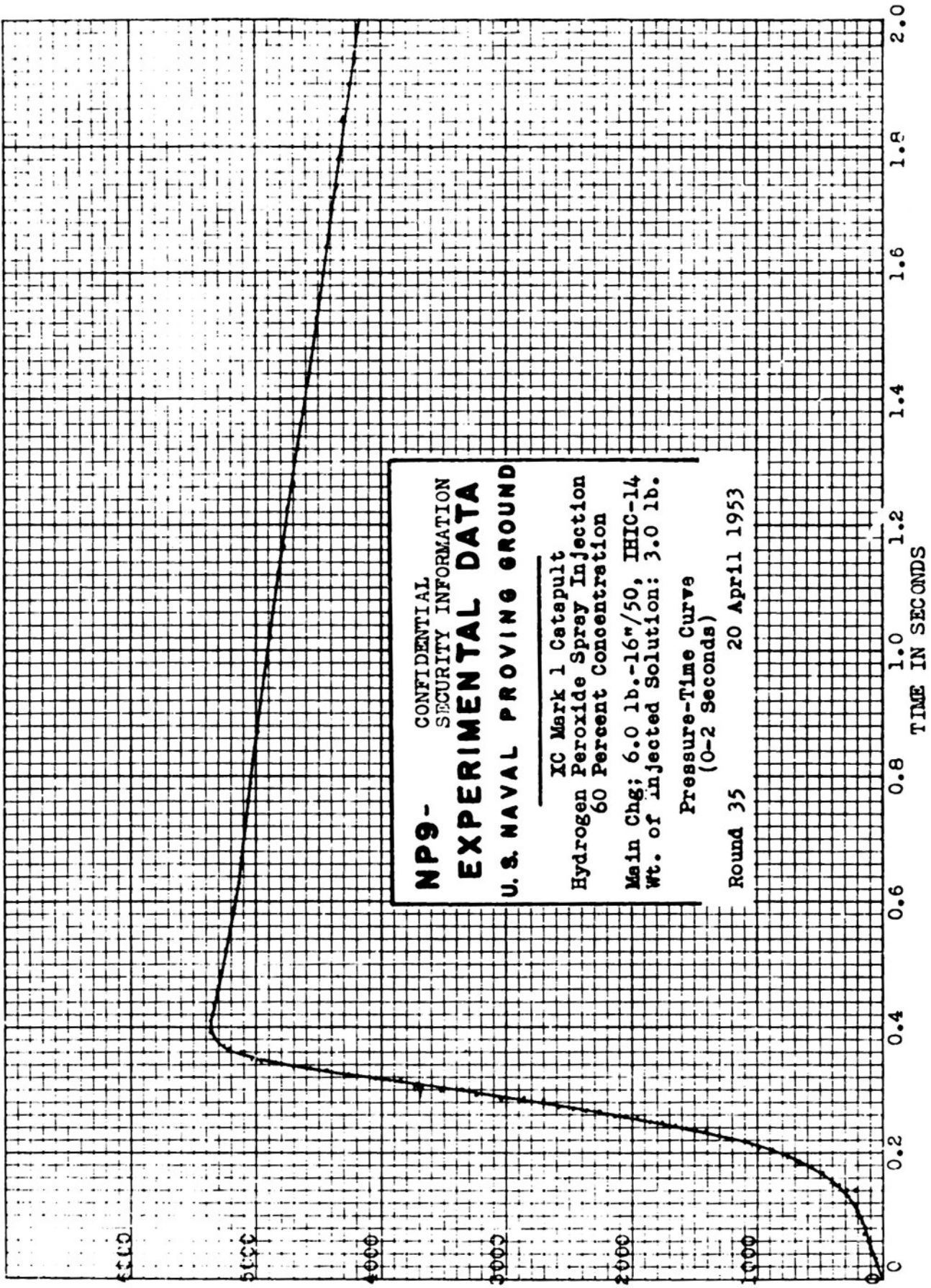
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
60 Percent Concentration

Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-2 Seconds)

Round 33 17 April 1953

TIME IN SECONDS



NP9 - CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

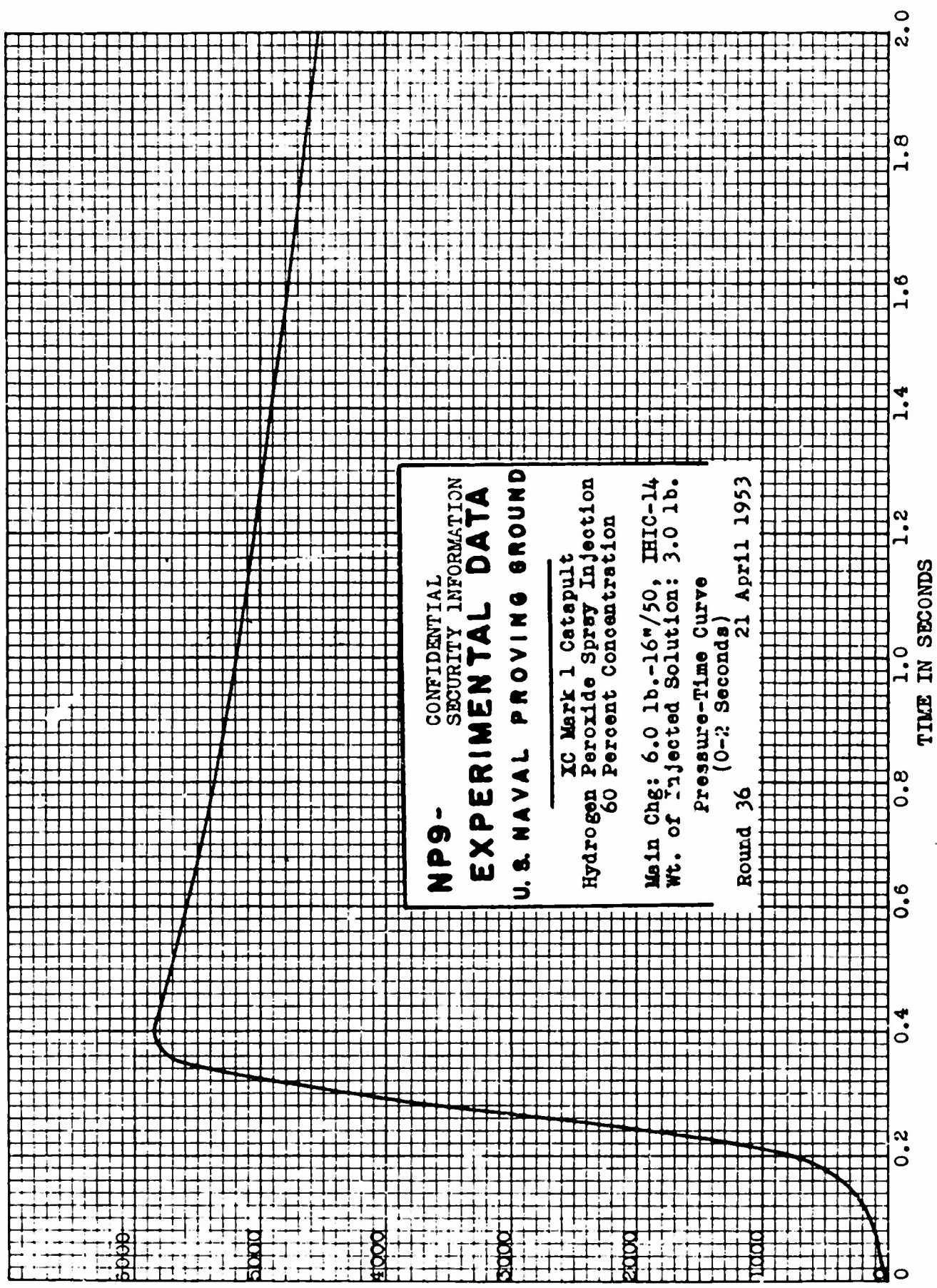
XC Mark 1 Catapult
 Hydrogen Peroxide Spray Injection
 60 Percent Concentration
 Main Chg; 6.0 lb.-16"/50, IHIC-14
 Wt. of injected Solution: 3.0 lb.

Pressure-Time Curve
 (0-2 Seconds)

Round 35 20 April 1953

PSI - PRESSURE

FIGURE 61



NP9- CONFIDENTIAL
 SECURITY INFORMATION
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND
 IC Mark 1 Catapult
 Hydrogen Peroxide Spray Injection
 60 Percent Concentration
 Main Chg: 6.0 lb.-16"/50, IHIC-14
 Wt. of Injected Solution: 3.0 lb.
 Pressure-Time Curve
 (0-? Seconds) 21 April 1953
 Round 36

29 PRESSURE - PSI

FIGURE 62

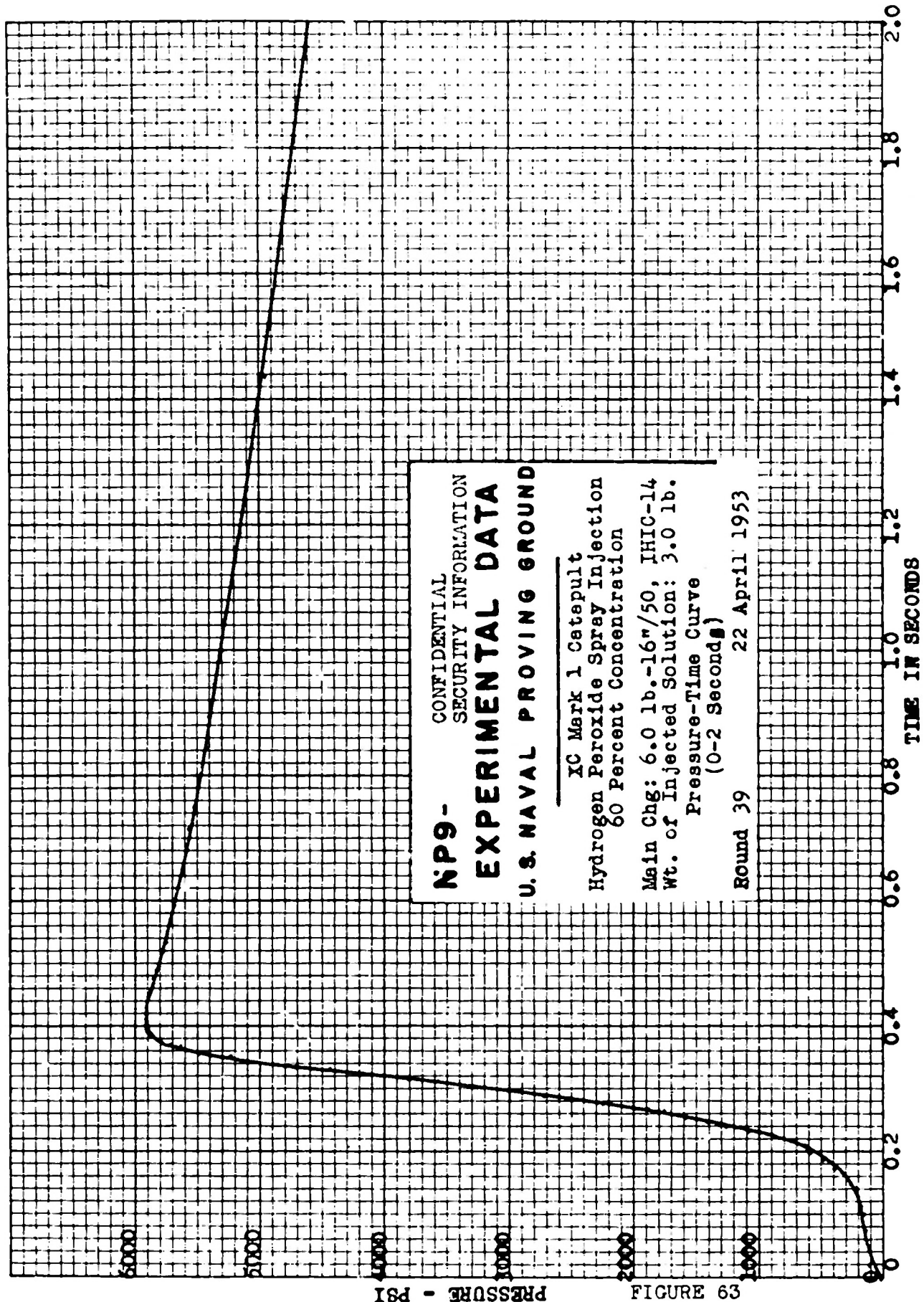


FIGURE 63 PRESSURE - PSI

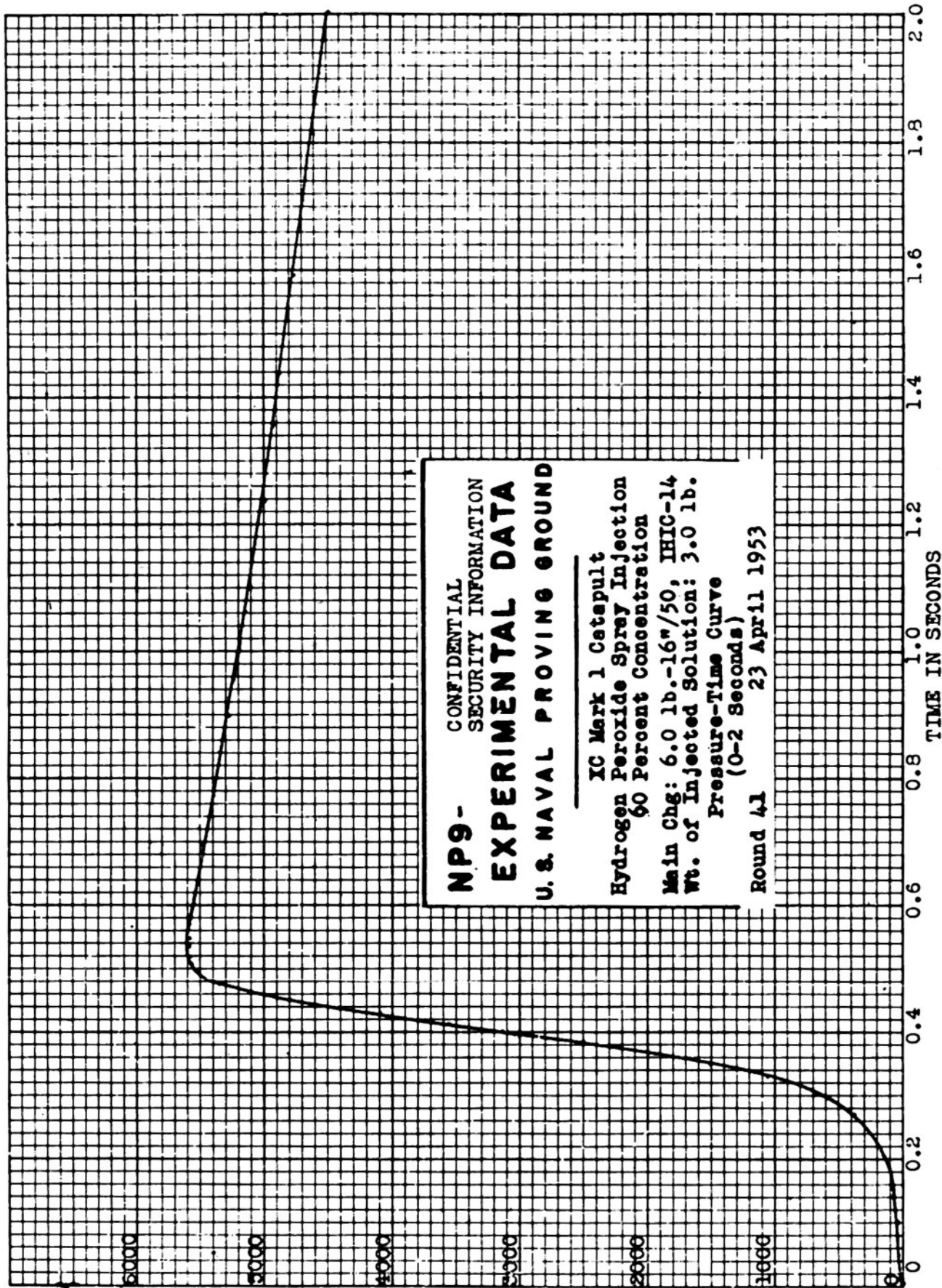


FIGURE 49 - PRESSURE - PSI

FIGURE 49

**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

CONFIDENTIAL
SECURITY INFORMATION

IC Mark 1 Cetspult
Dry Round
Main Chg: 6.0 lb.-16"/50, IHIC-14
Ambient Temp: 15.1°C
I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)
Round 32 16 April 1953

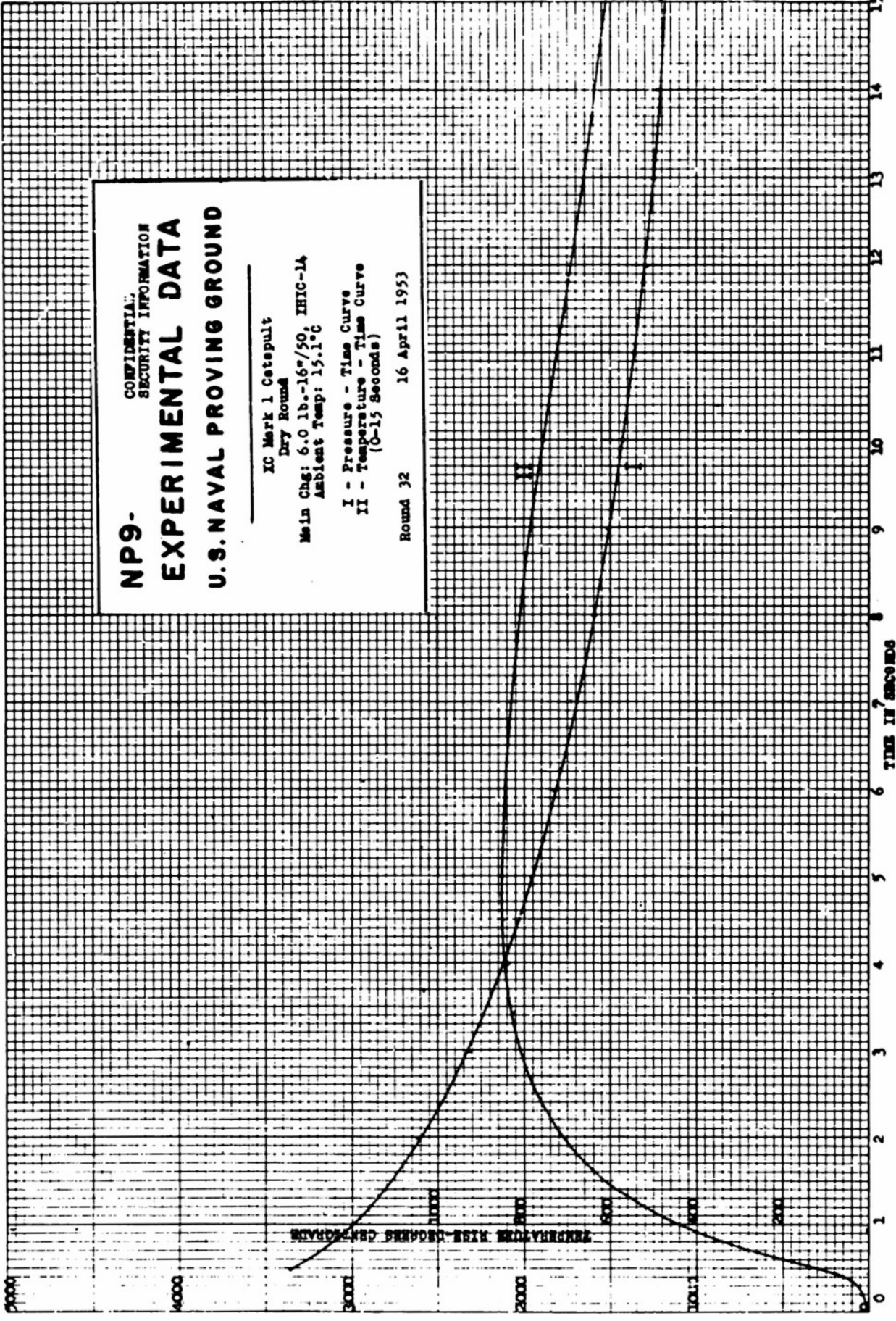
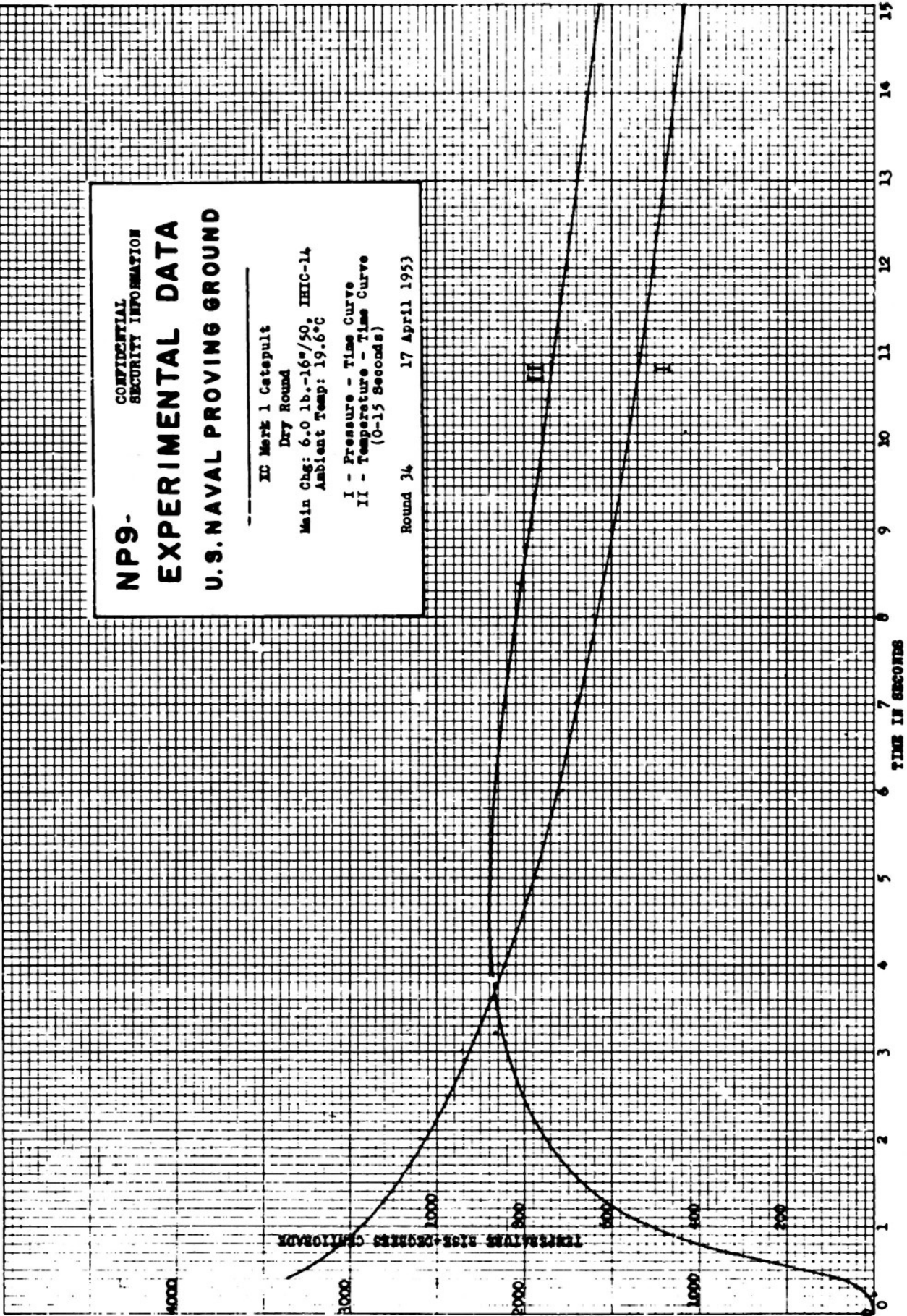


FIGURE 55 PRESSURE - PSI

NP9-
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

IC Mark 1 Catapult
Dry Round
Main Chg: 6.0 lb.-16"/50, IHIC-14
Ambient Temp: 19.6°C
I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)
Round 34 17 April 1953



PRESSURE - PSI

FIGURE 66

**NP9-
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

XC Mark 1 Catapult
Dry Round
Main Chg: 6.0 lb.-16"/50, IHIC-14
Ambient Temp: 12.6°C
I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)

Round 37 21 April 1953

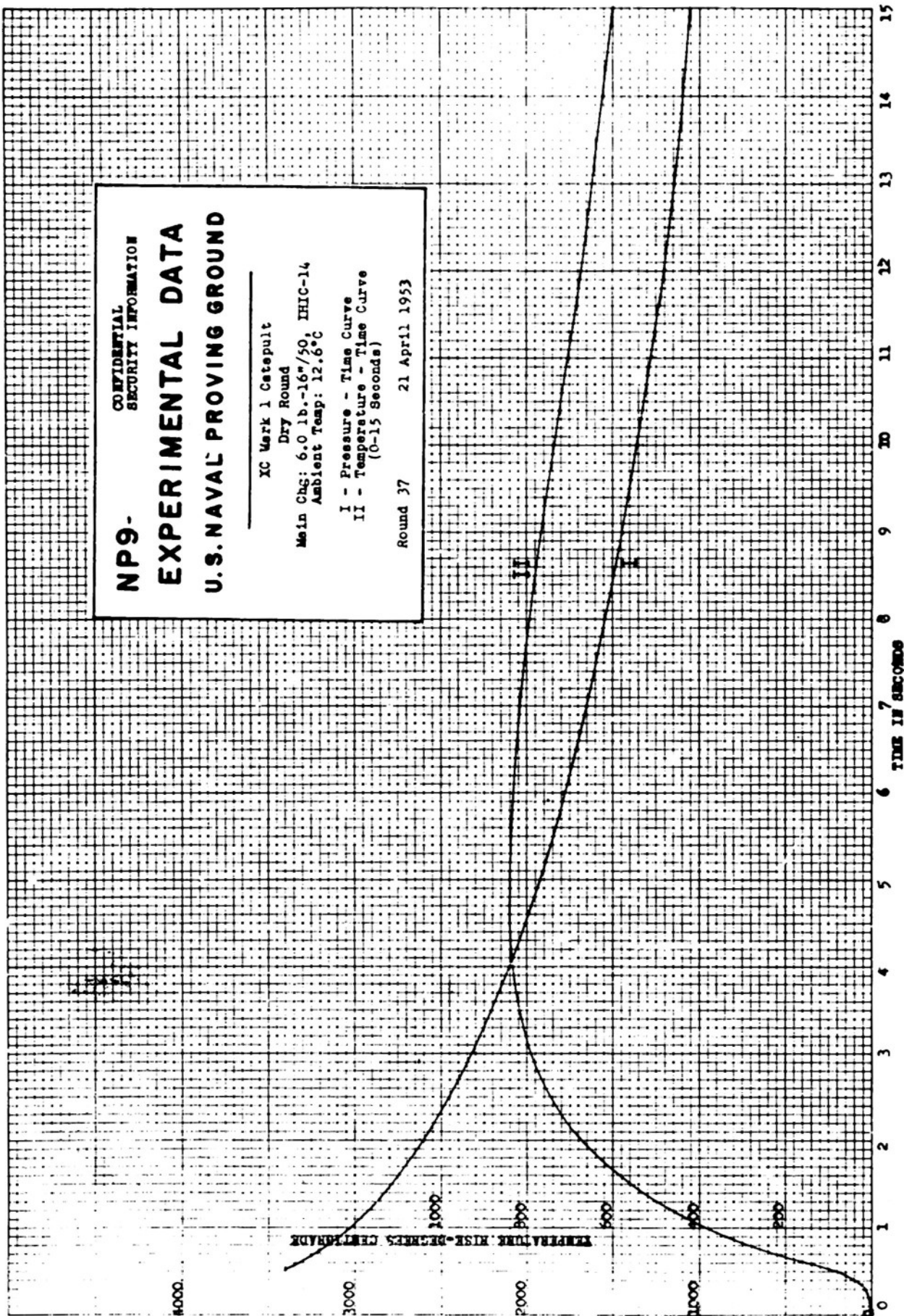


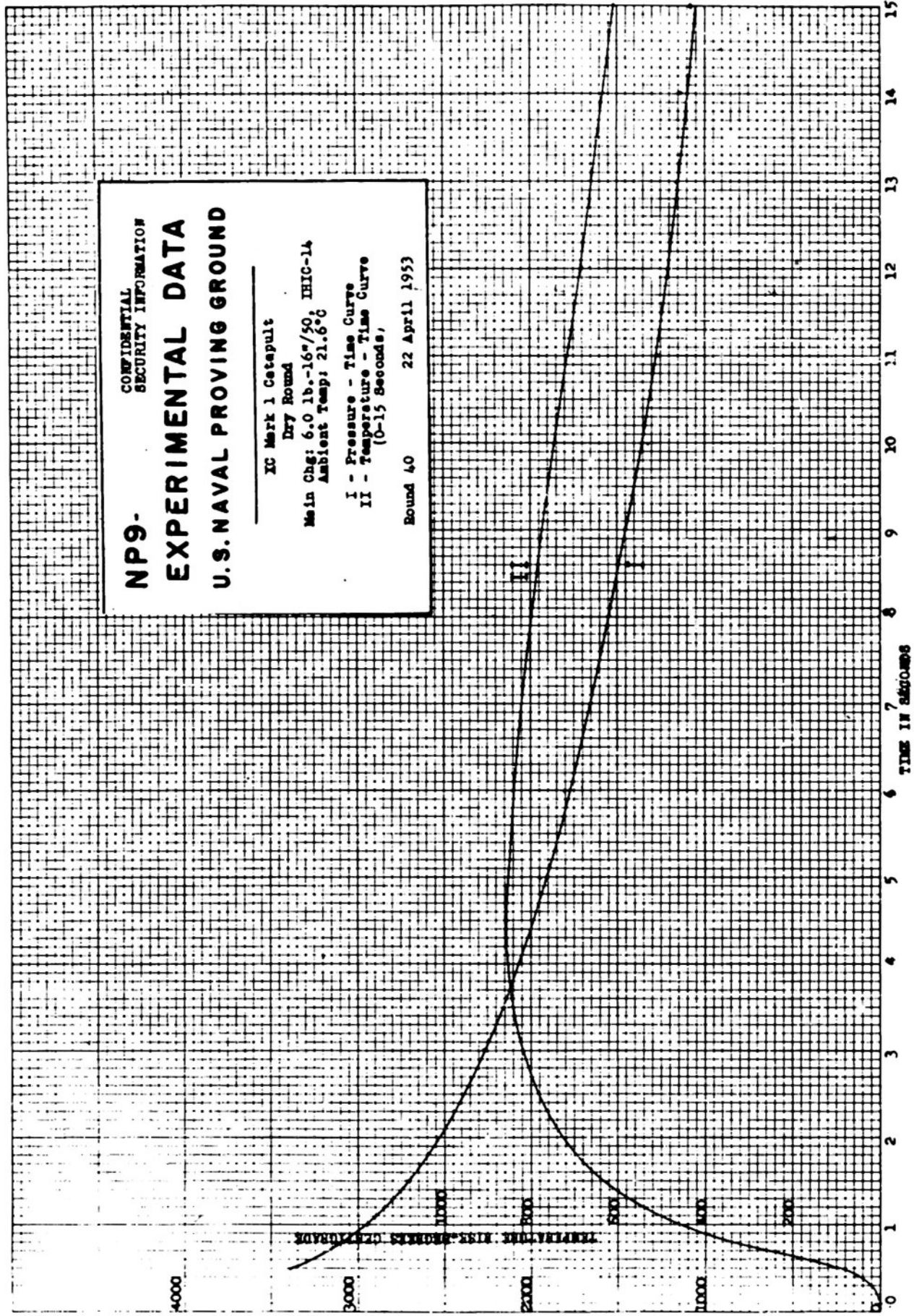
FIGURE 69
PRESSURE - PSI

NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

CONFIDENTIAL
 SECURITY INFORMATION

IC Mark 1 Catapult
 Dry Round
 Main Chg: 6.0 lb.-16"/50, IHIC-14
 Ambient Temp: 21.6°C
 I - Pressure - Time Curve
 II - Temperature - Time Curve
 (0-15 Seconds)

