RESOURCES ECONOMICS PRELIMINARY

EXAMINATION

May 30, 1980

The examination is for a four-hour period, 8:00 - 12:00. Pace yourself in responding to questions considering this four hour restriction, i.e., do not spend an undue amount of time on any specific question at the expense of the other questions. However, it is expected that you will address each question in some detail. Please put your social security number at the top of the page.

A. Answer each of the following three questions.

1. Suppose that we have an industry comprised of two profit maximizing firms, both of whom behave as if they were in a perfectly competitive market. Both firms are polluters, but one firm's pollution results from input usage, while the other firm's pollution results from output. Further assume the following functional characteristics:

$Y_1 = 4X_1^{\frac{1}{2}}$ Production function for Firm #1

$Y_2 = 2X_2^{\frac{1}{2}}$ Production function for Firm #2

$Y_m = Y_1 + Y_2$ Total production in the product market

$P = Y_m^{-\frac{1}{2}}$ Product demand

$r = 2$ = input price

$MEC_1 = X_1^{\frac{1}{2}}$ Marginal external cost for Firm 1

$MEC_2 = 2Y_2$ Marginal external cost for Firm 2

Given the above relationships, what is the socially optimal tax policy and tax rate to internalize the externalities? (Show your work. You do not have to carry out all the arithmetic, but make your numerical answers as concise as possible.)

2. What are the causes of market failure and what are the possible solutions to each? Include intertemporal issues. (Be complete in your response providing details).

3. It has commonly been argued that the supply curve for demersal fisheries is backward-bending. Explain the logic behind this argument. How does this result rest on the existence of a common property type resource, or does it? Is this supply curve for the fishery based upon the same type of logic used to derive a backward-bending labor supply curve? Why or why not?

B. From the following set of three questions, answer any one.

1. Suppose the U.S. Department of the Interior proposes to buy a 5,000 acre tract of Oklahoma prairie for a national park to protect several species of native plants that are found in no other part of the world. The area is now used mainly for wheat and cattle operations. Most of the land is owned by decendents of the original settlers of the Oklahoma Territory. How would you determine the socially optimal use of this land?

2. The Bureau of Reclamation has recently made a new ruling for an irrigation district using irrigation water from a reservoir. Previously there was an annual allotment for each acre based on available water and if not used was basically lost. Now an irrigation district by using less than the allotment (practicing conservation) in a specific year can accumulate water in the reservoir for a future time period. Another change is that the owner of acres with the priority on irrigation water (Priority A user) can sell the water to a lower priority user (Priority B user). What are the implications of this ruling, major issues and difficulties? Be specific and thorough in your answer. How would you evaluate the effects of this ruling?

3. What types of methods have been proposed for estimating the demand for environmental services? What are the strengths and weaknesses of each method?