

# Floodplain Soils

- **Available data**
  - covered last time
- **Uncertainties in data**
- **Reducing uncertainties**

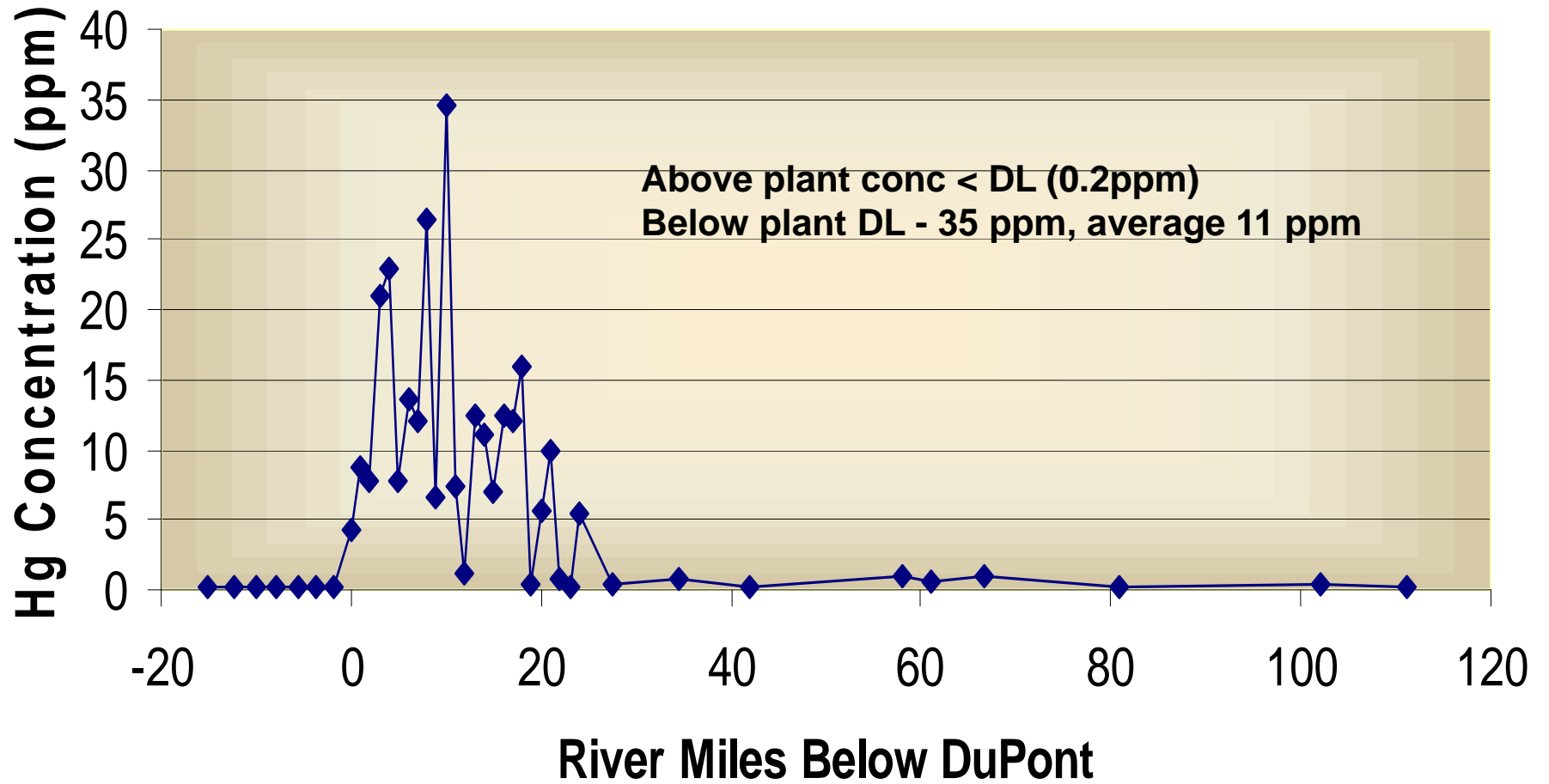
# Information Review

- **Mercury contamination of the South, South Fork Shenandoah and Shenandoah Rivers. State Water Control Board, Basic Data Bulletin 47, March 1980.**
- **Mercury contamination of the flood plains of the South and South Fork Shenandoah Rivers. Virginia State Water Control Board, Basic Data Bulletin 48, May 1981.**
- **Engineering feasibility study of rehabilitating the South River and South Fork Shenandoah River. Vol I., Lawler, Matusky & Skelly, 1981.**
- **Engineering feasibility study of rehabilitating the South River and South Fork Shenandoah River. Vol II., Lawler, Matusky & Skelly, 1982.**
- **Cooking, et al, 1991. Water, Air, and Soil Pollution 57-58: 159-170**
- **USEPA (1995) Guide to the Biosolids Risk Assessments for the EPA Part 503 Rule, EPA/832-B-93-005**
- **NAS (1996) Use of Reclaimed Water and Sludge in Food Production**

# State Water Control Board

- **Hg in soils discovered in 1976**
- **April 1977 - SWCB embarks on 4-part program to study river.**
  - **Sediment/soil, surface water, fish, algae**
- **June 1978 - Preliminary evaluation**
  - **12 samples in 100-yr floodplain, 3" deep, 40 ppm max conc**
  - **Estimates 57,000lbs of Hg in sediments / soils, 95% of which is in the above-bank flood plain**
  - **Compared to estimates of 10 gallons**
  - **Finds no other major sources of Hg than plant area**
- **Summer 1980 - More comprehensive evaluation**
  - **500-yr floodplain, 100-yr floodplain above and below plant**
  - **48 composite samples, 0.5 ft; 10 grab samples 1.0-1.25 ft**
  - **Estimates 82,000lbs,  $2 \times 10^8$  ft<sup>3</sup>, 25 miles of riverbank**

# Hg Concentration in Floodplain Soils Summer 1980



# Follow-up Activity

- **Additional sampling by LMS, 1981 on recommendation of SWCB**
