CWA

- quality < human consumption "potable"
  - fishable / boatable

- organic effluent
  - Volatile Organic Compounds
  - nitrates - detergents
    - fertilizer
    - pesticides
- ag runoff
- muni sewage
- heated water

- biochemical oxygen demand (BOD)
  - effluent → disolved oxygen

eutrophication - dead lake

- point source - identify source
  regulate source
  - toxic materials
- non-point source
  - shared responsibility

- receiving water (where pollution goes)
  quality / quantity affect regs
  re emissions
- Weyerhauser Co. v. Castle D.C. 1978
  discharge into Pacific Ocean
  "dilution is the solution to pollution"
  ruled against W.

- least cost avoider principle
  - if cost of cleaning effluent is less than cleaning water for use → clean up effluent
- penalties → damages - restore injured party
  → punitive - to make up for incomplete prosecution

EV Losses ($P_L \cdot \#L$)

EV Damage Award ↑ $\#L$ awards ($P_P \cdot P_L \cdot \#L$)

CAA

- NAAQS → offsets in non-attainment areas - market mechanism

Project 88 - Wirth (CO)
Heinz (PA)

Acid Rain Trading Program

SO_2, NO_x

H_2O
H_2SO_4
H_2SO_3

Midwest Powerplants
Harm: NY, VT, NH, ME
Canada (Quebec)

Emission Trading SO_2 - Crocker
- Dales

- heterogeneous producers of emissions

Low cost → High Cost of emission

- if set uniform standard - reduce by X% - HC spend a lot LC less

If allow trade HC buy emission rights
LC sell

Issue permits (emit 1 Ton of SO_2)
allow trade - CBOT

Area → NAAQS.

permits - site specific
- banked (risk reduction)

2 constraints - permit
- using permit does not allow exceeding NAAQS for region

3 firms

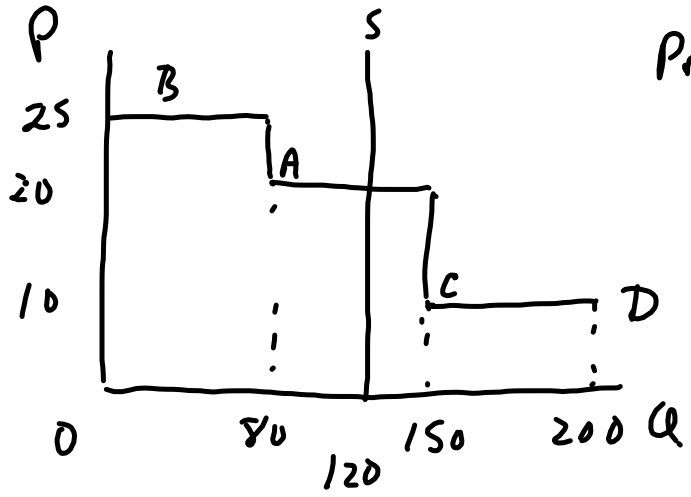
A $20/ton 70 tons
B $25/ton 80 tons
C $10/ton 50 tons

200

Std set at 120 - commandano trade

Cost A 30 · 20 - $600
B $0 . 25 - 1000
C 10 · 10 - 100

1700



Price of permit $20
C sells to B
$B_{WTP} = 25$
$C_{WTA} = 10$

B buy C's permits C gets $800
C pay $500 to abate
50 tons ↓ abate
at $10/ton

B save $40 \times \$5 = \$200$

Issues

- initial allocation level
  - how? - shares?
    - prior emissions?
- irreversible production choices
  - uncertainty re price of permits
- heterogeneity among firms trading.