UGR-189

INDIVIDUAL WELL REPORT
FROM THE PROGRAM ON

CHARACTERIZATION AND ANALYSIS OF DEVONIAN SHALES AS RELATED TO RELEASE OF GASEOUS HYDROCARBONS

WELL P-1 SULLIVAN COUNTY, INDIANA

by

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and M. J. Snyder

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TABLE OF CONTENTS

	Page
LIST OF CONTRIBUTORS	i
INTRODUCTION AND SUMMARY	1
OBJECTIVE AND SCOPE	2
A. ANALYSIS AND DISCUSSION OF THE CHARACTERIZATION DATA	3
Task 1. Core Sampling	3
Task 2. Gas Contents and Release Rates	3
Task 3. Chemical Characterization Data	3
Task 4. Summary of Physical Characterization Data	4
Task 5. Shale Lithology	4
Task 6. Data Interpretation	5

APPENDIX A

MERCURY INTRUSION POROSITY DATA FOR WELL P-1

LIST OF TABLES

		Page
Table 1.	Well Data for P-1.	7
Table 2.	Field Sampling Data for Well P-1	8
Table 3.	Initial Gas Release Data	9
Table 4.	Statistical Analyses of Off Gas Data	10
Table 5.	Chemical Characterization Data	11
Table 6.	Summary of Physical Characterization Data.	12
Table 7.	Statistical Analysis of Physical Characterization Data	13
Table 8.	Mercury Intrusion Porosity for P-1 Shales.	14
Table 9.	Minerals Observed by XRD Analysis of Random Shale Samples.	15
Table 10.	Degree of Variability Reduction for Various Criterion and Potential Predictor Variables.	16

LIST OF FIGURES

Figure 1.	Sample on Surface Time	17
Figure 2.	Gas Content as a Function of Sample Depth for Well P-1	18
Figure 3.	Carbon Content as a Function of Sample Depth for Well P-1	19
Figure 4.	Hydrogen Content as a Function of Sample Depth for Well P-1	20
Figure 5.	H/C Atomic Ratio as a Function of Sample Depth for Well P-1	21
Figure 6.	Gas Content as a Function of Carbon Content for Well P-1	22
Figure 7.	Gas Content as a Function of Hydrogen Content for Well P-1	23

LIST OF FIGURES (Continued)

		Page
Figure 8.	Gas Content as a Function of Bulk Density for Well P-1	24
Figure 9.	Carbon Content as a Function of Bulk Density for Well P-1	25
Figure 10.	Hydrogen Content as a Function of Bulk Density for Well P-1	26
Figure 11.	SEM Micrograph of P-1-2495	27
Figure 12.	SEM Microphotograph of P-1-2495	28

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INTRODUCTION AND SUMMARY

Partial data on the characterization of shales from Well P-1 (Sullivan County, Indiana) were presented in the Fifth Quarterly Technical Progress Report on The Characterization of Devonian Shale to DOE/METC (ORO-5205). This individual well report presents and discusses the total characterization data available on P-1 shales.

Coring of the shale samples were accomplished in September, 1976. A total of 17 samples were obtained: 11 for Battelle and six for other DOE contractors.

P-1 well exhibited relatively high hydrocarbon gas contents compared to other wells. Average hydrocarbon gas contents surrounding the free space in the canisters is about 61 percent of the total gases (including air). Methane and ethane make up the bulk of total hydrocarbons.

Chemical characterization data (carbon and hydrogen contents) relate well with the hydrocarbon gas content, as do the bulk densities among the physical characterization data.

OBJECTIVE AND SCOPE

The objective of this program is to determine the relationships between shale characteristic, hydrocarbon gas content, and well location to provide a sound basis for defining the productive capacity of the Eastern Devonian Shale deposits and for guiding research, development, and demonstration projects to enhance the recovery of natural gas from the shale deposits. The program includes a number of elemental tasks as a part of the Resource Inventory and Shale Characterization subprojects of DOE's Eastern Gas Shales Project and is designed to provide a wide variety of support data for that project.

A large number of core samples of gas bearing Eastern Devonian Shale will have been examined by the end of the program. After the characterization data for individual wells have been compiled, attempts will be made to establish the interrelationships between the shale characteristics, the hydrocarbon gas content, and well locations from which the samples were obtained, employing the Automatic Interaction Detection (AID) Analysis.

The following tasks comprise the total efforts in this research program:

Task	Descriptive Title
1	Core Sampling
2	Gas Content and Gas Release Kinetics
3	Chemical Characterization of Shale
4	Physical Characterization of Shale
5	Lithology of Shale
6	Data Interpretation and Correlation

A. ANALYSIS AND DISCUSSION OF THE CHARACTERIZATION DATA

Detailed descriptions of the experimental procedures employed in the execution of the elemental tasks described were reported in the Appendix of the Fifth Quarterly Technical Progress Report (ORO-5205-5) submitted to U.S./DOE in January 1978.

Task 1. Core Sampling

Well P-1 shales (Sullivan County, Indiana) were cored in September, 1976. A total of 17 samples were collected; 11 for Battelle and 6 for other DOE contractors. Two barrels of shale core were collected. Additional information and field sampling data (color, on-surface time) are summarized in Tables 1 and 2. Figure 1 shows on-surface times for the 11 P-1 cored shale samples.

Task 2. Gas Contents and Release Rates

Initial gas release data on the P-1 well are summarized in Table 3. Data include hydrocarbon gases, C_1 through C_5, nitrogen, oxygen, and carbondioxide, all of which accumulate in the free space surrounding the shale samples inside the canisters. Methane and ethane make up the bulk of the total hydrocarbon gas contents. Average hydrocarbon gas content for the well is 60.6 percent with upper and lower limits being 68 and 53 percent, respectively. Table 4 depicts the pertinent statistical parameters of the gas analysis data.

Hydrocarbon gas contents do not show any particular trend with shale depth as shown in Figure 2.

Task 3. Chemical Characterization Data

Total carbon, hydrogen and nitrogen (C-H-N) values are reported in Table 5. Carbon contents range from 3.8 to 11.5 percent and hydrogen values vary between 0.5 and 1.3 percent by weight of shales. Average values are 6.9 and 0.9 percent for carbon and hydrogen contents, respectively.

Figures 3 through 5 analyze the chemical data as a function of shale depth. An apparent decrease in carbon contents with shale depth is observed in Figure 3. A similar pattern is also somewhat apparent in Figure 4 where hydrogen contents as a function of depth are plotted.

Hydrocarbon gas contents as a function of carbon and hydrogen contents are presented in Figures 6 and 7, respecitvely. As evident in these figures, hydrocarbon gas contents increase with increasing carbon and hydrogen contents.

Task 4. Summary of Physical Characterization Data

Density, porosity (calculated from the density data) and surface areas for P-1 shales are tabulated in Table 6. Table 7 presents the pertintent statistical data on the physical characterization results. P-1 shales show an average bulk density of 2.48 with upper and lower values 2.55 and 2.40 g/cc, respectively. Total porosities average 3.32 percent, ranging between 2.24 and 4.40 volume percent. Surface area values are scattered between the values 1.21 and 7.33 m^2/g with an average value of 5.13 m^2/g.

In Figures 8 through 10 hydrocarbon gas, carbon and hydrogen contents are shown as a function of shale bulk density. Inverse relationships between bulk density and hydrocarbon gas, carbon and hydrogen contents are depicted in these figures. Porosities were also measured of P-1 shales employing the mercury intrusion porosimetry technique. Values depicted in Table 8 range from 1.86 to 9.54 percent by bulk volume of shale. Detailed analysis results on the mercury intrusion porosities are presented in Appendix A.

Gas permeability measurements on the P-1 shale samples showed no measurable permeability values for these shales.

Task 5. Shale Lithology

Two P-1 shale samples were examined with the SEM/EDAX and the petrographic microscope. Both were high in illite content and contained fair quantities of quartz; the difference between the two being a somewhat different ratio of quartz-to-illite contents. Pyrite was relatively

scarce in these samples. Small, but significant, amounts of carbonate minerals were observed. EDAX analysis support the microscopic observations. Figures 11 and 12 are SEM microphotographs of two P-1 shales.

X-ray diffraction (XRD) patterns on four shale specimens were obtained. Quantitative analysis on these diffraction patterns confirm the SEM/EDAX findings. XRD results on four samples studied are shown in Table 9.

Task 6. Data Interpretation

Due to the small number of samples taken from this well (11 core specimens) the full capabilities of the Automatic Interaction Detection (A.I.D.) program could normally not be utilized. The important capability of this program is that it can identify multiple relationships between groups of variables without assuming any particular model. This, then, becomes a powerful tool for identifying the variable or group of variables that are most important in predicting the behavior of other variables of interest, such as the gas content of Devonian shale.

The basic principle of the program is that the data available on the variable of interest (the criterion) are split into two groups in such a fashion as to achieve the lowest total variability within each group. This is done for each possible predictor variable. In this manner the predictor variable producing the greatest reduction in the initial data variability is identified and the criterion data will be so split. The process is repeated on the two new groups. However, because of the small number of samples more than one split of the data would be meaningless in this case. The program is useful, however, to compare the relative merit of various variables as to their importance as potential predictors.

Table 10 shows the relative effectiveness of various potential predictors for several criterion variables of interest. As can be seen there was little wirelog data available (only the Birdwell Electric Log) to evaluate. The wirelog data showed a small degree of usefulness in

predicting gas per unit volume of shale. The wirelog information does correlate well with the density of the material. The ultimate usefulness of these correlations is questionable, however, as the density does not correlate in a good fashion with the gas data. As might be expected there is fair correlation between density and total carbon and hydrogen. As was observed in other wells, a simple relationship between porosity and gas contents is not evident and this points again to the need for the development of greater understanding of how gas is held and transported in these systems.

TABLE 1. WELL DATA FOR P- 1

LOCATION: SULLIVAN COUNTY, IN

ALTITUDE: 430 FEET

COORDINATES: 38.50 (DEGREES.MINUTES) LATITUDE
87.30 (DEGREES.MINUTES) LONGITUDE

CORING BEGAN AT 2490 FEET AND STOPPED AT 2606 FEET. IT TOOK 2 BARRELS TO COMPLETE.

SAMPLES WERE RETURNED TO BATTELLE ON 9/ 3/76.

THERE WERE 11 SAMPLES COLLECTED FOR BATTELLE AND 6 SAMPLES COLLECTED FOR OTHERS.

RUN INFORMATION FROM WELL P- 1

RUN NO. 1 CORING BEGAN AT 2490 FEET AND CORING STOPPED AT 2548 FEET. THE AVERAGE CORING RATE IS 16.55 MINUTES PER FOOT.** THE SAMPLES WERE ON THE SURFACE IN 2.00 HOURS

RUN NO. 2 CORING BEGAN AT 2548 FEET AND CORING STOPPED AT 2606 FEET. THE AVERAGE CORING RATE IS 16.81 MINUTES PER FOOT. THE SAMPLES WERE ON THE SURFACE IN 1.50 HOURS

TABLE 2. FIELD SAMPLING DATA FOR WELL P 1

SAMPLE ID.	COLOR	ON SURFACE TIME	BARREL NO	SEQ NO.
P 1-2495.	N4	1.25	1	1
P 1-2505.	N5	1.50	1	2
P 1-2515.	N4	1.75	1	3
P 1-2528.	N4	1.83	1	4
P 1-2536.		2.00	1	5
P 1-2547.	N5	2.25	1	6
P 1-2554.	N3	2.33	2	7
P 1-2565.	N3	2.50	2	8
P 1-2575.	N3	2.67	2	9
P 1-2585.	N3	2.83	2	10
P 1-2595.		3.00	2	11

MEAN EXPOSURE TIME 2.17
STANDARD DEVIATION OF EXPOSURE TIME .56

TABLE 3. INITIAL GAS RELEASE DATA: WELL P- 1

SAMPLE ID	PRESSURE TORR	FREE VOLUME CC	CORE VOLUME CC	OPEN POROSITY PCT.	GAS COMPOSITION, VOLUME PERCENT METHANE	ETHANE	PROPANE	BUTANE	PENTANE	TOTAL HYDROC.	NITROGEN	OXYGEN	CARBON DIOXIDE	GAS RELEASED/ UNIT VOLUME OF SHALE	SEQ NO.
P 1-2495.	900.	887.	563.	5.08	21.47	4.61	3.53	1.72	.63	31.96	65.87	.91	1.27	.60	1
P 1-2505.	1345.	801.	649.	.64	66.41	3.60	.22	0.00	0.00	70.23	21.06	2.18	6.53	1.53	2
P 1-2515.	1900.	950.	500.	1.06	58.46	4.19	.26	.05	0.00	62.96	29.95	2.68	4.41	2.99	3
P 1-2528.	2104.	797.	653.	.55	60.60	2.59	0.00	0.00	0.00	63.19	28.14	1.88	6.79	2.14	4
P 1-2536.	1770.	720.	730.	1.67	54.60	2.27	1.65	0.00	0.00	58.52	31.29	2.31	7.92	1.35	5
P 1-2547.	17 ..	735.	715.	2.26	61.32	6.01	.20	0.00	0.00	67.53	27.72	.54	4.22	1.55	6
P 1-2554.	1900.	647.	803.	1.61	62.95	5.42	.34	.07	.03	68.81	27.23	.65	3.31	1.38	7
P 1-2565.	1391.	708.	742.	1.93	52.58	5.04	1.63	.59	.29	60.13	35.62	.74	3.52	1.05	8
P 1-2575.	1970.	780.	670.	.62	62.81	4.60	0.00	0.00	0.00	67.41	27.33	.12	5.14	2.04	9
P 1-2585.	1340.	741.	709.	.62	45.00	3.30	0.00	0.00	0.00	48.30	40.40	4.10	7.20	.89	10
P 1-2595.	2030.	573.	677.	.77	59.31	4.95	2.36	.98	.30	67.60	26.68	.56	5.51	1.18	11

TABLE 4. STATISTICAL ANALYSES OF OFF GAS DATA

WELL P 1

	MEAN	STANDARD DEVIATION	VARIENCE	COEFFICIENT OF DEVIATION	95 PCT. CONFIDENCE INTERVAL LOWER LIMIT	UPPER LIMIT	NO OF SAMPLES
ETHANE, PERCENT	4.235	1.18	1.38	.28	3.444	5.025	11
PROPANE, PERCENT	.926	1.19	1.42	1.29	.125	1.728	11
BUTANE, PERCENT	.310	.57	.32	1.83	-.071	.691	11
PENTANE, PERCENT	.114	.21	.04	1.82	-.026	.253	11
TOTAL HYDROCARBONS, PCT	60.684	11.37	129.19	.19	52.968	68.239	11
NITROGEN, PERCENT	32.445	12.06	145.35	.37	24.746	40.943	11
OXYGEN, PERCENT 1	1.515	1.22	1.48	.80	.699	2.332	11
CARBON DIOXIDE, PERCENT	5.075	1.98	3.90	.39	3.747	6.402	11
GAS VOLUME/SHALE VOLUME	1.518	.67	.44	.44	-6.117	1.966	11

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TABLE 5. CHEMICAL CHARACTERIZATION DATA, 6/77

SAMPLE ID	TOTAL, PERCENT CARBON	HYDROGEN	NITROGEN	LOW TEMPERATURE ASH, % 200 C	100 C	CARD CODE	SEQ NO.
P 1-2495.	.8	.5	.1			5	1
P 1-2505.	11.5	1.3	.3	10.80	11.50	5	2
P 1-2515.	6.1	.8	.2	5.90		5	3
P 1-2528.	8.6	1.0	.2			5	4
P 1-2536.	10.3	1.1	.2	8.95	9.24	5	5
P 1-2547.	7.1	.9	.2			5	6
P 1-2554.	5.4	.8	.3	4.46		5	7
P 1-2565.	3.2	.6	.1			5	8
P 1-2575.	7.5	1.0	.2			5	9
P 1-2585.	8.7	1.0	.2			5	10
P 1-2595.	6.1	.8	.1			5	11

TABLE 6. SUMMARY OF PHYSICAL CHARACTERIZATION DATA

	BULK DENSITY G/CC	OPEN POROSITY PCT	CLOSED POROSITY PCT	TOTAL POROSITY PCT	SURFACE AREA M2/G	SEQ
P 1-2495.	2.654	5.078	0.000	5.078	7.330	1
P 1-2505.	2.293	.636	2.378	3.014	4.330	2
P 1-2515.	2.447	1.064	.207	1.272	4.300	3
P 1-2528.	2.442	.547	2.747	3.294	4.370	4
P 1-2538.	2.411	1.674	0.000	1.674	3.110	5
P 1-2547.	2.368	2.262	2.271	4.533	1.210	6
P 1-2554.	2.487	1.605	2.462	4.067	4.670	7
P 1-2565.	2.608	1.930	.935	2.865	4.600	8
P 1-2575.	2.543	.619	0.000	.619	4.410	9
P 1-2585.	2.414	.619	4.585	5.204	4.330	10
P 1-2595.	2.592	.770	4.099	4.869	2.340	11

MAR 30 1978

TABLE 7. STATISTISTICAL ANALYSES OF PHYSICAL CHARACTERIZATION DATA

WELL P- 1

	MEAN	STANDARD DEVIATION	VARIENCE	COEFFICIENT OF DEVIATION	95 PCT. CONFIDENCE INTERVAL LOWER LIMIT	UPPER LIMIT	NO OF SAMPLES
BULK DENSITY, G/CC	2.478	.11	.01	.04	2.404	2.552	11
APPARENT DENSITY, G/CC	2.519	.13	.02	.05	2.428	2.609	11
TRUE DENSITY, G/CC	2.477	.14	.02	.06	2.382	2.571	11
OPEN POROSITY, PCT	1.528	1.32	1.75	.87	.638	2.417	11
CLOSED POROSITY, PCT	1.789	1.67	2.79	.93	.667	2.912	11
TOTAL POROSITY, PCT	3.317	1.60	2.56	.48	2.243	4.391	11
WEIGHT LOSS INITIAL, G/KG	8.750	.83	.69	.10	8.191	9.309	11
WEIGHT LOSS FINAL, G/KG	-.496	1.16	1.35	-2.34	0.000	.283	11
TOTAL WEIGHT LOSS, G/KG	8.254	1.24	1.53	.15	7.422	9.085	11
[illegible]	[illegible]	1.54	[illegible]	.38	3.056	5.126	11

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TABLE 8. MERCURY INTRUSION POROSITY FOR P-1 SHALES

Sequence No.	Sample I. D. No.	Porosity, Vol.,Percent
1	P-1-2495	9.54
2	-2505	1.86
3	-2515	3.98
4	-2528	4.24
5	-2536	4.25
6	-2547	5.04
7	-2554	2.39
8	-2565	3.98
9	-2578	4.77
10	-2585	4.24
11	-2595	3.45

TABLE 9. MINERALS OBSERVED BY XRD ANALYSIS OF RANDOM SHALE SAMPLES

Sample No.	Quartz	Illite	Kaolin	Pyrite	Nahcolite	Shortite	Siderite	Calcite	Mica	Others
P-1-2505	M	m	d	m	m	m	d	–	–	Feldspar
P-1-2515	M	m	m	m	m	d	–	–	–	Feldspar
P-1-2554	M	m	–	d	m	m	d	–	–	Feldspar
P-1-2565	M	m	–	–	m	d	–	–	–	Feldspar

LEGEND:

M – Major
m – minor
D – minor to detectable
d – detectable

TABLE 10. DEGREE OF VARIABILITY REDUCTION FOR VARIOUS CRITERION AND POTENTIAL PREDICTOR VARIABLES

Criterion/ Predictor Variable	Depth	16" Normal Resistivity	64" Normal Resistivity	18'8" Lateral Resistivity	Exposure Time	Total Carbon	Total Hydrogen	Surface Area	Hydrocarbon Gas Content	Gas Per Unit Volume of Shale	Bulk Density	True Density	Open Porosity	Total Porosity
Hydrocarbon Gas Content	8	11	9	14	-	-	4	-	-	-	-	15	7	9
Gas Per Unit Volume of Shale	9	32	27	-	9	-	-	-	-	-	15	16	23	33
Bulk Density	19	73	16	-	19	47	47	36	6	26	-	-	6	-
True Density	30	62	20	-	30	28	28	25	-	31	-	-	7	20
Open Porosity	9	12	-	-	9	26	26	10	6	13	12	-	-	-
Total Porosity	7	11	-	-	7	11	11	-	-	21	-	50	-	-