Round 40 22 April 1953



89 PRESSURE - PSI

FIGURE 68

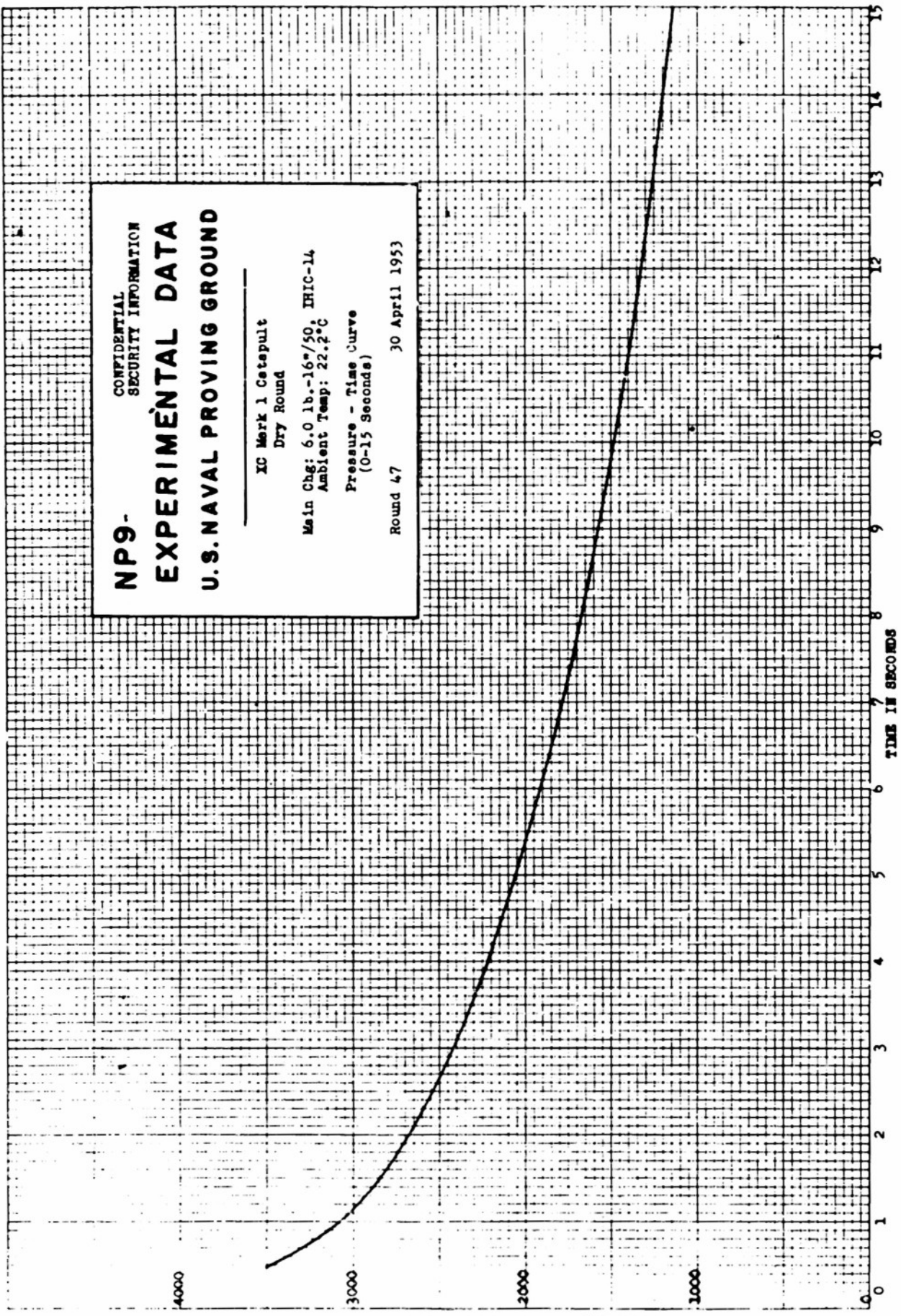
NP9-
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

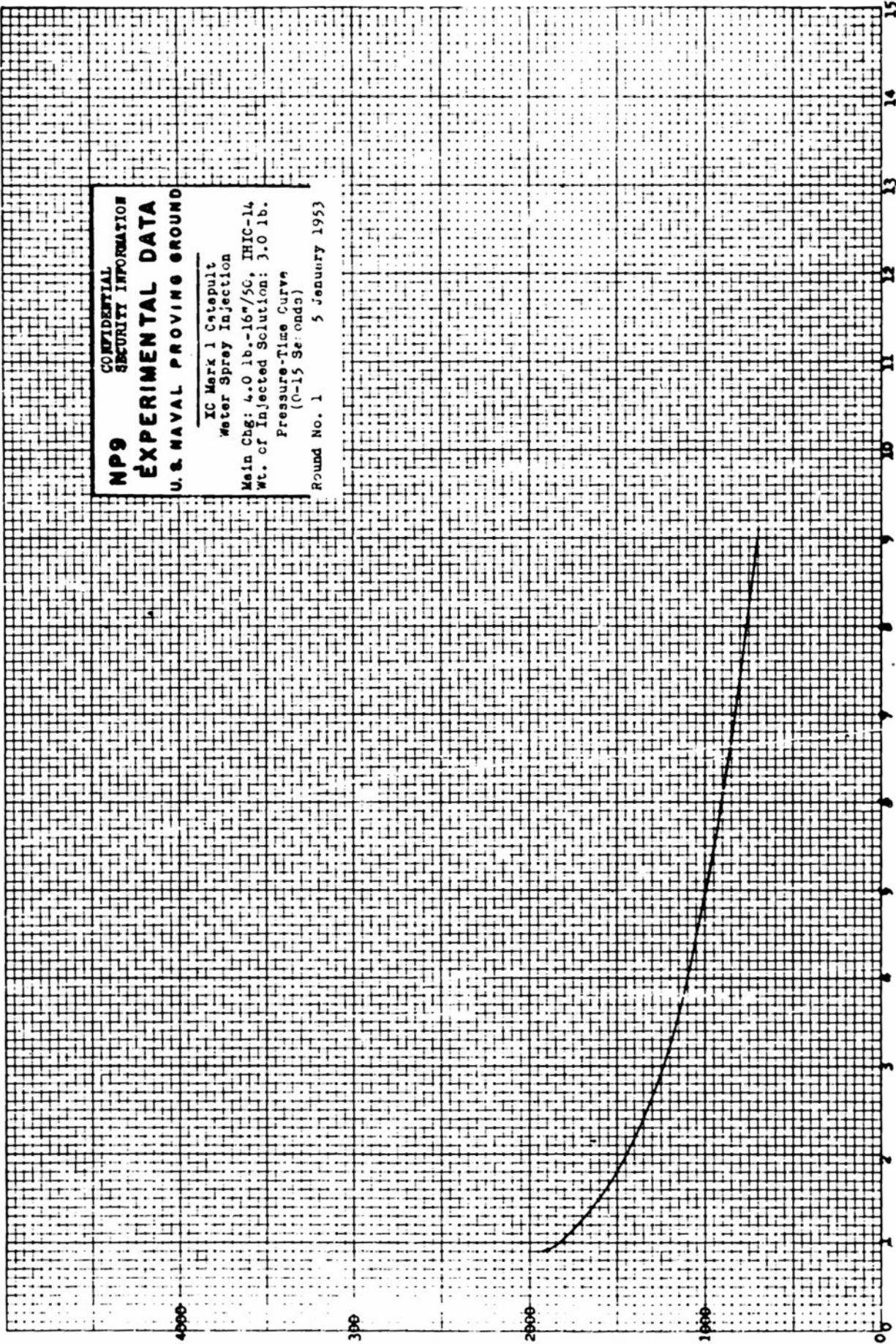
IC Mark 1 Cetapult
Dry Round

Main Chg: 6.0 lb.-167/50, IRIC-14
Ambient Temp: 22.2°C

Pressure - Time Curve
(0-15 Seconds)

Round 47 30 April 1953





CONFIDENTIAL
SECURITY INFORMATION
NP9
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

XC Merk 1 Catapult
 Meter Spray Injection
 Main Chg: 4.0 lb.-16"/5C, IHIC-14
 Wt. of Injected Solution: 3.0 lb.
 Pressure-Time Curve
 (0-15 Seconds)

Round No. 1 5 January 1953

70 FIGURE - PSI

TIME IN SECONDS

CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

IC Mark 1 Catapult
Water Spray Injection
Main Chg: 4.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-15 Seconds)

Round No. 2 6 January 1953

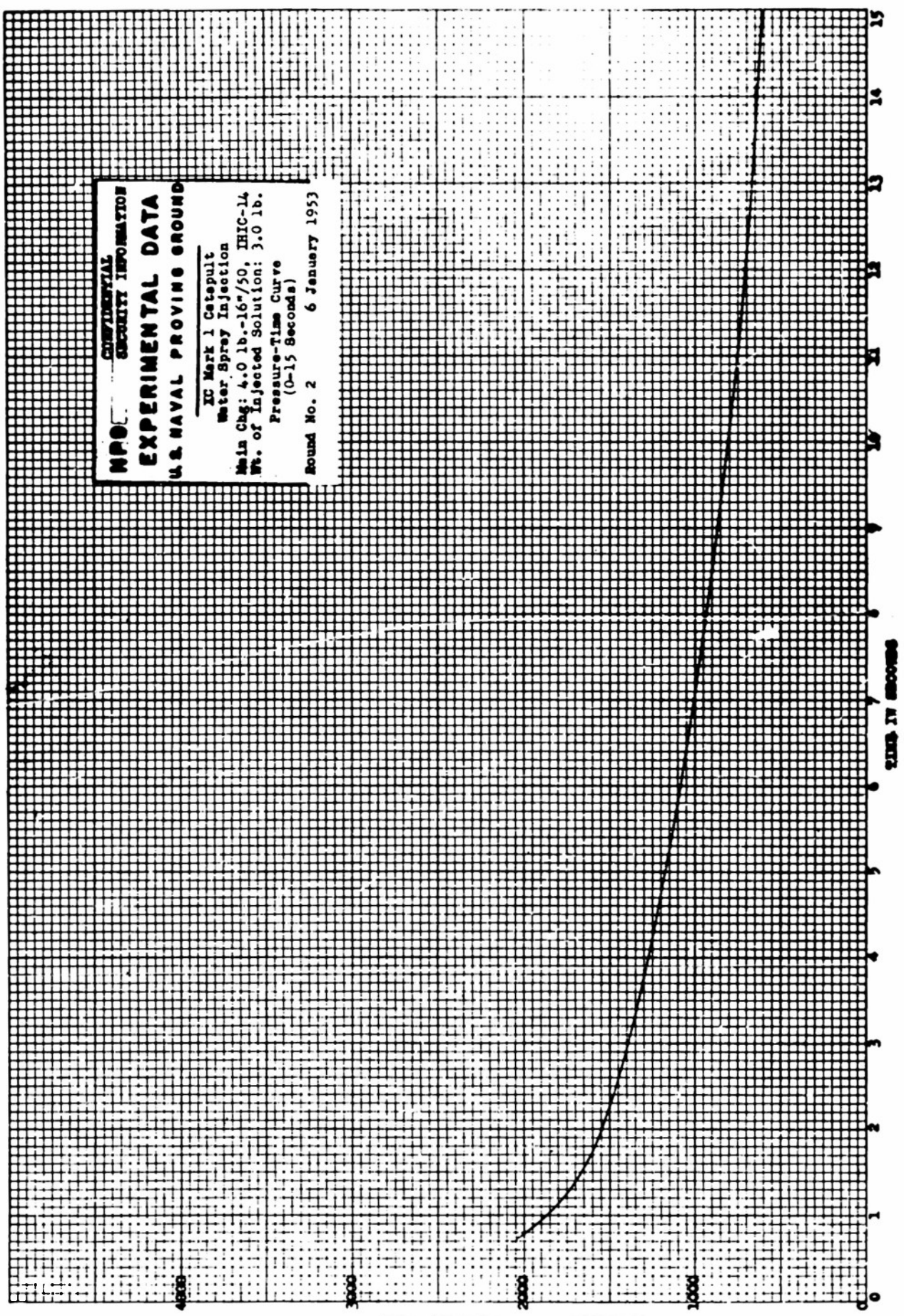


FIGURE 71
PRESSURE - PSI

CONFIDENTIAL
SECURITY INFORMATION
NPS
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

XC Mark 1 Cetepult
Water Spray Injection
Main Chg: 6.0 lb.-.16"/50, IHC-14
Wt. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-15 Seconds)

Round No. 3 7 January 1953

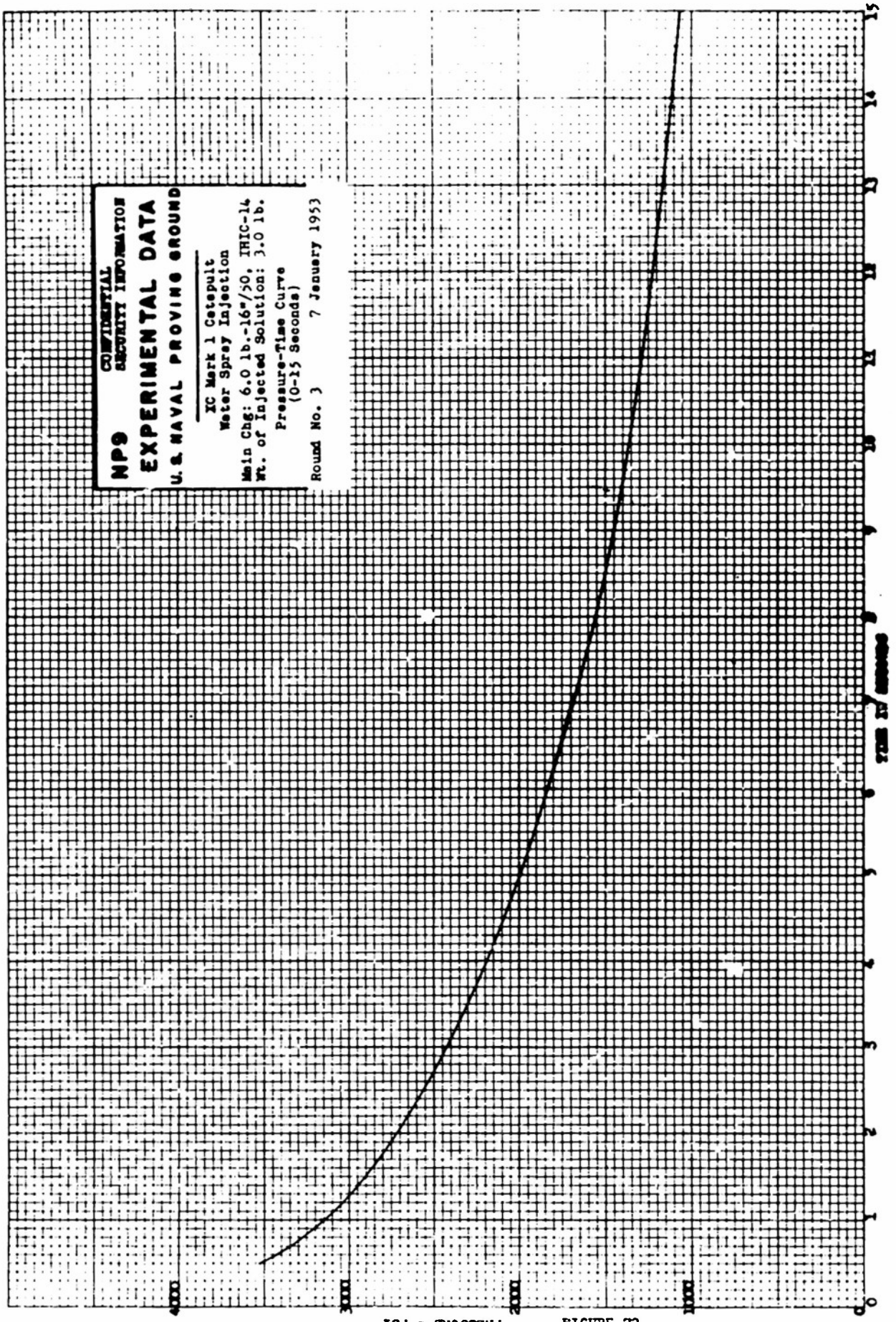


FIGURE 72
PRESSURE - PSI

**NP9- CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

XIG Mark 1 Catapult
Water Spray Injection

Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 21.2°C

Temperature - Time Curve
(0-15 Seconds)

Round 53

7 May 1953

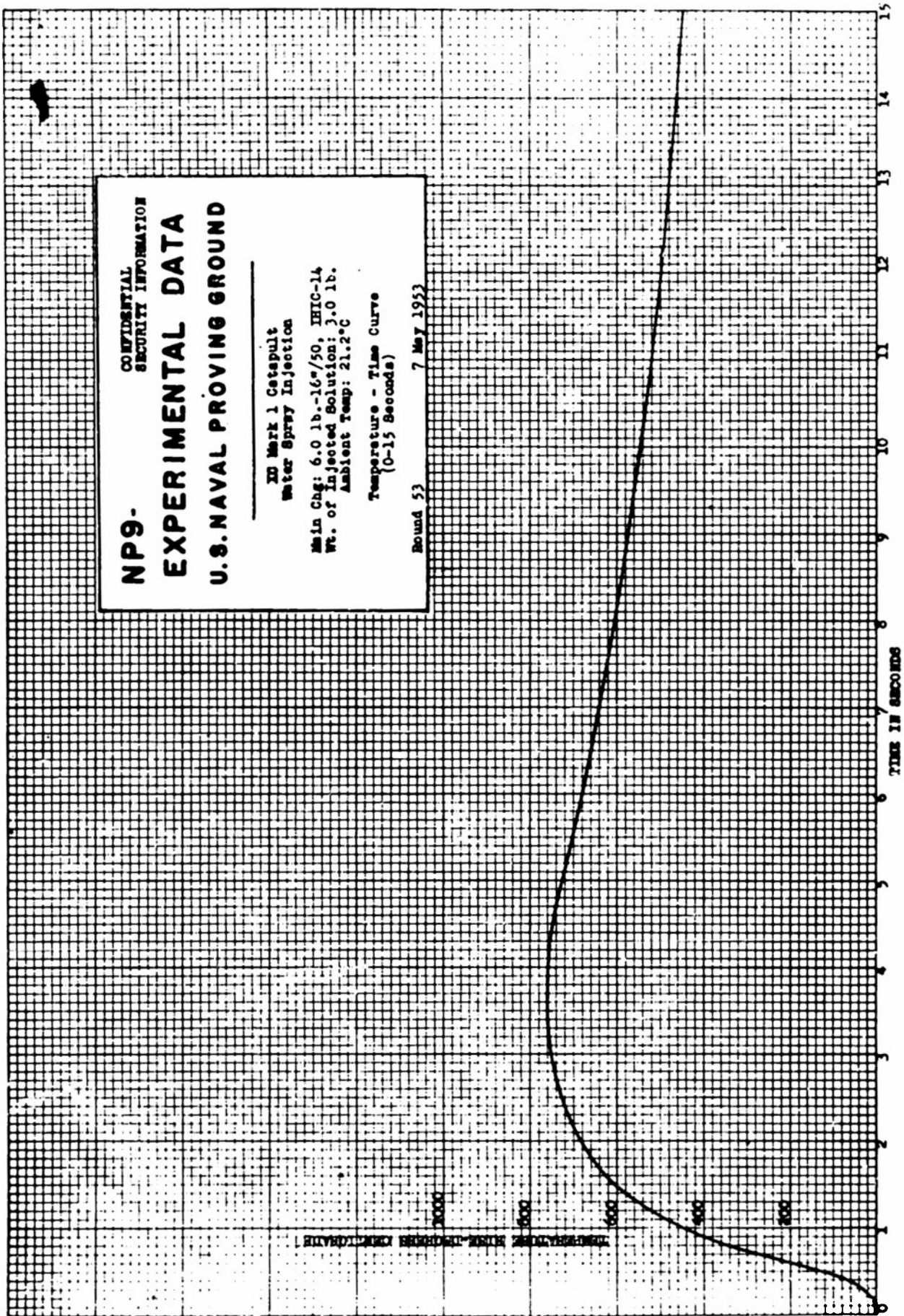


FIGURE 73

NP9-
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

IC Mark 1 Catepult
 Meter Spray Injection
 Main Chg: 6.0 lb.-16"/50, IHIC-14
 Wt. of Injected Solution: 3.0 lb.
 Ambient Temp: 23.1°C

I - Pressure - Time Curve
 II - Temperature - Time Curve
 (0-15 Seconds)

Round 54 7 May 1953

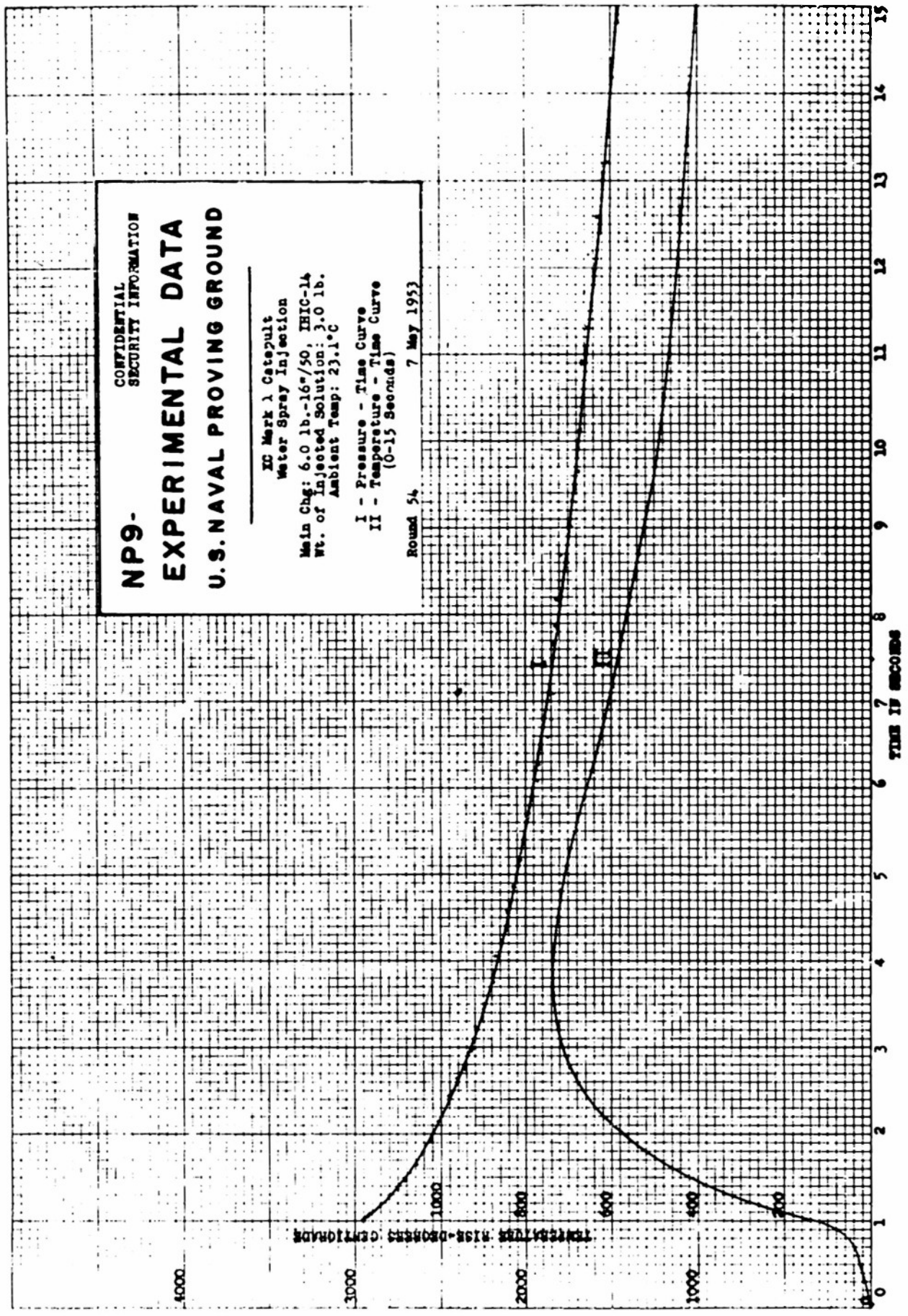
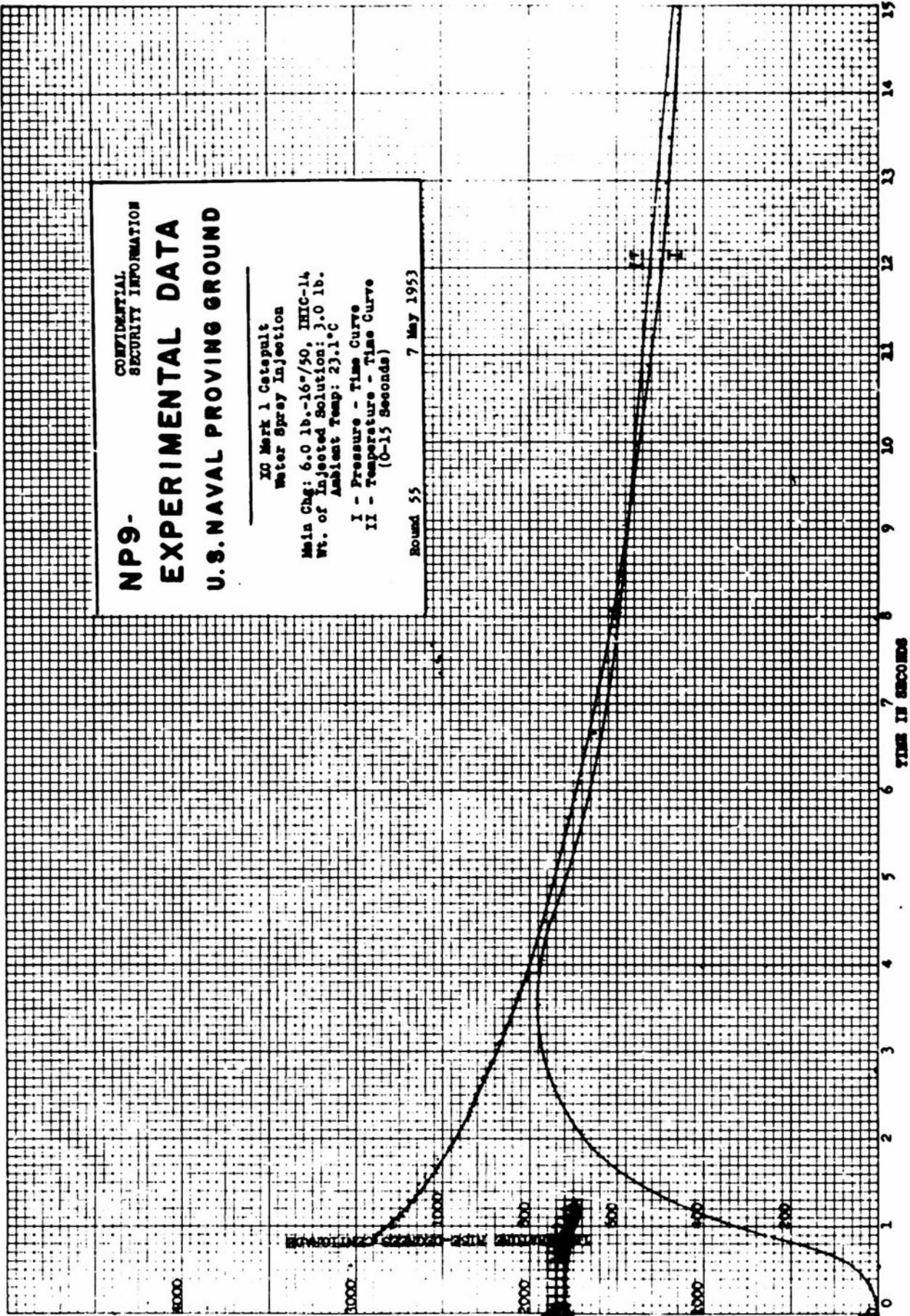


