

NEW 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	<input checked="" type="checkbox"/>	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		REPORT ON DEEPENING WELL	
REPORT ON RESULT OF PLUGGING OF WELL			

Hobbs, New Mexico
Place

6/8/36
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 _____

Tide Water Oil Company State F Well No. 2 in the
Company or Operator Lease
NW 1/4 of Sec. 20, T. 19-S, R. 37-E, N. M. P. M.,
MOOREHEAD Field, Lea County.

The dates of this work were as follows: 6/8/36

Notice of intention to do the work was [~~XXXXX~~] submitted on Form C-101 on 5/27/36 19____
and approval of the proposed plan was [~~XXXXX~~] obtained. (Cross out incorrect words.)

DETAILED ACCOUNT OF WORK DONE AND RESULTS OBTAINED

Spudded 6/8/36

DUPLICATE

Witnessed by _____ Name _____ Company _____ Title _____

Subscribed and sworn to before me this 9
day of June, 1936
Petricia Mahoney
Notary Public
My Commission expires 10-24-39

I hereby swear or affirm that the information given above is true and correct.
Name F. Schneider - P. P.
Position Prod. Sup't
Representing Tide Water Oil Company
Company or Operator
Address Drawer KK Hobbs, New Mexico

Remarks:

APPROVED
[Signature]
Name _____
Oil & Gas Inspector Title _____

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PHYSICS 354: QUANTUM MECHANICS

Problem Set 10: Scattering Theory

1. Scattering by a Potential Well

Consider a particle of mass m and energy $E > 0$ incident from the left on a potential well of depth V_0 and width a .

(a) Write down the wave function in each region and apply the boundary conditions to find the reflection and transmission coefficients.

(b) Show that the transmission coefficient is given by

$$T = \frac{4k^2 \sin^2(ka)}{(k^2 - V_0)^2 + 4k^2 \sin^2(ka)}$$

where $k = \sqrt{2mE}$ and $\sin^2(ka) = \frac{V_0}{4E} \left(1 - \frac{V_0}{4E} \right)$.

(c) For a shallow well ($V_0 \ll E$), show that $T \approx \frac{4V_0^2 \sin^2(ka)}{E^2}$.

(d) For a deep well ($V_0 \gg E$), show that $T \approx \frac{4E \sin^2(ka)}{V_0^2}$.

(e) Show that the transmission coefficient is symmetric about $E = V_0/4$.

(f) Discuss the behavior of T as a function of E and V_0 .

2. Scattering by a Potential Barrier

Consider a particle of mass m and energy $E > 0$ incident from the left on a potential barrier of height V_0 and width a .

(a) Write down the wave function in each region and apply the boundary conditions to find the reflection and transmission coefficients.

(b) Show that the transmission coefficient is given by

$$T = \frac{4k_1 k_2 \sin^2(k_2 a)}{(k_1^2 + k_2^2)^2 + 4k_1 k_2 \sin^2(k_2 a)}$$

where $k_1 = \sqrt{2mE}$ and $k_2 = \sqrt{2m(E - V_0)}$.

(c) For a thin barrier ($a \ll \lambda$), show that $T \approx \frac{16E(E - V_0)}{(E + V_0)^2}$.

(d) For a high barrier ($V_0 \gg E$), show that $T \approx \frac{16E^2 \exp(-2k_2 a)}{V_0^2}$.

(e) Show that the transmission coefficient is symmetric about $E = V_0/2$.

(f) Discuss the behavior of T as a function of E and V_0 .

3. Scattering by a Potential Step

Consider a particle of mass m and energy $E > 0$ incident from the left on a potential step of height V_0 .

(a) Write down the wave function in each region and apply the boundary conditions to find the reflection and transmission coefficients.

(b) Show that the reflection coefficient is given by $R = \left(\frac{k_1 - k_2}{k_1 + k_2} \right)^2$ and the transmission coefficient is $T = \frac{4k_1 k_2}{(k_1 + k_2)^2}$.

(c) For a small step ($V_0 \ll E$), show that $R \approx \left(\frac{V_0}{2E} \right)^2$ and $T \approx 1 - \left(\frac{V_0}{2E} \right)^2$.

(d) For a large step ($V_0 \gg E$), show that $R \approx 1 - \frac{4E}{V_0}$ and $T \approx \frac{4E}{V_0}$.

(e) Show that the reflection coefficient is symmetric about $E = V_0/2$.

(f) Discuss the behavior of R and T as a function of E and V_0 .

4. Scattering by a Potential Well (continued)

Consider a particle of mass m and energy $E > 0$ incident from the left on a potential well of depth V_0 and width a .

(a) Write down the wave function in each region and apply the boundary conditions to find the reflection and transmission coefficients.

(b) Show that the transmission coefficient is given by

$$T = \frac{4k^2 \sin^2(ka)}{(k^2 - V_0)^2 + 4k^2 \sin^2(ka)}$$

where $k = \sqrt{2mE}$ and $\sin^2(ka) = \frac{V_0}{4E} \left(1 - \frac{V_0}{4E} \right)$.

(c) For a shallow well ($V_0 \ll E$), show that $T \approx \frac{4V_0^2 \sin^2(ka)}{E^2}$.

(d) For a deep well ($V_0 \gg E$), show that $T \approx \frac{4E \sin^2(ka)}{V_0^2}$.