# OSWER Monitored Natural Attenuation Directive 9200.4-17P

Major Differences between Interim Draft (12/97) and Final (4/99)

- Final explicitly states that directive does NOT address remediation of contaminated sediments, although many of the principles would apply (footnote #1)

- Final provides guidance on defining contaminant plumes:
  - defined for each contaminant of concern (footnote #2)
  - uncertainty in measuring plume boundaries should be considered in determining plume stability (footnote #19)

- Final strengthens language on remediation objectives—objective is *preventing* contamination migration rather than *minimizing* migration (footnote #5)

- Final explicitly defines source materials (footnote #6)

- Final adds radioactive decay to list of *in-situ* natural attenuation processes—the threat posed by radioactive contaminants due to external direct radiation exposure is clarified in footnote #12

- Final states that appropriate selection of MNA requires evaluation of all contaminants that represent an actual or potential threat to human health or the environment

- Final adds a section on "Cross-Media Transfer":
  - destruction of contaminants preferred over transfer to another media
  - where contaminants are transferred, a risk-assessment and long term monitoring of the affected media should be conducted

- Final expresses that remedial action decisions should include opportunities for public involvement to both educate and gather feedback from interested parties

- Final stresses requirement for data of known quality:
  - for environmental decision-making, data must be of adequate quality and usability for their intended purpose
  - the level of confidence on calculated attenuation rates should be documented—statistical confidence intervals should be estimated
  - sensitivity analyses should be performed to determine dependence of calculated remediation timeframes on uncertainties in rate constants and other factors

- Guidance provided on determining reasonable timeframe for achieving remediation objectives:
  - a reasonable timeframe is one that is comparable to that which could be achieve through active remediation
  - the most appropriate timeframe must be determined through analysis of all appropriate remedy alternatives
  - for restoration of groundwaters to beneficial uses, a comparison of restoration alternatives from most aggressive to passive is necessary to establish range of time required to achieve remediation objectives
  - a measured decrease in contaminant concentrations of at least one order of magnitude is necessary to determine appropriate rate law to describe rate of attenuation, and to

demonstrate that the estimated rate is statistically different from zero at a 95% level of condidence

- The Final recognizes that due to longer timeframe often associated with MNA remedies, there is a higher level of uncertainty—adequate performance monitoring and contingency remedies are important

- The Final states that performance monitoring should continue until remediation objectives have been achieved, *and longer if necessary*, to verify that the site no longer poses a threat to human health or the environment