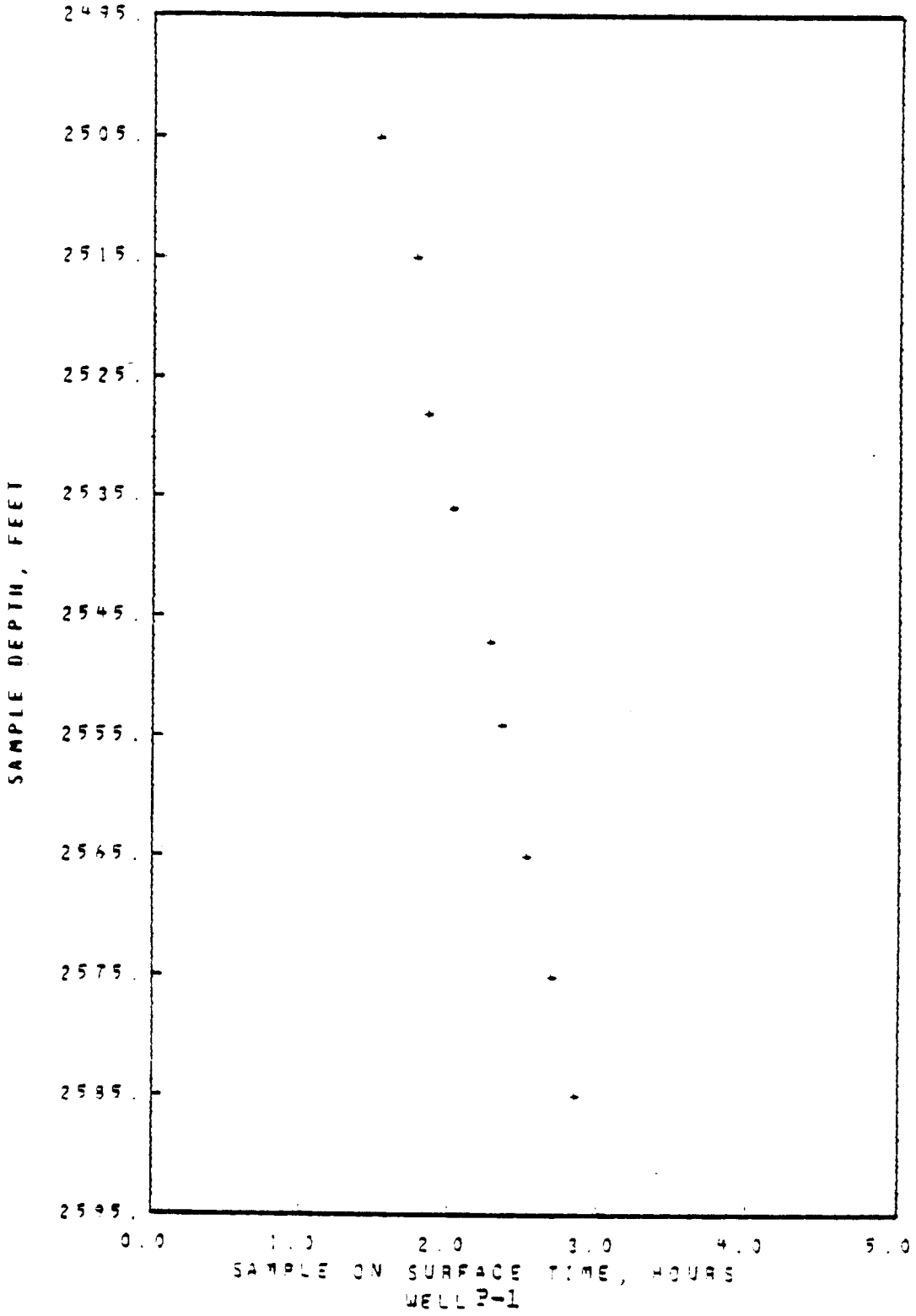


FIGURE 1. SAMPLE ON SURFACE TIME

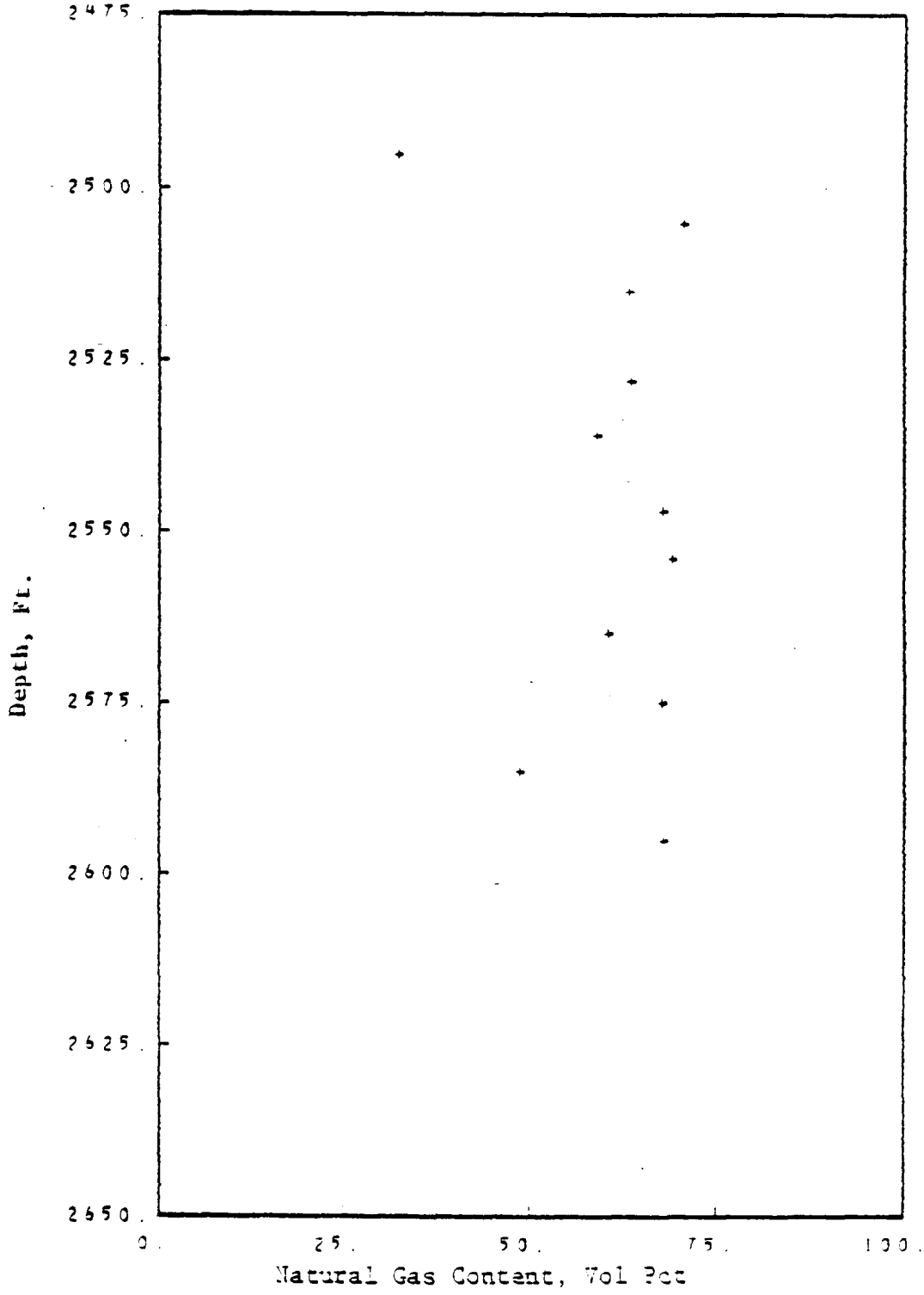


FIGURE 2. GAS CONTENT AS A FUNCTION OF SAMPLE DEPTH FOR WELL P-1

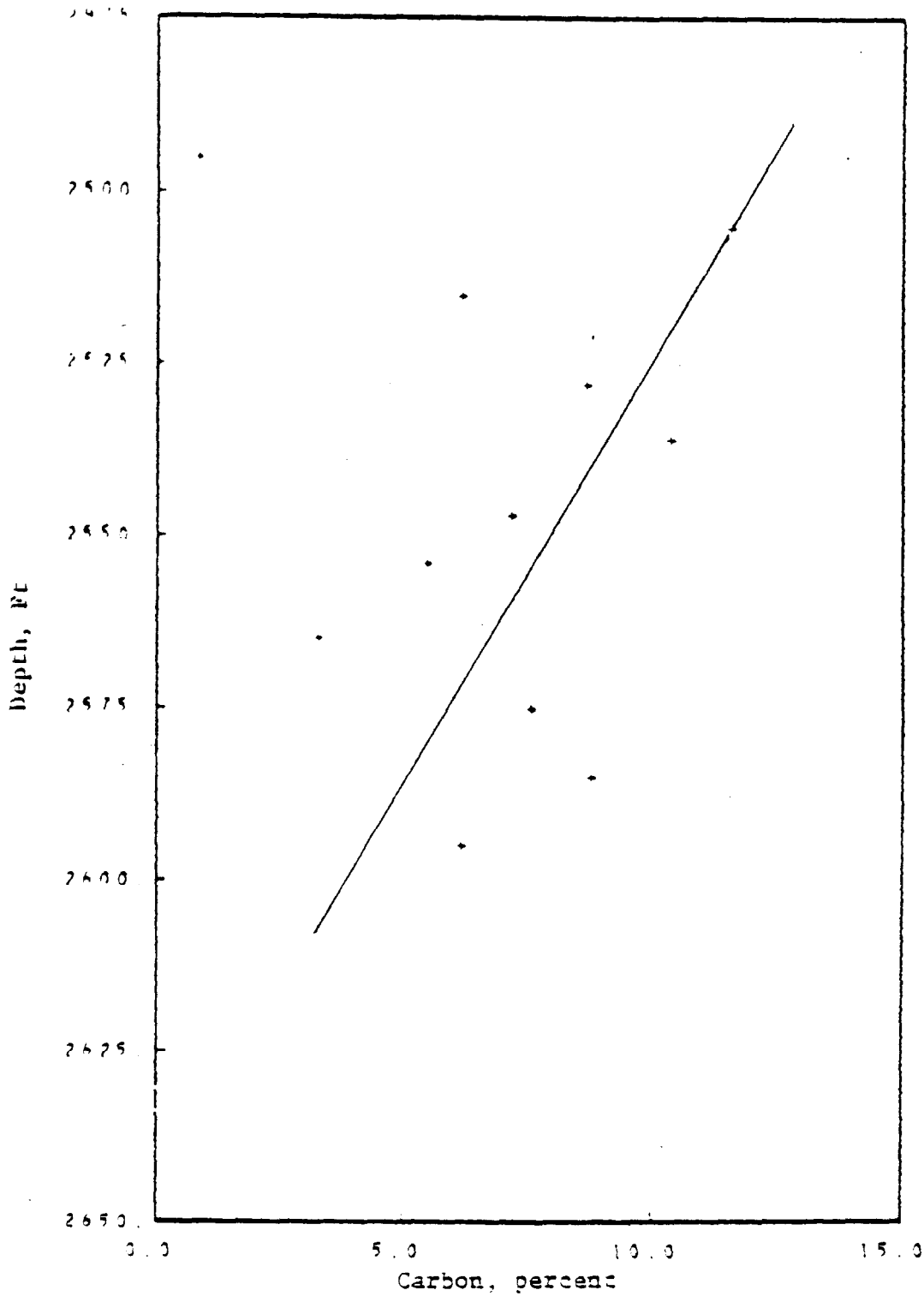


FIGURE 3. CARBON CONTENT AS A FUNCTION OF SAMPLE DEPTH FOR WELL P-1

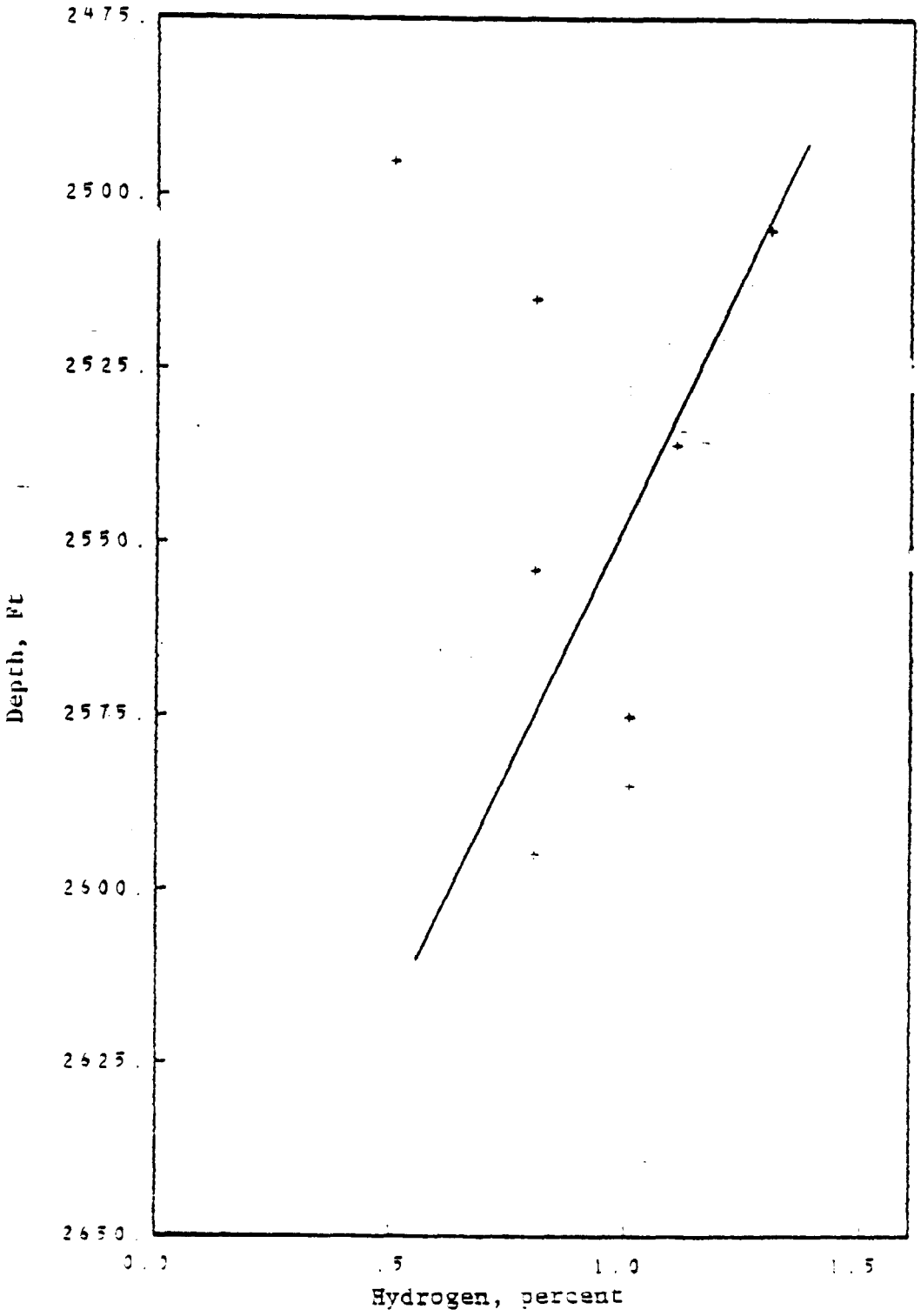


FIGURE 4. HYDROGEN CONTENT AS A FUNCTION OF SAMPLE DEPTH FOR WELL P-1

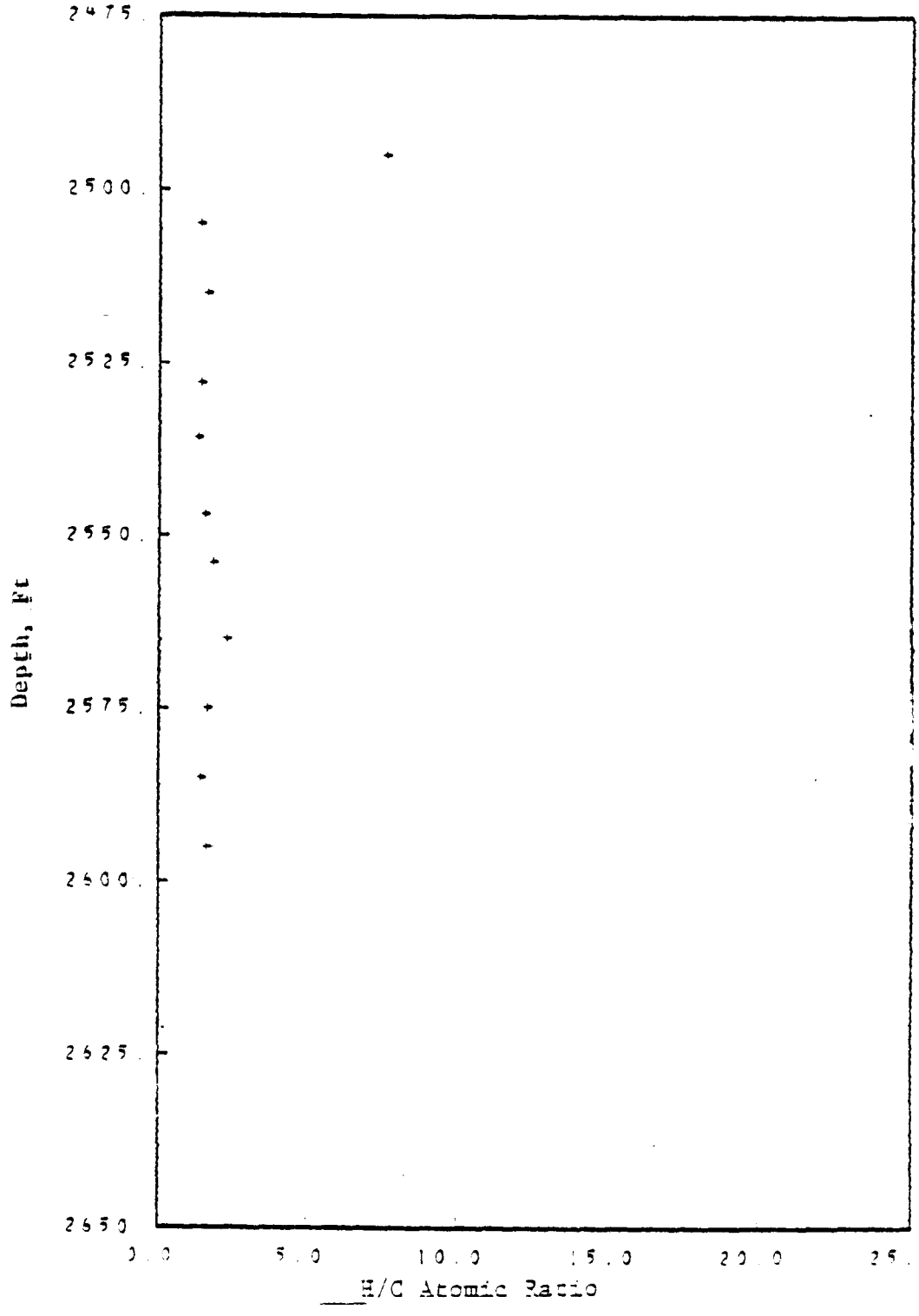


FIGURE 5. H/C ATOMIC RATIO AS A FUNCTION OF SAMPLE DEPTH FOR WELL P-1

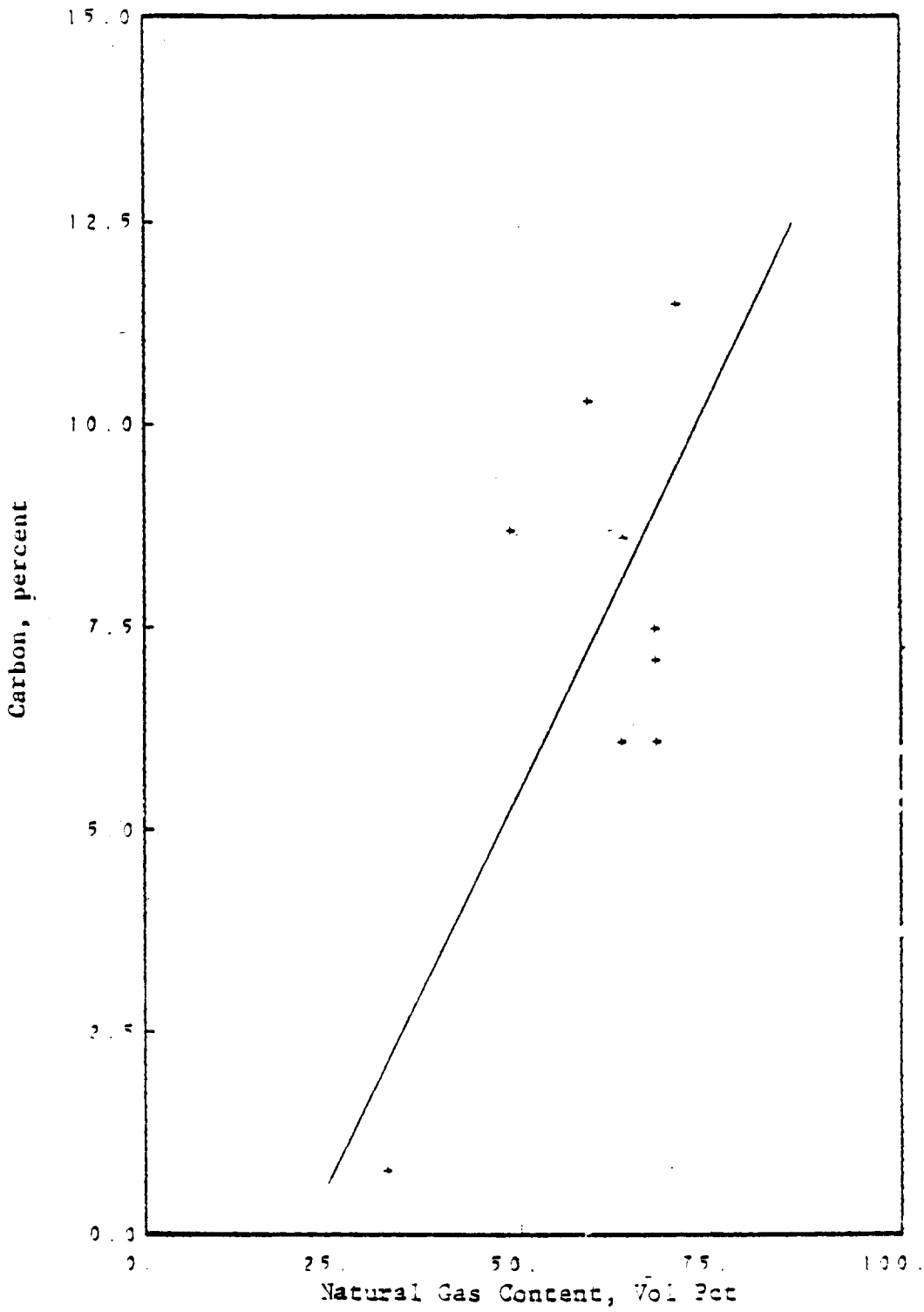


FIGURE 6. GAS CONTENT AS A FUNCTION OF CARBON CONTENT FOR WELL P-1

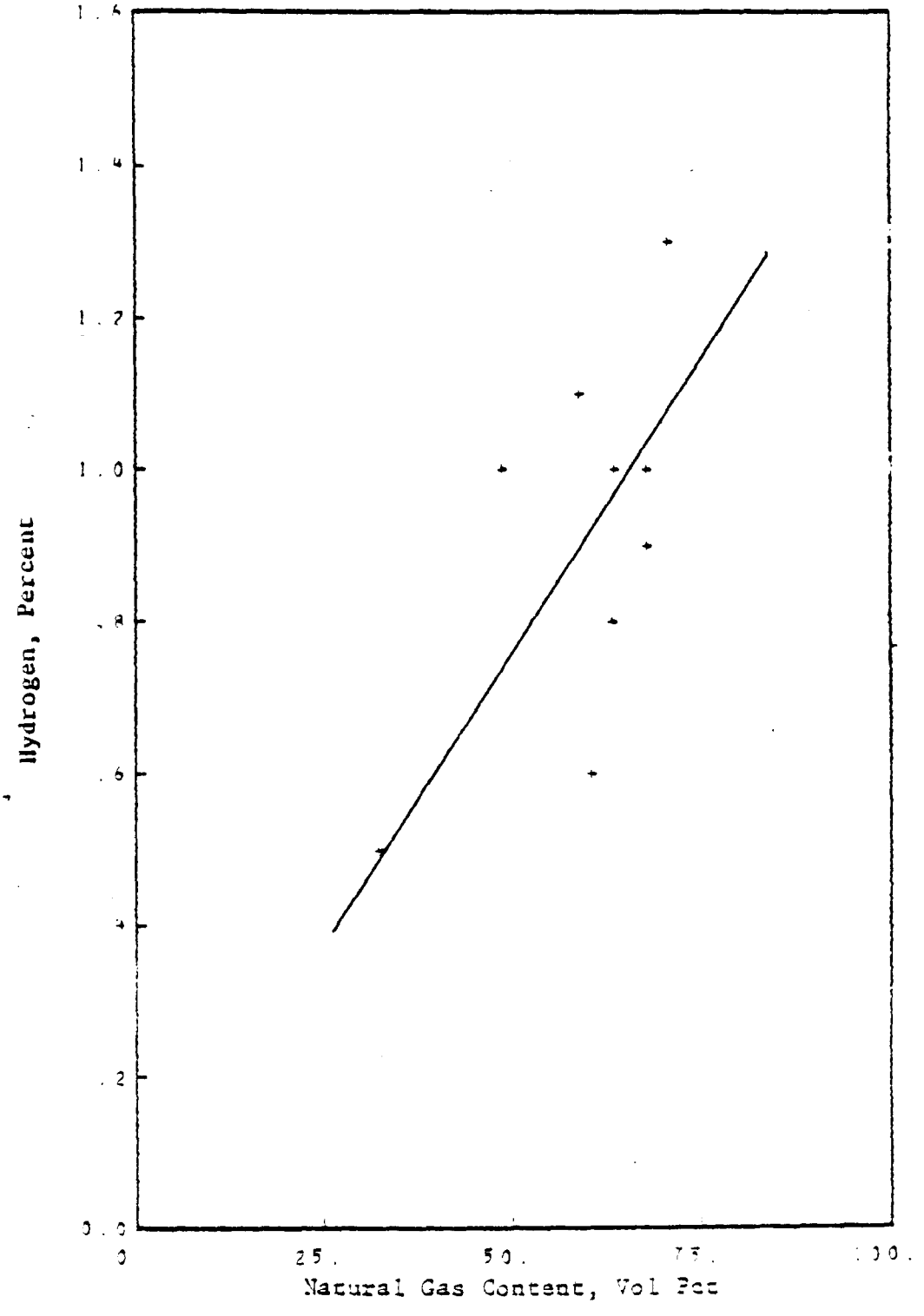


FIGURE 7. GAS CONTENT AS A FUNCTION OF HYDROGEN CONTENT FOR WELL P-1

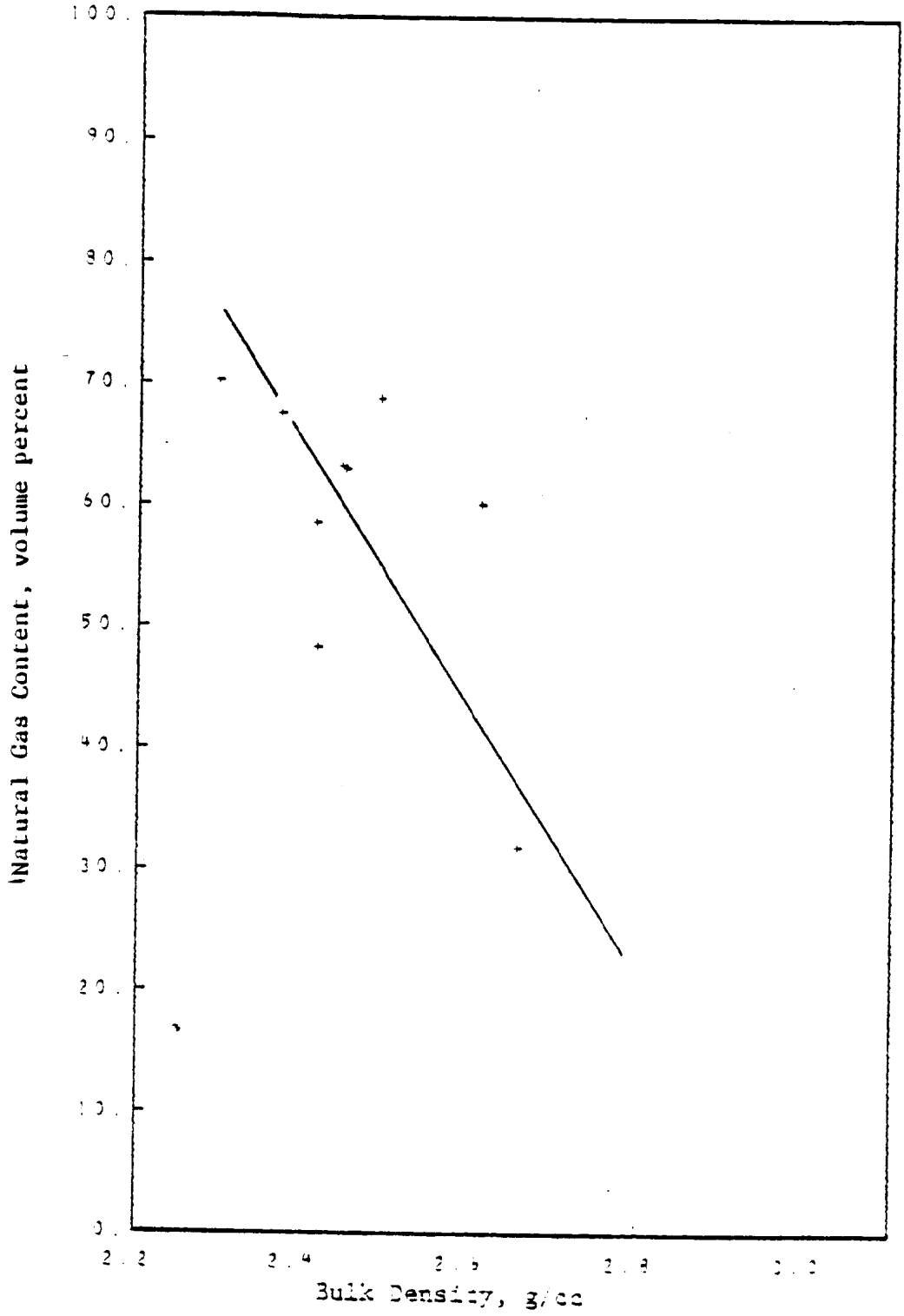


FIGURE 3. GAS CONTENT AS A FUNCTION OF BULK DENSITY FOR WELL P-1

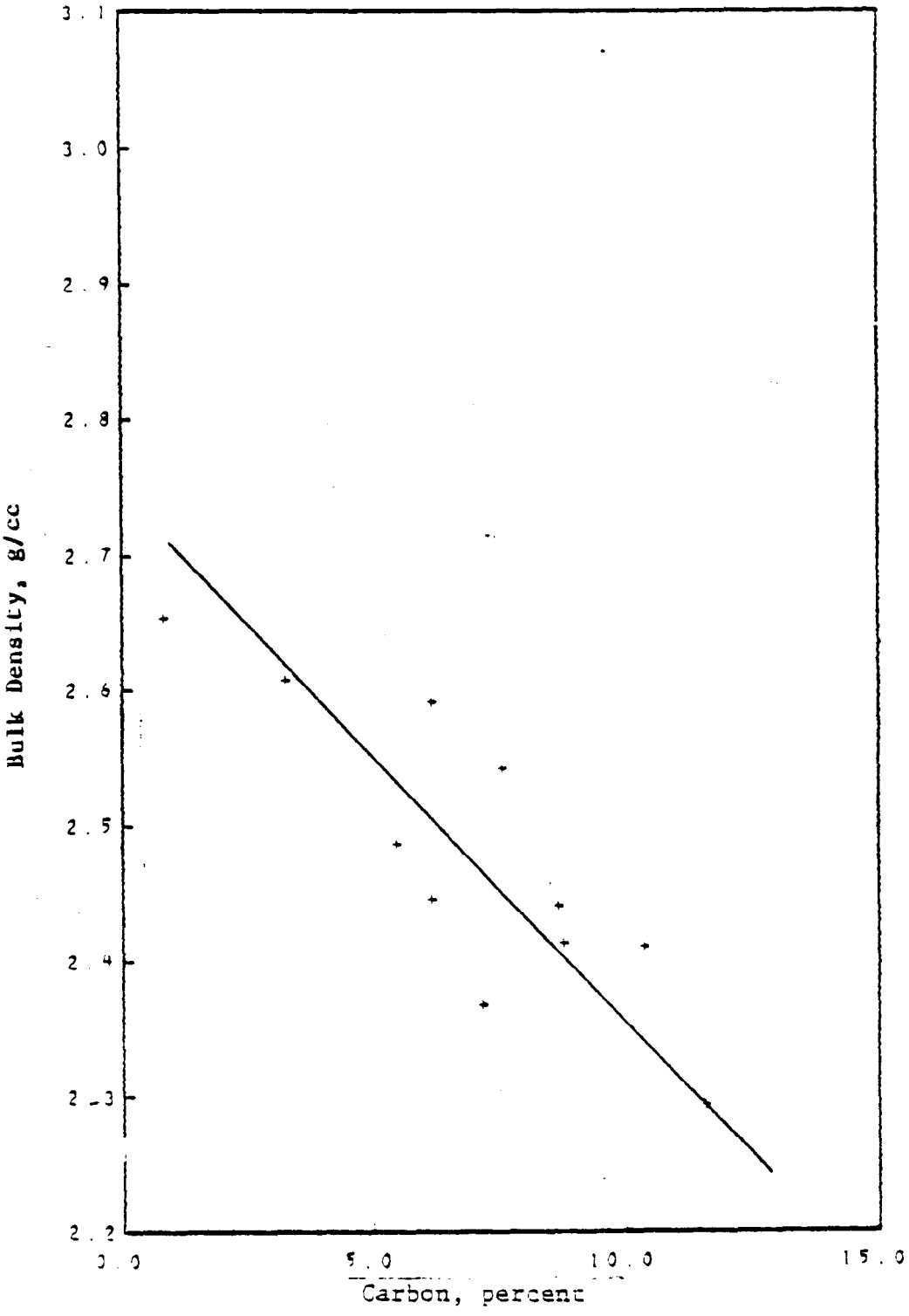


FIGURE 9. CARBON CONTENT AS A FUNCTION OF BULK DENSITY FOR WELL P-1

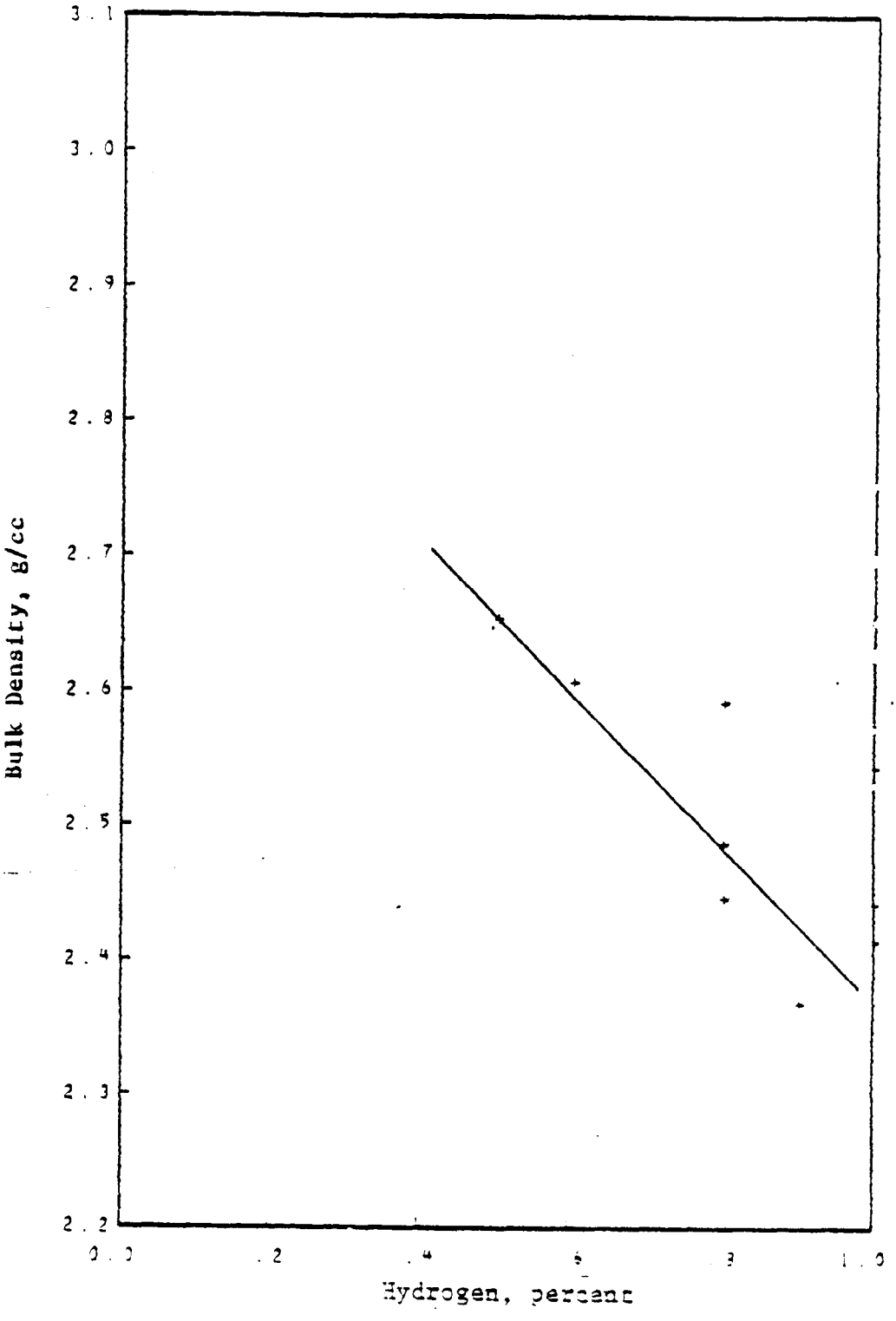
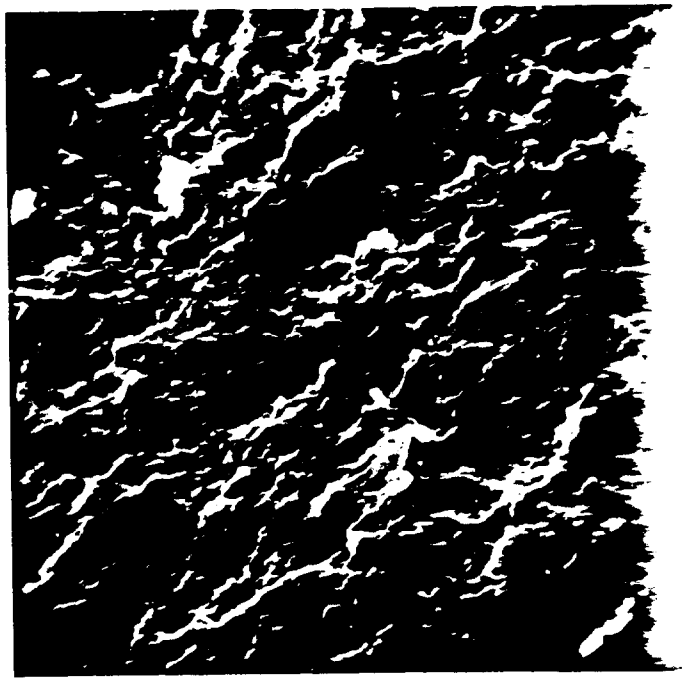
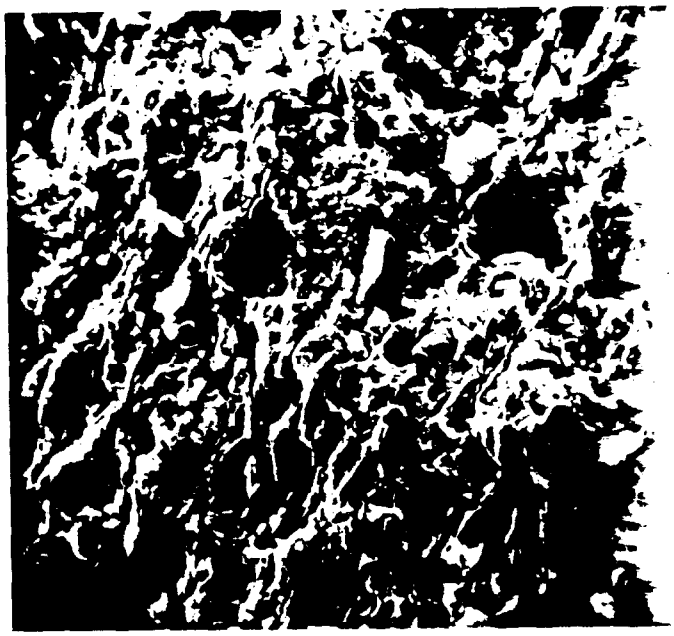


FIGURE 10. HYDROGEN CONTENT AS A FUNCTION OF BULK DENSITY FOR WELL P-1



700 X

FIGURE 11. SEM MICROGRAPH OF P-1-2495



700 X

FIGURE 12. SEM MICROPHOTOGRAPH OF P-1-2595

APPENDIX A

MERCURY INTRUSION POROSITY DATA FOR WELL P-1

POROSITY DATA FOR SAMPLE P 1-2495.

SEQUENCE NUMBER 1
PORE VOLUME .036 CC/G

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
1.	14.696	15.000	.0000	.0362	.0
2.	29.392	7.500	.0029	.0333	8.1
3.	44.088	5.000	.0033	.0329	9.1
4.	58.784	3.700	.0033	.0329	9.1
5.	73.480	3.000	.0035	.0327	9.7
6.	88.176	2.500	.0042	.0320	11.7
7.	102.872	2.100	.0048	.0314	13.3
8.	117.568	1.800	.0059	.0303	16.2
9.	132.264	1.600	.0066	.0296	18.2
10.	146.960	1.500	.0071	.0292	19.5
11.	161.656	1.400	.0076	.0286	21.1
12.	176.352	1.300	.0082	.0280	22.7
13.	191.048	1.200	.0092	.0270	25.3
14.	205.744	1.100	.0096	.0266	26.6
15.	220.440	1.000	.0102	.0260	28.2
16.	235.136	.930	.0102	.0260	28.2
17.	249.832	.880	.0114	.0248	31.5
