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STUDY OF HYDROCARBON - SHALE INTERACTION

PROGRESS REPORT #16

October 1 - December 31, 1979

and

January 1 - March 31, 1980

MASTER

Paul D. Schettler, Jr., Principal Investigator,

and Dale L. Wampler

Juniata College

Huntingdon, Pennsylvania 16652

PREPARED UNDER CONTRACT TO THE
EASTERN GAS SHALES PROJECT

Contract No. DE-AS05-76MC05197

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NOTE

This is a combined progress report covering

the reporting periods of October 1 to

December 31, 1979, and January 1 to March 31, 1980.

ABSTRACT

Data and interpretations relating the physical chemistry of Devonian shale to the productivity of natural gas wells are presented in this report. Specifically, methane isotherms, helium porosity, BET, and permeability and diffusion data are presented at pressures ranging up to 1000 psi. Use of the data in productivity calculations and resource estimation has been the subject of other reports in this series.

QUARTERLY PROGRESS REPORT

October 1 - December 31, 1979
and
January 1 - March 31, 1980

Contract No. DE-AS05-76MC05197

Summary of Progress: Work was effected in both contractual tasks resulting in a comparison between low pressure and high pressure isotherms.

A. Technical Progress

- I. A comparison of low and high pressure isotherm/degasibility data - Appendix A.
- II. An updated summary of low pressure data gathered to date - Appendix B.
- III. Gas chromatographic data - Appendix C.

B. Financial Expenditures

Note: Formal accounting is sent by our business office. The accounting here is a summary of the monthly informal accounting by the P.I. for the period October 1, 1979-March 31, 1980.

Faculty Salaries	\$3,566.70
Indirect Costs	3,566.70
Supplies and Maintenance Contract on Computer	1,945.92
EGSP Symposium (Morgantown)	<u>175.09</u>
	\$9,254.41

APPENDICES

- A. HIGH PRESSURE ISOTHERMS AND DEGASIBILITIES: A COMPARISON. A1-A63
- B. DATA SUMMARY B1-B14
- C. GAS CHROMATOGRAPHIC ANALYSIS OF OFF-GASSING
FROM WELLS OH#4, #5, #6, #7. C1 - C3

HIGH PRESSURE ISOTHERMS AND DEGASIBILITIES: A COMPARISON

Paul D. Schettler, Jr.
and
Dale L. Wampler

Juniata College
Huntingdon, Pennsylvania 16652

HIGH PRESSURE ISOTHERMS AND DEGASIBILITIES: A COMPARISON

Introduction

This preliminary report deals with the interaction of methane with samples of Devonian shale at high pressure. We measured both the solubility of methane within shale as a function of pressure (isotherms) as well as the rate of transport of methane through shale. Since we have already gathered and analyzed considerable data at low pressure, these initial high pressure runs were made with "equivalent" samples run through the standard set of low pressure measurements at the same time. In this report we consider predictive equations describing the high pressure data, the accuracy of the fits to high pressure data, and finally a comparison of high pressure and low pressure data.

Experimental

The procedure and methods for obtaining low pressure data has been described elsewhere.⁽¹⁾

The high pressure apparatus is shown in the accompanying diagram. The components shown in red are mounted on a piece of 1/4" copper plate the back side of which is soldered to 1/2" copper pipes spaced at regular ~ 5" intervals. Thermostatted water is run through the pipes as well as the heat exchangers, also shown in black. The copper plate with the mounted components is surrounded by insulating material.

All internal volumes of the tubing and components marked in red are determined by comparison to a standard volume obtained by removing mercury from the drain associated with MV1. The pneumatic valves are actuated through Skinner solenoid 3-way Magna Latch valves with needle valves installed on the vent side so that the pneumatic valves are closed very gently. The Skinner valves, as well as the electric ball valves, are operated by computer through

an interface developed by the project. Specifically PV1, 2, 4 are closed and the pressure at the high pressure transducer measured. Then the volume between F and MV1 is increased by draining an amount of mercury from MV1 and determining its volume by weighing it. The total volume between PV4, PV1 and PV2 can be determined from the original pressure, its change, the mercury volume measured, and the equation of state of the gas. The volume between PV3 and the surface of the mercury can then be determined by filling the apparatus with gas, closing PV3, evacuating the apparatus, closing PV4, PV1, and PV2, then opening PV3 and measuring the pressure again. The volume between PV2 and a Cajon VCR connector installed between F and the sample holder S was then determined by installing a disk in place of the washer of the fitting and monitoring the pressure change as PV2 is opened in the same way as before. The volume of the sample holder S was determined by weight of water upon filling it and this volume compared with the volume obtained by replacing the disk with the empty sample cell and remeasuring the volume below PV2. A small discrepancy existed and was corrected so that a cell filled with inert material gave "zero" amount of sorption.

During the calibration procedure it was discovered that the volumes obtained differed by about .15 ml/valve according to whether the valve was opened or closed. Smaller discrepancies existed as to how fast the valves were opened and closed. We associated these discrepancies with pressure transients from the bellows volume change and eliminated them by closing the pneumatic valves slowly. (This was accomplished by installing throttles on the Skinner valves.) All actual pressure measurements were made by placing all PV valves in the closed position first. Then the pressure measurement was made, and the relevant valve (PV2 usually) was opened to (re)equilibrate pressure, then closed, and the pressure measurement repeated. Equilibrium was ascertained on the basis of equivalency of the pressure readings upon repeated cycling.

Runs themselves are made in a manner similar to the low pressure. A crushed and sieved sample of known density (determined by toluene and a pycnometer) is loaded into sample chamber S which is then fastened onto the system and evacuated. A Dewar containing hot water is placed around the sample to hasten degassing. Runs are made by progressively closing PV2, increasing the pressure between PV3, PV4 and PV1, measuring the pressure, opening PV2, equilibrating, then measuring the pressure again. This process is repeated in about six steps until the pressure on the sample is about 1000 psi. From these data, the number of moles of gas in the gas phase is determined before and after opening PV2 and the difference ascribed to the amount of gas sorbed into the sample as has been discussed before for the low pressure case. The gas (methane) is assumed to obey the Benedict-Webb-Rubin equation of state.

Degasibility data is obtained as before by following the rate of gas release from the sample upon change of the applied gas pressure. Specifically the sample is equilibrated at a high initial pressure (~ 800 psi) then dropped discontinuously by closing PV2, evacuating the space between PV1, PV2, PV3, and PV4, then opening PV2. The degassing rate of the sample is followed by monitoring the pressure as a function of time (with PV2 open and the appropriate bellows volume correction applied).

Results

The detailed results are shown at the end of the report along with Tables I-IV which summarize the results and compares them with the expectation of the low pressure data.

Several features should be mentioned. First, the data is highly reproducible in the sense that repeat runs on the same sample give the same results. Second, most of the isotherms obtained fit the equation

$$(1) \quad n_{\text{ads}} = AP + \frac{BP}{1 + CP}$$

Fits were made by a method of successive approximations which involved least square fitting A and B, arranging the equation to a form that was linear in C, then fitting C. The process was repeated until no further improvement was obtained. The results are shown in Figures 2 - 8 and in the detailed computer printouts. In the figures the fits are represented by the curves and the experimental points by (X). The fits are somewhat low (about 10%) at high pressure which may be an artifact of the somewhat unusual fitting procedure. We intend to replace this procedure with a direct nonlinear least squares method using the Marquardt algorithm.

The equation (1) is compatible with a dual mechanism of sorption. The second term is that of a Langmuir absorption isotherm wherein there are a finite number of sorptive sites that place an upper bound on adsorption at B/C. At low pressures the number of sites is much larger than the number of adsorbed molecules and the amount adsorbed is proportional to pressure with slope B. The Langmuir adsorption isotherm is appropriate for single layer adsorption such as when the adsorbate is well above its critical temperature. (In this case multilayer adsorption is not important because the magnitude of the forces involved is of the order of those of condensation and condensation forces are not important above the critical temperature.) The first term of equation (1) can be associated with a second process including sorption into the open porosity of the shale, solution into kerogen or adsorption onto a second type of site with different isotherm characteristics. The equation (1) thus fits existing conceptions of the sorption of methane into shale involving multiple processes.

Most of the fits were good but in some cases exceptions exist. Figures 6 and 8 show data that is quite unintelligible by the two step mechanism proposed above. Negative isotherms such as displayed for Figures 6 and 8 are often observed with microporous materials.⁽²⁾ In my opinion such negative isotherms (implying that the amount of methane contained in the rock decreases

with increasing gas pressure) cannot occur when the volume of the rock is calculated from a bulk density. However, if a fluid used to determine a "bulk density" penetrates into the porous structure of the sample, the result is a "bulk density" determination that is too high and corresponds to a "volume" wherein some sorption is already included. The negative isotherms thus occur, in my opinion, in situations wherein some of the space (phase space) associated with sorption is included twice, once in the density determination and again in the processes associated with sorption. The veracity of this view and its implications for gas producers needs further work.

The comparison of these results with low pressure data obtained from a second sample at the same depth gave much useful information concerning the range of possible sorption models applicable to methane in shale. First it should be noted that the plateau associated with the Langmuir isotherm part of equation (1) is considerably higher than that associated with a monolayer from the BET experiment as Table I shows. As a general rule BET experiments give higher areas at higher temperatures; for example, CO_2 at -78.6°C give larger surface areas associated with adsorption than N_2 at -196°C . Normally these differences are associated with the sorption process requiring some sort of activation energy. For shale there is also the possibility of solution in kerogen being involved; solution involving penetration into the material would be expected to be greatly hindered at the lower temperatures. In any event a BET surface area underestimates the height of the Langmuir plateau by about a factor of 3.

Finally there is presently some discordance between the low pressure data obtained with the older apparatus and that obtained by the new one. Table III shows limiting slopes of equation (1) as compared with that obtained with data from the low pressure apparatus. Direct comparison of the nature of Table III is of uncertain value because the pressure ranges of the two apparatuses do not even approximately overlap, but we are investigating this point further, nevertheless.

Table IV shows a comparison of high pressure versus low pressure degasibility data. An astonishing feature is that the specific degasibility remains so constant over a range of pressures (from ~ 1 atm-40 atm). At face value the constancy observed would seem to support the diffusion approach to gas transport in shale wherein the diffusion constant is assumed to be constant as opposed to the Darcy Law approach wherein the bulk viscosity of the gas is assumed to be applicable in its transport through micropassages. We plan to do a more in-depth analysis both for samples wherein the agreement is excellent (e.g., Pa#1:4799) and wherein some dependence is apparent (e.g., Pa#1:4949).

Bibliography

1. E. Jensen, S. Steckbeck, and P. D. Schettler, Jr., "Diffusion Constants in Devonian Shale," Quarterly Report ORO-5197-1 submitted to USERDA under Contract No. E(40-1)5197.
E. Jensen, P. D. Schettler, Jr., Isotherms of Devonian Shale," ORO-5197-1.
2. Robert R. Frost and Josephus Thomas, Jr., "Use of Internal Surface Area and High Pressure Sorption Data to Estimate Capacity for Gas Production from the New Albany Shale Group," Proceedings 2nd Eastern Gas Shale Symposium, Morgantown, 1978.

