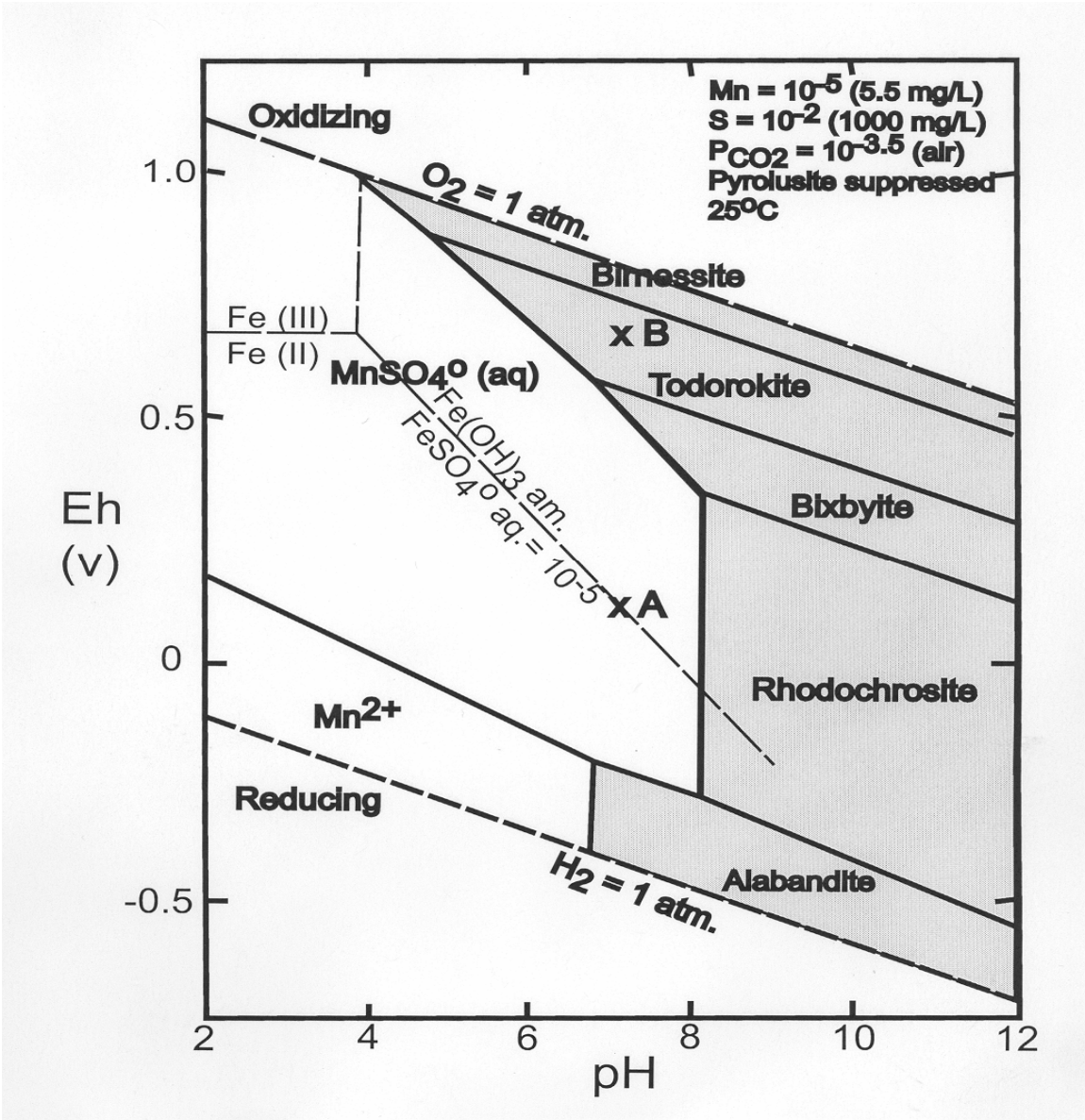
PASSIVE MANGANESE REMOVAL FROM ACID MINE DRAINAGE

- Regulations limit Mn to 2 mg/L in mine discharges.
- Most passive methods (wetlands, SAPS, ALD's) do not remove Mn.
- Active treatment usually requires pH 9-10 which exceeds pH limits.
- Mn can be removed passively by a limestone bed under some conditions.