FIGURE 74 PRESSURE - PSI

NP9-
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

IG Mark 1 Catapult
Water Spray Injection
Main Chg: 6.0 lb.-.16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 23.1°C
I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)

Round 55 7 May 1953

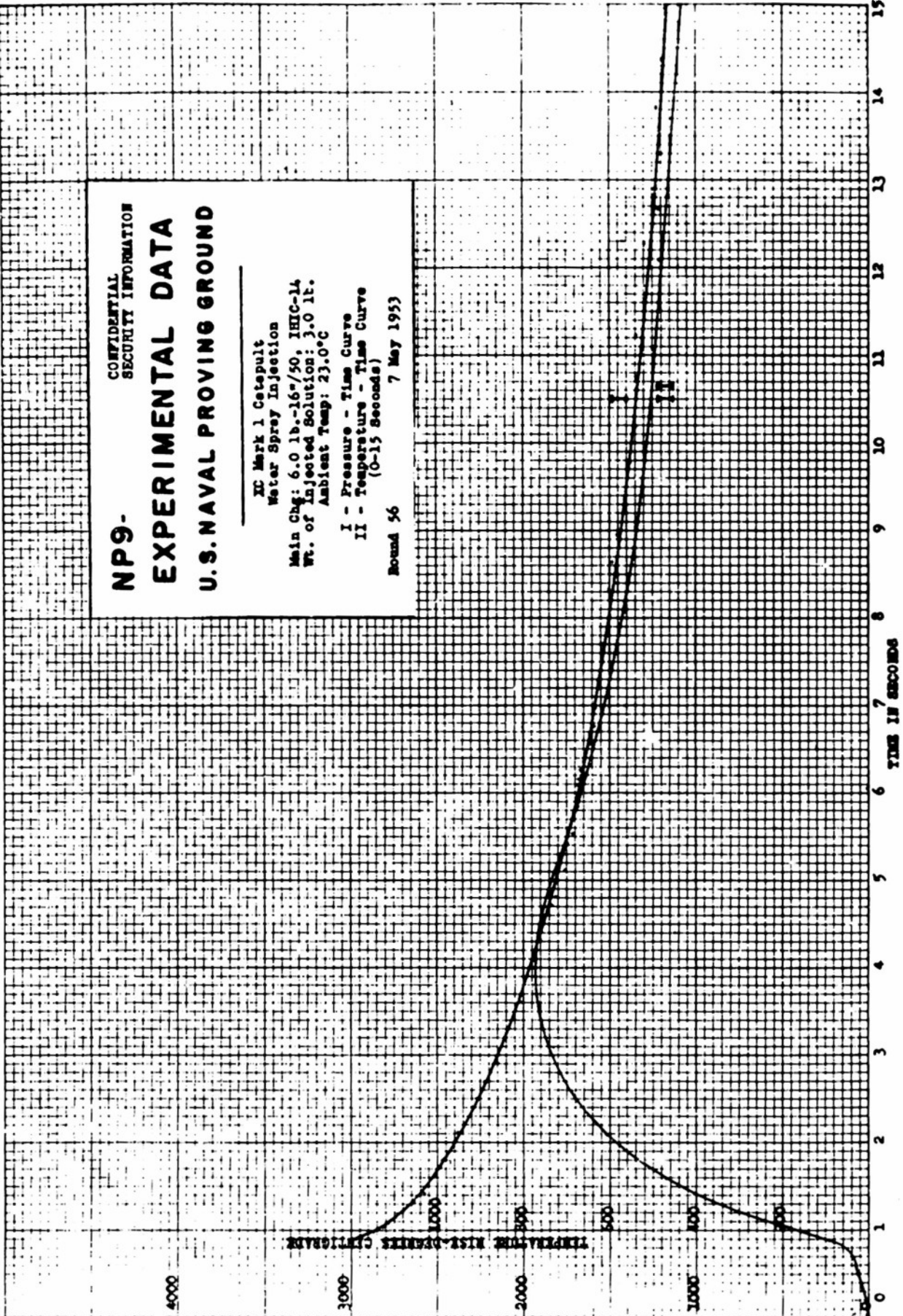


PSI - PRESSURE

FIGURE 75

**NP9-
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

IX Mark I Catapult
Water Spray Injection
Main Chg: 6.0 lb.-16"/50; IHIC-14
Wt. of Injected Solution: 3.0 lt.
Ambient Temp: 23.0°C
I - Pressure - Time Curve
II - Temperature - Time Curve
Round 56 7 May 1953



76 FIGURE - PSI

NP9-
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

IX Mark 1 Catepult
 Water Spray Injection
 Main Chg: 6.0 lb.-16"/50, IHIC-14
 Wt. of Injected Solution: 3.0 lb.
 Ambient Temp: 20.1°C

I - Pressure - Time Curve
 II - Temperature - Time Curve
 (0-15 Seconds)

Round 57
 8 May 1953

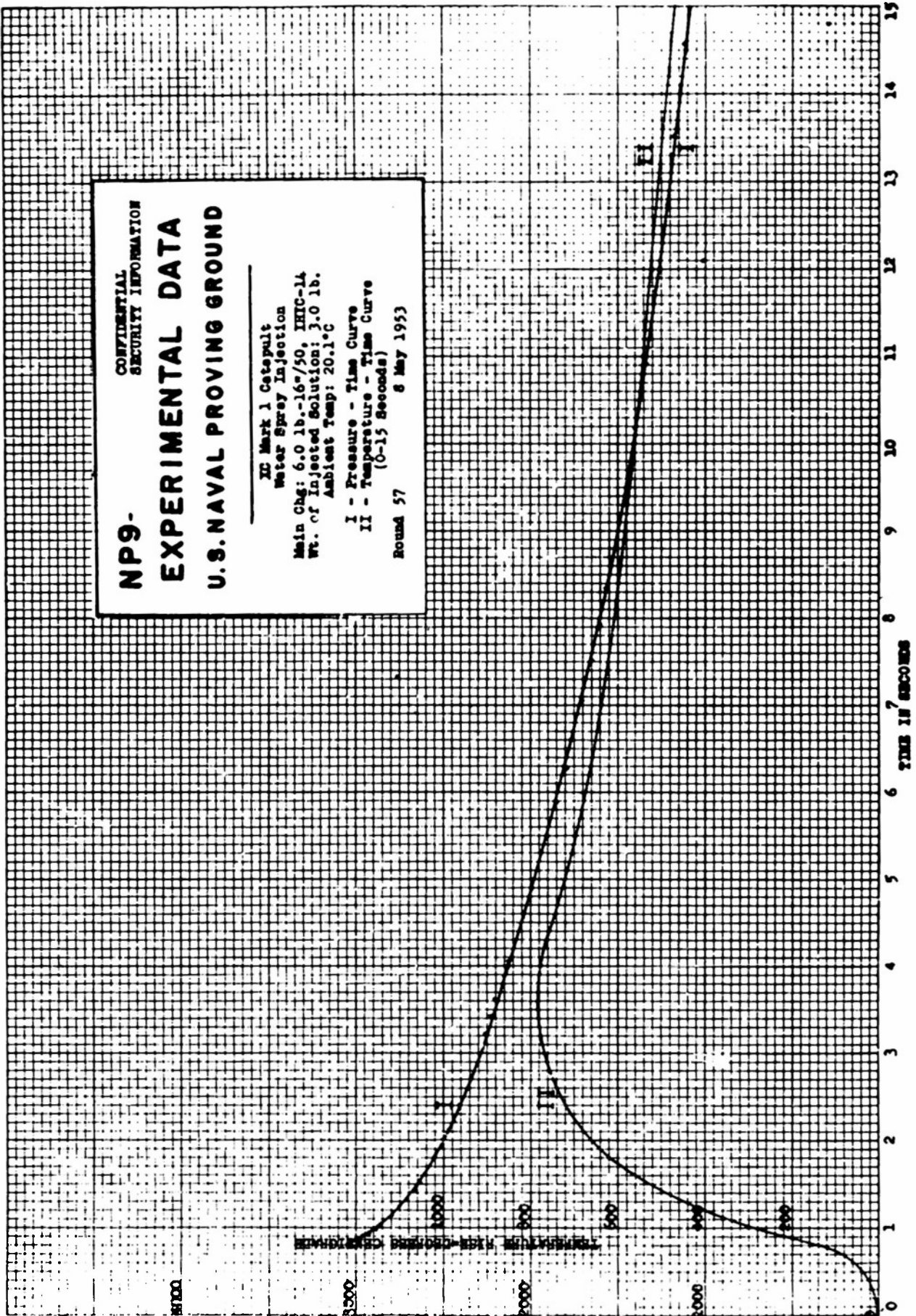
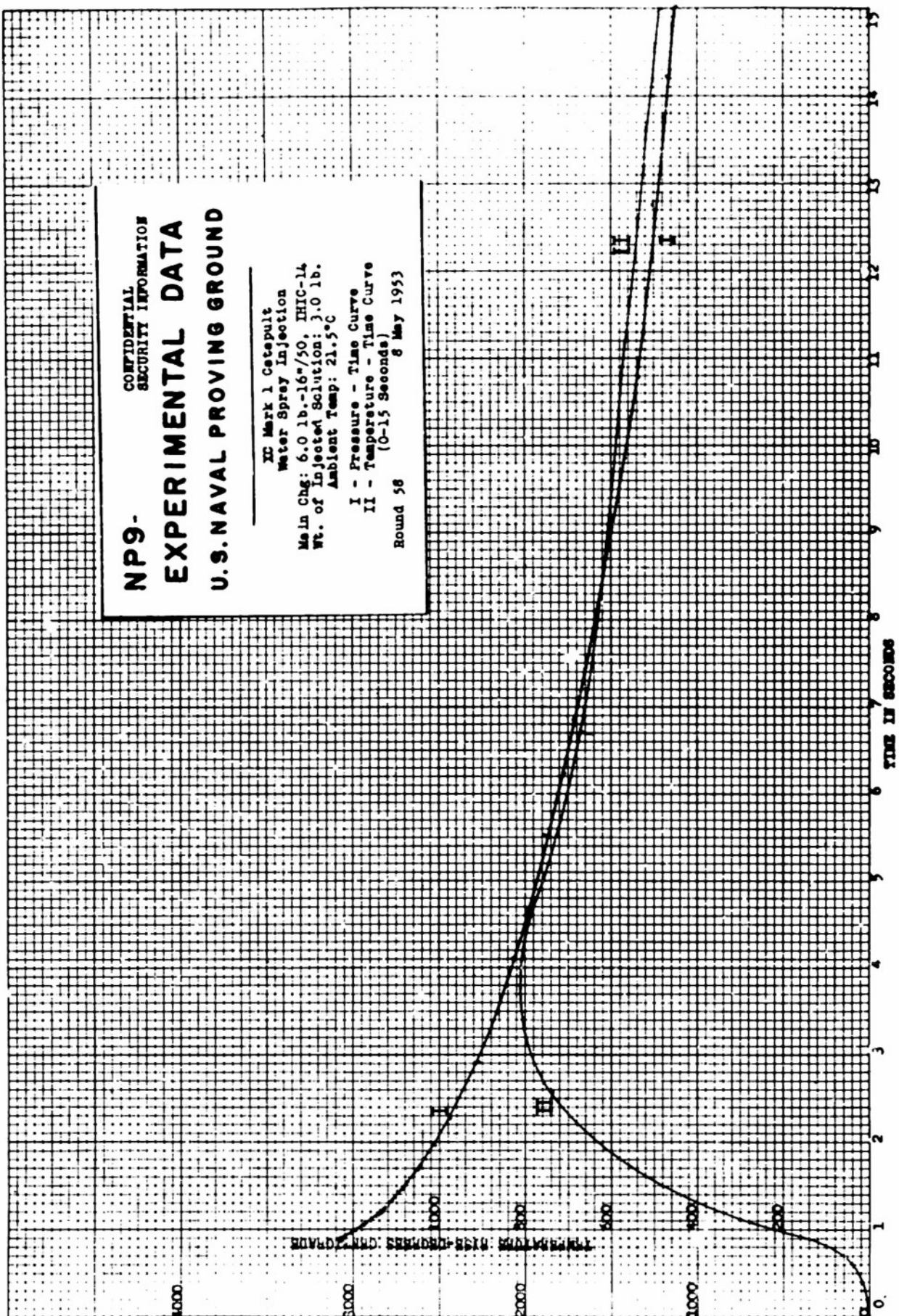


FIGURE 77
 PRESSURE - PSI

**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

**CONFIDENTIAL
SECURITY INFORMATION**

IC Mark 1 Cetepult
Water Spray Injection
Mn Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 21.5°C
I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)
Round 58
8 May 1953



NP9 **CONFIDENTIAL**
SECURITY INFORMATION

EXPERIMENTAL DATA

U. S. NAVAL PROVING GROUND

IC Mark 1 Cetapult
Hydrogen Peroxide Spray Injection
10 Percent Concentration

Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-15 Seconds)

Round No. 4 14 January 1953

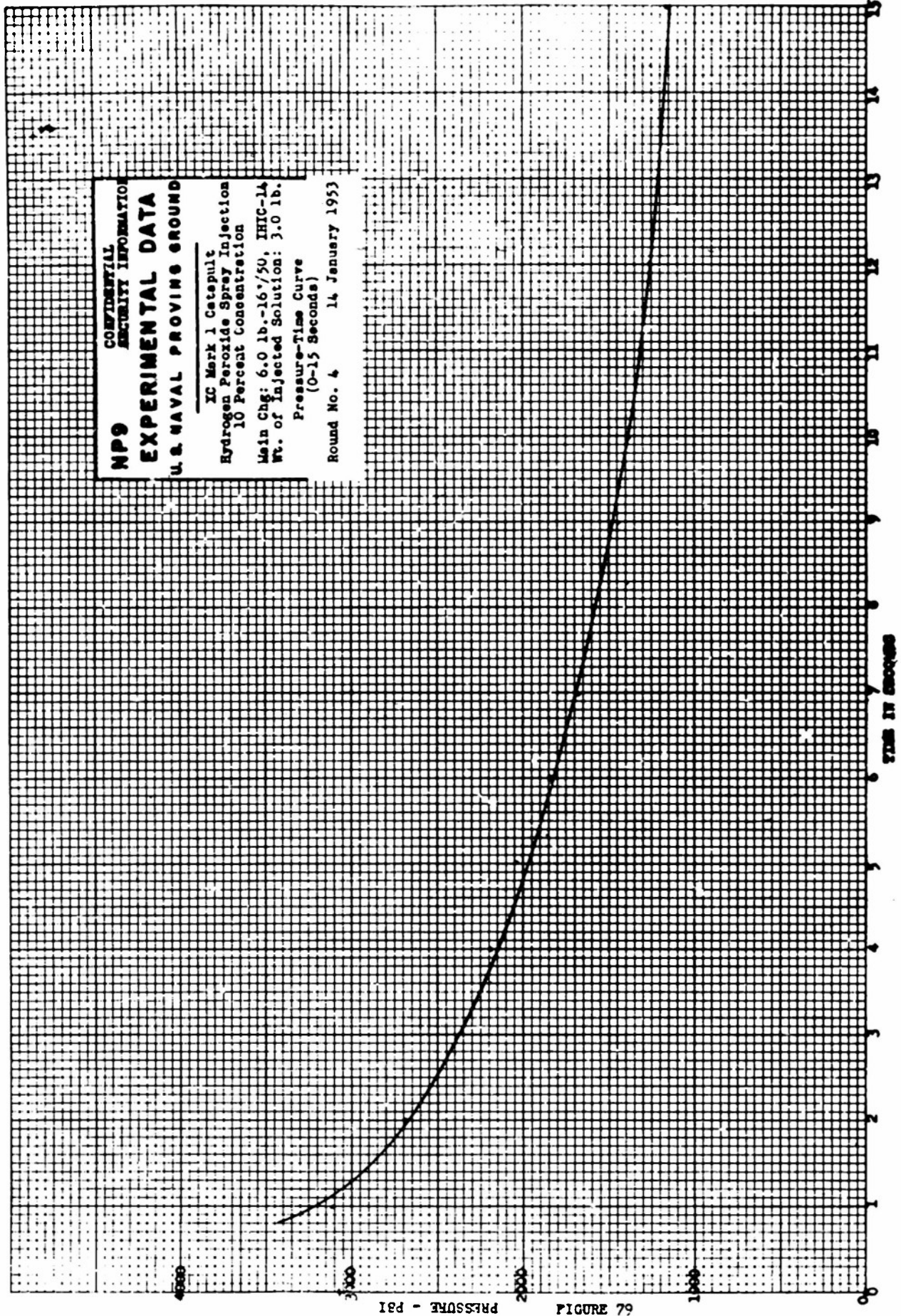


FIGURE 79

PRESSURE - PSI

TIME IN SECONDS

CONFIDENTIAL
SECURITY INFORMATION
NPS
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND
 XT Mark 1 Catapult
 Hydrogen Peroxide Spray Injection
 10 Percent Concentration
 Main Chg: 6.0 lb.-16"/50, IHIC-14
 Wt. of Injected Solution: 3.0 lb.
 Pressure-Time Curve
 (0-15 Seconds)

Round No. 5 20 January 1953

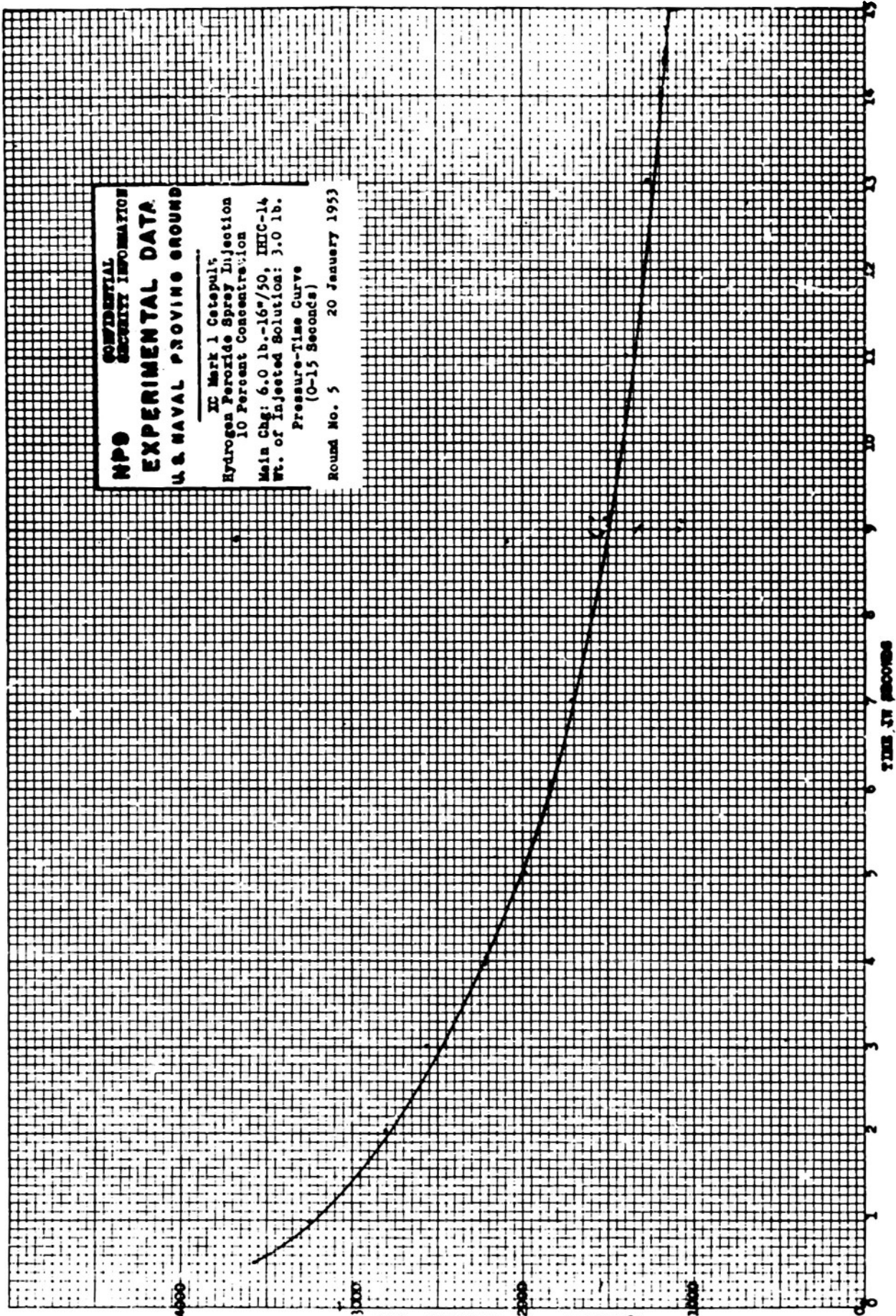
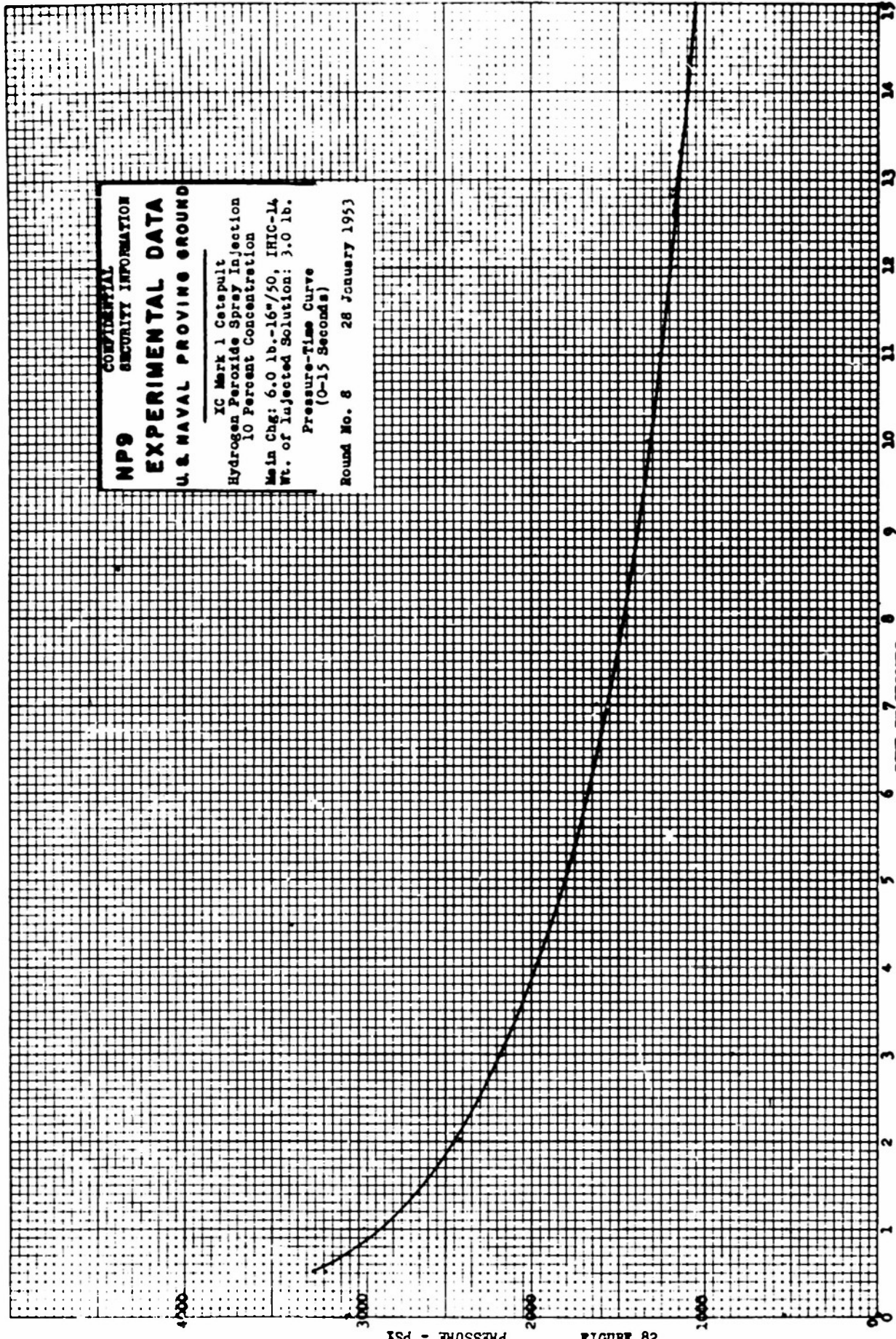


FIGURE 80 PRESSURE - PSI

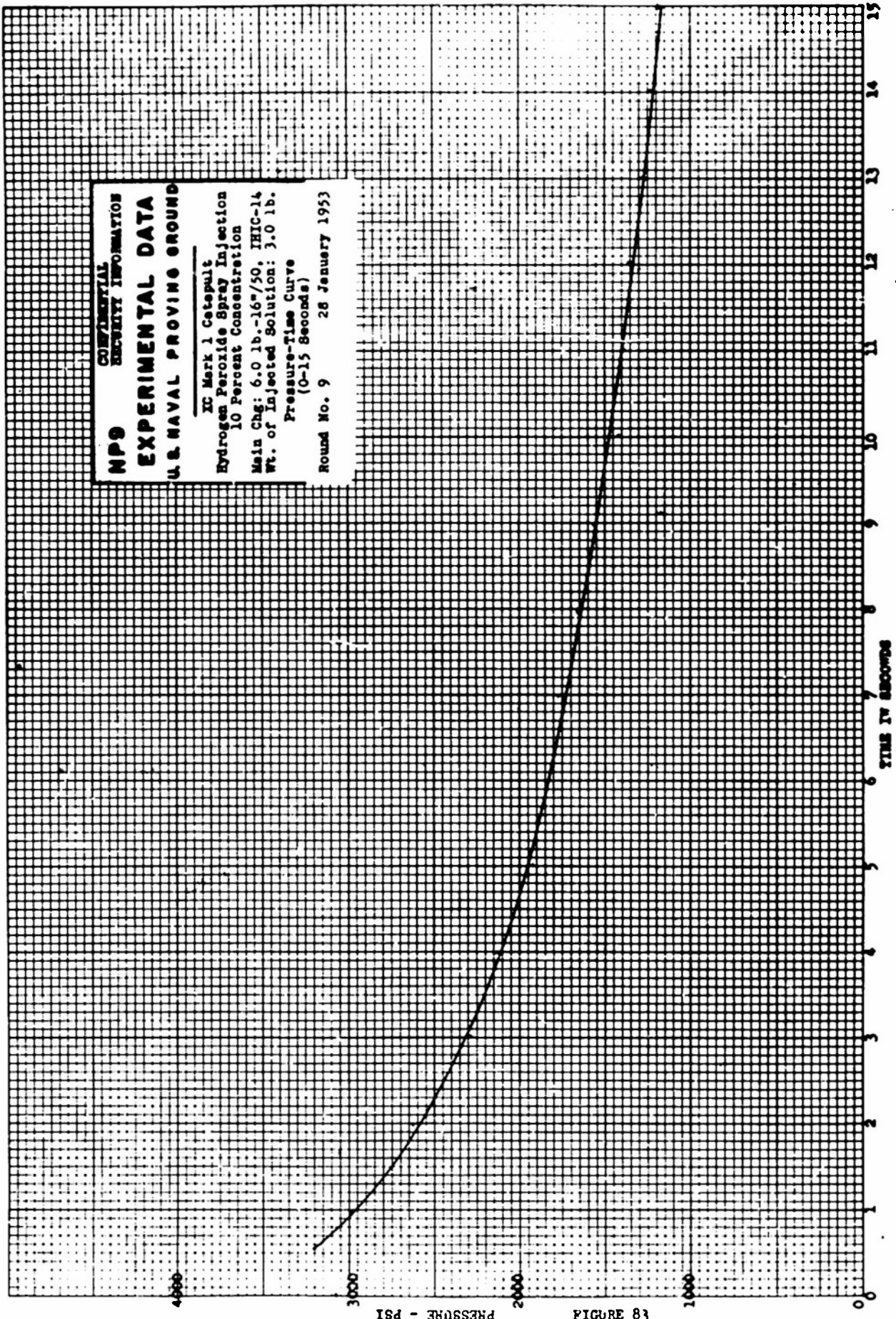
CONFIDENTIAL
SECURITY INFORMATION
NP9
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

XC Mark 1 Cetepult
 Hydrogen Peroxide Spray Injection
 10 Percent Concentration
 Main Chg: 6.0 lb.-16"/50, IHIC-14
 Wt. of Injected Solution: 3.0 lb.
 Pressure-Time Curve
 (0-15 Seconds)