Table I

Well ID	Low Pressure BET Monolayer	High Pressure B/C
	Volume Gas STP/Vol Rock	Volume Gas STP/Vol Rock
NY#1:1728	1.53	9.23
Pa#1:998	2.26	16.1
:4799	2.64	9.80
:4949	--	9.85
:5053	1.95	9.34

Table II

Well ID	HP Porosity from Term "A"	LP Porosity from He Isotherm Slope
	(%)	(%)
NY#1:1728	.35	7.7
Pa#1:998	.48	6.3
:4597	--	3.0
:4799	.41	7.1
:4949	.48	5.2
:5053	.42	6.7

Table III

Well ID	Limiting Slope from High Pressure Data (A + B)	Slope of Low Pressure Data
	Vol/Vol/Atm	Vol/Vol/Atm
NY#1:1728	3.53	1.98
Pa#1:998	4.25	2.79
:4597	4.63	4.61
:4799	2.42	3.21
:4949	1.99	3.05
:5053	3.23	4.83

Table IV

Well ID	Degasibility HP*	Degasibility LP**
	Vol(STP)/Area(cc)/Torr/Sec ^{1/2}	Vol(STP cm ³)
NY#1:1728	.784	.277
Pa#1:998	1.83	1.47
:4597	2.41	2.24
:4799	1.44	1.47
:4949	1.78	.319
:5053	1.72	1.91

* Initial equilibrium pressure ~ 40,000 torr,
end of jump ~ final equil pressure ~ 27,000 torr

** Initial equilibrium pressure ~ 900 torr,
end of jump ~ final equil pressure ~ 200 torr.

LEGEND FOR DRAWING HIGH PRESSURE APPARATUS

BLACK-- PIPES & MATERIALS ASSOCIATED WITH THERMOSTATING

RED-- THERMOSTATED HIGH PRESSURE 1/8" SS TUBING & COMPONENTS

PV#--PNEUMATIC ACTUATED VALVES NUPRO SS-4BK-TSW-81NC

MV1-MANUAL METERING VALVE WHITEY SS-31RF2

F--FILTER. NUPRO SS-2TF4-140S

RV1-RELIEF VALVE 15 PSI

LOW PRESSURE TRANSDUCER - DATAMETRICS BAROCELL 0-1000 TORR

HIGH PRESSURE TRANSDUCER VIATRAN 218-24 M5 M19 0-1000PSI

BLUE-- UNTHERMOSTATED SS TUBING AND COMPONENTS

EV#- ELECTRICALLY ACTUATED BALL VALVES

RV2-RELIEF VALVE. 1PSI

GREEN-- GLASS VACUUM SYSTEM

GV#- GLASS STOPCOCK

T#- VAPOR TRAP

MST- MOLECULAR SIEVE PUMP

FIG #11

CH4 ISOTHERM PA#1-EGSP: 4799

FIG # 2

CH4 ISOTHERM PA#1-EGSP: 5053

FIG # 3

CH4 ISOTHERM NY#1-EGSP:998

FIG # 4

CH₄ ISOTHERM PA#1-EGSP: 4949

FIG # 5

CH₄ ISOTHERM PA#1-EGSP: 4597

FIG # 6

CH₄ ISOTHERM NY#1-EGSP: 1728

FIG # 7

CH₄ ISOTHERM PA#1-EGSP: 4899

FIG # 8

Date 11/25/1979

Sample ID : NY#1-EGSP:1728

Gas : Helium

Initials : PDS

Book : 5

Page : 44

SAMPLE DATA

Weight : 5.8397 (grams)

Density : 2.6619 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

SLOPE OF ISOTHERM

1.02209E-04 Vol Gas/Vol Rock/Torr
5.28575E-03 Vol Gas/Vol rock/PSI
7.76791E-02 Vol Gas/Vol Rock/ATM
1.71306E-09 Moles Gas/Gram Rock/Torr

UNCERTAINTY : 1.72874 %

DETAILED DATA 4 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
242.86	4.16046E-07	5.626	1	0
531.668	8.74874E-07	3.78842	1	0
823.483	1.42094E-06	2.86033	1	0
896.951	1.56666E-06	2.99776	1	0

Date 11/25/1979

Sample ID : NY#1-EGSP-1728

Gas : Methane

Initials : PDS

Book : 5

Page : 44

SAMPLE DATA

Weight : 5.8397 (grams)

Density : 2.6619 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

SLOPE OF ISOTHERM

1.98019E-04 Vol Gas/Vol Rock/Torr

1.02405E-02 Vol Gas/Vol rock/PSI

.150494 Vol Gas/Vol Rock/ATM

3.31885E-09 Moles Gas/Gram Rock/Torr

UNCERTAINTY : .903962 %

DETAILED DATA 4 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
238.053	9.0693E-07	2.585	1	0
527.502	1.74748E-06	1.90141	2	.614394
818.614	2.6743E-06	1.32493	1	0
885.722	2.86899E-06	1.64331	1	0

Date 11/25/1979

Sample ID : NY#1-EGSP-1728

Gas : Methane

Initials : PDS

Book : 5

Page : 44

SAMPLE DATA

Weight : 5.8397 (grams)

Density : 2.6619 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 903.228

P equilibrium : 199.99

P o : 199.352

SPECIFIC DEGASIBILITY 2.77813E-08

UNCERTAINTY 3.12018 %

System d Moles/ dP 2.01218E-06

Date 11/25/1979

Sample ID : NY#1-EGSP:1728

Gas : Nitrogen

Initials : PDS

Book : 5

Page : 44

SAMPLE DATA

Weight : 5.8397 (grams)

Density : 2.6619 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

INTERNAL AREA

2.5763E-05 Moles/Gram
9.67842E-06 Moles/ml.
1.53616 ml. gas/ml. rock
2.45135 Specific Area (sq. meters/gram)

UNCERTAINTY : .36331 %

C : 381.671

UNCERTAINTY IN C : 8.244 %

BAROMETRIC PRESSURE : 745.571 mm Hg

DETAILED DATA 5 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
19.9085	2.40805E-05	.450689	1	0
88.5857	2.93403E-05	.52317	1	0
142.951	3.19224E-05	.588983	1	0
193.136	3.43438E-05	.632208	1	0
243.622	3.63944E-05	.667069	1	0

Date 11/25/1979

Sample ID : NY#1-EGSP-1728

Gas : Nitrogen

Initials : PDS

Book : 5

Page : 44

SAMPLE DATA

Weight : 5.8397 (grams)

Density : 2.6619 (grams/cc)

Sample Temp : -196 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 243.521

P equilibrium : 34.8466

P o : 32.034

SPECIFIC DEGASIBILITY 1.80093E-06

UNCERTAINTY .453384 %

System d Moles/ dP 8.31518E-06

Date 11/25/1979

Sample ID : NY#1-EGSP:1728

Gas : Methane

Initials : PDS

Book : 5

Page : 44

SAMPLE DATA

Weight : 9.33528 (grams)

Density : 2.66194 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

THE COEFFICIENTS OF THE EQUATION $N=AP+BP/(1+CP)$ ARE :

A = 7.90957E-11

B = 5.85736E-09

C = 3.61989E-05

DETAILED DATA OF AUTOMATED ISOTHERM :

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter	ADS GAS CALC Moles/Gram
0	0.000E+00	0.000	0	0.0	0.000E+00
4026	2.117E-05	0.042	1	0.0	2.090E-05
9866	4.459E-05	0.029	1	0.0	4.337E-05
19105	6.847E-05	0.024	1	0.0	6.768E-05
28522	8.777E-05	0.022	1	0.0	8.447E-05
36199	1.007E-04	0.022	1	0.0	9.466E-05
41037	1.104E-04	0.022	1	0.0	9.998E-05

Date 11/25/1979

Sample ID : NY#1-EGSP-1728

Gas : Methane

Initials : PDS

Book : 5

Page : 44

SAMPLE DATA

Weight : 9.33528 (grams)

Density : 2.66194 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 27736.4

P equilibrium : 18751.3

P o : 18614.5

SPECIFIC DEGASIBILITY 7.84729E-08

UNCERTAINTY .126419 %

System d Moles/dP 4.29631E-06

Date 12/ 2/1979

Sample ID : PA#1-EGSP:4899

Gas : Helium

Initials : PDS

Book : 5

Page : 46

SAMPLE DATA

Weight : 5.8772 (grams)

Density : 2.6712 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

SLOPE OF ISOTHERM

1.23656E-04 Vol Gas/Vol Rock/Torr
6.39487E-03 Vol Gas/Vol rock/PSI
9.39787E-02 Vol Gas/Vol Rock/ATM
2.0653E-09 Moles Gas/Gram Rock/Torr

UNCERTAINTY : 1.48092 %

DETAILED DATA 4 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
226.368	5.30853E-07	4.43097	1	0
512.675	1.03473E-06	3.21882	1	0
802.873	1.63784E-06	2.49358	1	0
886.625	1.81861E-06	2.59496	1	0

Date 12/ 2/1979

Sample ID : PA#1-EGSP-4899

Gas : Methane

Initials : PDS

Book : 5

Page : 46

SAMPLE DATA

Weight : 5.8772 (grams)

Density : 2.6712 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

SLOPE OF ISOTHERM

3.66597E-04 Vol Gas/Vol Rock/Torr
1.89585E-02 Vol Gas/Vol rock/PSI
.278614 Vol Gas/Vol Rock/ATM
6.12287E-09 Moles Gas/Gram Rock/Torr

UNCERTAINTY : .509684 %

DETAILED DATA 4 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
221.137	1.53868E-06	1.53106	1	0
500.486	3.08224E-06	1.08316	1	0
793.242	4.75165E-06	.862335	1	0
872.423	5.2598E-06	.900618	1	0

Date 12/ 2/1979

Sample ID : PA#1-EGSP:4899

Gas : Methane

Initials : PDS

Book : 5

Page : 46

SAMPLE DATA

Weight : 5.8772 (grams)

Density : 2.6712 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 872.473

P equilibrium : 236.165

P o : 234.916

SPECIFIC DEGASIBILITY 8.36967E-08

UNCERTAINTY 2.22899 %

System d Moles/ dP 2.1367E-06

Date 12/ 2/1979

Sample ID : PA#1-EGSP:4899

Gas : Nitrogen

Initials : PDS

Book : 5

Page : 46

SAMPLE DATA

Weight : 5.8772 (grams)

Density : 2.6712 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

INTERNAL AREA

7.16158E-05 Moles/Gram
2.68103E-05 Moles/ml.
4.28512 ml. gas/ml. rock
6.81424 Specific Area (sq. meters/gram)

UNCERTAINTY : .114708 %

C : 424.823

UNCERTAINTY IN C : .118098 %
BAROMETRIC PRESSURE 756.794 mm Hg

DETAILED DATA 5 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
3.32839	4.69914E-05	230417	1	0
67.7331	7.49569E-05	204314	1	0
131.272	8.62282E-05	217554	1	0
185.116	9.5439E-05	226995	1	0
235.822	1.04212E-04	232453	1	0

Date 12/ 2/1979

Sample ID : PA#1-EGSP:4899

Gas : Nitrogen

Initials : PDS

Book : 5

Page : 46

SAMPLE DATA

Weight : 5.8772 (grams)

Density : 2.6712 (grams/cc)

Sample Temp : -196 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 235.122

P equilibrium : 57.2759

P o : 44.3047

SPECIFIC DEGASIBILITY 9.35763E-06

UNCERTAINTY .264683 %

System d Moles/ dP 8.73771E-06

Date 12/ 2/1979

Sample ID : PA#1-EGSP:4899

Gas : Methane

Initials : PDS

Book : 5

Page : 46

SAMPLE DATA

Weight : 8.75184 (grams)

Density : 2.6712 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

THE COEFFICIENTS OF THE EQUATION $N=AP+BP/(1+CP)$ ARE :

A = 2.41098E-10

B = 1.5307E-08

C = 2.54263E-04

DETAILED DATA OF AUTOMATED ISOTHERM :

