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Battelle Columbus Laboratories
Dec. 1979

INDIVIDUAL WELL REPORT
FROM THE PROGRAM ON

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

WELL A-1 MCKEAN COUNTY, PENNSYLVANIA

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
ANALYSIS AND DISCUSSION OF THE CHARACTERIZATION DATA	2
Task 1. Sample Coring	3
Task 2. Free Gas Analysis	3
Task 3. Chemical Characterization Data	3
Task 4. Physical Characterization Data	4
Task 5. Lithology of Shale	4

LIST OF TABLES

Table 1. Well Data for A-1	6
Table 2. Field Sampling Data for Well A-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 Analyses of Physical Characterization Data	13
Table 8. Mercury Intrusion Porosities of A-1 Shales	14
Table 9. Energy Dispersive Analysis of A-1 Shales	15

LIST OF FIGURES

Figure 1. Sample on Surface Time Versus Sample Depth for Well A-1	16
Figure 2. Gas Released/Unit Volume of Shale Versus Depth for Well A-1	17

LIST OF FIGURES (Continued)

		Page
Figure 3.	Carbon Versus Depth for Well A-1.	18
Figure 4.	Hydrogen Versus Depth for Well A-1.	19
Figure 5.	H/C Atomic Ratio Versus Depth for Well A-1.	20
Figure 6.	Sulfur Versus Depth for Well A-1.	21
Figure 7.	Gas Released/Unit Volume of Shale Versus Carbon for Well A-1	22
Figure 8.	Gas Released/Unit Volume of Shale Versus Hydrogen for Well A-1	23
Figure 9.	Gas Released/Unit Volume of Shale Versus Sulfur for Well A-1	24
Figure 10.	Gas Released/Unit Volume of Shale Versus Bulk Density for Well A-1	25
Figure 11.	Carbon Versus Bulk Density for Well A-1	26
Figure 12.	Porosity Versus Hydrogen for Well A-1	27
Figure 13.	Porosity Versus Carbon for Well A-1	28
Figure 14.	Porosity Versus Bulk Density for Well A-1	29
Figure 15.	Sulfur Versus Bulk Density for Well A-1	30
Figure 16.	Hydrogen Versus Bulk Density for Well A-1	31
Figure 17.	SEM Micrograph of Sample A-1-3472	32
Figure 18.	SEM Micrograph of Sample A-1-4687	33
Figure 19.	SEM Micrograph of Sample A-1-5159	34

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INTRODUCTION AND SUMMARY

Shale samples from McKean County, Pennsylvania (A-1), cored and acquired in February 1979, were characterized and analyzed for their hydrocarbon gas and organic contents. A total of 85 core samples were obtained; 36 samples for Battelle and 49 specimens for other DOE contractors.

The hydrocarbon gas data of A-1 samples are characterized by significant amounts of higher chain hydrocarbons, though methane is still the predominant species in the gas mixture.

Total carbon contents range between 0.2 and 10.5 percent. Whereas the sulfur values range from 0.1 to 2.6 percent. Hydrogen contents remain relatively uniform (0.4 to 0.8 percent).

There are no unusual values observed among the physical characterization data, e.g., densities, porosities, etc., compared with those of other shales. This topical report summarizes the laboratory findings on the characterization of A-1 shales.

OBJECTIVE AND SCOPE

The objective of this program is to determine the relationship between shale characteristics, 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.

Approximately 1000 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, a regression-type analysis for pattern recognition will be performed to establish the interrelationships between the shale characteristics, the hydrocarbon gas content, and well locations from which the samples were obtained.

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

ANALYSIS AND DISCUSSION OF THE CHARACTERIZATION DATA

The characterization data on the A-1 (McKean County, Pennsylvania) well are reported and discussed in the ensuing pages.

Task 1. Sample Coring

McKean County, Pennsylvania well (A-1) was cored by Minard Run Oil Company. Coring took place in February 1979. A total of 85 core samples were collected; 36 samples being collected for Battelle and 49 samples for other DOE contractors. Depth of coring was from 3470 to 5212 feet.

Additional well and field sampling data are provided in Tables 1 and 2, respectively. Figure 1 is a plot of depth versus sample on surface time for A-1 shale samples.

Task 2. Free Gas Analysis

The initial hydrocarbon gases released by the A-1 shale samples are tabulated in Table 3. Methane is the predominant single hydrocarbon species, but a number of samples show significantly higher and longer chain hydrocarbons (e.g., ethane, propane) and some are even higher than methane contents (e.g., samples 4630, 4747, and 5059 being a few examples). This again points out the higher BTU value, and hence, the quality of the natural gas as pointed out in previous reports. The hydrocarbon gas contents measured in the sealed canisters vary from about 5.5 to over 7.6 percent of the total gas contents (including air) accumulated in the free space in the canisters surrounding the shale samples.

Statistical parameters on the free gas data are summarized in Table 4. Average hydrocarbon gas content for 36 samples is about 36 percent of the gas mixture corresponding to a value of about 0.5 cubic foot of natural gas per cubic foot of shale. Shale depth versus gas contents plotted in Figure 2 shows a large scatter in the data to detect any possible relationship between the two.

Task 3. Chemical Characterization Data

Total carbon, hydrogen, nitrogen and sulfur contents of A-1 shales are reported in Table 5. Usual high scatter in carbon, and to a certain extent in sulfur contents, is seen in the table. Carbon contents vary from 0.2 to 10.5 percent by weight of shale, whereas the sulfur

contents range from 0.1 to 2.6 percent. Hydrogen contents remain relatively uniform ranging between 0.4 and 0.8 percent. Figures 3 through 6 are a summary of chemical characterization data as a function of sample depth. Large scatter in the data does not permit determination of any quantitative relationships. Figures 7 through 9 are plots of hydrocarbon gas contents versus carbon, hydrogen and sulfur contents, respectively. There is a great similarity between Figures 7 and 9.

Task 4. Physical Characterization Data

Partial physical characterization data (densities, porosity, caluclated from the densities and surface area) are presented in Table 6. Densities average 2.59 and 2.72 for bulk and true densities respectively, which translates into about five percent overall porosity in these shales. Few pertinent statistical parameters on the physical characterization data are given in Table 7. Surface areas have an average value of 3.43 m^2/g and range between 1.13 and 8.44 m^2/g. Figures 10 through 13 depict relationships between the bulk densities and gas contents and chemical characteristics.

Mercury intrusion porosities are compiled in Table 8. The average value of these values is somewhat higher than the average porosity value calculated from the density data. Bulk density, carbon and hydrogen values are plotted against porosities in Figures 14 through 16. Large scatter in the data makes it difficult to detect any discernable relationship between the parameters. Detailed mercury intrusion porosity data are presented in Appendix A.

Permeability measurements were made of several A-1 shales. The values for four measurements ranged between 1.67×10^{-6} to 1.16×10^{-5} darcy.

Task 5. Lithology of Shale

Examination by petrograph microscope and the results of the energy dispersive analyses, presented in Table 9, showed the four samples studied to vary in their content of the major mineral constituents. Sample A-1-3472 was high in quartz, had a moderate illite content and was low in carbonate and pyrite. Sample A-1-4687, on the other hand, had a relatively high

content of carbonate mineral, a moderate amount of quartz, and a relatively low illite and pyrite content. Sample A-1-5159 was too opaque to permit estimation of mineral contents microscopically. EDAX results indicated significant illite and quartz contents by virtue of the relatively high K and Si counts. The Ca count indicates a moderate carbonate mineral content and the low S count shows a small amount of pyrite. Sample A-1-5159 contains the same minerals as the other sample but differs in having the lowest quartz and highest pyrite content. SEM views of the shale samples are shown in Figures 17, 18 and 19.

TABLE 1. WELL DATA FOR A- 1

LOCATION: MCKEAN COUNTY, PA

ALTITUDE: 2260 FEET

COORDINATES: 40.86 (DEGREES.MINUTES) LATITUDE
78.61 (DEGREES.MINUTES) LONGITUDE

CORING BEGAN AT 3470 FEET AND STOPPED AT 5212 FEET. IT TOOK 13 BARRELS TO COMPLETE.

SAMPLES WERE RETURNED TO BATTELLE ON 2/21/79.

THERE WERE 36 SAMPLES COLLECTED FOR BATTELLE AND 49 SAMPLES COLLECTED FOR OTHERS.

RUN INFORMATION FROM WELL A- 1

RUN NO. 1 CORING BEGAN AT 3470 FEET AND CORING STOPPED AT 3528 FEET. THE AVERAGE CORING RATE IS 8.81 MINUTES PER FOOT. THE SAMPLES WERE ON THE SURFACE IN 4.83 HOURS

RUN NO. 2 CORING BEGAN AT 4530 FEET AND CORING STOPPED AT 4588 FEET. THE AVERAGE CORING RATE IS 5.40 MINUTES PER FOOT. THE SAMPLES WERE ON THE SURFACE IN 3.53 HOURS

RUN NO. 3 CORING BEGAN AT 4588 FEET AND CORING STOPPED AT 4647 FEET. THE AVERAGE CORING RATE IS 7.19 MINUTES PER FOOT. THE SAMPLES WERE ON THE SURFACE IN 4.63 HOURS

RUN NO. 4 CORING BEGAN AT 4647 FEET AND CORING STOPPED AT 4706 FEET. THE AVERAGE CORING RATE IS 5.69 MINUTES PER FOOT. THE SAMPLES WERE ON THE SURFACE IN 3.46 HOURS

RUN NO. 5 CORING BEGAN AT 4706 FEET AND CORING STOPPED AT 4767 FEET. THE AVERAGE CORING RATE IS 5.69 MINUTES PER FOOT. THE SAMPLES WERE ON THE SURFACE IN 4.11 HOURS

RUN NO. 6 CORING BEGAN AT 4764 FEET AND CORING STOPPED AT 4822 FEET. THE AVERAGE CORING RATE IS 5.84 MINUTES PER FOOT. THE SAMPLES WERE ON THE SURFACE IN 3.43 HOURS

TABLE 1. (Continued)
RUN INFORMATION FROM WELL CONTINUED A- 1

RUN NO. 7 CORING BEGAN AT 4822 FEET AND CORING STOPPED AT 4880 FEET. THE AVERAGE CORING RATE IS 9.05 MINUTES PER FOOT. THE SAMPLES WERE ON THE SURFACE IN 3.42 HOURS

RUN NO. 8 CORING BEGAN AT 4880 FEET AND CORING STOPPED AT 4938 FEET. THE AVERAGE CORING RATE IS 7.84 MINUTES PER FOOT. THE SAMPLES WERE ON THE SURFACE IN 3.15 HOURS

RUN NO. 9 CORING BEGAN AT 4938 FEET AND CORING STOPPED AT 4996 FEET. THE AVERAGE CORING RATE IS 7.95 MINUTES PER FOOT. THE SAMPLES WERE ON THE SURFACE IN 3.80 HOURS

RUN NO. 10 CORING BEGAN AT 4998 FEET AND CORING STOPPED AT 5056 FEET. THE AVERAGE CORING RATE IS 6.34 MINUTES PER FOOT. THE SAMPLES WERE ON THE SURFACE IN 3.82 HOURS

RUN NO. 11 CORING BEGAN AT 5056 FEET AND CORING STOPPED AT 5114 FEET. THE AVERAGE CORING RATE IS 4.81 MINUTES PER FOOT. THE SAMPLES WERE ON THE SURFACE IN 3.37 HOURS

RUN NO. 12 CORING BEGAN AT 5118 FEET AND CORING STOPPED AT 5176 FEET. THE AVERAGE CORING RATE IS 7.97 MINUTES PER FOOT. THE SAMPLES WERE ON THE SURFACE IN 3.65 HOURS

RUN NO. 13 CORING BEGAN AT 5176 FEET AND CORING STOPPED AT 5212 FEET. THE AVERAGE CORING RATE IS 5.25 MINUTES PER FOOT. THE SAMPLES WERE ON THE SURFACE IN 3.65 HOURS

TABLE 2. FIELD SAMPLING DATA FOR WELL A 1

SAMPLE ID.	COLOR	ON SURFACE TIME	BARREL NO	SEQ NO.
A 1-3472.	N4	1.28	1	1
A 1-3492.	5Y2/N4	1.63	1	2
A 1-3512.	N4	1.85	1	3
A 1-4532.	5YR2/1	1.38	2	4
A 1-4552.	5YR2/1	1.72	2	5
A 1-4572.	5YR2/1	1.85	2	6
A 1-4590.	5YR2/1	.98	3	7
A 1-4610.	5YR2/1	1.37	3	8
A 1-4630.	5YR2/1	1.62	3	9
A 1-4647.	N3	1.03	4	10
A 1-4667.	N3	1.40	4	11
A 1-4687.	5YR2/1	1.66	4	12
A 1-4707.	N4	1.07	5	13
A 1-4727.	5YR2/1	1.28	5	14
A 1-4747.	5YR2/1	1.60	5	15
A 1-4675.	N4	.70	6	16
A 1-4785.	N3	.97	6	17
A 1-4805.	N4	1.10	6	18
A 1-4825.	N2	.83	7	19
A 1-4845.	N4	1.08	7	20
A 1-4865.	N3	1.32	7	21
A 1-4883.	N3	.50	8	22
A 1-4903.	5Y2/1	.85	8	23
A 1-4923.	5Y2/1	1.03	8	24
A 1-4941.	N2	.82	9	25
A 1-4961.	N3	1.13	9	26
A 1-4981.	N3	1.35	9	27
A 1-5000.	N4	.66	10	28
A 1-5020.	5Y2/1	.98	10	29
A 1-5040.	5Y2/1	1.12	10	30
A 1-5059.	5YR2/1	.83	11	31
A 1-5079.	5Y2/1	1.10	11	32
A 1-5099.	5YR2/1	1.32	11	33
A 1-5119.	N3	1.07	12	34
A 1-5139.	5YR2/1	1.22	12	35
A 1-5159.	5YR2/1	1.40	12	36

TABLE 3. INITIAL GAS RELEASE DATA: WELL A 1

06/28/79

SAMPLE ID	PRESSURE TORR	FREE VOLUME CC	CORE VOLUME CC	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.
A 1-3472.	800.	559.	891.	7.95	9.37	1.34	.32	.05	0.00	11.08	72.67	15.56	.69	.07	1
A 1-3492.	850.	443.	1007.	8.42	21.63	4.53	1.14	.22	.05	27.57	68.83	1.25	2.34	.14	2
A 1-3512.	750.	701.	749.	0.00	4.51	.71	.12	0.00	0.00	5.34	76.02	18.19	.43	.05	3
A 1-4532.	850.	742.	708.	11.38	7.39	10.89	7.86	2.93	.89	29.96	68.40	.72	.92	.35	4
A 1-4552.	750.	963.	487.	3.50	4.70	5.52	4.92	2.19	.74	18.15	77.56	1.77	2.48	.35	5
A 1-4572.	900.	890.	560.	8.27	14.71	7.66	5.57	2.48	.82	31.24	66.84	.88	1.02	.59	6
A 1-4590.	900.	873.	577.	5.71	13.50	8.62	5.15	2.05	.61	29.93	63.14	5.71	1.22	.54	7
A 1-4610.	800.	879.	571.	0.00	9.68	8.59	6.68	3.01	.89	28.85	69.04	.97	1.08	.47	8
A 1-4630.	800.	828.	622.	5.68	8.16	9.25	7.63	3.40	.97	29.41	69.08	1.04	.49	.41	9
A 1-4647.	1050.	887.	563.	7.22	24.82	8.71	4.45	1.80	.57	40.35	56.21	.74	2.71	.08	10
A 1-4687.	800.	778.	672.	.27	4.51	7.89	8.39	4.05	1.14	25.98	72.25	1.20	.58	.32	12
A 1-4707.	1100.	803.	647.	12.97	29.52	7.82	4.01	1.66	.61	43.62	50.21	4.27	1.91	.78	13
A 1-4727.	850.	700.	750.	6.90	17.52	13.32	8.00	2.51	.79	42.14	54.60	1.94	1.29	.44	14
A 1-4747.	700.	925.	525.	6.63	.62	4.85	7.69	3.72	1.06	17.94	79.58	1.17	1.29	.29	15
A 1-4765.	1050.	835.	615.	7.40	27.73	7.10	2.92	.88	.37	39.00	52.50	7.79	.71	.73	16
A 1-4785.	1100.	724.	726.	2.20	17.24	14.46	11.02	4.40	1.32	48.44	50.90	.65	.05	.70	17
A 1-4805.	1300.	696.	754.	6.66	38.26	10.43	4.19	1.31	.39	54.58	43.80	1.72	.69	.86	18
A 1-4825.	900.	724.	726.	9.88	10.41	12.44	7.68	2.38	.68	33.51	61.60	4.14	.77	.40	19
A 1-4845.	750.	933.	517.	3.41	19.83	5.56	2.49	.78	.21	28.87	63.81	6.22	1.09	.51	20
A 1-4865.	900.	910.	540.	0.00	18.45	4.30	1.95	.58	.15	25.43	64.14	9.94	.55	.51	21
A 1-4883.	750.	671.	779.	10.54	22.55	8.62	5.36	2.20	.68	39.41	59.22	1.05	.34	.34	22
A 1-4903.	1150.	649.	801.	4.46	27.48	11.98	7.52	2.76	.77	50.51	48.68	.73	.03	.62	23
A 1-4923.	1000.	869.	581.	11.89	17.98	9.14	6.94	3.18	1.17	38.41	60.38	.91	.29	.76	24
A 1-4941.	1400.	502.	948.	4.77	26.38	17.71	10.63	3.44	.93	59.09	39.96	.54	.42	.58	25
A 1-4961.	1250.	728.	722.	0.00	30.82	12.18	7.03	2.85	1.37	54.25	44.65	.67	.43	.90	26
A 1-4981.	1350.	447.	1003.	6.44	49.23	14.96	7.90	2.96	1.28	76.25	23.46	.29	.03	.60	27
A 1-5000.	1050.	647.	803.	5.05	30.00	7.04	2.83	.80	.20	40.87	53.47	5.59	.08	.45	28
A 1-5040.	1150.	714.	736.	0.00	21.13	14.67	8.89	3.39	1.03	49.11	49.19	.59	1.13	.72	30
A 1-5059.	850.	887.	563.	.67	3.98	7.39	8.06	4.39	1.52	25.34	71.23	.96	2.53	.45	31
A 1-5079.	950.	829.	621.	9.44	11.87	8.78	8.55	3.42	1.02	33.64	54.52	10.39	1.44	.56	32
A 1-5099.	750.	1027.	423.	0.00	.31	4.61	7.35	3.65	.98	16.90	77.54	1.53	4.49	.40	33
A 1-5119.	800.	652.	798.	1.70	11.72	13.10	9.30	3.15	.85	38.12	58.92	.78	2.23	.33	34
A 1-5139.	950.	640.	810.	1.59	11.09	15.68	10.28	3.07	.65	40.77	58.40	.60	.25	.40	35
A 1-5159.	800.	673.	777.	0.00	9.33	17.53	11.19	3.20	.61	41.86	57.34	.68	.13	.38	36

TABLE 4. STATISTICAL ANALYSES OF OFF GAS DATA

06/28/79

WELL A 1

	MEAN	STANDARD DEVIATION	VARIANCE	COEFFICIENT OF DEVIATION	95 PCT. CONFIDENCE INTERVAL LOWER LIMIT	UPPER LIMIT	NO OF SAMPLES
METHANE, PERCENT	16.956	11.19	125.19	.66	13.049	20.863	34
ETHANE, PERCENT	9.335	4.28	18.30	.46	7.841	10.828	34
PROPANE, PERCENT	6.294	3.02	9.13	.48	5.239	7.350	34
BUTANE, PERCENT	2.437	1.24	1.54	.51	2.004	2.870	34
PENTANE, PERCENT	.740	.40	.16	.54	.601	.879	34
TOTAL HYDROCARBONS, PCT	35.762	14.37	206.48	.40	30.745	40.780	34
NITROGEN, PERCENT	59.922	12.27	150.46	.20	55.639	64.205	34
OXYGEN, PERCENT	3.270	4.41	19.44	1.35	1.730	4.810	34
CARBON DIOXIDE, PERCENT	1.063	.98	.97	.93	.719	1.406	34
GAS VOLUME/SHALE VOLUME	.496	.21	.05	.43	.421	.571	34

*I IS INSIGNIFICANT

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TABLE 5. CHEMICAL CHARACTERIZATION DATA, 06/20/79

SAMPLE ID	TOTAL CARBON PERCENT	TOTAL HYDROGEN PERCENT	TOTAL NITROGEN PERCENT	TOTAL SULFUR PERCENT	CARD CODE	SEQ NO.
A 1-3472.	.3	.4	.1	.1	5	1
A 1-3492.	.3	.5	.1	1.0	5	2
A 1-3512.	.2	.4	.1	.1	5	3
A 1-4532.	2.2	.5	.1	1.2	5	4
A 1-4552.	2.1	.5	.1	1.8	5	5
A 1-4572.	2.4	.4	.1	1.2	5	6
A 1-4590.	3.2	.5	.2	2.0	5	7
A 1-4610.	3.2	.5	.1	2.0	5	8
A 1-4630.	3.1	.5	.1	3.6	5	9
A 1-4647.	1.7	.4	.1	3.4	5	10
A 1-4687.	4.9	.4	.1	.8	5	12
A 1-4707.	10.5	.2	.1	.7	5	13
A 1-4727.	4.8	.4	.1	1.1	5	14
A 1-4747.	4.8	.6	.1	2.0	5	15
A 1-4765.	9.1	.1	.1	.9	5	16
A 1-4785.	1.2	.5	.2	1.2	5	17
A 1-4805.	4.3	.3	.1	.7	5	18
A 1-4825.	2.9	.4	.1	.4	5	19
A 1-4845.	2.1	.4	.1	1.6	5	20
A 1-4865.	2.6	.4	.1	.6	5	21
A 1-4883.	2.7	.4	.1	.6	5	22
A 1-4903.	2.5	.4	.1	.6	5	23
A 1-4923.	1.8	.5	.1	.8	5	24
A 1-4941.	2.0	.4	.1	.8	5	25
A 1-4961.	.9	.4	.1	1.1	5	26
A 1-4981.	2.2	.4	.1	1.1	5	27
A 1-5000.	2.9	.4	.1	.4	5	28
A 1-5040.	3.5	.5	.2	.8	5	30
A 1-5059.	3.5	.5	.2	1.5	5	31
A 1-5079.	3.1	.5	.2	1.0	5	32
A 1-5099.	6.6	.7	.3	2.6	5	33
A 1-5119.	3.2	.4	.2	1.0	5	34
A 1-5139.	7.1	.4	.2	1.5	5	35
A 1-5159.	6.2	.8	.3	2.6	5	36

TABLE 6. SUMMARY OF PHYSICAL CHARACTERIZATION DATA
06/28/79

SAMPLE ID.	BULK DENSITY, G/CC	TRUE DENSITY, G/CC	POROSITY, PC	SURFACE AREA, M2/G	SEQ NO.
A 1-3472.	2.649	2.878	7.952	3.309	1
A 1-3492.	2.563	2.799	6.418	2.669	2
A 1-3512.	2.635	2.522	0.000	1.272	3
A 1-4532.	2.548	2.875	11.377	2.156	4
A 1-4552.	2.540	2.632	3.498	3.532	5
A 1-4572.	2.570	2.802	8.269	2.371	6
A 1-4590.	2.559	2.714	5.712	4.100	7
A 1-4610.	2.593	2.545	0.000	3.202	8
A 1-4630.	2.518	2.744	5.683	1.544	9
A 1-4647.	2.609	2.812	7.216	1.098	10
A 1-4667.	2.555	2.562	.265	2.678	12
A 1-4707.	2.521	2.697	12.971	1.618	13
A 1-4727.	2.554	2.743	6.896	3.616	14
A 1-4747.	2.537	2.781	6.628	5.506	15
A 1-4765.	2.585	2.791	7.397	2.027	16
A 1-4785.	2.609	2.668	2.201	4.050	17
A 1-4805.	2.530	2.775	6.657	1.387	18
A 1-4825.	2.575	2.857	9.884	3.118	19
A 1-4845.	2.556	2.646	3.411	5.495	20
A 1-4865.	2.610	2.579	0.000	3.801	21
A 1-4883.	2.619	2.927	10.536	4.599	22
A 1-4903.	2.621	2.743	4.459	4.704	23
A 1-4923.	2.576	2.924	11.893	5.779	24
A 1-4941.	2.573	2.702	4.768	4.488	25
A 1-4961.	2.629	2.614	0.000	4.881	26
A 1-4981.	2.631	2.812	6.442	4.121	27
A 1-5000.	2.621	2.760	5.051	2.833	28
A 1-5040.	2.625	2.510	0.000	1.315	30
A 1-5059.	2.559	2.576	.666	3.883	31
A 1-5079.	2.531	2.850	9.441	2.180	32
A 1-5099.	2.581	2.576	0.000	8.439	33
A 1-5119.	2.573	2.617	1.695	4.410	34
A 1-5139.	2.604	2.646	1.594	1.126	35
A 1-5159.	2.609	2.602	0.000	5.341	36

TABLE 7. STATISTISTICAL ANALYSES OF PHYSICAL CHARACTERIZATION DATA
06/28/79

WELL A 1

	MEAN	STANDARD DEVIATION	VARIANCE	COEFFICIENT OF DEVIATION	95 PCT. CONFIDENCE INTERVAL LOWER LIMIT	UPPER LIMIT	NO OF SAMPLES
BULK DENSITY, G/CC	2.588	.03	.00	.01	2.577	2.599	34
TRUE DENSITY, G/CC	2.720	.12	.02	.05	2.677	2.763	34
POROSITY, PCT	5.029	4.01	16.10	.60	3.628	6.430	34
SURFACE AREA, M2/G	3.431	1.66	2.74	.48	2.852	4.009	34

*I IS INSIGNIFICANT

GR File #257

TABLE 8. MERCURY INTRUSION POROSITIES OF A-1 SHALES

Sequence Number	I.D. Number	Porosity, Percent
1	A-1-3472	4.51
3	A-1-3512	5.46
5	A-1-4552	8.58
7	A-1-4590	7.80
9	A-1-4630	7.28
13	A-1-4707	3.91
15	A-1-4747	3.38
17	A-1-4785	12.74
19	A-1-4825	4.68
23	A-1-4903	7.02
31	A-1-5059	9.62
33	A-1-5099	8.32
35	A-1-5139	8.06

TABLE 9. ENERGY DISPERSIVE ANALYSIS OF A-1 SHALES

Shale Sample	Element Count Per 100 Counts											
	K	Ca	Mg	Al	Si	Fe	S	Ti	Fe/S	K/Al	K/Si	Al/Si
A-1-3472	5.8	1.0	Tr	13.7	69.4	9.1	--	1.0	∞	0.42	0.08	0.20
A-1-4687	5.2	15.9	-	11.4	62.4	3.6	1.3	-	2.88	0.46	0.08	0.18
A-1-4923	8.8	6.5	Tr	11.8	62.3	8.6	1.7	-	4.84	0.74	0.14	0.19
A-1-5159	7.7	4.2	Tr	18.1	59.6	5.9	4.3	0.8	1.37	0.39	0.12	0.30
Illite grain	17.2	-	-	25.5	57.3	-	-	-	-	0.67	0.30	0.45
Pyrite grain	-	-	-	-	-	27.5	72.5	-	0.38	-	-	-
Quartz grain	-	-	-	-	100	-	-	-	-	-	-	-