18.	264.528	.830	.0116	.0246	32.1
19.	279.224	.790	.0121	.0241	33.4
20.	293.920	.750	.0128	.0234	35.4
25.	367.400	.600	.0135	.0227	37.3
30.	440.880	.500	.0141	.0221	39.0
35.	514.360	.430	.0154	.0208	42.5
40.	587.840	.370	.0167	.0195	46.1
45.	661.320	.330	.0174	.0188	48.1
50.	734.800	.300	.0181	.0181	50.0
55.	808.280	.270	.0189	.0173	52.3
60.	881.760	.250	.0198	.0165	54.5
65.	955.240	.230	.0205	.0158	56.5
70.	1028.720	.210	.0212	.0151	58.4
75.	1102.200	.200	.0218	.0145	60.1
80.	1175.680	.180	.0223	.0139	61.7
85.	1249.160	.170	.0226	.0136	62.3

MAR 9 0 1978

POROSITY DATA FOR SAMPLE P 1-2495.

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
90.	1322.640	.160	.0228	.0134	63.0
100.	1469.600	.150	.0235	.0127	64.9
110.	1616.560	.140	.0245	.0118	67.5
120.	1763.520	.130	.0249	.0113	68.8
130.	1910.480	.120	.0253	.0109	69.8
140.	2057.440	.110	.0256	.0106	70.8
150.	2204.400	.100	.0262	.0100	72.4
170.	2498.320	.088	.0268	.0094	74.0
180.	2645.280	.083	.0270	.0092	74.7
190.	2792.240	.079	.0274	.0088	75.6
200.	2939.200	.075	.0276	.0086	76.3
220.	3233.120	.068	.0280	.0082	77.3
240.	3527.040	.062	.0286	.0076	78.9
260.	3820.960	.057	.0288	.0074	79.5
280.	4114.880	.053	.0292	.0071	80.5
300.	4408.800	.050	.0295	.0067	81.5
330.	4849.680	.045	.0299	.0064	82.5
360.	5290.560	.041	.0303	.0059	83.8
390.	5731.440	.038	.0308	.0054	85.1
420.	6172.320	.035	.0310	.0052	85.7
450.	6613.200	.033	.0315	.0047	87.0
490.	7201.040	.030	.0322	.0040	89.0
510.	7494.960	.029	.0325	.0038	89.6
540.	7935.840	.027	.0327	.0035	90.3
590.	8670.640	.025	.0330	.0032	91.2
610.	8964.560	.024	.0333	.0029	91.9
640.	9405.440	.023	.0336	.0026	92.9
700.	10287.200	.021	.0340	.0022	93.8
740.	10875.040	.020	.0342	.0020	94.5
770.	11315.920	.019	.0345	.0018	95.1
800.	11756.800	.019	.0348	.0014	96.1
830.	12197.680	.018	.0350	.0012	96.8
860.	12638.560	.017	.0353	.0009	97.4
900.	13226.400	.017	.0355	.0007	98.1
930.	13667.280	.016	.0359	.0004	99.0
960.	13961.200	.016	.0361	.0001	99.7
1000.	14696.000	.014	.0362	.0000	100.0

MAR 9 0 1978

TABLE 49. POROSITY DATA FOR SAMPLE P 1-2505.