Round No. 8 28 January 1953



28 ANG14 PRESSURE - PSI



88 ERGIDA
 PRESSURE - PSI

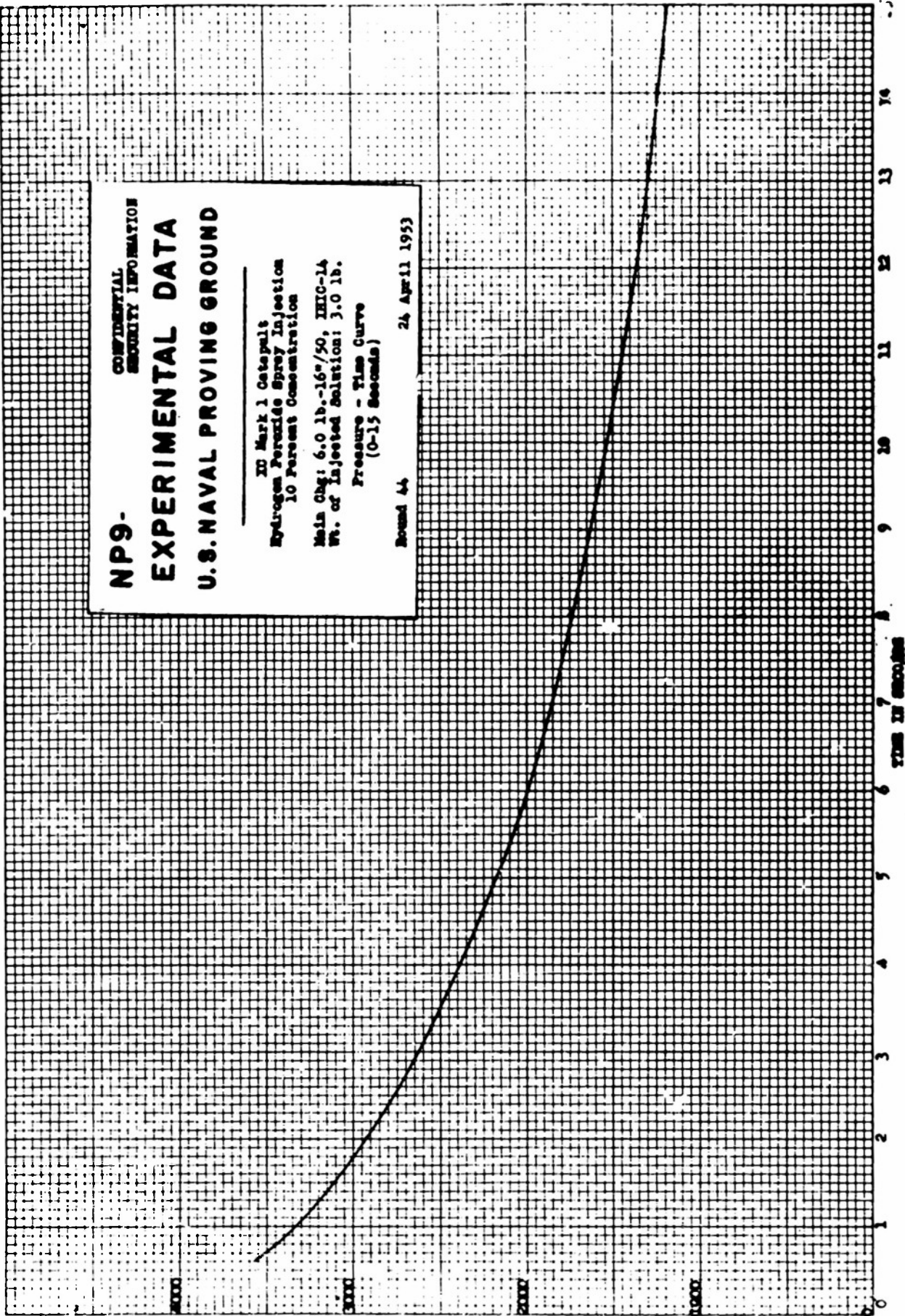
FIGURE 83

TIME IN SECONDS

NP9 -
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

XI Mark 1 Catalyst
Hydrogen Peroxide Spray Injection
10 Percent Concentration
Main Gbg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Pressure - Time Curve
(0-15 Seconds)

Round 44 24 April 1953



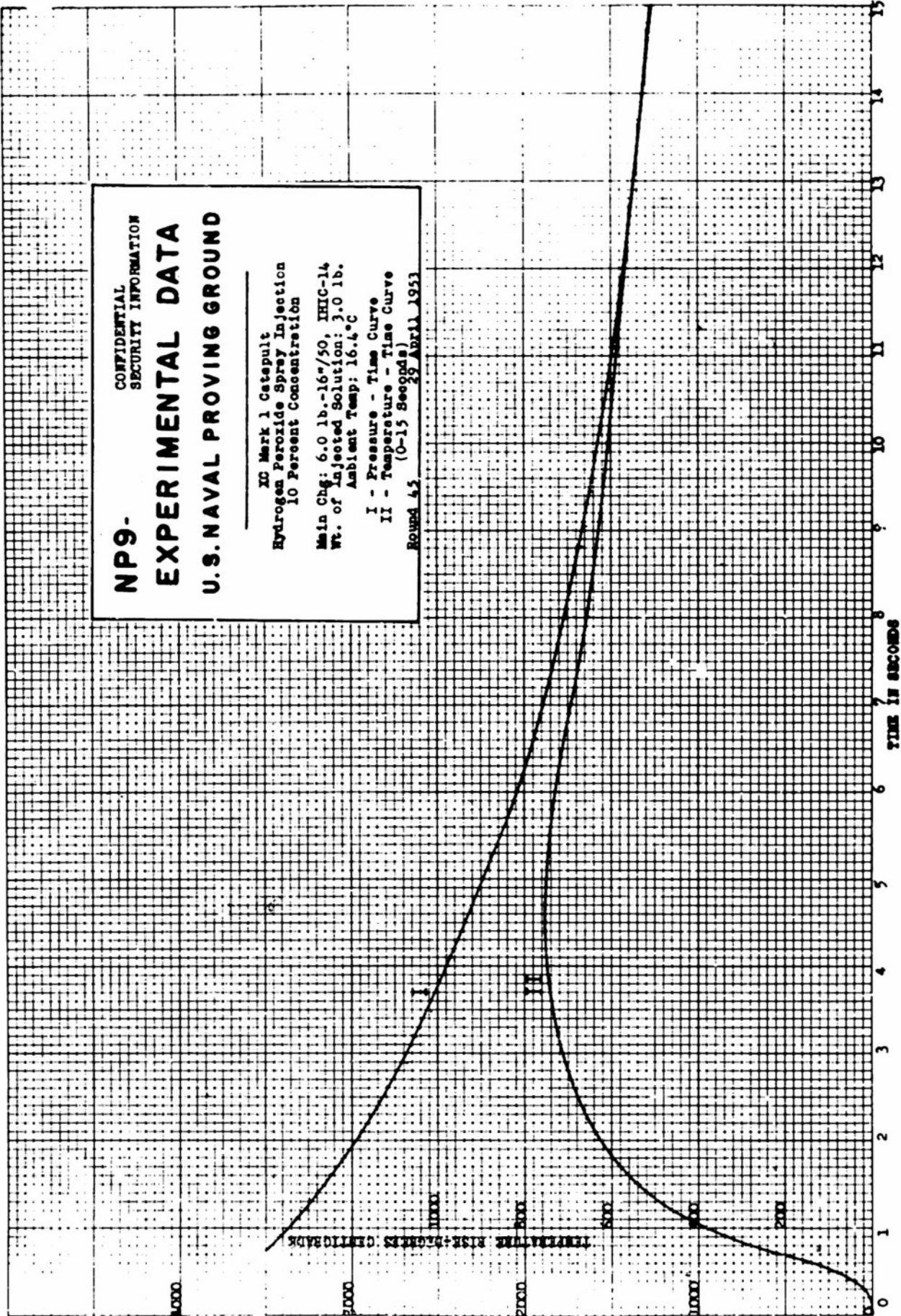
**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

CONFIDENTIAL
SECURITY INFORMATION

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
10 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 16.4°C

I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)

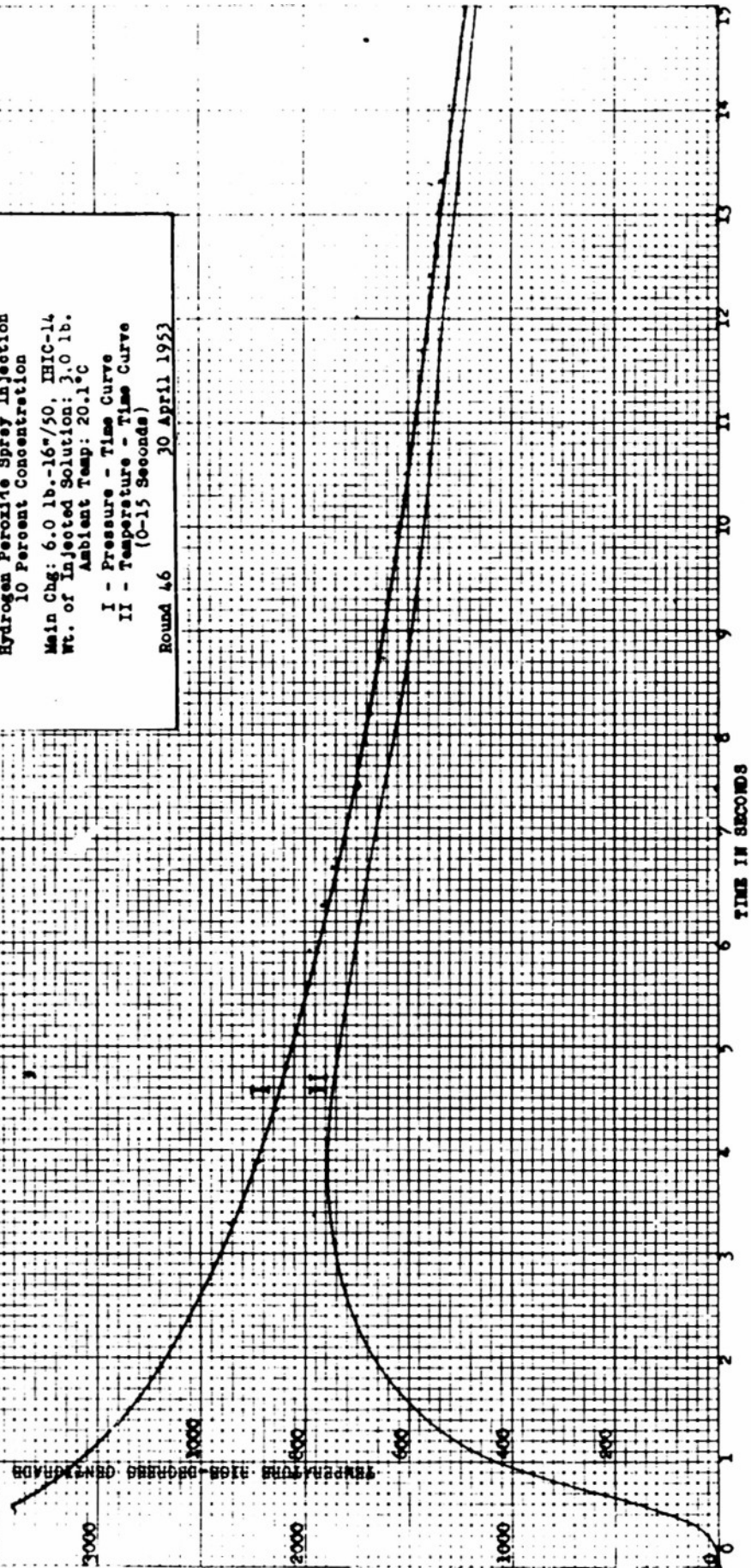
Round 45
29 April 1953



NP9-
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

XC Mark 1 Cetspult
Hydrogen Peroxide Spray Injection
10 Percent Concentration
Main Chg: 6.0 lb.-16"/50, RHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 20.1°C
I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)

Round 46 30 April 1953



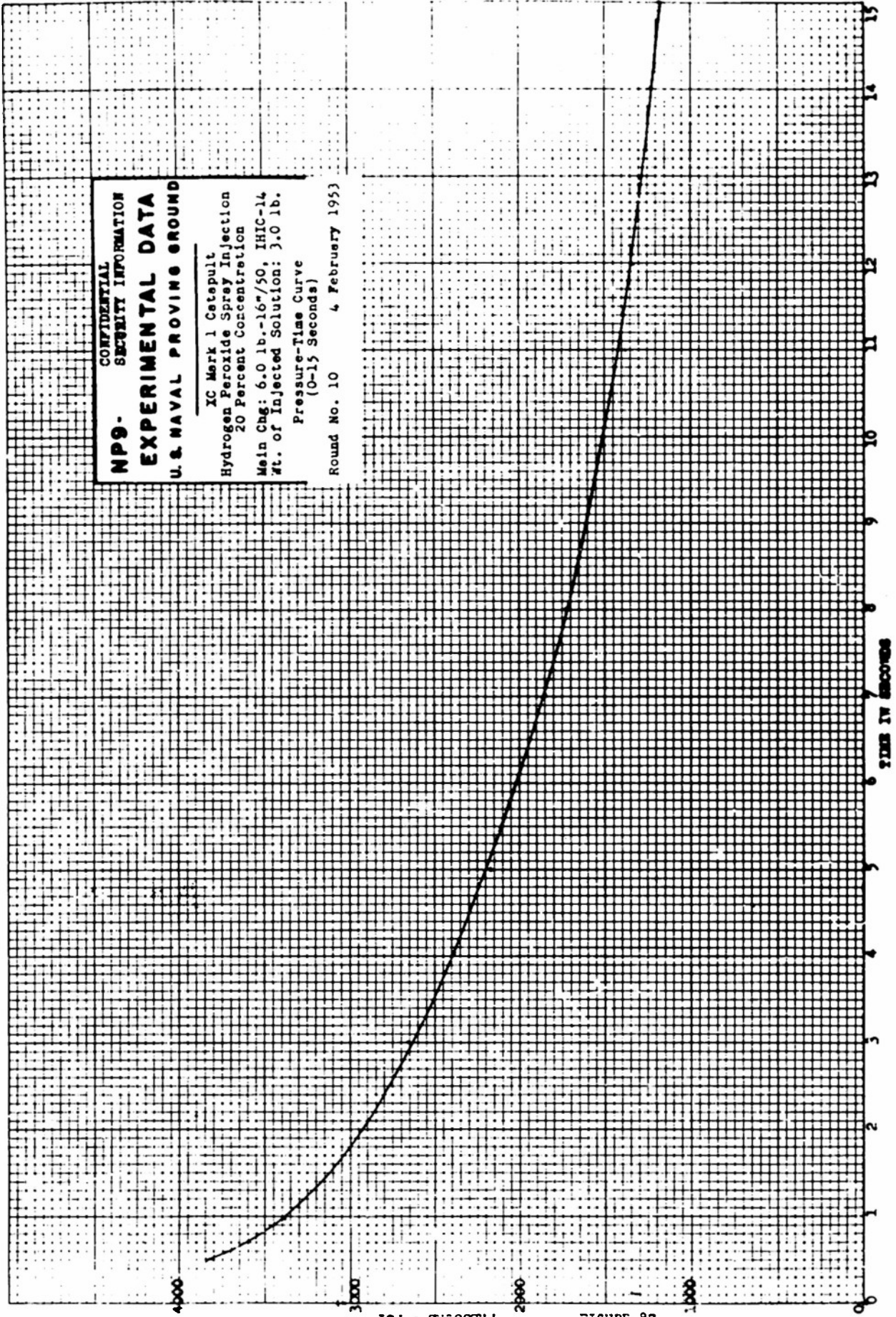
PRSSOPE - PSI

FIGURE 86

**NP9 - CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

XC Mark 1 Cetepult
Hydrogen Peroxide Spray Injection
20 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
#t. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-15 Seconds)

Round No. 10 4 February 1953



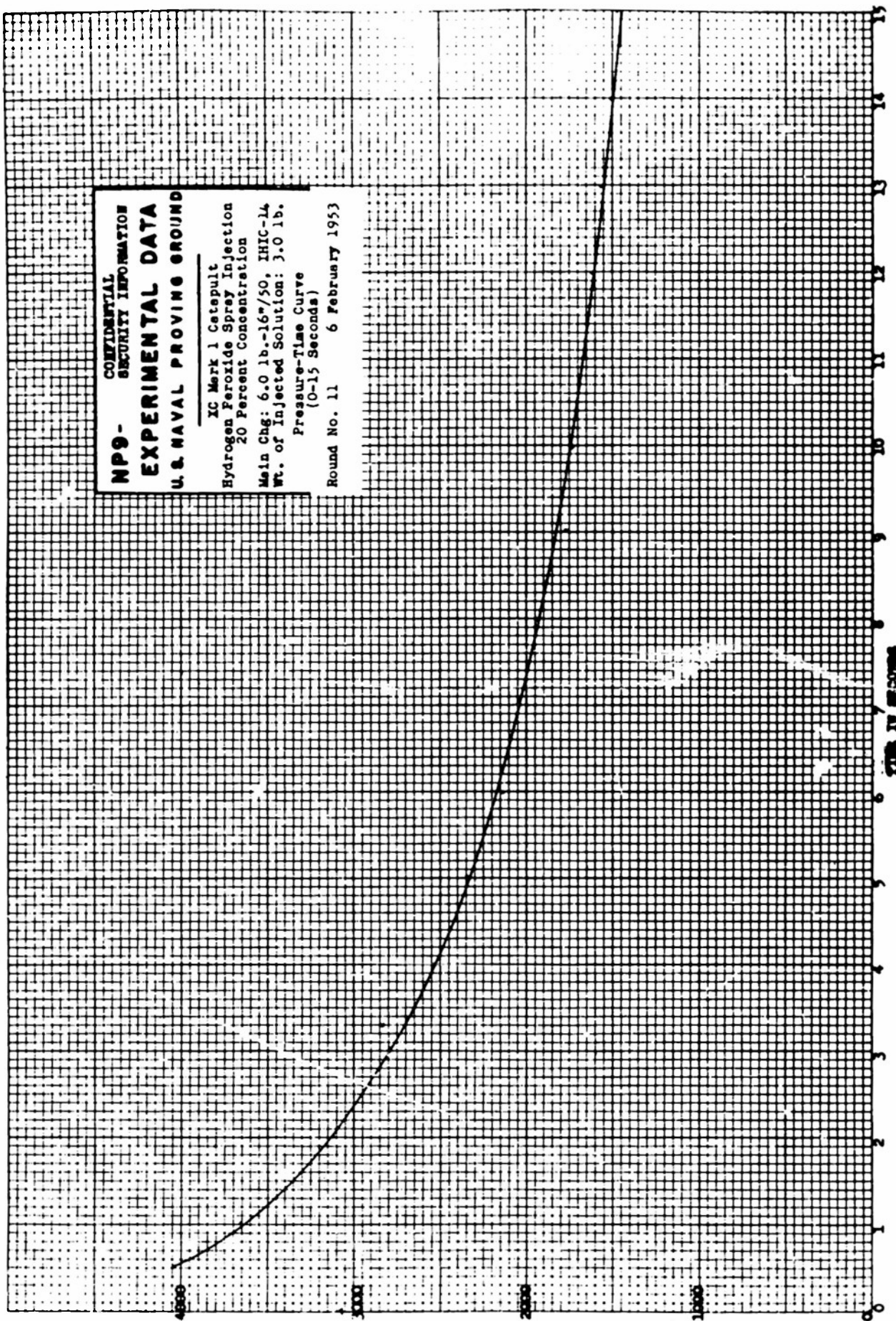
48 GRAPHIC PRESSURE - PSI

FIGURE 87

**NP9 - CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

**XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
20 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-15 Seconds)**

Round No. 11 6 February 1953



PSI - PRESSURE

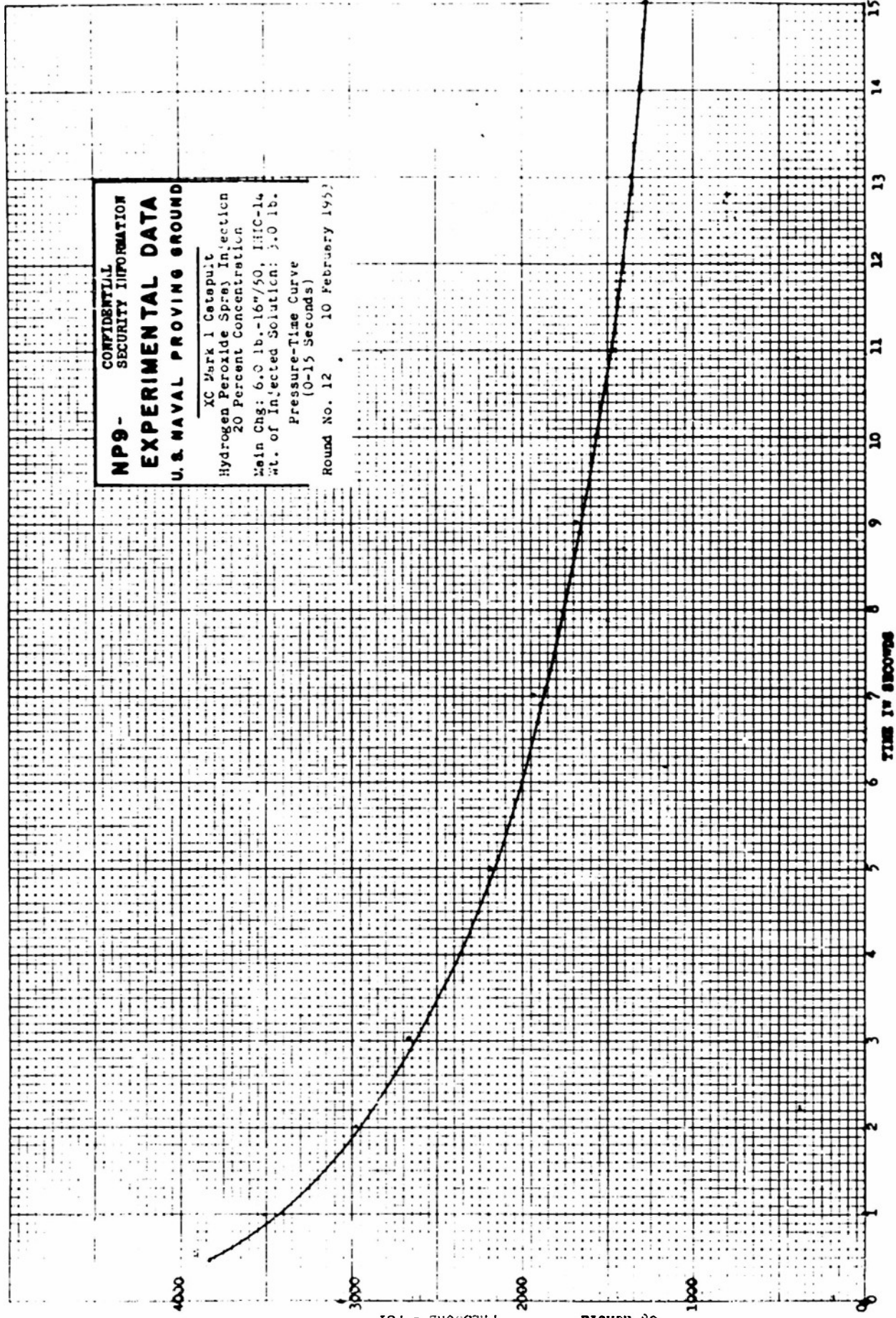
FIGURE 88

TIME IN SECONDS

CONFIDENTIAL
SECURITY INFORMATION
NP9 -
EXPERIMENTAL DATA
U. S. NAVAL PROVING GROUND

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
20 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHC-14
Wt. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-15 Seconds)

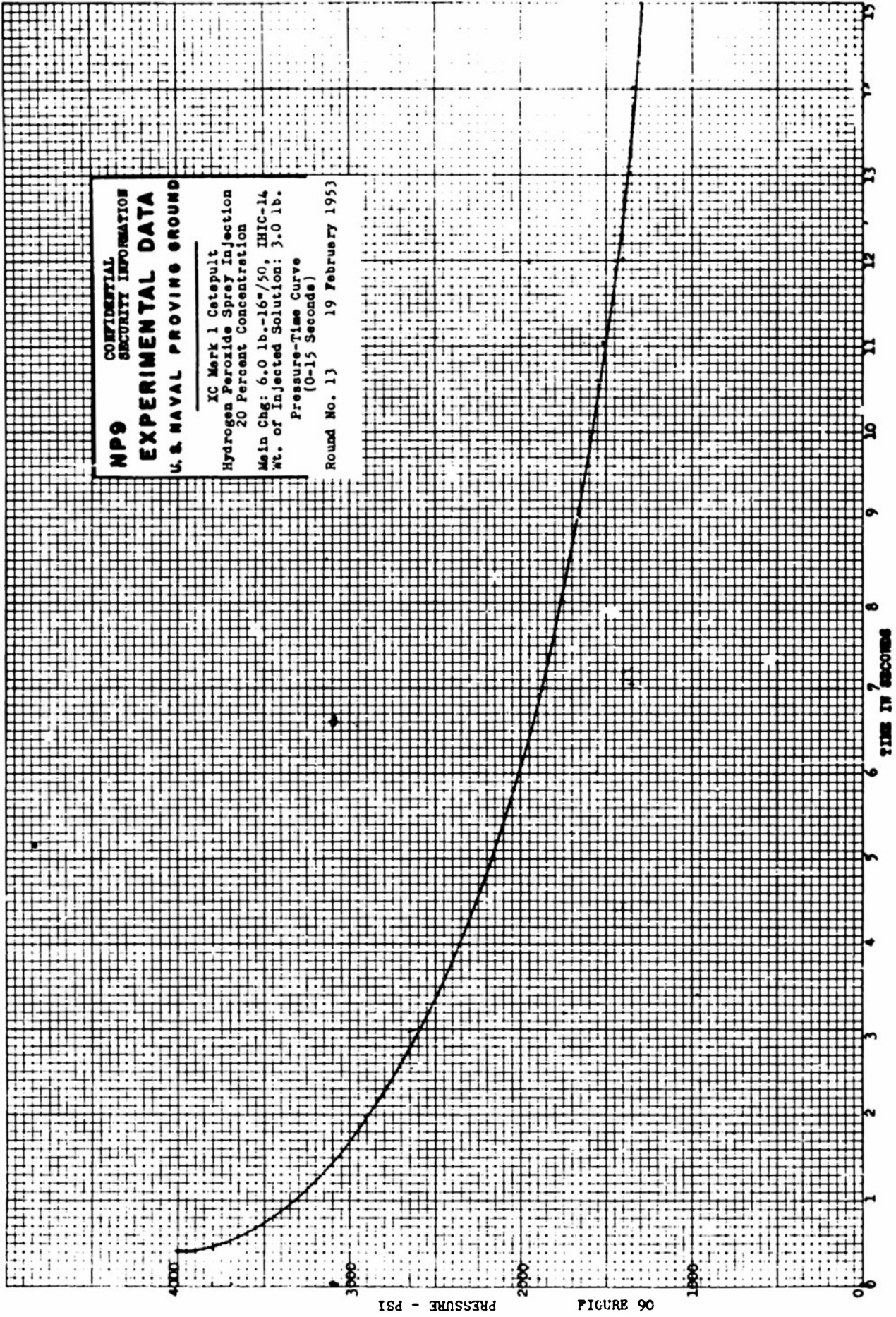
Round No. 12 10 February 1953



68 ENRIDA
PRESSURE - PSI

FIGURE 68

TIME IN SECONDS



06 ENR14
PRESSURE - PSI

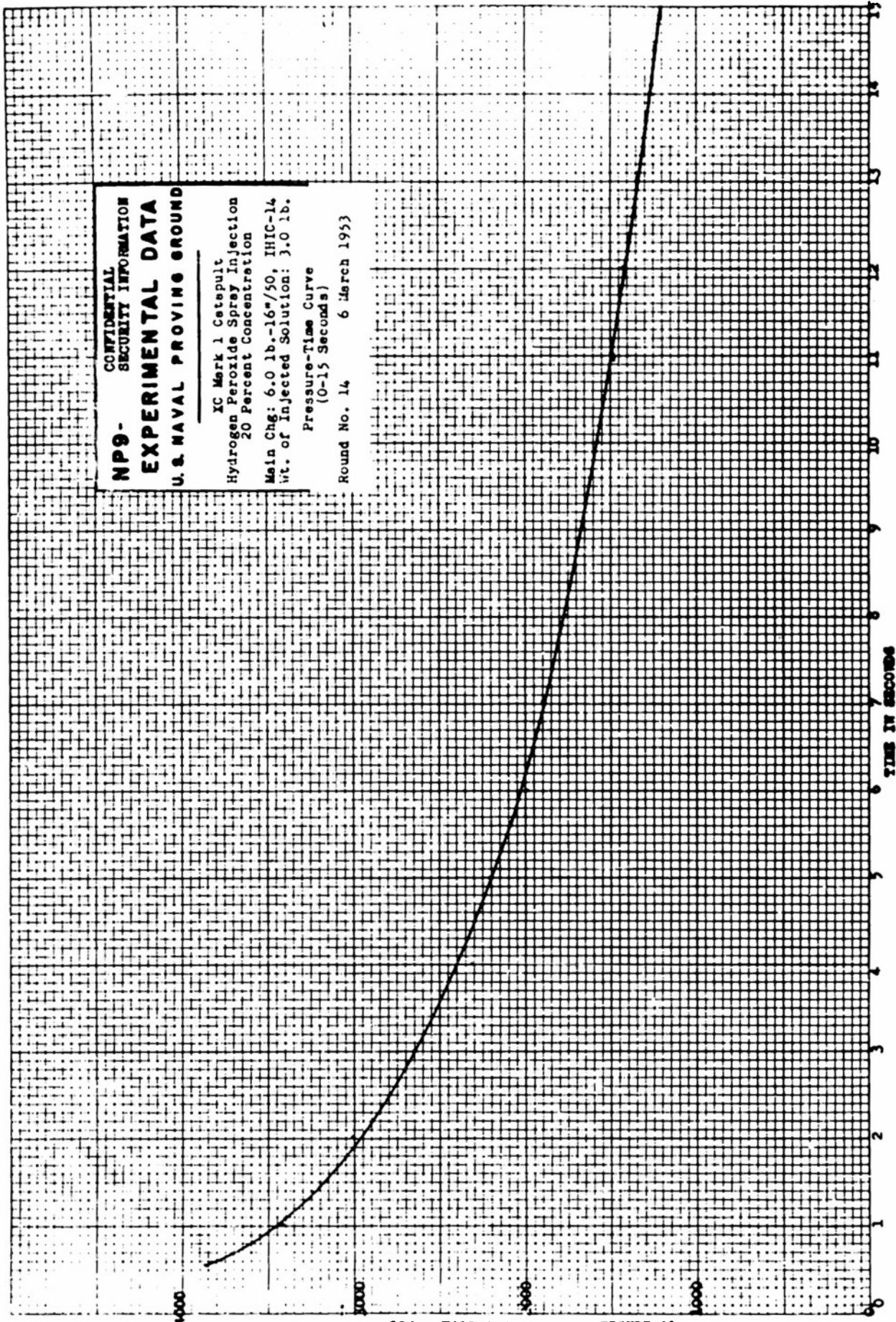
FIGURE 90

CONFIDENTIAL
SECURITY INFORMATION
NP9 -
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

XC Mark 1 Cetepult
Hydrogen Peroxide Spray Injection
20 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.