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter	ADS GAS CALC Moles/Gram
0	0.000E+00	0.000	0	0.0	0.000E+00
3817	3.102E-05	0.032	3	38.4	3.057E-05
9461	5.837E-05	0.024	1	0.0	4.481E-05
18464	8.014E-05	0.022	1	0.0	5.408E-05
27780	9.328E-05	0.023	1	0.0	5.943E-05
35524	7.935E-05	0.031	1	0.0	6.277E-05
40521	5.798E-05	0.047	1	0.0	6.464E-05

Date 12/ 2/1979

Sample ID : PA#1-EGSP:4899

Gas : Methane

Initials : PDS

Book : 5

Page : 46

SAMPLE DATA

Weight : 8.75184 (grams)

Density : 2.6712 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm diam)

DATA COLLECTED

P initial : 40444.2

P equilibrium : 38486.3

P o : 38264.3

SPECIFIC DEGASIBILITY 4.2562E-07

UNCERTAINTY .183212 %

System d Moles/ dP 4.81698E-06

Date 12/ 4/1979

Sample ID : PA#1-EGSP-4799

Gas : Helium

Initials : PDS

Book : 5

Page : 47

SAMPLE DATA

Weight : 9.39356 (grams)

Density : 2.67926 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

SLOPE OF ISOTHERM

9.44138E-05 Vol Gas/Vol Rock/Torr

4.8826E-03 Vol Gas/Vol rock/PSI

7.17545E-02 Vol Gas/Vol Rock/ATM

1.57215E-09 Moles Gas/Gram Rock/Torr

UNCERTAINTY : 1.19132 %

DETAILED DATA 4 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
238.572	4.17226E-07	3.51078	1	0
524.276	8.2357E-07	2.51839	2	4.89136E-02
811.285	1.25359E-06	2.02881	2	174149
895.711	1.39023E-06	2.11391	2	18751

Date 12/ 4/1979

Sample ID : PA#1-EGSP:4799

Gas : Methane

Initials : PDS

Book : 5

Page : 47

SAMPLE DATA

Weight : 9.39356 (grams)

Density : 2.67926 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

SLOPE OF ISOTHERM

2.42195E-04 Vol Gas/Vol Rock/Torr
1.25251E-02 Vol Gas/Vol rock/PSI
.184068 Vol Gas/Vol Rock/ATM
4.03296E-09 Moles Gas/Gram Rock/Torr

UNCERTAINTY : 474645 %

DETAILED DATA 4 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
228.906	9.79847E-07	1.49702	1	0
510.803	2.09721E-06	.991226	1	0
803.49	3.19997E-06	.797323	1	0
879.979	3.49527E-06	.8439	1	0

Date 12/ 4/1979

Sample ID : PA#1-EGSP:4799

Gas : Methane

Initials : PDS

Book : 5

Page : 47

SAMPLE DATA

Weight : 9.39356 (grams)

Density : 2.67926 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 879.862

P equilibrium : 224.193

P o : 220.595

SPECIFIC DEGASIBILITY 1.47481E-07

UNCERTAINTY 3.29823 %

System d Moles/ dP 2.08714E-06

Date 12/ 4/1979

Sample ID : PA#1-EGSP:4799

Gas : Nitrogen

Initials : PDS

Book : 5

Page : 47

SAMPLE DATA

Weight : 9.39356 (grams)

Density : 2.67926 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

INTERNAL AREA

4.40058E-05 Moles/Gram
1.64246E-05 Moles/ml.
2.64103 ml gas/ml. rock
4.18716 Specific Area (sq.meters/gram)

UNCERTAINTY : .128711 %

C : 145.398

UNCERTAINTY IN C : .164528 %
BAROMETRIC PRESSURE 734.789 mm Hg

DETAILED DATA 5 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
10.8354	3.07345E-05	.220007	1	0
75.3282	4.47374E-05	.213777	1	0
136.111	5.25968E-05	.222726	1	0
189.09	5.89721E-05	.229405	1	0
240.323	6.53217E-05	.231577	1	0

Date 12/ 4/1979

Sample ID : PA#1-EGSP:4799

Gas : Nitrogen

Initials : PDS

Book : 5

Page : 47

SAMPLE DATA

Weight : 9.39356 (grams)

Density : 2.67926 (grams/cc)

Sample Temp : -196 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 239.441

P equilibrium : 57.7612

P o : 41.9205

SPECIFIC DEGASIBILITY 5.59046E-06

UNCERTAINTY .18177 %

System d Moles/ dP 8.5578E-06

Date 12/ 4/1979

Sample ID : PA#1-EGSP-4799

Gas : Methane

Initials : PDS

Book : 5

Page : 47

SAMPLE DATA

Weight : 9.71479 (grams)

Density : 2.6932 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

THE COEFFICIENTS OF THE EQUATION $N=AP+BP/(1+CP)$ ARE :

A = 8.97822E-11

B = 5.22868E-09

C = 3.21994E-05

DETAILED DATA OF AUTOMATED ISOTHERM :

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter	ADS GAS CALC Moles/Gram
0	0.000E+00	0.000	0	0.0	0.000E+00
4133	1.960E-05	0.043	1	0.0	1.944E-05
9905	4.158E-05	0.030	1	0.0	4.016E-05
19141	6.490E-05	0.024	1	0.0	6.364E-05
28559	8.498E-05	0.022	1	0.0	8.036E-05
36264	9.774E-05	0.021	1	0.0	9.073E-05
41115	1.059E-04	0.022	1	0.0	9.620E-05

Date 12/ 4/1979

Sample ID : PA#1-EGSP:4799

Gas : Methane

Initials : PDS

Book : 5

Page : 47

SAMPLE DATA

Weight : 9.71479 (grams)

Density : 2.6932 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 40923.9

P equilibrium : 27989.7

P o : 27768.6

SPECIFIC DEGASIBILITY 1.43494E-07

UNCERTAINTY 6.07476E-02 %

System d Moles/ dP 4.49041E-06

Date 12/17/1979

Sample ID : PA#1-EGSP:5053

Gas : Helium

Initials : PDS

Book : 5

Page : 48

SAMPLE DATA

Weight : 5.45156 (grams)

Density : 2.642 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

SLOPE OF ISOTHERM

8.79971E-05 Vol Gas/Vol Rock/Torr
4.55076E-03 Vol Gas/Vol rock/PSI
6.68778E-02 Vol Gas/Vol Rock/ATM
1.48596E-09 Moles Gas/Gram Rock/Torr

UNCERTAINTY : 2.19085 %

DETAILED DATA 4 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
235.402	3.73746E-07	6.78607	1	0
521.661	7.45742E-07	4.81564	1	0
808.538	1.19555E-06	3.68334	2	335921
894.854	1.34593E-06	3.78062	2	4.21929E-02

Date 12/17/1979

Sample ID : PA#1-EGSP:5053

Gas : Methane

Initials : PDS

Book : 5

Page : 48

SAMPLE DATA

Weight : 5.45156 (grams)

Density : 2.642 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

SLOPE OF ISOTHERM

3.23405E-04 Vol Gas/Vol Rock/Torr

1.67248E-02 Vol Gas/Vol rock/PSI

.245787 Vol Gas/Vol Rock/ATM

5.46117E-09 Moles Gas/Gram Rock/Torr

UNCERTAINTY : .610503 %

DETAILED DATA 4 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
224.646	1.45211E-06	1.74925	1	0
507.301	2.858E-06	1.25955	1	0
798.5	4.23468E-06	1.04332	1	0
878.995	4.61889E-06	1.10584	2	9.45188E-02

Date 12/17/1979

Sample ID : PA#1-EGSP:5053

Gas : Methane

Initials : PDS

Book : 5

Page : 48

SAMPLE DATA

Weight : 5.45156 (grams)

Density : 2.642 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 878.97

P equilibrium : 235.511

P o : 231.977

SPECIFIC DEGASIBILITY 1.91146E-07

UNCERTAINTY 1.22635 %

System d Moles/ dP 2.13418E-06

Date 12/17/1979

Sample ID : PA#1-EGSP:5053

Gas : Nitrogen

Initials : PDS

Book : 5

Page : 48

SAMPLE DATA

Weight : 5.45156 (grams)

Density : 2.642 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

INTERNAL AREA

3.29866E-05 Moles/Gram

1.24854E-05 Moles/ml.

1.95217 ml. gas/ml. rock

3.13867 Specific Area (sq. meters/gram)

UNCERTAINTY : .367342 %

C : 66.5097

UNCERTAINTY IN C : 3.06483 %

BAROMETRIC PRESSURE 747.663 mm Hg

DETAILED DATA 5 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
23.6157	2.33557E-05	500043	1	0
85.4627	3.30084E-05	500441	1	0
140.679	3.84338E-05	526461	1	0
192.714	4.28729E-05	54503	1	0
242.994	4.7185E-05	553743	1	0

Date 12/17/1979

Sample ID : PA#1-EGSP:5053

Gas : Nitrogen

Initials : PDS

Book : 5

Page : 48

SAMPLE DATA

Weight : 5.45156 (grams)

Density : 2.642 (grams/cc)

Sample Temp : -196 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 242.495

P equilibrium : 49.5631

P o : 43.2978

SPECIFIC DEGASIBILITY 3.77584E-06

UNCERTAINTY .308122 %

System d Moles/dP 8.72354E-06

Date 12/17/1979

Sample ID : PA#1-EGSP-5053

Gas : Methane

Initials : PDS

Book : 5

Page : 48

SAMPLE DATA

Weight : 9.41879 (grams)

Density : 2.642 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

THE COEFFICIENTS OF THE EQUATION $N=AP+BP/(1+CP)$ ARE :

A = 9.58841E-11

B = 8.06191E-09

C = 5.1094E-05

DETAILED DATA OF AUTOMATED ISOTHERM :

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter	ADS GAS CALC Moles/Gram
0	0.000E+00	0.000	0	0.0	0.000E+00
3878	2.662E-05	0.034	1	0.0	2.647E-05
9513	5.433E-05	0.024	1	0.0	5.252E-05
18556	8.245E-05	0.020	1	0.0	7.857E-05
27872	1.021E-04	0.019	1	0.0	9.537E-05
35559	1.111E-04	0.020	1	0.0	1.052E-04
40467	1.181E-04	0.021	1	0.0	1.102E-04

Date 12/17/1979

Sample ID : PA#1-EGSP:5053

Gas : Methane

Initials : PDS

Book : 5

Page : 48

SAMPLE DATA

Weight : 9.41879 (grams)

Density : 2.642 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 40226.8

P equilibrium : 27928

P o : 27703.8

SPECIFIC DEGASIBILITY 1.72127E-07

UNCERTAINTY 4.57186E-02 %

System d Moles/ dP 4.56031E-06

Date 12/22/1979

Sample ID : NY#1-EGSP:998

Gas : Helium

Initials : DLW

Book : 5

Page : 49

SAMPLE DATA

Weight : 8.01424 (grams)

Density : 2.673 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

SLOPE OF ISOTHERM

8.31087E-05 Vol Gas/Vol Rock/Torr
4.29796E-03 Vol Gas/Vol rock/PSI
6.31626E-02 Vol Gas/Vol Rock/ATM
1.38714E-09 Moles Gas/Gram Rock/Torr

UNCERTAINTY : 1.58902 %

DETAILED DATA 4 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
236.246	2.41394E-07	7.12088	1	0
525.982	7.14885E-07	3.40473	1	0
809.751	1.16386E-06	2.56441	1	0
890.223	1.2952E-06	2.66271	2	094514

