MDL

- By far, the most commonly used procedure for determining detection limits
- CFR40 Part 136 Appendix B - Wastewater
- Also appears in many methods
- Not explicitly required, but almost always used, for SW-846 methods
- Used for drinking water methods "when detection limit is needed"
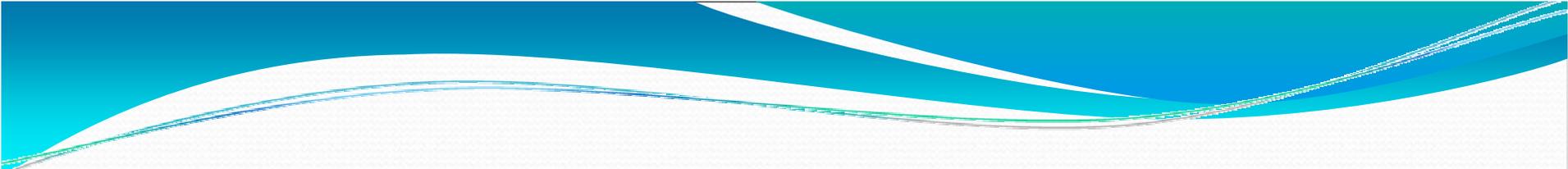
- At least 7 spiked reagent blanks at low level
- MDL = ts, where s is the standard deviation of the results from the spiked sample
- Calculated MDL must be in the range 0.1-1 x the spiking level

Theory of the MDL
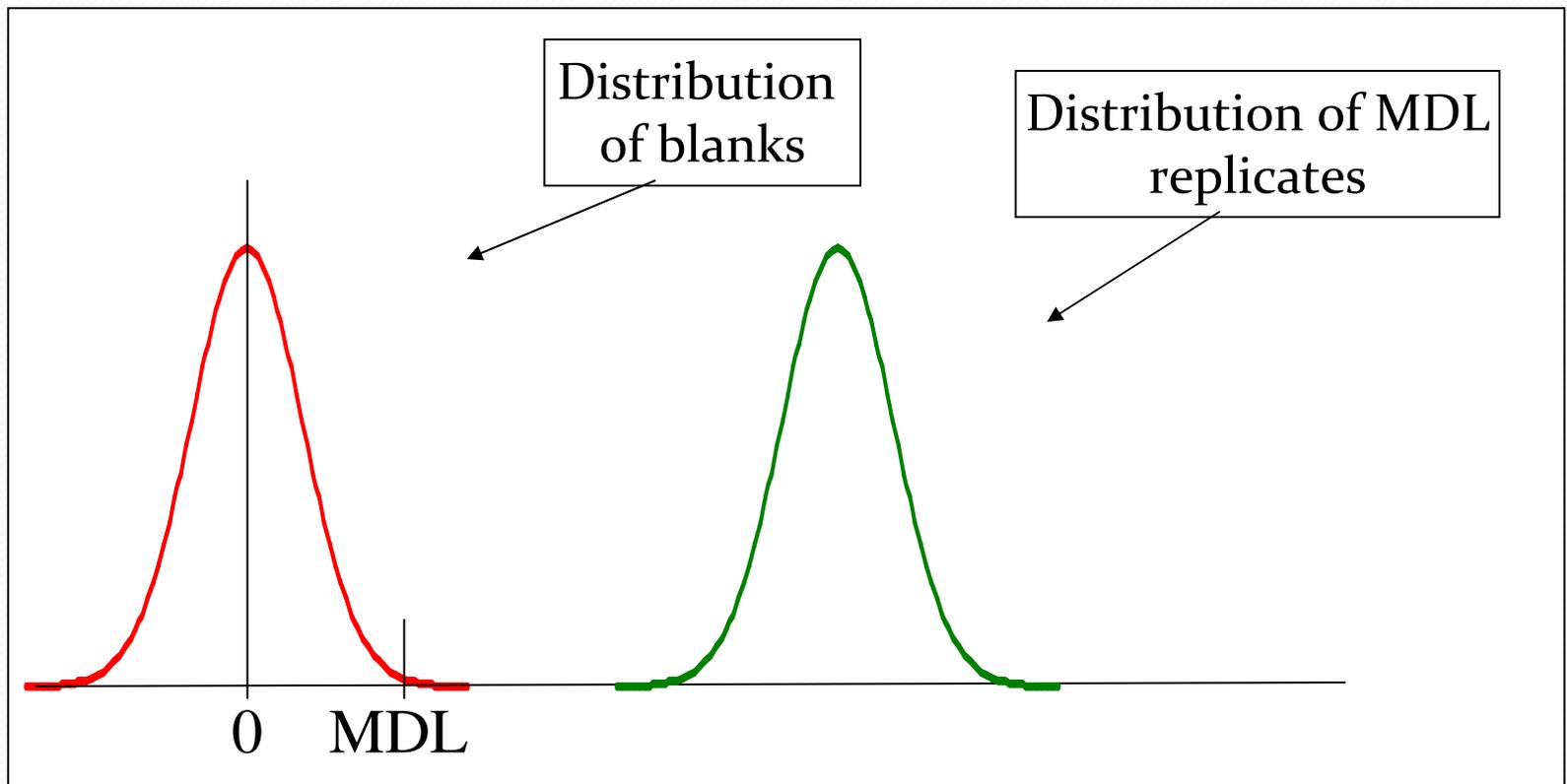
MDL basics

- Is the MDL L_C or L_D?
  - L_C = lowest result that can be distinguished from a blank with 99% confidence
  - L_D = lowest true concentration that will give a result above L_C with 99% confidence
- **Definition is ambiguous, but formula is clearly L_C**

Difficulties with the MDL

- Assumptions
  - Mean of blanks = Zero
  - Distribution of MDL replicates is representative of the distribution of the whole sample population
  - Variance between zero concentration and MDL spike concentration is constant
  - Qualitative identification criteria are met for results at or above the calculated MDL

MDL paradox

- Most generators and users of environmental data do not have confidence in the detection limit estimates generated by the MDL procedure

- ORCR have stated that they don't want anything to do with the MDL

- Some states and agencies have added requirements to attempt to improve confidence in the MDL
  - Texas DCS – Verification spike
  - DOD L_D – Verification spike
  - TNI – verification spike

- **But, everyone still uses the MDL**