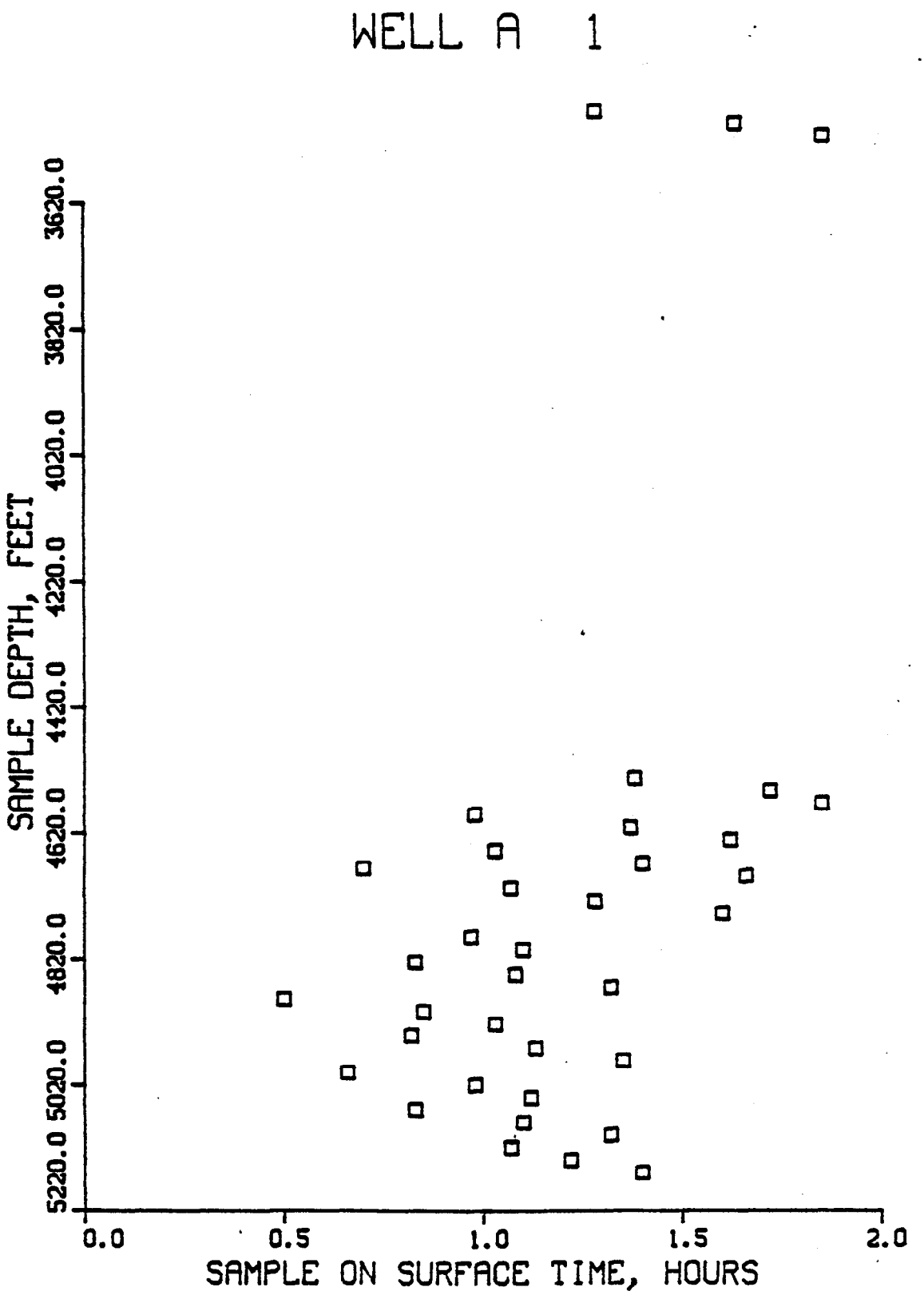


FIGURE 1. SAMPLE ON SURFACE TIME VERSUS SAMPLE DEPTH FOR WELL A-1

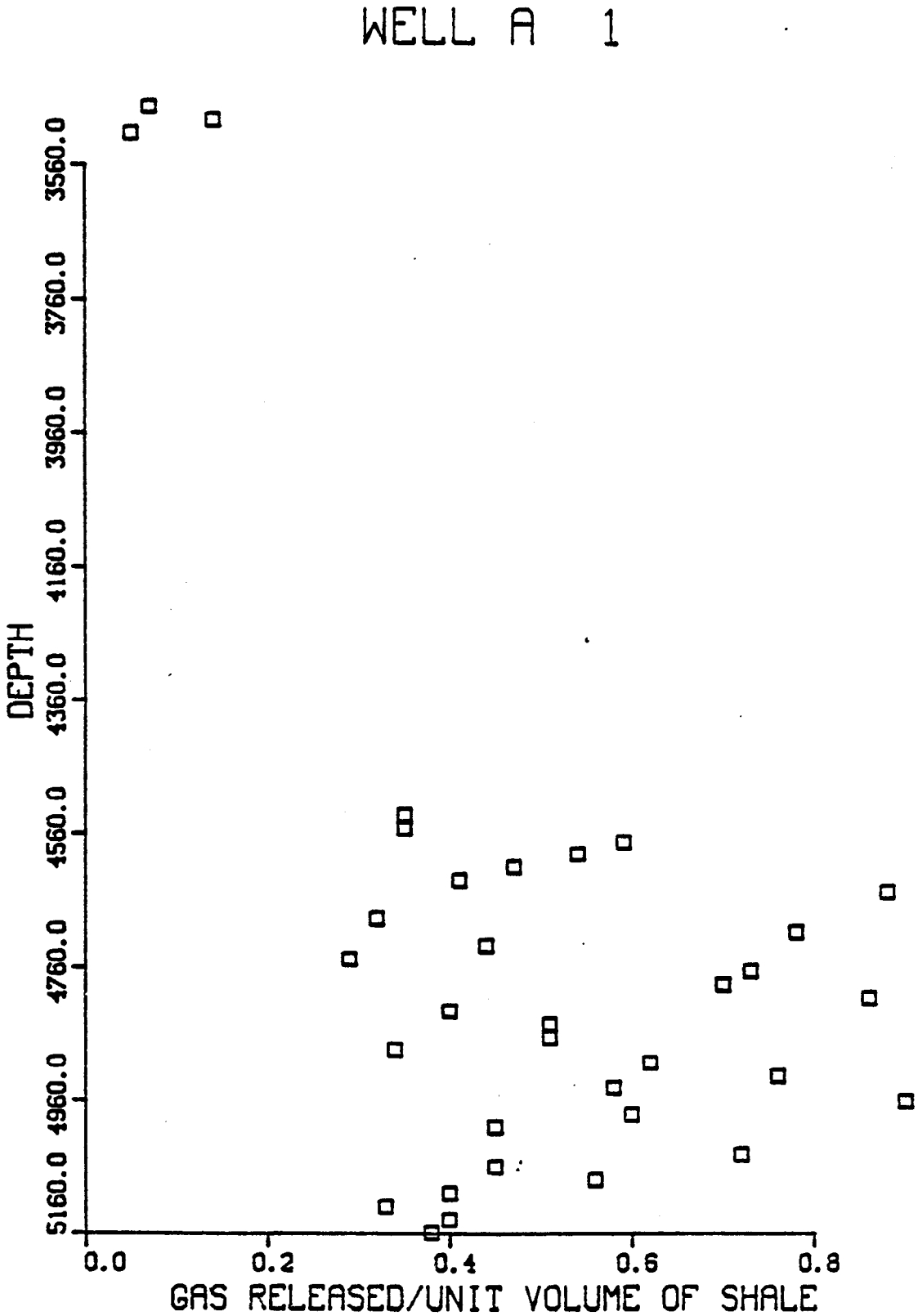


FIGURE 2. GAS RELEASED/UNIT VOLUME OF SHALE VERSUS DEPTH FOR WELL A-1

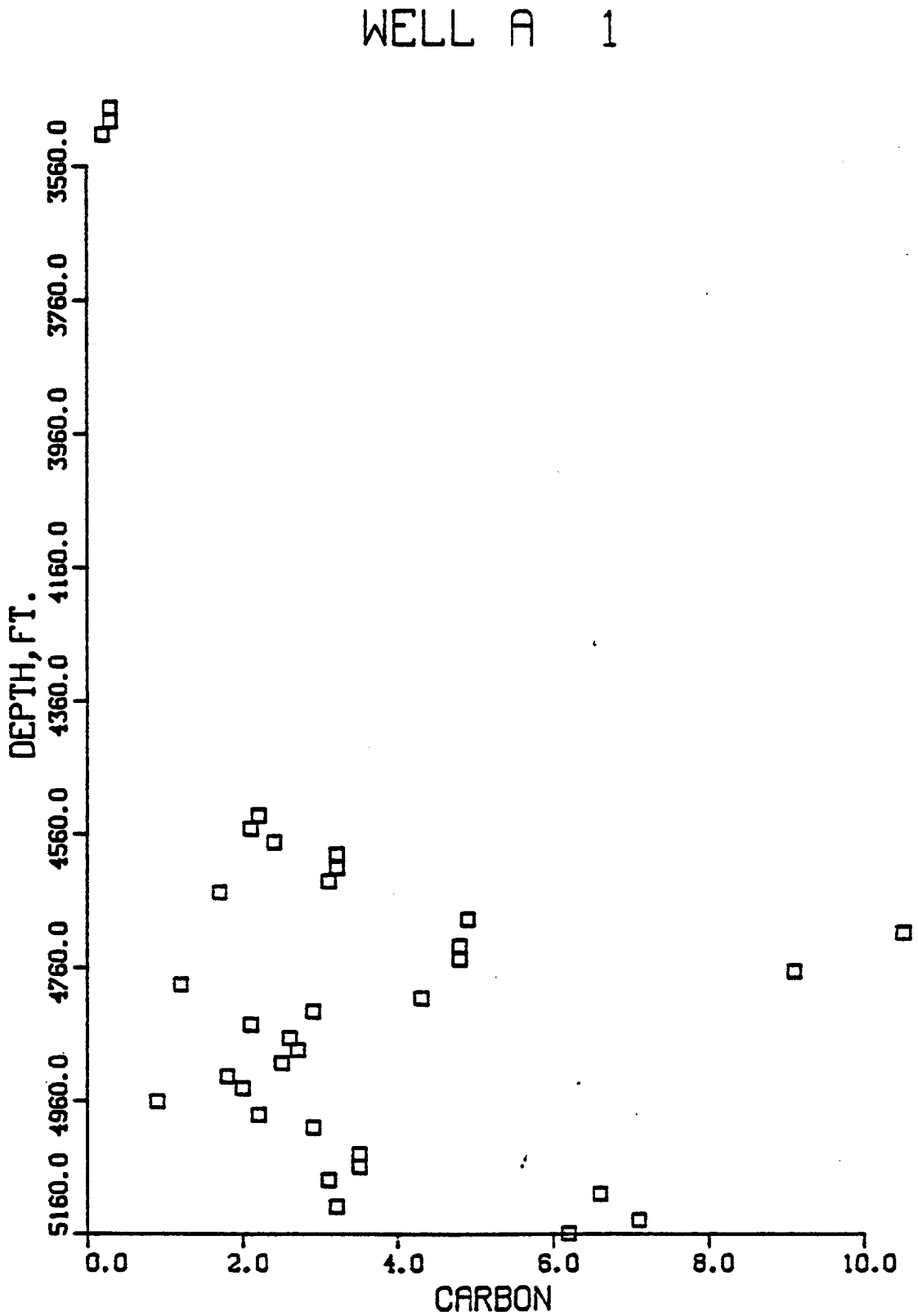


FIGURE 3. CARBON VERSUS DEPTH FOR WELL A-1

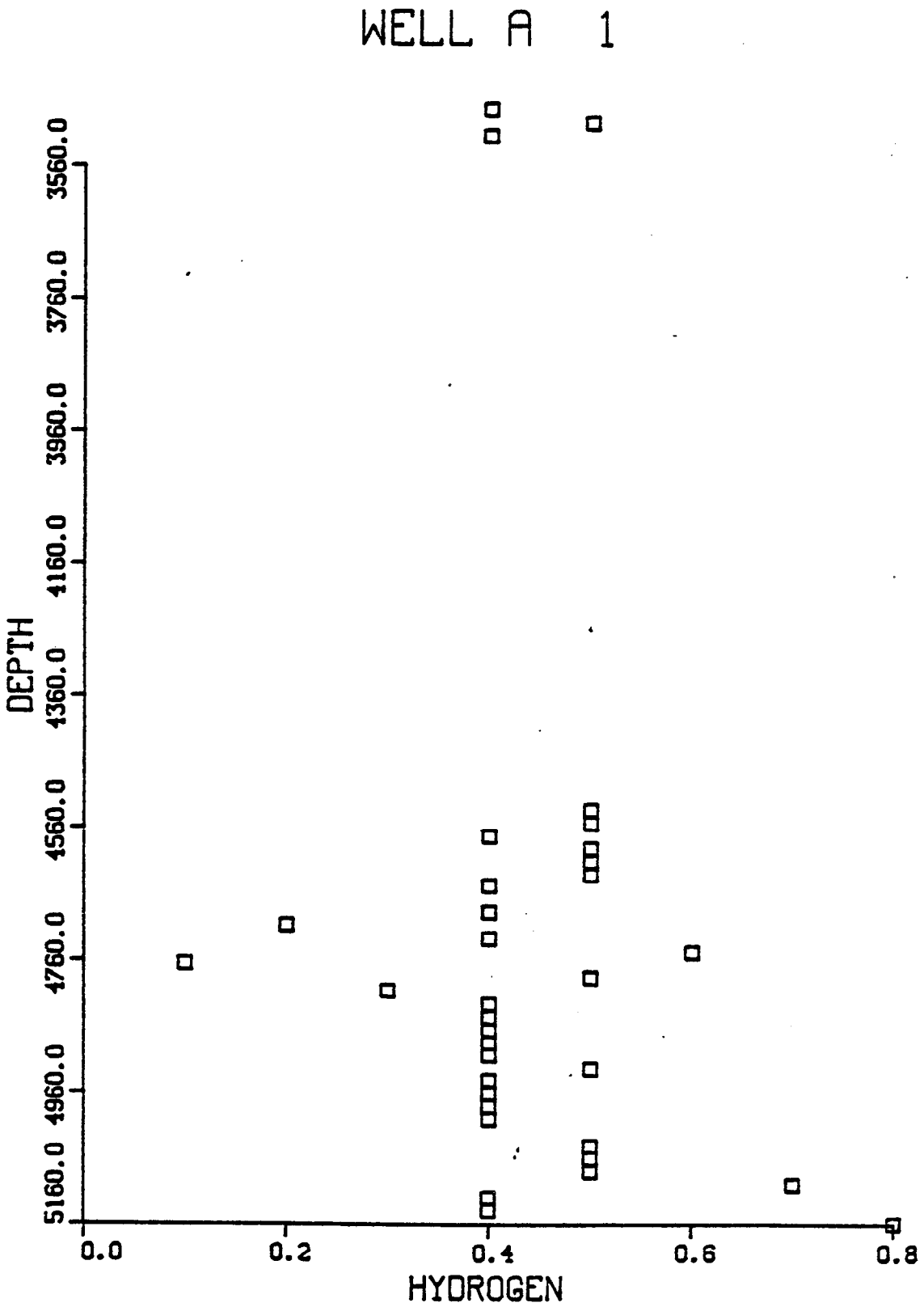


FIGURE 4. HYDROGEN VERSUS DEPTH FOR WELL A-1

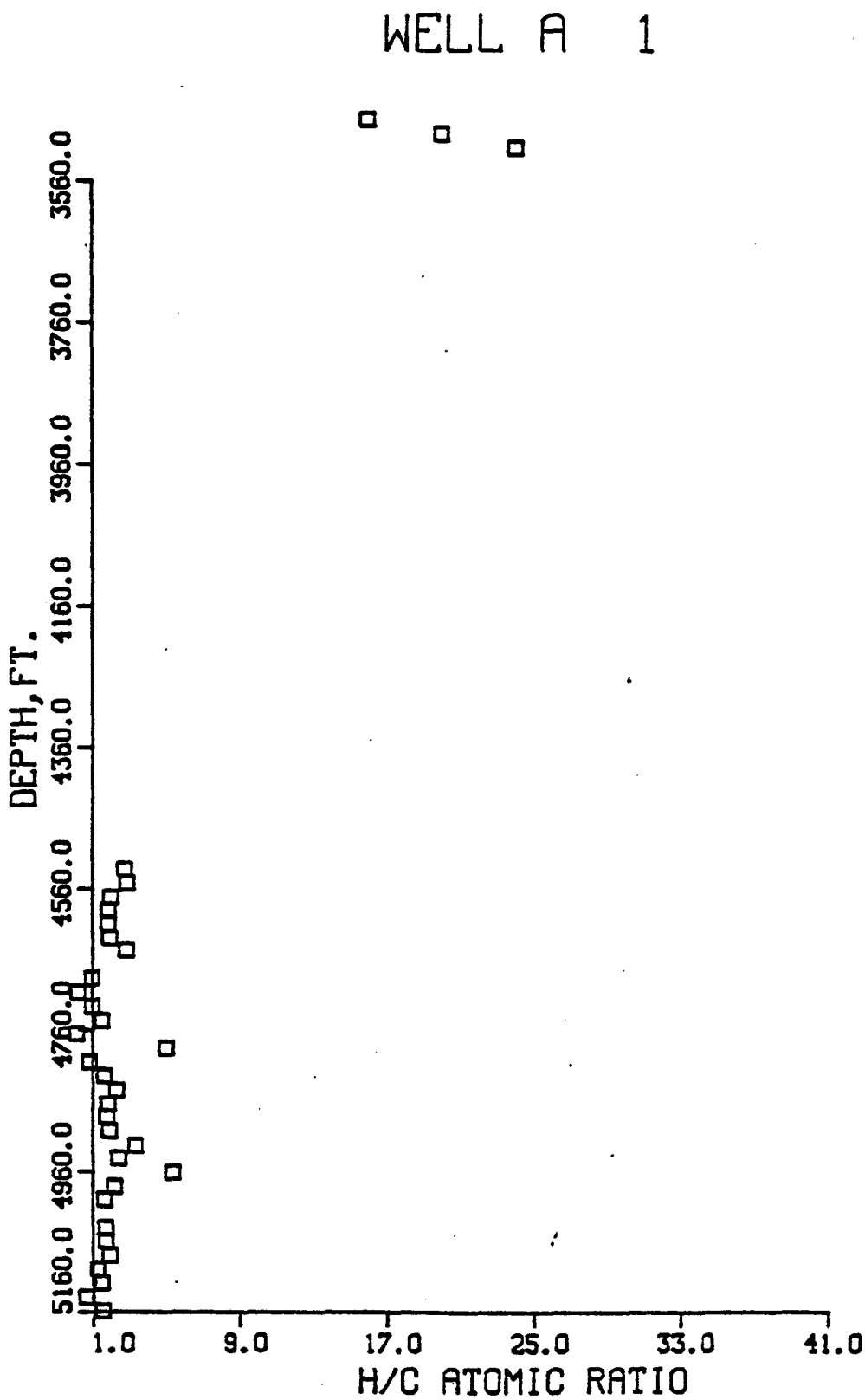


FIGURE 5. H/C ATOMIC RATIO VERSUS DEPTH FOR WELL A-1

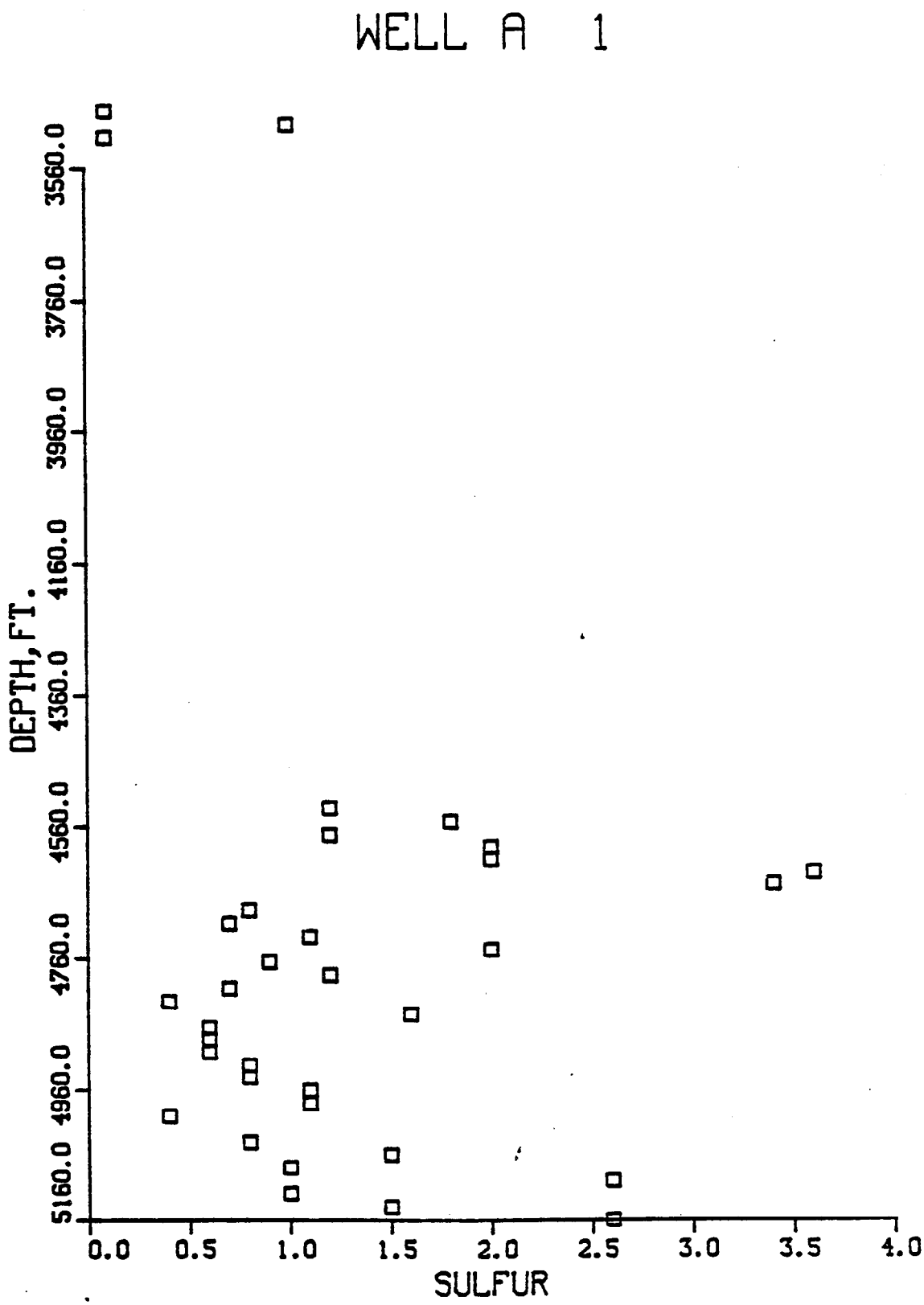


FIGURE 6. SULFUR VERSUS DEPTH FOR WELL A-1

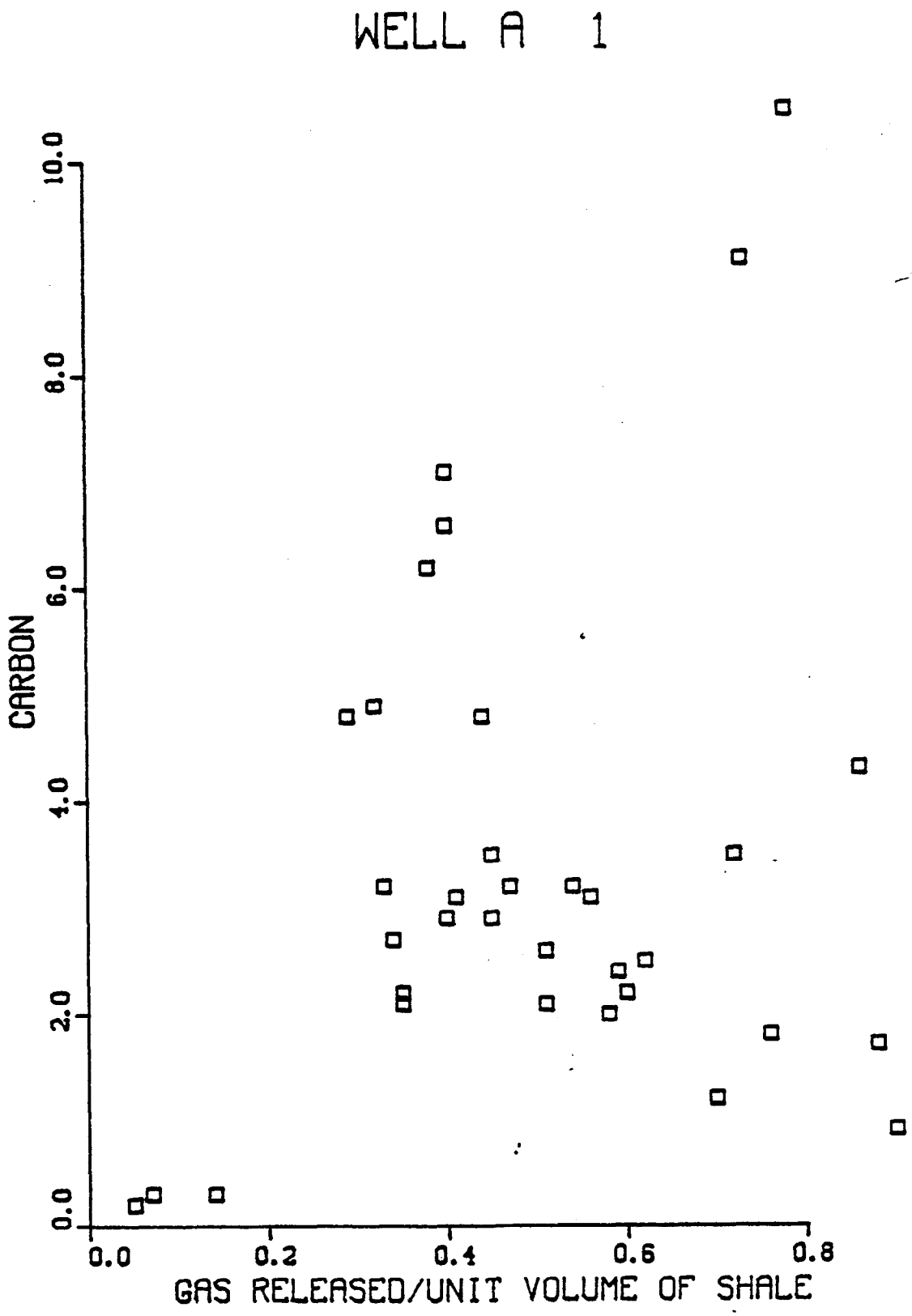


FIGURE 7. GAS RELEASED/UNIT VOLUME OF SHALE VERSUS CARBON FOR WELL A-1

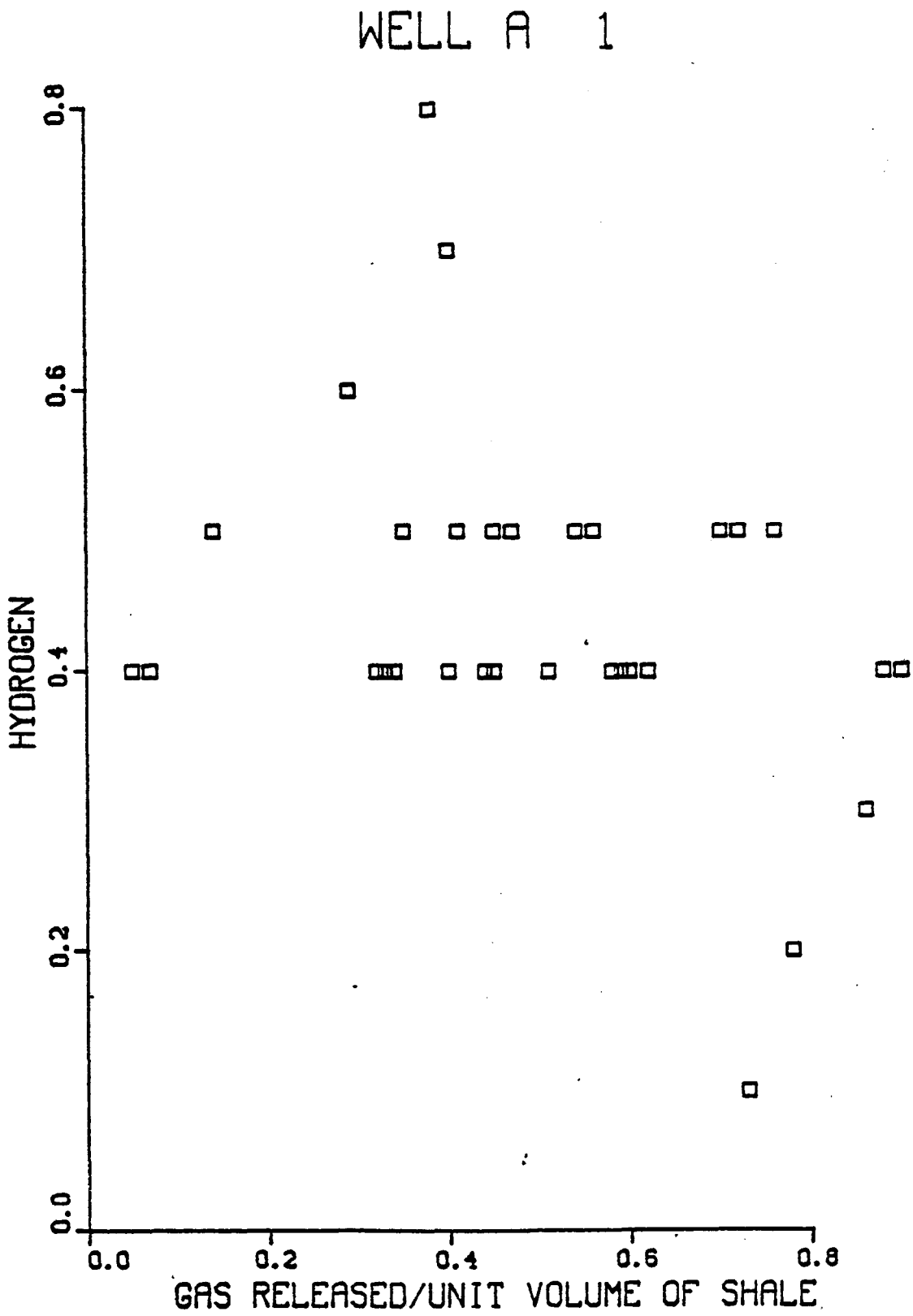


FIGURE 8. GAS RELEASED/UNIT VOLUME OF SHALE VERSUS HYDROGEN FOR WELL A-1

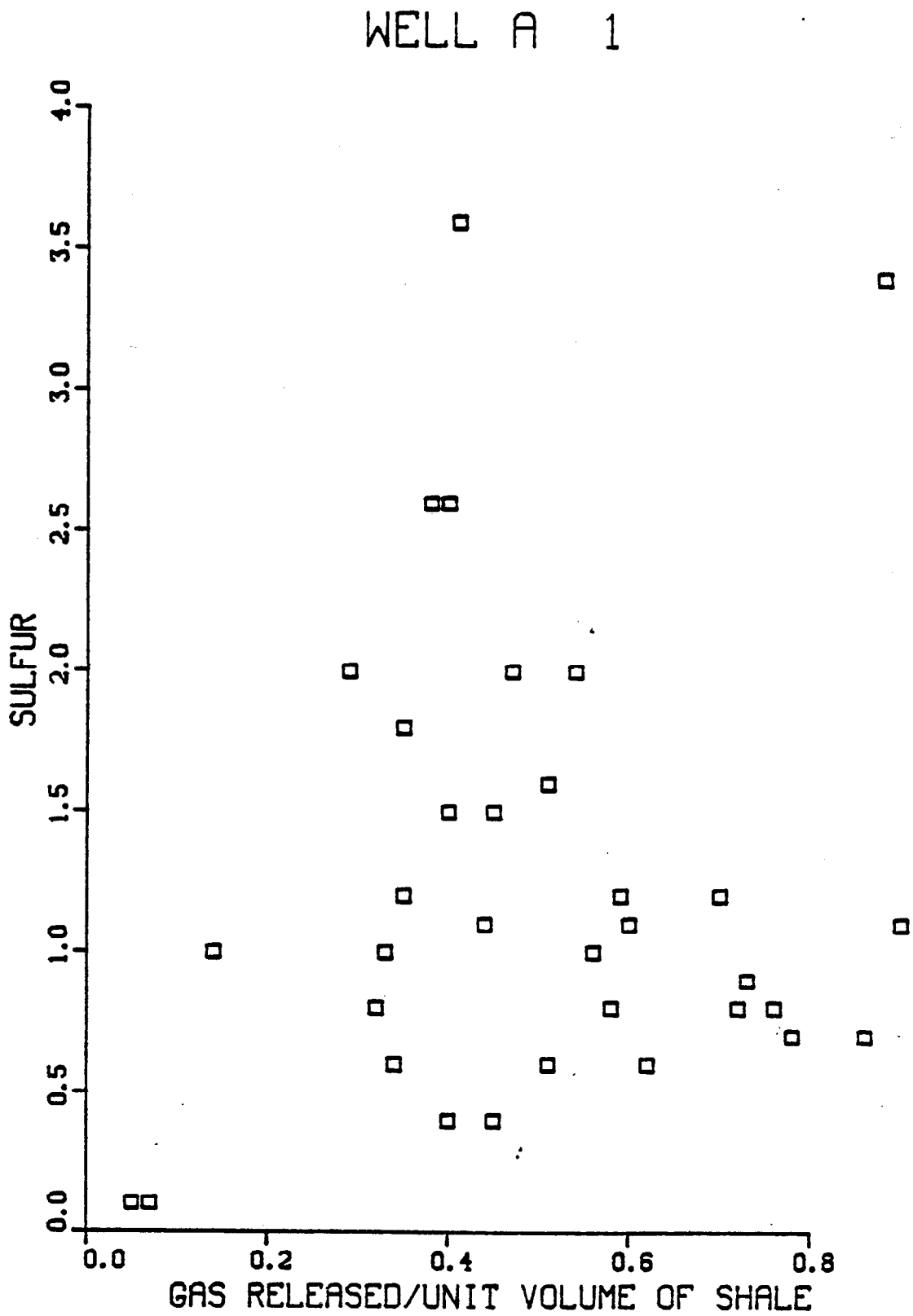


FIGURE 9. GAS RELEASED/UNIT VOLUME OF SHALE VERSUS SULFUR FOR WELL A-1

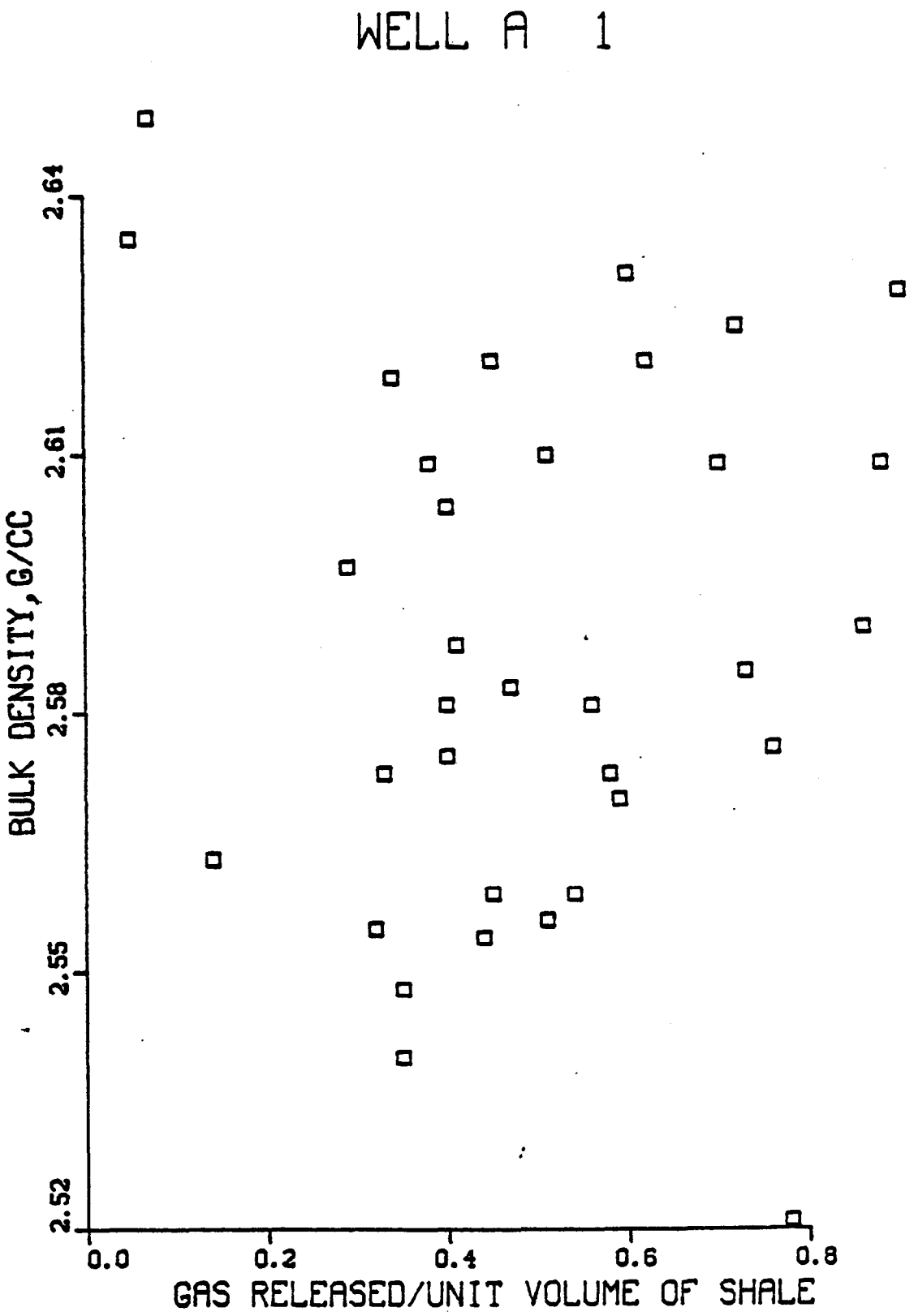