Date 12/22/1979

Sample ID : NY#1-EGSP:998

Gas : Methane

Initials : DLW

Book : 5

Page : 49

SAMPLE DATA

Weight : 8.01424 (grams)

Density : 2.673 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

SLOPE OF ISOTHERM

2.79957E-04 Vol Gas/Vol Rock/Torr

1.44779E-02 Vol Gas/Vol rock/PSI

.212767 Vol Gas/Vol Rock/ATM

4.67267E-09 Moles Gas/Gram Rock/Torr

UNCERTAINTY : .482317 %

DETAILED DATA 4 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
226.641	1.10607E-06	1.55646	1	0
509.829	2.41153E-06	1.01172	1	0
801.416	3.72686E-06	.80348	1	0
877.543	4.03894E-06	.857117	1	0

Date 12/22/1979

Sample ID : NY#1-EGSP-998

Gas : Methane

Initials : DLW

Book : 5

Page : 49

SAMPLE DATA

Weight : 8.01424 (grams)

Density : 2.673 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 877.608

P equilibrium : 227.644

P o : 223.074

SPECIFIC DEGASIBILITY : 1.4772E-07

UNCERTAINTY : .765272 %

System d Moles/ dP : 2.09987E-06

Date 12/22/1979

Sample ID : NY#1-EGSP:998

Gas : Nitrogen

Initials : DLW

Book : 5

Page : 49

SAMPLE DATA

Weight : 8.01424 (grams)

Density : 2.673 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

INTERNAL AREA

3.77782E-05 Moles/Gram
1.41333E-05 Moles/ml.
2.26198 ml. gas/ml. rock
3.59459 Specific Area (sq. meters/gram)

UNCERTAINTY : .182258 %

C : 117.068

UNCERTAINTY IN C : .346756 %
BAROMETRIC PRESSURE 740.997 mm Hg

DETAILED DATA 5 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
11.9441	2.53544E-05	.31281	1	0
77.2133	3.81311E-05	.29419	1	0
135.008	4.45736E-05	.308269	1	0
186.936	4.99584E-05	.317628	1	0
237.713	5.53206E-05	.320734	1	0

Date 12/22/1979

Sample ID : NY#1-EGSP:998

Gas : Nitrogen

Initials : DLW

Book : 5

Page : 49

SAMPLE DATA

Weight : 8.01424 (grams)

Density : 2.673 (grams/cc)

Sample Temp : -196 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 237.111

P equilibrium : 52.1274

P o : 42.1901

SPECIFIC DEGASIBILITY 2.82827E-06

UNCERTAINTY .130706 %

System d Moles/dP 8.613E-06

Date 12/22/1979

Sample ID : NY#1-EGSP:998

Gas : Methane

Initials : DLW

Book : 5

Page : 49

SAMPLE DATA

Weight : 9.9795 (grams)

Density : 2.673 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

THE COEFFICIENTS OF THE EQUATION $N=AP+BP/(1+CP)$ ARE :

A = 1.07607E-10

B = 6.99958E-09

C = 2.60519E-05

DETAILED DATA OF AUTOMATED ISOTHERM :

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter	ADS GAS CALC Moles/Gram
0	0.000E+00	0.000	0	0.0	0.000E+00
3634	2.457E-05	0.034	1	0.0	2.363E-05
9596	5.402E-05	0.022	1	0.0	5.477E-05
18936	8.982E-05	0.017	1	0.0	9.080E-05
28436	1.206E-04	0.015	1	0.0	1.174E-04
36102	1.449E-04	0.014	1	0.0	1.341E-04
40983	1.600E-04	0.014	1	0.0	1.431E-04

Date 12/22/1979

Sample ID : NY#1-EGSP:998

Gas : Methane

Initials : DLW

Book : 5

Page : 49

SAMPLE DATA

Weight : 9.9795 (grams)

Density : 2.673 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 40970.5

P equilibrium : 27918.3

P o : 27687.7

SPECIFIC DEGASIBILITY 1.83362E-07

UNCERTAINTY 4.59967E-02 %

System d Moles/ dP 4.47946E-06

Date 1/13/1980

Sample ID : PA#1-EGSP:4949

Gas : Helium

Initials : PDS

Book : 5

Page : 52

SAMPLE DATA

Weight : 7.32232 (grams)

Density : 2.69 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

SLOPE OF ISOTHERM

6.80111E-05 Vol Gas/Vol Rock/Torr
3.51719E-03 Vol Gas/Vol rock/PSI
5.16884E-02 Vol Gas/Vol Rock/ATM
1.12798E-09 Moles Gas/Gram Rock/Torr

UNCERTAINTY : 2.1294 %

DETAILED DATA 4 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
235.268	2.42073E-07	7.75195	1	0
524.07	5.6081E-07	4.73806	1	0
814.514	9.31218E-07	3.49902	1	0
892.797	1.05233E-06	3.57785	1	0

Date 1/13/1980

Sample ID : PA#1-EGSP:4949 **

Gas : Methane

Initials : PDS

Book : 5

Page : 52

SAMPLE DATA

Weight : 7.32232 (grams)

Density : 2.69 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

SLOPE OF ISOTHERM

1.99439E-04 Vol Gas/Vol Rock/Torr
.010314 Vol Gas/Vol rock/PSI
.151574 Vol Gas/Vol Rock/ATM
3.30774E-09 Moles Gas/Gram Rock/Torr

UNCERTAINTY : .738689 %

DETAILED DATA 4 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
230.383	8.07908E-07	2.32637	1	0
514.555	1.71191E-06	1.55595	1	0
837.248	2.65569E-06	1.23103	1	0
879.783	2.86765E-06	1.31798	2	165746

Date 1/13/1980

Sample ID : PA#1-EGSP:4949

Gas : Methane

Initials : PDS

Book : 5

Page : 52

SAMPLE DATA

Weight : 7.32232 (grams)

Density : 2.69 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 879.738

P equilibrium : 216.103

P o : 215.302

SPECIFIC DEGASIBILITY 3.19849E-08

UNCERTAINTY 1.03024 %

System d Moles/dP 2.07152E-06

Date 1/13/1980

Sample ID : PA#1-EGSP:4949

Gas : Methane

Initials : PDS

Book : 5

Page : 52

SAMPLE DATA

Weight : 8.48195 (grams)

Density : 2.69 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

THE COEFFICIENTS OF THE EQUATION $N=AP+BP/(1+CP)$ ARE :

A = 8.38311E-11

B = 4.96909E-09

C = 3.04904E-05

DETAILED DATA OF AUTOMATED ISOTHERM :

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter	ADS GAS CALC Moles/Gram
0	0.000E+00	0.000	0	0.0	0.000E+00
4390	1.976E-05	0.052	1	0.0	1.961E-05
10687	4.276E-05	0.035	1	0.0	4.095E-05
19196	6.265E-05	0.030	1	0.0	6.178E-05
28155	7.621E-05	0.029	1	0.0	7.764E-05
35476	9.774E-05	0.026	1	0.0	8.766E-05
40362	1.044E-04	0.027	1	0.0	9.330E-05

Date 1/13/1980

Sample ID : PA#1-EGSP:4949

Gas : Methane

Initials : PDS

Book : 5

Page : 52

SAMPLE DATA

Weight : 8.48195 (grams)

Density : 2.69 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 40353.6

P equilibrium : 28217.9

P o : 28038.3

SPECIFIC DEGASIBILITY 1.78032E-07

UNCERTAINTY 6.04912E-02 %

System d Moles/ dP 4.59593E-06

Date 2/ 6/1980

Sample ID : PA#1-EGSP:4597

Gas : Helium

Initials : SAK

Book : 5

Page : 50

SAMPLE DATA

Weight : 6.02391 (grams)

Density : 2.587 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

SLOPE OF ISOTHERM

3.97085E-05 Vol Gas/Vol Rock/Torr
2.05352E-03 Vol Gas/Vol rock/PSI
3.01784E-02 Vol Gas/Vol Rock/ATM
6.84794E-10 Moles Gas/Gram Rock/Torr

UNCERTAINTY : 4.73509 %

DETAILED DATA 4 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
240.591	1.90666E-07	12.0458	1	0
531.64	3.66606E-07	8.87088	1	0
704.575	5.01845E-07	7.94335	2	898242
745.005	4.48468E-07	10.2685	2	45238

Date 2/ 6/1980

Sample ID : PA#1-EGSP-4597

Gas : Methane

Initials : SAK

Book : 5

Page : 50

SAMPLE DATA

Weight : 6.02391 (grams)

Density : 2.587 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

SLOPE OF ISOTHERM

4.61034E-04 Vol Gas/Vol Rock/Torr

2.38423E-02 Vol Gas/Vol rock/PSI

.350386 Vol Gas/Vol Rock/ATM

7.95077E-09 Moles Gas/Gram Rock/Torr

UNCERTAINTY : .378646 %

DETAILED DATA 4 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
230.842	2.14065E-06	1.07462	1	0
511.618	4.21961E-06	772584	1	0
796.931	6.18769E-06	646595	1	0
877.119	6.651E-06	695437	1	0

Date 2/ 6/1980

Sample ID : PA#1-EGSP:4597

Gas : Methane

Initials : SAK

Book : 5

Page : 50

SAMPLE DATA

Weight : 6.02391 (grams)

Density : 2.587 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 876.475

P equilibrium : 239.49

P o : 232.342

SPECIFIC DEGASIBILITY 2.24285E-07

UNCERTAINTY .195308 %

System d Moles/dP 2.13481E-06

Date 2/ 6/1980

Sample ID : PA#1-EGSP:4597

Gas : Nitrogen

Initials : SAK

Book : 5

Page : 50

SAMPLE DATA

Weight : 6.02391 (grams)

Density : 2.587 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

INTERNAL AREA

4.2047E-05 Moles/Gram
1.62532E-05 Moles/ml
2.43658 ml. gas/ml. rock
4.00078 Specific Area (sq.meters/gram)

UNCERTAINTY : .245463 %

C : 76.11

UNCERTAINTY IN C : .937998 %

BAROMETRIC PRESSURE 741.51 mm Hg

DETAILED DATA 5 POINTS TAKEN

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter
0	0	0	0	0
19.8325	2.9203E-05	.362132	1	0
83.305	4.28236E-05	.349293	1	0
139.656	4.96975E-05	.368672	1	0
193.705	5.51667E-05	.383552	1	0
242.351	5.97033E-05	.396288	1	0

Date 2/ 6/1980

Sample ID : PA#1-EGSP:4597

Gas : Nitrogen

Initials : SAK

Book : 5

Page : 50

SAMPLE DATA

Weight : 6.02391 (grams)

Density : 2.587 (grams/cc)

Sample Temp : -196 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 239.033

P equilibrium : 51.5342

P o : 44.583

SPECIFIC DEGASIBILITY 2.77749E-06

UNCERTAINTY 8.59665E-02 %

System d Moles/ dP 8.71063E-06

Date 2/ 6/1980

Sample ID : PA#1-EGSP:4597

Gas : Methane

Initials : SAK

Book : 5

Page : 50

SAMPLE DATA

Weight : 8.55665 (grams)

Density : 2.587 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

THE COEFFICIENTS OF THE EQUATION $N=AP+BP/(1+CP)$ ARE : $A = 1.05584E-10$ $B = 7.59243E-09$ $C = 1.13386E-04$

DETAILED DATA OF AUTOMATED ISOTHERM

PRESSURE Torr	ADS GAS Moles/Gram	UNCERTAINTY %	FLAG	FLAG Parameter	ADS GAS CALC Moles/Gram
0	0.000E+00	0.000	0	0.0	0.000E+00
4554	2.311E-05	0.043	3	58.0	2.328E-05
11311	4.439E-05	0.032	1	0.0	3.882E-05
19974	5.967E-05	0.030	1	0.0	4.856E-05
29022	6.476E-05	0.033	1	0.0	5.442E-05
36481	6.325E-05	0.038	1	0.0	5.778E-05
41179	5.967E-05	0.045	1	0.0	5.950E-05

Date 2/ 6/1980

Sample ID : PA#1-EGSP-4597

Gas : Methane

Initials : SAK

Book : 5

Page : 50

SAMPLE DATA

Weight : 8.55665 (grams)

Density : 2.587 (grams/cc)

Sample Temp : 0 (cent)

Particle Size : .085 (cm. diam)

DATA COLLECTED

P initial : 41179.7

P equilibrium : 28156.9

P o : 27915.5

SPECIFIC DEGASIBILITY 2.41339E-07

UNCERTAINTY 3.66911E-02 %

System d Moles/ dP 4.53345E-06

DATA SUMMARY

Juniata College

Huntingdon, Pennsylvania 16652

DATA SUMMARY

This compact presentation is designed to save production costs. Herein is a summary of all data on our data files. The * samples have been run during the period of this report. The complete data (as presented in previous reports) is available on request.