Pressure-Time Curve
(0-15 Seconds)

Round No. 14 6 March 1953



PRESSURE - PSI

FIGURE 91

TIME IN SECONDS

NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

CONFIDENTIAL
 SECURITY INFORMATION

XC Mark 1 Cetapult
 Hydrogen Peroxide Spray Injection
 20 Percent Concentration
 Main Chg: 6.0 lb.-16"/50, IHIC-14
 Wt. of Injected Solution: 3.0 lb.
 Ambient Temp: 27.9°C

I - Pressure - Time Curve
 II - Temperature - Time Curve

Round 42 (0-15 Seconds)
 23 April 1953

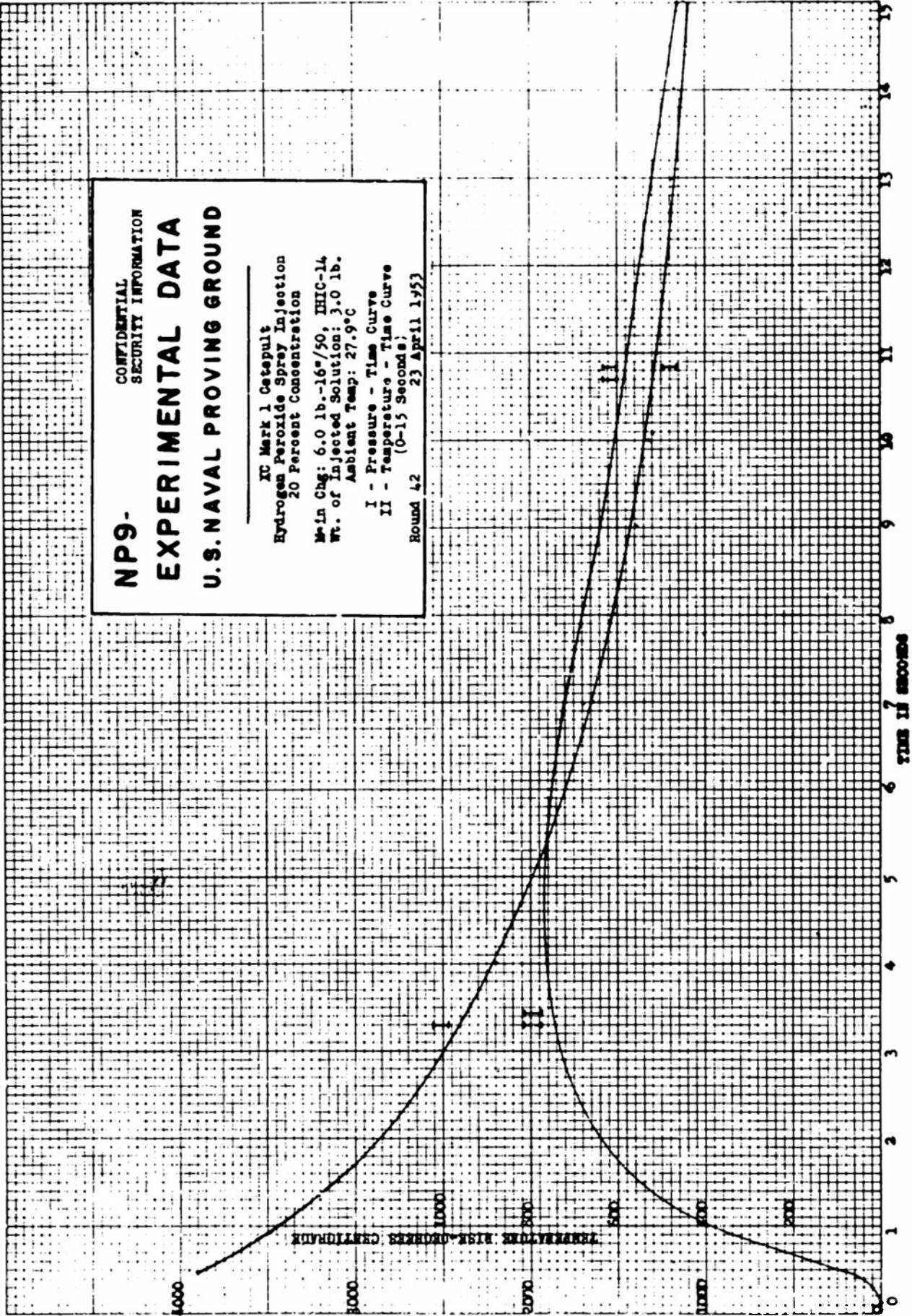


FIGURE 26 - PSI

FIGURE 26

**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

CONFIDENTIAL
SECURITY INFORMATION

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
20 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 17.8°C

I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)

Round 43
24 April 1953

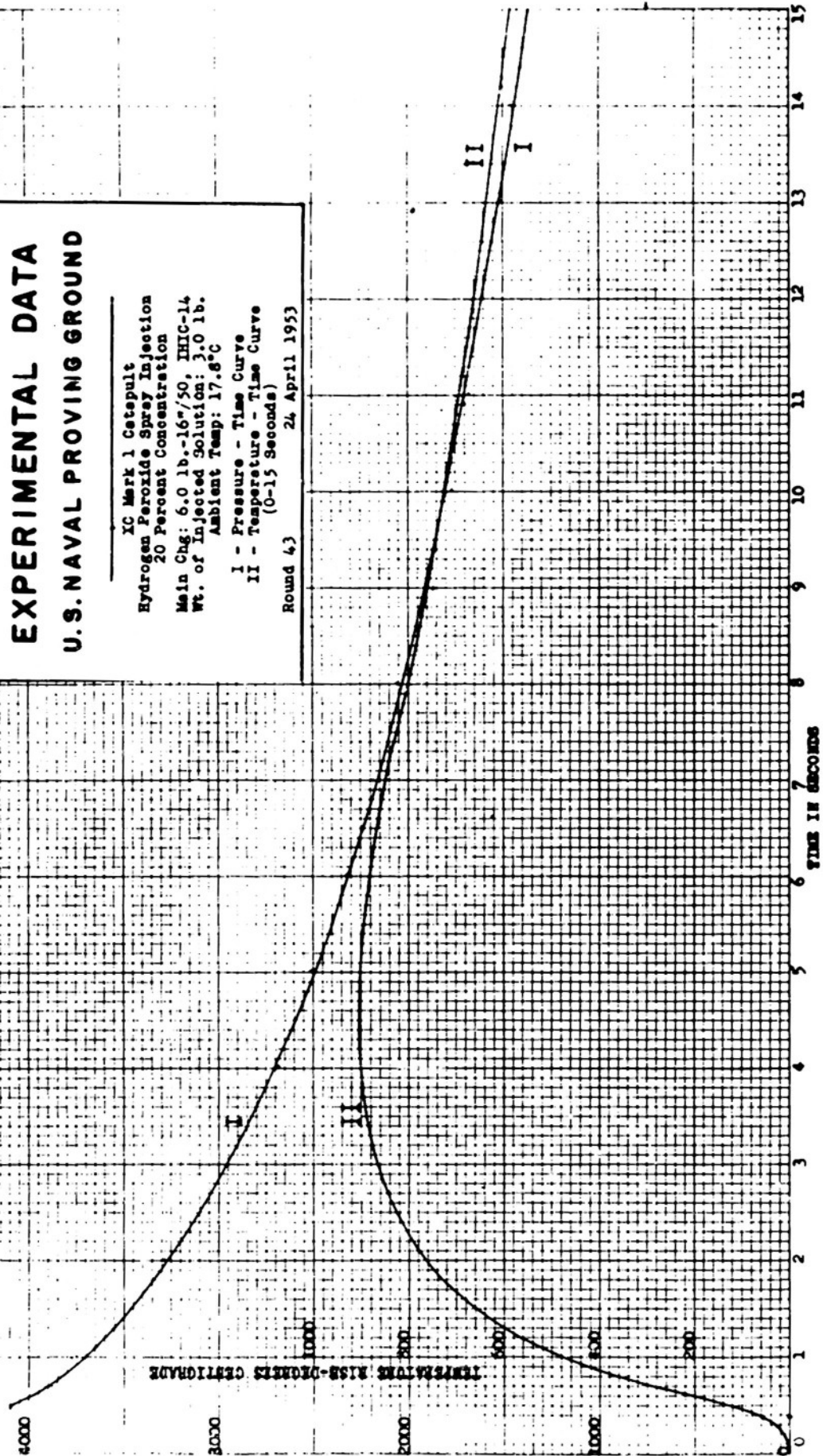


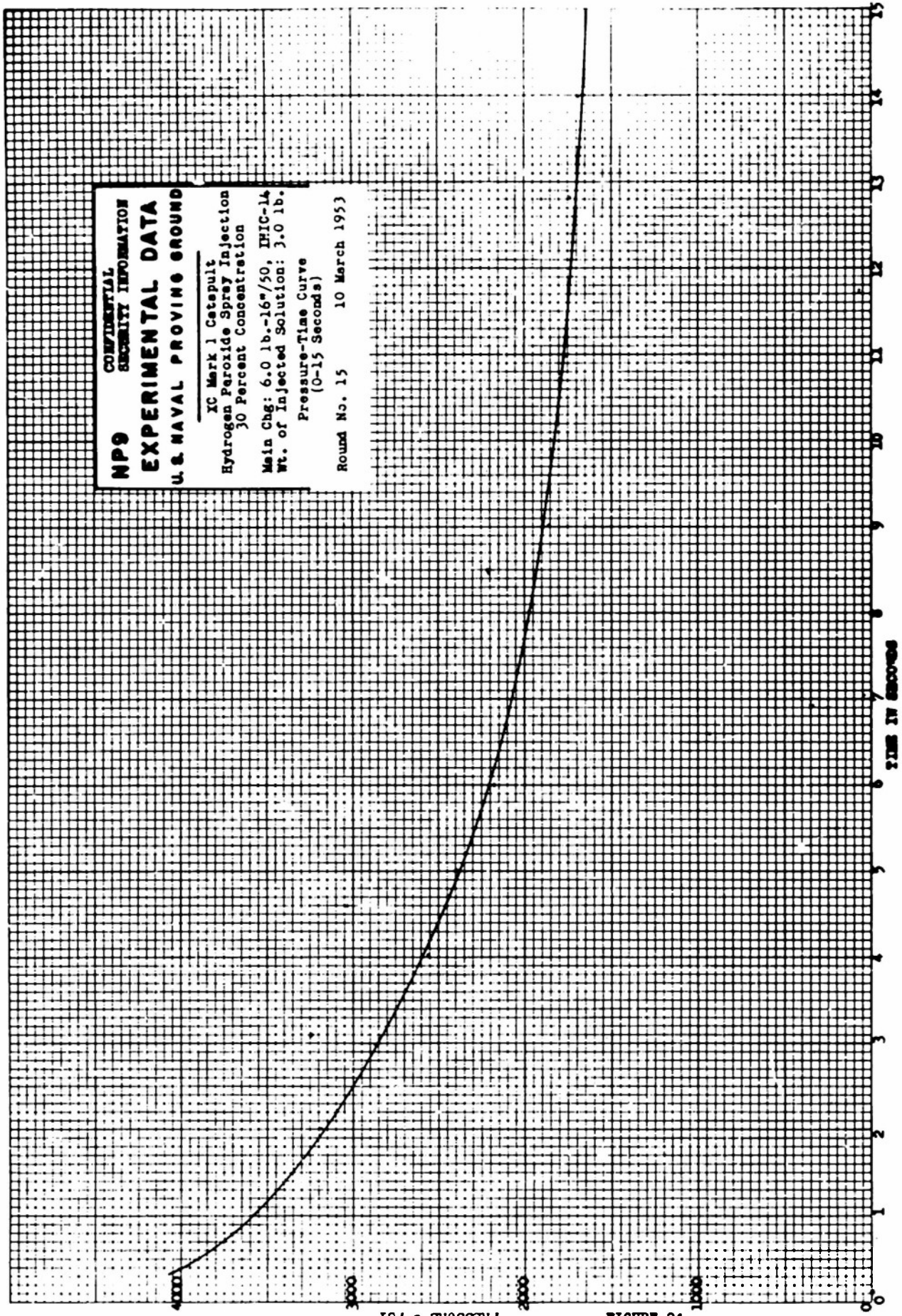
FIGURE 93
PRESSURE - PSI

TEMPERATURE - DEGREES CENTIGRADE

NP9 CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

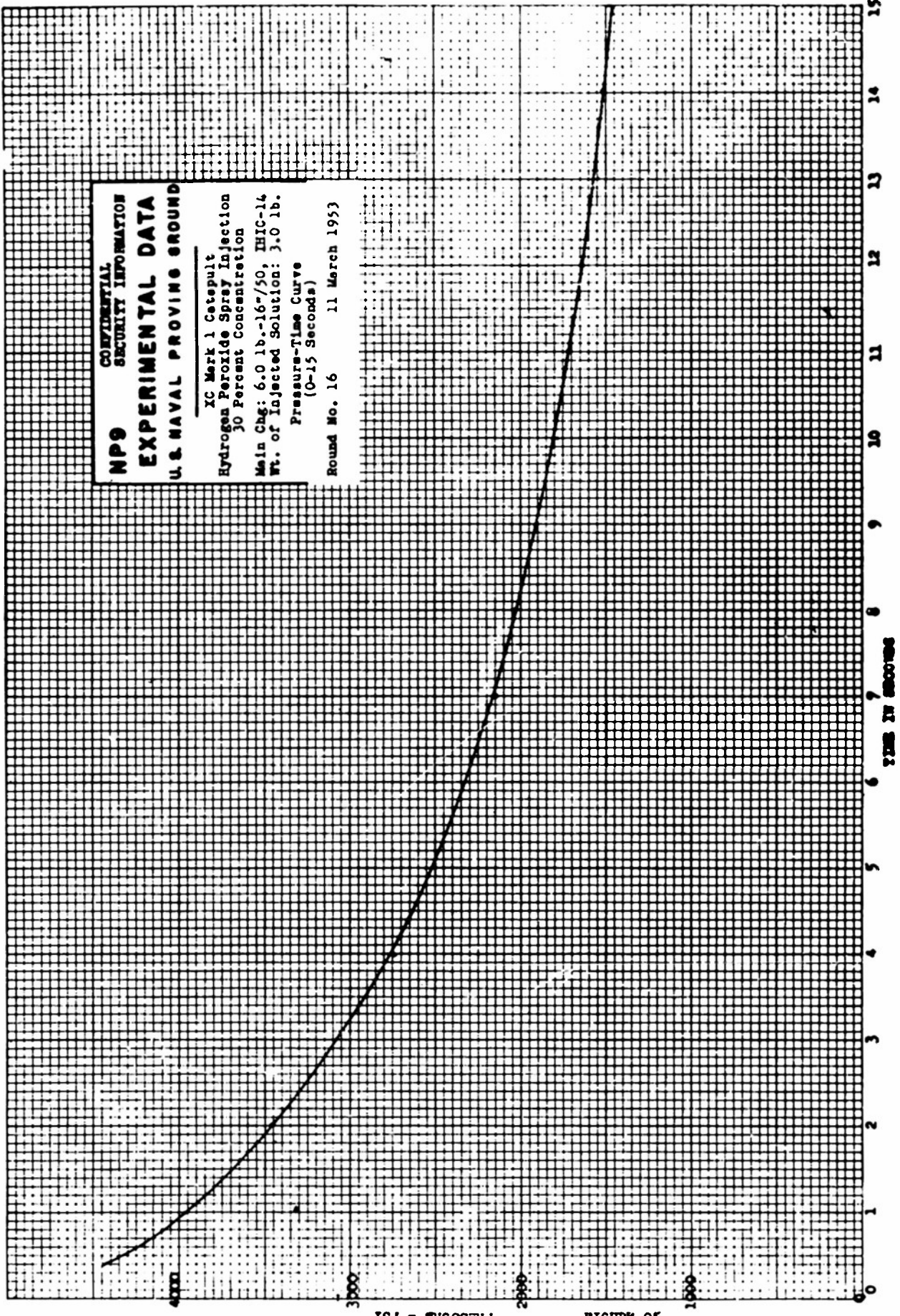
XC Mark 1 Catalyst
Hydrogen Peroxide Spray Injection
30 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-15 Seconds)

Round No. 15 10 March 1953



46 ERNDIA
PRESSURE - PSI

TIME IN SECONDS



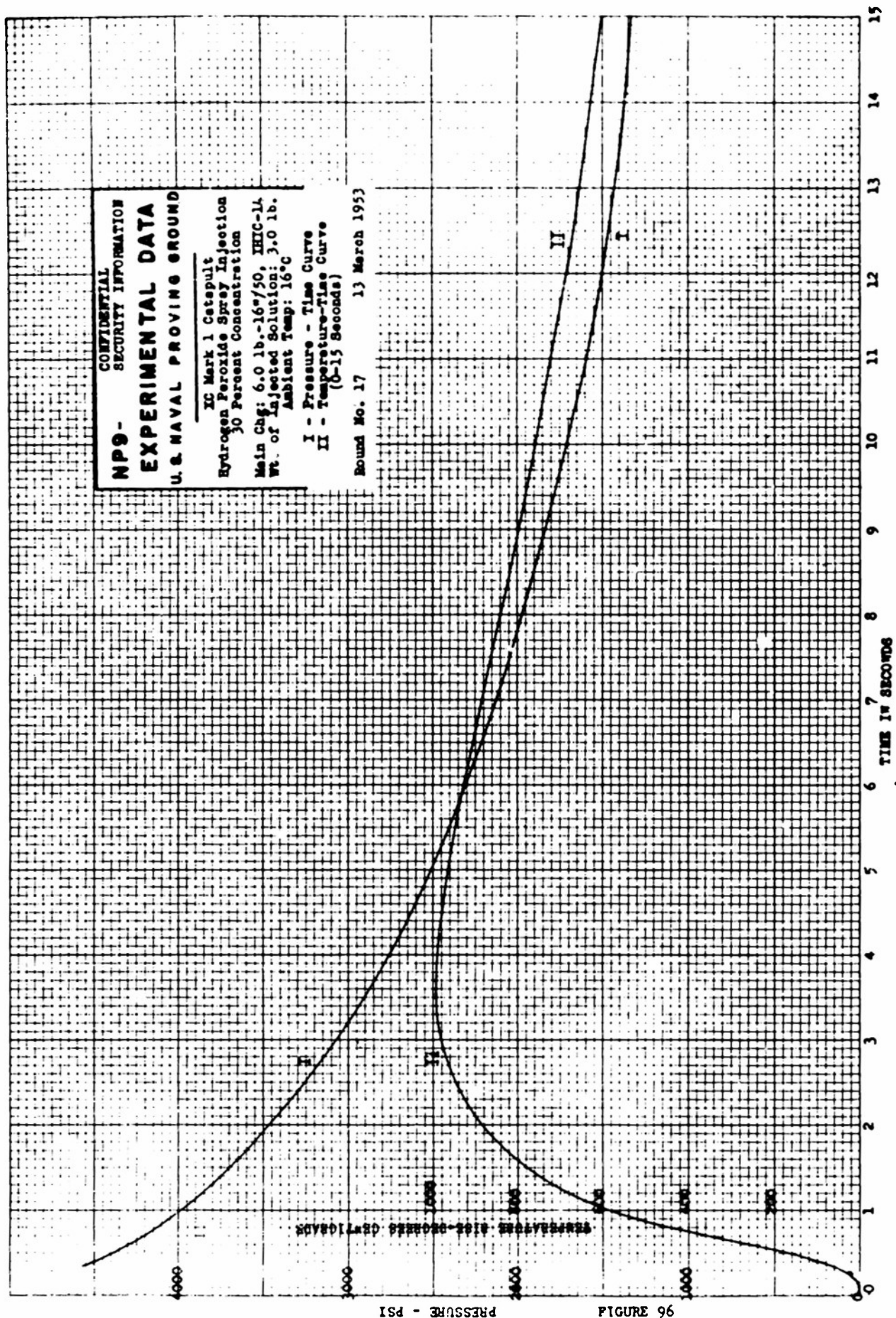
NP9 **CONFIDENTIAL**
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

XC Mark 1 Cetepuit
Hydrogen Peroxide Spray Injection
30 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Pressure-Time Curve
(0-15 Seconds)

Round No. 16 11 March 1953

IS4 - 951

FIGURE 95



NP9 - CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND
 XC Mark 1 Catapult
 Hydrogen Peroxide Spray Injection
 30 Percent Concentration
 Main Chg: 6.0 lb.-16"/50, IHIC-1A
 Wt. of Injected Solution: 3.0 lb.
 Ambient Temp: 16°C
 I - Pressure - Time Curve
 II - Temperature-Time Curve
 (0-15 Seconds)

Bound No. 17 13 March 1953

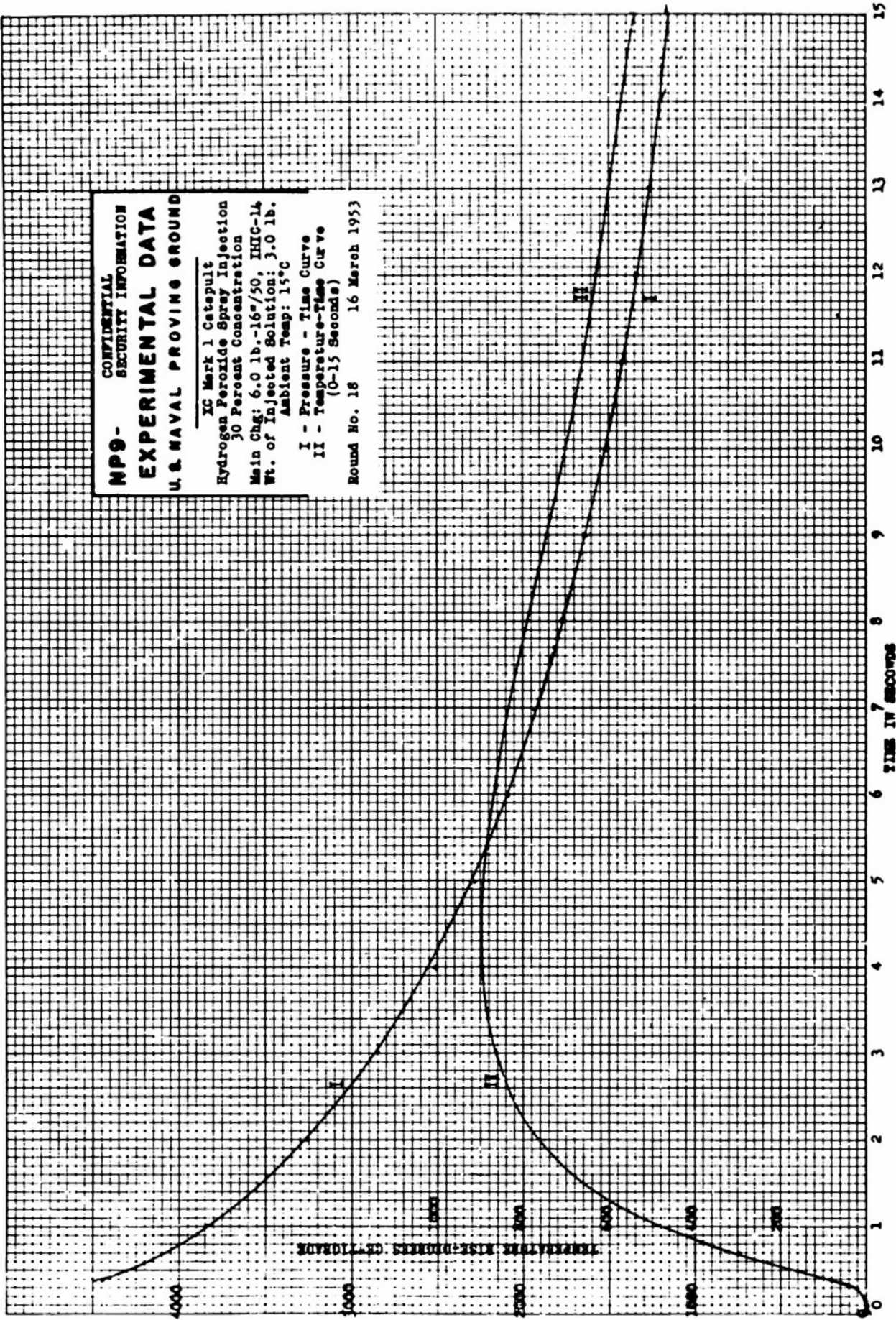
FIGURE 96 PRESSURE - PSI

**NP9 - CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
30 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHG-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 15°C

I - Pressure - Time Curve
II - Temperature-Time Curve
(0-15 Seconds)

Round No. 18 16 March 1953

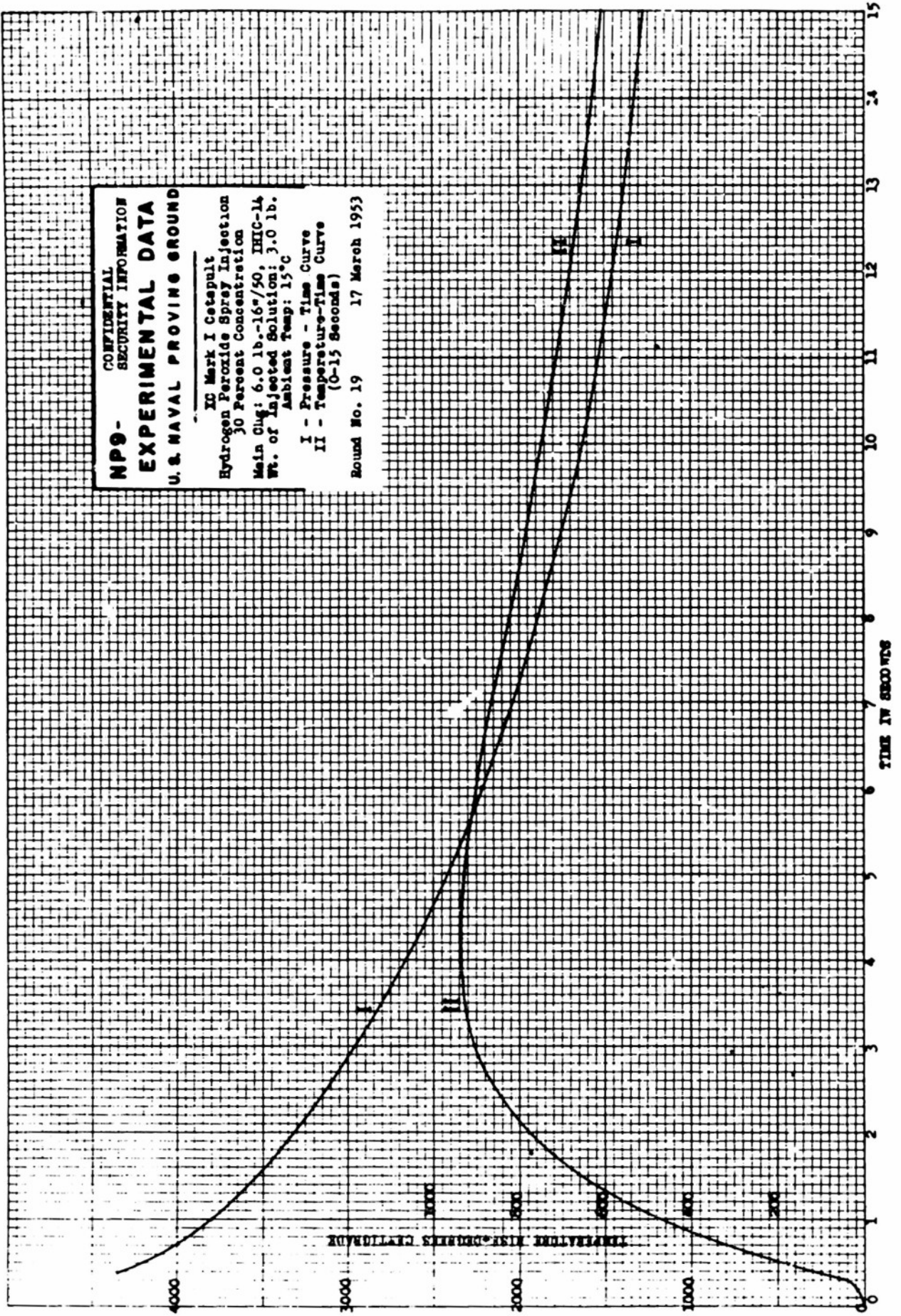


66 RRDJIA PRESSURE - PSI

FIGURE 97

**NP9 - CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

IC Mark I Cetapult
Hydrogen Peroxide Spray Injection
30 Percent Concentration
Main Oug: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 15°C
I - Pressure - Time Curve
II - Temperature-Time Curve
(0-15 Seconds)
Round No. 19 17 March 1953



86 ENCLID PRESSURE - PSI

NP9-
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

IX Mark 1 Catalyst
 Hydrogen Peroxide Spray Injection
 30 Percent Concentration
 Main Chg. 6.0 lb.-1.6"/50, IHIC-14
 Wt. of Injected Solution: 3.0 lb.
 Ambient Temp: 15.7°C

I - Pressure - Time Curve
 II - Temperature - Time Curve
 (0-15 Seconds)