SEQUENCE NUMBER 2
PORE VOLUME .007 CC/G

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
1.	14.696	15.000	.0000	.0075	.0
2.	29.392	7.500	.0012	.0063	16.1
3.	44.088	5.000	.0014	.0060	19.4
4.	58.784	3.700	.0014	.0060	19.4
5.	73.480	3.000	.0014	.0060	19.4
6.	88.176	2.500	.0014	.0060	19.4
7.	102.872	2.100	.0014	.0060	19.4
8.	117.568	1.800	.0014	.0060	19.4
9.	132.264	1.600	.0014	.0060	19.4
10.	146.960	1.500	.0014	.0060	19.4
11.	161.656	1.400	.0014	.0060	19.4
12.	176.352	1.300	.0014	.0060	19.4
13.	191.048	1.200	.0024	.0051	32.3
14.	205.744	1.100	.0024	.0051	32.3
15.	220.440	1.000	.0024	.0051	32.3
16.	235.136	.930	.0024	.0051	32.3
17.	249.832	.880	.0024	.0051	32.3
18.	264.528	.830	.0024	.0051	32.3
19.	279.224	.790	.0024	.0051	32.3
20.	293.920	.750	.0024	.0051	32.3
25.	367.400	.600	.0027	.0048	35.5
30.	440.880	.500	.0030	.0045	40.3
35.	514.360	.430	.0030	.0045	40.3
40.	587.840	.370	.0030	.0045	40.3
45.	661.320	.330	.0030	.0045	40.3
50.	734.800	.300	.0031	.0043	41.9
55.	808.280	.270	.0031	.0043	41.9
60.	881.760	.250	.0031	.0043	41.9
65.	955.240	.230	.0031	.0043	41.9
70.	1028.720	.210	.0031	.0043	41.9
75.	1102.200	.200	.0033	.0042	43.5
80.	1175.680	.180	.0033	.0042	43.5
85.	1249.160	.170	.0033	.0042	43.5

DEC 21 1977
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TABLE 49. POROSITY DATA FOR SAMPLE P 1-2505. (Continued)

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
90.	1322.640	.160	.0034	.0041	45.2
100.	1469.600	.150	.0034	.0041	45.2
110.	1616.560	.140	.0034	.0041	45.2
120.	1763.520	.130	.0034	.0041	45.2
130.	1910.480	.120	.0034	.0041	45.2
140.	2057.440	.110	.0034	.0041	45.2
150.	2204.400	.100	.0034	.0041	45.2
170.	2498.320	.088	.0034	.0041	45.2
180.	2645.280	.083	.0034	.0041	45.2
190.	2792.240	.079	.0034	.0041	45.2
200.	2939.200	.075	.0034	.0041	45.2
220.	3233.120	.068	.0035	.0040	46.8
240.	3527.040	.062	.0035	.0040	46.8
260.	3820.960	.057	.0035	.0040	46.8
280.	4114.880	.053	.0035	.0040	46.8
300.	4408.800	.050	.0035	.0040	46.8
330.	4849.680	.045	.0035	.0040	46.8
360.	5290.560	.041	.0035	.0040	46.8
390.	5731.440	.038	.0035	.0040	46.8
420.	6172.320	.035	.0035	.0040	46.8
450.	6613.200	.033	.0037	.0037	50.0
480.	7201.040	.030	.0037	.0037	50.0
510.	7494.960	.029	.0039	.0036	51.6
540.	7935.840	.027	.0043	.0031	58.1
590.	8670.640	.025	.0048	.0027	64.5
610.	8964.560	.024	.0048	.0027	64.5
640.	9405.440	.023	.0048	.0027	64.5
700.	10287.200	.021	.0053	.0022	71.0
740.	10875.040	.020	.0055	.0019	74.2
770.	11315.920	.019	.0058	.0017	77.4
800.	11756.800	.019	.0060	.0014	80.6
830.	12197.680	.018	.0060	.0014	80.6
860.	12638.560	.017	.0063	.0012	83.9
900.	13226.400	.017	.0064	.0011	85.5
930.	13667.280	.016	.0067	.0007	90.3
960.	13961.200	.016	.0070	.0005	93.5
1000.	14696.000	.014	.0075	.0000	100.0

DEC 2 1 1977

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POROSITY DATA FOR SAMPLE P-1 -2515.

SEQUENCE NUMBER 3
PORE VOLUME .015 CC/G

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
1.	14.696	15.000	.0000	.0154	.0
2.	29.392	7.500	.0011	.0143	7.2
3.	44.088	5.000	.0011	.0143	7.2
4.	58.784	3.700	.0022	.0132	14.4
5.	73.480	3.000	.0022	.0132	14.4
6.	88.176	2.500	.0022	.0132	14.4
7.	102.872	2.100	.0025	.0128	16.5
8.	117.568	1.800	.0025	.0128	16.5
9.	132.264	1.600	.0033	.0120	21.6
10.	146.960	1.500	.0033	.0120	21.6
11.	161.656	1.400	.0048	.0106	30.9
12.	176.352	1.300	.0048	.0106	30.9
13.	191.048	1.200	.0048	.0106	30.9
14.	205.744	1.100	.0048	.0106	30.9
15.	220.440	1.000	.0048	.0106	30.9
16.	235.136	.930	.0048	.0106	30.9
17.	249.832	.880	.0048	.0106	30.9
18.	264.528	.830	.0048	.0106	30.9
19.	279.224	.790	.0048	.0106	30.9
20.	293.920	.750	.0048	.0106	30.9
25.	367.400	.600	.0057	.0096	37.4
30.	440.880	.500	.0065	.0088	42.4
35.	514.360	.430	.0066	.0087	43.2
40.	587.840	.370	.0072	.0082	46.8
45.	661.320	.330	.0073	.0081	47.5
50.	734.800	.300	.0074	.0080	48.2
55.	808.280	.270	.0075	.0078	48.9
60.	881.760	.250	.0075	.0078	48.9
65.	955.240	.230	.0078	.0075	51.1
70.	1028.720	.210	.0080	.0074	51.8
75.	1102.200	.200	.0081	.0073	52.5
80.	1175.680	.180	.0082	.0072	53.2
85.	1249.160	.170	.0082	.0072	53.2

DEC 21

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POROSITY DATA FOR SAMPLE P-1 -2515.

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
90.	1322.640	.160	.0083	.0071	54.0
100.	1469.600	.150	.0087	.0066	56.8
110.	1616.560	.140	.0090	.0064	58.3
120.	1763.520	.130	.0091	.0063	59.0
130.	1910.480	.120	.0092	.0062	59.7
140.	2057.440	.110	.0094	.0060	61.2
150.	2204.400	.100	.0094	.0060	61.2
170.	2498.320	.088	.0094	.0060	61.2
180.	2645.280	.083	.0097	.0056	63.3
190.	2792.240	.079	.0097	.0056	63.3
200.	2939.200	.075	.0099	.0054	64.7
220.	3233.120	.068	.0101	.0053	65.5
240.	3527.040	.062	.0105	.0049	68.3
260.	3820.960	.057	.0105	.0049	68.3
280.	4114.880	.053	.0105	.0049	68.3
300.	4408.800	.050	.0108	.0045	70.5
330.	4849.680	.045	.0108	.0045	70.5
360.	5290.560	.041	.0114	.0040	74.1
390.	5731.440	.038	.0114	.0040	74.1
420.	6172.320	.035	.0120	.0033	78.4
450.	6613.200	.033	.0122	.0032	79.1
490.	7201.040	.030	.0124	.0030	80.6
510.	7494.960	.029	.0125	.0029	81.3
540.	7935.840	.027	.0127	.0027	82.7
590.	8670.640	.025	.0132	.0022	85.6
610.	8964.560	.024	.0134	.0020	87.1
640.	9405.440	.023	.0134	.0020	87.1
700.	10287.200	.021	.0139	.0014	90.6
740.	10875.040	.020	.0139	.0014	90.6
770.	11315.920	.019	.0140	.0013	91.4
800.	11756.800	.019	.0146	.0008	95.0
830.	12197.680	.018	.0146	.0008	95.0
860.	12638.560	.017	.0147	.0007	95.7
900.	13226.400	.017	.0147	.0007	95.7
930.	13667.280	.016	.0151	.0002	98.6
960.	13961.200	.016	.0151	.0002	98.6
1000.	14696.000	.014	.0154	.0000	100.0

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POROSITY DATA FOR SAMPLE P 1-2520.

SEQUENCE NUMBER 4
PORE VOLUME .016 CC/G

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
1.	14.696	15.000	.0000	.0161	.0
2.	29.392	7.500	.0011	.0150	7.0
3.	44.088	5.000	.0040	.0121	24.6
4.	58.784	3.700	.0042	.0119	26.1
5.	73.480	3.000	.0043	.0118	26.8
6.	88.176	2.500	.0045	.0116	28.2
7.	102.872	2.100	.0052	.0109	32.4
8.	117.568	1.800	.0054	.0107	33.8
9.	132.264	1.600	.0054	.0107	33.8
10.	146.960	1.500	.0056	.0106	34.5
11.	161.656	1.400	.0065	.0096	40.1
12.	176.352	1.300	.0065	.0096	40.1
13.	191.048	1.200	.0065	.0096	40.1
14.	205.744	1.100	.0065	.0096	40.1
15.	220.440	1.000	.0066	.0095	40.8
16.	235.136	.930	.0066	.0095	40.8
17.	249.832	.880	.0066	.0095	40.8
18.	264.528	.830	.0074	.0087	45.8
19.	279.224	.790	.0074	.0087	45.8
20.	293.920	.750	.0074	.0087	45.8
25.	367.400	.600	.0076	.0085	47.2
30.	440.880	.500	.0079	.0082	49.3
35.	514.360	.430	.0081	.0081	50.0
40.	587.840	.370	.0082	.0079	50.7
45.	661.320	.330	.0083	.0078	51.4
50.	734.800	.300	.0085	.0076	52.8
55.	808.280	.270	.0087	.0074	54.2
60.	881.760	.250	.0090	.0072	55.6
65.	955.240	.230	.0091	.0070	56.3
70.	1028.720	.210	.0093	.0068	57.7
75.	1102.200	.200	.0094	.0067	58.5
80.	1175.680	.180	.0095	.0066	59.2
85.	1249.160	.170	.0096	.0065	59.9

DEC 21 1977

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POROSITY DATA FOR SAMPLE P 1-2528.

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
90.	1322.640	.160	.0098	.0064	60.6
100.	1469.600	.150	.0099	.0062	61.3
110.	1616.560	.140	.0100	.0061	62.0
120.	1763.520	.130	.0102	.0059	63.4
130.	1910.480	.120	.0102	.0059	63.4
140.	2057.440	.110	.0104	.0057	64.8
150.	2204.400	.100	.0104	.0057	64.8
170.	2498.320	.088	.0108	.0053	66.9
180.	2645.280	.083	.0108	.0053	66.9
190.	2792.240	.079	.0110	.0051	68.3
200.	2939.200	.075	.0111	.0050	69.0
220.	3233.120	.068	.0111	.0050	69.0
240.	3527.040	.062	.0114	.0048	70.4
260.	3820.960	.057	.0119	.0042	73.9
280.	4114.880	.053	.0119	.0042	73.9
300.	4408.800	.050	.0119	.0042	73.9
330.	4849.680	.045	.0121	.0040	75.4
360.	5290.560	.041	.0123	.0039	76.1
390.	5731.440	.038	.0126	.0035	78.2
420.	6172.320	.035	.0127	.0034	78.9
450.	6613.200	.033	.0131	.0031	81.0
490.	7201.040	.030	.0131	.0031	81.0
510.	7494.960	.029	.0135	.0026	83.8
540.	7935.840	.027	.0135	.0026	83.8
590.	8670.640	.025	.0138	.0023	85.9
610.	8964.560	.024	.0138	.0023	85.9
640.	9405.440	.023	.0140	.0022	86.6
700.	10287.200	.021	.0143	.0018	88.7
740.	10875.040	.020	.0145	.0016	90.1
770.	11315.920	.019	.0148	.0014	91.5
800.	11756.800	.019	.0150	.0011	93.0
830.	12197.680	.018	.0150	.0011	93.0
860.	12638.560	.017	.0150	.0011	93.0
900.	13226.400	.017	.0153	.0008	95.1
930.	13667.280	.016	.0154	.0007	95.8
960.	13961.200	.016	.0157	.0005	97.2
1000.	14696.000	.014	.0161	.0000	100.0

DEC 21 1977

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POROSITY DATA FOR SAMPLE P-1 -2536.

SEQUENCE NUMBER 5
PORE VOLUME .016 CC/G

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
1.	14.696	15.000	.0000	.0164	0.0
2.	29.392	7.500	.0002	.0162	1.3
3.	44.088	5.000	.0012	.0152	7.5
4.	58.784	3.700	.0022	.0143	13.1
5.	73.480	3.000	.0022	.0143	13.1
6.	88.176	2.500	.0022	.0143	13.1
7.	102.872	2.100	.0039	.0125	23.8
8.	117.568	1.800	.0040	.0124	24.4
9.	132.264	1.600	.0041	.0123	25.0
10.	146.960	1.500	.0042	.0122	25.6
11.	161.656	1.400	.0043	.0121	26.3
12.	176.352	1.300	.0043	.0121	26.3
13.	191.048	1.200	.0044	.0120	26.9
14.	205.744	1.100	.0044	.0120	26.9
15.	220.440	1.000	.0048	.0116	29.4
16.	235.136	.930	.0048	.0116	29.4
17.	249.832	.880	.0048	.0116	29.4
18.	264.528	.830	.0048	.0116	29.4
19.	279.224	.790	.0055	.0109	33.8
20.	293.920	.750	.0055	.0109	33.8
25.	367.400	.600	.0062	.0103	37.5
30.	440.880	.500	.0072	.0092	43.8
35.	514.360	.430	.0074	.0090	45.0
40.	587.840	.370	.0077	.0087	46.9
45.	661.320	.330	.0080	.0084	48.8
50.	734.800	.300	.0082	.0082	50.0
55.	808.280	.270	.0082	.0082	50.0
60.	881.760	.250	.0082	.0082	50.0
65.	955.240	.230	.0084	.0080	51.3
70.	1028.720	.210	.0086	.0078	52.5
75.	1102.200	.200	.0089	.0075	54.4
80.	1175.680	.180	.0091	.0073	55.6
85.	1249.160	.170	.0091	.0073	55.6

DEC 21 1977

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POROSITY DATA FOR SAMPLE P-1 -2536.

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
90.	1322.640	.160	.0092	.0072	56.3
100.	1469.600	.150	.0093	.0071	56.9
110.	1616.560	.140	.0097	.0067	59.4
120.	1763.520	.130	.0099	.0065	60.6
130.	1910.480	.120	.0101	.0063	61.9
140.	2057.440	.110	.0103	.0062	62.5
150.	2204.400	.100	.0103	.0062	62.5
170.	2498.320	.088	.0105	.0059	63.8
180.	2645.280	.083	.0105	.0059	63.8
190.	2792.240	.079	.0106	.0058	64.4
200.	2939.200	.075	.0106	.0058	64.4
220.	3233.120	.068	.0112	.0052	68.1
240.	3527.040	.062	.0115	.0049	70.0
260.	3820.960	.057	.0115	.0049	70.0
280.	4114.880	.053	.0116	.0048	70.6
300.	4408.800	.050	.0120	.0044	73.1
330.	4849.680	.045	.0122	.0042	74.4
360.	5290.560	.041	.0124	.0040	75.6
390.	5731.440	.038	.0125	.0039	76.3
420.	6172.320	.035	.0127	.0037	77.5
450.	6613.200	.033	.0127	.0037	77.5
490.	7201.040	.030	.0134	.0030	81.9
510.	7494.960	.029	.0134	.0030	81.9
540.	7935.840	.027	.0135	.0029	82.5
590.	8670.640	.025	.0139	.0025	85.0
610.	8964.560	.024	.0139	.0025	85.0
640.	9405.440	.023	.0140	.0024	85.6
700.	10287.200	.021	.0146	.0018	88.8
740.	10875.040	.020	.0146	.0018	88.8
770.	11315.920	.019	.0152	.0012	92.5
800.	11756.800	.019	.0153	.0011	93.1
830.	12197.680	.018	.0155	.0009	94.4
860.	12638.560	.017	.0156	.0008	95.0
900.	13226.400	.017	.0158	.0006	96.2
930.	13667.280	.016	.0160	.0004	97.5
960.	13961.200	.016	.0162	.0002	98.8
1000.	14696.000	.014	.0164	.0000	100.0

DEC 21 1977

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POROSITY DATA FOR SAMPLE P 1-2547.

SEQUENCE NUMBER 5
PORE VOLUME .019 CC/G

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
1.	14.696	15.000	.0000	.0186	.0
2.	29.392	7.500	.0025	.0162	13.2
3.	44.088	5.000	.0034	.0152	18.4
4.	58.784	3.700	.0039	.0147	21.1
5.	73.480	3.000	.0047	.0140	25.0
6.	88.176	2.500	.0050	.0136	27.0
7.	102.872	2.100	.0053	.0134	28.3
8.	117.568	1.800	.0059	.0127	31.6
9.	132.264	1.600	.0062	.0124	33.6
10.	146.960	1.500	.0064	.0123	34.2
11.	161.656	1.400	.0066	.0120	35.5
12.	176.352	1.300	.0069	.0118	36.8
13.	191.048	1.200	.0072	.0114	38.8
14.	205.744	1.100	.0076	.0110	40.8
15.	220.440	1.000	.0077	.0109	41.4
16.	235.136	.930	.0080	.0107	42.8
17.	249.832	.880	.0081	.0105	43.4
18.	264.528	.830	.0081	.0105	43.4
19.	279.224	.790	.0083	.0103	44.7
20.	293.920	.750	.0085	.0102	45.4
25.	367.400	.600	.0087	.0099	46.7
30.	440.880	.500	.0093	.0093	50.0
35.	514.360	.430	.0097	.0089	52.0
40.	587.840	.370	.0100	.0086	53.9
45.	661.320	.330	.0102	.0085	54.6
50.	734.800	.300	.0103	.0083	55.3
55.	808.280	.270	.0105	.0081	56.6
60.	881.760	.250	.0108	.0078	57.9
65.	955.240	.230	.0110	.0076	59.2
70.	1028.720	.210	.0113	.0074	60.5
75.	1102.200	.200	.0115	.0071	61.8
80.	1175.680	.180	.0118	.0069	63.2
85.	1249.160	.170	.0119	.0067	63.8

DEC 21 1977
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POROSITY DATA FOR SAMPLE P 1-2547.

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
90.	1322.640	.160	.0120	.0066	64.5
100.	1469.600	.150	.0120	.0066	64.5
110.	1616.560	.140	.0123	.0064	65.8
120.	1763.520	.130	.0123	.0064	65.8
130.	1910.480	.120	.0126	.0060	67.8
140.	2057.440	.110	.0126	.0060	67.8
150.	2204.400	.100	.0127	.0059	68.4
170.	2498.320	.088	.0130	.0056	69.7
180.	2645.280	.083	.0132	.0054	71.1
190.	2792.240	.079	.0132	.0054	71.1
200.	2939.200	.075	.0135	.0051	72.4
220.	3233.120	.068	.0135	.0051	72.4
240.	3527.040	.062	.0137	.0049	73.7
260.	3820.960	.057	.0140	.0047	75.0
280.	4114.880	.053	.0142	.0044	76.3
300.	4408.800	.050	.0145	.0042	77.6
330.	4849.680	.045	.0146	.0040	78.3
360.	5290.560	.041	.0148	.0038	79.6
390.	5731.440	.038	.0152	.0034	81.6
420.	6172.320	.035	.0152	.0034	81.6
450.	6613.200	.033	.0153	.0033	82.2
490.	7201.040	.030	.0157	.0029	84.2
510.	7494.960	.029	.0160	.0026	86.2
540.	7935.840	.027	.0163	.0023	87.5
590.	8670.640	.025	.0164	.0022	88.2
610.	8964.560	.024	.0164	.0022	88.2
640.	9405.440	.023	.0167	.0020	89.5
700.	10287.200	.021	.0170	.0016	91.4
740.	10875.040	.020	.0174	.0012	93.4
770.	11315.920	.019	.0174	.0012	93.4
800.	11756.800	.019	.0174	.0012	93.4
830.	12197.680	.018	.0176	.0010	94.7
860.	12638.560	.017	.0179	.0007	96.1
900.	13226.400	.017	.0179	.0007	96.1
930.	13667.280	.016	.0181	.0005	97.4
960.	13961.200	.016	.0181	.0005	97.4
1000.	14696.000	.014	.0186	.0000	100.0

DEC 21 1

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POROSITY DATA FOR SAMPLE P 1-2554.

SEQUENCE NUMBER 7
PORE VOLUME .009 CC/G

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
1.	14.696	15.000	.0000	.0091	.0
2.	29.392	7.500	.0000	.0091	.0
3.	44.088	5.000	.0005	.0086	5.3
4.	58.784	3.700	.0005	.0086	5.3
5.	73.480	3.000	.0007	.0084	7.9
6.	88.176	2.500	.0008	.0083	8.8
7.	102.872	2.100	.0009	.0082	9.6
8.	117.568	1.800	.0010	.0082	10.5
9.	132.264	1.600	.0010	.0082	10.5
10.	146.960	1.500	.0010	.0081	11.4
11.	161.656	1.400	.0014	.0078	14.9
12.	176.352	1.300	.0014	.0078	14.9
13.	191.048	1.200	.0014	.0077	15.8
14.	205.744	1.100	.0014	.0077	15.8
15.	220.440	1.000	.0016	.0075	17.5
16.	235.136	.930	.0016	.0075	17.5
17.	249.832	.880	.0018	.0073	20.2
18.	264.528	.830	.0018	.0073	20.2
19.	279.224	.790	.0018	.0073	20.2
20.	293.920	.750	.0021	.0070	22.8
25.	367.400	.600	.0026	.0065	28.9
30.	440.880	.500	.0028	.0063	30.7
35.	514.360	.430	.0030	.0061	33.3
40.	587.840	.370	.0032	.0059	35.1
45.	661.320	.330	.0032	.0059	35.1
50.	734.800	.300	.0033	.0058	36.0
55.	808.280	.270	.0033	.0058	36.0
60.	881.760	.250	.0038	.0054	41.2
65.	955.240	.230	.0038	.0054	41.2
70.	1028.720	.210	.0038	.0054	41.2
75.	1102.200	.200	.0038	.0054	41.2
80.	1175.680	.180	.0038	.0054	41.2
85.	1249.160	.170	.0038	.0053	42.1

DEC 21 1977

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POROSITY DATA FOR SAMPLE P 1-2554.