Explanation of Headings

Table I

Well ID

EGSP# when possible. Others as follows:

Brown - Belmont County, Ohio
Dawson - Richland County, Ohio
Egner - Richland County, Ohio
Romig - Richland County, Ohio
Warn - Chataqua County, New York

Density Bulk

Density measured using toluene as displacing fluid

Isotherm Slope

Volume of gas sorbed into rock (STP) per unit volume rock per torr pressure

BET Area

Volume of nitrogen (STP) calculated from BET equation required

G

Specific degasibility. Volume of gas (STP) released from a sq cm of rock surface per (sec)^{1/2} per torr of discontinuous pressure drop.

Explanation of Headings (cont)

Table II

Well ID

Brown - Belmont County, Ohio
Dawson - Richland County, Ohio
Egner - Richland County, Ohio
Romig - Richland County, Ohio
Warn - Chataqua County, New York

Diffusion Constant

Calculated from degassing data. Expressed in cm^2/sec .

Density, Helium

Density found using helium as the displacing fluid in g/cm^3 .

Net Methane Sorption

The amount of methane that must be in solution in kerogen, or adsorbed onto surfaces expressed in volume sorbed/volume rock/torr pressure.

Permeability

Expressed in darcies.

Apparent Porosity

Calculated in the standard manner from helium and methane isotherms. These numbers do not, however, reflect actual void spaces in the shale.

WELL ID	DENSITY BULK G/CM ³	ISO SLOPE HELIUM TORR ⁻¹ *E4	ISO SLOPE METHANE TORR ⁻¹ *E4	BET AREA	G METHANE CM/TORR *E7	G NITROGEN CM/TORR *E7
BROWN:4400	2.735	0.211	2.132	4.4	2.68	47.44
BROWN:5541	2.661	0.580	2.724	5.0	1.66	106.02
BROWN:5561	2.611	0.314	1.678	2.2	0.72	6.30
BROWN:5586	2.623	0.573	2.109	2.7	1.10	13.29
CH-11940:3481.5	2.500	*****	2.180	*****	*****	*****
CH-11940:3636.4	2.678	0.195	1.570	*****	*****	*****
CH-11940:3778.9	2.504	0.551	4.009	*****	*****	*****
CH-11940:3787.9	2.554	0.137	1.579	*****	*****	*****
DAWSON:676	2.370	0.461	10.327	4.0	8.76	61.24
DAWSON:686	2.684	0.039	0.896	3.2	0.01	69.31
EGNER:340	2.605	1.204	6.477	12.5	0.31	188.49
EGNER:345	2.656	1.289	6.150	11.2	0.29	155.78
EGNER:510	2.560	2.638	10.580	5.8	11.44	113.73
EGNER:520	2.424	0.685	8.297	6.7	9.61	150.39
IL#1-EGSP:3010	2.568	0.862	4.834	*****	0.16	*****
IL#1-EGSP:3038	2.346	1.322	7.504	*****	1.16	*****
IL#1-EGSP:3052	2.480	0.659	3.093	2.2	0.94	8.95
IL#1-EGSP:3070	2.410	1.426	5.124	*****	0.89	*****
IL#1-EGSP:3094	2.379	0.936	4.938	*****	1.09	*****
IL#1-EGSP:3106	2.628	0.434	0.503	2.5	0.02	0.01
IL#2-EGSP:321.3	2.520	1.684	7.678	16.7	0.08	111.74
IL#2-EGSP:418.33	2.560	1.432	4.715	18.6	0.12	185.78
IL#2-EGSP:465.65	2.483	1.175	5.838	11.6	0.24	588.52
IL#2-EGSP:513.1	2.502	0.939	6.361	*****	0.34	*****
IL#3-EGSP:926.5	2.592	0.908	5.011	13.3	0.06	92.96
IL#3-EGSP:976.2	2.560	*****	4.498	12.2	0.06	85.06
IL#3-EGSP:1026	2.539	1.446	8.839	18.4	0.16	170.93

Table I

WELL ID	DENSITY BULK G/CM ³	ISO SLOPE HELIUM TORR^-1 *E4	ISO SLOPE METHANE TORR^-1 *E4	BET AREA	G METHANE CM/TORR *E7	G NITROGEN CM/TORR *E7
IL#3-EGSP:1076.0	2.524	1.400	7.189	13.8	0.17	164.37
IL#3-EGSP:1126	2.788	1.158	3.631	7.7	0.10	92.96
IN#2-EGSP:141	2.436	*****	14.997	5.7	13.93	92.82
IN#2-EGSP:191	2.670	*****	5.501	10.0	0.30	150.49
IN#2-EGSP:232	2.362	1.298	11.534	6.1	12.19	112.11
NY#1-EGSP:375	2.882	0.384	3.658	7.7	0.24	136.99
NY#1-EGSP:425	2.690	0.733	2.588	5.2	0.12	65.60
NY#1-EGSP:475	2.748	0.391	2.063	5.2	0.17	63.80
NY#1-EGSP:998	2.405	2.343	4.108	3.1	2.53	39.91
NY#1-EGSP:1333	2.645	0.638	1.082	2.1	0.02	0.55
NY#1-EGSP:1383	2.851	0.872	3.100	6.0	0.46	85.28
NY#1-EGSP:1427	2.731	0.306	0.607	2.1	0.03	0.68
NY#1-EGSP:1477	2.625	1.013	2.664	3.9	0.73	69.95
NY#1-EGSP:1527	2.771	0.650	2.831	2.8	1.74	17.71
NY#1-EGSP:1577	2.666	0.827	0.977	1.9	0.04	1.43
NY#1-EGSP:1628	2.688	1.063	2.823	4.0	0.66	*****
NY#1-EGSP:1678	2.728	1.148	3.253	5.2	0.83	85.06
* NY#1-EGSP:1728	2.662	1.022	1.980	1.5	0.28	18.01
NY#1-EGSP:1778	2.685	0.884	2.912	3.6	2.79	53.30
NY#1-EGSP:1829	2.720	0.514	2.386	3.6	0.65	49.41
NY#1-EGSP:1891	2.735	1.099	3.565	5.5	1.80	77.31
NY#1-EGSP:1941	2.743	0.683	2.015	4.3	0.63	45.84
NY#1-EGSP:1990	2.681	1.537	3.658	5.0	0.57	57.45
NY#1-EGSP:2040	2.695	0.742	2.208	3.8	0.32	40.75
NY#1-EGSP:2092	2.674	1.031	2.218	3.8	0.92	24.12
NY#1-EGSP:2142	2.756	0.390	2.567	4.4	1.67	61.70
NY#1-EGSP:2192	2.637	1.399	3.953	4.9	1.81	70.41
NY#1-EGSP:2245	2.731	0.764	2.765	4.0	1.81	67.55
NY#1-EGSP:2295	2.651	0.783	2.035	3.4	0.89	39.47
NY#1-EGSP:2345	2.742	1.024	2.937	4.7	0.99	67.17
NY#1-EGSP:2491	2.752	0.587	1.967	4.1	1.15	48.72

Table I (cont)

WELL ID	DENSITY BULK G/CM ³	ISO SLOPE HELIUM TORR ⁻¹ *E4	ISO SLOPE METHANE TORR ⁻¹ *E4	BET AREA	G METHANE CM/TORR *E7	G NITROGEN CM/TORR *E7
NY#1-EGSP:2541	2.596	0.848	1.889	3.2	0.52	4.60
NY#1-EGSP:2591	2.647	0.899	2.864	3.4	2.59	47.96
NY#1-EGSP:2641	2.468	1.931	3.517	3.4	1.77	55.99
NY#1-EGSP:2893	2.388	1.672	5.589	2.3	0.90	19.41
NY#1-EGSP:2733	2.186	2.846	4.002	1.4	1.37	0.19
NY#1-EGSP:2783	2.702	0.470	2.707	3.9	2.82	61.23
OH#2-EGSP:3544	2.694	0.020	0.930	*****	*****	*****
*PA#1-EGSP:4597	2.587	0.397	4.610	2.4	2.24	27.77
*PA#1-EGSP:4699	2.687	0.628	1.684	*****	0.30	*****
*PA#1-EGSP:4799	2.679	0.944	2.422	2.6	1.47	55.90
*PA#1-EGSP:4899	2.671	1.237	3.666	4.3	0.84	93.58
PA#1-EGSP:4949	2.690	0.680	1.994	*****	0.32	*****
*PA#1-EGSP:5053	2.642	0.880	3.234	2.0	1.91	37.76
ROMIG:570	2.682	0.540	2.465	11.9	0.13	263.26
ROMIG:571	2.748	0.936	4.662	8.5	0.50	197.42
ROMIG:684	2.400	0.959	10.111	26.5	100.24	2383.86
ROMIG:704	2.777	*****	10.934	5.5	15.22	112.47
WU#5-EGSP:2723	2.488	0.383	2.066	1.9	0.59	0.30
WU#5-EGSP:2823	2.704	0.837	3.209	5.7	2.02	81.37
WU#5-EGSP:2935	2.471	0.547	3.426	1.7	0.97	0.78
WU#5-EGSP:3030	2.429	0.253	2.105	1.2	1.26	1.05
WU#5-EGSP:3035	2.658	0.855	3.144	4.7	3.17	70.64
WU#5-EGSP:3135	2.661	1.357	4.200	7.0	2.05	145.14
WU#5-EGSP:3235	2.676	0.443	3.580	4.2	4.38	88.46
WU#5-EGSP:3305	2.648	0.704	2.564	0.6	0.94	110.72
WU#5-EGSP:3335	2.428	0.568	2.120	1.4	0.49	1.02
WU#5-EGSP:3355	2.359	0.381	4.508	1.2	0.90	0.86
WU#5-EGSP:6142	2.612	0.965	3.427	2.8	1.87	31.22

Table I (cont)

