

AAE / ECON / Env. St. 343
Environmental Economics

Homework #6
Due in class on Tuesday, November 18, 2008

Provide short answers to the 8 questions below. No required reading.

Suppose a new mineral is discovered by UW researchers named Buckyite. The total stock of Buckyite is 82 units and it is non-renewable. The inverse demand for Buckyite is described by $P=90-0.5Q$, where P is price and Q is quantity. The marginal extraction cost is equal to \$10 in every period and the discount rate is $r=0.1$.

1. What is the back-stop price for Buckyite?
2. If supply were not scarce, how much Buckyite would be produced in a given period?
3. Let T represent the time period in which Buckyite is completely depleted. According to the Hotelling rule, what must the price of Buckyite be in period $T-1$?
4. Calculate the entire Hotelling price path for Buckyite. What is the initial price and how many periods will it take to deplete Buckyite? Hint: after calculating the price at $T-1$, calculate marginal profit ($M\pi$) at $T-1$, Q at $T-1$, and the remaining stock at $T-1$. You can work backwards to the initial time period by setting up the following table:

Period	Price(t)	MEC	$M\pi(t)$	Demand ($Q(t)$)	Remaining Stock
T					
T-1					
...					
Initial T					

5. Suppose the discount rate increases to $r=0.22$. Intuitively, what do you expect to happen to the price path of Buckyite. Will the initial price be higher or lower? Will the stock be depleted more or less quickly?
6. Calculate approximately how many periods it will take to deplete Buckyite when $r=0.22$.

The following information applies to questions 7 and 8. Suppose we were to find out today of a tremendous breakthrough by researchers: they accomplish, for the first time in history, the process of cold fusion. This is the process of combining hydrogen nuclei to release energy. The researchers were able to accomplish this by using as a substrate –that is, as a necessary “facilitator” of the chemical process –the metal palladium. The common understanding among experts is that this discovery will lead to cheap, clean, abundant fuel, though moving cold fusion from the lab to commercial uses such as generating electricity and fueling automobiles **remains several years away**.

7. What, if any, is the effect of the breakthrough on the **current** price of the metal palladium? Explain.
8. What, if any, is the effect of the breakthrough on the **current** price of petroleum? Explain.