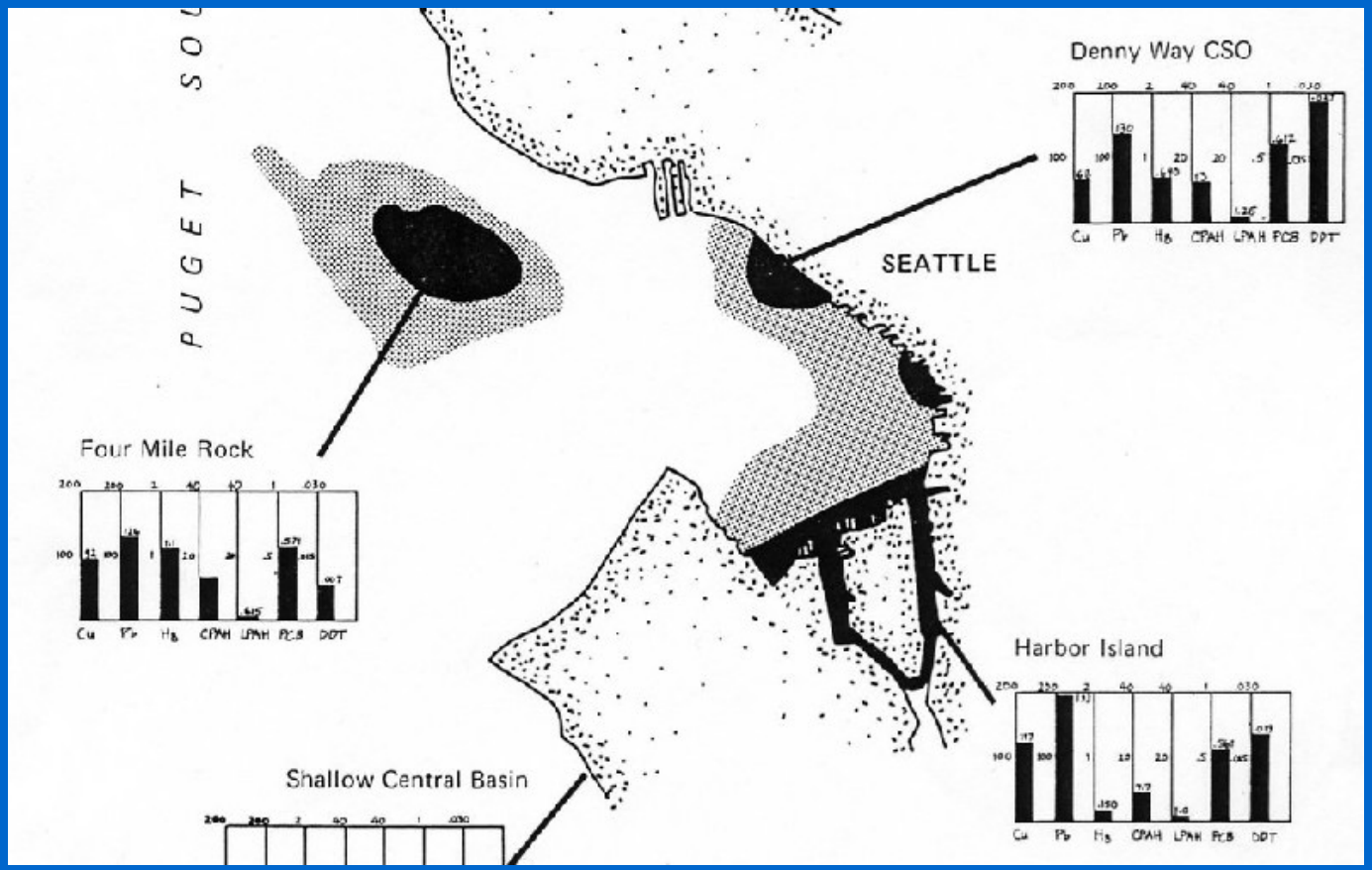
RESULTS OF TEN YEAR MONITORING PROGRAM AT PIER 53-55 SEDIMENT CAP ALONG SEATTLE WATERFRONT

CAP 54 WHERE ARE YOU ?

HOW HAVE YOU BEEN FOR THE PAST 10 YEARS ?

ARE YOU READY FOR COMPANY ?

Metro's Report in 1984 Showed Toxicant Problems In Elliott Bay



Metro Funding Treatment Plants Limited Funding For Cleanup

- Expensive Construction Projects
  - West Point plant to secondary treatment
  - Expansion at Renton plant
  - Move Renton discharge to Puget Sound

- Inexpensive Sediment Cleanup Projects
  - In-Place Sediment Cap at Denny Way CSO using clean sand US Army CORP dredged.