WELL ID	DENSITY BULK G/CM ³	ISO SLOPE HELIUM TORR ⁻¹ *E4	ISO SLOPE METHANE TORR ⁻¹ *E4	BET AREA	G METHANE CM/TORR *E7	G NITROGEN CM/TORR *E7
WU#6-MERC-1X:7215	2.592	0.916	3.205	3.7	1.77	54.78
WU#6-MERC-1X:7267	2.671	0.494	8.015	7.5	4.95	85.92
WU#6-MERC-1X:7316	2.639	1.033	6.233	6.2	3.93	77.72
WU#6-MERC-1X:7369	2.572	0.951	16.118	13.0	13.46	142.04
WU#6-MERC-1X:7421	2.522	0.647	29.439	15.5	19.53	86.72
WU#6-MERC-1X:7474	2.509	1.040	10.815	13.3	4.53	123.10
WU#7-EGSP:6192	2.639	0.972	3.725	2.4	0.99	*****
WU#7-EGSP:6242	2.672	0.868	4.560	3.4	2.83	27.37
WU#7-EGSP:6342	2.706	1.277	3.474	4.6	1.64	79.29
WU#7-EGSP:6464	2.609	1.187	2.883	3.4	1.34	53.93
WU#7-EGSP:6566	2.617	1.027	3.774	3.7	3.19	45.00
EGSP-WU#7:6516	2.765	0.046	1.002	3.2	0.70	51.89
EGSP-WU#7:6621	2.497	0.943	10.761	8.5	9.04	139.83
WARN:1517	2.673	0.785	2.706	5.2	0.58	106.05
WARN:2630	2.517	0.051	1.099	2.2	0.66	13.29
WARN:2660	2.419	0.941	3.098	2.1	0.89	11.09
WARN:2675	2.677	0.294	1.729	3.7	2.72	73.55
20336:2449	2.424	0.374	1.853	1.6	0.70	0.53
20336:2459	2.454	0.648	2.268	1.6	0.82	0.74
20336:2539	2.657	1.161	4.105	7.7	0.89	147.15
20336:2579	2.644	0.590	4.606	9.0	1.92	158.08
20336:2629	2.660	1.132	4.004	5.3	3.12	*****
20336:2873	2.642	0.752	2.554	3.1	1.22	25.98
20336:3029	2.492	0.285	1.366	1.9	0.57	0.64
20336:3129	2.648	0.703	2.461	5.6	0.37	145.09
20336:3139	2.642	1.330	3.232	5.8	0.13	142.11
20336:3349	2.554	0.569	3.029	*****	1.84	*****
20338:4921	2.566	0.514	6.334	5.7	4.24	44.82

Table I (cont)

WELL ID	DENSITY BULK G/CM ³	ISO SLOPE HELIUM TORR ⁻¹ *E4	ISO SLOPE METHANE TORR ⁻¹ *E4	BET AREA	G METHANE CM/TORR *E7	G NITROGEN CM/TORR *E7
20338:4971	2.695	0.453	3.486	6.1	3.29	*****
20338:5221	2.692	0.557	1.804	*****	0.38	*****
20338:5451	2.542	0.563	18.634	14.6	8.89	62.00
20403:2756.3	2.765	0.372	2.485	4.2	1.37	37.99
20403:2836.2	2.721	0.309	3.707	5.6	4.48	67.74
20403:2846.1	2.658	1.824	3.154	3.3	0.69	39.98
20403:2866.3	2.699	0.612	3.733	5.4	3.61	64.25
20403:2876.1	2.698	0.337	3.303	*****	4.02	64.04
20403:2876.3	2.740	0.352	4.133	6.1	5.40	65.33
20403:2886.1	2.668	0.629	3.301	3.6	1.75	*****
20403:2896.1	2.683	0.365	0.974	2.3	0.57	5.19
20403:2906.1	2.708	0.377	2.681	2.8	1.36	28.62
20403:2916.1	2.690	0.060	1.093	2.8	0.30	18.01
20403:2916.3	2.697	0.528	2.092	3.4	1.84	28.40
20403:2926.1	2.737	0.325	2.941	8.8	2.00	37.25
20403:2936.1	2.708	*****	2.911	3.2	1.97	15.58
20403:2946.1	2.744	0.412	2.649	3.0	2.25	23.65
20403:2946.3	2.732	0.839	3.432	4.2	2.54	38.76
20403:2976.1	2.679	0.814	3.656	20.5	3.27	94.43
20403:2996.1	2.624	0.138	1.727	1.4	0.68	3.30
20403:3006.1	2.666	*****	1.633	0.8	2.32	59.88
20403:3016.1	2.745	*****	0.776	15.0	0.86	70.72
20403:3016.3	2.620	0.932	2.659	3.7	2.08	37.31
20403:3026.1	2.669	0.096	1.197	0.3	0.73	2.10
20403:3026.3	2.654	0.618	2.196	2.0	0.83	5.92
20403:3036.1	2.744	0.669	2.615	2.5	13.60	244.00
20403:3046.1	2.726	0.369	2.564	2.9	1.73	*****
20403:3046.3	2.670	0.334	2.521	4.3	2.78	35.85
20403:3056.1	2.742	0.241	2.541	3.8	2.64	25.43
20403:3066.1	2.674	0.579	2.470	2.9	1.95	28.62
20403:3066.3	2.582	0.840	2.966	2.3	1.46	14.60
20403:3076.1	2.678	0.496	1.854	2.8	1.76	27.53

Table I (cont)

WELL ID	DENSITY BULK G/CM ³	ISO SLOPE HELIUM TORR ⁻¹ *E4	ISO SLOPE METHANE TORR ⁻¹ *E4	BET AREA	G METHANE CM/TORR *E7	G NITROGEN CM/TORR *E7
20403:3086.1	2.703	0.733	2.964	2.8	1.50	14.34
20403:3116.3	2.597	0.815	3.579	2.4	1.36	11.93
20403:3126.3	2.588	1.372	4.416	6.0	4.01	46.19
20403:3186.3	2.647	0.326	1.246	2.1	0.42	2.06
20403:3201.3	3.178	*****	1.837	6.0	5.65	67.11
20403:3211.3	2.681	0.724	3.220	3.4	1.87	23.92
20403:3241.3	2.704	0.232	3.643	31.3	3.35	170.96
20403:3251.3	2.648	0.408	2.738	3.7	2.55	39.89
20403:3291.3	2.716	1.023	3.769	6.8	3.60	62.51
20403:3301.3	2.750	0.622	3.740	5.9	3.45	49.17
20403:3311.3	2.646	0.583	1.543	1.7	0.39	2.09
20403:3321.3	2.653	0.174	1.196	14.7	0.63	14.46
20403:3376.3	2.631	1.234	3.362	3.6	2.39	29.70
20403:3436.1	2.390	1.369	4.717	1.7	0.71	4.61
20403:3476.3	2.570	0.531	1.206	1.7	0.30	2.30
20403:3506.3	2.628	0.863	2.092	3.3	2.28	55.39
20403:3526.3	2.494	0.995	2.210	2.2	0.31	1.37
20403:3546.3	2.583	0.318	1.608	1.8	0.41	1.49
20403:3556.3	2.677	0.863	2.852	4.8	2.16	86.12
20403:3616.3	2.684	0.775	1.832	2.4	1.17	16.87
20403:3656.3	2.670	0.693	2.415	5.0	0.14	120.54
20403:3666.3	2.714	0.554	2.380	5.3	0.16	119.67
20403:3676.3	2.670	0.980	2.780	4.6	1.07	*****
20403:3686.3	2.650	0.420	2.340	6.5	1.42	*****
20403:3756.1	2.330	0.659	8.857	1.9	1.41	0.29
20403:3786.1	2.767	1.188	3.349	5.8	0.12	132.37
20403:3796.3	2.672	0.617	2.858	6.0	0.10	130.23
20403:3816.3	2.870	0.222	1.930	5.9	0.16	144.59
20403:3876.3	2.715	0.490	2.060	5.4	0.23	134.83
20403:3946.1	2.512	1.098	2.320	2.0	0.67	6.93
20403:3976.3	2.506	0.212	0.791	2.2	0.26	1.48

Table I (cont)

WELL ID	DIF CONST METHANE CM^2/S *E7	DENSITY HELIUM G/CM^3	NET CH4 SORPTION TORR^-1 *E4	PERM DARCIES *E9	APP POROSITY HELIUM %	APP POROSITY METHANE %
BROWN:4400	49.70	2.78	1.921	8.262	1.6	16.2
BROWN:5541	11.62	2.78	2.144	2.469	4.4	20.7
BROWN:5561	5.79	2.67	1.364	0.758	2.4	12.8
BROWN:5586	8.54	2.74	1.536	1.405	4.4	16.0
CH-11940:3481.5	*****	****	2.180	*****	*****	16.6
CH-11940:3636.4	*****	2.72	1.375	*****	1.5	11.9
CH-11940:3778.9	*****	2.61	3.458	*****	4.2	30.5
CH-11940:3787.9	*****	2.58	1.443	*****	1.0	12.0
DAWSON:676	22.63	2.46	9.865	18.219	3.5	78.5
DAWSON:686	0.01	2.69	0.857	0.000	0.3	6.8
EGNER:340	0.07	2.87	5.274	0.037	9.1	49.2
EGNER:345	0.07	2.94	4.861	0.033	9.8	46.7
EGNER:510	36.72	3.20	7.942	30.291	20.0	80.4
EGNER:520	42.18	2.56	7.612	27.288	5.2	63.1
IL#1-EGSP:3010	0.03	2.75	3.972	0.013	6.5	36.7
IL#1-EGSP:3038	0.76	2.61	6.183	0.442	10.0	57.0
IL#1-EGSP:3052	2.87	2.61	2.434	0.693	5.0	23.5
IL#1-EGSP:3070	0.95	2.70	3.697	0.378	10.8	38.9
IL#1-EGSP:3094	1.53	2.56	4.002	0.589	7.1	37.5
IL#1-EGSP:3106	0.06	2.72	0.069	0.002	3.3	3.8
IL#2-EGSP:321.3	0.00	2.89	5.994	0.002	12.8	58.4
IL#2-EGSP:418.33	0.02	2.87	3.283	0.007	10.9	35.8
IL#2-EGSP:465.65	0.05	2.73	4.663	0.025	8.9	44.4
IL#2-EGSP:513.1	0.09	2.69	5.423	0.044	7.1	48.3
IL#3-EGSP:926.5	0.00	2.78	4.103	0.002	6.9	38.1
IL#3-EGSP:976.2	0.01	****	4.498	0.002	*****	34.2
IL#3-EGSP:1026	0.01	2.85	7.392	0.007	11.0	67.2