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
90.	1322.640	.160	.0040	.0051	43.9
100.	1469.600	.150	.0040	.0051	43.9
110.	1616.560	.140	.0042	.0049	46.5
120.	1763.520	.130	.0045	.0046	49.1
130.	1910.440	.120	.0046	.0045	50.9
140.	2057.440	.110	.0047	.0044	51.8
150.	2204.400	.100	.0048	.0043	52.6
170.	2498.320	.088	.0048	.0043	52.6
180.	2645.280	.083	.0048	.0043	52.6
190.	2792.240	.079	.0049	.0042	53.5
200.	2939.200	.075	.0049	.0042	53.5
220.	3233.120	.068	.0051	.0040	56.1
240.	3527.040	.062	.0051	.0040	56.1
260.	3820.960	.057	.0055	.0036	60.5
280.	4114.880	.053	.0055	.0036	60.5
300.	4408.800	.050	.0055	.0036	60.5
330.	4849.680	.045	.0065	.0026	71.1
360.	5290.560	.041	.0065	.0026	71.1
390.	5731.440	.038	.0066	.0025	72.8
420.	6172.320	.035	.0068	.0023	74.6
450.	6613.200	.033	.0068	.0023	74.6
490.	7201.040	.030	.0068	.0023	74.6
510.	7494.960	.029	.0070	.0021	77.2
540.	7935.840	.027	.0071	.0020	78.1
590.	8670.640	.025	.0071	.0020	78.1
610.	8964.560	.024	.0071	.0020	78.1
640.	9405.440	.023	.0078	.0014	85.1
700.	10287.200	.021	.0079	.0012	86.8
740.	10875.040	.020	.0084	.0007	92.1
770.	11315.920	.019	.0084	.0007	92.1
800.	11756.800	.019	.0084	.0007	92.1
830.	12197.680	.018	.0086	.0006	93.9
860.	12638.560	.017	.0086	.0006	93.9
900.	13226.400	.017	.0086	.0006	93.9
930.	13667.280	.016	.0086	.0006	93.9
960.	13961.200	.016	.0086	.0005	94.7
1000.	14696.000	.014	.0091	.0000	100.0

DEC 21 1977

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POROSITY DATA FOR SAMPLE P 1-2565.

SEQUENCE NUMBER 8
PORE VOLUME .015 CC/G

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
1.	14.696	15.000	.0000	.0147	.0
2.	29.392	7.500	.0000	.0147	.0
3.	44.088	5.000	.0000	.0147	.0
4.	58.784	3.700	.0007	.0140	4.5
5.	73.480	3.000	.0010	.0137	6.8
6.	88.176	2.500	.0011	.0136	7.6
7.	102.872	2.100	.0014	.0133	9.8
8.	117.568	1.800	.0017	.0130	11.4
9.	132.264	1.600	.0021	.0126	14.4
10.	146.960	1.500	.0023	.0124	15.9
11.	161.656	1.400	.0023	.0124	15.9
12.	176.352	1.300	.0029	.0118	19.7
13.	191.048	1.200	.0030	.0117	20.5
14.	205.744	1.100	.0035	.0113	23.5
15.	220.440	1.000	.0036	.0111	24.2
16.	235.136	.930	.0037	.0110	25.0
17.	249.832	.880	.0037	.0110	25.0
18.	264.528	.830	.0040	.0107	27.3
19.	279.224	.790	.0040	.0107	27.3
20.	293.920	.750	.0040	.0107	27.3
25.	367.400	.600	.0052	.0095	35.6
30.	440.880	.500	.0061	.0086	41.7
35.	514.360	.430	.0065	.0082	43.9
40.	587.840	.370	.0067	.0080	45.5
45.	661.320	.330	.0068	.0079	46.2
50.	734.800	.300	.0069	.0078	47.0
55.	808.280	.270	.0072	.0075	49.2
60.	881.760	.250	.0076	.0071	51.5
65.	955.240	.230	.0077	.0070	52.3
70.	1028.720	.210	.0078	.0069	53.0
75.	1102.200	.200	.0078	.0069	53.0
80.	1175.680	.180	.0078	.0069	53.0
85.	1249.160	.170	.0080	.0067	54.5

DEC 21 1977

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POROSITY DATA FOR SAMPLE P 1-2565.

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
90.	1322.640	.160	.0084	.0064	56.8
100.	1469.600	.150	.0087	.0060	59.1
110.	1616.560	.140	.0087	.0060	59.1
120.	1763.520	.130	.0089	.0058	60.6
130.	1910.480	.120	.0090	.0057	61.4
140.	2057.440	.110	.0091	.0056	62.1
150.	2204.400	.100	.0091	.0056	62.1
170.	2498.320	.088	.0098	.0049	66.7
180.	2645.280	.083	.0099	.0048	67.4
190.	2792.240	.079	.0099	.0048	67.4
200.	2939.200	.075	.0099	.0048	67.4
220.	3233.120	.068	.0101	.0046	68.9
240.	3527.040	.062	.0106	.0041	72.0
260.	3820.960	.057	.0108	.0039	73.5
280.	4114.880	.053	.0108	.0039	73.5
300.	4408.800	.050	.0111	.0036	75.8
330.	4849.680	.045	.0113	.0035	76.5
360.	5290.560	.041	.0113	.0035	76.5
390.	5731.440	.038	.0118	.0029	80.3
420.	6172.320	.035	.0118	.0029	80.3
450.	6613.200	.033	.0118	.0029	80.3
490.	7201.040	.030	.0120	.0027	81.8
510.	7494.960	.029	.0120	.0027	81.8
540.	7935.840	.027	.0125	.0022	84.8
590.	8670.640	.025	.0127	.0020	86.4
610.	8964.560	.024	.0129	.0018	87.9
640.	9405.440	.023	.0129	.0018	87.9
700.	10287.200	.021	.0131	.0016	89.4
740.	10875.040	.020	.0135	.0012	91.7
770.	11315.920	.019	.0137	.0010	93.2
800.	11756.800	.019	.0137	.0010	93.2
830.	12197.680	.018	.0139	.0008	94.7
860.	12638.560	.017	.0142	.0006	96.2
900.	13226.400	.017	.0142	.0006	96.2
930.	13667.280	.016	.0145	.0002	98.5
960.	13961.200	.016	.0145	.0002	98.5
1000.	14696.000	.014	.0147	.0000	100.0

DEC 21 1977

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POROSITY DATA FOR SAMPLE P 1-2575.

SEQUENCE NUMBER 9
PORE VOLUME .018 CC/G

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
1.	14.696	15.000	.0004	.0171	2.4
2.	29.392	7.500	.0014	.0161	8.0
3.	44.088	5.000	.0028	.0147	16.0
4.	58.784	3.700	.0029	.0146	16.8
5.	73.480	3.000	.0036	.0139	20.8
6.	88.176	2.500	.0043	.0132	24.8
7.	102.872	2.100	.0046	.0129	26.4
8.	117.568	1.800	.0053	.0122	30.4
9.	132.264	1.600	.0055	.0121	31.2
10.	146.960	1.500	.0056	.0119	32.0
11.	161.656	1.400	.0056	.0119	32.0
12.	176.352	1.300	.0060	.0115	34.4
13.	191.048	1.200	.0060	.0115	34.4
14.	205.744	1.100	.0060	.0115	34.4
15.	220.440	1.000	.0067	.0108	38.4
16.	235.136	.930	.0067	.0108	38.4
17.	249.832	.880	.0069	.0107	39.2
18.	264.528	.830	.0069	.0107	39.2
19.	279.224	.790	.0069	.0107	39.2
20.	293.920	.750	.0083	.0093	47.2
25.	367.400	.600	.0087	.0088	49.6
30.	440.880	.500	.0091	.0084	52.0
35.	514.360	.430	.0093	.0083	52.8
40.	587.840	.370	.0094	.0081	53.6
45.	661.320	.330	.0095	.0080	54.4
50.	734.800	.300	.0097	.0079	55.2
55.	808.280	.270	.0098	.0077	56.0
60.	881.760	.250	.0101	.0074	57.6
65.	955.240	.230	.0102	.0073	58.4
70.	1028.720	.210	.0104	.0071	59.2
75.	1102.200	.200	.0104	.0071	59.2
80.	1175.680	.180	.0104	.0071	59.2
85.	1249.160	.170	.0107	.0069	60.8

DEC 21 1977
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POROSITY DATA FOR SAMPLE P 1-2575.

PRESSURE ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
90.	1322.640	.160	.0107	.0069	60.8
100.	1469.600	.150	.0112	.0063	64.0
110.	1616.560	.140	.0112	.0063	64.0
120.	1763.520	.130	.0114	.0062	64.8
130.	1910.480	.120	.0114	.0062	64.8
140.	2057.440	.110	.0114	.0062	64.8
150.	2204.400	.100	.0115	.0060	65.6
170.	2498.320	.088	.0123	.0052	70.4
180.	2645.280	.083	.0123	.0052	70.4
190.	2792.240	.079	.0123	.0052	70.4
200.	2939.200	.075	.0126	.0049	72.0
220.	3233.120	.068	.0128	.0048	72.8
240.	3527.040	.062	.0128	.0048	72.8
260.	3820.960	.057	.0130	.0045	74.4
280.	4114.880	.053	.0130	.0045	74.4
300.	4408.800	.050	.0130	.0045	74.4
330.	4849.680	.045	.0136	.0039	77.6
360.	5290.560	.041	.0137	.0038	78.4
390.	5731.440	.038	.0140	.0035	80.0
420.	6172.320	.035	.0143	.0032	81.6
450.	6613.200	.033	.0143	.0032	81.6
490.	7201.040	.030	.0144	.0031	82.4
510.	7494.960	.029	.0147	.0028	84.0
540.	7935.840	.027	.0147	.0028	84.0
590.	8670.640	.025	.0153	.0022	87.2
610.	8964.560	.024	.0156	.0020	88.8
640.	9405.440	.023	.0158	.0017	90.4
700.	10287.200	.021	.0160	.0015	91.2
740.	10875.040	.020	.0163	.0013	92.8
770.	11315.920	.019	.0163	.0013	92.8
800.	11756.800	.019	.0165	.0010	94.4
830.	12197.680	.018	.0168	.0007	96.0
860.	12638.560	.017	.0168	.0007	96.0
900.	13226.400	.017	.0171	.0004	97.6
930.	13667.280	.016	.0171	.0004	97.6
960.	13961.200	.016	.0175	.0000	100.0
1000.	14696.000	.014	.0175	.0000	100.0

81

DEC 21

00

POROSITY DATA FOR SAMPLE P 1-2585.

[illegible] 10
[illegible] .015 CC/G

[illegible]	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
1.	19.656	15.000	.0000	.0160	.0
2.	29.592	7.500	.0012	.0148	7.4
3.	44.088	5.000	.0021	.0139	13.2
4.	54.704	3.700	.0038	.0122	23.5
5.	73.480	3.000	.0041	.0119	25.7
6.	88.176	2.500	.0045	.0115	27.9
7.	102.872	2.100	.0045	.0115	27.9
8.	117.568	1.800	.0053	.0107	33.1
9.	132.264	1.600	.0053	.0107	33.1
10.	146.960	1.500	.0053	.0107	33.1
11.	161.656	1.400	.0053	.0107	33.1
12.	176.352	1.300	.0055	.0104	34.6
13.	191.048	1.200	.0055	.0104	34.6
14.	205.744	1.100	.0061	.0099	38.2
15.	220.440	1.000	.0061	.0099	38.2
16.	235.136	.930	.0061	.0099	38.2
17.	249.832	.880	.0063	.0096	39.7
18.	264.528	.830	.0063	.0096	39.7
19.	279.224	.790	.0063	.0096	39.7
20.	293.920	.750	.0066	.0094	41.2
25.	367.400	.600	.0069	.0090	43.4
30.	440.880	.500	.0073	.0087	45.6
35.	514.360	.430	.0074	.0086	46.3
40.	587.840	.370	.0076	.0083	47.8
45.	661.320	.330	.0079	.0081	49.3
50.	734.800	.300	.0080	.0080	50.0
55.	808.280	.270	.0081	.0079	50.7
60.	881.760	.250	.0082	.0077	51.5
65.	955.240	.230	.0083	.0076	52.2
70.	1028.720	.210	.0085	.0075	52.9
75.	1102.200	.200	.0086	.0074	53.7
80.	1175.680	.180	.0087	.0073	54.4
85.	1249.160	.170	.0088	.0072	55.1

JAN 10 1978

POROSITY DATA FOR SAMPLE P 1-2585.

[illegible]	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
90.	1362.560	.160	.0089	.0070	55.9
100.	1629.440	.150	.0092	.0068	57.4
110.	1816.560	.140	.0092	.0068	57.4
120.	1765.560	.130	.0094	.0066	58.8
130.	1910.400	.120	.0094	.0066	58.8
140.	2057.440	.110	.0096	.0065	60.3
150.	2204.800	.100	.0099	.0061	61.8
160.	2358.320	.085	.0102	.0058	64.0
170.	2645.280	.083	.0103	.0056	64.7
180.	2752.240	.079	.0104	.0055	65.4
190.	2859.200	.075	.0107	.0053	66.9
200.	5255.120	.068	.0108	.0052	67.6
250.	5567.080	.062	.0108	.0052	67.6
300.	5820.960	.057	.0108	.0052	67.6
350.	6114.880	.053	.0113	.0047	70.6
400.	6408.800	.050	.0115	.0045	72.1
450.	6649.680	.045	.0117	.0042	73.5
500.	6890.560	.041	.0120	.0040	75.0
550.	7151.440	.038	.0122	.0038	76.5
600.	7412.320	.035	.0123	.0036	77.2
650.	7613.200	.033	.0126	.0034	78.7
700.	7801.080	.030	.0131	.0028	82.4
750.	7894.960	.029	.0131	.0028	82.4
800.	7955.840	.027	.0135	.0025	84.6
850.	8270.680	.025	.0135	.0025	84.6
900.	8584.560	.024	.0139	.0021	86.8
950.	9905.440	.023	.0140	.0020	87.5
1000.	10267.200	.021	.0146	.0014	91.2
1050.	10315.080	.020	.0146	.0014	91.2
1100.	11315.920	.019	.0148	.0012	92.6
1150.	11736.800	.019	.0150	.0009	94.1
1200.	12157.680	.018	.0153	.0007	95.6
1250.	12578.560	.017	.0154	.0006	96.3
1300.	13220.400	.017	.0155	.0005	97.1
1350.	13567.280	.016	.0157	.0002	98.5
1400.	13961.280	.016	.0157	.0002	98.5
1000.	13960.000	.014	.0160	.0000	100.0

JAN 10 1978

POROSITY DATA FOR SAMPLE P-1 -2595.

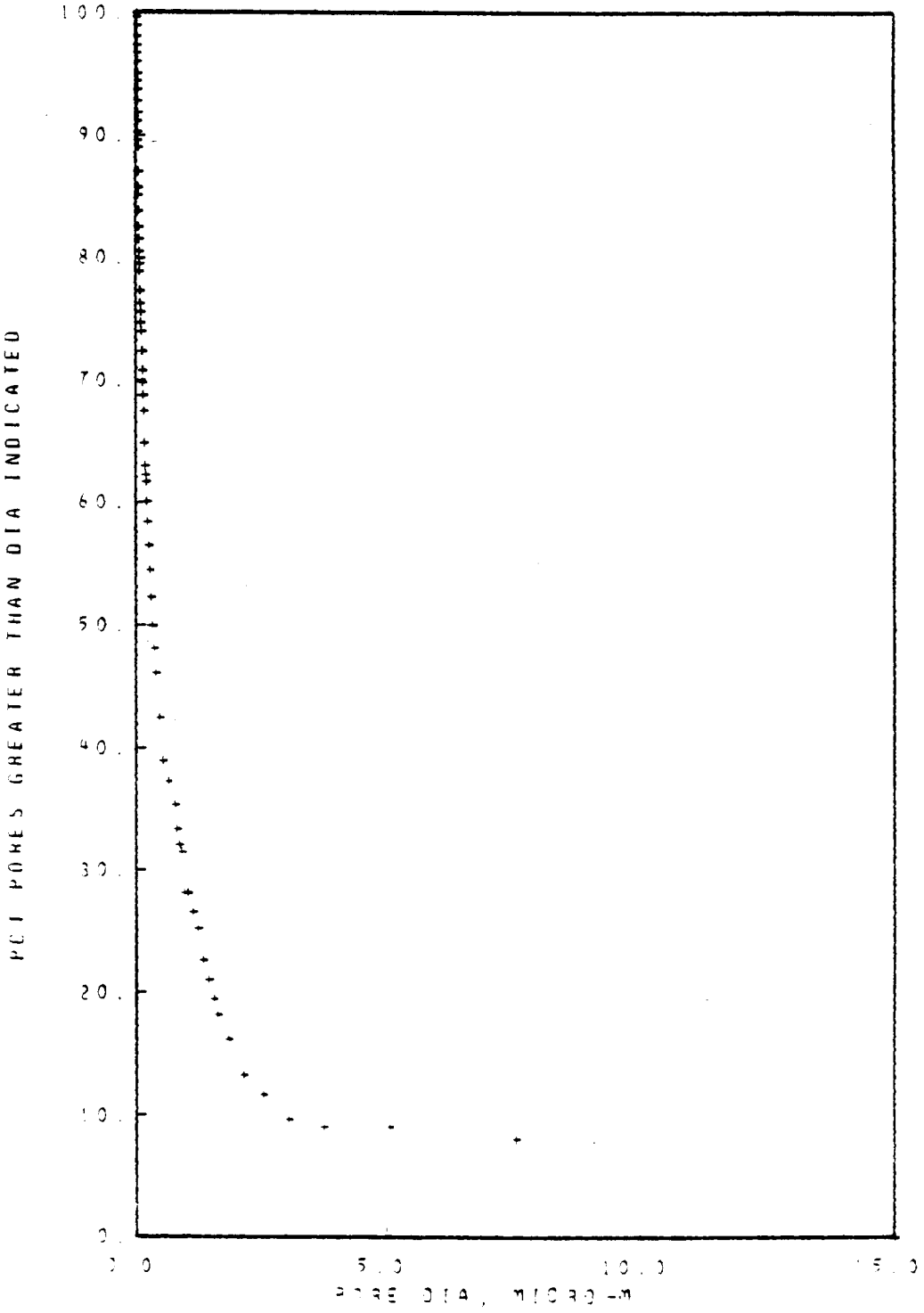
[illegible] 11
[illegible] .[illegible] CC/G

[illegible] ATMS	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
1.	14.696	15.000	.0100	.0131	.0
2.	29.392	7.500	.0105	.0127	3.6
3.	44.088	5.000	.0010	.0121	7.9
4.	58.784	3.750	.0020	.0112	15.0
5.	73.480	3.000	.0024	.0107	18.6
6.	88.176	2.500	.0028	.0103	21.4
7.	102.872	2.100	.0033	.0099	25.0
8.	117.568	1.800	.0038	.0094	28.6
9.	132.264	1.600	.0038	.0094	28.6
10.	146.960	1.500	.0040	.0091	30.7
11.	161.656	1.400	.0040	.0091	30.7
12.	176.352	1.300	.0047	.0084	35.7
13.	191.048	1.200	.0047	.0084	35.7
14.	205.744	1.100	.0049	.0083	37.1
15.	220.440	1.000	.0049	.0083	37.1
16.	235.136	.930	.0049	.0083	37.1
17.	249.832	.880	.0054	.0077	41.4
18.	264.528	.830	.0054	.0077	41.4
19.	279.224	.790	.0054	.0077	41.4
20.	293.920	.750	.0054	.0077	41.4
25.	367.400	.600	.0059	.0072	45.0
30.	440.880	.500	.0064	.0068	48.6
35.	514.360	.430	.0064	.0068	48.6
40.	587.840	.370	.0064	.0068	48.6
45.	661.320	.330	.0064	.0068	48.6
50.	734.800	.300	.0069	.0063	52.1
55.	808.280	.270	.0069	.0063	52.1
60.	881.760	.250	.0069	.0063	52.1
65.	955.240	.230	.0069	.0063	52.1
70.	1028.720	.210	.0069	.0063	52.1
75.	1102.200	.200	.0069	.0062	52.9
80.	1175.680	.180	.0070	.0061	53.6
90.	1249.160	.170	.0071	.0060	54.3

OCT 22 1977

POROSITY DATA FOR SAMPLE P-1 -2595.