Round 26
 10 April 1953

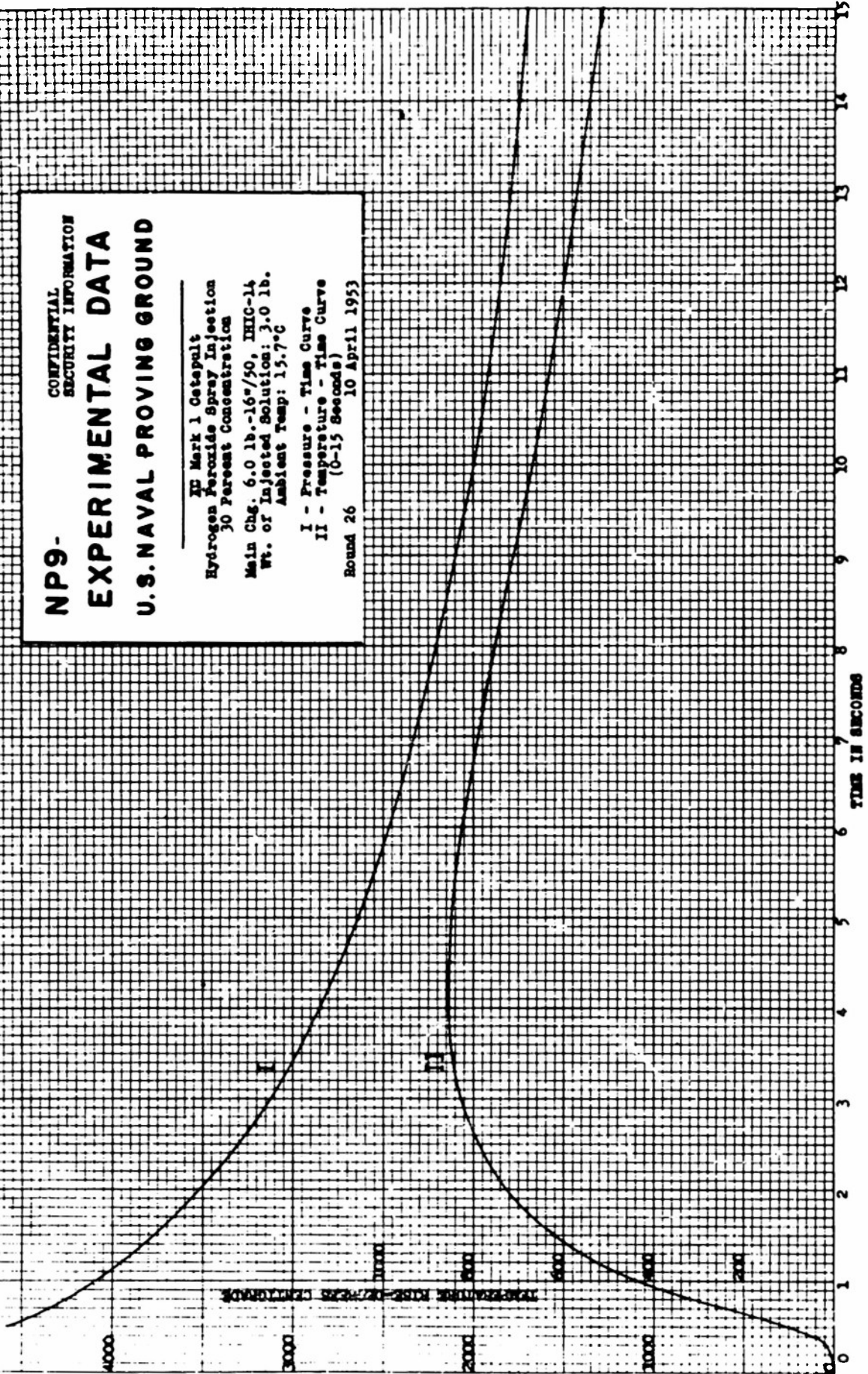


FIGURE 66
 PRESSURE - PSI

**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

CONFIDENTIAL
SECURITY INFORMATION

IC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
30 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 13.8°C
I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)

Round 36 21 April 1953

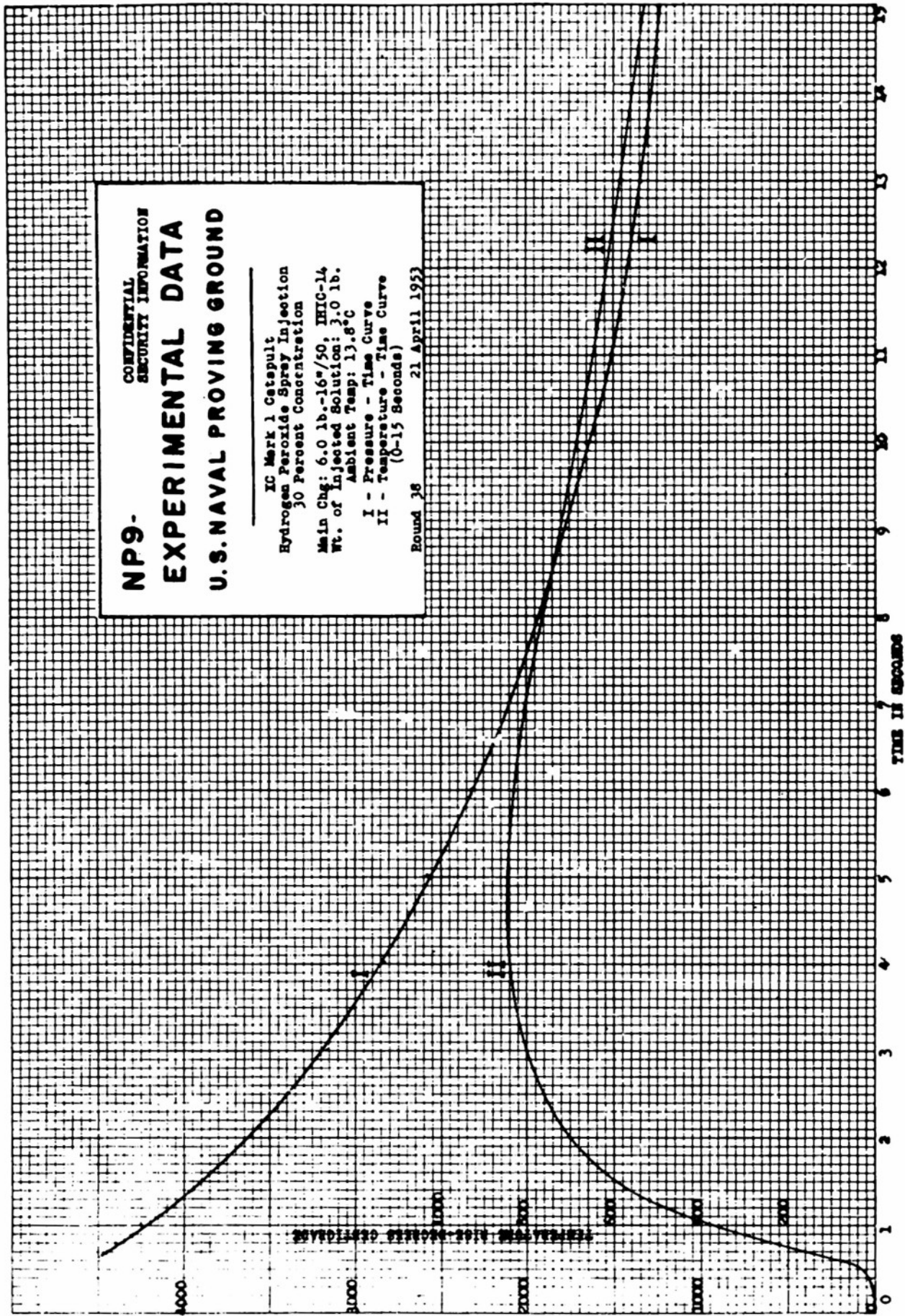


FIGURE 100 PRESSURE - PSI

CONFIDENTIAL
SECURITY INFORMATION

NP9 - EXPERIMENTAL DATA

U.S. NAVAL PROVING GROUND

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
40 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 16.5°C

I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)

Round 20
19 March 1953

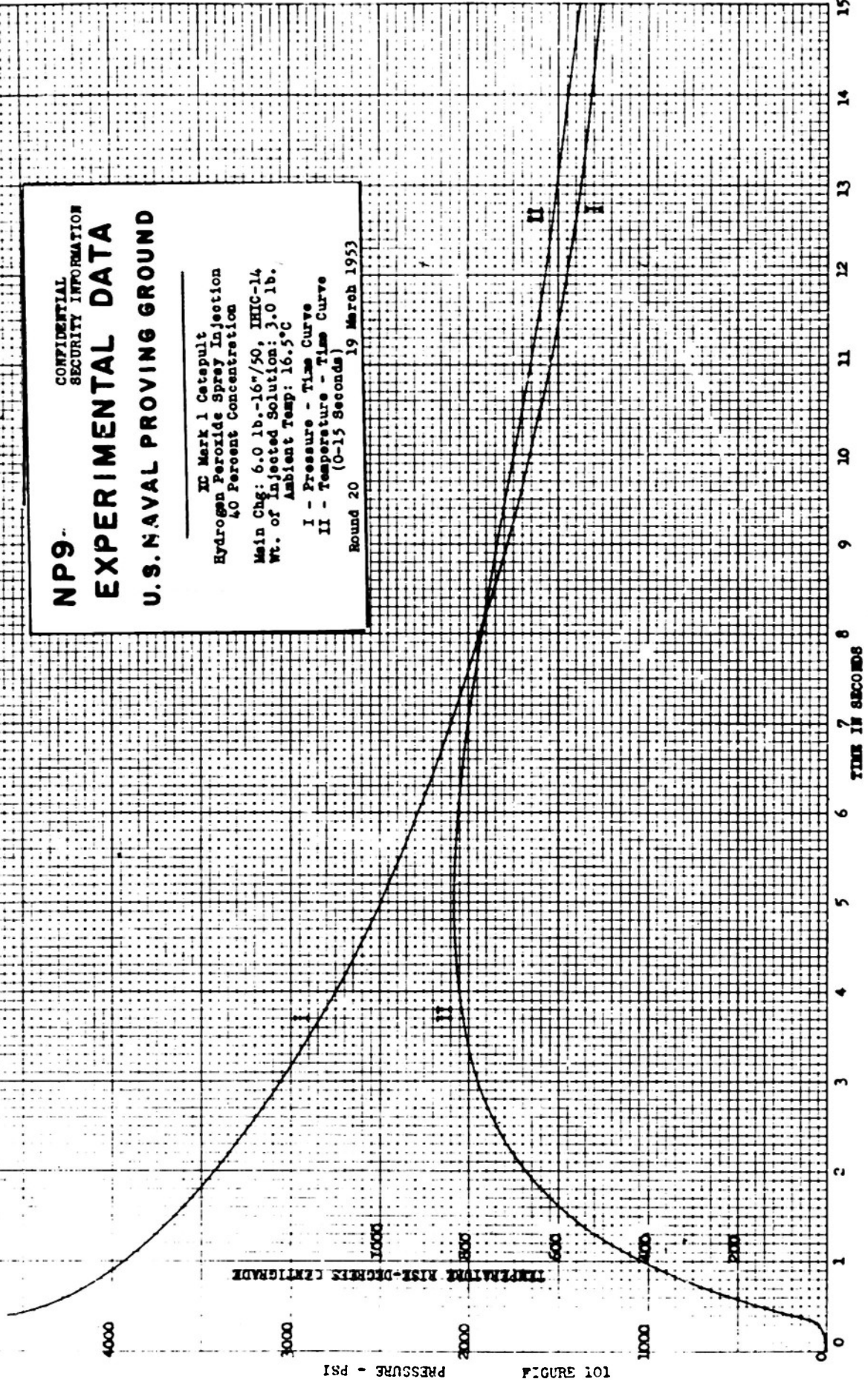


FIGURE 101

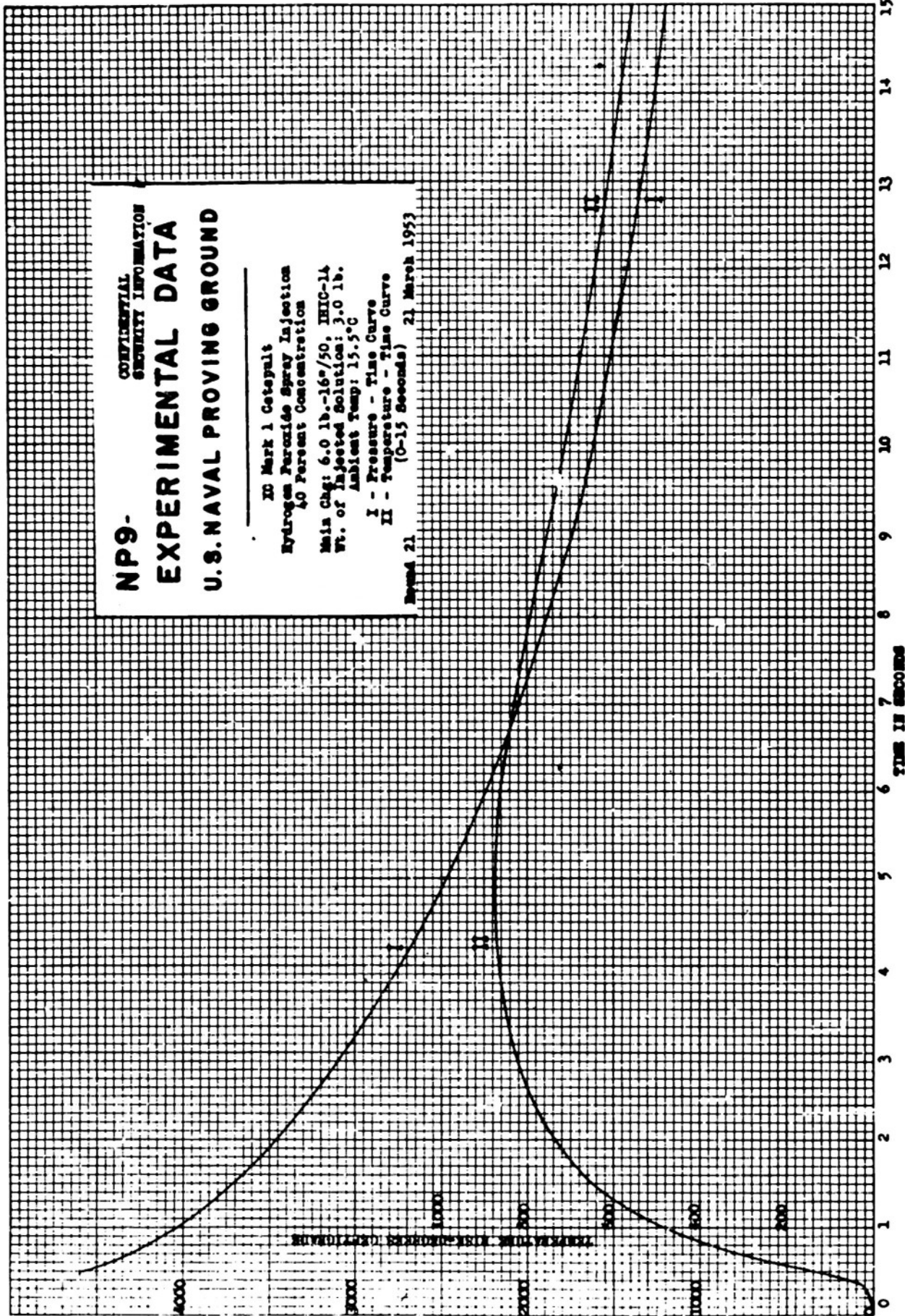
**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

**CONFIDENTIAL
SECURITY INFORMATION**

XD Mark 1 Catalyst
Hydrogen Peroxide Spray Injection
40 Percent Concentration
Main Chgt: 6.0 lb.-16"/50. IHIG-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 15.5°C

I - Pressure - Time Curve
II - Temperature - Time Curve

Bywd 21 (0-15 Seconds) 21 March 1953



102 - PRESSURE - PSI

FIGURE 102

**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

CONFIDENTIAL
SECURITY INFORMATION

XC Mark 1 Catepult
Hydrogen Peroxide Spray Injection
40 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 8°C

I - Pressure - Time Curve
II - Temperature - Time Curve

Round 22 26 March 1953

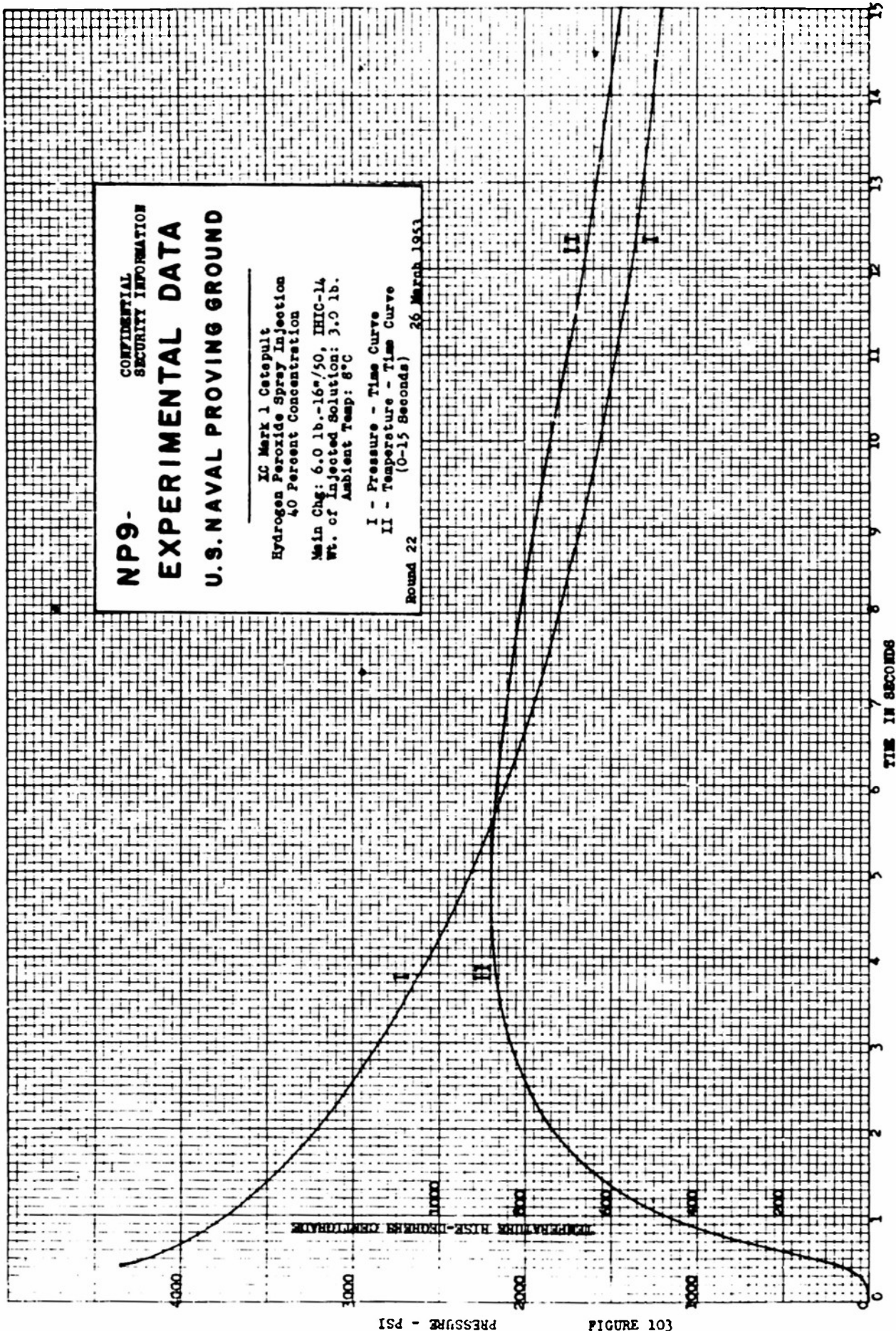


FIGURE 103

CONFIDENTIAL
SECURITY INFORMATION

**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

IC Mark 1 Cetepult
Hydrogen Peroxide Spray Injection
40 Percent Concentration
Main Chg: 6.0 lb.-16"/50; IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 13.5°C
I - Pressure - Time Curve
II - Temperature - Time Curve
Bound 23 1 April 1953

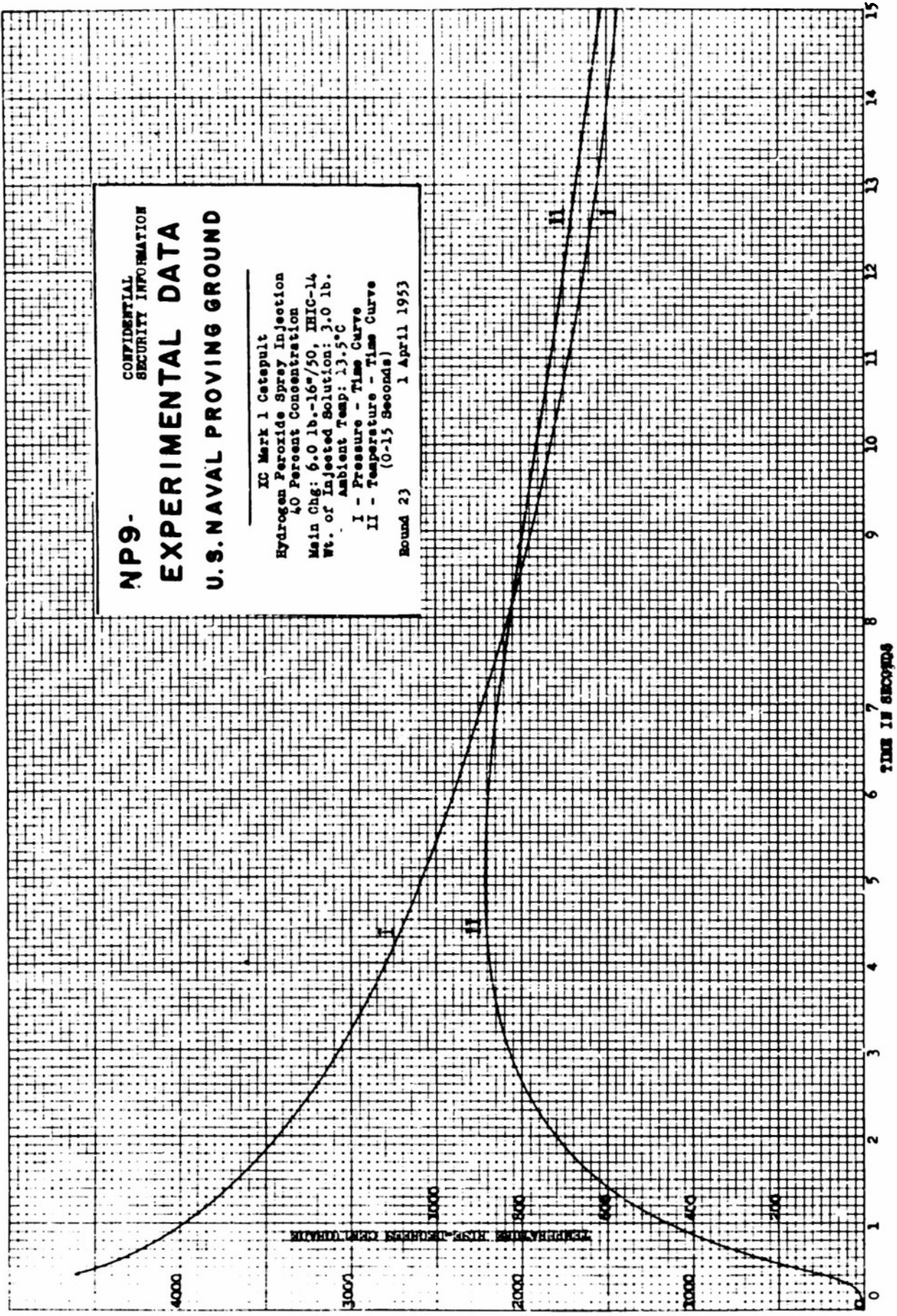


FIGURE 104 PRESSURE - PSI

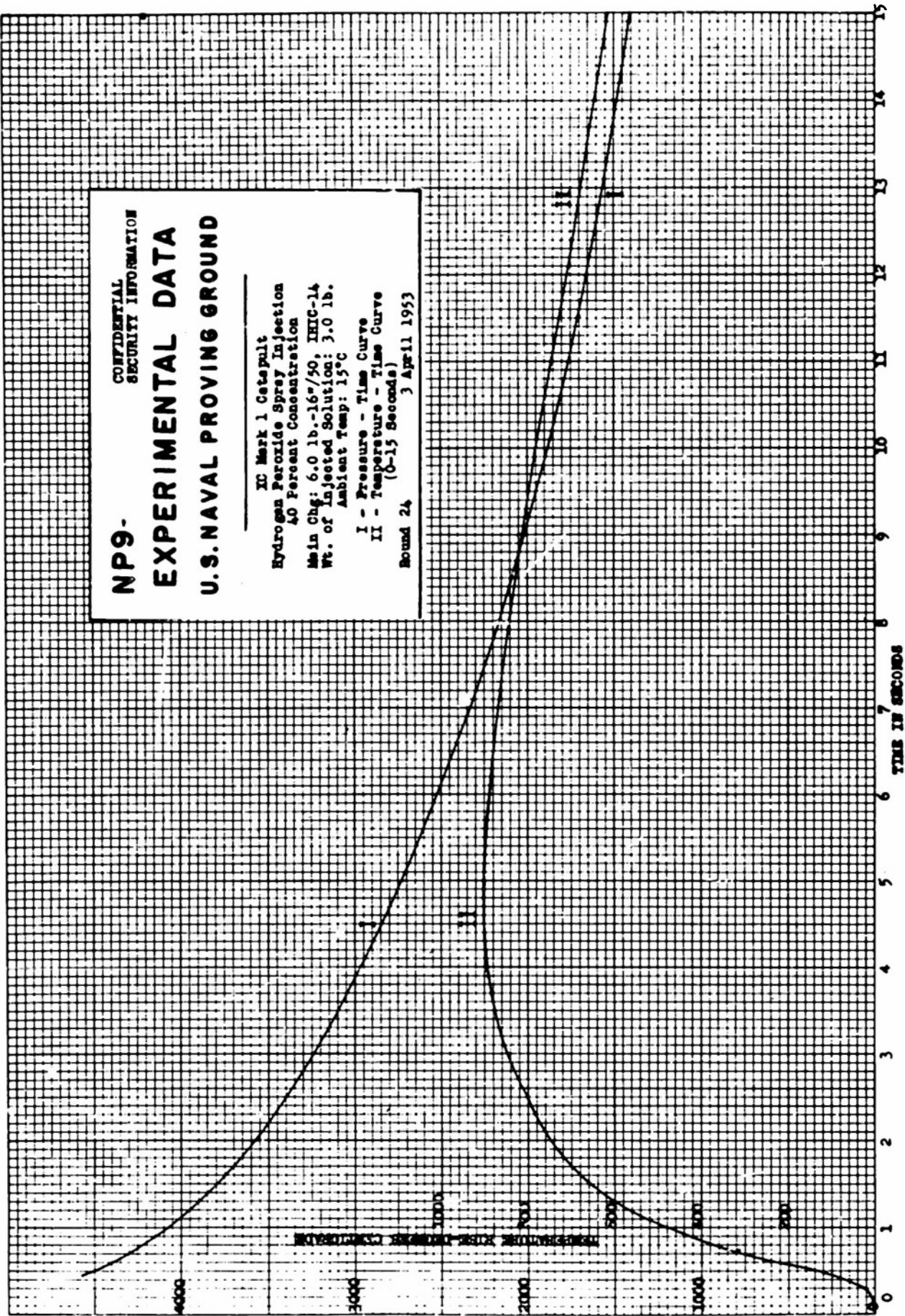
**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

CONFIDENTIAL
SECURITY INFORMATION

IX Mark 1 Catalyst
Hydrogen Peroxide Spray Injection
40 Percent Concentration
Main Chg: 6.0 lb.-16"/50; IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 15°C

I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)

Round 24 3 April 1953



**NP9- CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

IC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
40 Percent Concentration
Main Chg: 6.0 lb.-16⁵/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 28.1°C

I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)