FIGURE 10. GAS RELEASED/UNIT VOLUME OF SHALE VERSUS BULK DENSITY FOR WELL A-1

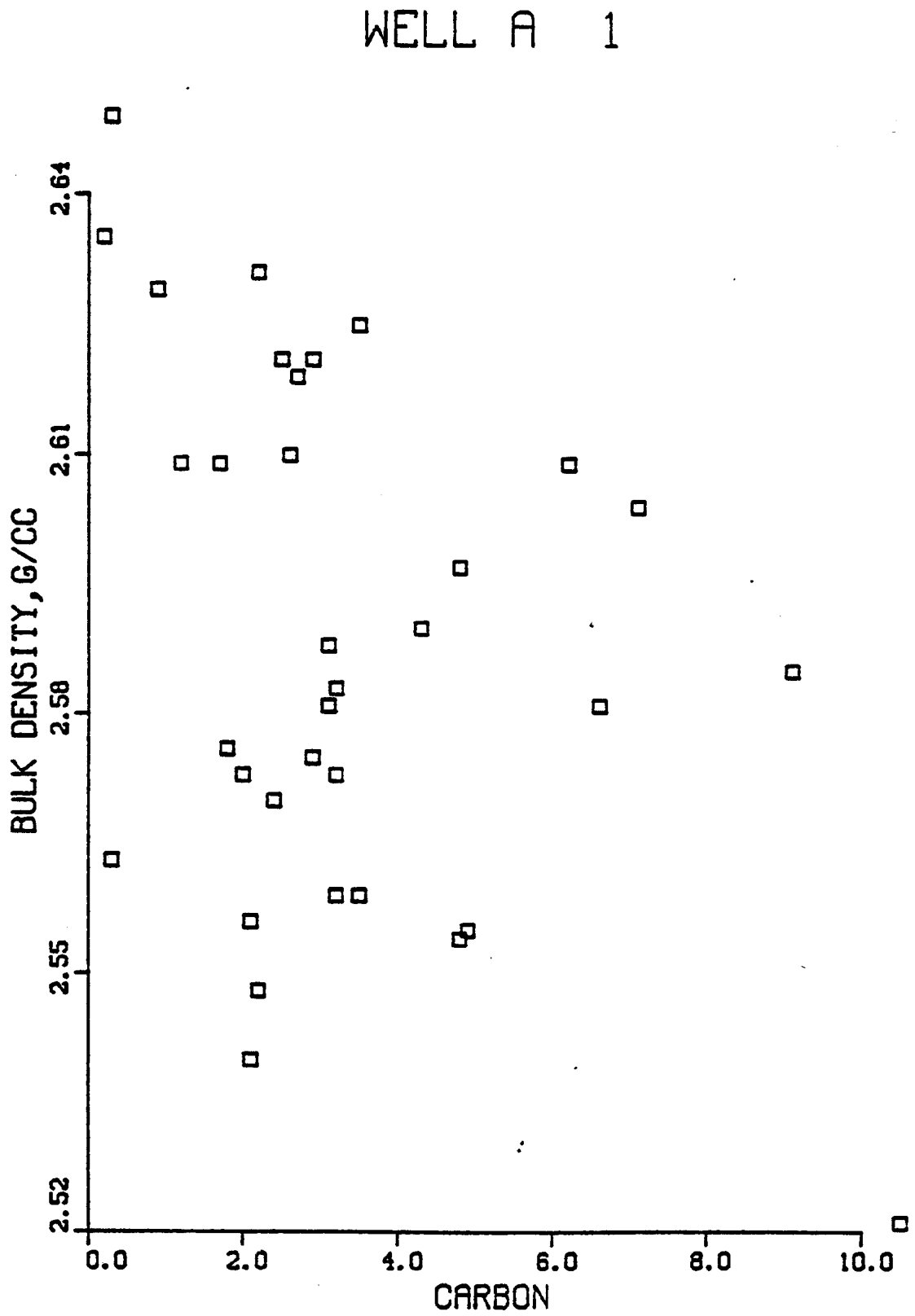


FIGURE 11. CARBON VERSUS BULK DENSITY FOR WELL A-1

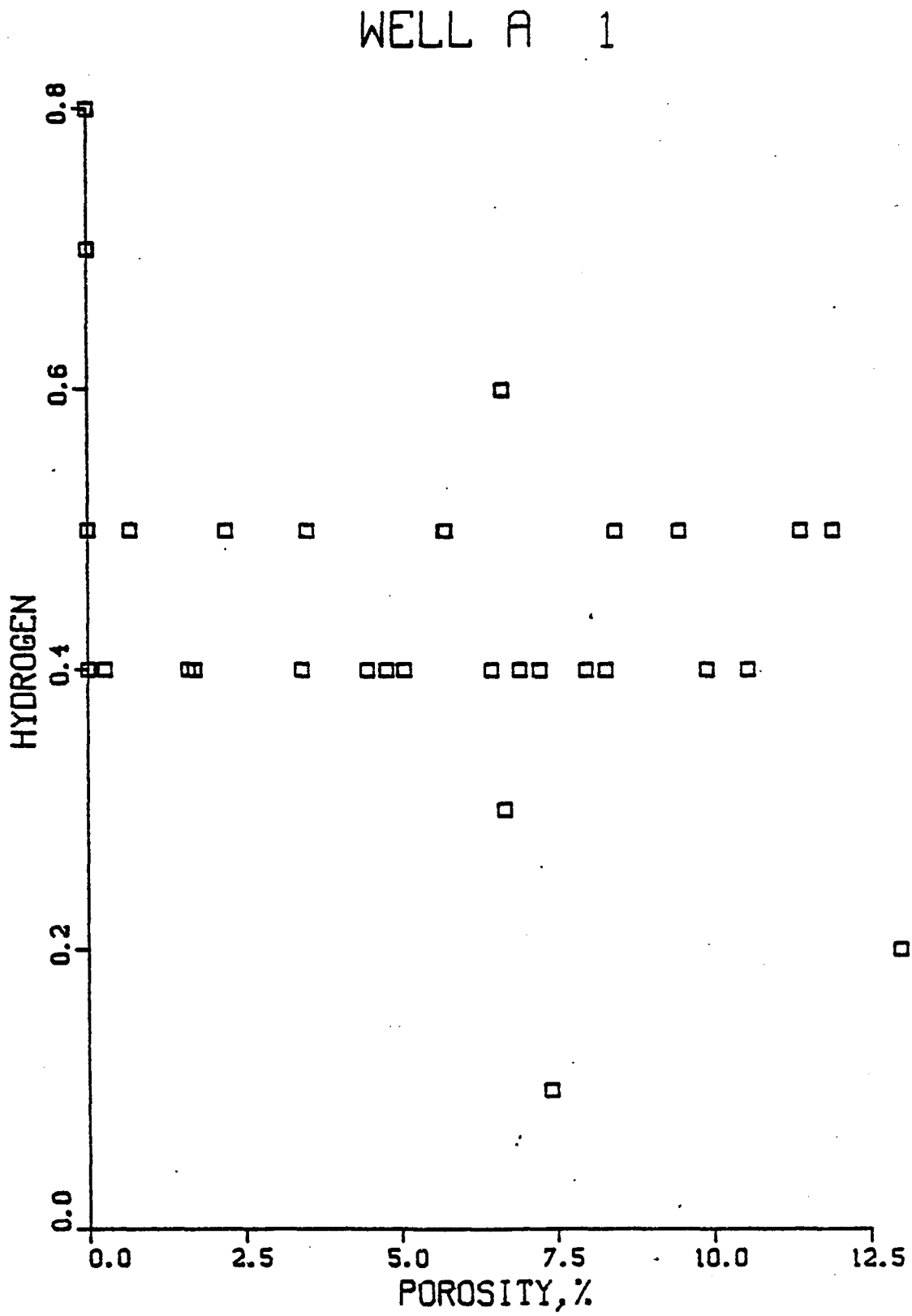


FIGURE 12. POROSITY VERSUS HYDROGEN FOR WELL A-1

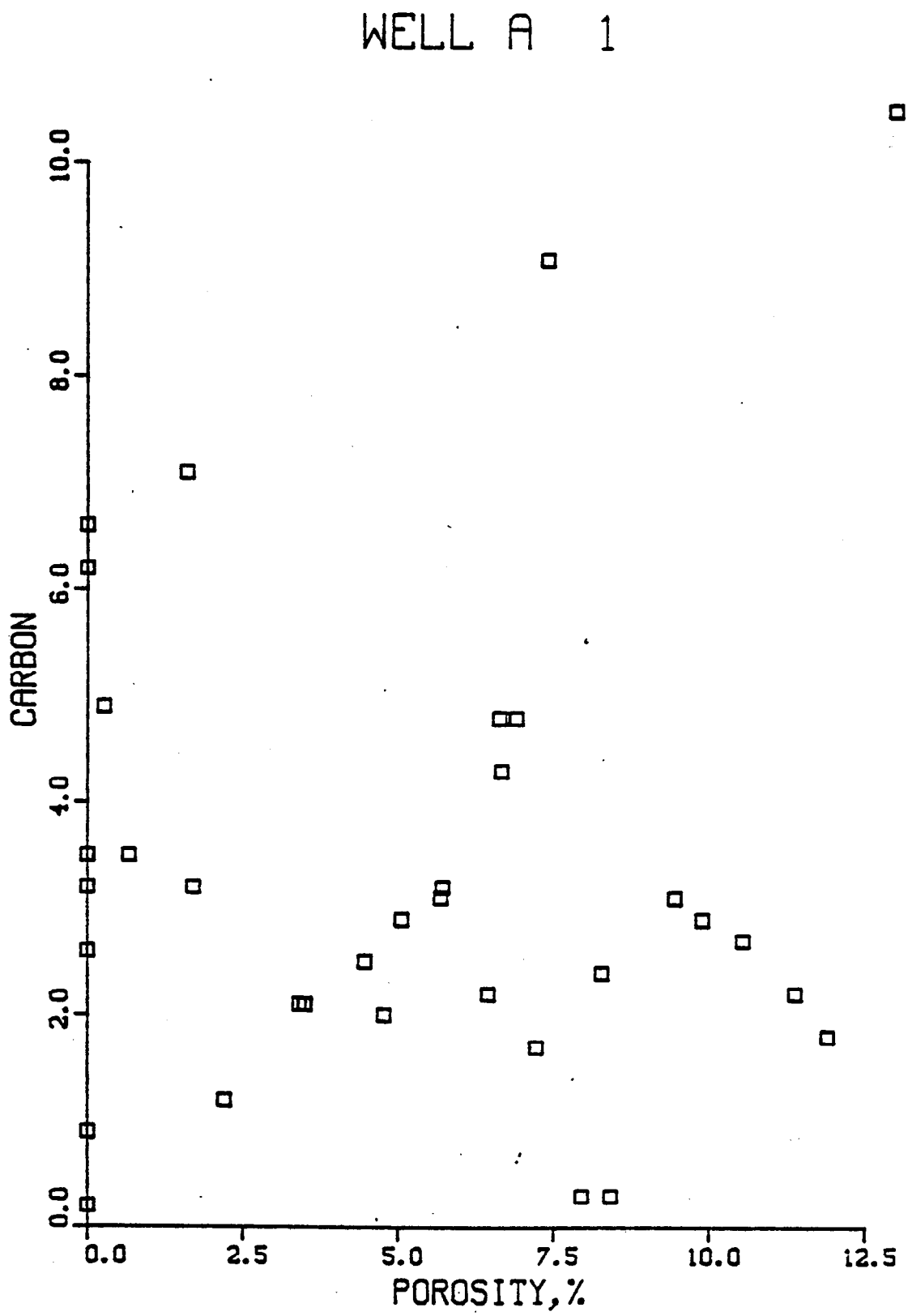


FIGURE 13. POROSITY VERSUS CARBON FOR WELL A-1

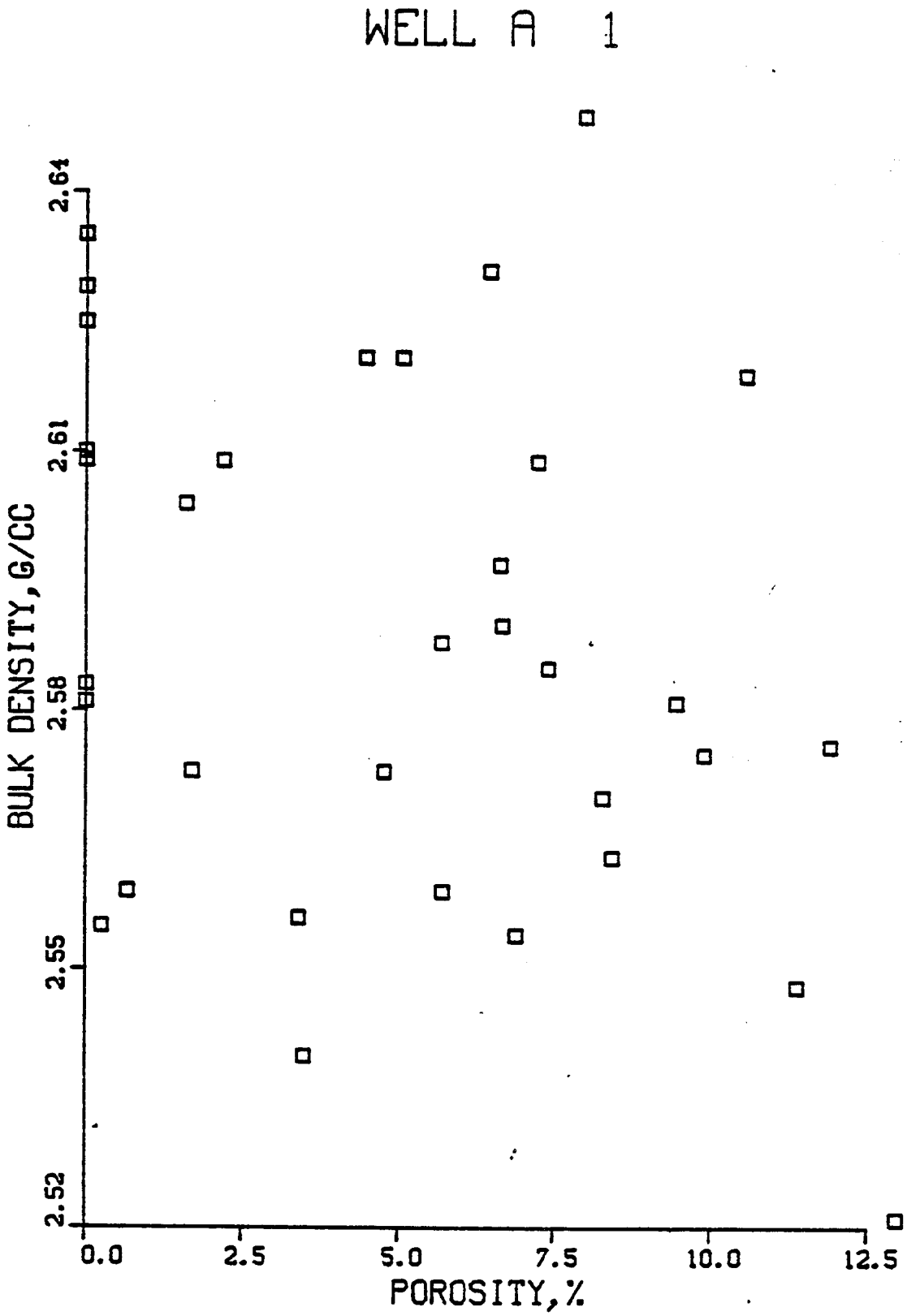


FIGURE 14. POROSITY VERSUS BULK DENSITY FOR WELL A-1

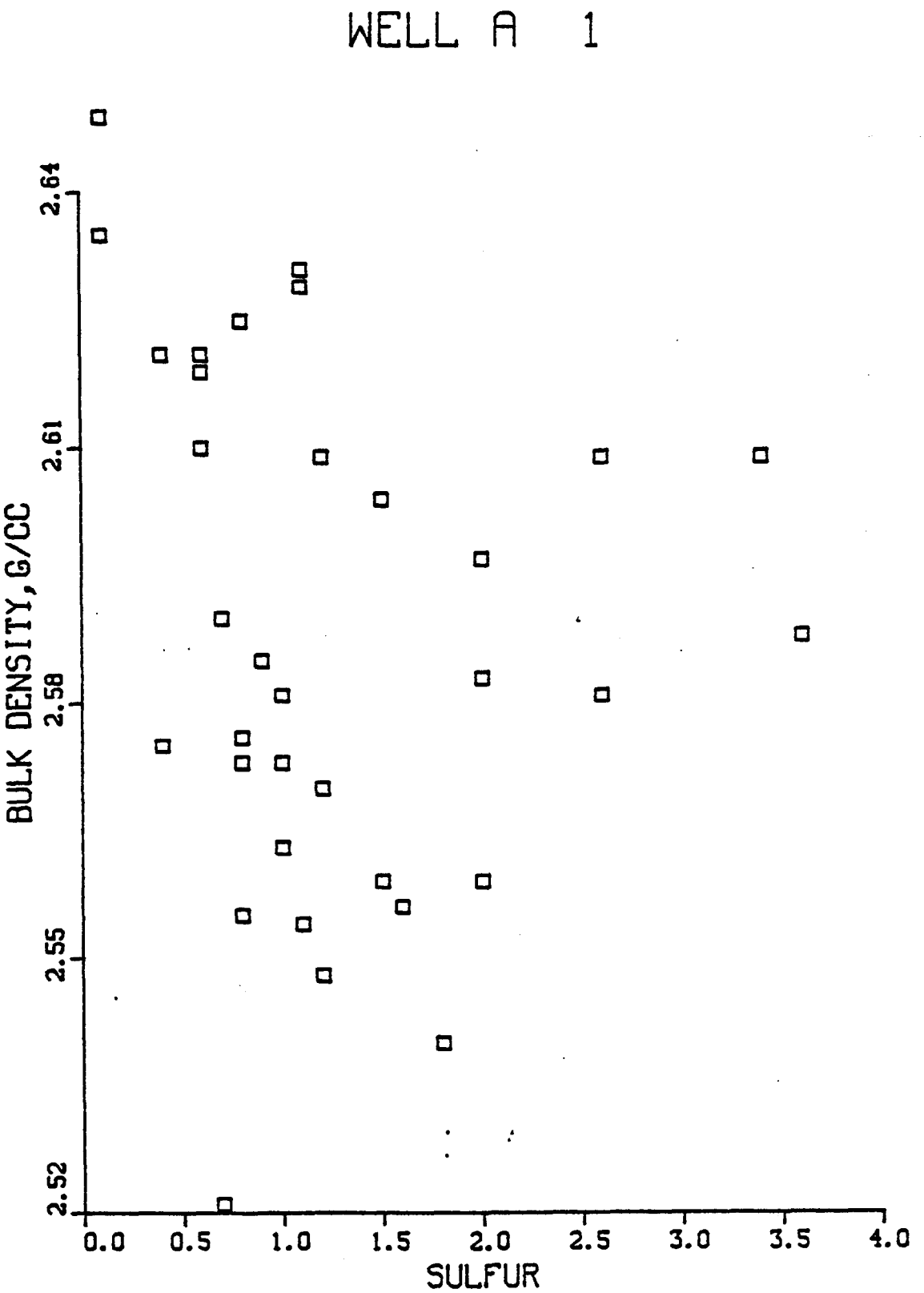


FIGURE 15. SULFUR VERSUS BULK DENSITY FOR WELL A-1

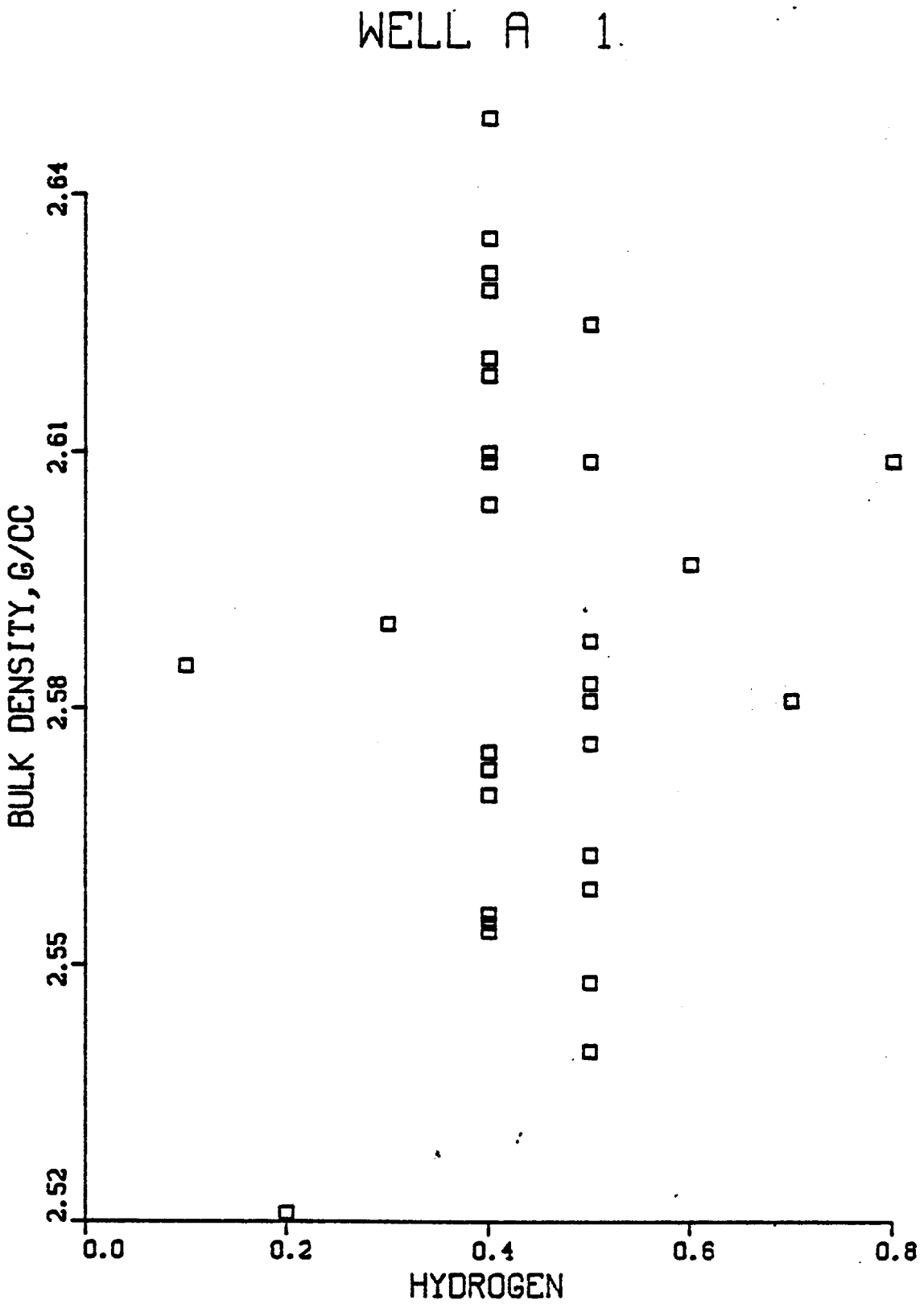
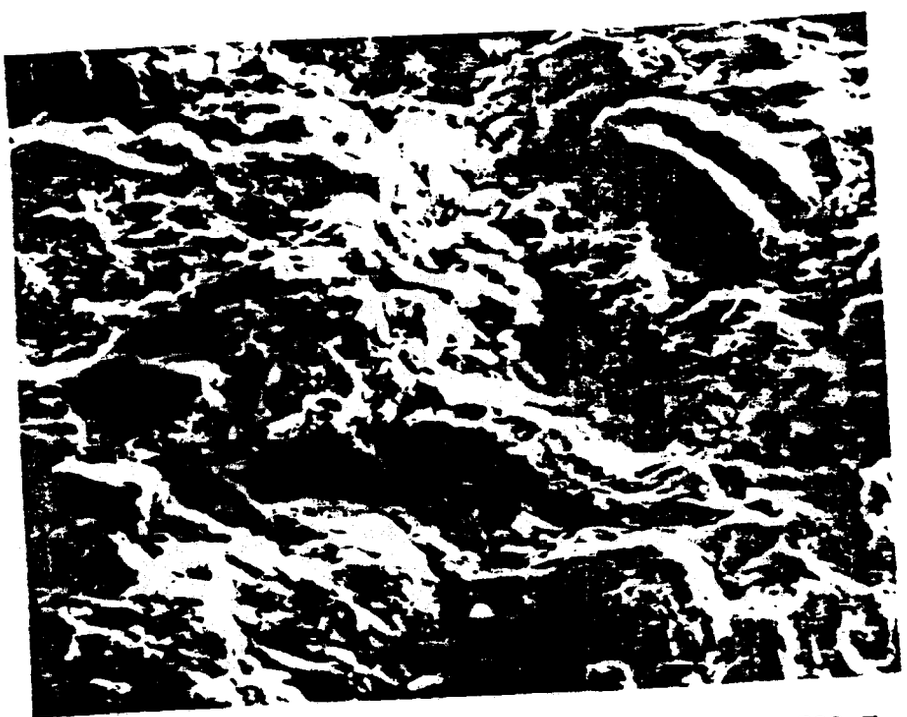


FIGURE 16. HYDROGEN VERSUS BULK DENSITY FOR WELL A-1

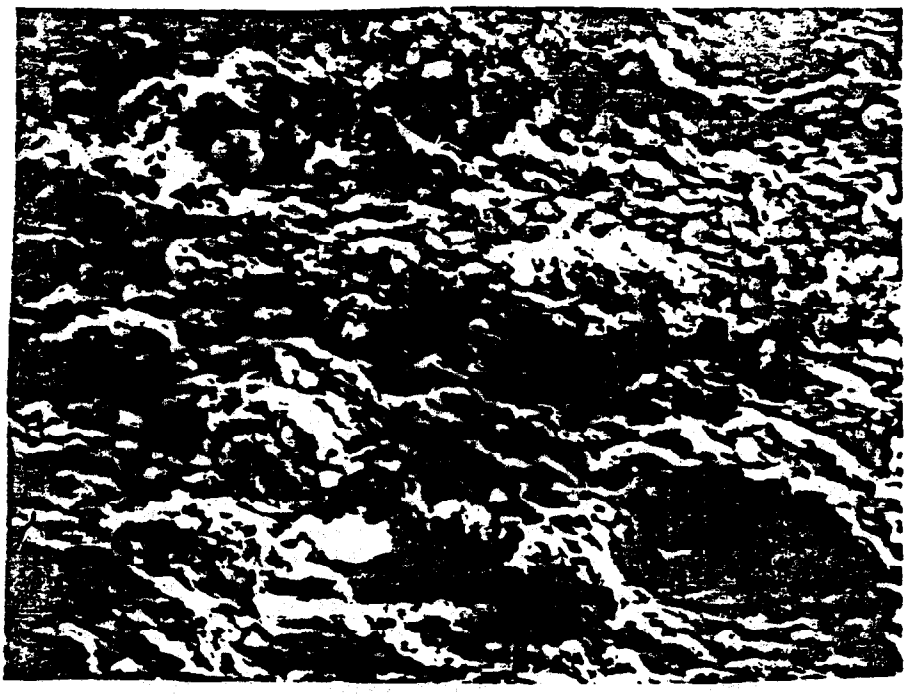
700 X

FIGURE 17. SEM MICROGRAPH OF SAMPLE A-1-3472



700 X

FIGURE 18. SEM MICROGRAPH OF SAMPLE A-1-4687



700 X

FIGURE 19. SEM MICROGRAPH OF SAMPLE A-1-5159

APPENDIX A

MERCURY INTRUSION POROSITY DATA FOR WELL A-1

POROSITY DATA FOR SAMPLE A 1-3472.

