Economics 431 Engelhardt and Wilcoxen
Public Economics Syracuse University

**Practice Final Exam**
Spring 2004

*The actual exam will be Thursday, May 6th from 10:15 am to 12:15 pm in Physics 104. The cover will have a list of instructions similar to the following:*

1. Write your SU ID NUMBER on your blue book. Please do NOT write your name.
2. Do not open this exam until you are told to do so.
3. Please turn off the ringer on your phone right now – before the exam begins.
4. Write on both sides of the bluebook pages.
5. SHOW ALL YOUR WORK. Numerical answers without supporting work will receive little or no credit.
6. Label all graphs, axes, curves, lines, points, etc., carefully.
7. Use economic reasoning.
8. Partial credit will be awarded for incomplete answers.
9. You have 120 minutes to work on the exam. There are 60 points possible; please budget your time accordingly.
10. Calculators may be used but may NOT be shared.
11. You may NOT use any of the following devices or technologies: cell phones, computers, personal digital assistants, or text messaging. Use of such devices or technologies on the exam will result in a failing grade.
12. This is a closed-book exam: you may NOT use any books or notes.
13. Please do your own work: collaboration of any kind on the exam is not allowed. Cheating will result, at a *minimum*, in a failing grade for the exam.

**Part 1 (10 points)**

(a) In a world without uncertainty, taxes and tradable permits would be equally efficient policies for dealing with an externality like pollution. In the real world, however, the costs and benefits of reducing pollution are seldom known with certainty. Explain in detail how this affects the choice between tax and permit policies.

(b) Suppose that the US Geological Survey has collected the information below about *discovered* deposits of a resource. It is also known that only 20% of the area where this resource might be found has been explored. The price of the resource is currently $25.

| Grade of ore | A | B | C | D | E | F |
|---|---|---|---|---|---|---|
| MEC ($) | 10 | 20 | 30 | 40 | 50 | 60 |
| Quantity (tons) | 100 | 200 | 300 | 500 | 700 | 900 |

Given this information, please calculate what the USGS would report as (1) proven reserves, (2) identified subeconomic reserves, (3) undiscovered economic reserves, and (4) undiscovered subeconomic reserves. (In other words, construct the four-cell USGS table for this data.) Be sure to explain how you calculated your numbers. Using this data, give examples of three specific events that would increase proven reserves by 100%.

**Part 2 (20 points)**

Consider a city dealing with a severe ozone problem. Ozone levels are initially uncontrolled and there are 100 units of it in the atmosphere. The ozone results from emissions at two sources, each of which is responsible for 50 units. Source 1 can abate its emissions at a marginal cost given by $MC1=2*Q1$, where $Q1$ is the amount of abatement it does. Source 2's marginal abatement cost is $MC2=4*Q2$. The marginal benefits of abating the ozone are believed to be given by a function of the form: $MB=A-B*Q$, where $A$ and $B$ are parameters and $Q$ is the total amount of abatement.

(a) A hedonic pricing study has been done on the value of improving air quality. The study reports that the marginal benefit for an improvement in air quality from the uncontrolled level would be $200. The authors also calculate that if the ozone level were reduced to 75 units, the marginal benefit of abatement would fall to $150. Determine the efficient level of abatement. How much should source 1 clean up? Source 2?

(b) Design a tradable permit policy that would achieve the efficient amount of abatement while spreading the overall cost equally between the two firms. How many permits would you distribute to each firm? What would the price of a permit be in equilibrium?

**Part 3 (15 points)**

Suppose you've been asked to determine the recreational and scenic value of a beach. At the moment, no admission fee is charged and 12,400 people visit the beach each day during the summer. A researcher has interviewed a sample of the visitors and concluded that they come from 4 geographic zones. He has collected the following information, where "Travel Cost" is the round-trip transportation cost of visiting the beach:

| Zone | Travel Cost | Pop. | Initial Visitors |
|---|---|---|---|
| A | $10 | 16,000 | 2,400 |
| B | $15 | 40,000 | 4,000 |
| C | $20 | 120,000 | 6,000 |
| D | $25 | 200,000 | 0 |
| Total | | | 12,400 |

(a) Using the travel cost method, calculate the number of people who would visit the beach if an admission fee of $5 were imposed.

(b) It is also known that the total number of visits to the park (including people from all zones) is given by an equation of the form: P=A-BQ, where P is the admission fee, Q is the number of visitors, and A and B are constants. Using this fact and the information above, calculate the daily value of the beach.

**Part 4 (15 points)**

Suppose that oil can be obtained from either a large underground reservoir or from a backstop technology. The quantity of oil in reservoir is know to be 120 units and the marginal cost of extracting it is constant at $20 per unit. Oil can be produced by the backstop method at a constant marginal cost of $40 per unit. Finally, suppose that we're interested in allocating the oil over 5 identical periods. Each period has a demand curve given by $P_i = 80 - Q_i$ and the interest rate is ... 0 (whew!).

(a) Find the efficient allocation of oil. What will be the price, quantity and marginal user cost in each period? When will the backstop be used?

(b) Suppose that the reservoir is *very* large in area and underlies property owned by many people. If ownership of oil is governed by the right of capture (whoever extracts it owns it), and it is too expensive to store once extracted, what will be the price and quantity of oil in each period? When will the backstop be used? Explain why this outcome is different from part (a). Is there a welfare gain or loss? Discuss.