[illegible]	PRESSURE PSI	PORE DIAMETER MICRON	PORE VOLUME CC/G	CHANGE IN PORE VOLUME CC/G	PCT. PORES GREATER THAN DIA INDICATED
[illegible]	1322.640	.169	.0072	.0059	55.0
[illegible]	1469.680	.150	.0075	.0056	57.1
[illegible]	1616.560	.140	.0073	.0054	59.3
[illegible]	1763.520	.130	.0078	.0054	59.3
[illegible]	1910.480	.120	.0078	.0054	59.3
[illegible]	2057.440	.110	.0083	.0049	62.9
[illegible]	2204.400	.100	.0083	.0049	62.9
[illegible]	2499.320	.088	.0083	.0049	62.9
[illegible]	2645.280	.083	.0084	.0047	64.3
[illegible]	2792.240	.079	.0089	.0042	67.9
[illegible]	2939.200	.075	.0090	.0041	68.6
[illegible]	3233.120	.068	.0090	.0041	68.6
[illegible]	3527.040	.062	.0093	.0038	70.7
[illegible]	3820.960	.057	.0094	.0038	71.4
[illegible]	4114.880	.053	.0094	.0038	71.4
[illegible]	4408.800	.050	.0097	.0035	73.6
[illegible]	4849.680	.045	.0099	.0033	75.0
[illegible]	5290.560	.041	.0102	.0029	77.9
[illegible]	5731.440	.038	.0104	.0027	79.3
[illegible]	6172.320	.035	.0105	.0026	80.0
[illegible]	6613.200	.033	.0107	.0024	81.4
[illegible]	7201.040	.030	.0111	.0021	84.3
[illegible]	7494.960	.029	.0111	.0021	84.3
[illegible]	7935.840	.027	.0112	.0020	85.0
[illegible]	8670.640	.025	.0114	.0018	86.4
[illegible]	8964.560	.024	.0115	.0017	87.1
[illegible]	9405.440	.023	.0115	.0017	87.1
[illegible]	10287.200	.021	.0120	.0011	91.4
[illegible]	10875.040	.020	.0121	.0010	92.1
[illegible]	11315.920	.019	.0121	.0010	92.1
[illegible]	11756.800	.019	.0123	.0008	93.6
[illegible]	12197.680	.018	.0124	.0008	94.3
[illegible]	12638.560	.017	.0124	.0008	94.3
[illegible]	13226.400	.017	.0127	.0005	96.4
[illegible]	13667.280	.016	.0130	.0002	98.6
[illegible]	13961.200	.016	.0130	.0002	98.6
[illegible]	14695.000	.014	.0131	.0000	100.0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70.
60.
50.
40.
30.
20.
10.
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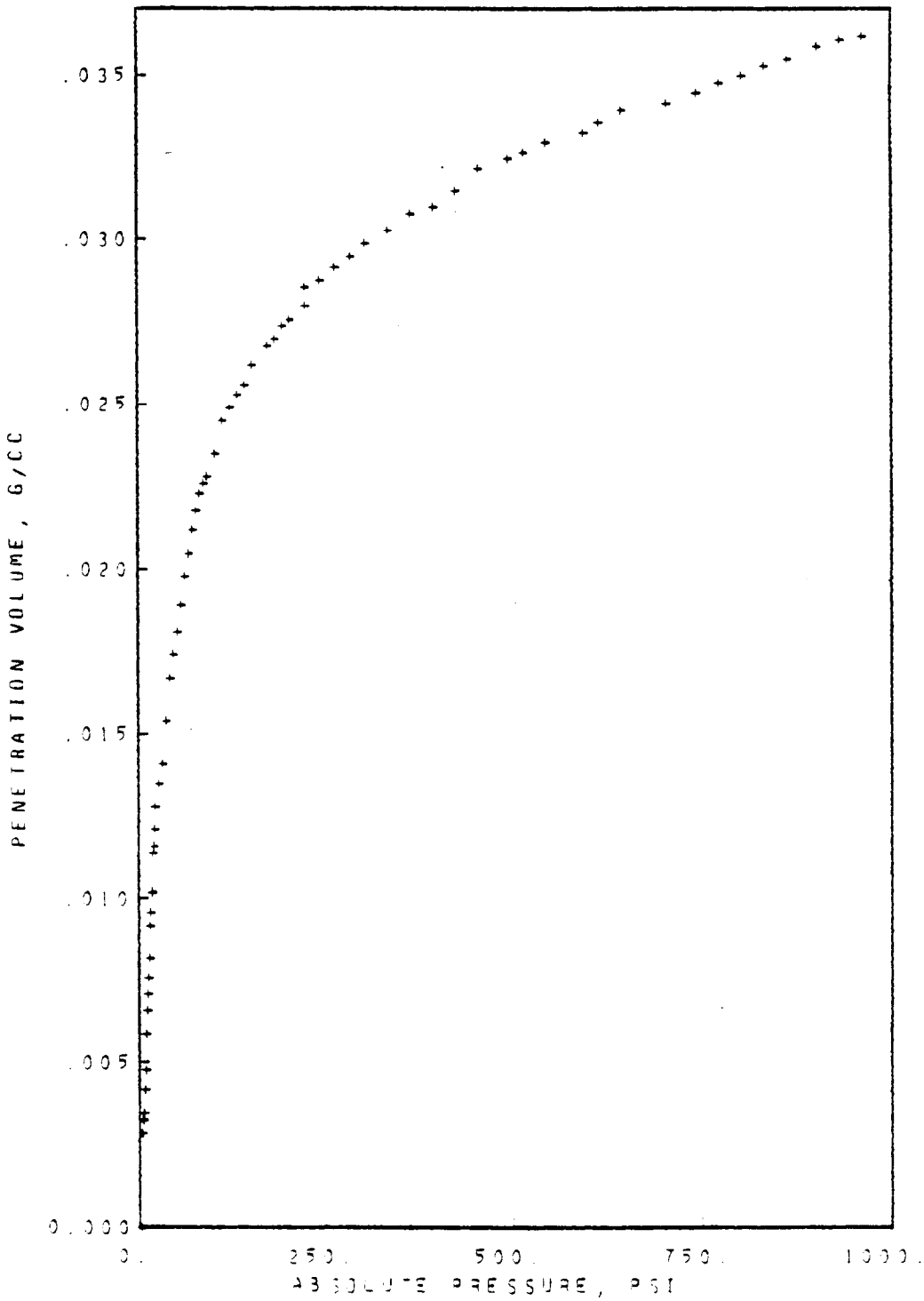
0.0
5.0
10.0
15.0
PORE DIA, MICRO-M

P 1-2495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.030
.025
.020
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.010
.005
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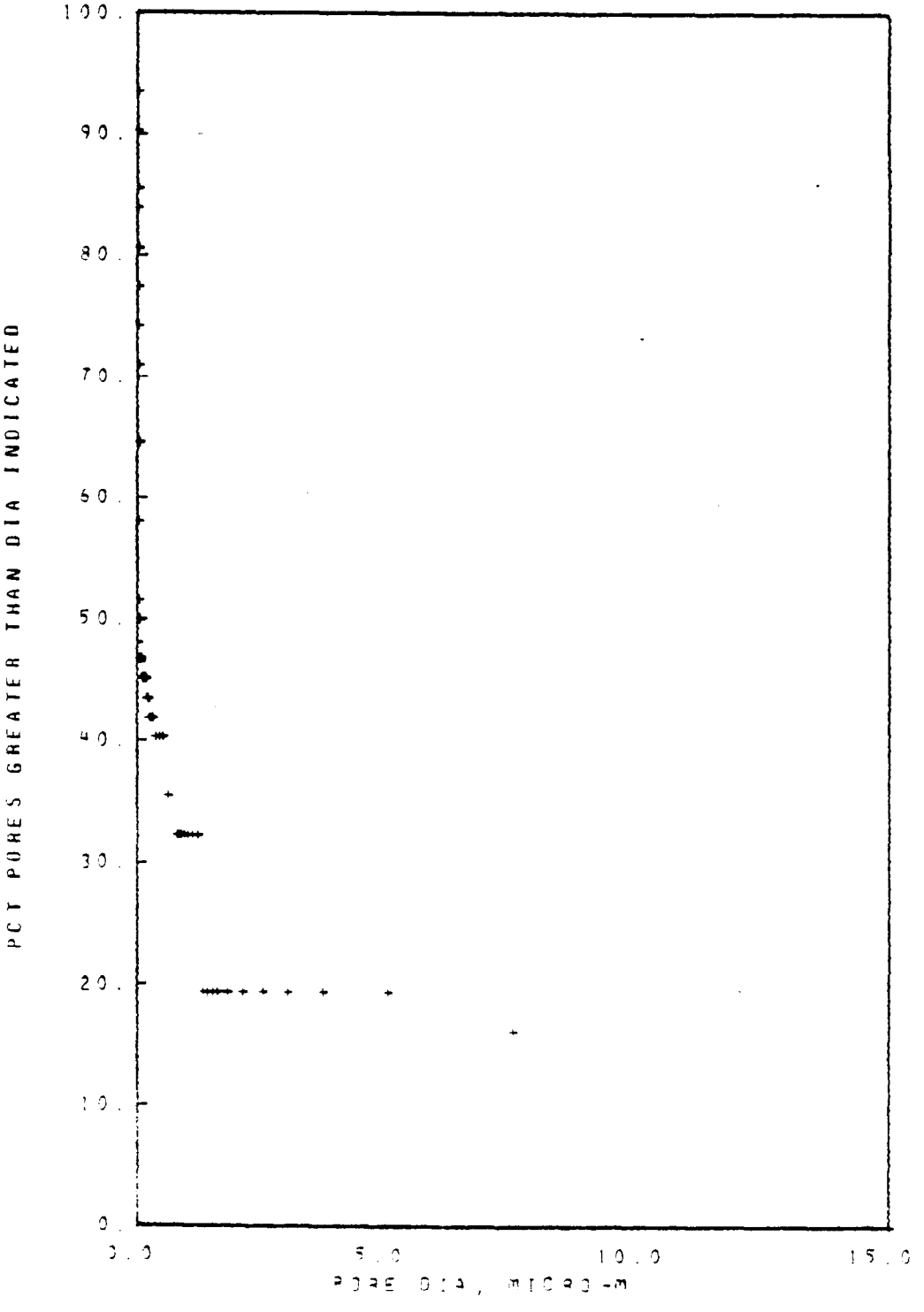
750.
1000.
ABSOLUTE PRESSURE, PSI

P 1-2495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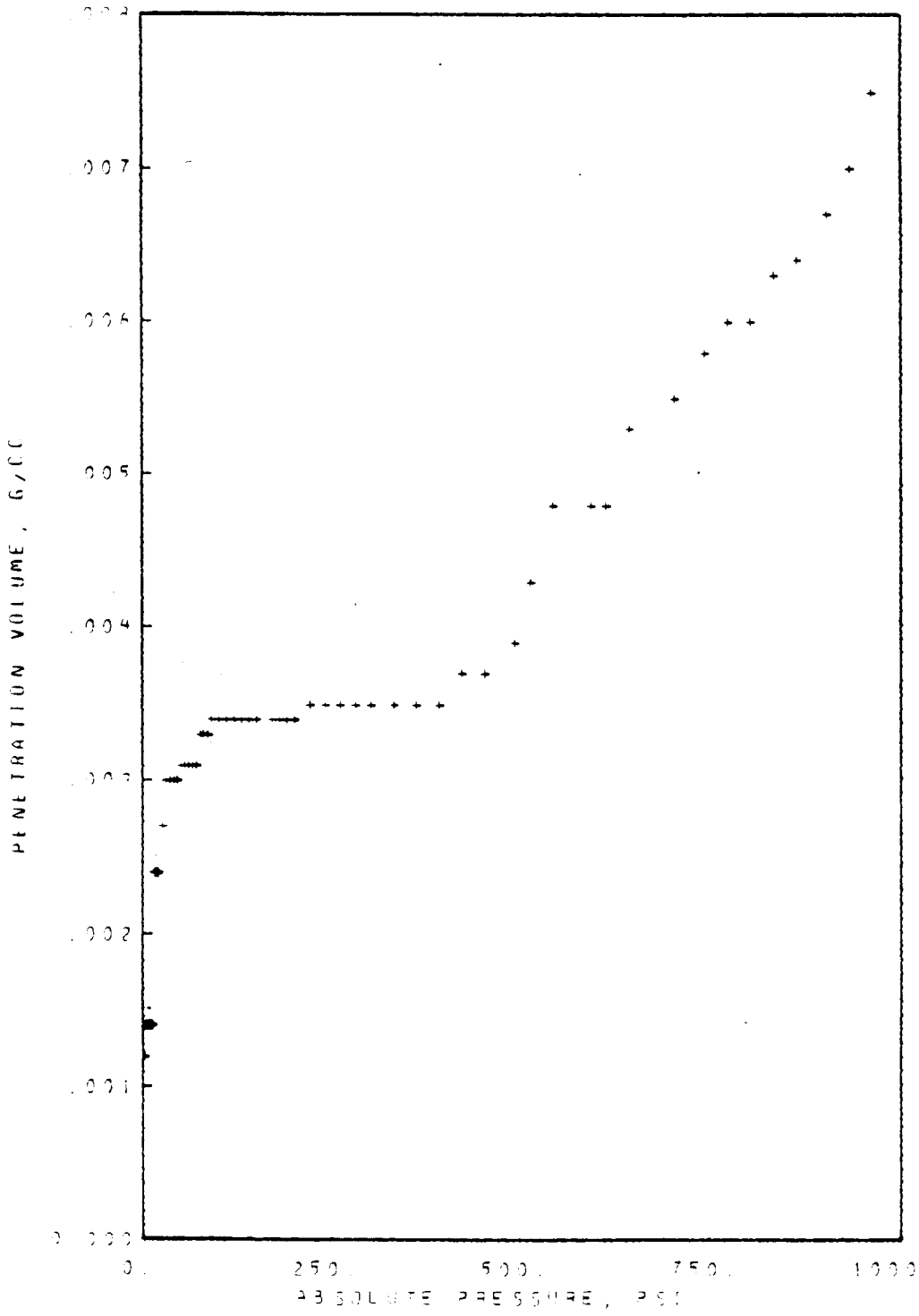
90.
80.
70.
60.
50.
40.
30.
20.
10.
0.
PCT PORES GREATER THAN DIA INDICATED
0.0
5.0
10.0
15.0
PORE DIA, MICRO-M

P 1-2505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.005
.004
.002
.001
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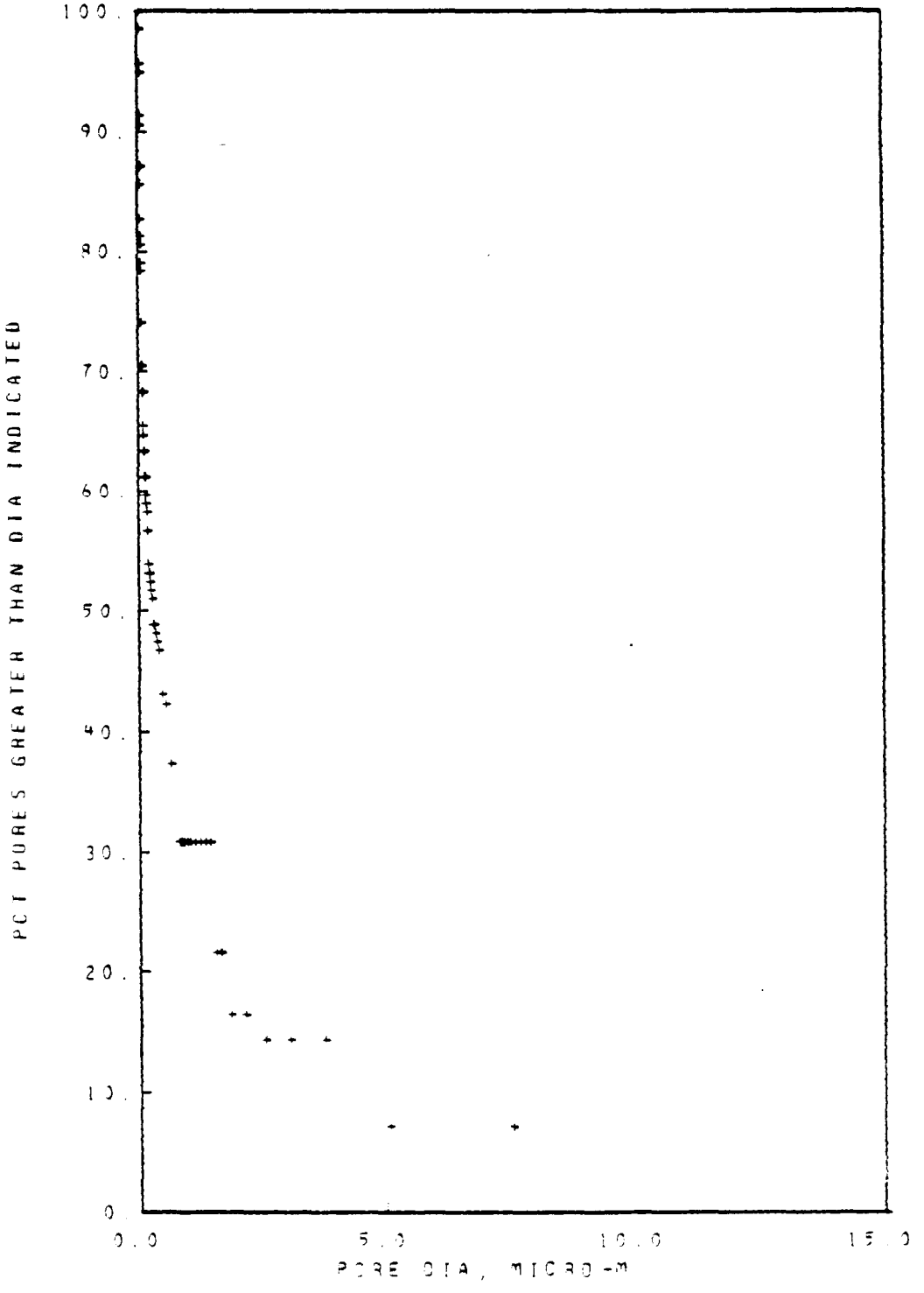
250.
500.
750.
1000
ABSOLUTE PRESSURE, PSI

P 1-2505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70.
60.
50.
40.
30.
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10.
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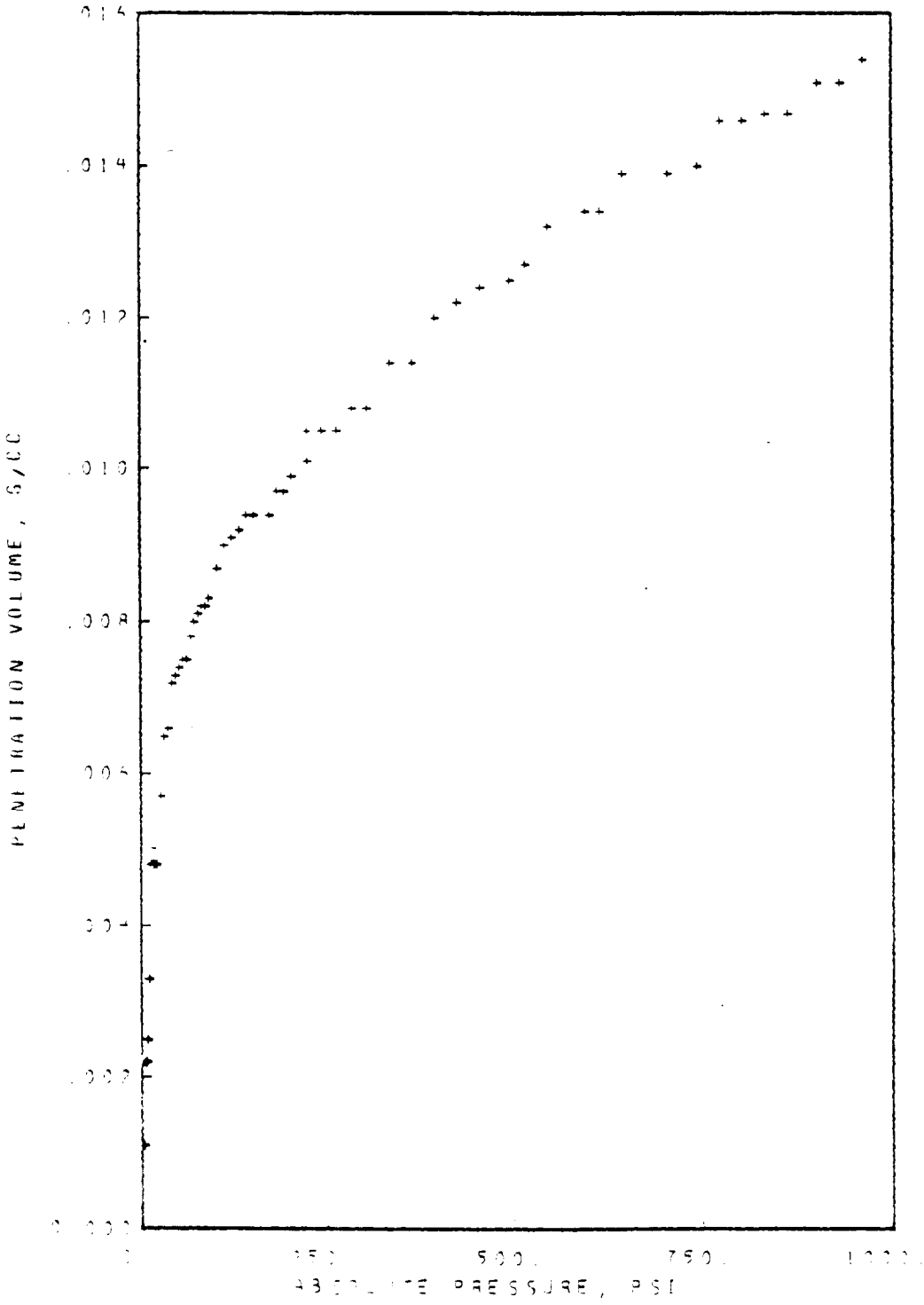
5.0
10.0
15.0
PORE DIA, MICRO-M

