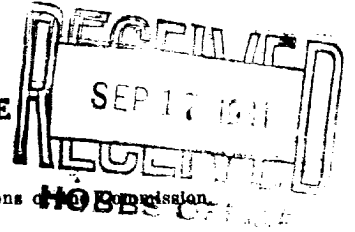


NEW MEXICO OIL CONSERVATION COMMISSION  
Santa Fe, New Mexico

REQUEST FOR PERMISSION TO CONNECT WITH PIPE LINE



THIS REQUEST SHOULD BE SUBMITTED IN TRIPLICATE. See instructions in the Rules and Regulations of the Commission.

**ARTESIA, NEW MEXICO - September 1, 1941**  
Place Date

OIL CONSERVATION COMMISSION,  
Santa Fe, New Mexico.

Gentlemen:

**CUNNINGHAM & PLOYHAR** State

Permission is requested to connect \_\_\_\_\_  
Company or Operator Lease

Wells No. **1** in **NW $\frac{1}{4}$ NW $\frac{1}{4}$**  of Sec. **30**, T. **17S**, R. **28E**, N. M. P. M.,

**Red Lakes** Field, **Eddy**

County, with the pipe line of the **Valley Refining Company** **Roswell, New Mexico**

Pipe Line Co. State Address

Status of land (State, Government or privately owned) \_\_\_\_\_

Location of tank battery **NW $\frac{1}{4}$ NW $\frac{1}{4}$  Sec. 30-17S-28E**

Description of tanks **1 - 250 bbl tank**

Logs of the above wells were filed with the Oil Conservation Commission \_\_\_\_\_ 19\_\_\_\_

All other requirements of the Commission have (have not) been complied with. (Cross out incorrect words.)

Additional information:

Yours truly,

**CUNNINGHAM & PLOYHAR**

Owner or Operator

By *Earl Ployhar*

**Partner**

Position **Artesia, N. M.**

Address \_\_\_\_\_

Permission is hereby granted to make pipe line connections requested above.

OIL CONSERVATION COMMISSION,

By *Roy Yarbrough*  
**JOHN M. KELLY**  
Title **State Geologist**

Secretary, Oil Conservation Commission

Date \_\_\_\_\_

PHYSICS 551: QUANTUM MECHANICS

1. Consider a particle of mass  $m$  moving in a one-dimensional potential  $V(x)$ . The wave function  $\psi(x,t)$  satisfies the Schrödinger equation

$$i\hbar \frac{\partial \psi}{\partial t} = -\frac{\hbar^2}{2m} \frac{\partial^2 \psi}{\partial x^2} + V(x)\psi$$

2. The probability density  $\rho(x,t)$  and the probability current  $j(x,t)$  are defined by

$$\rho(x,t) = \psi^* \psi$$

$$j(x,t) = \frac{\hbar}{2mi} (\psi^* \frac{\partial \psi}{\partial x} - \psi \frac{\partial \psi^*}{\partial x})$$

3. Show that the continuity equation is satisfied:

$$\frac{\partial \rho}{\partial t} + \frac{\partial j}{\partial x} = 0$$

4. For a stationary state  $\psi(x,t) = \psi(x)e^{-iEt/\hbar}$ , the probability density is independent of time.

5. The expectation value of the position  $\langle x \rangle$  is given by

$$\langle x \rangle = \int_{-\infty}^{\infty} x \rho(x,t) dx$$

6. For a stationary state,  $\langle x \rangle$  is constant in time.

7. The expectation value of the momentum  $\langle p \rangle$  is given by

$$\langle p \rangle = \int_{-\infty}^{\infty} \psi^* (-i\hbar \frac{\partial}{\partial x}) \psi dx$$

8. For a stationary state,  $\langle p \rangle$  is constant in time.

9. The expectation value of the energy  $\langle E \rangle$  is given by

$$\langle E \rangle = \int_{-\infty}^{\infty} \psi^* H \psi dx$$

10. For a stationary state,  $\langle E \rangle$  is constant in time.

11. The expectation value of the position  $\langle x \rangle$  for a wave packet is given by

$$\langle x \rangle = \int_{-\infty}^{\infty} x \rho(x,t) dx$$

12. The expectation value of the momentum  $\langle p \rangle$  for a wave packet is given by

$$\langle p \rangle = \int_{-\infty}^{\infty} \psi^* (-i\hbar \frac{\partial}{\partial x}) \psi dx$$

13. The expectation value of the energy  $\langle E \rangle$  for a wave packet is given by

$$\langle E \rangle = \int_{-\infty}^{\infty} \psi^* H \psi dx$$

14. The uncertainty in position  $\Delta x$  and the uncertainty in momentum  $\Delta p$  are given by

$$\Delta x = \sqrt{\langle x^2 \rangle - \langle x \rangle^2}$$

$$\Delta p = \sqrt{\langle p^2 \rangle - \langle p \rangle^2}$$

15. The Heisenberg uncertainty principle states that

$$\Delta x \Delta p \geq \frac{\hbar}{2}$$