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Name: _____

Section: _____

Date: _____

Petroleum Engineering 324 — Well Performance
Exercise Problem 07 — Material Balance Equation
Assigned: 11 February 2009 — Due: 13 February 2009 [to be submitted in class]

Assignment Coversheet

(This sheet must be included with your work submission)

Required Academic Integrity Statement: (Texas A&M University Policy Statement)

Academic Integrity Statement

All syllabi shall contain a section that states the Aggie Honor Code and refers the student to the Honor Council Rules and Procedures on the web.

Aggie Honor Code
"An Aggie does not lie, cheat, or steal or tolerate those who do."

Upon accepting admission to Texas A&M University, a student immediately assumes a commitment to uphold the Honor Code, to accept responsibility for learning and to follow the philosophy and rules of the Honor System. Students will be required to state their commitment on examinations, research papers, and other academic work. Ignorance of the rules does not exclude any member of the Texas A&M University community from the requirements or the processes of the Honor System. For additional information please visit: www.tamu.edu/aggiehonor/

On all course work, assignments, and examinations at Texas A&M University, the following Honor Pledge shall be preprinted and signed by the student:

"On my honor, as an Aggie,
I have neither given nor received unauthorized aid on this academic work."

Aggie Code of Honor:

An Aggie does not lie, cheat, or steal or tolerate those who do.

Required Academic Integrity Statement:

"*On my honor, as an Aggie, I have neither given nor received unauthorized aid on this academic work.*"

_____ (Print your name)

_____ (Your signature)

Coursework Copyright Statement: (Texas A&M University Policy Statement)

The handouts used in this course are copyrighted. By "handouts," this means all materials generated for this class, which include but are not limited to syllabi, quizzes, exams, lab problems, in-class materials, review sheets, and additional problem sets. Because these materials are copyrighted, you do not have the right to copy them, unless you are expressly granted permission.

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If you have any questions about plagiarism and/or copying, please consult the latest issue of the *Texas A&M University Student Rules*, under the section "Scholastic Dishonesty."

Zero Tolerance Policy:

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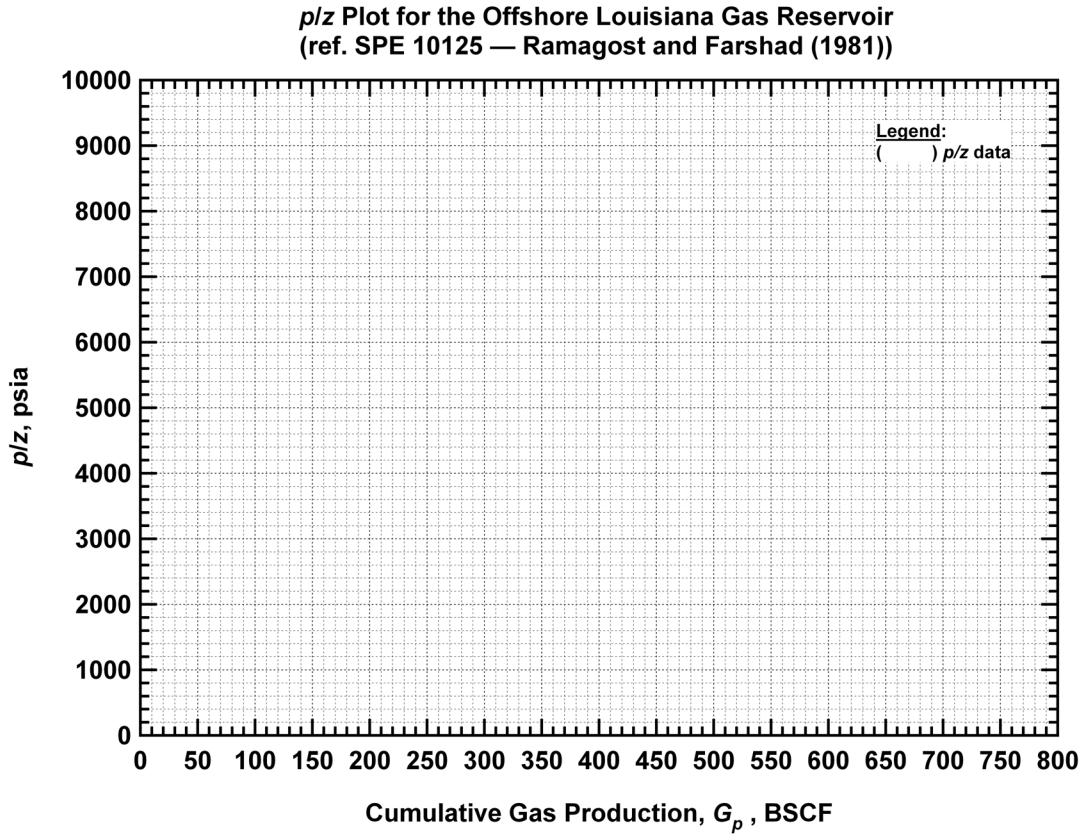
In this exercise problem you are to construct the *p/z* vs. G_p plot for the "Offshore Louisiana Gas Reservoir". You are to then estimate the gas-in-place, G, and comment on your analysis. You *MUST* show all trends and label all pertinent features. For reference *p/z* vs. G_p data is given on the next page.



Required:

Analysis of *p/z* versus G_p Performance

Theory: (Gas Material Balance Equations)

- Dry Gas Case: (No Influx)

$$\frac{\bar{p}}{\bar{z}} = \frac{p_i}{z_i}\left[1 - \frac{G_p}{G}\right]$$

- "High Pressure" Gas Material Balance Equation:

$$\frac{\bar{p}}{\bar{z}} = \frac{p_i}{z_i}\left[\frac{1}{1 - \bar{c}_e(p_i - \bar{p})}\right]\left[1 - \frac{G_p}{G}\right]$$

Tasks:

a. *Determine* the "apparent" gas-in-place (G_{app}) using the dry gas material balance equation, and
b. *Estimate* the original gas-in-place (G) using a "best guess" — but you must explain your "guess."

Ans. a. G_{app} = _____ BSCF

Ans. b. G = _____ BSCF

Comments/Observations:

_____

_____

_____

_____

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Given Data: (p/z vs. G_p)

point	G_p(BSCF)	p/z (psia)
1	0.00	7649.733
2	9.92	7422.809
3	28.62	7251.969
4	53.60	6957.143
5	77.67	6698.438
6	101.42	6427.642
7	120.36	6191.275
8	145.01	5933.276
9	160.63	5693.405
10	182.34	5375.461
11	197.73	5117.313
12	215.66	4840.271
13	235.74	4477.612
14	245.90	4220.648

Reference:

Ramagost, B.P. and Farshad, F.F. 1981. *p/z* Abnormal Pressured Gas Reservoirs. SPE paper 10125 presented at the SPE Annual Technical Conference and Exhibition, San Antonio, Texas. 05-07 October.

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