Table II

WELL ID	DIF CONST METHANE CM ² /S *E7	DENSITY HELIUM G/CM ³	NET CH4 SORPTION TORR ⁻¹ *E4	PERM DARCIES *E9	APP POROSITY HELIUM %	APP POROSITY METHANE %
IL#3-EGSP:1076.0	0.02	2.82	5.789	0.010	10.6	54.6
IL#3-EGSP:1126	0.02	3.06	2.473	0.007	8.8	27.6
IN#2-EGSP:141	27.09	****	14.983	31.679	*****	114.0
IN#2-EGSP:191	0.09	****	5.501	0.039	*****	41.8
IN#2-EGSP:232	35.11	2.62	11.522	31.575	9.9	87.7
NY#1-EGSP:375	0.14	2.97	3.658	0.039	2.9	27.8
NY#1-EGSP:425	0.07	2.85	2.587	0.014	5.6	19.7
NY#1-EGSP:475	0.22	2.83	2.063	0.035	3.0	15.7
NY#1-EGSP:998	11.96	2.93	4.106	3.830	17.8	31.2
NY#1-EGSP:1333	0.01	2.78	1.082	0.001	4.9	8.2
NY#1-EGSP:1383	0.68	3.05	3.100	0.165	6.6	23.6
NY#1-EGSP:1427	0.08	2.80	0.606	0.004	2.3	4.6
NY#1-EGSP:1477	2.35	2.84	2.663	0.487	7.7	20.2
NY#1-EGSP:1527	11.89	2.92	2.829	2.624	4.9	21.5
NY#1-EGSP:1577	0.06	2.85	0.977	0.004	6.3	7.4
NY#1-EGSP:1628	1.73	2.92	2.823	0.381	8.1	21.5
NY#1-EGSP:1678	2.04	2.99	3.252	0.516	8.7	24.7
* NY#1-EGSP:1728	0.62	2.89	1.980	0.095	7.8	15.0
NY#1-EGSP:1778	28.78	2.88	2.910	6.534	6.7	22.1
NY#1-EGSP:1829	1.97	2.83	1.872	0.366	3.9	18.1
NY#1-EGSP:1891	7.99	2.98	3.563	2.222	8.4	27.1
NY#1-EGSP:1941	3.07	2.89	2.014	0.482	5.2	15.3
NY#1-EGSP:1990	0.76	3.04	3.658	0.217	11.7	27.8
NY#1-EGSP:2040	0.67	2.86	2.207	0.115	5.6	16.8
NY#1-EGSP:2092	5.36	2.90	2.217	0.928	7.8	16.9
NY#1-EGSP:2142	13.27	2.84	2.566	2.656	3.0	19.5
NY#1-EGSP:2192	6.60	2.95	3.952	2.036	10.6	30.0
NY#1-EGSP:2245	13.53	2.90	2.764	2.917	5.8	21.0
NY#1-EGSP:2295	6.05	2.82	2.035	0.960	5.9	15.5
NY#1-EGSP:2345	3.56	2.97	2.936	0.816	7.8	22.3
NY#1-EGSP:2491	10.69	2.88	1.966	1.640	4.5	15.0

Table II (cont)

WELL ID	DIF CONST METHANE CM^2/S *E7	DENSITY HELIUM G/CM^3	NET CH4 SORPTION TORR^-1 *E4	PERM DARCIES *E9	APP POROSITY HELIUM %	APP POROSITY METHANE %
NY#1-EGSP:2541	2.42	2.77	1.041	0.356	6.4	14.4
NY#1-EGSP:2591	25.74	2.84	2.861	5.748	6.8	21.8
NY#1-EGSP:2641	7.94	2.89	3.516	2.176	14.7	26.7
NY#1-EGSP:2893	0.82	2.74	5.589	0.359	12.7	42.5
NY#1-EGSP:2733	3.70	2.79	4.001	1.155	21.6	30.4
NY#1-EGSP:2783	34.06	2.80	2.704	7.189	3.6	20.6
OH#2-EGSP:3544	*****	2.70	0.910	*****	0.2	7.1
*PA#1-EGSP:4597	7.44	2.67	4.608	2.673	3.0	35.0
*PA#1-EGSP:4699	1.01	2.82	1.684	0.132	4.8	12.8
*PA#1-EGSP:4799	11.65	2.89	2.420	2.200	7.2	18.4
*PA#1-EGSP:4899	1.64	2.95	3.665	0.468	9.4	27.9
PA#1-EGSP:4949	0.81	2.84	1.994	0.126	5.2	15.2
*PA#1-EGSP:5053	10.97	2.83	3.232	2.767	6.7	24.6
ROMIG:570	0.09	2.80	1.926	0.018	4.1	18.7
ROMIG:571	0.36	2.96	3.727	0.129	7.1	35.4
ROMIG:684	3087.93	2.59	9.152	2434.340	7.3	76.8
ROMIG:704	60.85	***	10.934	51.876	*****	83.1
WU#5-EGSP:2723	2.60	2.56	1.684	0.419	2.9	15.7
WU#5-EGSP:2823	12.45	2.89	2.372	3.114	6.4	24.4
WU#5-EGSP:2935	2.51	2.58	2.879	0.672	4.2	26.0
WU#5-EGSP:3030	11.17	2.48	1.852	1.834	1.9	16.0
WU#5-EGSP:3035	32.04	2.84	2.289	7.854	6.5	23.9
WU#5-EGSP:3135	7.50	2.97	2.843	2.457	10.3	31.9
WU#5-EGSP:3235	46.94	2.77	3.137	13.103	3.4	27.2
WU#5-EGSP:3305	4.26	2.80	1.860	0.851	5.3	19.5
WU#5-EGSP:3335	1.66	2.54	1.552	0.274	4.3	16.1
WU#5-EGSP:3355	1.26	2.43	4.127	0.444	2.9	34.3
WU#5-EGSP:6142	9.39	2.82	3.425	2.508	7.3	26.0

Table II (cont)

WELL ID	DIF CONST METHANE CM ² /S *E7	DENSITY HELIUM G/CM ³	NET CH4 SORPTION TORR ⁻¹ *E4	PERM DARCIES *E9	APP POROSITY HELIUM %	APP POROSITY METHANE %
WU#6-MERC-1X:7215	9.63	2.79	2.289	2.407	7.0	24.4
WU#6-MERC-1X:7267	12.00	2.78	7.522	7.501	3.8	60.9
WU#6-MERC-1X:7316	12.50	2.86	5.199	6.076	7.9	47.4
WU#6-MERC-1X:7369	21.91	2.77	15.166	27.539	7.2	122.5
WU#6-MERC-1X:7421	13.82	2.65	28.792	31.731	4.9	223.7
WU#6-MERC-1X:7474	5.51	2.72	9.775	4.644	7.9	82.2
WU#7-EGSP:6192	2.23	2.85	3.724	0.647	7.4	28.3
WU#7-EGSP:6242	12.11	2.86	4.558	4.307	6.6	34.7
WU#7-EGSP:6342	7.01	3.00	3.472	1.898	9.7	26.4
WU#7-EGSP:6464	6.81	2.87	2.882	1.531	9.0	21.9
WU#7-EGSP:6566	22.44	2.84	3.771	6.603	7.8	28.7
EGSP-WU#7:6516	15.20	2.77	1.002	1.188	0.3	7.6
EGSP-WU#7:6621	22.18	2.69	10.751	18.610	7.2	81.8
WARN:1517	1.47	2.84	1.921	0.309	6.0	20.6
WARN:2630	11.38	2.53	1.048	0.975	0.4	8.4
WARN:2660	2.56	2.61	2.157	0.619	7.2	23.5
WARN:2675	77.48	2.74	1.436	10.448	2.2	13.1
20336:2449	4.51	2.49	1.480	0.651	2.8	14.1
20336:2459	4.13	2.58	1.619	0.731	4.9	17.2
20336:2539	1.49	2.91	2.944	0.476	8.8	31.2
20336:2579	5.44	2.77	4.015	1.952	4.5	35.0
20336:2629	19.08	2.91	2.872	5.955	8.6	30.4
20336:2873	7.17	2.80	1.802	1.427	5.7	19.4
20336:3029	5.39	2.55	1.081	0.573	2.2	10.4
20336:3129	0.69	2.80	1.759	0.133	5.3	18.7
20336:3139	0.05	2.94	1.902	0.014	10.1	24.6
20336:3349	11.60	2.67	2.460	2.740	4.3	23.0
20338:4921	14.07	2.67	5.820	6.949	3.9	48.1

Table II (cont)

WELL ID	DIF CONST METHANE CM^2/S *E7	DENSITY HELIUM G/CM^3	NET CH4 SORPTION TORR^-1 *E4	PERM DARCIES *E9	APP POROSITY HELIUM %	APP POROSITY METHANE %
20338-4971	28.04	2.79	3.033	7.621	3.4	26.5
20338-5221	1.38	2.81	1.247	0.194	4.2	13.7
20338-5451	7.15	2.66	18.071	10.394	4.3	141.6
20403-2756.3	9.52	2.85	2.483	1.844	2.8	18.9
20403-2836.2	45.79	2.79	3.398	13.238	2.3	28.2
20403-2846.1	1.49	3.09	1.330	0.366	13.9	24.0
20403-2866.3	29.34	2.83	3.120	8.539	4.7	28.4
20403-2876.1	46.47	2.77	2.966	11.967	2.6	25.1
20403-2876.3	53.55	2.82	3.781	17.254	2.7	31.4
20403-2886.1	8.83	2.80	2.673	2.273	4.8	25.1
20403-2896.1	10.83	2.76	0.609	0.822	2.8	7.4
20403-2906.1	8.08	2.79	2.304	1.689	2.9	20.4
20403-2916.1	2.35	2.70	1.033	0.200	0.5	8.3
20403-2916.3	24.40	2.81	1.564	3.980	4.0	15.9
20403-2926.1	14.47	2.81	2.616	3.318	2.5	22.4
20403-2936.1	14.46	****	2.911	3.281	*****	22.1
20403-2946.1	22.75	2.83	2.237	4.700	3.1	20.1
20403-2946.3	17.22	2.92	2.593	4.607	6.4	26.1
20403-2976.1	25.17	2.86	2.842	7.175	6.2	27.8
20403-2996.1	4.93	2.65	1.590	0.664	1.0	13.1
20403-3006.1	63.42	****	1.633	8.060	*****	12.4
20403-3016.1	38.42	****	0.776	2.324	*****	5.9
20403-3016.3	19.29	2.82	1.727	3.998	7.1	20.2
20403-3026.1	11.73	2.69	1.102	1.095	0.7	9.1
20403-3026.3	4.50	2.78	1.578	0.770	4.7	16.7
20403-3036.1	84.97	2.89	1.946	173.300	5.1	19.9
20403-3046.1	14.35	2.80	2.195	2.869	2.8	19.5
20403-3046.3	38.09	2.74	2.187	7.486	2.5	19.2
20403-3056.1	33.97	2.79	2.300	6.730	1.8	19.3
20403-3056.1	19.51	2.80	1.890	3.758	4.4	18.8
20403-3066.3	7.63	2.76	2.126	1.765	6.4	22.5
20403-3076.1	28.45	2.78	1.359	4.113	3.8	14.1

Table II (cont)

WELL ID	DIF CONST METHANE CM ² /S *E7	DENSITY HELIUM G/CM ³	NET CH4 SORPTION TORR ⁻¹ *E4	PERM DARCIES *E9	APP POROSITY HELIUM %	APP POROSITY METHANE %
20403-3086.1	8.04	2.86	2.231	1.858	5.6	22.5
20403-3116.3	4.54	2.77	2.764	1.266	6.2	27.2
20403-3126.3	25.93	2.89	3.044	8.928	10.4	33.6
20403-3186.3	3.51	2.71	0.920	0.341	2.5	9.5
20403-3201.3	296.77	****	1.837	42.517	*****	14.0
20403-3211.3	10.61	2.84	2.496	2.664	5.5	24.5
20403-3241.3	26.59	2.75	3.412	7.554	1.8	27.7
20403-3251.3	27.20	2.73	2.330	5.807	3.1	20.8
20403-3291.3	28.60	2.94	2.746	8.403	7.8	28.6
20403-3301.3	26.74	2.89	3.737	7.799	4.7	28.4
20403-3311.3	1.99	2.77	0.960	0.240	4.4	11.7
20403-3321.3	8.81	2.69	1.022	0.822	1.3	9.1
20403-3376.3	15.88	2.90	3.359	4.163	9.4	25.5
20403-3436.1	0.71	2.67	4.717	0.259	10.4	35.9
20403-3476.3	1.92	2.68	0.674	0.180	4.0	9.2
20403-3506.3	37.27	2.81	1.229	6.077	6.6	15.9
20403-3526.3	0.63	2.70	2.210	0.108	7.6	16.8
20403-3546.3	2.08	2.65	1.607	0.260	2.4	12.2
20403-3556.3	18.03	2.87	1.989	4.010	6.6	21.7
20403-3616.3	12.87	2.85	1.057	1.838	5.9	13.9
20403-3656.3	0.10	2.82	1.722	0.019	5.3	18.4
20403-3666.3	0.14	2.83	1.826	0.027	4.2	18.1
20403-3676.3	4.69	2.88	1.800	1.017	7.4	21.1
20403-3686.3	11.57	2.74	1.920	2.111	3.2	17.8
20403-3756.1	0.80	2.45	8.856	0.550	5.0	67.3
20403-3786.1	0.04	3.04	3.349	0.011	9.0	25.5
20403-3796.3	0.04	2.80	2.241	0.009	4.7	21.7
20403-3816.3	0.20	2.92	1.708	0.031	1.7	14.7
20403-3876.3	0.39	2.82	1.570	0.063	3.7	15.7
20403-3946.1	2.64	2.74	1.222	0.477	8.3	17.6
20403-3976.3	3.37	2.55	0.578	0.208	1.6	6.0