  - Also follow-up to sampling by DuPont in 1977 (22 riverbank samples)
  - 5 new holes next to original, sampled to depth of 76'
  - Estimate revised 97,200 lbs (98%) in floodplain
  - Concludes that Hg in floodplain is stabilized
- **Virginia Dept of Agriculture**
  - Two letter reports 10/5/81 & 3/17/82
  - Analysis of livestock/poultry showed no contamination with Hg
  - Consistent with a study done by DuPont control animals and those exposed to pastures fertilized with sludge containing Hg
- **Virginia Dept of Health**

# Other Information

- **USEPA Biosolids “503” Rule**
  - Ceiling value of 57 ppm, based on direct ingestion by child
  - Hg as an example of “soil-plant barrier” - metals that sorb so strongly to soil (or plant roots) that they are not translocated, regardless of quantities in soil
- **James Madison Study**
  - Evaluation of terrestrial floodplain ecosystem, Waynesboro as example, growing seasons 1983-1985
  - Soil conc range 11- 84ppm, Average in test area 5 - 25 ppm
  - Hg widely distributed - found in greater levels in roots than leaves, detritus eaters than grazers
  - Flooding/river sediment an issue for terrestrial ecosystem

# Report Concludes

## ....Uncertainties

- Greater 90% of Hg believed to be in floodplain soils
  - Based on extrapolation ...how real is this?
  - What are representative levels in floodplain soils?
- Materials in floodplain are not available
  - Supported by properties of Hg
  - What about flood events?
  - Is there is unacceptable exposure to Hg in floodplain soils?

# Phased Approach to Reducing Uncertainty

- Is there unacceptable exposures to Hg from floodplain soils?
  - Develop exposure scenarios based on landuse
    - Identify potential exposure pathways
  - Definitive landuse survey for the area
    - Focus on South River
    - 100 & 500 year floodplain, magnitude of flooding
    - Agricultural vs residential activity
  - Follow up with JMU on status of previous ecological assessments.