SEQUENCE NUMBER 1
PORE VOLUME .017 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	.0173	.0
2.	29.392	7.500	.0000	.0173	.0
3.	44.088	5.000	.0007	.0166	3.8
4.	58.784	3.700	.0007	.0166	3.8
5.	73.480	3.000	.0007	.0166	3.8
6.	88.176	2.500	.0007	.0166	3.8
7.	102.872	2.100	.0007	.0166	3.8
8.	117.568	1.800	.0008	.0165	4.5
9.	132.264	1.600	.0008	.0165	4.5
10.	146.960	1.500	.0008	.0165	4.5
11.	161.656	1.400	.0008	.0165	4.5
12.	176.352	1.300	.0008	.0165	4.5
13.	191.048	1.200	.0008	.0165	4.5
14.	205.744	1.100	.0009	.0164	5.1
15.	220.440	1.000	.0009	.0164	5.1
16.	235.136	.930	.0009	.0164	5.1
17.	249.832	.880	.0009	.0164	5.1
18.	264.528	.830	.0010	.0163	5.8
19.	279.224	.790	.0010	.0163	5.8
20.	293.920	.750	.0010	.0163	5.8
25.	367.400	.600	.0010	.0163	5.8
30.	440.880	.500	.0011	.0162	6.4
35.	514.360	.430	.0022	.0151	12.8
40.	587.840	.370	.0033	.0139	19.2
45.	661.320	.330	.0040	.0133	23.1
50.	734.800	.300	.0046	.0126	26.9
55.	808.280	.270	.0048	.0125	27.6
60.	881.760	.250	.0049	.0124	28.2
65.	955.240	.230	.0051	.0122	29.5
70.	1028.720	.210	.0053	.0120	30.8
75.	1102.200	.200	.0054	.0118	31.4
80.	1175.680	.180	.0055	.0117	32.1
85.	1249.160	.170	.0062	.0111	35.9

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Dec. 1979

POROSITY DATA FOR SAMPLE A 1-3472.

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	.0069	.0104	39.7
100.	1469.600	.150	.0080	.0093	46.2
110.	1616.560	.140	.0086	.0086	50.0
120.	1763.520	.130	.0089	.0084	51.3
130.	1910.480	.120	.0090	.0083	51.9
140.	2057.440	.110	.0091	.0082	52.6
150.	2204.400	.100	.0091	.0082	52.6
170.	2498.320	.088	.0097	.0075	56.4
180.	2645.280	.083	.0100	.0073	57.7
190.	2792.240	.079	.0100	.0073	57.7
200.	2939.200	.075	.0100	.0073	57.7
220.	3233.120	.068	.0104	.0069	60.3
240.	3527.040	.062	.0106	.0066	61.5
260.	3020.960	.057	.0108	.0064	62.8
280.	4114.880	.053	.0110	.0063	63.5
300.	4408.800	.050	.0111	.0062	64.1
330.	4849.680	.045	.0114	.0059	66.0
360.	5290.560	.041	.0117	.0055	67.9
390.	5731.440	.038	.0120	.0053	69.2
420.	6172.320	.035	.0122	.0051	70.5
450.	6613.200	.033	.0126	.0046	73.1
490.	7201.040	.030	.0127	.0045	73.7
510.	7494.960	.029	.0128	.0044	74.4
540.	7935.840	.027	.0132	.0041	76.3
590.	8670.640	.025	.0135	.0038	78.2
610.	8964.560	.024	.0137	.0035	79.5
640.	9405.440	.023	.0141	.0032	81.4
700.	10287.200	.021	.0143	.0030	82.7
740.	10875.040	.020	.0148	.0024	85.9
770.	11315.920	.019	.0151	.0022	87.2
800.	11756.800	.019	.0154	.0019	89.1
830.	12197.680	.018	.0157	.0015	91.0
860.	12638.560	.017	.0159	.0013	92.3
900.	13226.400	.017	.0164	.0009	94.9
930.	13667.280	.016	.0166	.0007	96.2
960.	13961.200	.016	.0168	.0004	97.4
1000.	14696.000	.014	.0173	.0000	100.0

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POROSITY DATA FOR SAMPLE A 1-3512.

SEQUENCE NUMBER 3
PORE VOLUME .021 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	.0209	.0
2.	29.392	7.500	.0011	.0199	5.1
3.	44.088	5.000	.0012	.0197	5.8
4.	58.784	3.700	.0012	.0197	5.8
5.	73.480	3.000	.0012	.0197	5.8
6.	88.176	2.500	.0014	.0196	6.5
7.	102.872	2.100	.0014	.0196	6.5
8.	117.568	1.800	.0018	.0191	8.7
9.	132.264	1.600	.0021	.0188	10.1
10.	146.960	1.500	.0027	.0182	13.0
11.	161.656	1.400	.0030	.0179	14.5
12.	176.352	1.300	.0033	.0176	15.9
13.	191.048	1.200	.0036	.0173	17.4
14.	205.744	1.100	.0039	.0170	18.8
15.	220.440	1.000	.0042	.0167	20.3
16.	235.136	.930	.0046	.0164	21.7
17.	249.832	.880	.0050	.0159	23.9
18.	264.528	.830	.0053	.0156	25.4
19.	279.224	.790	.0056	.0153	26.8
20.	293.920	.750	.0058	.0152	27.5
25.	367.400	.600	.0058	.0152	27.5
30.	440.880	.500	.0058	.0152	27.5
35.	514.360	.430	.0062	.0147	29.7
40.	587.840	.370	.0067	.0143	31.9
45.	661.320	.330	.0071	.0138	34.1
50.	734.800	.300	.0076	.0134	36.2
55.	808.280	.270	.0080	.0129	38.4
60.	881.760	.250	.0085	.0124	40.6
65.	955.240	.230	.0088	.0121	42.0
70.	1028.720	.210	.0091	.0118	43.5
75.	1102.200	.200	.0093	.0117	44.2
80.	1175.680	.180	.0094	.0115	44.9
85.	1249.160	.170	.0097	.0112	46.4

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Dec. 1979

POROSITY DATA FOR SAMPLE A 1-3512.

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	.0100	.0109	47.8
100.	1469.600	.150	.0103	.0106	49.3
110.	1616.560	.140	.0106	.0103	50.7
120.	1763.520	.130	.0108	.0102	51.4
130.	1910.480	.120	.0109	.0100	52.2
140.	2057.440	.110	.0109	.0100	52.2
150.	2204.400	.100	.0112	.0097	53.6
170.	2498.320	.088	.0120	.0090	57.2
180.	2645.280	.083	.0120	.0090	57.2
190.	2792.240	.079	.0121	.0088	58.0
200.	2939.200	.075	.0121	.0088	58.0
220.	3233.120	.068	.0123	.0086	58.7
240.	3527.040	.062	.0127	.0082	60.9
260.	3820.960	.057	.0127	.0082	60.9
280.	4114.880	.053	.0134	.0076	63.8
300.	4408.800	.050	.0137	.0073	65.2
330.	4849.680	.045	.0138	.0071	65.9
360.	5290.560	.041	.0143	.0067	68.1
390.	5731.440	.038	.0146	.0064	69.6
420.	6172.320	.035	.0149	.0061	71.0
450.	6613.200	.033	.0152	.0058	72.5
490.	7201.040	.030	.0155	.0055	73.9
510.	7494.960	.029	.0155	.0055	73.9
540.	7935.840	.027	.0158	.0052	75.4
590.	8670.640	.025	.0167	.0042	79.7
610.	8964.560	.024	.0167	.0042	79.7
640.	9405.440	.023	.0173	.0036	82.6
700.	10287.200	.021	.0176	.0033	84.1
740.	10875.040	.020	.0181	.0029	86.2
770.	11315.920	.019	.0184	.0026	87.7
800.	11756.800	.019	.0185	.0024	88.4
830.	12197.680	.018	.0190	.0020	90.6
860.	12638.560	.017	.0190	.0020	90.6
900.	13226.400	.017	.0196	.0014	93.5
930.	13667.280	.016	.0200	.0009	95.7
960.	13961.200	.016	.0203	.0006	97.1
1000.	14696.000	.014	.0209	.0000	100.0

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-4552.

SEQUENCE NUMBER 5
PORE VOLUME .033 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	.0333	.0
2.	29.392	7.500	.0010	.0322	3.1
3.	44.088	5.000	.0012	.0321	3.5
4.	58.784	3.700	.0018	.0314	5.6
5.	73.480	3.000	.0023	.0309	6.9
6.	88.176	2.500	.0031	.0301	9.4
7.	102.872	2.100	.0039	.0293	11.8
8.	117.568	1.800	.0045	.0288	13.5
9.	132.264	1.600	.0053	.0279	16.0
10.	146.960	1.500	.0060	.0273	18.1
11.	161.656	1.400	.0067	.0266	20.1
12.	176.352	1.300	.0073	.0260	21.9
13.	191.048	1.200	.0081	.0252	24.3
14.	205.744	1.100	.0087	.0246	26.0
15.	220.440	1.000	.0092	.0240	27.8
16.	235.136	.930	.0098	.0234	29.5
17.	249.832	.880	.0106	.0226	31.9
18.	264.528	.830	.0111	.0222	33.3
19.	279.224	.790	.0114	.0218	34.4
20.	293.920	.750	.0120	.0212	36.1
25.	367.400	.600	.0124	.0209	37.2
30.	440.880	.500	.0127	.0206	38.2
35.	514.360	.430	.0137	.0195	41.3
40.	587.840	.370	.0148	.0185	44.4
45.	661.320	.330	.0159	.0173	47.9
50.	734.800	.300	.0171	.0162	51.4
55.	808.280	.270	.0179	.0154	53.8
60.	881.760	.250	.0187	.0146	56.3
65.	955.240	.230	.0192	.0141	57.6
70.	1028.720	.210	.0196	.0136	59.0
75.	1102.200	.200	.0201	.0132	60.4
80.	1175.680	.180	.0206	.0127	61.8
85.	1249.160	.170	.0210	.0122	63.2

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-4552.

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	.0215	.0118	64.6
100.	1469.600	.150	.0217	.0115	65.3
110.	1616.560	.140	.0221	.0112	66.3
120.	1763.520	.130	.0225	.0107	67.7
130.	1910.480	.120	.0229	.0104	68.8
140.	2057.440	.110	.0232	.0100	69.8
150.	2204.400	.100	.0233	.0099	70.1
170.	2498.320	.088	.0239	.0094	71.9
180.	2645.280	.083	.0243	.0090	72.9
190.	2792.240	.079	.0244	.0089	73.3
200.	2939.200	.075	.0246	.0087	74.0
220.	3233.120	.068	.0249	.0083	75.0
240.	3527.040	.062	.0255	.0077	76.7
260.	3820.960	.057	.0256	.0076	77.1
280.	4114.880	.053	.0263	.0069	79.2
300.	4408.800	.050	.0263	.0069	79.2
330.	4849.680	.045	.0267	.0066	80.2
360.	5290.560	.041	.0271	.0061	81.6
390.	5731.440	.038	.0277	.0055	83.3
420.	6172.320	.035	.0279	.0053	84.0
450.	6613.200	.033	.0281	.0052	84.4
490.	7201.040	.030	.0286	.0046	86.1
510.	7494.960	.029	.0291	.0042	87.5
540.	7935.840	.027	.0291	.0042	87.5
590.	8670.640	.025	.0293	.0039	88.2
610.	8964.560	.024	.0298	.0035	89.6
640.	9405.440	.023	.0303	.0030	91.0
700.	10287.200	.021	.0305	.0028	91.7
740.	10875.040	.020	.0309	.0023	93.1
770.	11315.920	.019	.0312	.0021	93.8
800.	11756.800	.019	.0314	.0018	94.4
830.	12197.680	.018	.0318	.0015	95.5
860.	12638.560	.017	.0318	.0015	95.5
900.	13226.400	.017	.0322	.0010	96.9
930.	13667.280	.016	.0326	.0007	97.9
960.	13961.200	.016	.0328	.0005	98.6
1000.	14696.000	.014	.0333	.0000	100.0

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-4590.

SEQUENCE NUMBER 7
PORE VOLUME .030 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	.0300	.0
2.	29.392	7.500	.0009	.0290	3.2
3.	44.088	5.000	.0011	.0289	3.5
4.	58.784	3.700	.0021	.0278	7.0
5.	73.480	3.000	.0026	.0273	8.8
6.	88.176	2.500	.0032	.0268	10.6
7.	102.872	2.100	.0040	.0259	13.4
8.	117.568	1.800	.0044	.0255	14.8
9.	132.264	1.600	.0051	.0249	16.9
10.	146.960	1.500	.0056	.0244	18.7
11.	161.656	1.400	.0063	.0236	21.1
12.	176.352	1.300	.0067	.0232	22.5
13.	191.048	1.200	.0074	.0226	24.6
14.	205.744	1.100	.0076	.0224	25.4
15.	220.440	1.000	.0082	.0217	27.5
16.	235.136	.930	.0089	.0211	29.6
17.	249.832	.880	.0093	.0207	31.0
18.	264.528	.830	.0098	.0201	32.7
19.	279.224	.790	.0103	.0196	34.5
20.	293.920	.750	.0105	.0194	35.2
25.	367.400	.600	.0108	.0192	35.9
30.	440.880	.500	.0110	.0190	36.6
35.	514.360	.430	.0117	.0182	39.1
40.	587.840	.370	.0124	.0175	41.5
45.	661.320	.330	.0135	.0165	45.1
50.	734.800	.300	.0146	.0154	48.6
55.	808.280	.270	.0151	.0149	50.4
60.	881.760	.250	.0156	.0143	52.1
65.	955.240	.230	.0161	.0138	53.9
70.	1028.720	.210	.0167	.0133	55.6
75.	1102.200	.200	.0173	.0127	57.7
80.	1175.680	.180	.0179	.0120	59.9
85.	1249.160	.170	.0181	.0118	60.6

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-4590.

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	.0184	.0116	61.3
100.	1469.600	.150	.0188	.0112	62.7
110.	1616.560	.140	.0192	.0108	64.1
120.	1763.520	.130	.0196	.0103	65.5
130.	1910.480	.120	.0198	.0101	66.2
140.	2057.440	.110	.0202	.0097	67.6
150.	2204.400	.100	.0206	.0094	68.7
170.	2498.320	.088	.0211	.0089	70.4
180.	2645.280	.083	.0213	.0086	71.1
190.	2792.240	.079	.0214	.0085	71.5
200.	2939.200	.075	.0216	.0083	72.2
220.	3233.120	.068	.0221	.0078	73.9
240.	3527.040	.062	.0224	.0076	74.6
260.	3820.960	.057	.0228	.0072	76.1
280.	4114.880	.053	.0230	.0070	76.8
300.	4408.800	.050	.0232	.0067	77.5
330.	4849.680	.045	.0236	.0063	78.9
360.	5290.560	.041	.0243	.0057	81.0
390.	5731.440	.038	.0243	.0057	81.0
420.	6172.320	.035	.0249	.0051	83.1
450.	6613.200	.033	.0251	.0049	83.8
490.	7201.040	.030	.0254	.0045	84.9
510.	7494.960	.029	.0257	.0042	85.9
540.	7935.840	.027	.0259	.0040	86.6
590.	8670.640	.025	.0264	.0036	88.0
610.	8964.560	.024	.0266	.0034	88.7
640.	9405.440	.023	.0268	.0032	89.4
700.	10287.200	.021	.0274	.0025	91.5
740.	10875.040	.020	.0277	.0022	92.6
770.	11315.920	.019	.0277	.0022	92.6
800.	11756.800	.019	.0283	.0017	94.4
830.	12197.680	.018	.0285	.0015	95.1
860.	12638.560	.017	.0289	.0011	96.5
900.	13226.400	.017	.0291	.0008	97.2
930.	13667.280	.016	.0291	.0008	97.2
960.	13961.200	.016	.0297	.0002	99.3
1000.	14696.000	.014	.0300	.0000	100.0

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-4630.

SEQUENCE NUMBER 9
PORE VOLUME .028 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	.0283	.0
2.	29.392	7.500	.0011	.0272	3.8
3.	44.088	5.000	.0012	.0271	4.3
4.	58.784	3.700	.0019	.0264	6.8
5.	73.480	3.000	.0028	.0255	9.8
6.	88.176	2.500	.0036	.0247	12.8
7.	102.872	2.100	.0042	.0241	15.0
8.	117.568	1.800	.0048	.0235	17.1
9.	132.264	1.600	.0053	.0230	18.8
10.	146.960	1.500	.0058	.0225	20.5
11.	161.656	1.400	.0065	.0218	23.1
12.	176.352	1.300	.0073	.0211	25.6
13.	191.048	1.200	.0076	.0207	26.9
14.	205.744	1.100	.0082	.0201	29.1
15.	220.440	1.000	.0086	.0197	30.3
16.	235.136	.930	.0090	.0194	31.6
17.	249.832	.880	.0093	.0190	32.9
18.	264.528	.830	.0097	.0186	34.2
19.	279.224	.790	.0102	.0182	35.9
20.	293.920	.750	.0104	.0179	36.8
25.	367.400	.600	.0105	.0178	37.2
30.	440.880	.500	.0107	.0177	37.6
35.	514.360	.430	.0114	.0169	40.2
40.	587.840	.370	.0121	.0162	42.7
45.	661.320	.330	.0132	.0151	46.6
50.	734.800	.300	.0143	.0140	50.4
55.	808.280	.270	.0145	.0138	51.3
60.	881.760	.250	.0148	.0136	52.1
65.	955.240	.230	.0153	.0131	53.8
70.	1028.720	.210	.0157	.0126	55.6
75.	1102.200	.200	.0162	.0121	57.3
80.	1175.680	.180	.0167	.0116	59.0
85.	1249.160	.170	.0171	.0113	60.3

POROSITY DATA FOR SAMPLE A 1-4630.

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	.0174	.0109	61.5
100.	1469.600	.150	.0180	.0103	63.7
110.	1616.560	.140	.0180	.0103	63.7
120.	1763.520	.130	.0182	.0102	64.1
130.	1910.480	.120	.0188	.0096	66.2
140.	2057.440	.110	.0192	.0091	67.9
150.	2204.400	.100	.0194	.0090	68.4
170.	2498.320	.088	.0196	.0087	69.2
180.	2645.280	.083	.0201	.0082	70.9
190.	2792.240	.079	.0203	.0080	71.8
200.	2939.200	.075	.0206	.0077	72.6
220.	3233.120	.068	.0207	.0076	73.1
240.	3527.040	.062	.0209	.0074	73.9
260.	3820.960	.057	.0217	.0067	76.5
280.	4114.880	.053	.0218	.0065	76.9
300.	4408.800	.050	.0218	.0065	76.9
330.	4849.680	.045	.0222	.0062	78.2
360.	5290.560	.041	.0225	.0058	79.5
390.	5731.440	.038	.0229	.0054	80.8
420.	6172.320	.035	.0234	.0050	82.5
450.	6613.200	.033	.0236	.0047	83.3
490.	7201.040	.030	.0241	.0042	85.0
510.	7494.960	.029	.0245	.0039	86.3
540.	7935.840	.027	.0245	.0039	86.3
590.	8670.640	.025	.0251	.0033	88.5
610.	8964.560	.024	.0255	.0028	90.2
640.	9405.440	.023	.0255	.0028	90.2
700.	10287.200	.021	.0259	.0024	91.5
740.	10875.040	.020	.0264	.0019	93.2
770.	11315.920	.019	.0269	.0015	94.9
800.	11756.800	.019	.0270	.0013	95.3
830.	12197.680	.018	.0270	.0013	95.3
860.	12638.560	.017	.0272	.0011	96.2
900.	13226.400	.017	.0276	.0007	97.4
930.	13667.280	.016	.0281	.0002	99.1
960.	13961.200	.016	.0283	.0000	100.0
1000.	14696.000	.014	.0283	.0000	100.0

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-4707.

SEQUENCE NUMBER 13
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	.0140	.0
2.	29.392	7.500	.0010	.0138	6.7
3.	44.088	5.000	.0011	.0137	7.6
4.	58.784	3.700	.0011	.0137	7.6
5.	73.480	3.000	.0011	.0137	7.6
6.	88.176	2.500	.0013	.0135	8.6
7.	102.872	2.100	.0013	.0135	8.6
8.	117.568	1.800	.0013	.0135	8.6
9.	132.264	1.600	.0013	.0135	8.6
10.	146.960	1.500	.0017	.0131	11.4
11.	161.656	1.400	.0020	.0128	13.3
12.	176.352	1.300	.0023	.0125	15.2
13.	191.048	1.200	.0028	.0120	19.0
14.	205.744	1.100	.0028	.0120	19.0
15.	220.440	1.000	.0034	.0114	22.9
16.	235.136	.930	.0037	.0111	24.8
17.	249.832	.880	.0039	.0108	26.7
18.	264.528	.830	.0042	.0106	28.6
19.	279.224	.790	.0042	.0106	28.6
20.	293.920	.750	.0045	.0103	30.5
25.	367.400	.600	.0045	.0103	30.5
30.	440.880	.500	.0045	.0103	30.5
35.	514.360	.430	.0049	.0099	33.3
40.	587.840	.370	.0054	.0094	36.2
45.	661.320	.330	.0058	.0090	39.0
50.	734.800	.300	.0062	.0086	41.9
55.	808.280	.270	.0063	.0084	42.9
60.	881.760	.250	.0065	.0083	43.8
65.	955.240	.230	.0066	.0082	44.8
70.	1028.720	.210	.0068	.0080	45.7
75.	1102.200	.200	.0069	.0079	46.7
80.	1175.680	.180	.0070	.0077	47.6
85.	1249.160	.170	.0072	.0076	48.6

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-4707.

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	.0073	.0075	49.5
100.	1469.600	.150	.0075	.0073	50.5
110.	1616.560	.140	.0076	.0072	51.4
120.	1763.520	.130	.0079	.0069	53.3
130.	1910.480	.120	.0082	.0066	55.2
140.	2057.440	.110	.0084	.0063	57.1
150.	2204.400	.100	.0084	.0063	57.1
170.	2498.320	.088	.0086	.0062	58.1
180.	2645.280	.083	.0086	.0062	58.1
190.	2792.240	.079	.0090	.0058	61.0
200.	2939.200	.075	.0093	.0055	62.9
220.	3233.120	.068	.0096	.0052	64.8
240.	3527.040	.062	.0096	.0052	64.8
260.	3820.960	.057	.0100	.0048	67.6
280.	4114.880	.053	.0100	.0048	67.6
300.	4408.800	.050	.0100	.0048	67.6
330.	4849.680	.045	.0104	.0044	70.5
360.	5290.560	.041	.0104	.0044	70.5
390.	5731.440	.038	.0110	.0038	74.3
420.	6172.320	.035	.0110	.0038	74.3
450.	6613.200	.033	.0113	.0035	76.2
490.	7201.040	.030	.0114	.0034	77.1
510.	7494.960	.029	.0115	.0032	78.1
540.	7935.840	.027	.0118	.0030	80.0
590.	8670.640	.025	.0121	.0027	81.9
610.	8964.560	.024	.0124	.0024	83.8
640.	9405.440	.023	.0127	.0021	85.7
700.	10287.200	.021	.0130	.0018	87.6
740.	10875.040	.020	.0131	.0017	88.6
770.	11315.920	.019	.0134	.0014	90.5
800.	11756.800	.019	.0135	.0013	91.4
830.	12197.680	.018	.0137	.0011	92.4
860.	12638.560	.017	.0139	.0008	94.3
900.	13226.400	.017	.0142	.0006	96.2
930.	13667.280	.016	.0145	.0003	98.1
960.	13961.200	.016	.0148	.0000	100.0
1000.	14696.000	.014	.0148	.0000	100.0

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-4747.

SEQUENCE NUMBER 15
PORE VOLUME .013 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	.0132	.0
2.	29.392	7.500	.0011	.0121	8.3
3.	44.088	5.000	.0013	.0120	9.5
4.	58.784	3.700	.0013	.0120	9.5
5.	73.480	3.000	.0013	.0120	9.5
6.	88.176	2.500	.0014	.0118	10.7
7.	102.872	2.100	.0014	.0118	10.7
8.	117.568	1.800	.0014	.0118	10.7
9.	132.264	1.600	.0014	.0118	10.7
10.	146.960	1.500	.0014	.0118	10.7
11.	161.656	1.400	.0014	.0118	10.7
12.	176.352	1.300	.0014	.0118	10.7
13.	191.048	1.200	.0014	.0118	10.7
14.	205.744	1.100	.0014	.0118	10.7
15.	220.440	1.000	.0016	.0116	11.9
16.	235.136	.930	.0016	.0116	11.9
17.	249.832	.880	.0016	.0116	11.9
18.	264.528	.830	.0019	.0113	14.3
19.	279.224	.790	.0019	.0113	14.3
20.	293.920	.750	.0019	.0113	14.3
25.	367.400	.600	.0020	.0112	15.5
30.	440.880	.500	.0022	.0110	16.7
35.	514.360	.430	.0024	.0108	17.9
40.	587.840	.370	.0025	.0107	19.0
45.	661.320	.330	.0028	.0104	21.4
50.	734.800	.300	.0031	.0101	23.8
55.	808.280	.270	.0033	.0099	25.0
60.	881.760	.250	.0035	.0097	26.2
65.	955.240	.230	.0038	.0094	28.6
70.	1028.720	.210	.0041	.0091	31.0
75.	1102.200	.200	.0044	.0088	33.3
80.	1175.680	.180	.0047	.0085	35.7
85.	1249.160	.170	.0047	.0085	35.7

POROSITY DATA FOR SAMPLE A 1-4747.

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	.0047	.0085	35.7
100.	1469.600	.150	.0050	.0082	38.1
110.	1616.560	.140	.0052	.0080	39.3
120.	1763.520	.130	.0052	.0080	39.3
130.	1910.480	.120	.0063	.0069	47.6
140.	2057.440	.110	.0063	.0069	47.6
150.	2204.400	.100	.0063	.0069	47.6
170.	2498.320	.088	.0064	.0068	48.8
180.	2645.280	.083	.0066	.0066	50.0
190.	2792.240	.079	.0069	.0063	52.4
200.	2939.200	.075	.0072	.0060	54.8
220.	3233.120	.068	.0075	.0057	57.1
240.	3527.040	.062	.0077	.0055	58.3
260.	3820.960	.057	.0079	.0053	59.5
280.	4114.880	.053	.0079	.0053	59.5
300.	4408.800	.050	.0082	.0050	61.9
330.	4849.680	.045	.0083	.0049	63.1
360.	5290.560	.041	.0085	.0047	64.3
390.	5731.440	.038	.0088	.0044	66.7
420.	6172.320	.035	.0093	.0039	70.2
450.	6613.200	.033	.0093	.0039	70.2
490.	7201.040	.030	.0096	.0036	72.6
510.	7494.960	.029	.0096	.0036	72.6
540.	7935.840	.027	.0101	.0031	76.2
590.	8670.640	.025	.0107	.0025	81.0
610.	8964.560	.024	.0107	.0025	81.0
640.	9405.440	.023	.0107	.0025	81.0
700.	10287.200	.021	.0107	.0025	81.0
740.	10875.040	.020	.0112	.0020	84.5
770.	11315.920	.019	.0113	.0019	85.7
800.	11756.800	.019	.0113	.0019	85.7
830.	12197.680	.018	.0116	.0016	88.1
860.	12638.560	.017	.0116	.0016	88.1
900.	13226.400	.017	.0123	.0009	92.9
930.	13667.280	.016	.0123	.0009	92.9
960.	13961.200	.016	.0129	.0003	97.6
1000.	14696.000	.014	.0132	.0000	100.0

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-4785.

SEQUENCE NUMBER 17
PORE VOLUME .049 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	.0493	.0
2.	29.392	7.500	.0011	.0482	2.2
3.	44.088	5.000	.0022	.0471	4.4
4.	58.784	3.700	.0024	.0469	4.9
5.	73.480	3.000	.0043	.0450	8.6
6.	88.176	2.500	.0049	.0444	9.9
7.	102.872	2.100	.0061	.0432	12.3
8.	117.568	1.800	.0068	.0425	13.8
9.	132.264	1.600	.0078	.0415	15.8
10.	146.960	1.500	.0085	.0408	17.3
11.	161.656	1.400	.0097	.0396	19.8
12.	176.352	1.300	.0110	.0383	22.2
13.	191.048	1.200	.0122	.0371	24.7
14.	205.744	1.100	.0136	.0357	27.7
15.	220.440	1.000	.0151	.0342	30.6
16.	235.136	.930	.0164	.0329	33.3
17.	249.832	.880	.0183	.0310	37.0
18.	264.528	.830	.0187	.0305	38.0
19.	279.224	.790	.0202	.0291	41.0
20.	293.920	.750	.0212	.0281	43.0
25.	367.400	.600	.0215	.0277	43.7
30.	440.880	.500	.0219	.0274	44.4
35.	514.360	.430	.0249	.0243	50.6
40.	587.840	.370	.0280	.0213	56.8
45.	661.320	.330	.0298	.0195	60.5
50.	734.800	.300	.0316	.0176	64.2
55.	808.280	.270	.0323	.0170	65.4
60.	881.760	.250	.0329	.0164	66.7
65.	955.240	.230	.0340	.0153	68.9
70.	1028.720	.210	.0351	.0142	71.1
75.	1102.200	.200	.0355	.0138	72.1
80.	1175.680	.180	.0360	.0133	73.1
85.	1249.160	.170	.0363	.0130	73.6

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-4785.