Round 48 1 May 1953

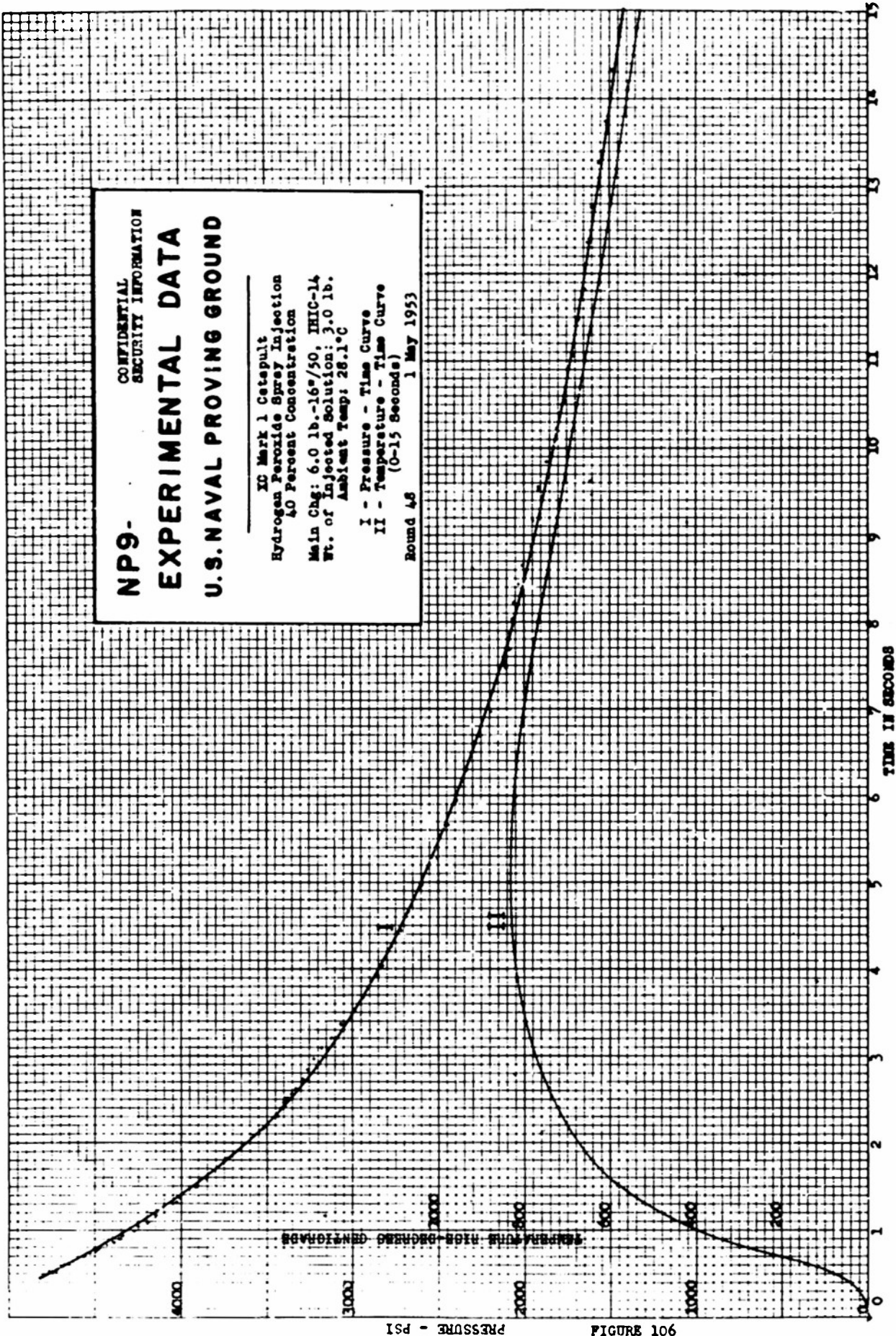


FIGURE 109 PRESSURE - PSI

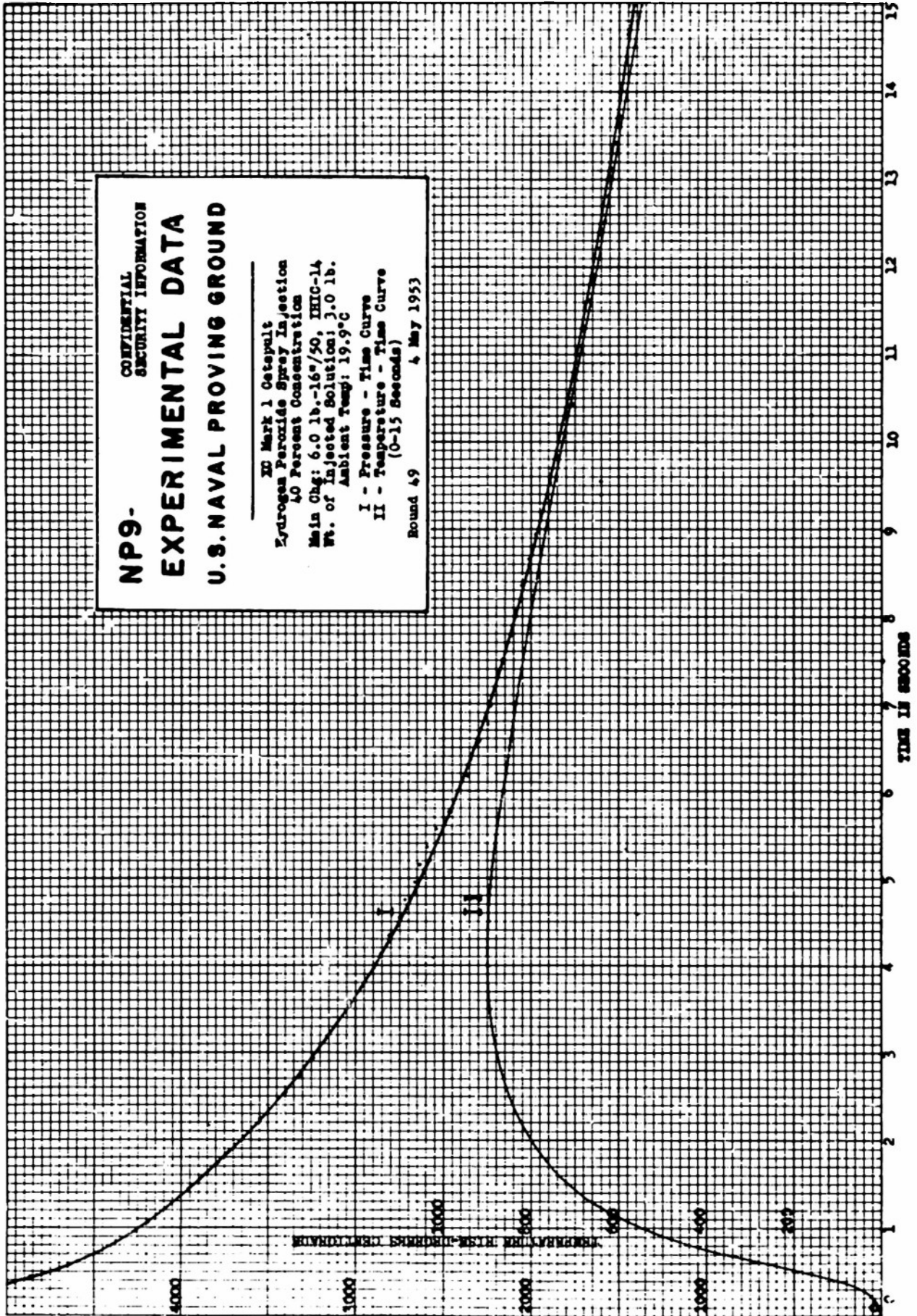
**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

CONFIDENTIAL
SECURITY INFORMATION

XO Mark 1 Catalyst
Hydrogen Peroxide Spray Injection
40 Percent Concentration
Main Chg: 6.0 lb.-16"/50; IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 19.9°C

I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)

Round 49 4 May 1953



CONFIDENTIAL
SECURITY INFORMATION

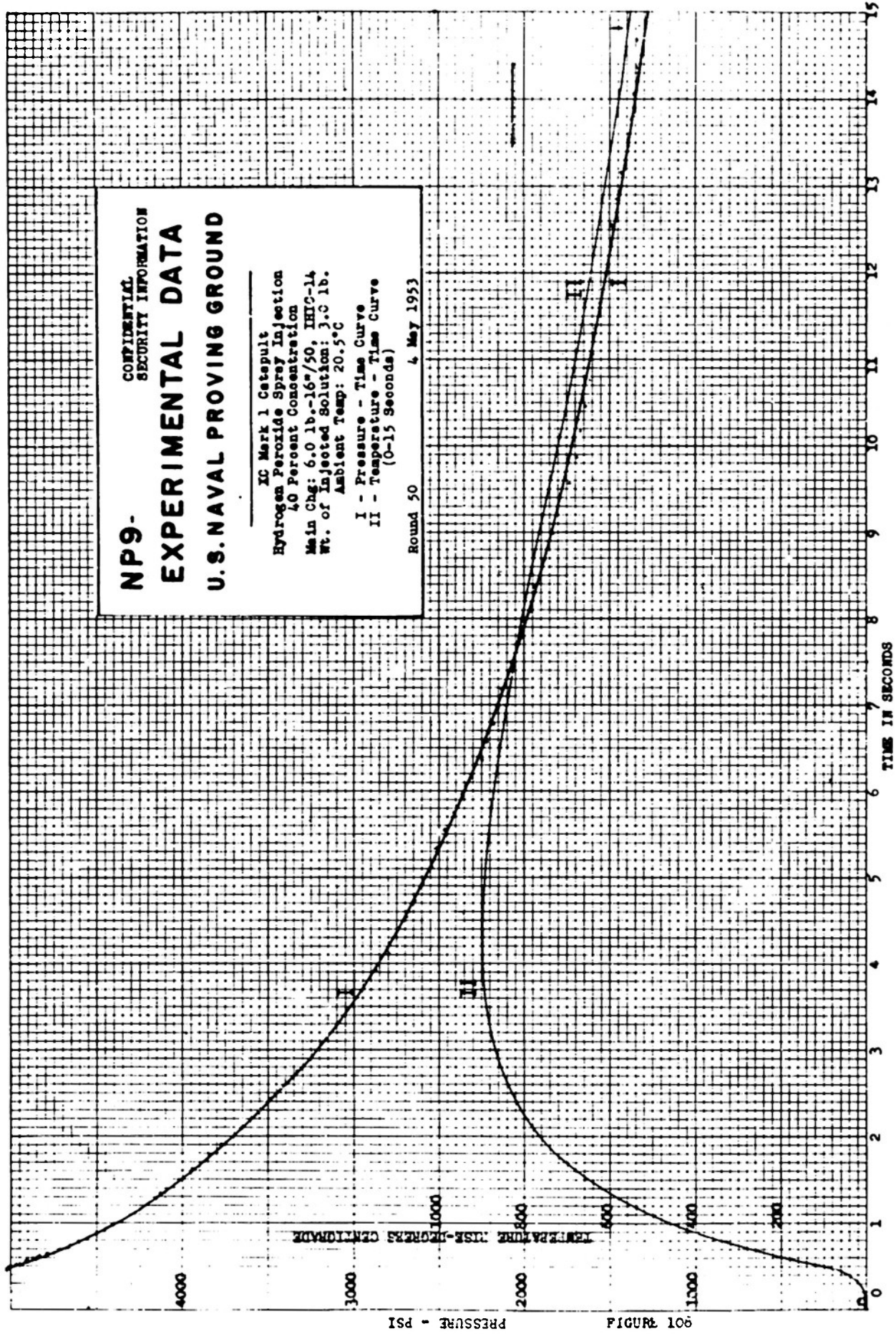
NP9 - EXPERIMENTAL DATA

U.S. NAVAL PROVING GROUND

IC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
40 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 20.5°C

I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)

Round 50 4 May 1953



901 RNDIA

FIGURE 106

NP9- CONFIDENTIAL SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

XG Mark 1 Ceteapult
 Hydrogen Peroxide Spray Injection
 40 Percent Concentration
 Main Chg: 6.0 lb.-16"/50, IHIG-14
 Wt. of Injected Solution: 3.0 lb.
 Ambient Temp: 25.0°C

I - Pressure - Time Curve
 II - Temperature - Time Curve
 (0-15 Seconds)

Round 51 5 May 1953

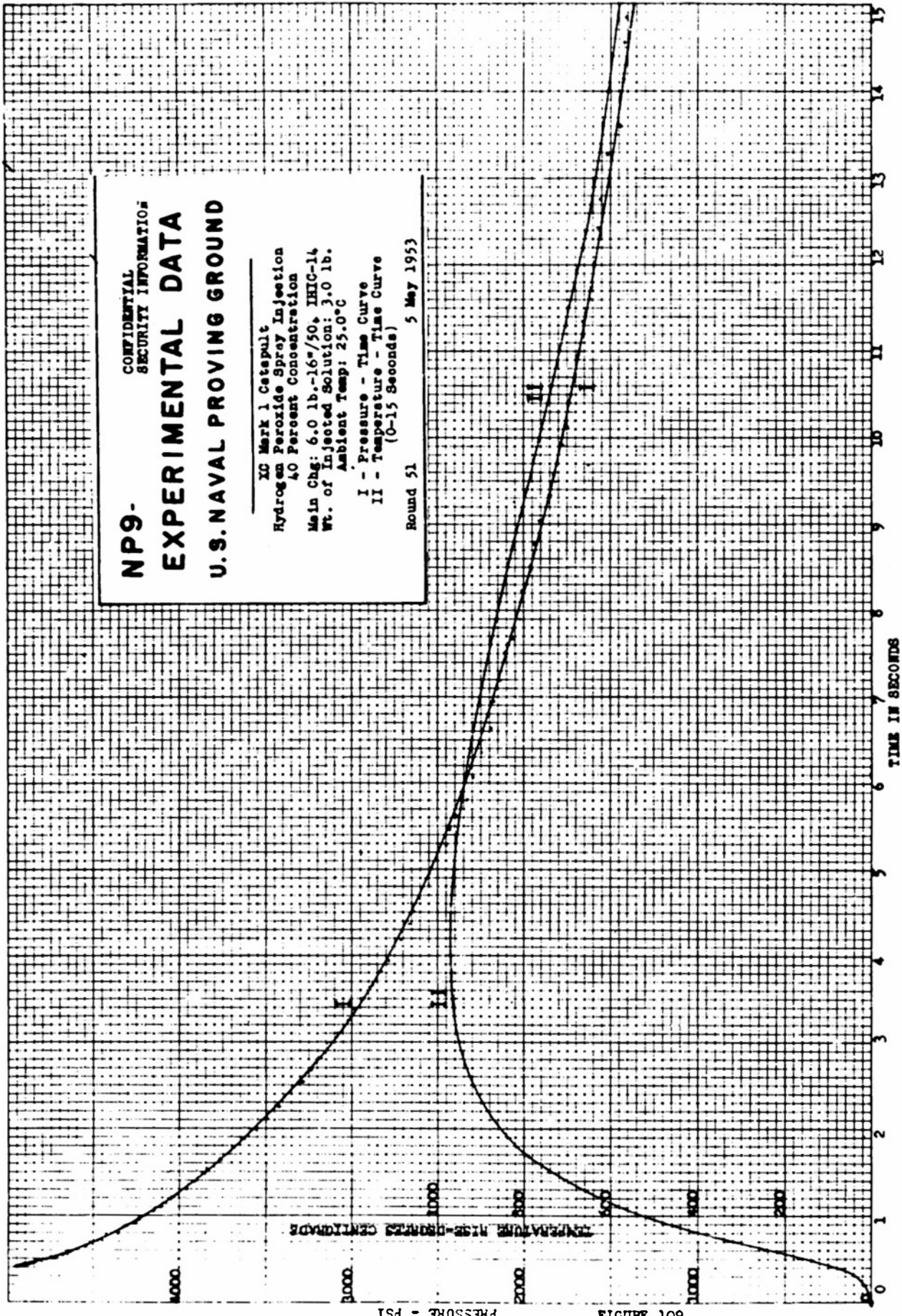


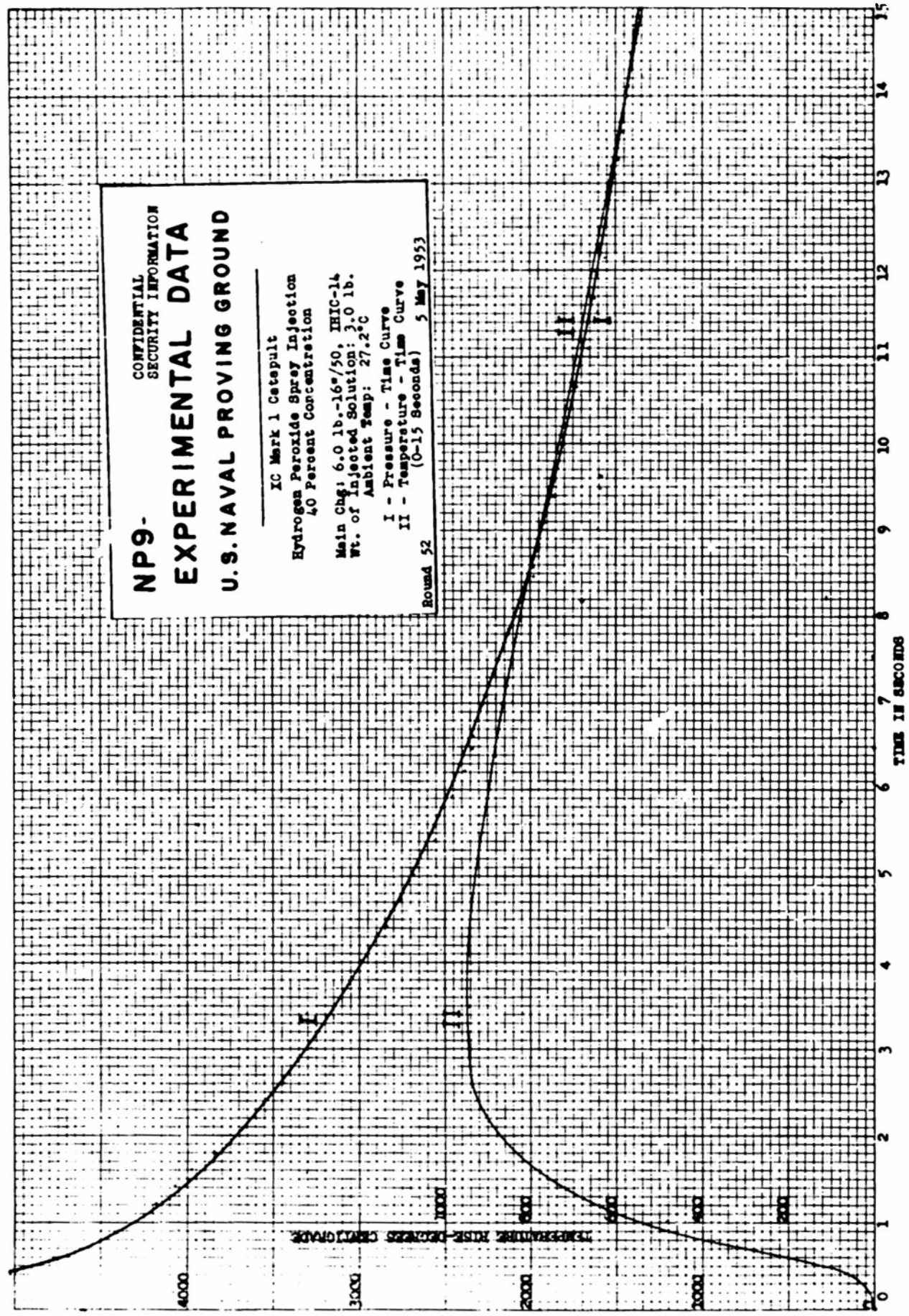
FIGURE 109

601 ADUJL

NP9 -
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

IC Mark 1 Catalyst
 Hydrogen Peroxide Spray Injection
 40 Percent Concentration
 Main Chg: 6.0 lb.-16"/50, IHIC-14
 Wt. of Injected Solution: 3.0 lb.
 Ambient Temp: 27.2°C

I - Pressure - Time Curve
 II - Temperature - Time Curve
 Round 52 (0-15 Seconds) 5 May 1953



154 - PRESSURE - PSI

FIGURE 110

**NP9-
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

IC Mark 1 Cetspult
Hydrogen Peroxide Spray Injection:
50 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 14.5°C
I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)
Round 25
6 April 1953

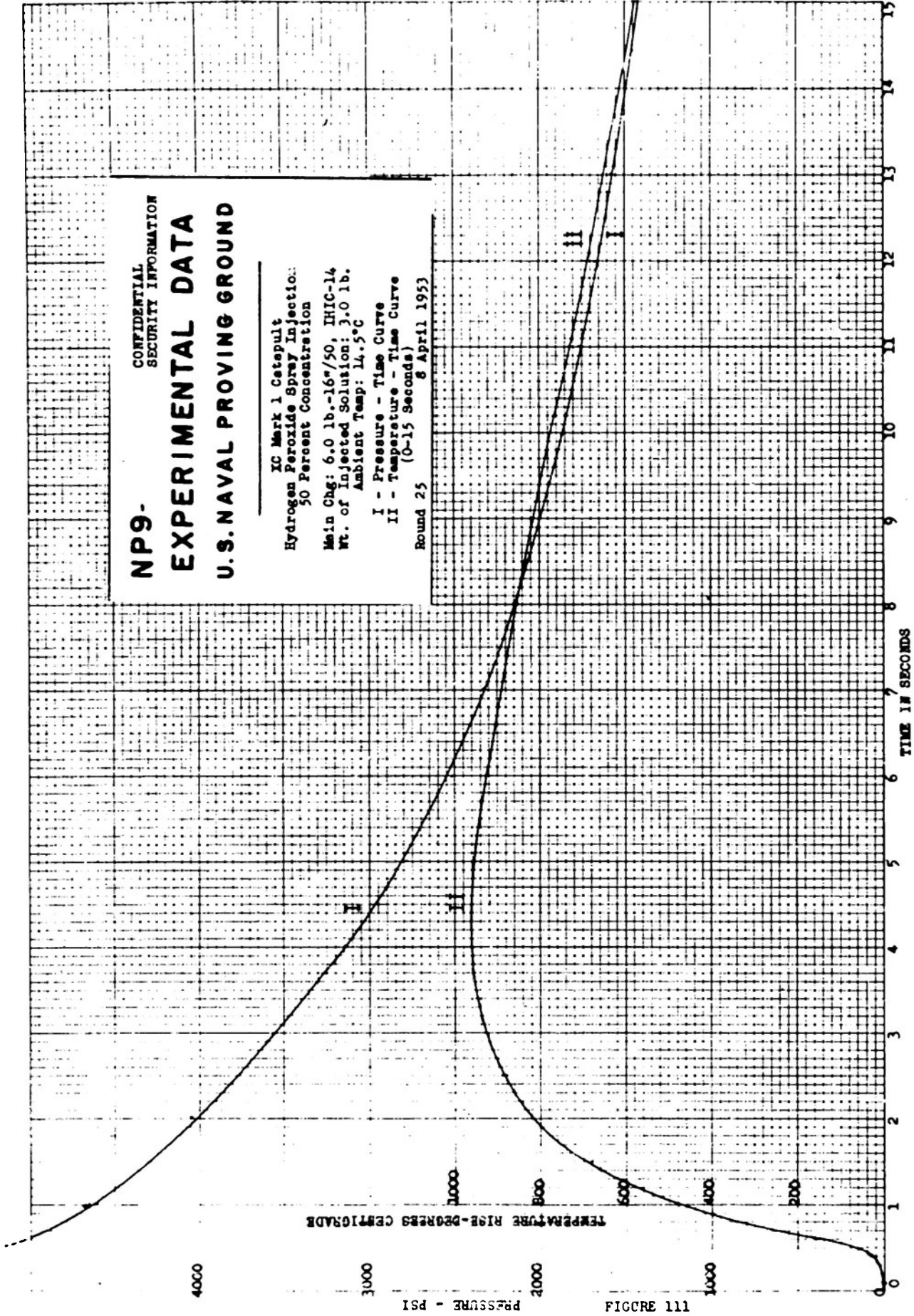


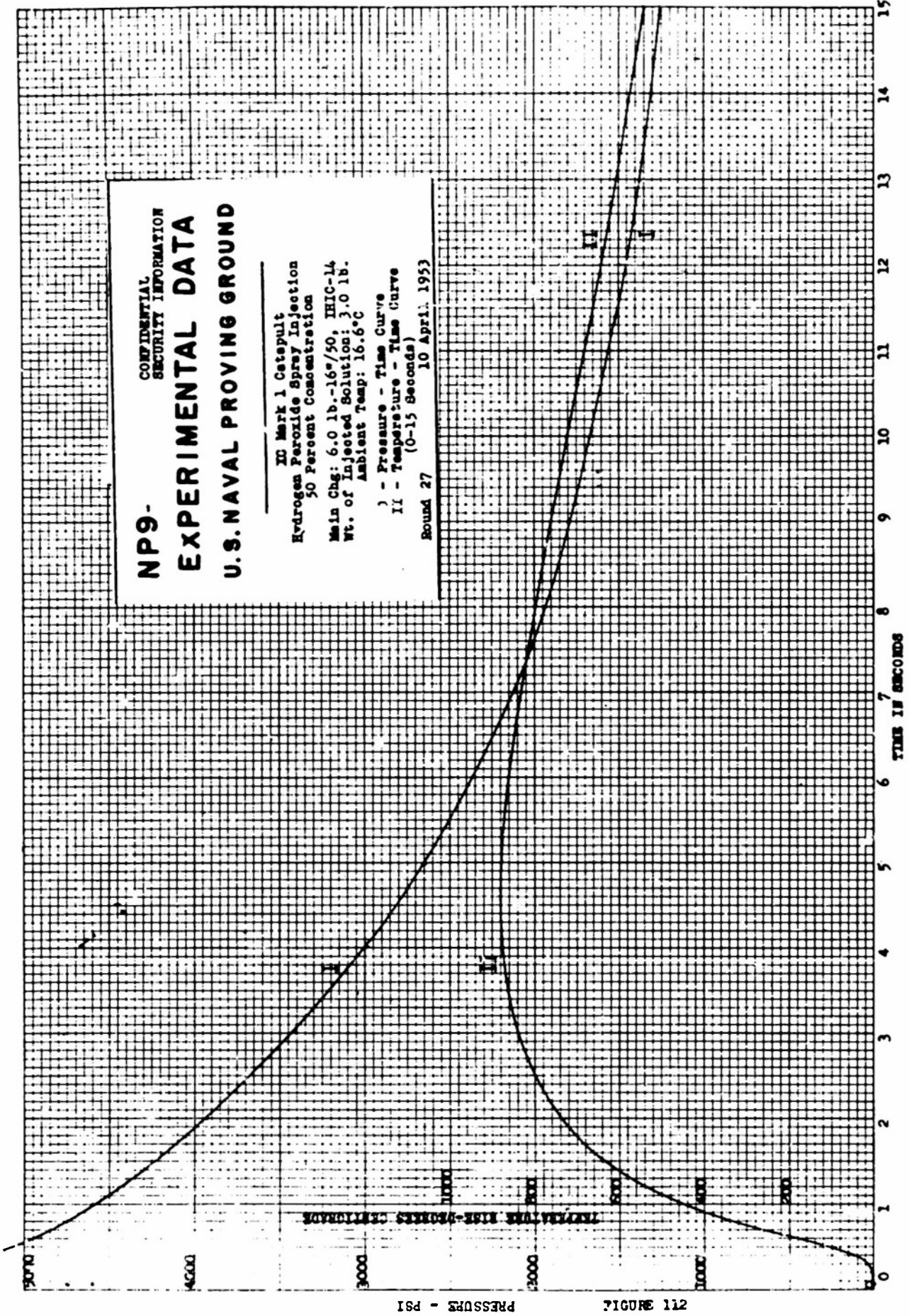
FIGURE 111

**NP9- CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

XI Mark 1 Catapult
Hydrogen Peroxide Spray Injection
50 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 16.6°C

I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)

Round 27
10 April, 1953



**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

CONFIDENTIAL
SECURITY INFORMATION

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
50 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 8.5°C

I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 seconds)