Elliott Bay/Duwamish Restoration Program (EB/DRP)

- 1990 Lawsuit by NOAA against Metro and City of Seattle
- Announced same day Metro started in-place capping at Denny Way CSO (March 1990)
- 1991 Settlement by Metro and City of Seattle for $ 24 Million

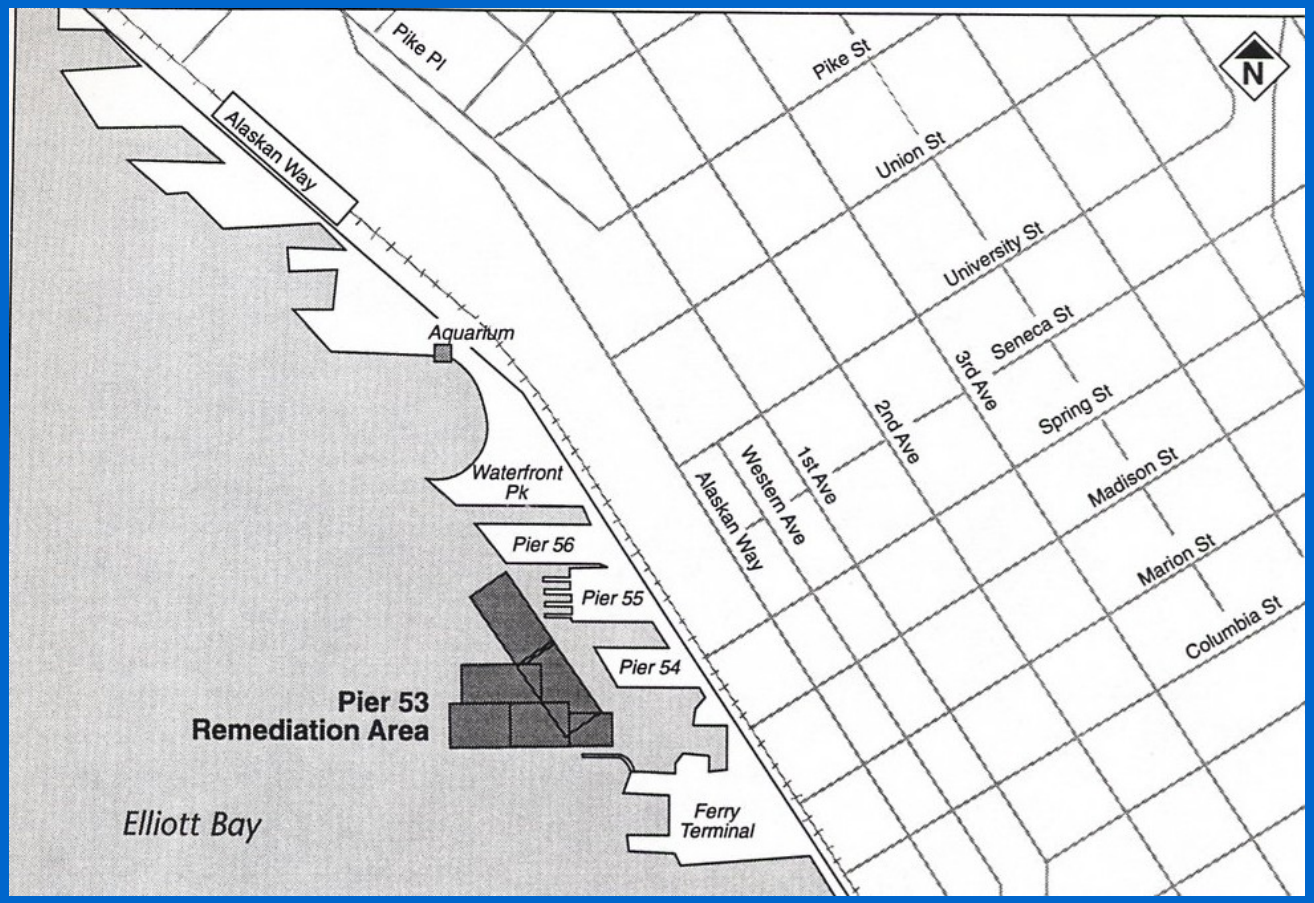
EB/DRP Provided Funds For Three Sediment Cleanup Projects

- $ 12 Million – SEDIMENT REMEDIATION – 3 Projects
- $ 2 Million – ADDED SOURCE CONTROL – 2 Basins
- $ 10 Million - HABATAT ENHANCEMENT – 6 Projects