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	.0365	.0128	74.1
100.	1469.600	.150	.0372	.0120	75.6
110.	1616.560	.140	.0377	.0116	76.5
120.	1763.520	.130	.0385	.0108	78.0
130.	1910.480	.120	.0389	.0103	79.0
140.	2057.440	.110	.0389	.0103	79.0
150.	2204.400	.100	.0392	.0101	79.5
170.	2498.320	.088	.0402	.0091	81.5
180.	2645.280	.083	.0404	.0089	82.0
190.	2792.240	.079	.0404	.0089	82.0
200.	2939.200	.075	.0405	.0088	82.2
220.	3233.120	.068	.0414	.0079	84.0
240.	3527.040	.062	.0416	.0077	84.4
260.	3820.960	.057	.0421	.0072	85.4
280.	4114.880	.053	.0425	.0068	86.2
300.	4408.800	.050	.0425	.0068	86.2
330.	4849.680	.045	.0426	.0067	86.4
360.	5290.560	.041	.0433	.0060	87.9
390.	5731.440	.038	.0436	.0057	88.4
420.	6172.320	.035	.0438	.0055	88.9
450.	6613.200	.033	.0444	.0049	90.1
490.	7201.040	.030	.0449	.0044	91.1
510.	7494.960	.029	.0449	.0044	91.1
540.	7935.840	.027	.0452	.0041	91.6
590.	8670.640	.025	.0456	.0037	92.6
610.	8964.560	.024	.0459	.0034	93.1
640.	9405.440	.023	.0459	.0034	93.1
700.	10287.200	.021	.0465	.0028	94.3
740.	10875.040	.020	.0470	.0023	95.3
770.	11315.920	.019	.0470	.0023	95.3
800.	11756.800	.019	.0475	.0018	96.3
830.	12197.680	.018	.0477	.0016	96.8
860.	12638.560	.017	.0469	.0024	95.1
900.	13226.400	.017	.0483	.0010	98.0
930.	13667.280	.016	.0483	.0010	98.0
960.	13961.200	.016	.0488	.0005	99.0
1000.	14696.000	.014	.0493	.0000	100.0

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-4825.

SEQUENCE NUMBER 19
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	.0000	.0179	.0
2.	29.392	7.500	.0018	.0169	5.4
3.	44.088	5.000	.0011	.0168	6.1
4.	58.784	3.700	.0011	.0168	6.1
5.	73.480	3.000	.0013	.0166	7.4
6.	88.176	2.500	.0022	.0157	12.2
7.	102.872	2.100	.0025	.0153	14.2
8.	117.568	1.800	.0036	.0143	20.3
9.	132.264	1.600	.0044	.0135	24.3
10.	146.960	1.500	.0046	.0133	25.7
11.	161.656	1.400	.0051	.0128	28.4
12.	176.352	1.300	.0060	.0118	33.8
13.	191.048	1.200	.0065	.0114	36.5
14.	205.744	1.100	.0073	.0106	40.5
15.	220.440	1.000	.0085	.0094	47.3
16.	235.136	.930	.0097	.0082	54.1
17.	249.832	.880	.0104	.0075	58.1
18.	264.528	.830	.0114	.0065	63.5
19.	279.224	.790	.0123	.0056	68.9
20.	293.920	.750	.0133	.0046	74.3
25.	367.400	.600	.0133	.0046	74.3
30.	440.880	.500	.0133	.0046	74.3
35.	514.360	.430	.0134	.0045	75.0
40.	587.840	.370	.0135	.0044	75.7
45.	661.320	.330	.0141	.0037	79.1
50.	734.800	.300	.0147	.0031	82.4
55.	808.280	.270	.0150	.0029	83.8
60.	881.760	.250	.0152	.0027	85.1
65.	955.240	.230	.0153	.0025	85.8
70.	1028.720	.210	.0155	.0024	86.5
75.	1102.200	.200	.0155	.0024	86.5
80.	1175.680	.180	.0155	.0024	86.5
85.	1249.160	.170	.0156	.0023	87.2

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-4825.

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	.0157	.0022	87.8
100.	1469.600	.150	.0161	.0018	89.9
110.	1616.560	.140	.0161	.0018	89.9
120.	1763.520	.130	.0161	.0018	89.9
130.	1910.480	.120	.0161	.0018	89.9
140.	2057.440	.110	.0161	.0018	89.9
150.	2204.400	.100	.0161	.0018	89.9
170.	2498.320	.088	.0162	.0017	90.5
180.	2645.280	.083	.0162	.0017	90.5
190.	2792.240	.079	.0162	.0017	90.5
200.	2939.200	.075	.0162	.0017	90.5
220.	3233.120	.068	.0167	.0012	93.2
240.	3527.040	.062	.0168	.0011	93.9
260.	3820.960	.057	.0169	.0010	94.6
280.	4114.880	.053	.0169	.0010	94.6
300.	4408.800	.050	.0169	.0010	94.6
330.	4849.680	.045	.0169	.0010	94.6
360.	5290.560	.041	.0169	.0010	94.6
390.	5731.440	.038	.0169	.0010	94.6
420.	6172.320	.035	.0169	.0010	94.6
450.	6613.200	.033	.0169	.0010	94.6
490.	7201.040	.030	.0169	.0010	94.6
510.	7494.960	.029	.0169	.0010	94.6
540.	7935.840	.027	.0169	.0010	94.6
590.	8670.640	.025	.0169	.0010	94.6
610.	8964.560	.024	.0169	.0010	94.6
640.	9405.440	.023	.0170	.0008	95.3
700.	10287.200	.021	.0170	.0008	95.3
740.	10875.040	.020	.0170	.0008	95.3
770.	11315.920	.019	.0170	.0008	95.3
800.	11756.800	.019	.0170	.0008	95.3
830.	12197.680	.018	.0170	.0008	95.3
860.	12638.560	.017	.0170	.0008	95.3
900.	13226.400	.017	.0172	.0007	95.9
930.	13667.280	.016	.0174	.0005	97.3
960.	13961.200	.016	.0176	.0002	98.6
1000.	14696.000	.014	.0179	.0000	100.0

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-4903.

SEQUENCE NUMBER 23
PORE VOLUME .027 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	.0267	.0
2.	29.392	7.500	.0012	.0255	4.5
3.	44.088	5.000	.0012	.0255	4.5
4.	58.784	3.700	.0013	.0254	5.0
5.	73.480	3.000	.0013	.0254	5.0
6.	88.176	2.500	.0013	.0254	5.0
7.	102.872	2.100	.0013	.0254	5.0
8.	117.568	1.800	.0013	.0254	5.0
9.	132.264	1.600	.0013	.0254	5.0
10.	146.960	1.500	.0015	.0252	5.6
11.	161.656	1.400	.0019	.0248	7.3
12.	176.352	1.300	.0024	.0243	8.9
13.	191.048	1.200	.0027	.0240	10.1
14.	205.744	1.100	.0036	.0231	13.4
15.	220.440	1.000	.0040	.0227	15.1
16.	235.136	.930	.0043	.0224	16.2
17.	249.832	.880	.0051	.0217	19.0
18.	264.528	.830	.0060	.0208	22.3
19.	279.224	.790	.0066	.0202	24.6
20.	293.920	.750	.0069	.0199	25.7
25.	367.400	.600	.0070	.0197	26.3
30.	440.880	.500	.0072	.0196	26.8
35.	514.360	.430	.0088	.0179	33.0
40.	587.840	.370	.0105	.0163	39.1
45.	661.320	.330	.0119	.0148	44.7
50.	734.800	.300	.0134	.0133	50.3
55.	808.280	.270	.0142	.0125	53.1
60.	881.760	.250	.0149	.0118	55.9
65.	955.240	.230	.0155	.0112	58.1
70.	1028.720	.210	.0161	.0106	60.3
75.	1102.200	.200	.0164	.0103	61.5
80.	1175.680	.180	.0167	.0100	62.6
85.	1249.160	.170	.0170	.0097	63.7

UGR File #257
Battelle Columbus Laboratories

POROSITY DATA FOR SAMPLE A 1-4903.

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	.0173	.0094	64.8
100.	1469.600	.150	.0178	.0090	66.5
110.	1616.560	.140	.0182	.0085	68.2
120.	1763.520	.130	.0185	.0082	69.3
130.	1910.480	.120	.0188	.0079	70.4
140.	2057.440	.110	.0194	.0073	72.6
150.	2204.400	.100	.0196	.0072	73.2
170.	2498.320	.088	.0199	.0069	74.3
180.	2645.280	.083	.0202	.0066	75.4
190.	2792.240	.079	.0202	.0066	75.4
200.	2939.200	.075	.0202	.0066	75.4
220.	3233.120	.068	.0208	.0060	77.7
240.	3527.040	.062	.0211	.0057	78.8
260.	3820.960	.057	.0212	.0055	79.3
280.	4114.880	.053	.0217	.0051	81.0
300.	4408.800	.050	.0221	.0046	82.7
330.	4849.680	.045	.0223	.0045	83.2
360.	5290.560	.041	.0224	.0043	83.8
390.	5731.440	.038	.0227	.0040	84.9
420.	6172.320	.035	.0230	.0037	86.0
450.	6613.200	.033	.0233	.0034	87.2
490.	7201.040	.030	.0236	.0031	88.3
510.	7494.960	.029	.0236	.0031	88.3
540.	7935.840	.027	.0242	.0025	90.5
590.	8670.640	.025	.0243	.0024	91.1
610.	8964.560	.024	.0243	.0024	91.1
640.	9405.440	.023	.0246	.0021	92.2
700.	10287.200	.021	.0249	.0018	93.3
740.	10875.040	.020	.0254	.0013	95.0
770.	11315.920	.019	.0257	.0010	96.1
800.	11756.800	.019	.0258	.0009	96.6
830.	12197.680	.018	.0258	.0009	96.6
860.	12638.560	.017	.0260	.0007	97.2
900.	13226.400	.017	.0260	.0007	97.2
930.	13667.280	.016	.0267	.0000	100.0
960.	13961.200	.016	.0267	.0000	100.0
1000.	14696.000	.014	.0267	.0000	100.0

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-5059.

SEQUENCE NUMBER 31
PORE VOLUME .037 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	.0365	.0
2.	29.392	7.500	.0011	.0354	3.1
3.	44.088	5.000	.0011	.0354	3.1
4.	58.784	3.700	.0025	.0340	6.8
5.	73.480	3.000	.0035	.0330	9.5
6.	88.176	2.500	.0050	.0315	13.6
7.	102.872	2.100	.0060	.0306	16.3
8.	117.568	1.800	.0066	.0299	18.0
9.	132.264	1.600	.0071	.0294	19.4
10.	146.960	1.500	.0081	.0284	22.1
11.	161.656	1.400	.0094	.0271	25.9
12.	176.352	1.300	.0099	.0266	27.2
13.	191.048	1.200	.0112	.0253	30.6
14.	205.744	1.100	.0117	.0248	32.0
15.	220.440	1.000	.0124	.0241	34.0
16.	235.136	.930	.0132	.0234	36.1
17.	249.832	.880	.0143	.0222	39.1
18.	264.528	.830	.0147	.0219	40.1
19.	279.224	.790	.0157	.0209	42.9
20.	293.920	.750	.0161	.0204	44.2
25.	367.400	.600	.0164	.0201	44.9
30.	440.880	.500	.0166	.0199	45.6
35.	514.360	.430	.0179	.0186	49.0
40.	587.840	.370	.0191	.0174	52.4
45.	661.320	.330	.0197	.0168	54.1
50.	734.800	.300	.0204	.0161	55.8
55.	808.280	.270	.0207	.0158	56.8
60.	881.760	.250	.0224	.0142	61.2
65.	955.240	.230	.0226	.0139	61.9
70.	1028.720	.210	.0229	.0137	62.6
75.	1102.200	.200	.0232	.0133	63.6
80.	1175.680	.180	.0236	.0129	64.6
85.	1249.160	.170	.0240	.0125	65.6

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-5059.

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	.0243	.0122	66.7
100.	1469.600	.150	.0246	.0119	67.3
110.	1616.560	.140	.0253	.0112	69.4
120.	1763.520	.130	.0257	.0108	70.4
130.	1910.480	.120	.0262	.0103	71.8
140.	2057.440	.110	.0262	.0103	71.8
150.	2204.400	.100	.0268	.0097	73.5
170.	2498.320	.088	.0273	.0092	74.8
180.	2645.280	.083	.0273	.0092	74.8
190.	2792.240	.079	.0278	.0087	76.2
200.	2939.200	.075	.0281	.0084	76.9
220.	3233.120	.068	.0281	.0084	76.9
240.	3527.040	.062	.0287	.0078	78.6
260.	3820.960	.057	.0291	.0075	79.6
280.	4114.880	.053	.0293	.0072	80.3
300.	4408.800	.050	.0296	.0070	81.0
330.	4849.680	.045	.0298	.0067	81.6
360.	5290.560	.041	.0301	.0065	82.3
390.	5731.440	.038	.0311	.0055	85.0
420.	6172.320	.035	.0312	.0053	85.4
450.	6613.200	.033	.0313	.0052	85.7
490.	7201.040	.030	.0317	.0048	86.7
510.	7494.960	.029	.0322	.0043	88.1
540.	7935.840	.027	.0325	.0040	89.1
590.	8670.640	.025	.0328	.0037	89.8
610.	8964.560	.024	.0330	.0035	90.5
640.	9405.440	.023	.0335	.0030	91.8
700.	10287.200	.021	.0343	.0022	93.9
740.	10875.040	.020	.0343	.0022	93.9
770.	11315.920	.019	.0348	.0017	95.2
800.	11756.800	.019	.0349	.0016	95.6
830.	12197.680	.018	.0353	.0012	96.6
860.	12638.560	.017	.0355	.0010	97.3
900.	13226.400	.017	.0358	.0007	98.0
930.	13667.280	.016	.0359	.0006	98.3
960.	13961.200	.016	.0363	.0002	99.3
1000.	14696.000	.014	.0365	.0000	100.0

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-5099.

SEQUENCE NUMBER 33
PORE VOLUME .032 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	.0320	.0
2.	29.392	7.500	.0009	.0312	2.7
3.	44.088	5.000	.0010	.0311	3.1
4.	58.784	3.700	.0011	.0309	3.5
5.	73.480	3.000	.0011	.0309	3.5
6.	88.176	2.500	.0013	.0308	4.0
7.	102.872	2.100	.0013	.0308	4.0
8.	117.568	1.800	.0013	.0308	4.0
9.	132.264	1.600	.0018	.0302	5.8
10.	146.960	1.500	.0026	.0295	8.0
11.	161.656	1.400	.0031	.0289	9.7
12.	176.352	1.300	.0043	.0278	13.3
13.	191.048	1.200	.0043	.0278	13.3
14.	205.744	1.100	.0051	.0269	15.9
15.	220.440	1.000	.0057	.0264	17.7
16.	235.136	.930	.0061	.0259	19.0
17.	249.832	.880	.0068	.0252	21.2
18.	264.528	.830	.0077	.0244	23.9
19.	279.224	.790	.0079	.0241	24.8
20.	293.920	.750	.0082	.0238	25.7
25.	367.400	.600	.0082	.0238	25.7
30.	440.880	.500	.0082	.0238	25.7
35.	514.360	.430	.0091	.0230	28.3
40.	587.840	.370	.0099	.0221	31.0
45.	661.320	.330	.0112	.0208	35.0
50.	734.800	.300	.0125	.0196	38.9
55.	808.280	.270	.0132	.0189	41.2
60.	881.760	.250	.0139	.0181	43.4
65.	955.240	.230	.0143	.0177	44.7
70.	1028.720	.210	.0147	.0173	46.0
75.	1102.200	.200	.0155	.0166	48.2
80.	1175.680	.180	.0162	.0159	50.4
85.	1249.160	.170	.0166	.0155	51.8

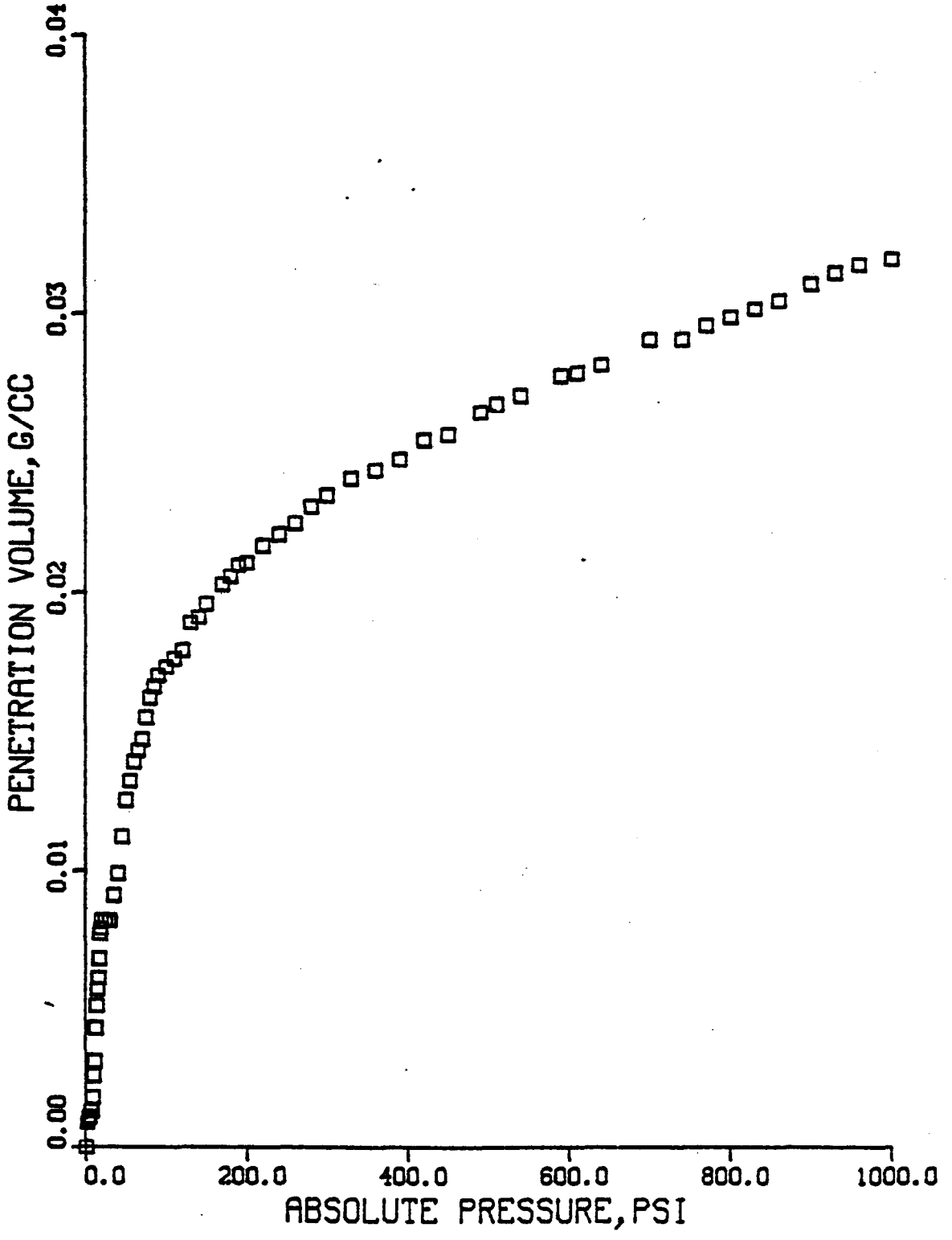
UGR File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-5099.

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	.0170	.0150	53.1
100.	1469.600	.150	.0173	.0147	54.0
110.	1616.560	.140	.0176	.0145	54.9
120.	1763.520	.130	.0179	.0142	55.8
130.	1910.480	.120	.0189	.0132	58.8
140.	2057.440	.110	.0191	.0129	59.7
150.	2204.400	.100	.0196	.0125	61.1
170.	2498.320	.088	.0203	.0118	63.3
180.	2645.280	.083	.0206	.0115	64.2
190.	2792.240	.079	.0210	.0111	65.5
200.	2939.200	.075	.0211	.0109	65.9
220.	3233.120	.068	.0217	.0104	67.7
240.	3527.040	.062	.0221	.0099	69.0
260.	3820.960	.057	.0225	.0095	70.4
280.	4114.880	.053	.0231	.0089	72.1
300.	4408.800	.050	.0235	.0085	73.5
330.	4849.680	.045	.0241	.0079	75.2
360.	5290.560	.041	.0244	.0077	76.1
390.	5731.440	.038	.0248	.0072	77.4
420.	6172.320	.035	.0255	.0065	79.6
450.	6613.200	.033	.0257	.0064	80.1
490.	7201.040	.030	.0265	.0055	82.7
510.	7494.960	.029	.0268	.0052	83.6
540.	7935.840	.027	.0271	.0050	84.5
590.	8670.640	.025	.0278	.0043	86.7
610.	8964.560	.024	.0279	.0041	87.2
640.	9405.440	.023	.0282	.0038	88.1
700.	10287.200	.021	.0291	.0030	90.7
740.	10875.040	.020	.0291	.0030	90.7
770.	11315.920	.019	.0296	.0024	92.5
800.	11756.800	.019	.0299	.0021	93.4
830.	12197.680	.018	.0302	.0018	94.2
860.	12638.560	.017	.0305	.0016	95.1
900.	13226.400	.017	.0311	.0010	96.9
930.	13667.280	.016	.0315	.0006	98.2
960.	13961.200	.016	.0318	.0003	99.1
1000.	14696.000	.014	.0320	.0000	100.0

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

A 15099.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0.02
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0.04
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400.0
600.0
800.0
1000.0
ABSOLUTE PRESSURE, PSI

POROSITY DATA FOR SAMPLE A 1-5139.

SEQUENCE NUMBER 35
PORE VOLUME .031 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	.0312	.0
2.	29.392	7.500	.0011	.0301	3.5
3.	44.088	5.000	.0012	.0300	3.9
4.	58.784	3.700	.0024	.0287	7.8
5.	73.480	3.000	.0027	.0285	8.5
6.	88.176	2.500	.0036	.0275	11.6
7.	102.872	2.100	.0046	.0266	14.7
8.	117.568	1.800	.0051	.0261	16.3
9.	132.264	1.600	.0062	.0250	19.4
10.	146.960	1.500	.0063	.0249	20.2
11.	161.656	1.400	.0072	.0239	23.3
12.	176.352	1.300	.0085	.0227	27.1
13.	191.048	1.200	.0091	.0221	29.1
14.	205.744	1.100	.0097	.0215	31.0
15.	220.440	1.000	.0101	.0210	32.6
16.	235.136	.930	.0109	.0203	34.9
17.	249.832	.880	.0114	.0198	36.4
18.	264.528	.830	.0121	.0191	38.8
19.	279.224	.790	.0126	.0186	40.3
20.	293.920	.750	.0128	.0184	41.1
25.	367.400	.600	.0130	.0181	41.9
30.	440.880	.500	.0133	.0179	42.6
35.	514.360	.430	.0144	.0168	46.1
40.	587.840	.370	.0155	.0157	49.6
45.	661.320	.330	.0161	.0151	51.6
50.	734.800	.300	.0167	.0145	53.5
55.	808.280	.270	.0175	.0136	56.2
60.	881.760	.250	.0184	.0128	58.9
65.	955.240	.230	.0188	.0123	60.5
70.	1028.720	.210	.0193	.0118	62.0
75.	1102.200	.200	.0197	.0115	63.2
80.	1175.680	.180	.0200	.0111	64.3
85.	1249.160	.170	.0202	.0110	64.7

UGR-File #257
Battelle Columbus Laboratories
Dec. 1979

POROSITY DATA FOR SAMPLE A 1-5139.

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	.0203	.0109	65.1
100.	1469.600	.150	.0208	.0104	66.7
110.	1616.560	.140	.0213	.0099	68.2
120.	1763.520	.130	.0215	.0097	69.0
130.	1910.480	.120	.0217	.0094	69.8
140.	2057.440	.110	.0223	.0088	71.7
150.	2204.400	.100	.0223	.0088	71.7
170.	2498.320	.088	.0228	.0083	73.3
180.	2645.280	.083	.0229	.0082	73.6
190.	2792.240	.079	.0231	.0081	74.0
200.	2939.200	.075	.0232	.0080	74.4
220.	3233.120	.068	.0234	.0077	75.2
240.	3527.040	.062	.0239	.0072	76.7
260.	3820.960	.057	.0242	.0070	77.5
280.	4114.880	.053	.0249	.0063	79.8
300.	4408.800	.050	.0249	.0063	79.8
330.	4849.680	.045	.0254	.0058	81.4
360.	5290.560	.041	.0254	.0058	81.4
390.	5731.440	.038	.0256	.0056	82.2
420.	6172.320	.035	.0260	.0052	83.3
450.	6613.200	.033	.0263	.0048	84.5
490.	7201.040	.030	.0267	.0045	85.7
510.	7494.960	.029	.0271	.0041	86.8
540.	7935.840	.027	.0273	.0039	87.6
590.	8670.640	.025	.0273	.0039	87.6
610.	8964.560	.024	.0278	.0034	89.1
640.	9405.440	.023	.0283	.0029	90.7
700.	10287.200	.021	.0283	.0029	90.7
740.	10875.040	.020	.0289	.0023	92.6
770.	11315.920	.019	.0292	.0019	93.8
800.	11756.800	.019	.0295	.0017	94.6
830.	12197.680	.018	.0295	.0017	94.6
860.	12638.560	.017	.0298	.0013	95.7
900.	13226.400	.017	.0302	.0010	96.9
930.	13667.280	.016	.0306	.0006	98.1
960.	13961.200	.016	.0306	.0006	98.1
1000.	14696.000	.014	.0312	.0000	100.0