P 1-2515


PENETRATION VOLUME, G/CC
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.012
.010
.008
.006
.004
.002
0.000
0
250
500
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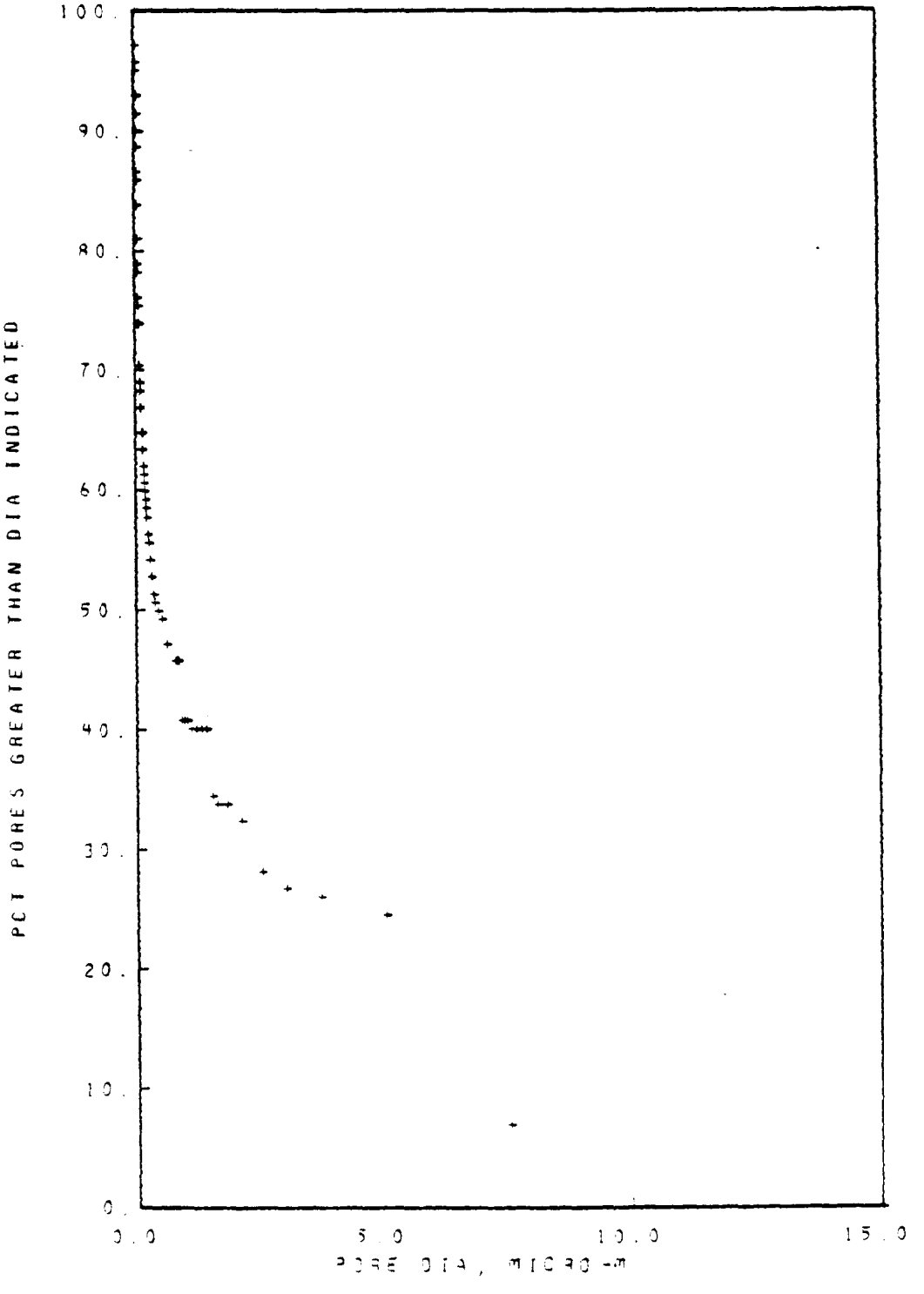
ABSOLUTE PRESSURE, PSI

p 1-2515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80.
70.
60.
50.
40.
30.
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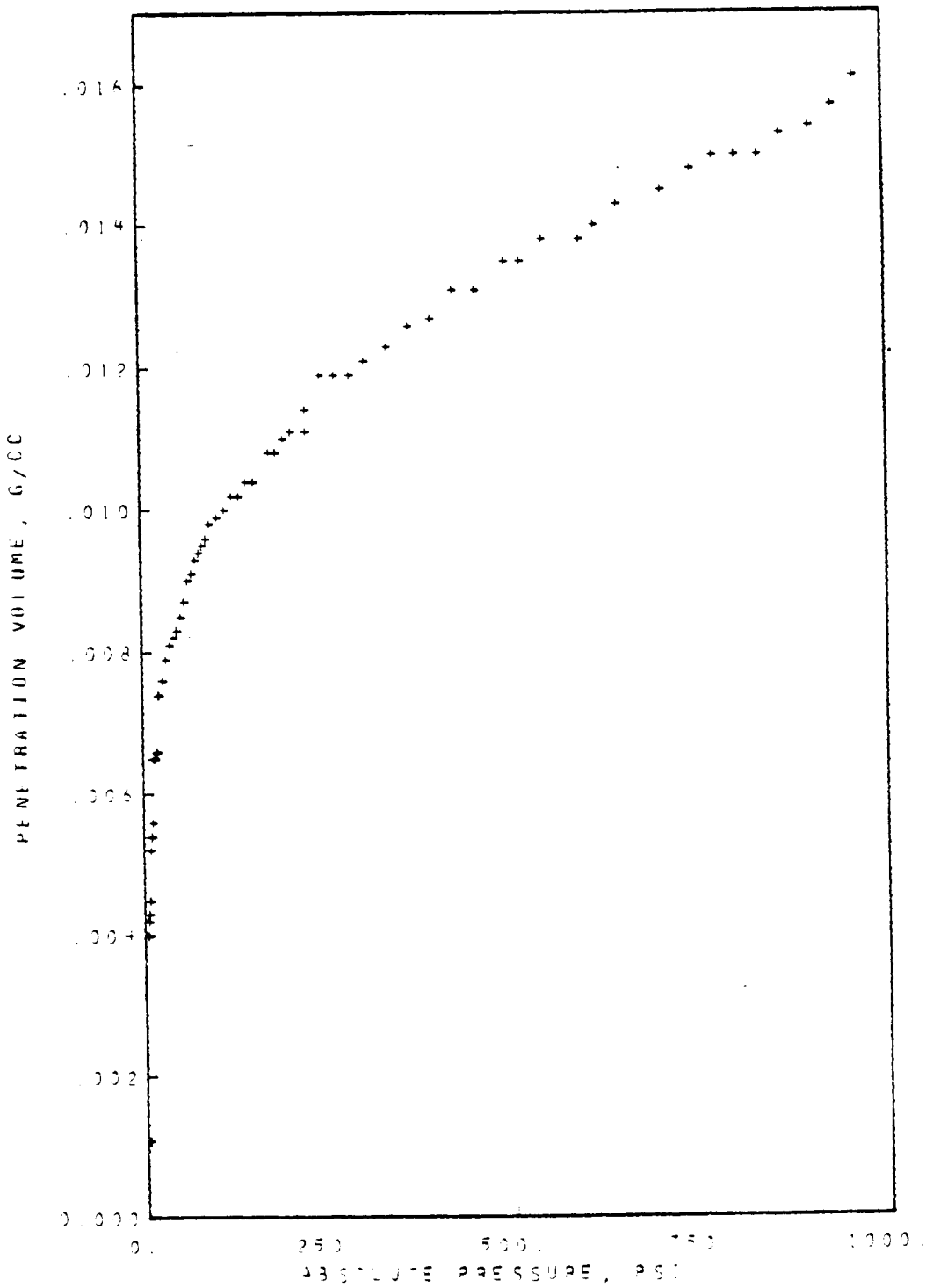
0.0
5.0
10.0
15.0
PORE DIA, MICRO-M

P 1-2528


.016
.014
.012
.010
.008
.006
.004
.002
0.000
PENETRATION VOLUME, G/CC
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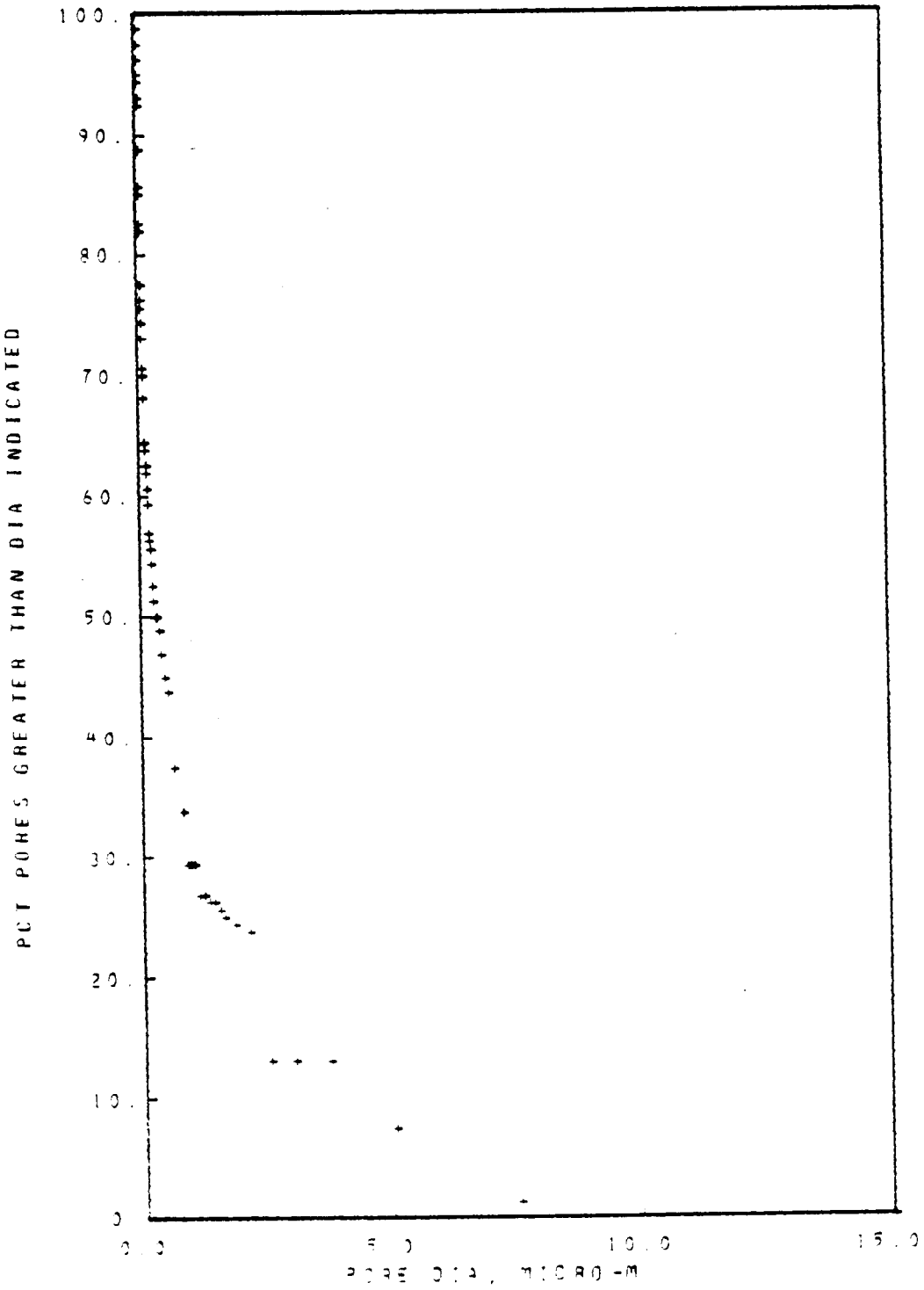
250
500.
750
1000.
ABSOLUTE PRESSURE, PSI

P 1-2528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70.
60.
50.
40.
30.
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10.
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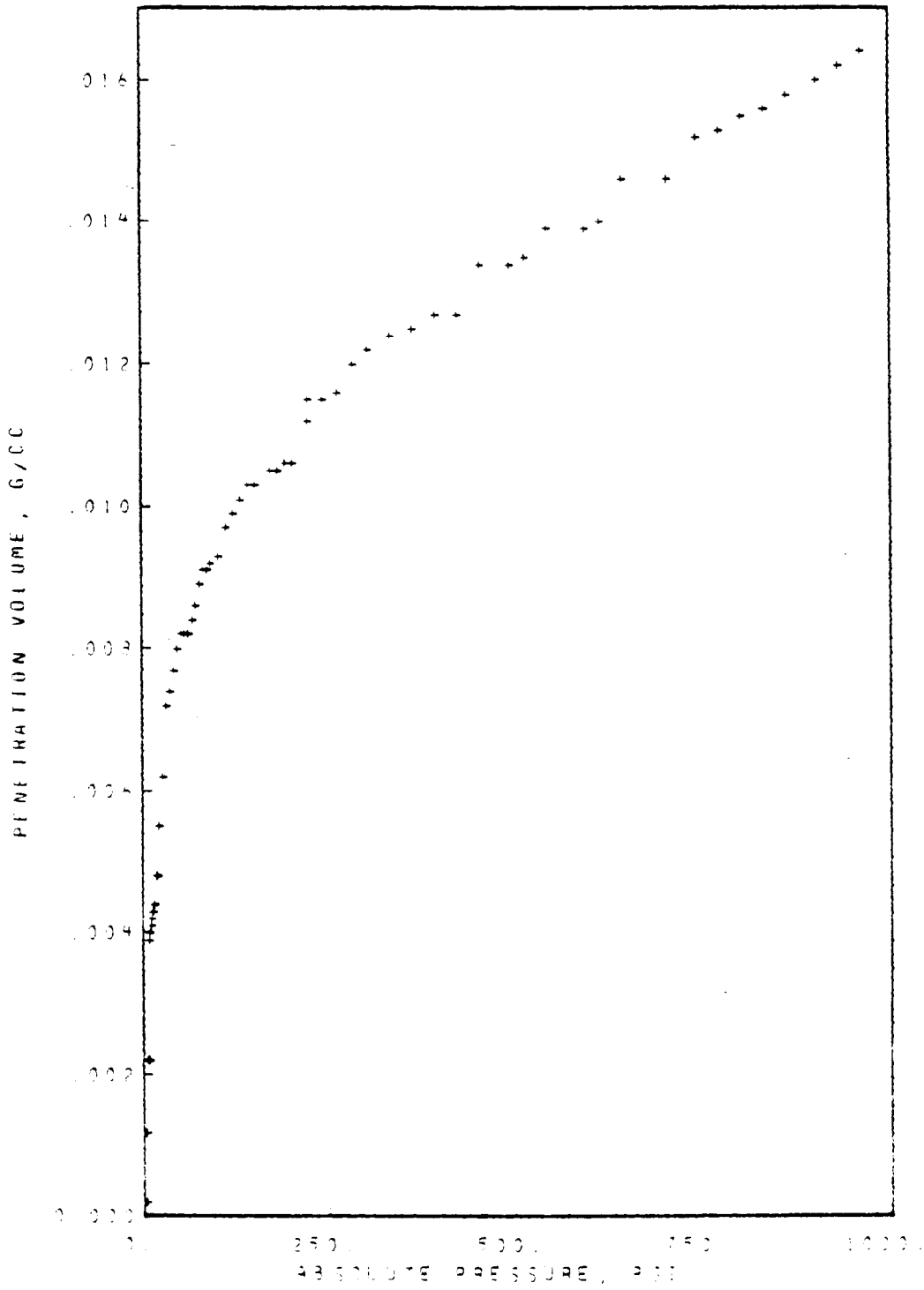
10.0
15.0
PORE DIA, MICRO-M

P 1-2536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.012
.010
.008
.006
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.002
0.000
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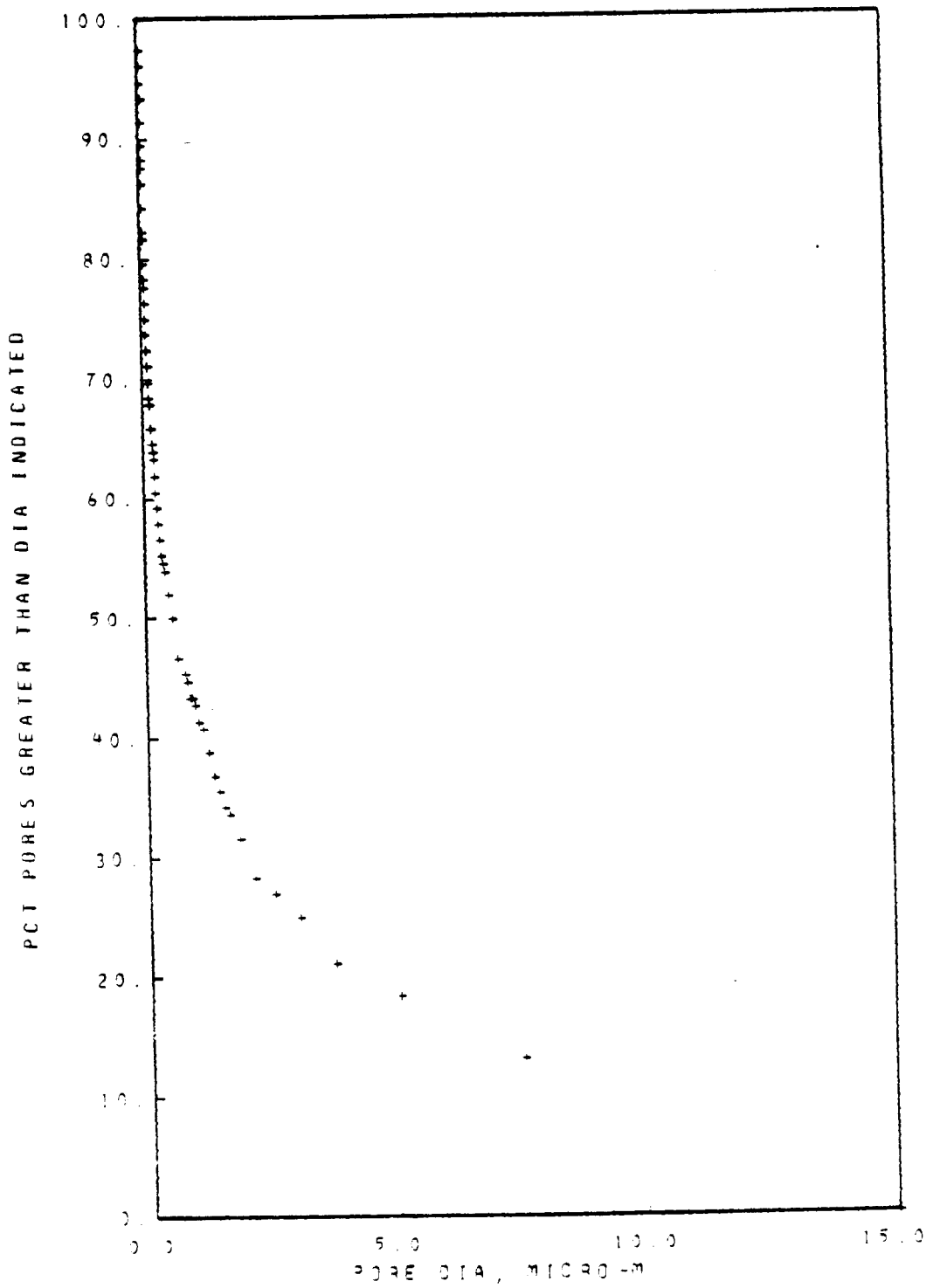
500.
750
1000.
ABSOLUTE PRESSURE, PSI

P 1-2536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90.
80.
70.
60.
50.
40.
30.
20.
10.
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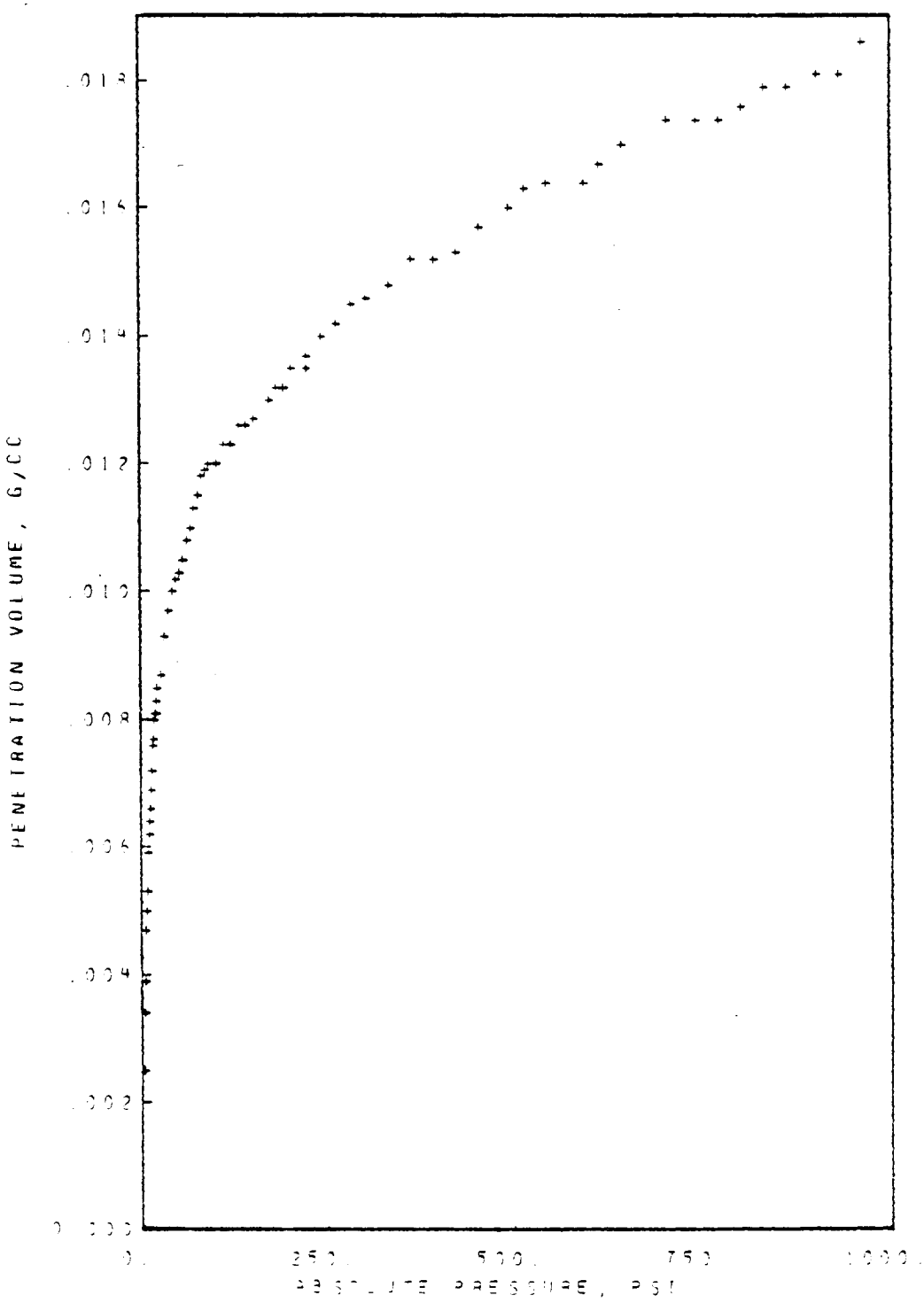
PCT PORES GREATER THAN DIA INDICATED
0.0
5.0
10.0
15.0
PORE DIA, MICRO-M