Table II (cont)

GAS CHROMATOGRAPHIC ANALYSIS OF OFF-GASSING

FROM WELLS OH#4, #5, #6, #7

Dale L. Wampler

Juniata College
Huntingdon, Pennsylvania 16652

GAS CHROMATOGRAPHIC ANALYSIS OF OFF-GASSING

FROM WELLS OH#4, #5, #6, #7

Chromatographic analysis and subsequent treatment of data is the same as has been previously reported.⁽¹⁾ The percent composition of the gas in the can with the sample, as determined by gas chromatography, is converted to the volume of gas off-gassed (STP) per unit volume of rock. The formula of conversion is

$$V_i = 0.916 \frac{V_C}{R_R} (PX_i - X_i^0)$$

where

- V_i -- the computed volume of gas per volume of rock for component i.
0.916 -- converts gas volumes to standard temperature (0°C)
 V_R -- the volume of rock (estimated by $(W - W_C)/2.55$)
 V_C -- free volume in can (Volume of empty can - V_R)
 P -- pressure (atm)
 X_i -- fraction of gas which is component i as determined by GC
 X_i^0 -- fraction of component i in air (i.e., 0.78 for nitrogen and etc.)

The results are shown in the accompanying table. Some oxygen take-up of the sample from the atmosphere originally canned occurred as has been noted previously. In addition some samples showed an uptake of N_2 . Most samples showed a compensating off-gas of methane and ethane.

Bibliography

1. L. Hoeflich, E. Jensen, D. Wampler, P. Schettler, "Analysis of Hydrocarbon Gases From Cores of Well #20403, Lincoln County, West Virginia," Progress Report #1, ORO-5197-1, under USERDA Contract No. E(40-1)5197.

TABLE I

VOLUMES OF GAS DESORBED PER VOLUME OF SHALE

SAMPLE ID	W(G)	P(ATM)	V(CH ₄)	V(C ₂ H ₆)	V(C ₃ H ₈)	V(CO ₂)	V(N ₂)	V(O ₂)
OH#4-EGSP:513	1005	0.999	0.069	0.000	0.004	0.057	0.102	-.227
OH#4-EGSP:563	1336	1.013	0.236	0.033	0.000	0.000	-.087	-.161
OH#4-EGSP:751	1858	1.000	0.315	0.047	0.024	0.000	-.197	-.189
OH#4-EGSP:801	1552	1.000	0.445	0.056	0.000	0.000	-.287	-.215
OH#4-EGSP:851	1238	0.997	0.409	0.053	0.000	0.000	-.284	-.184
OH#4-EGSP:965	1231	1.000	0.040	0.000	0.000	0.000	0.039	-.079
OH#4-EGSP:1075	1245	1.003	0.045	0.000	0.000	0.000	0.069	-.108
OH#4-EGSP:1135	1247	1.000	0.289	0.062	0.023	0.000	-.180	-.194
OH#4-EGSP:1185	1556	1.000	0.489	0.061	0.020	0.000	-.381	-.188
OH#4-EGSP:1315	970	1.001	0.309	0.075	0.000	0.000	-.193	-.187
OH#4-EGSP:1365	1128	0.999	0.172	0.043	0.000	0.000	-.143	-.076
OH#5-EGSP:429	1636	0.999	0.017	0.000	0.000	0.058	0.051	-.128
OH#5-EGSP:479	1727	0.999	0.049	0.000	0.000	0.080	0.050	-.181
OH#5-EGSP:529	1301	0.999	0.035	0.000	0.000	0.084	0.073	-.194
OH#5-EGSP:579	1604	0.998	0.251	0.036	0.004	0.000	-.042	-.250
OH#5-EGSP:629	1170	1.000	0.183	0.033	0.000	0.076	-.079	-.213
OH#5-EGSP:679	1154	1.007	0.298	0.055	0.000	0.106	-.094	-.352
OH#5-EGSP:729	1120	1.266	0.857	0.163	0.066	0.000	-.086	-.441
OH#5-EGSP:779	697	0.999	0.475	0.070	0.000	0.008	-.231	-.310
OH#5-EGSP:829	1288	1.167	0.577	0.064	0.000	0.000	-.170	-.186
#5-EGSP:879	1272	1.349	1.144	0.122	0.030	0.000	-.325	-.365
#5-EGSP:929	1212	1.211	0.755	0.075	0.000	0.000	-.190	-.246
OH#5-EGSP:979	822	0.992	0.058	0.000	0.000	0.000	0.031	-.120
OH#5-EGSP:1029	814	1.573	1.921	0.514	0.226	0.000	-.128	-.679
OH#5-EGSP:1079	1252	1.235	0.800	0.091	0.000	0.000	-.237	-.236
OH#5-EGSP:1128	1175	1.002	0.625	0.124	0.043	0.000	-.378	-.411
OH#5-EGSP:1178	1173	0.889	0.069	0.029	0.000	0.000	-.098	-.218
OH#5-EGSP:1228	1233	1.015	0.099	0.030	0.000	0.000	-.021	-.081
OH#5-EGSP:1278	1236	1.188	0.450	0.093	0.000	0.000	-.020	-.182
OH#6-EGSP:1728	720	1.046	0.855	0.075	0.000	0.000	-.429	-.330
OH#6-EGSP:1830	916	0.998	0.000	0.000	0.000	0.000	0.082	-.086
OH#6-EGSP:1893	990	1.014	0.000	0.000	0.000	0.000	0.091	-.056
OH#6-EGSP:1496	851	0.995	0.000	0.000	0.000	0.000	0.055	-.070
OH#6-EGSP:1993	760	1.081	0.425	0.000	0.000	0.000	-.016	-.123
OH#6-EGSP:2010	1396	1.000	0.483	0.039	0.000	0.000	-.350	-.171
OH#6-EGSP:2043	894	1.002	0.043	0.000	0.000	0.000	0.035	-.072
OH#6-EGSP:2093	629	1.005	0.000	0.000	0.000	0.000	0.146	-.126
OH#6-EGSP:2143	1003	1.007	0.035	0.000	0.000	0.051	0.002	-.071
OH#6-EGSP:2192	652	1.044	0.147	0.187	0.000	0.000	-.033	-.113
OH#6-EGSP:2193	941	1.015	0.196	0.071	0.000	0.099	0.017	-.342
OH#6-EGSP:2243	1059	1.116	0.385	0.077	0.228	0.000	0.006	-.205
OH#6-EGSP:2243	1048	1.064	0.176	0.103	0.000	0.000	-.054	-.077
OH#6-EGSP:2296	753	1.100	0.461	0.196	0.000	0.000	-.124	-.177
OH#6-EGSP:2310	784	1.258	1.047	0.225	0.000	0.171	-.144	-.423
#6-EGSP:2343	855	1.040	0.137	0.000	0.000	0.000	0.105	-.121
#6-EGSP:2348	688	1.010	0.112	0.000	0.000	0.000	0.089	-.161
OH#6-EGSP:2441	779	1.000	0.099	0.000	0.000	0.000	0.002	-.100
OH#6-EGSP:2452	802	1.003	0.491	0.145	0.000	0.000	-.368	-.259

TABLE I

VOLUMES OF GAS DESORBED PER VOLUME OF SHALE

SAMPLE ID	W(G)	P(ATM)	V(CH ₄)	V(C ₂ H ₆)	V(C ₃ H ₈)	V(CO ₂)	V(N ₂)	V(O ₂)
OH#6-EGSP:2475	806	1.043	0.472	0.238	0.000	0.000	-.256	-.315
OH#6-EGSP:2493	679	1.011	0.119	0.193	0.000	0.000	-.136	-.131
OH#6-EGSP:2543	810	1.114	0.503	0.071	0.000	0.000	-.036	-.166
OH#6-EGSP:2593	939	1.064	0.252	0.000	0.000	0.000	0.024	-.106
OH#6-EGSP:2599	2158	1.000	0.330	0.040	0.011	0.000	-.244	-.136
OH#6-EGSP:2643	836	1.030	0.014	0.000	0.000	0.000	0.125	-.044
OH#6-EGSP:	857	1.025	0.192	0.000	0.000	0.000	0.002	-.119
OH#7-EGSP:1531	1462	0.886	0.047	0.000	0.000	0.025	-.011	-.221
OH#7-EGSP:1580	1390	0.994	0.467	0.053	0.000	0.000	-.307	-.207
OH#7-EGSP:1631	1233	0.777	0.336	0.046	0.000	0.000	-.543	-.245
OH#7-EGSP:1682	1406	0.993	0.192	0.036	0.000	0.048	-.054	-.232
OH#7-EGSP:1730	1508	0.988	0.209	0.053	0.000	0.000	-.159	-.119
OH#7-EGSP:1780	1449	1.030	0.561	0.083	0.020	0.000	-.404	-.218
OH#7-EGSP:1830	1896	0.990	0.321	0.049	0.013	0.000	-.250	-.145
OH#7-EGSP:1880	1648	1.127	0.328	0.066	0.000	0.000	-.137	-.113
OH#7-EGSP:1930	1578	1.091	0.367	0.049	0.015	0.000	-.168	-.152
OH#7-EGSP:1980	1474	0.996	0.322	0.069	0.034	0.000	-.226	-.205
OH#7-EGSP:2030	1249	1.223	0.557	0.106	0.054	0.000	-.025	-.294
OH#7-EGSP:2080	1268	1.045	0.355	0.049	0.000	0.000	-.189	-.136
OH#7-EGSP:2130	1045	1.116	0.542	0.088	0.000	0.000	-.185	-.175
OH#7-EGSP:2180	1281	1.017	0.166	0.038	0.000	0.079	-.015	-.239
OH#7-EGSP:2230	1463	0.963	0.009	0.000	0.000	0.000	-.021	-.039
OH#7-EGSP:2280	1836	0.991	0.029	0.000	0.000	0.000	0.014	-.051
OH#7-EGSP:2330	1336	0.979	0.056	0.000	0.000	0.000	0.001	-.090
OH#7-EGSP:2380	1578	0.990	0.138	0.046	0.029	0.063	-.044	-.245
OH#7-EGSP:2430	1210	1.000	0.500	0.132	0.066	0.000	-.391	-.307
OH#7-EGSP:2480	1242	0.987	0.147	0.047	0.000	0.000	-.065	-.152
OH#7-EGSP:2530	1192	1.012	0.827	0.176	0.075	0.000	-.728	-.327
OH#7-EGSP:2580	1176	0.996	0.625	0.174	0.084	0.000	-.601	-.291
OH#7-EGSP:2630	1427	0.994	0.155	0.043	0.000	0.000	-.091	-.117
OH#7-EGSP:2680	1549	1.132	0.721	0.156	0.067	0.000	-.549	-.228