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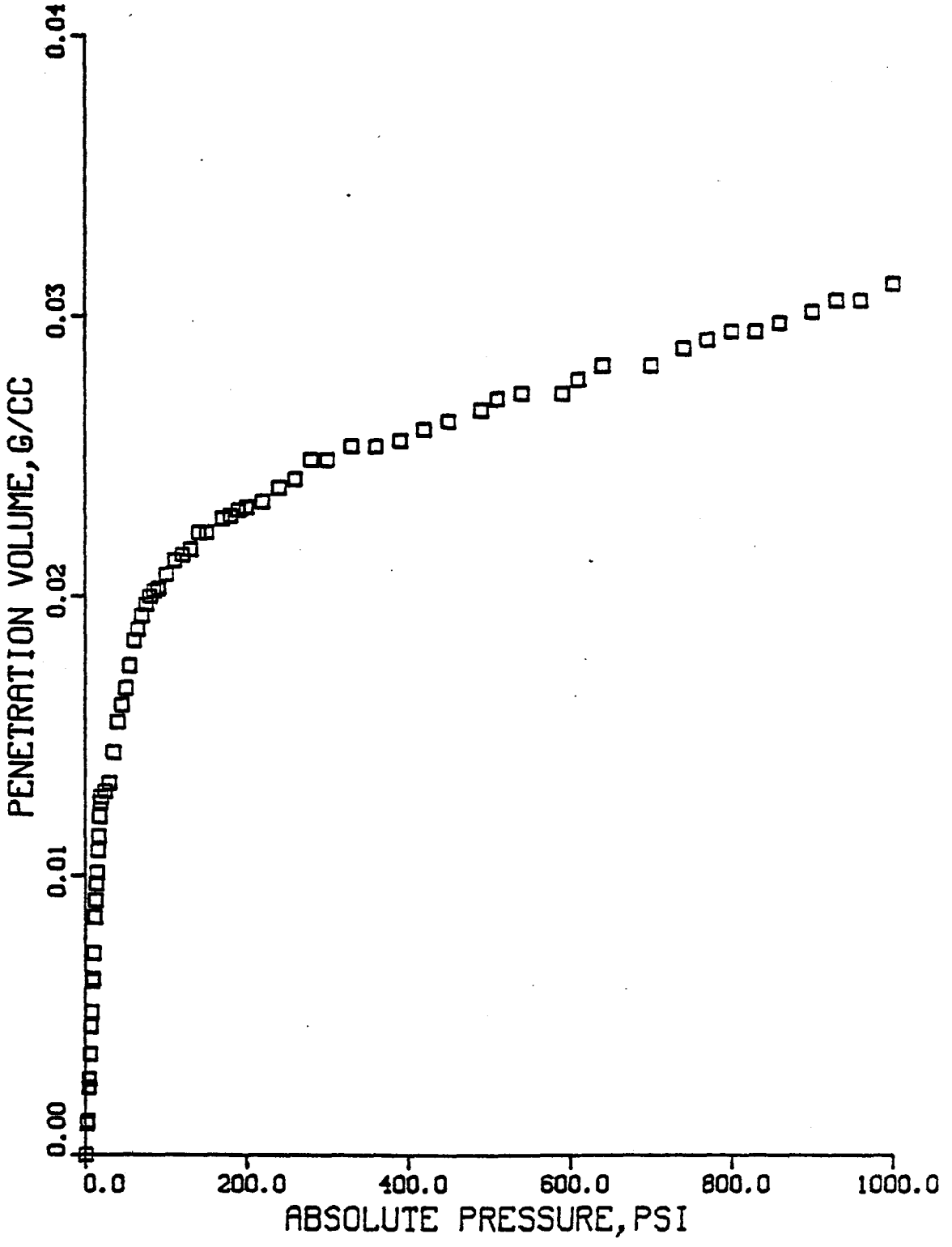
A 15139.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0.01
0.02
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200.0
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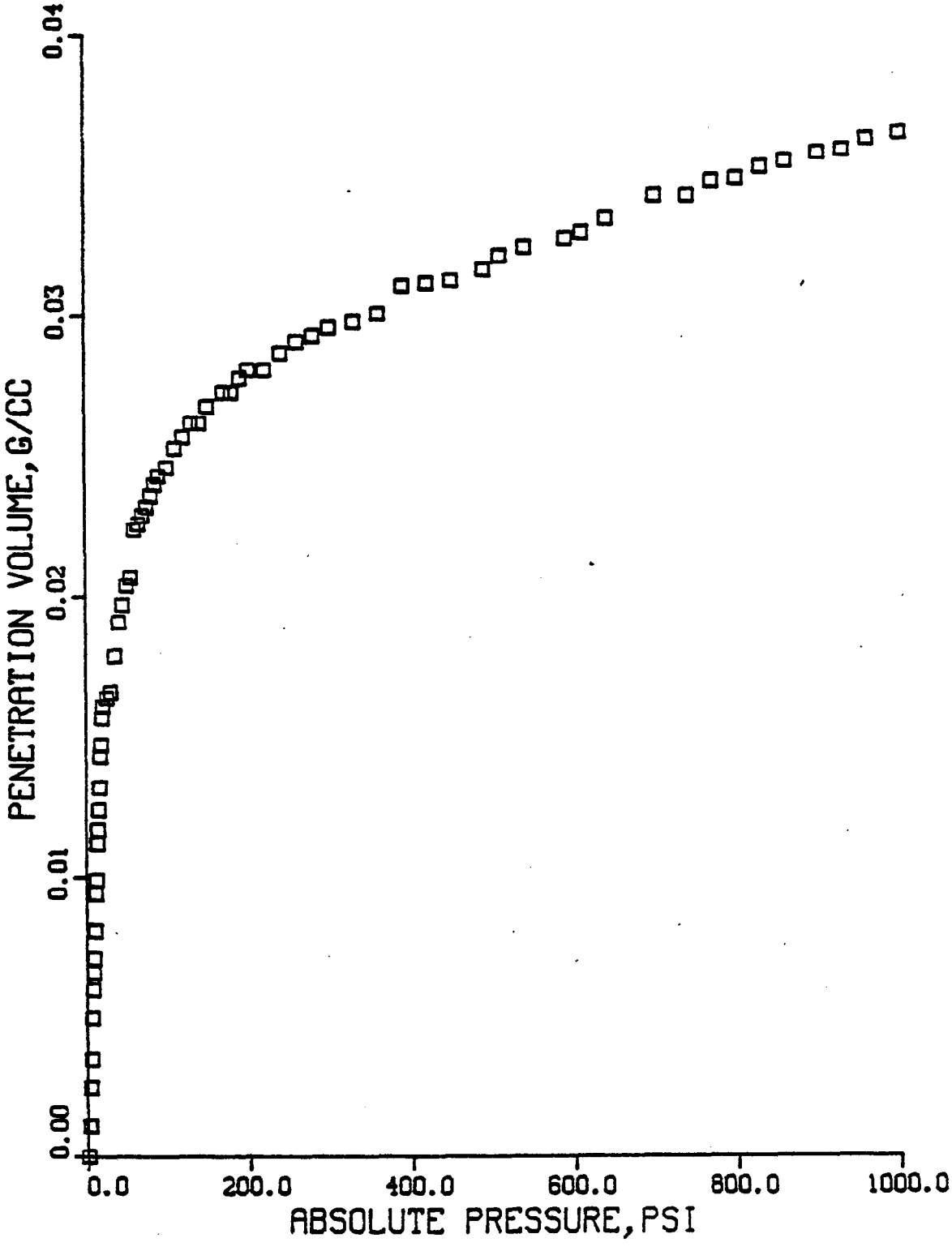
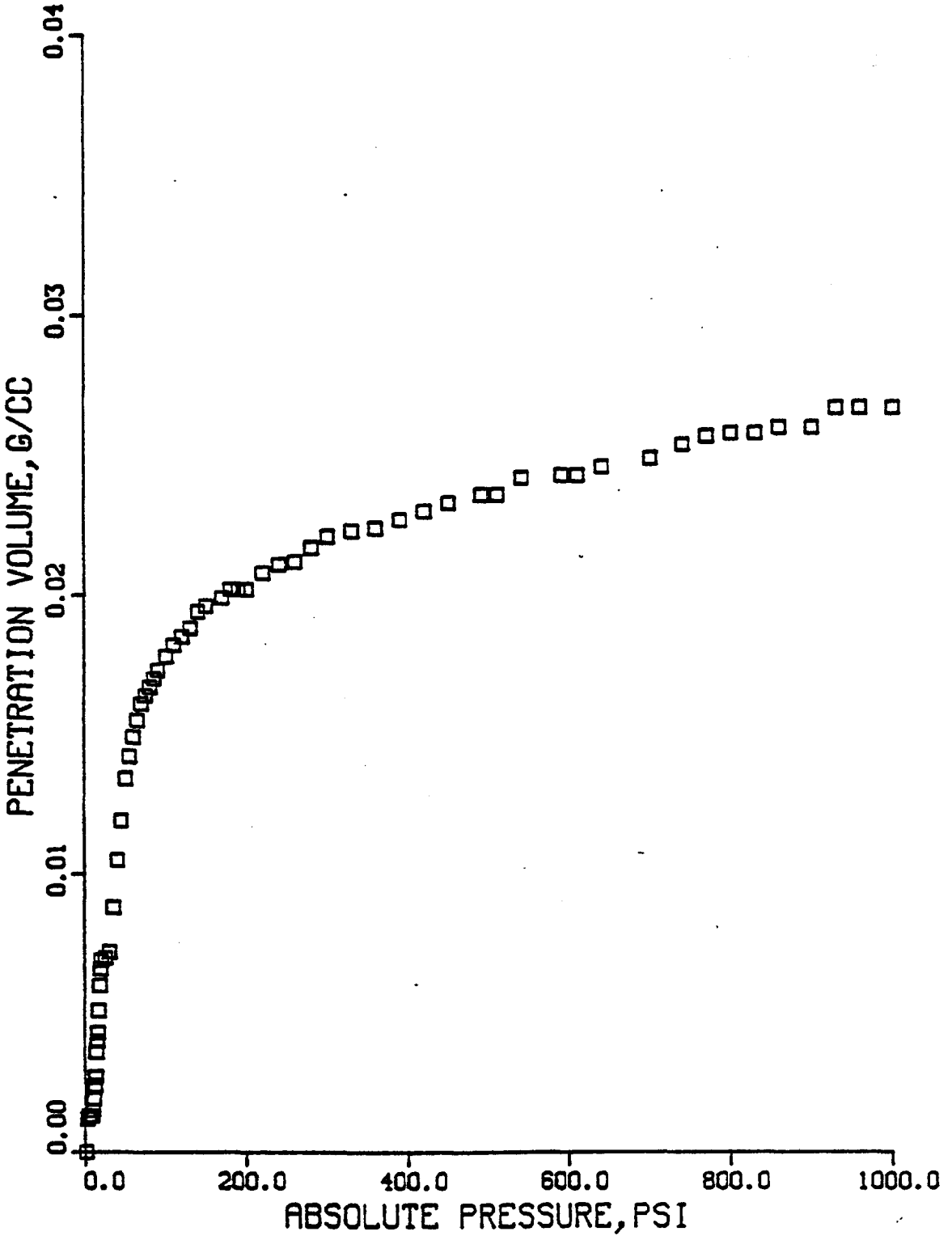
ABSOLUTE PRESSURE, PSI

A 15059.


0.04
0.03
0.02
0.01
0.00
PENETRATION VOLUME, G/CC
0.0
200.0
400.0
600.0
800.0
1000.0
ABSOLUTE PRESSURE, PSI

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

A 14903.



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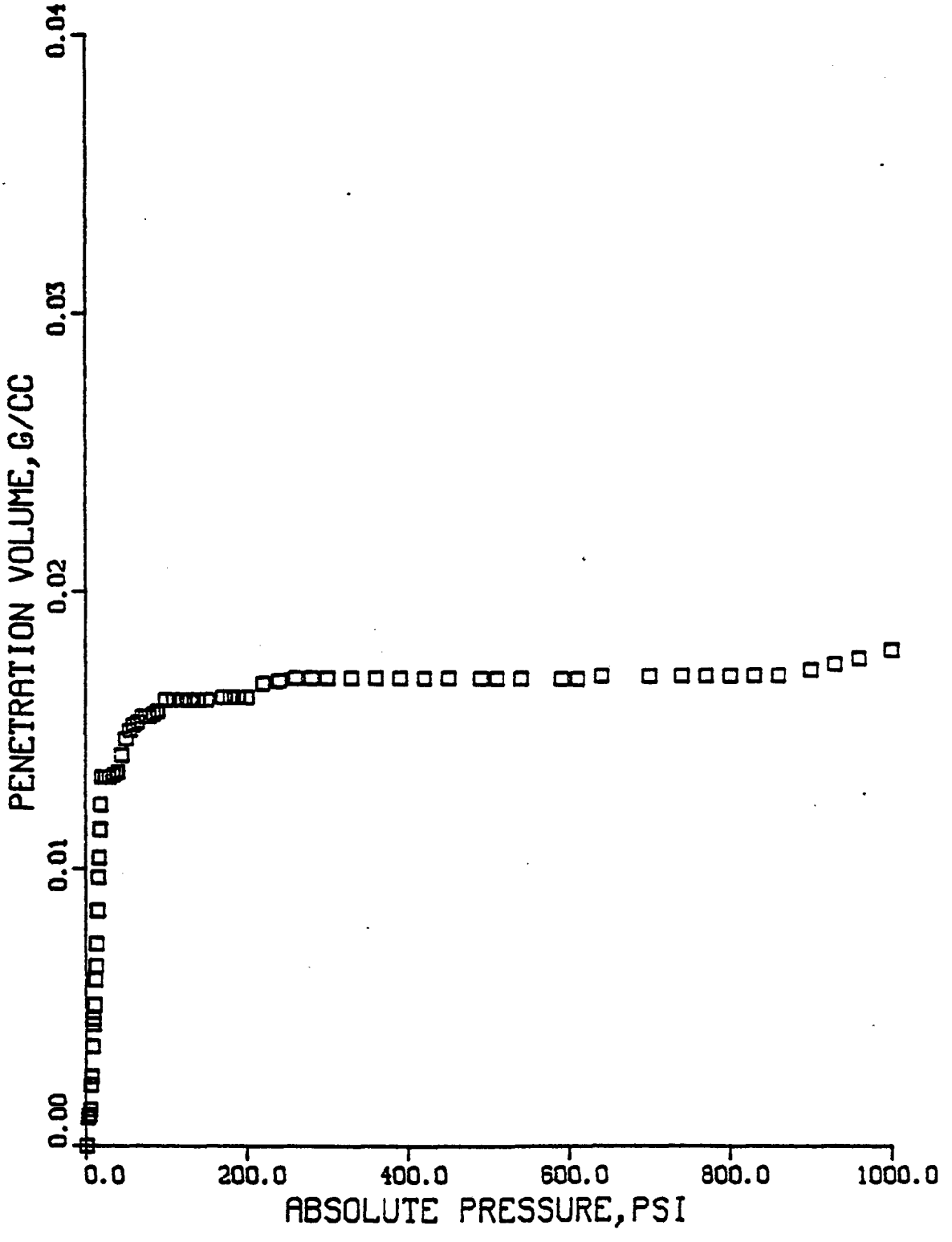
Battelle Columbus Laboratories
Dec. 1979

A 14825.



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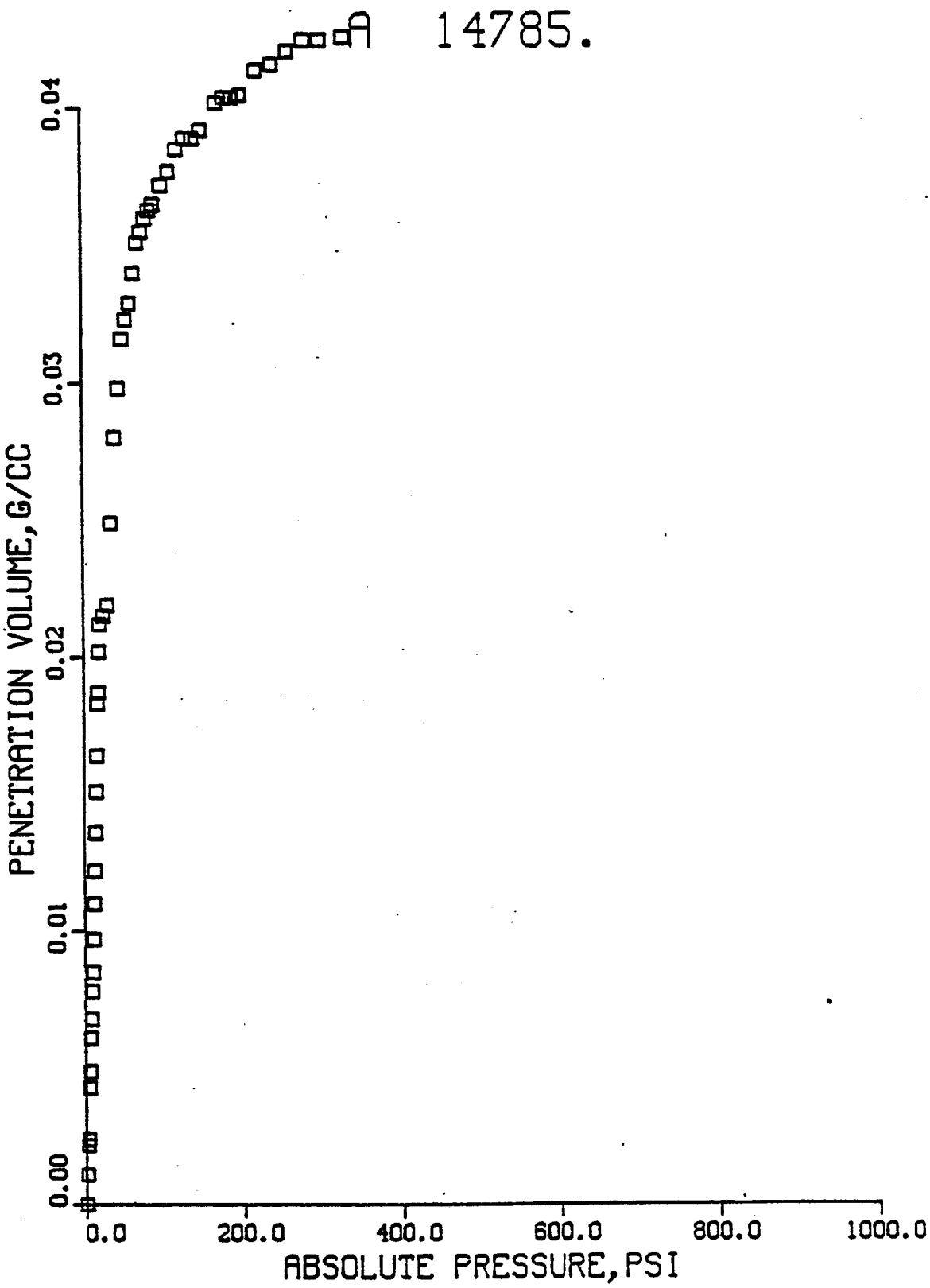
Dec. 1979



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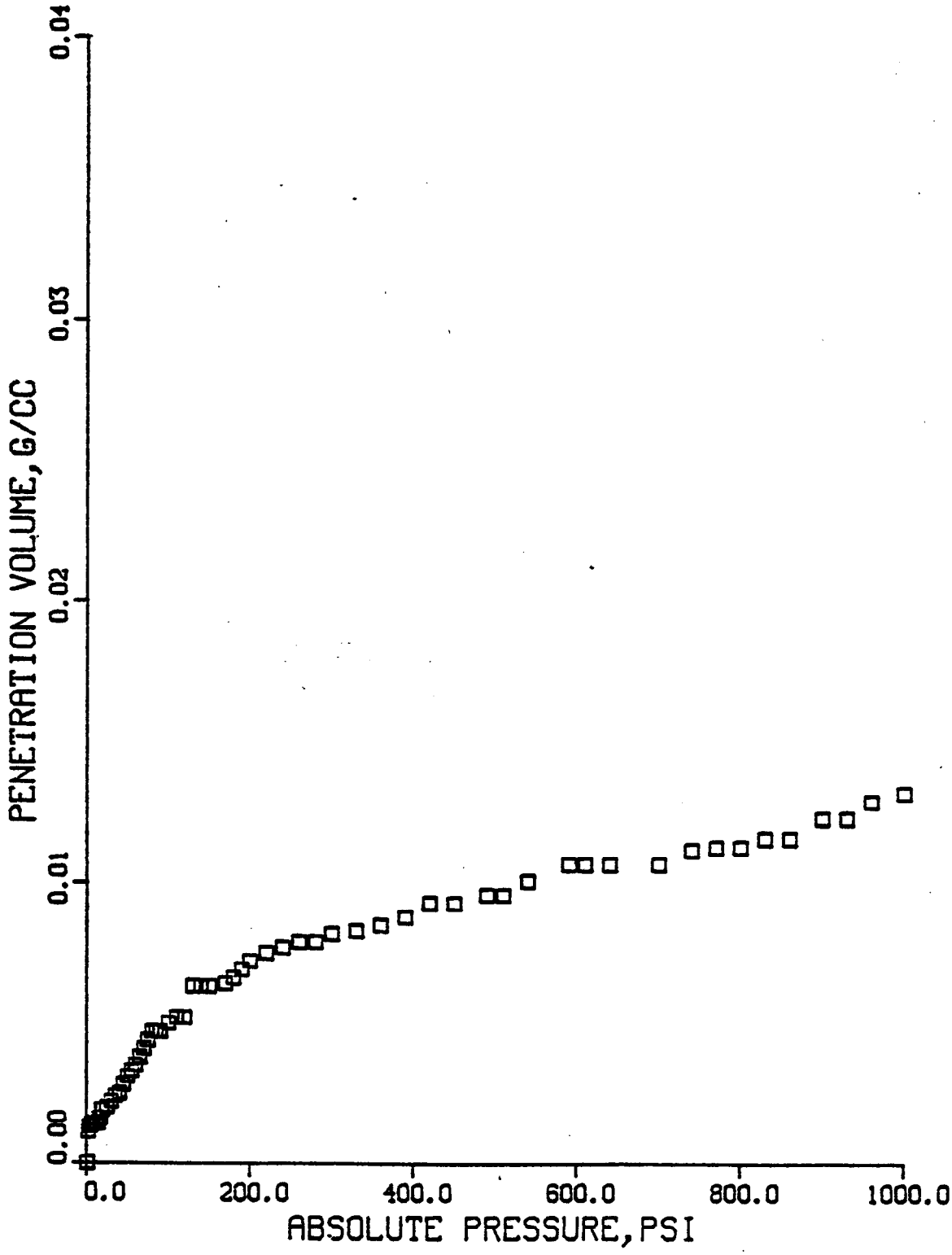
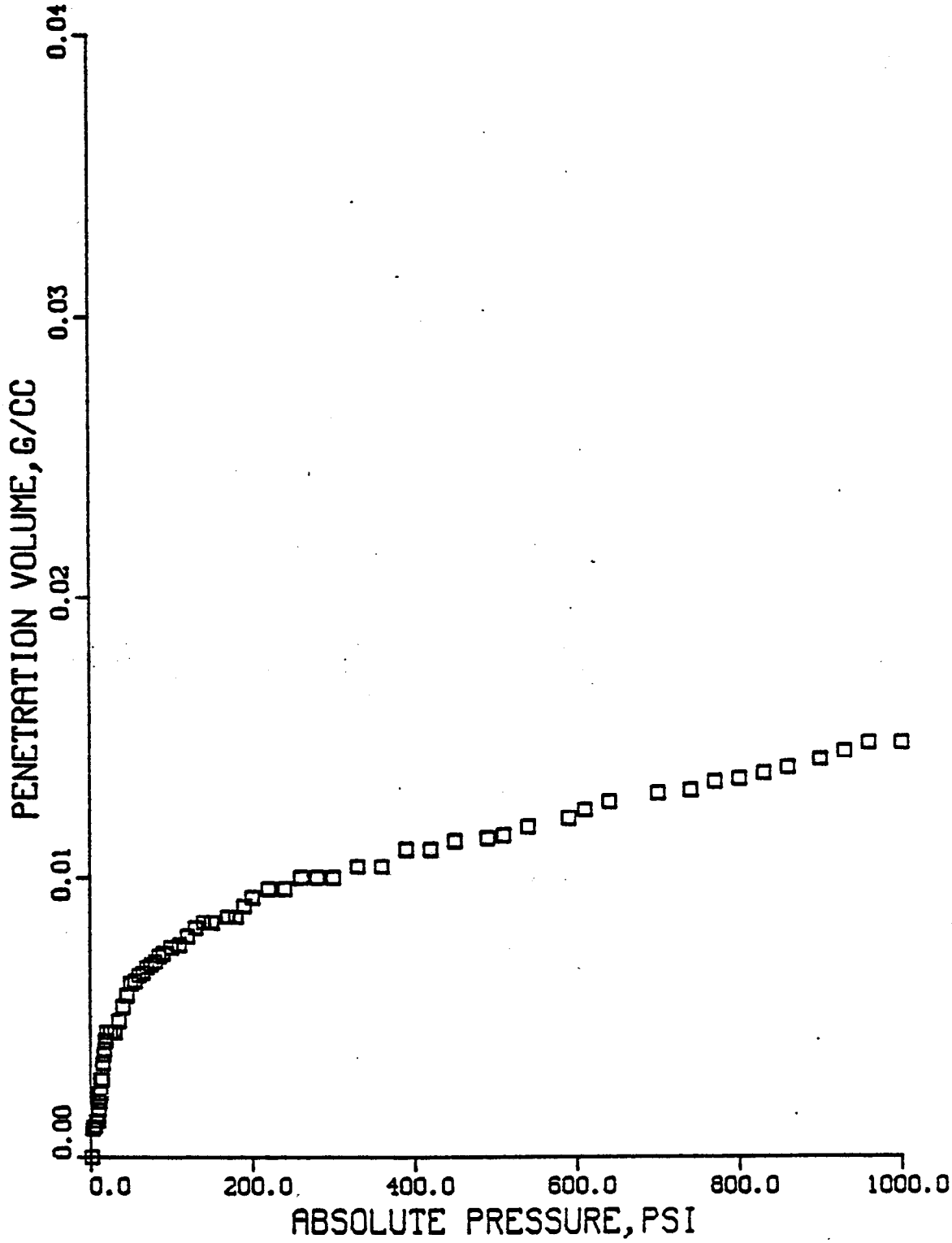
Dec. 1979

A 14747.



A 14707.


PENETRATION VOLUME, G/CC
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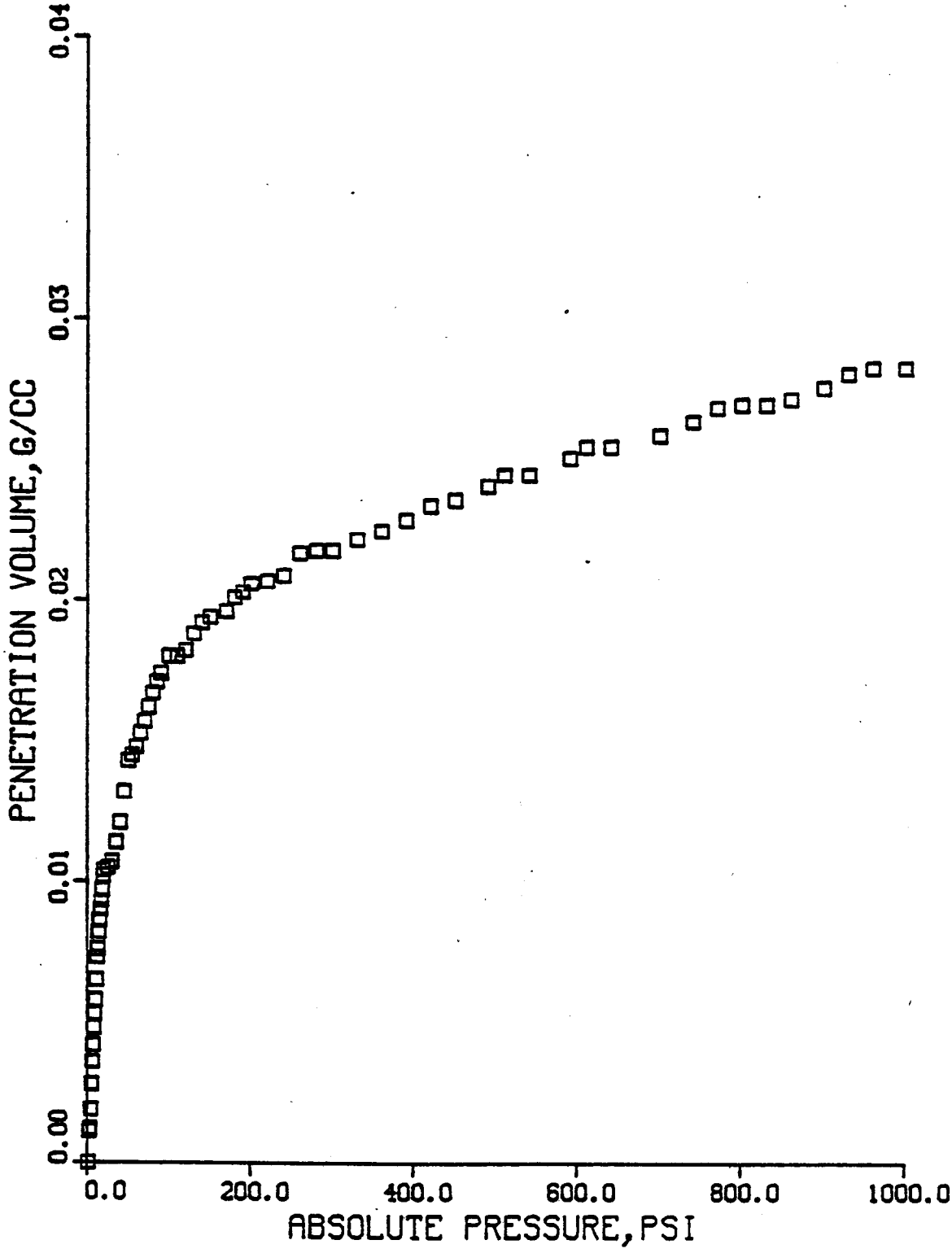
0.01
0.02
0.03
0.04
0.0
200.0
400.0
600.0
800.0
1000.0
ABSOLUTE PRESSURE, PSI

A 14630.


PENETRATION VOLUME, G/CC
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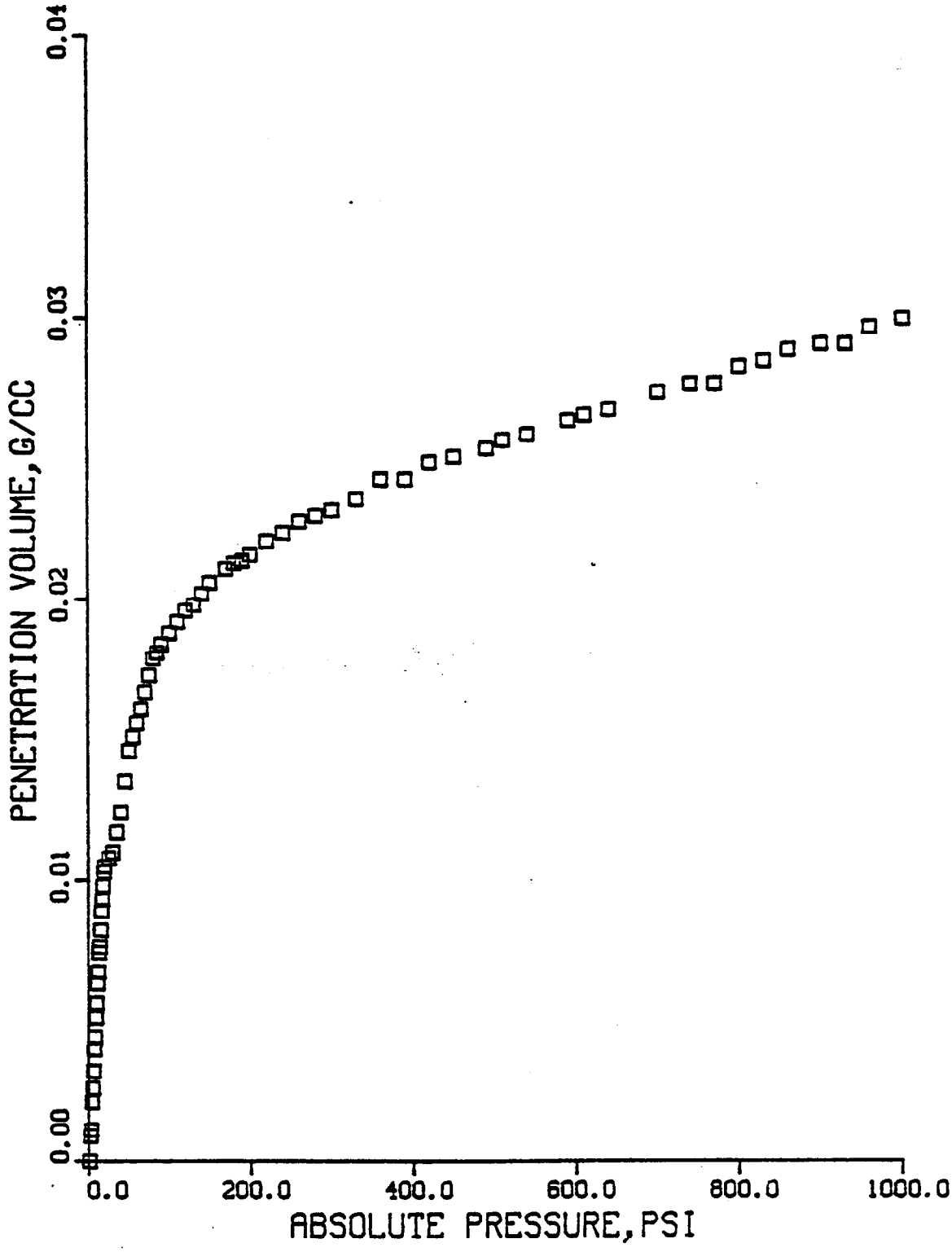
0.02
0.03
0.04
0.0
200.0
400.0
600.0
800.0
1000.0
ABSOLUTE PRESSURE, PSI

A 14590.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0.03
0.04
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800.0
1000.0
ABSOLUTE PRESSURE, PSI

UGR File #257
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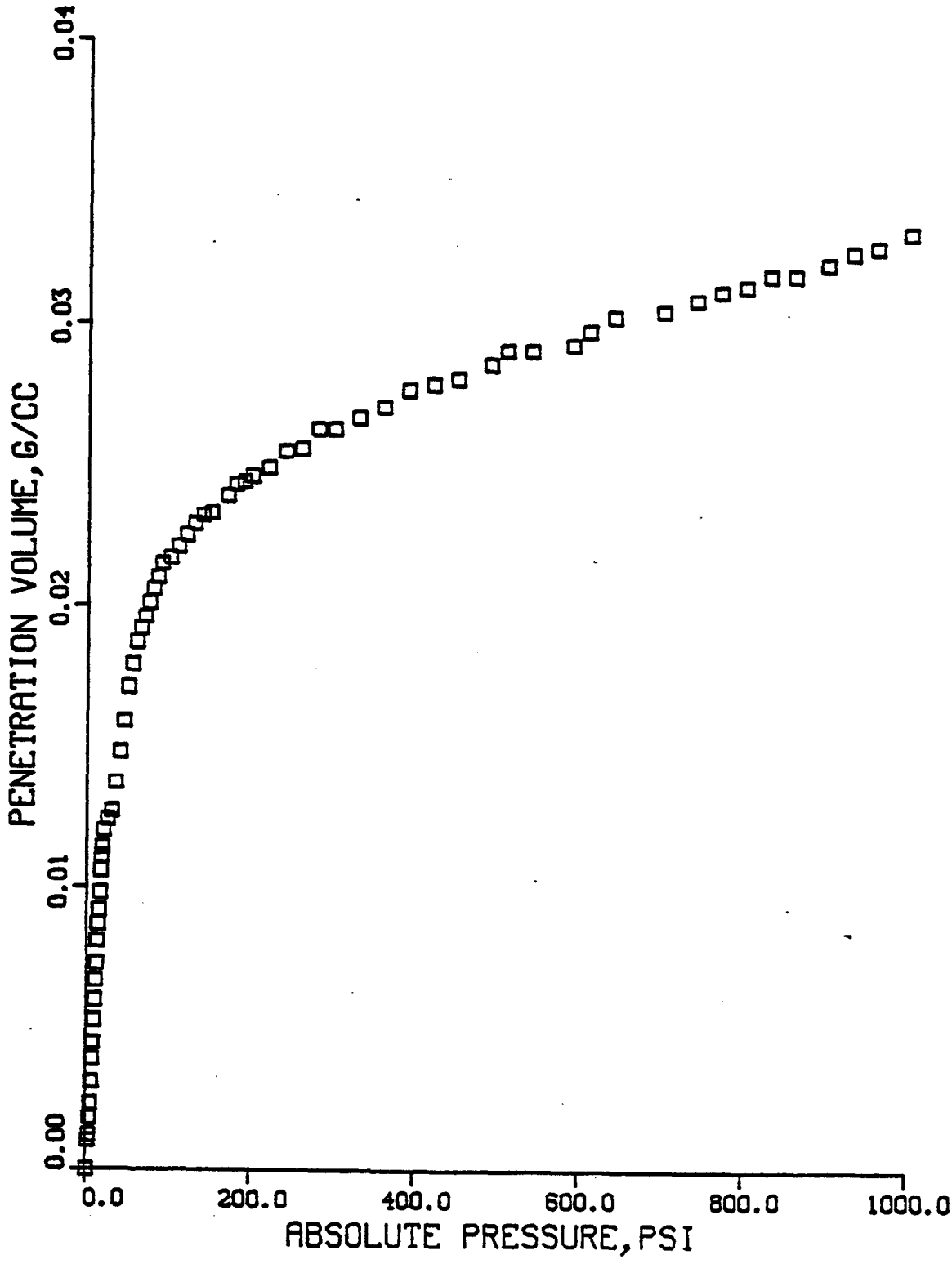
Dec. 1979

A 14552.