P 1-2547


PENETRATION VOLUME, G/CC
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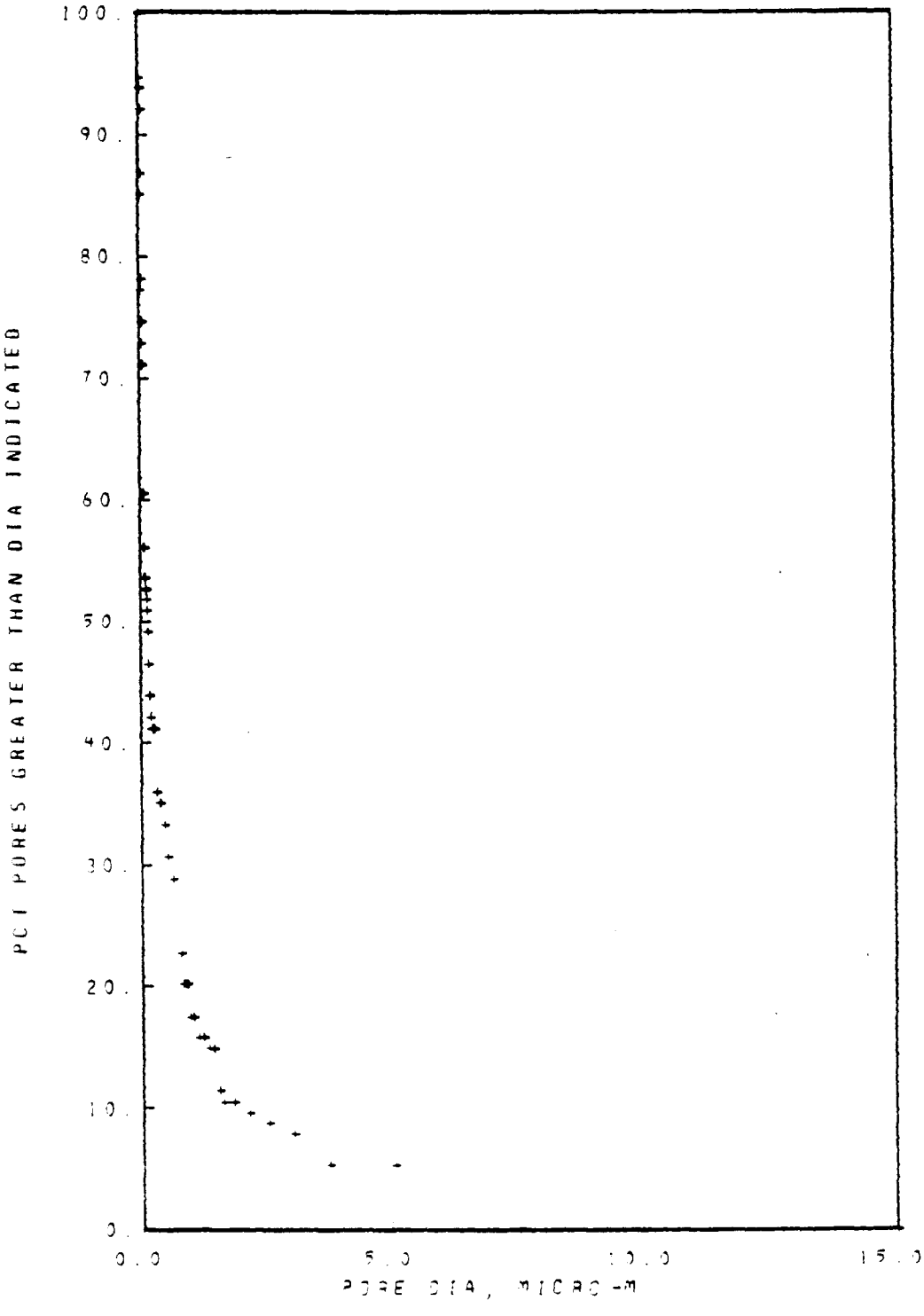
.016
.014
.012
.010
.008
.006
.004
.002
0.000
0.
250.
500.
750.
1000.
ABSOLUTE PRESSURE, PSI

P 1-2547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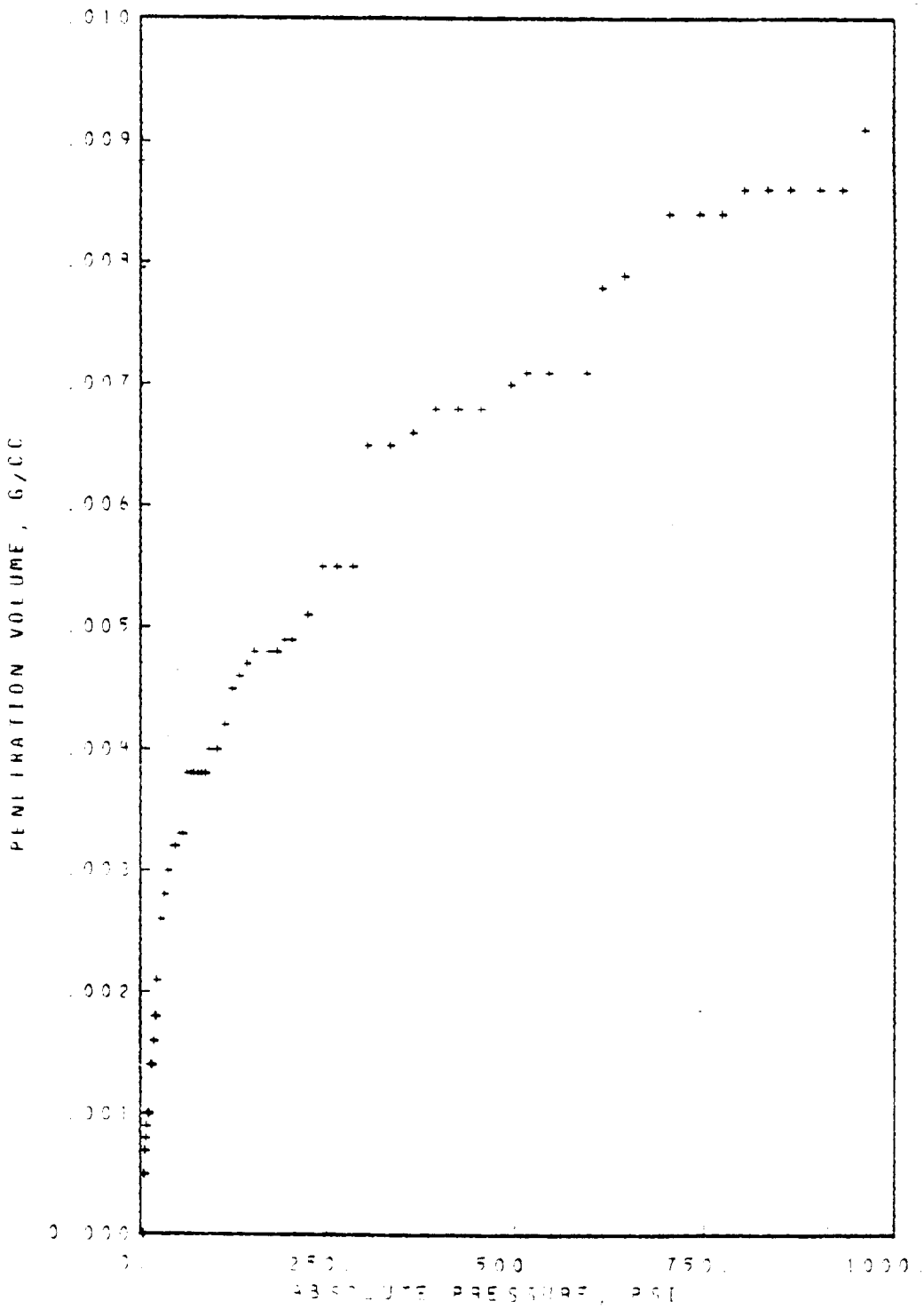
15.0
PORE DIA, MICRO-M

P 1-2554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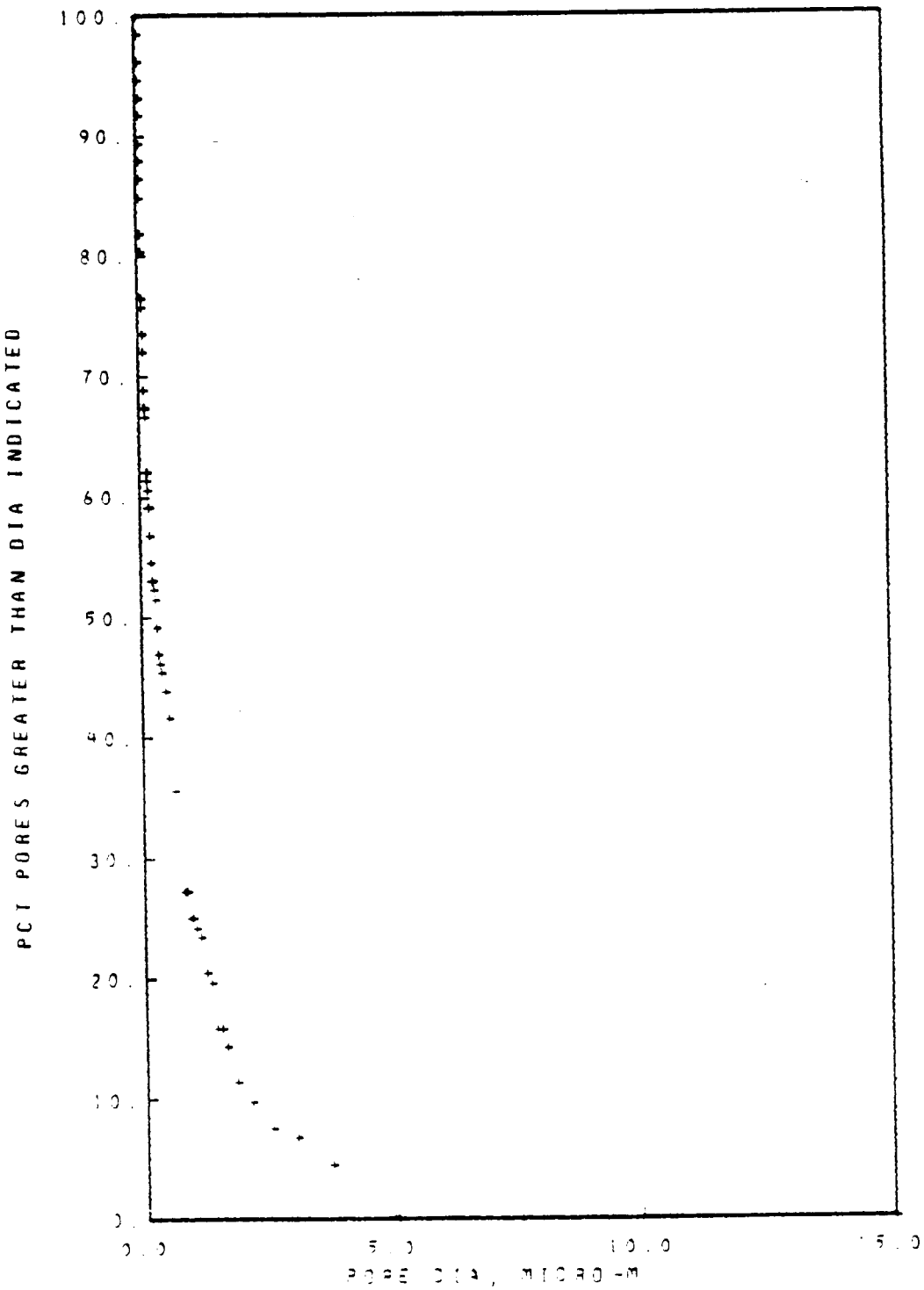
ABSOLUTE PRESSURE, PSI

P 1-2554


PCT PORES GREATER THAN DIA INDICATED
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80.
70.
60.
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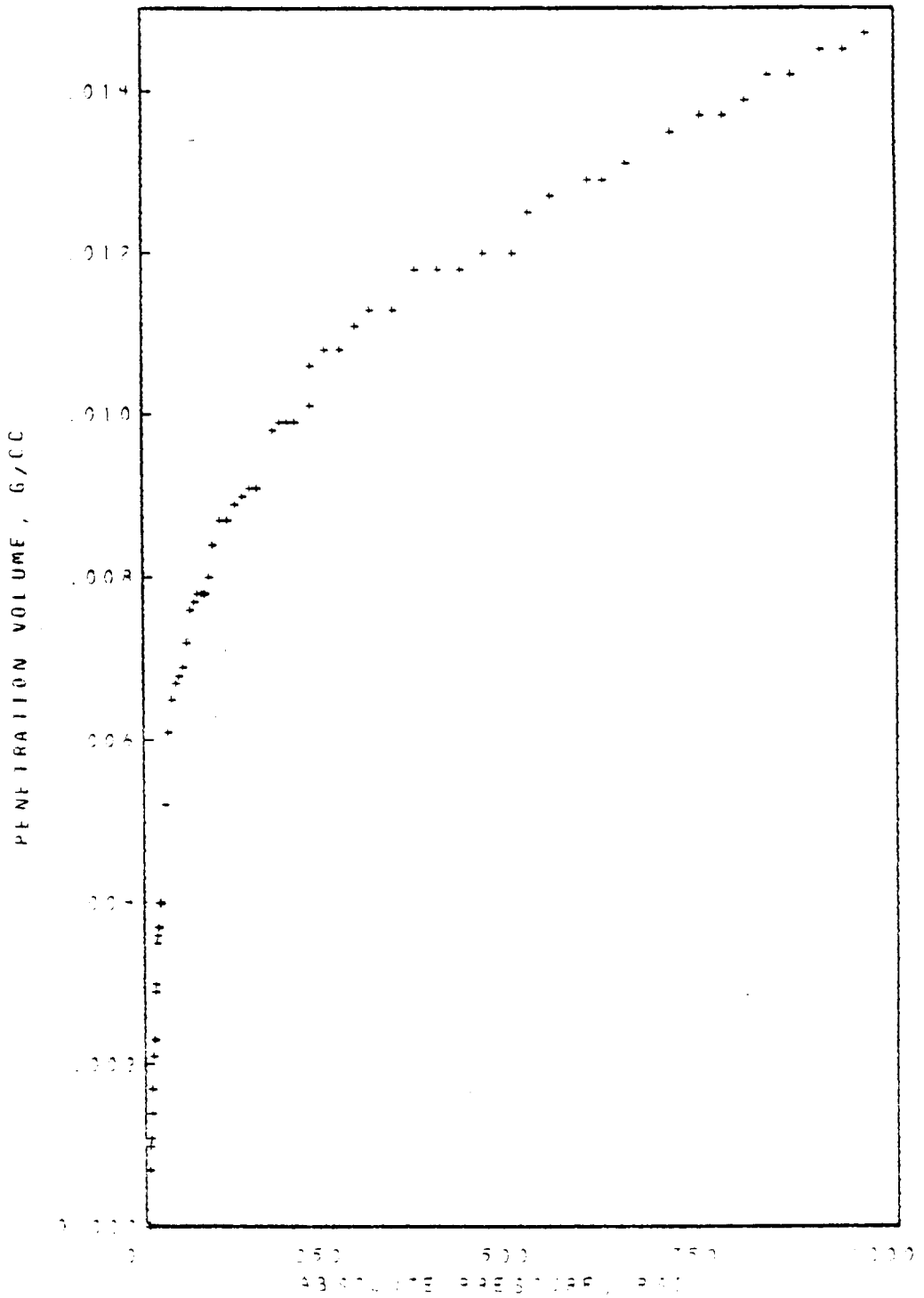
10.
0.
0.0
5.0
10.0
15.0
PORE DIA, MICRO-M

P 1-2565


PENETRATION VOLUME, G/CC
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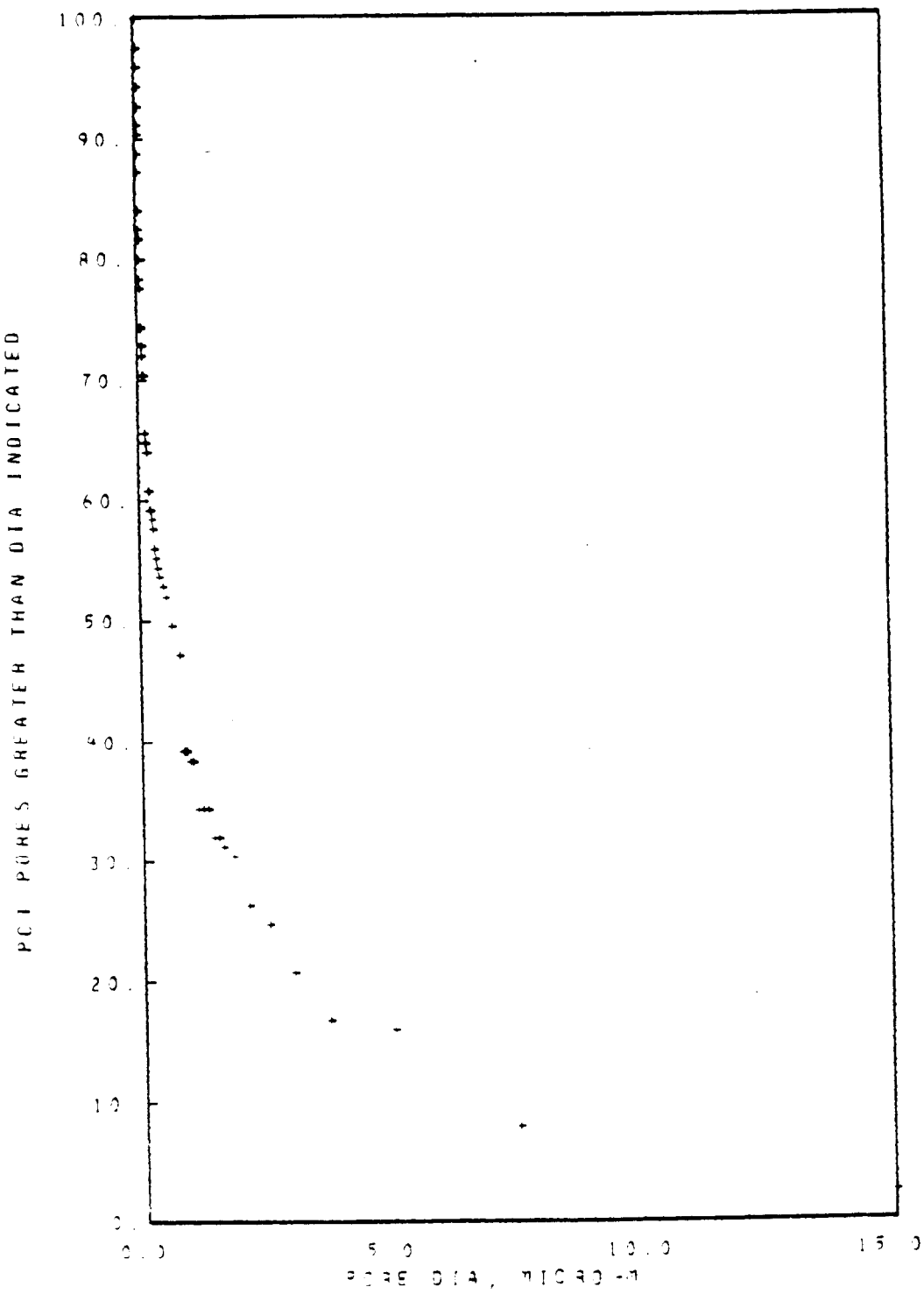
.006
.004
.002
0
0
250
500
750
1000

P 1-2565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40.
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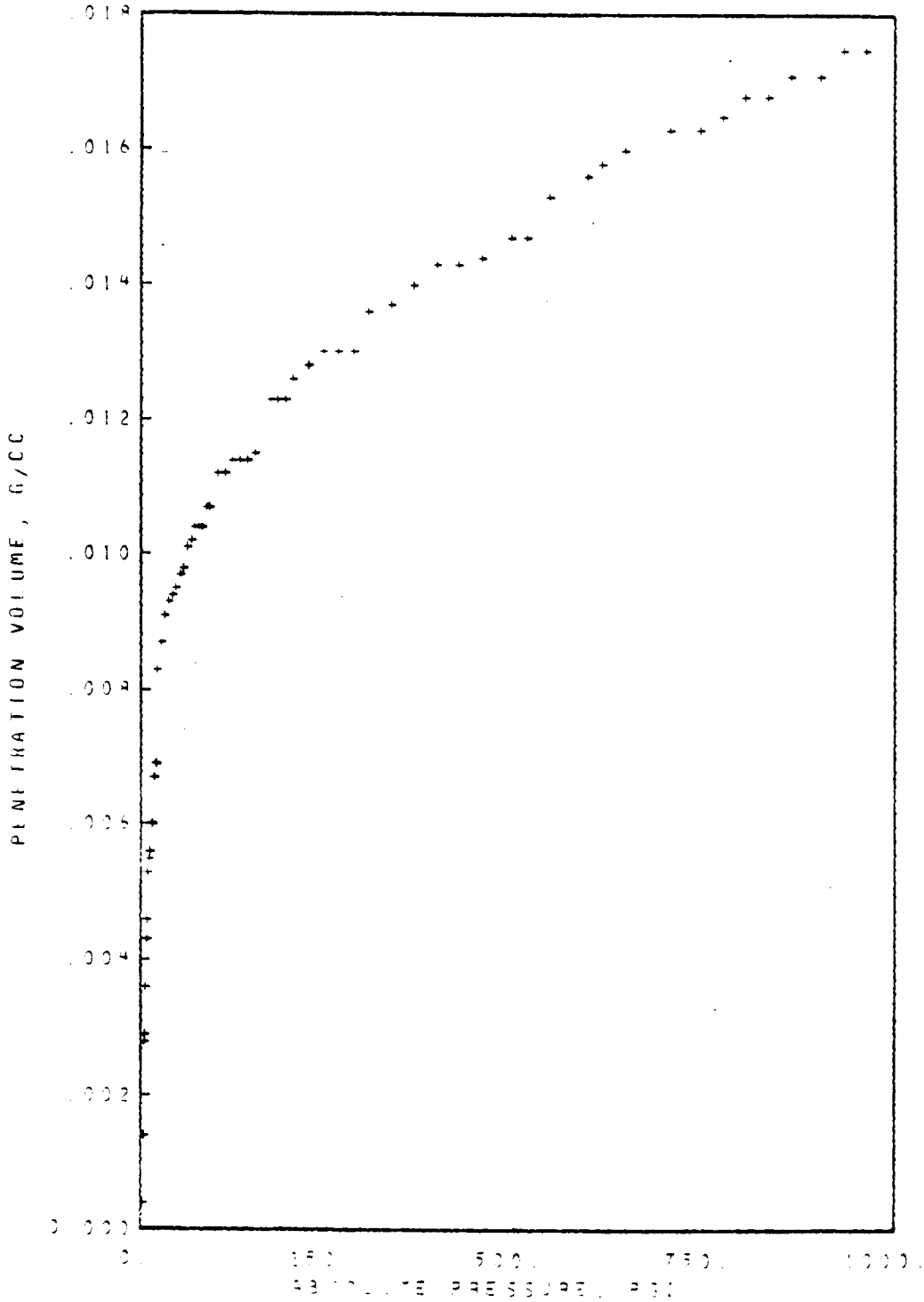
5.0
10.0
15.0
PORE DIA, MICRO-M

P 1-2575


PENETRATION VOLUME, G/CC
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.010
.008
.006
.004
.002
0.000
0.
250.
500.
750.
1000.
ABSOLUTE PRESSURE, PSI

P 1-2575