Round 28
14 April 1953

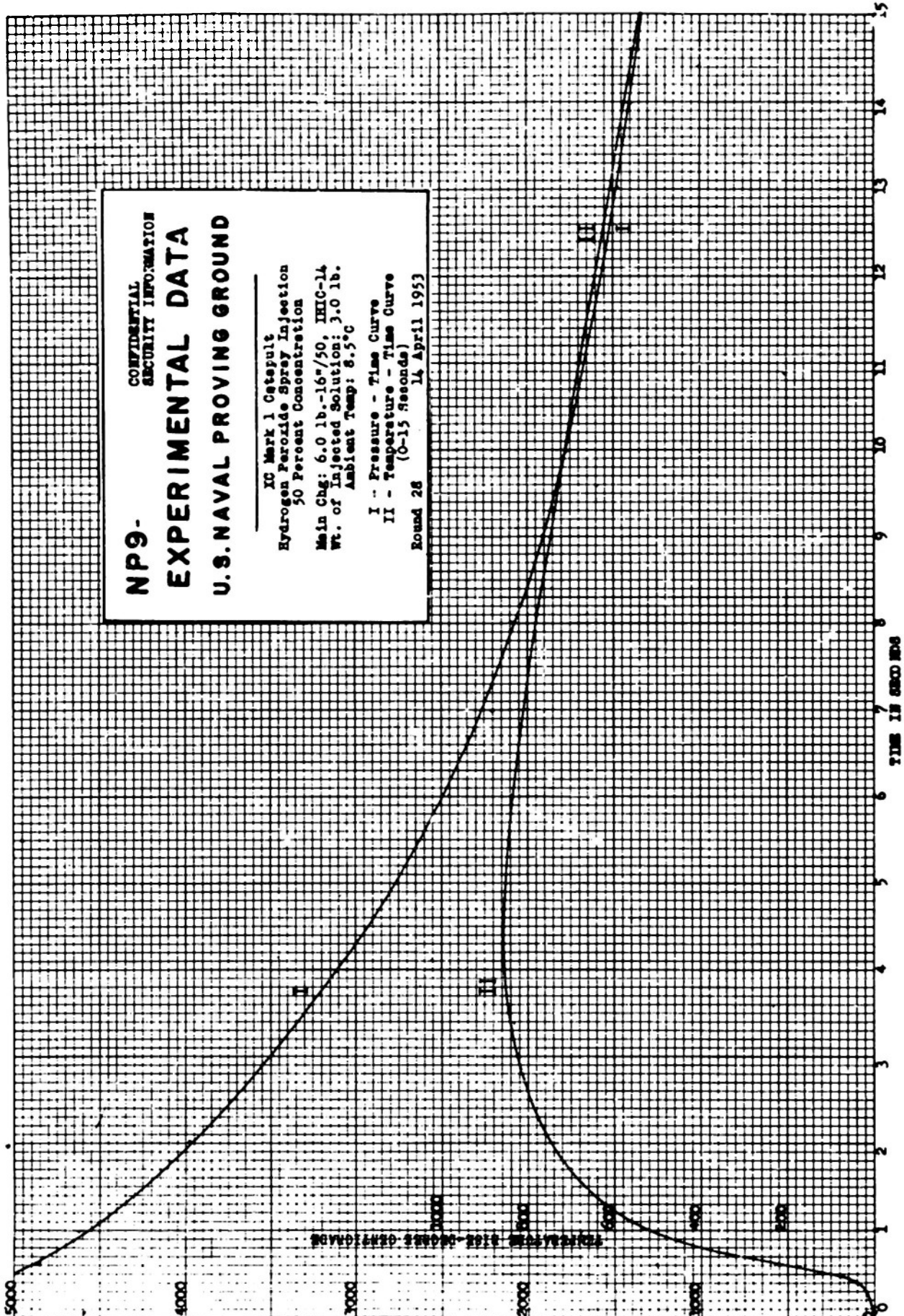


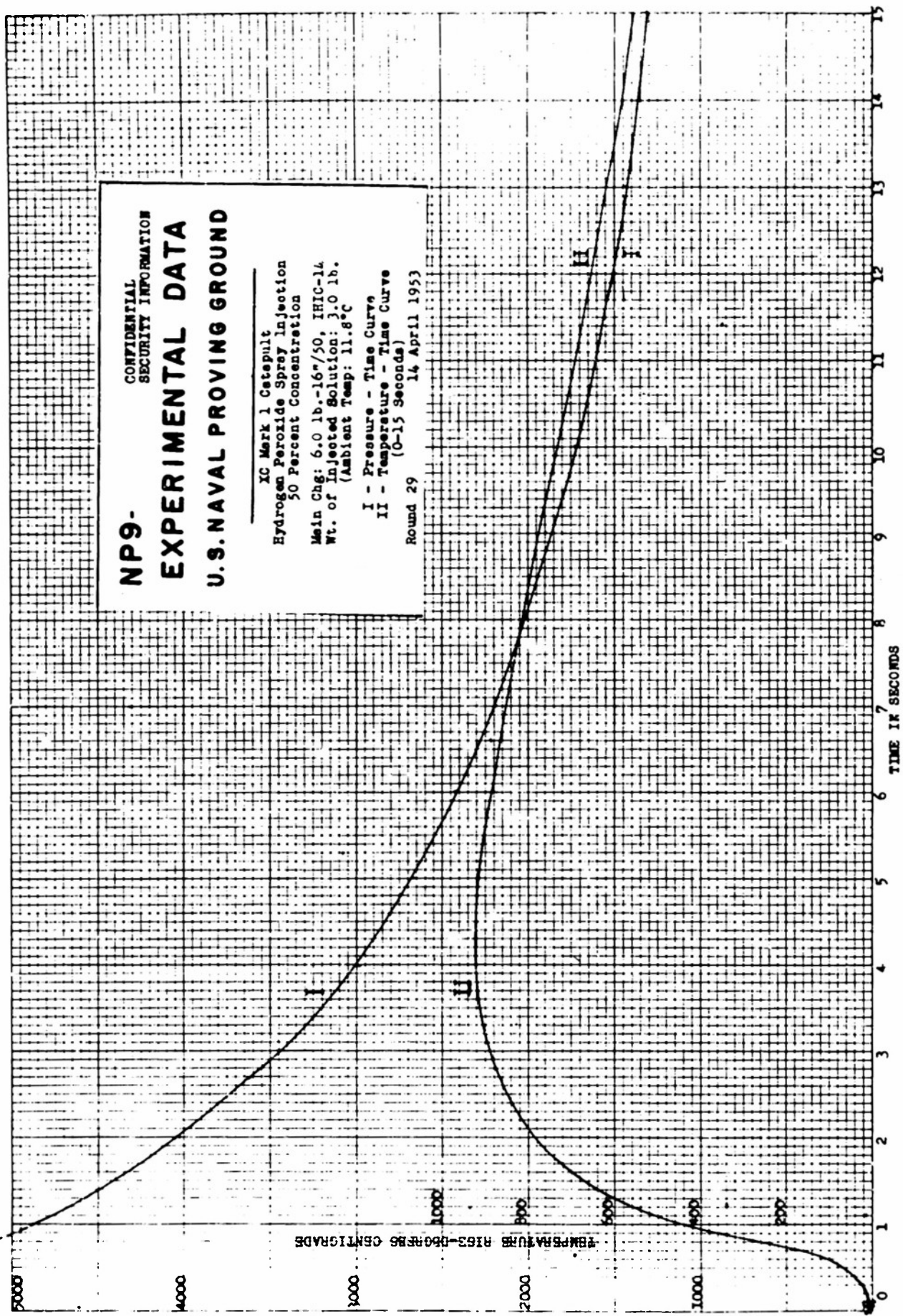
FIGURE 113
PRESSURE - PSI

TIME IN SECONDS

**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

CONFIDENTIAL
SECURITY INFORMATION

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
50 Percent Concentration
Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
(Ambient Temp: 11.8°C)
I - Pressure - Time Curve
II - Temperature - Time Curve
Round 29 (0-15 Seconds) 14 April 1953



Pressure - PSI

FIGURE 114

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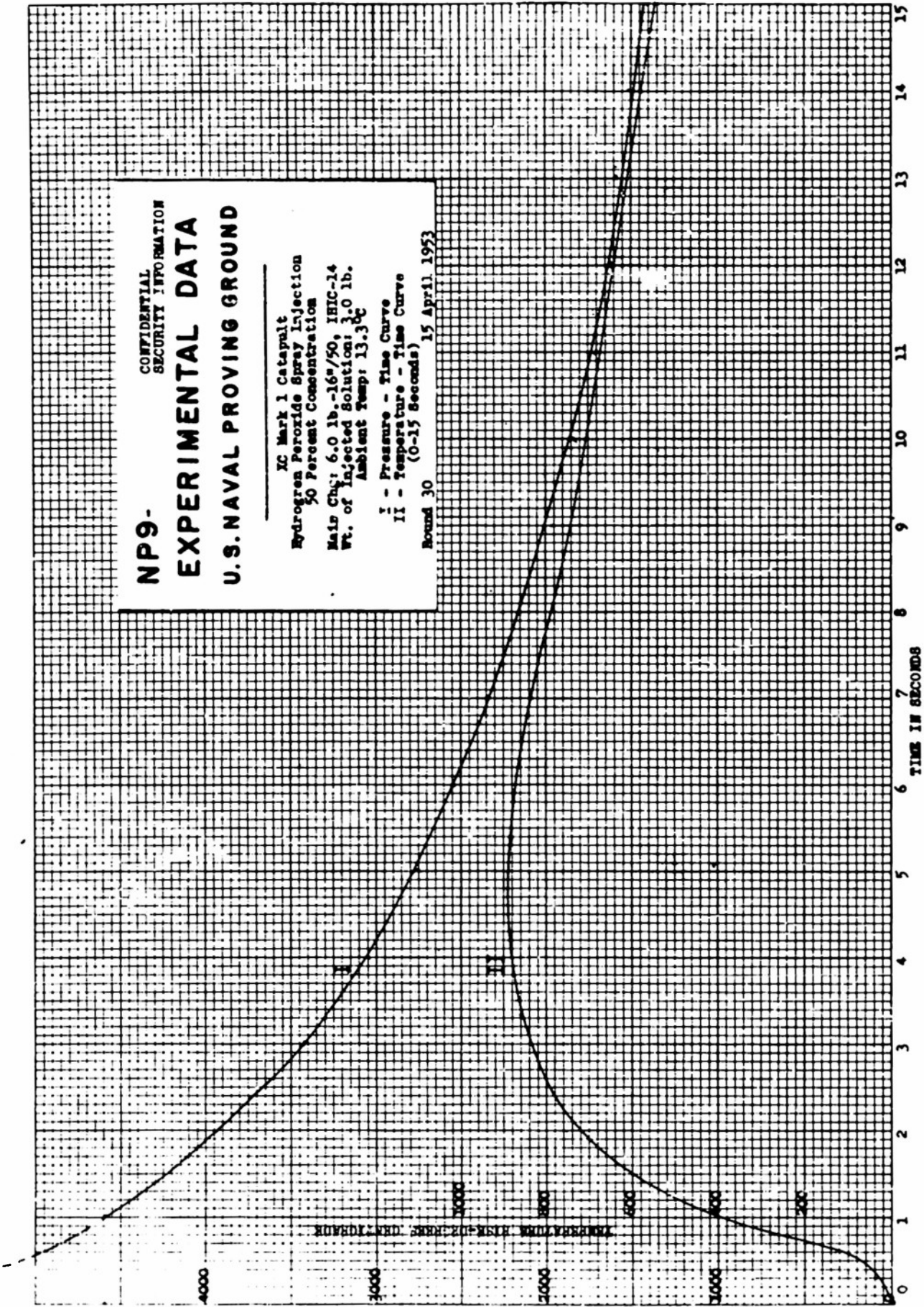
**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

CONFIDENTIAL
SECURITY INFORMATION

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
50 Percent Concentration
Mils Ch#: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 13.3°C

I - Pressure - Time Curve
II - Temperature - Time Curve

Round 30 15 April 1973



51t ERGID PRESSURE - PSI

FIGURE 115

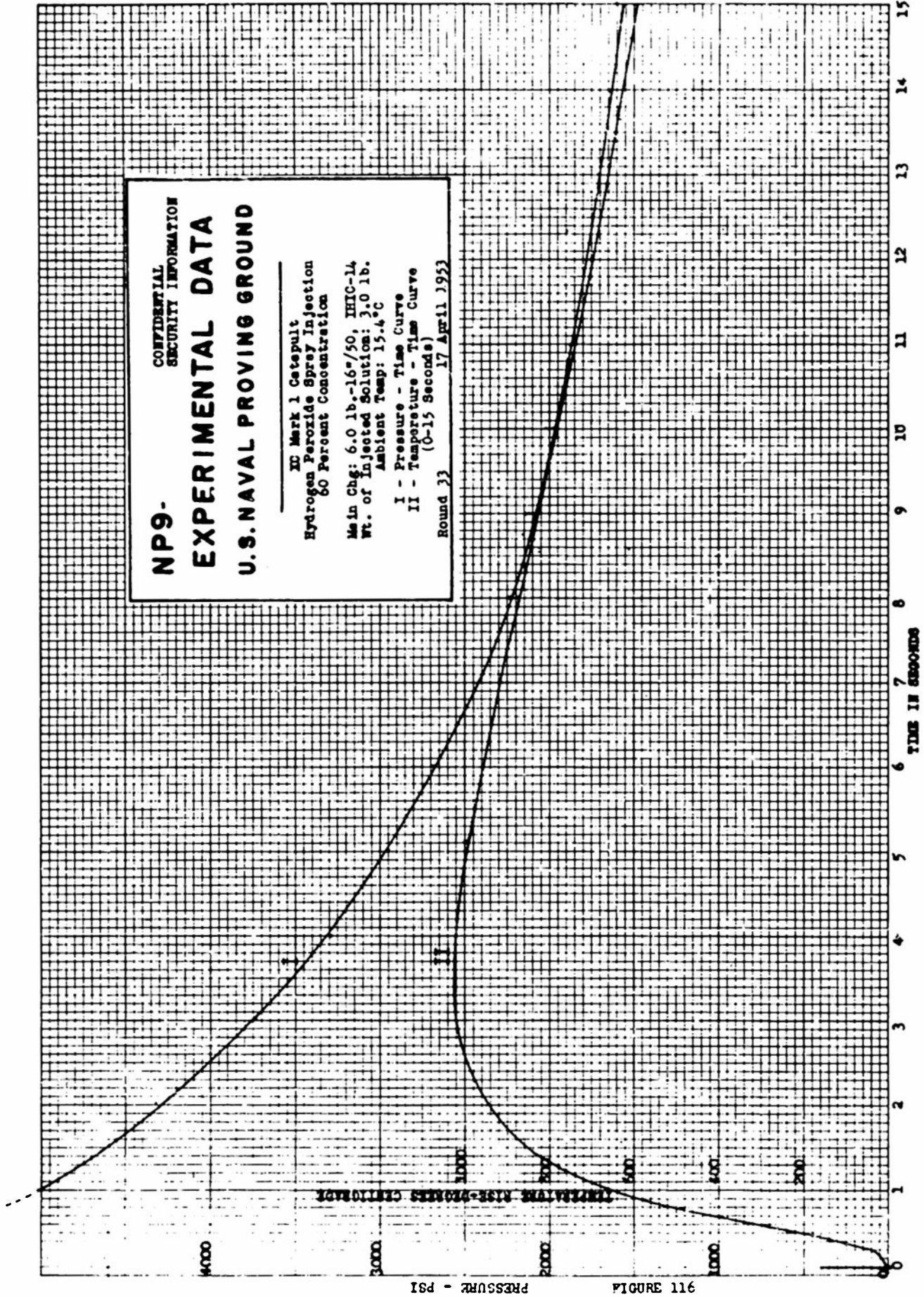
**NP9-
CONFIDENTIAL
SECURITY INFORMATION
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

XC Mark 1 Cetepult
Hydrogen Peroxide Spray Injection
60 Percent Concentration

Main Chg: 6.0 lb.-16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 15.4°C

I - Pressure - Time Curve
II - Temperature - Time Curve

Round 33 17 April 1953



PRESSURE - PSI

911 3RD014

TEMPERATURE RISE-DEGREES CENTIGRADE

TIME IN SECONDS

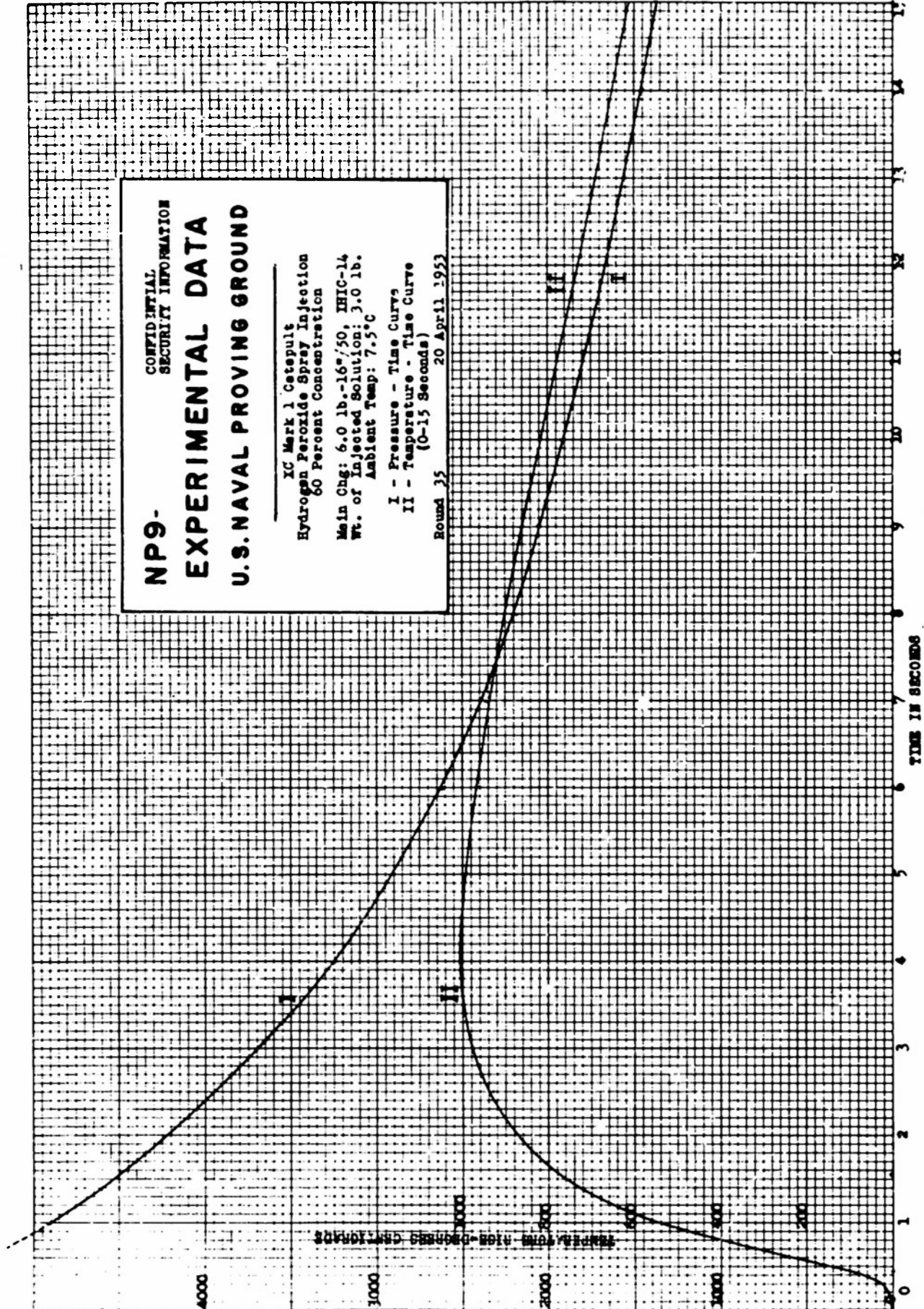
**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

CONFIDENTIAL
SECURITY INFORMATION

XC Mark 1 Cetapult
Hydrogen Peroxide Spray Injection
60 Percent Concentration
Main Cng: 6.0 lb.-16³/₅₀, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 7.5°C

I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)

Round 35 20 April 1953



PRESSURE - PSI

FIGURE 117

TIME IN SECONDS

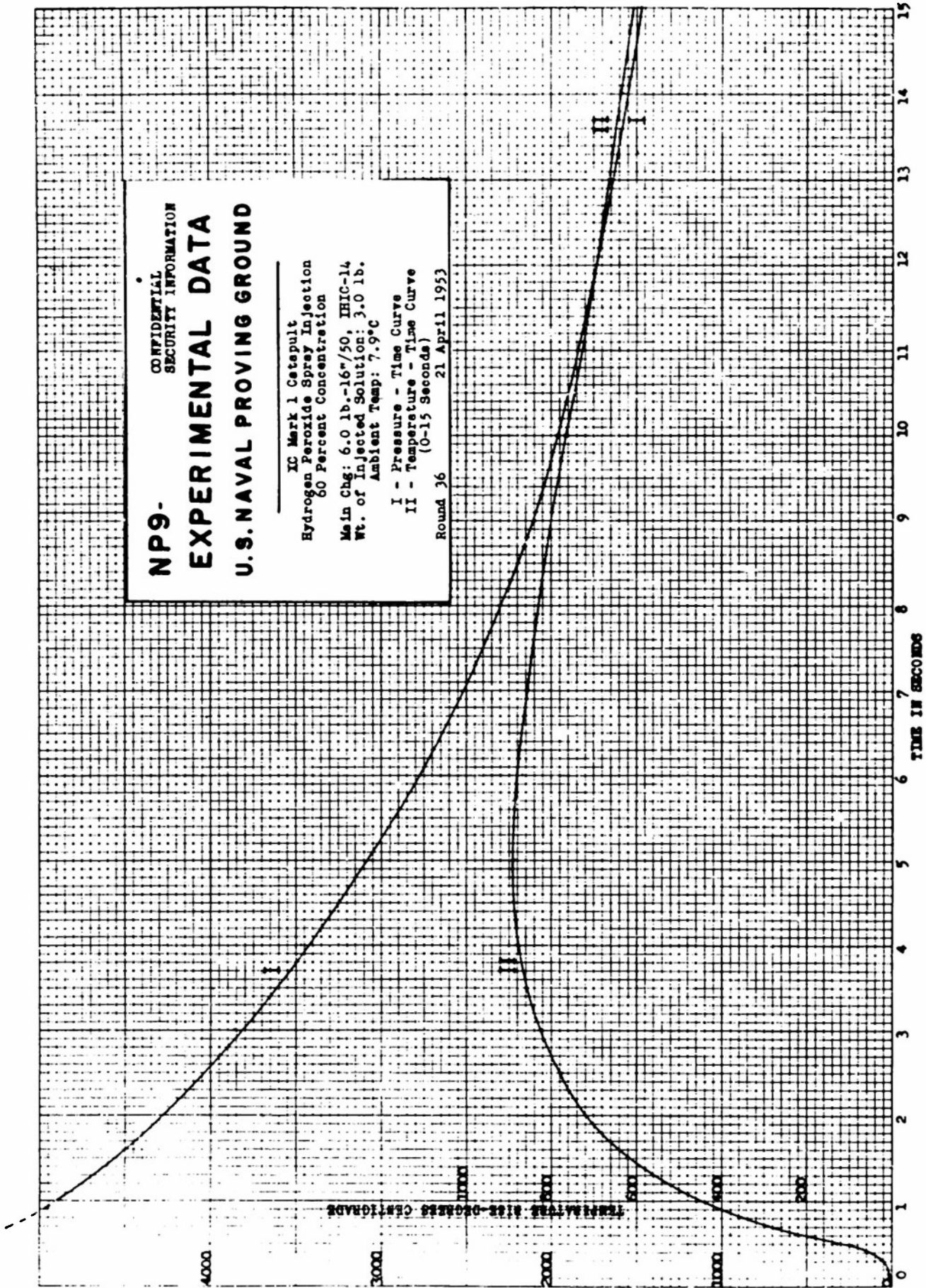
**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

CONFIDENTIAL
SECURITY INFORMATION

XC Mark 1 Catapult
Hydrogen Peroxide Spray Injection
60 Percent Concentration
Main Chg: 6.0 lb., -16"/50, IHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 7.9°C

I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)

Round 36 21 April 1953



811 ERDIA
PRESSURE - PSI

FIGURE 118

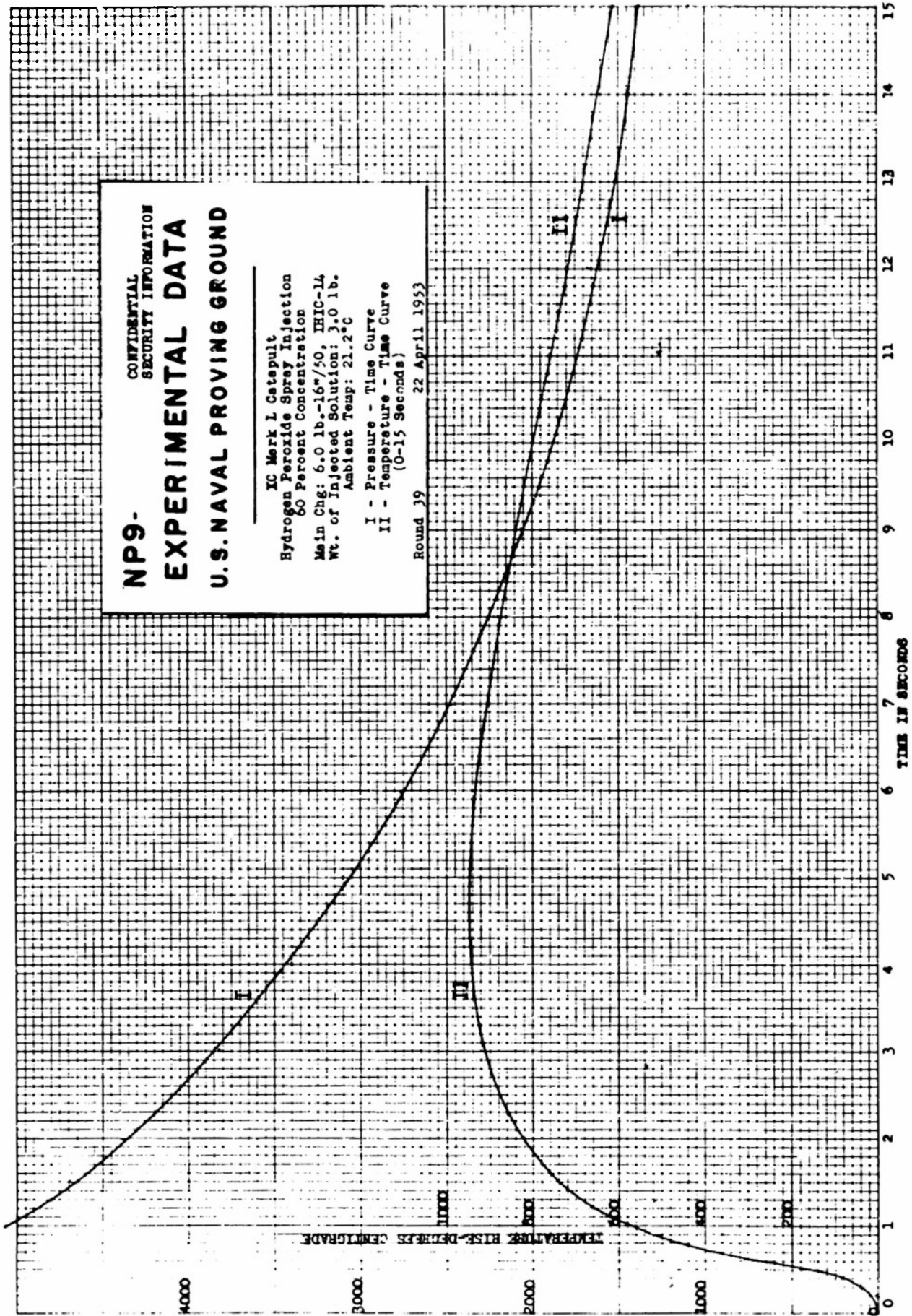
**NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND**

CONFIDENTIAL
SECURITY INFORMATION

IC Mark I Cetspult
Hydrogen Peroxide Spray Injection
60 Percent Concentration
Main Chg: 6.0 lb.-16"/50, RHIC-14
Wt. of Injected Solution: 3.0 lb.
Ambient Temp: 21.2°C

I - Pressure - Time Curve
II - Temperature - Time Curve
(0-15 Seconds)

Round 39 22 April 1953



611 FIGURE - PSI

FIGURE 119

NP9-
EXPERIMENTAL DATA
U.S. NAVAL PROVING GROUND

CONFIDENTIAL
 SECURITY INFORMATION

IC Mark 1 Catapult
 Hydrogen Peroxide Spray Injection
 60 Percent Concentration

Main Chg: 6.0 lb.-16"/50, IHIC-14
 Wt. of Injected Solution: 3.0 lb.
 Ambient Temp: 22.2°C

I - Pressure - Time Curve
 II - Temperature - Time Curve
 (0-15 Seconds)

Round 41 23 April 1953

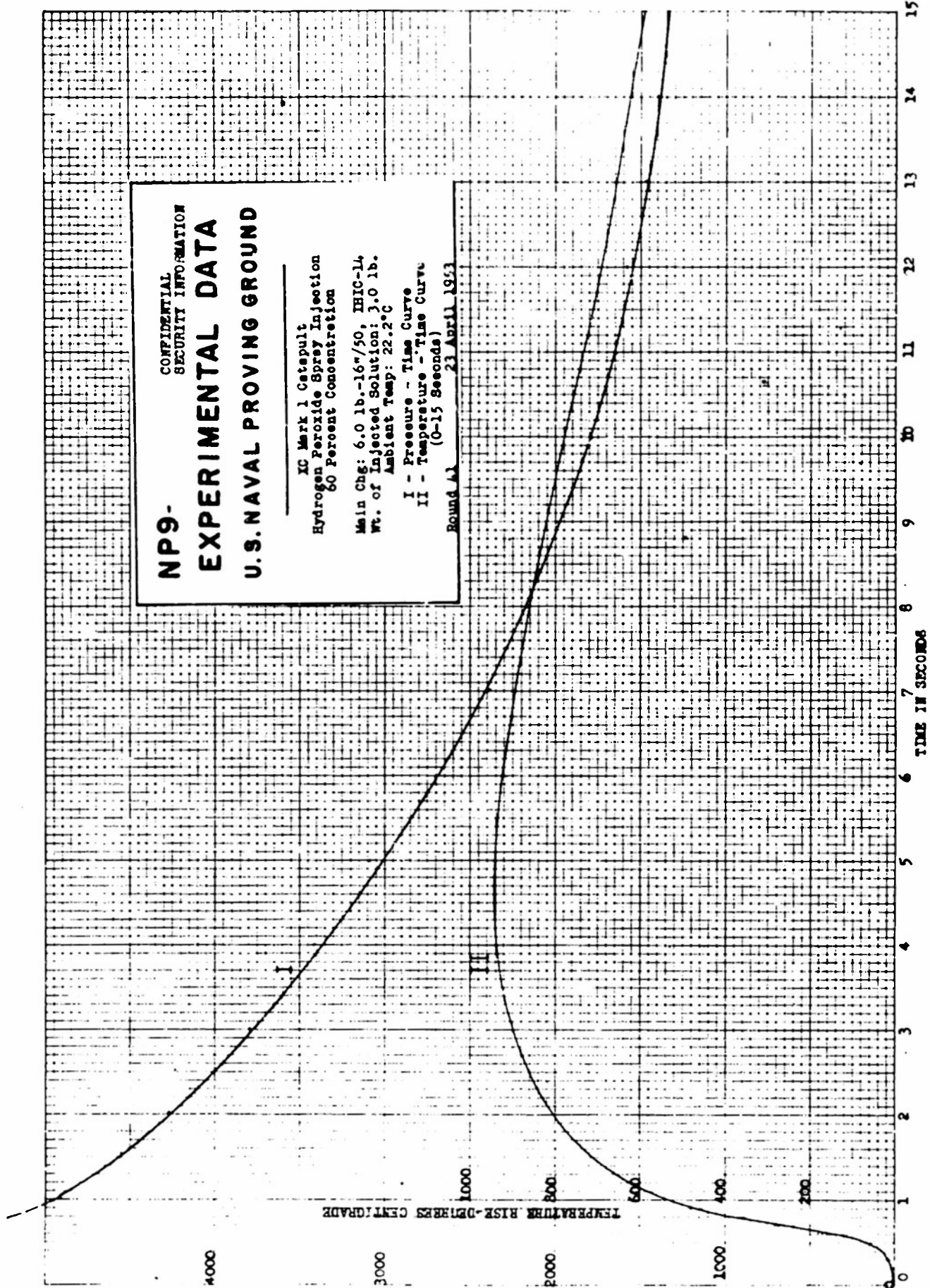


FIGURE 120
 PRESSURE - PSI

TEMPERATURE RISE - DEGREES CENTIGRADE

XC Mark 1 Catapult-Hydrogen Peroxide Tests

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