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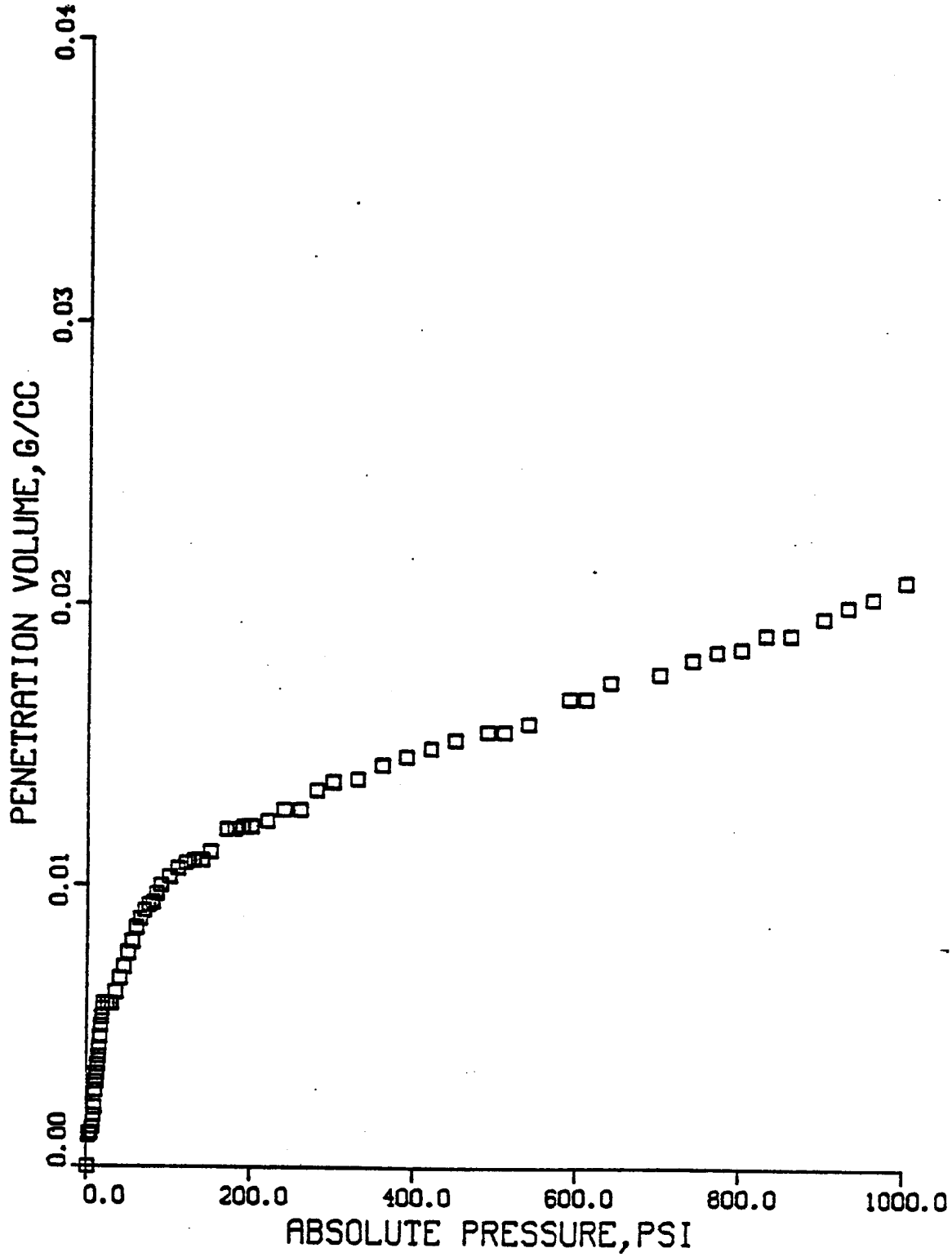
Dec. 1979

A 13512.



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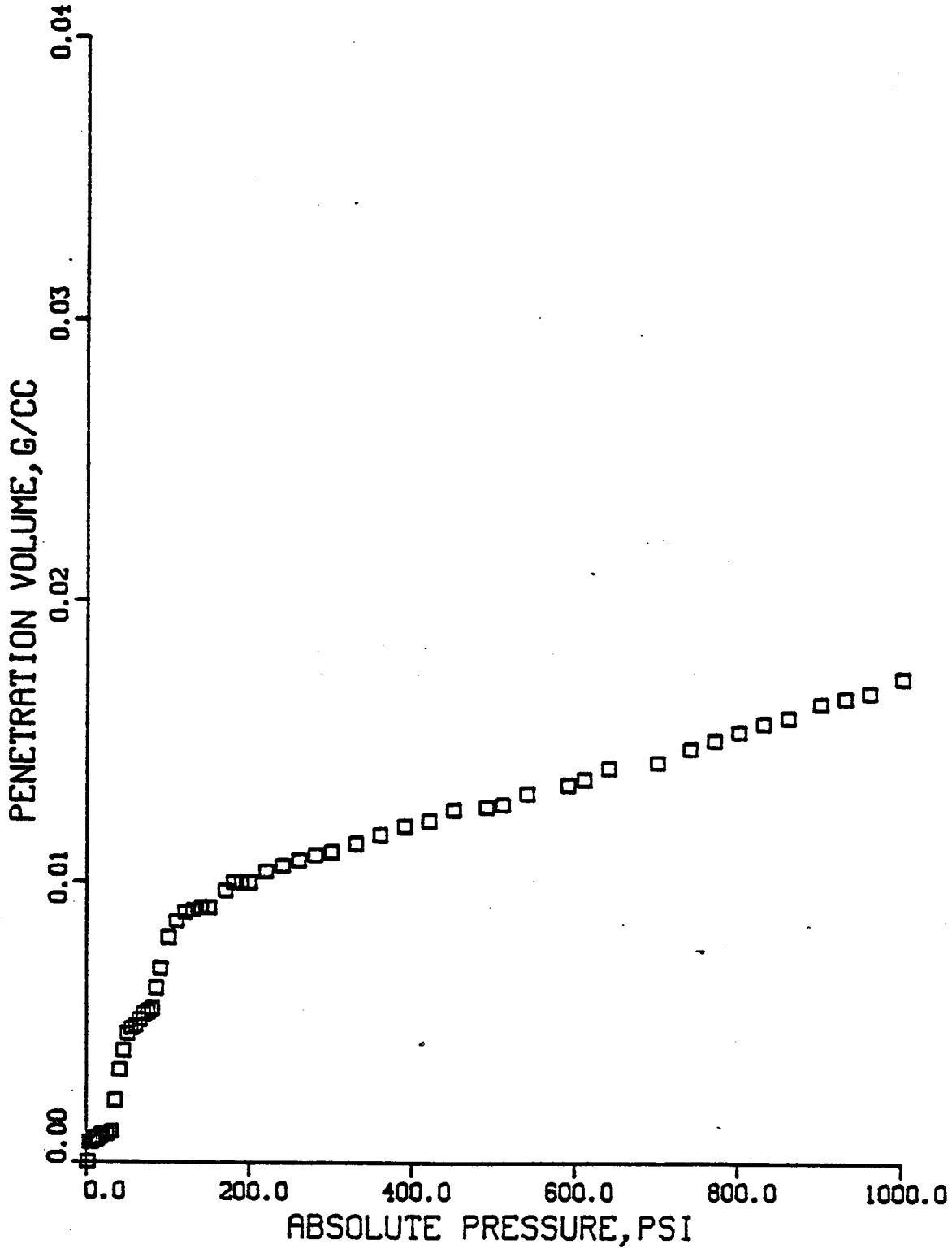
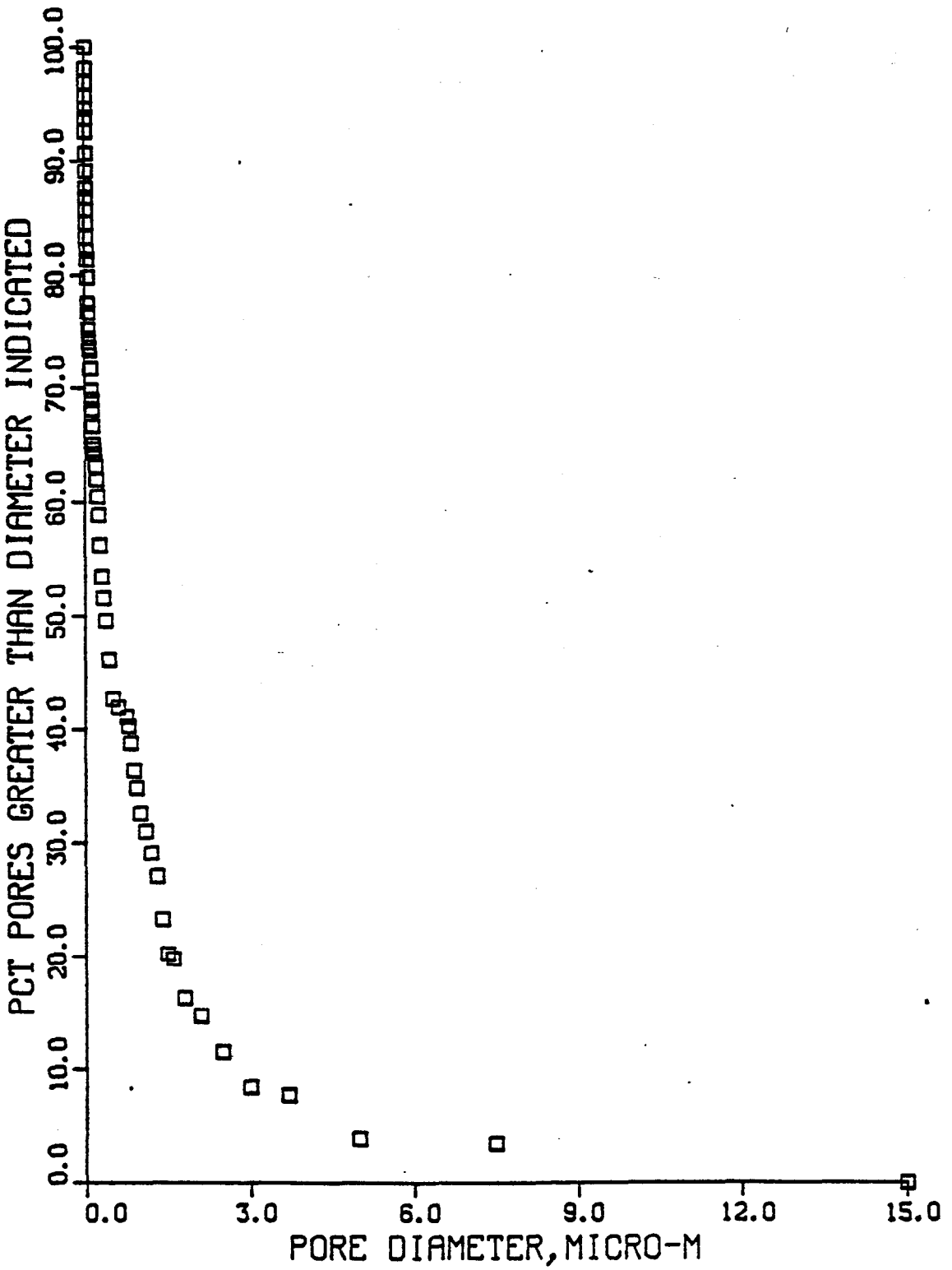
Dec. 1979

A 13472.



UGR File #257
Battelle Columbus Laboratories
Dec. 1979

A 15139.



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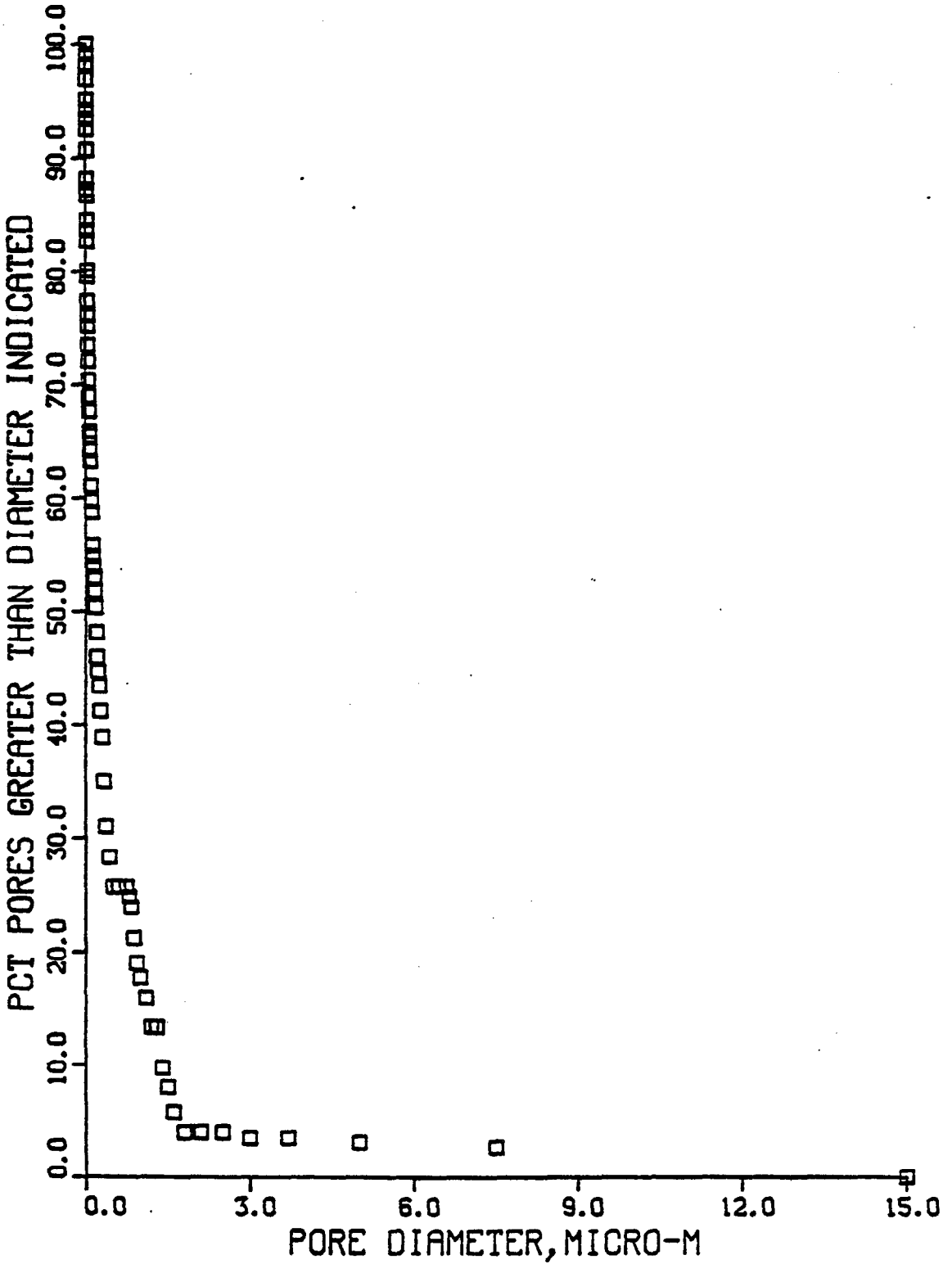
Battelle Columbus Laboratories
Dec. 1979

A 15099.



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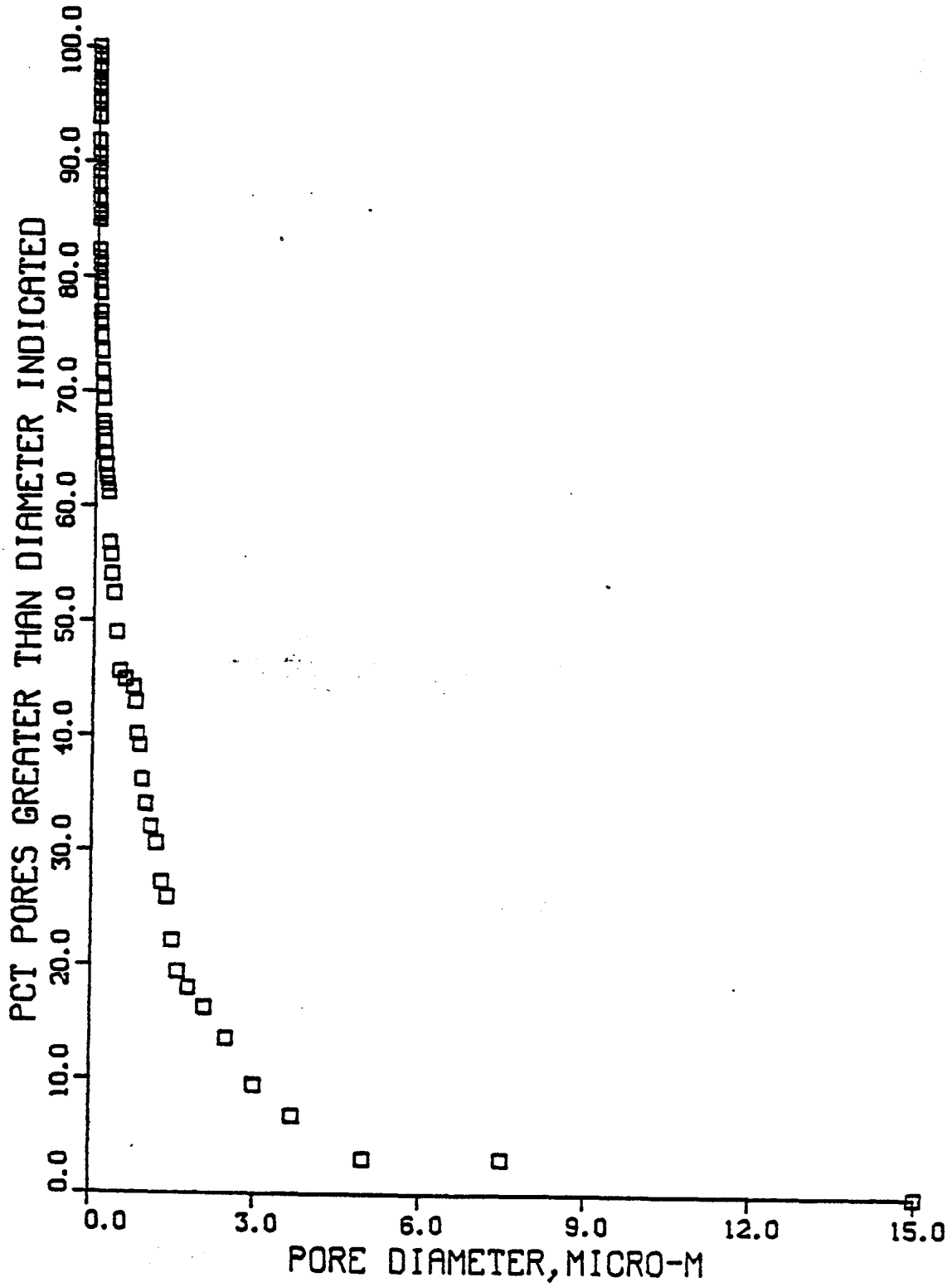
Battelle Columbus Laboratories
Dec. 1979

A 15059.



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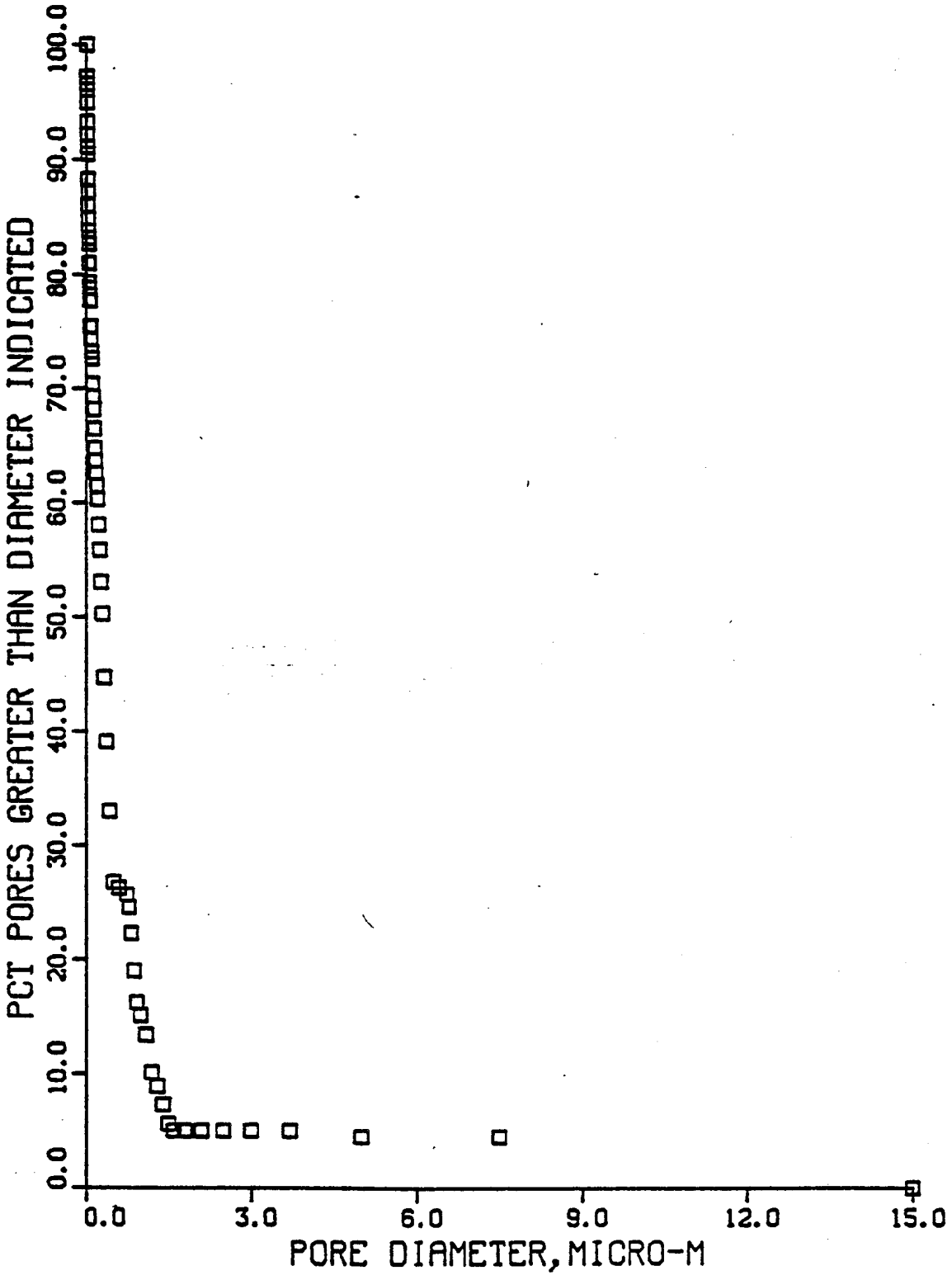
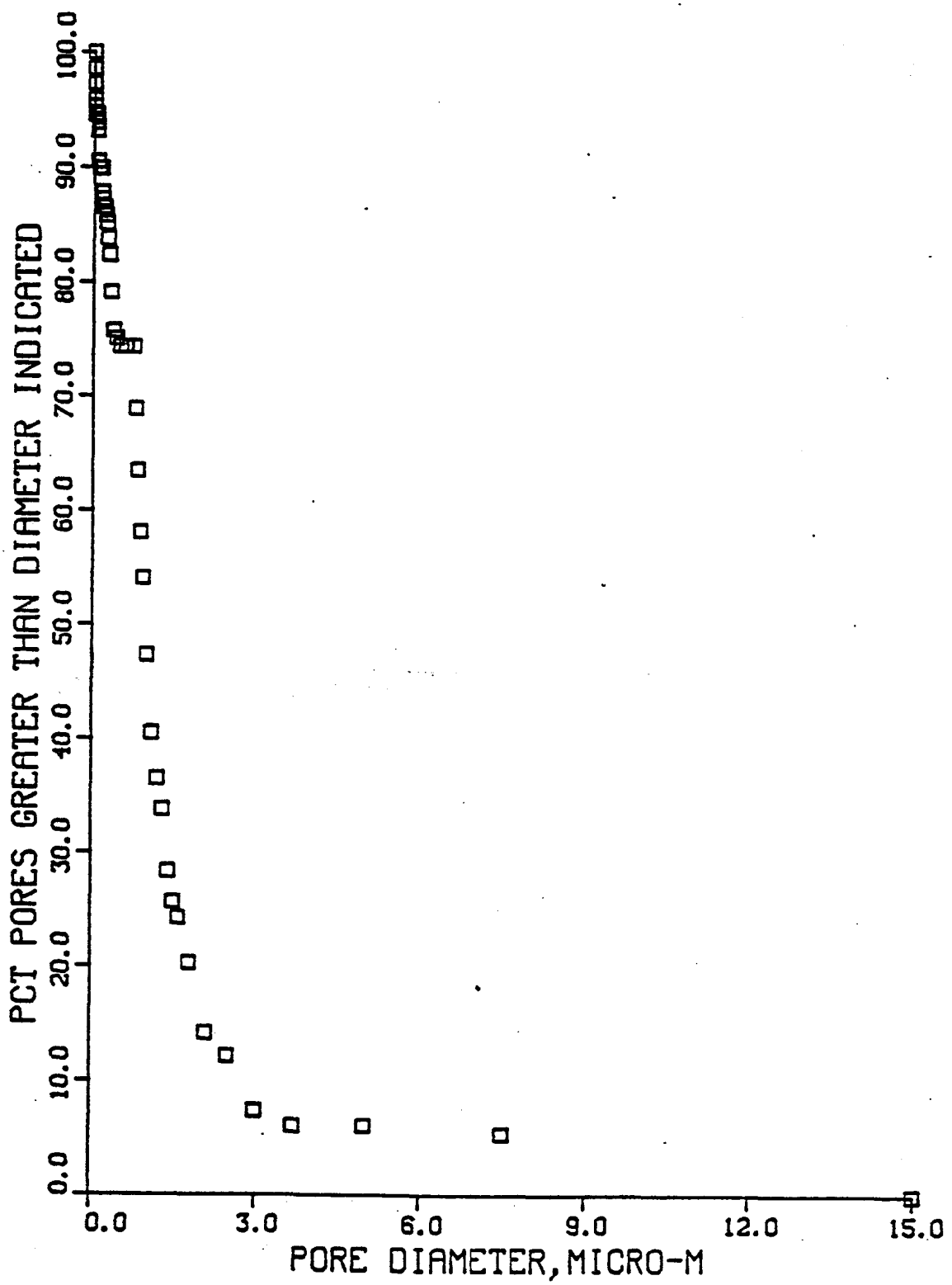
Battelle Columbus Laboratories
Dec. 1979

A 14903.