Manganese Chemistry

- Mn^{2+} is soluble at pH <8
- Mn^{4+} is insoluble under strongly oxidizing conditions
- $Mn^{2+} + 0.5\ O_2 + H_2O = MnO_2 + 2\ H^+$
- Oxidation is slow, but is catalyzed by bacteria and by Mn oxide surfaces.

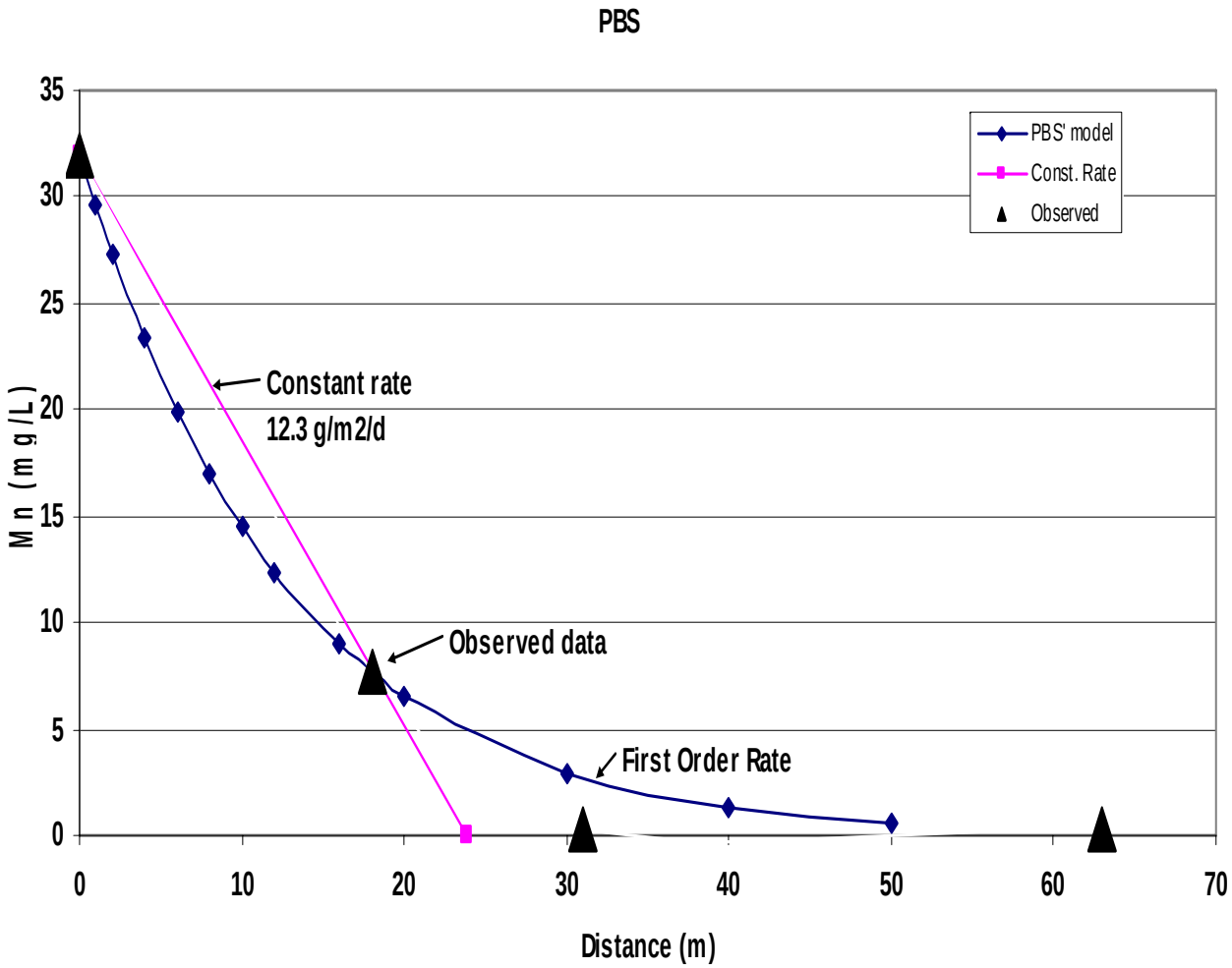
Eh-pH for Manganese



Passive treatment methods

- “Pyrolusite System” – A limestone bed inoculated with Mn-oxidizing bacteria.
- Actually, inoculation is not necessarily needed – “If conditions are right, they will find it”

Mn vs distance, PBS site



Requirements and Problems

- The pH must be above about 6.5
- All dissolved Fe must be removed first
- Many beds tend to plug with silt and leaves