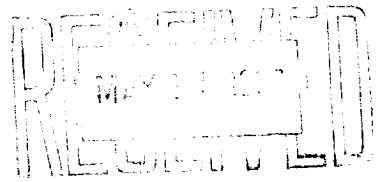


N. MEXICO OIL CONSERVATION COMMISSION

Santa Fe, New Mexico

MISCELLANEOUS REPORTS ON WELLS



Submit this report in triplicate to the Oil Conservation Commission or its proper agent within ten days after the work specified is completed. It should be signed and sworn to before a notary public for reports on beginning drilling operations, results of shooting well, results of test of casing shut-off, result of plugging of well, and other important operations, even though the work was witnessed by an agent of the Commission. Reports on minor operations need not be signed and sworn to before a notary public. See additional instructions in the Rules and Regulations of the Commission.

Indicate nature of report by checking below:

REPORT ON BEGINNING DRILLING OPERATIONS		REPORT ON REPAIRING WELL	
REPORT ON RESULT OF SHOOTING OR CHEMICAL TREATMENT OF WELL		REPORT ON PULLING OR OTHERWISE ALTERING CASING	
REPORT ON RESULT OF TEST OF CASING SHUT-OFF	10 3/4"	REPORT ON DEEPENING WELL	
REPORT ON RESULT OF PLUGGING OF WELL			

Hobbs, New Mexico May 7th 1937.

Place Date

OIL CONSERVATION COMMISSION, SANTA FE, NEW MEXICO.

Gentlemen:

Following is a report on the work done and the results obtained under the heading noted above at the Gulf Oil Corpn - Gypsy Divn. R. R. Bell "G" Well No. #2 in the SE/4 of Sec. 13, T. 30S, R. 36E., N. M. P. M., Monument Field, Lea. County.

The dates of this work were as follows: Cemented May 4 1937 - May 6th 1937.  
 Notice of intention to do the work was [~~was not~~] submitted on Form C-102 on May 5th 1937. 19\_\_\_\_  
 and approval of the proposed plan was [~~was not~~] obtained. (Cross out incorrect words.)

DETAILED ACCOUNT OF WORK DONE AND RESULTS OBTAINED

The plug was drilled and the hole bailed dry and let stand for one hour, the bailer reran and hole found to be dry and test OK, after approval of Mr Shepard State Oil & Gas inspector preparations were made to drill ahead.

DUPLICATE

Witnessed by C. L. Hoppe Gulf Foreman.  
R. S. Wiggins Clevenger Tool pusher.  
 Name Company Title

Subscribed and sworn before me this 8th day of May, 19 37  
[Signature]  
 Notary Public  
 My commission expires Feb 8 1941.

I hereby swear or affirm that the information given above is true and correct.  
 Name [Signature]  
 Position District Supt.  
 Representing Gulf Oil Corpn - Gypsy Divn.  
 Company or Operator  
 Address Hobbs, New Mexico

Remarks:

[Signature]  
 Name  
 Title

CR.

MAY 1937

PHYSICS 311: QUANTUM MECHANICS

Problem Set 10: Angular Momentum and Spin

1. Angular Momentum Commutation Relations

Let  $J_x, J_y, J_z$  be the components of the angular momentum operator. Show that  $[J_x, J_y] = i\hbar J_z$ .

2. Eigenvalues of  $J^2$  and  $J_z$

For a state  $|j, m\rangle$ , show that  $J^2 |j, m\rangle = \hbar^2 j(j+1) |j, m\rangle$  and  $J_z |j, m\rangle = \hbar m |j, m\rangle$ .

3. Raising and Lowering Operators

Define the raising and lowering operators  $J_{\pm} = J_x \pm iJ_y$ . Show that  $J_{\pm} |j, m\rangle \propto |j, m \pm 1\rangle$ .

4. Spin-1/2 Particles

For a spin-1/2 particle, the spin operators are  $S_i = \frac{\hbar}{2} \sigma_i$ , where  $\sigma_i$  are the Pauli matrices.

5. Addition of Angular Momenta

Two particles with angular momenta  $J_1$  and  $J_2$  are combined. Find the possible values of the total angular momentum  $J$ .

6. Spin-orbit Coupling

Consider the spin-orbit interaction  $H_{SO} = \lambda \mathbf{L} \cdot \mathbf{S}$ . Find the energy splitting of a state with  $l=1$ .

7. Parity and Angular Momentum

Under a parity transformation, the angular momentum operator  $\mathbf{J}$  is invariant, while the position vector  $\mathbf{r}$  changes sign.

8. Addition of Spin and Orbital Angular Momentum

For a particle with spin  $s=1/2$  and orbital angular momentum  $l=1$ , find the possible values of the total angular momentum  $j$ .