A 14825.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40.0
50.0
60.0
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80.0
90.0
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0.0
3.0
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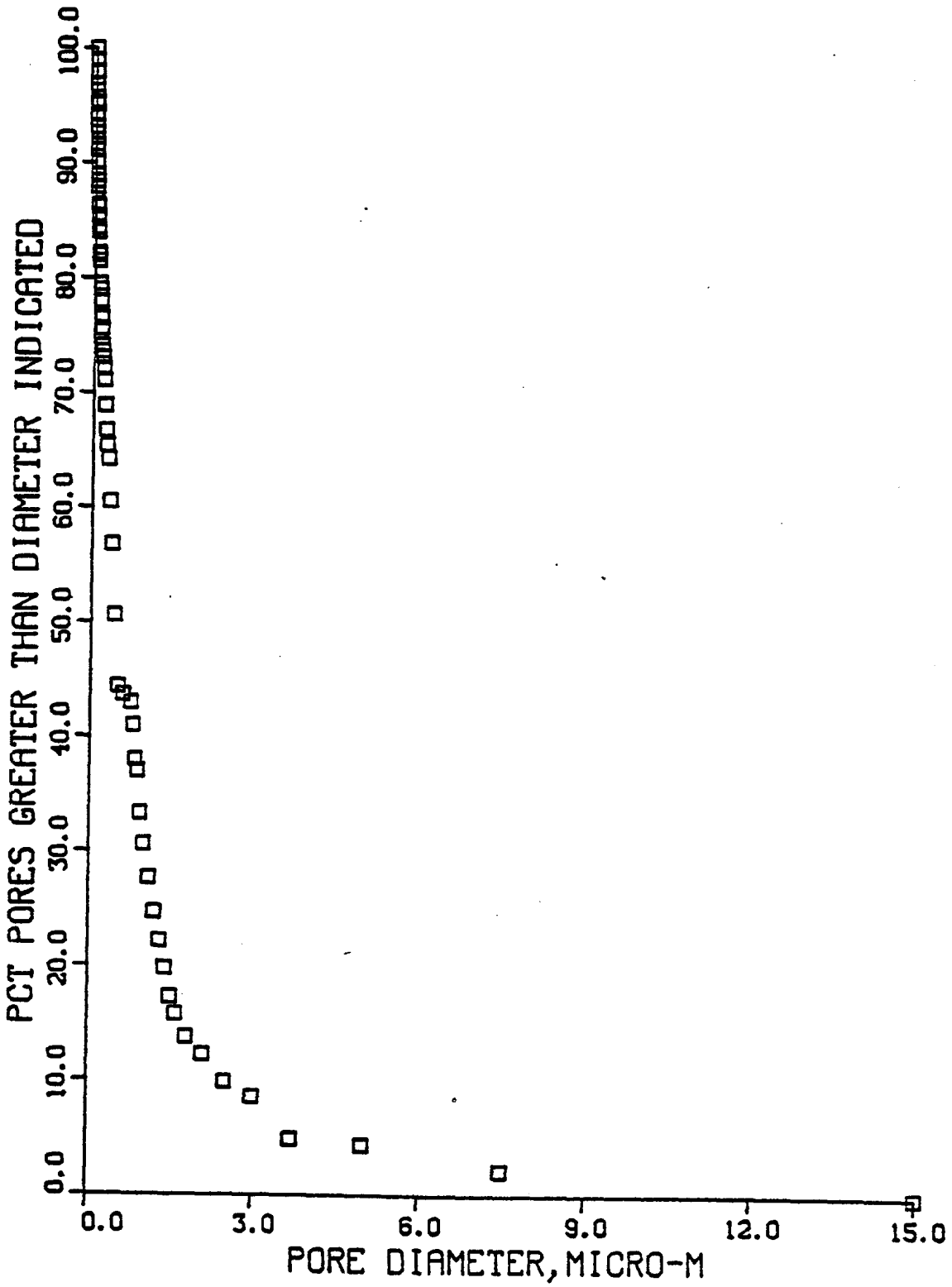
9.0
12.0
15.0
PORE DIAMETER, MICRO-M

A 14785.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80.0
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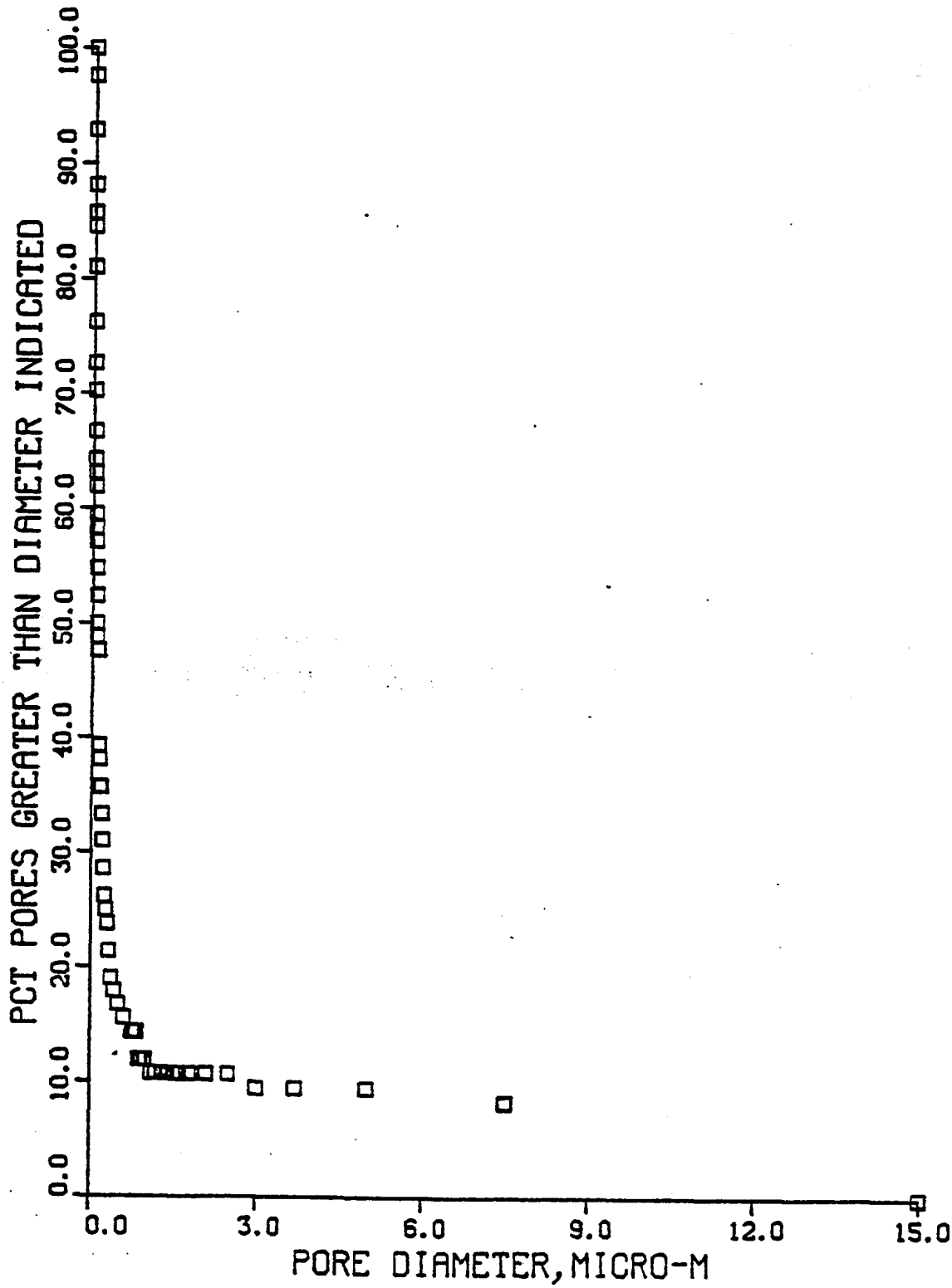
PORE DIAMETER, MICRO-M

A 14747.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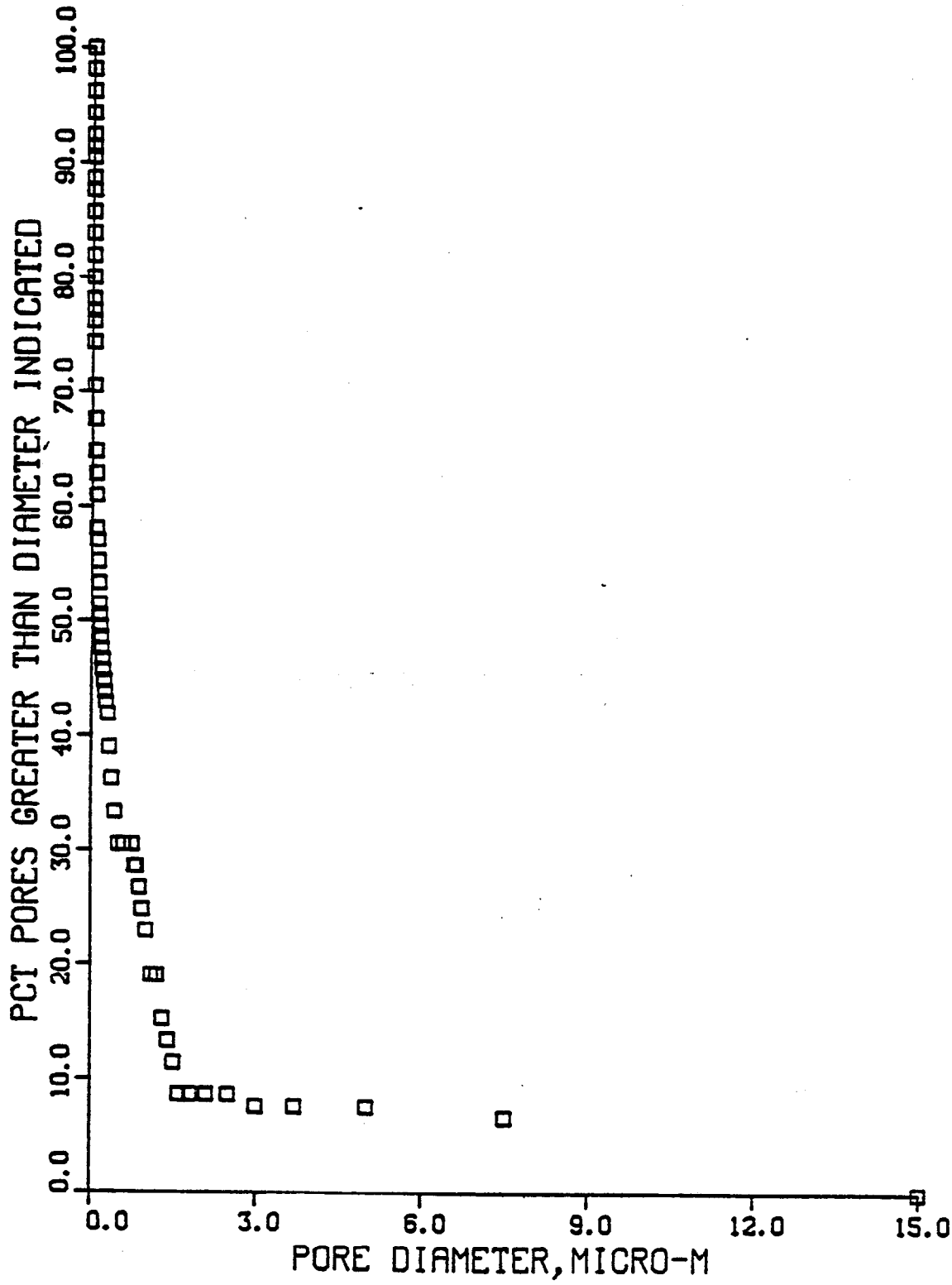
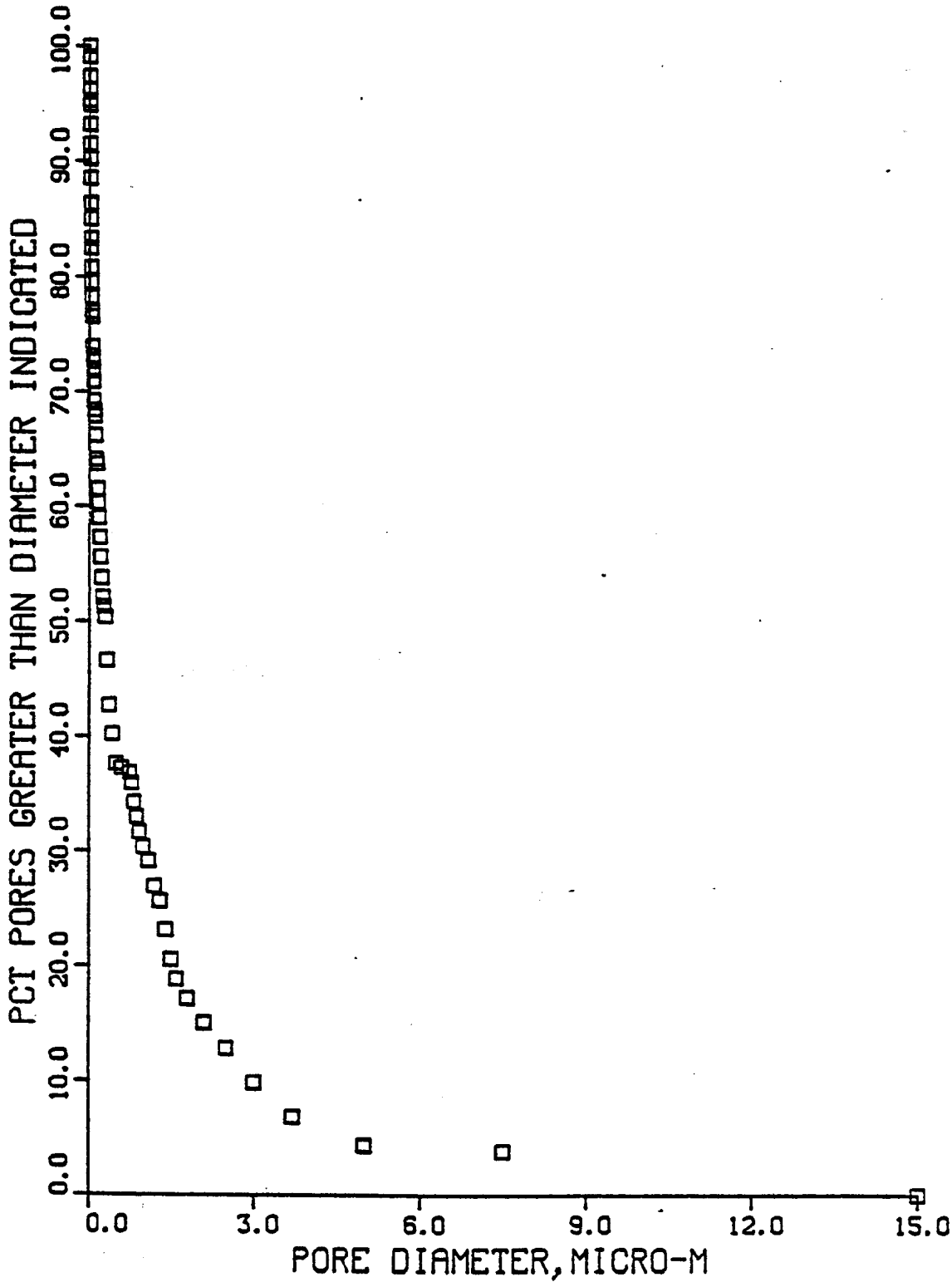
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
0.0
3.0
6.0
9.0
12.0
15.0
PORE DIAMETER, MICRO-M

UGR File #257
Battelle Columbus Laboratories
Dec. 1979

A 14707.



A 14630.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10.0
20.0
30.0
40.0
50.0
60.0
70.0
80.0
90.0
100.0
0.0
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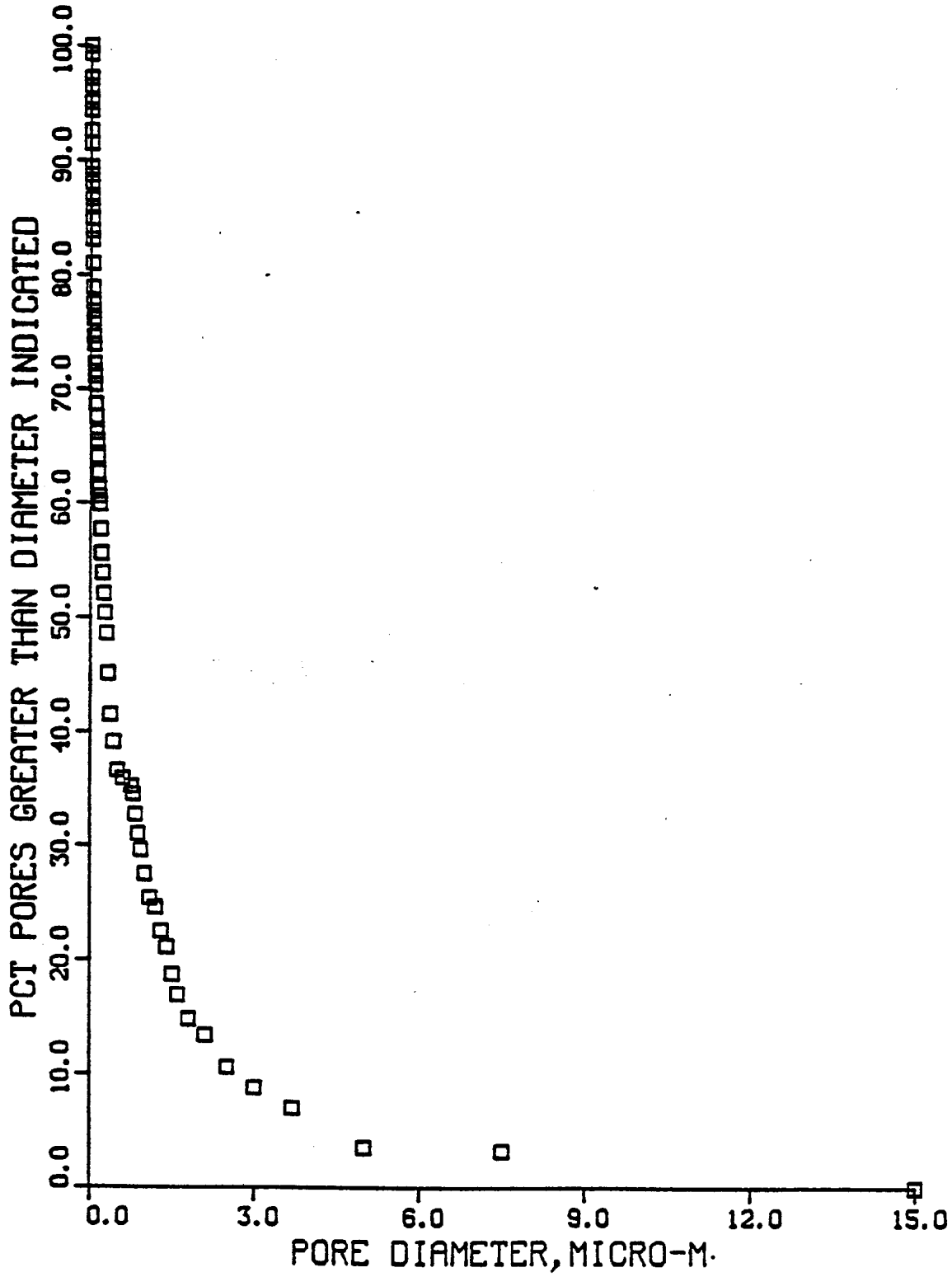
6.0
9.0
12.0
15.0
PORE DIAMETER, MICRO-M

A 14590.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30.0
40.0
50.0
60.0
70.0
80.0
90.0
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6.0
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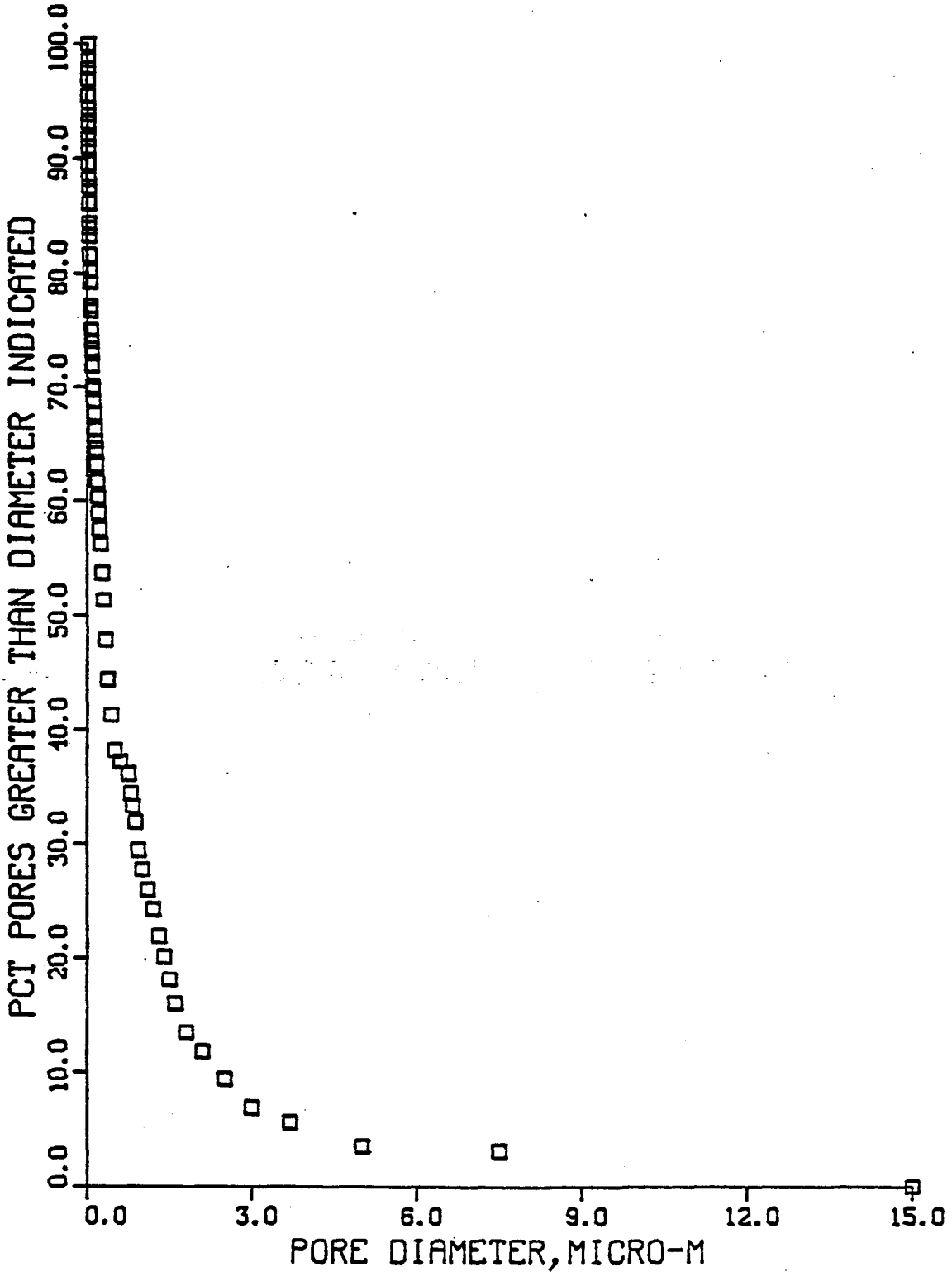
12.0
15.0
PORE DIAMETER, MICRO-M.

A 14552.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90.0
100.0
0.0
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9.0
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15.0
PORE DIAMETER, MICRO-M

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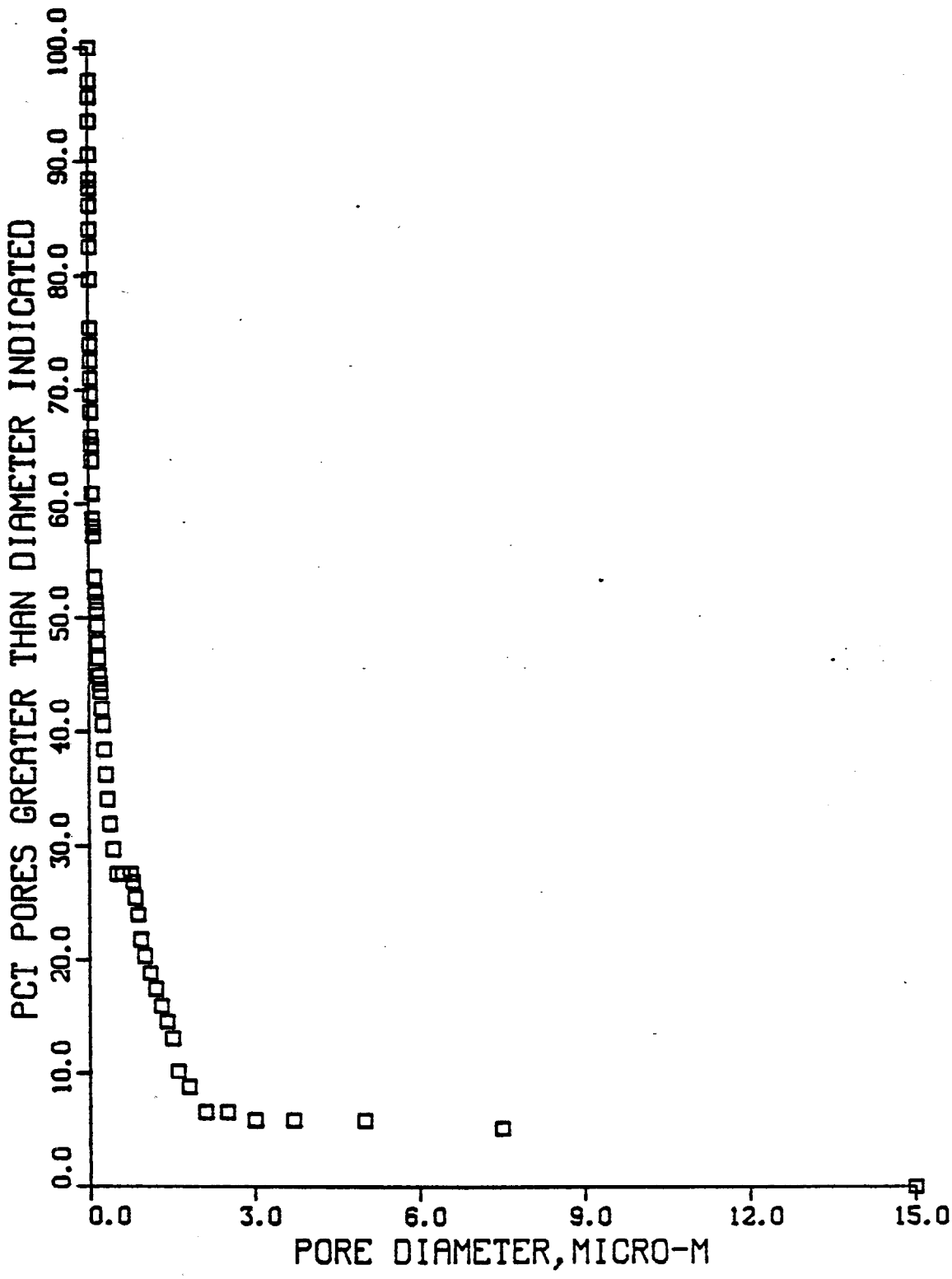
Battelle Columbus Laboratories
Dec. 1979

A 13512.



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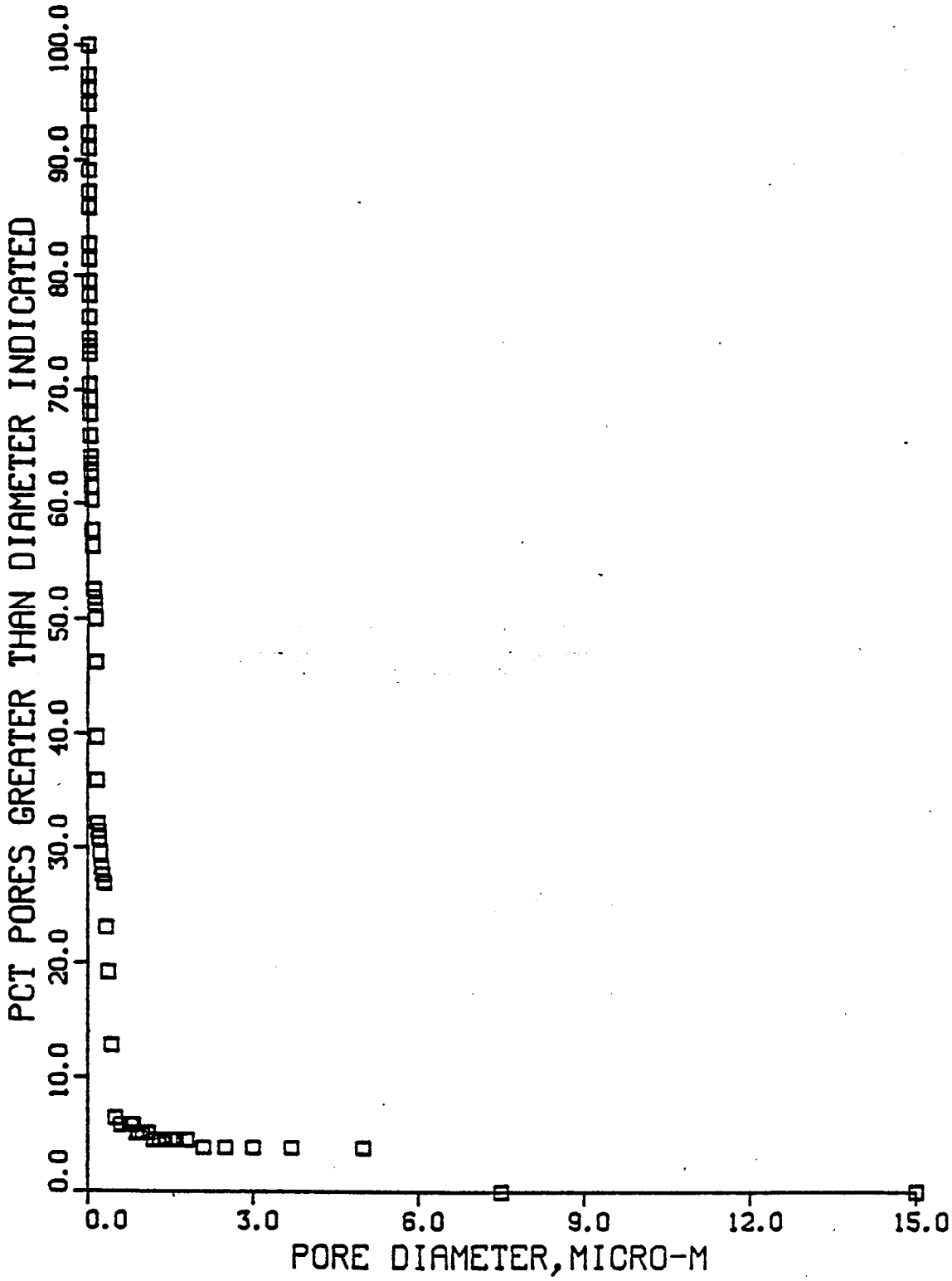
Battelle Columbus Laboratories
Dec. 1979

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