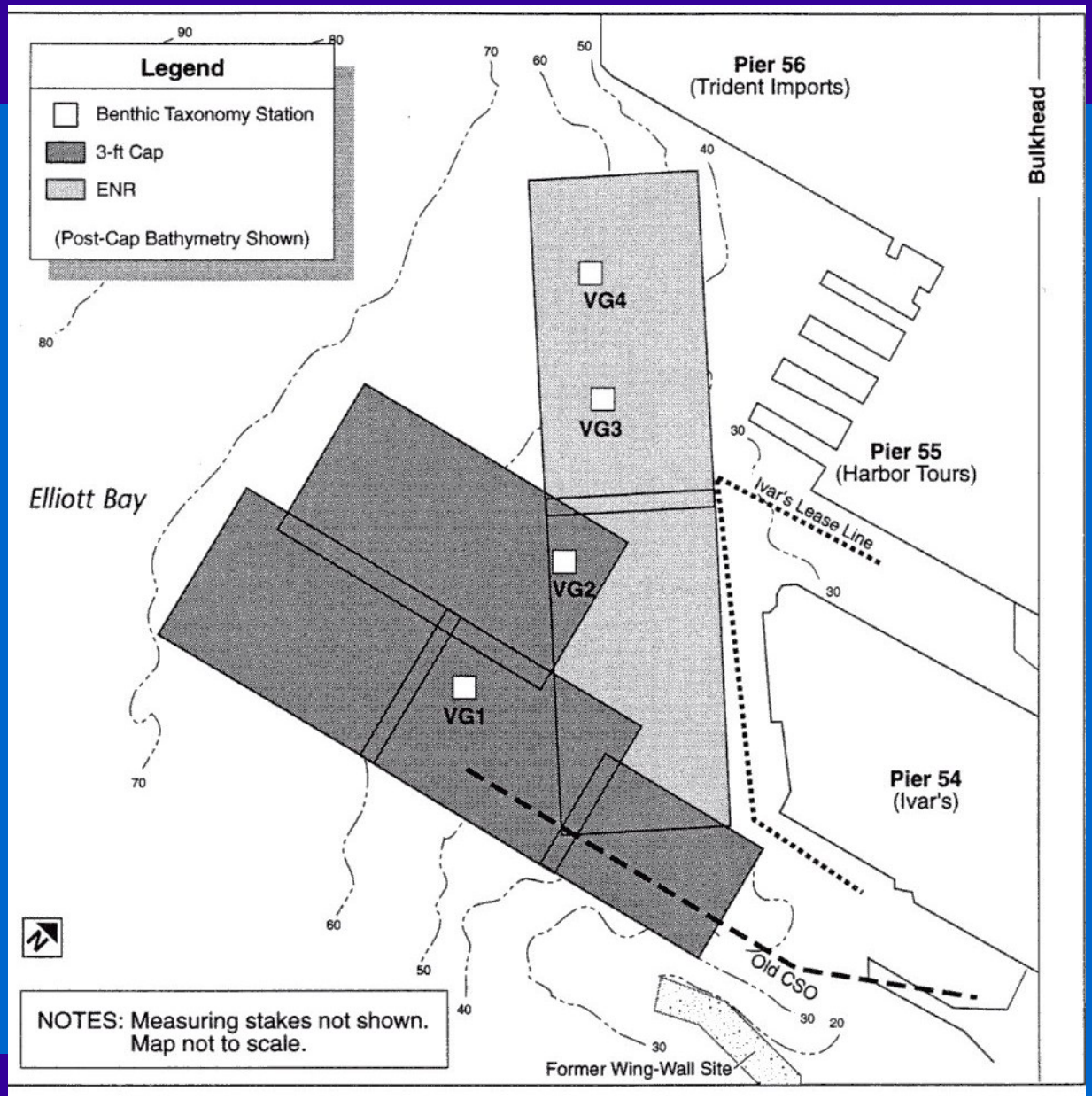
EB/DRP Projects Show In-place Capping Costs Less

- 1992 - Pier 53-55 In-Place Sediment Cap
  -- 4.5 Acres cost -- **$ 300 Thousand**
- 1999 - Norfolk CSO - Dredge and Cap
  -- 1 Acre cost -- **$ 2 Million**
- 2004 - Duwamish/Diagonal Dredge & Cap
  -- 7 Acres cost -- **$ 10 Million**

Location of Pier 53-55 cap



Cap Covers Area Off Pier 53 - 55



Pier 54 Where Are You ?

In The Middle At Iver's !

Man Admires Seattle Views

Man Looks For Pier 53-55 Cap

Six Monitoring Tasks Required

- **13** -- bottom stakes to show cap thickness
- **7** -- stations show surface chemistry change
- **4** --stations show benthic recolinization
- **5** --coring stations show chemical isolation
- **3** -- diver video transects show cap surface
- **4** -- monitoring reports

Expanded Sampling Frequency

- DENNY WAY CAP
- 1990 - Baseline
- 1991 - 1-yr postcap
- 1992 - 2-yrs postcap
- 1994 - 4-yrs postcap
- 1996 - 6-yrs postcap
- 2000 - 10-yrs postcap

- PIER 53-55 CAP
- 1992 - Baseline
- 1993 - 1-yrs postcap
- 1996 - 4-ys postcap
- 2002 - 10-yrs postcap

Importance Of Cap Monitoring

- Supported decision to cap large area of Eagle Harbor to isolate high PAH's.
- Supported decision to cap where Bell Street Marina is located along Seattle waterfront.
- Provides support to using capping as method for cleaning up Seattle waterfront.

Thanks For Good Monitoring

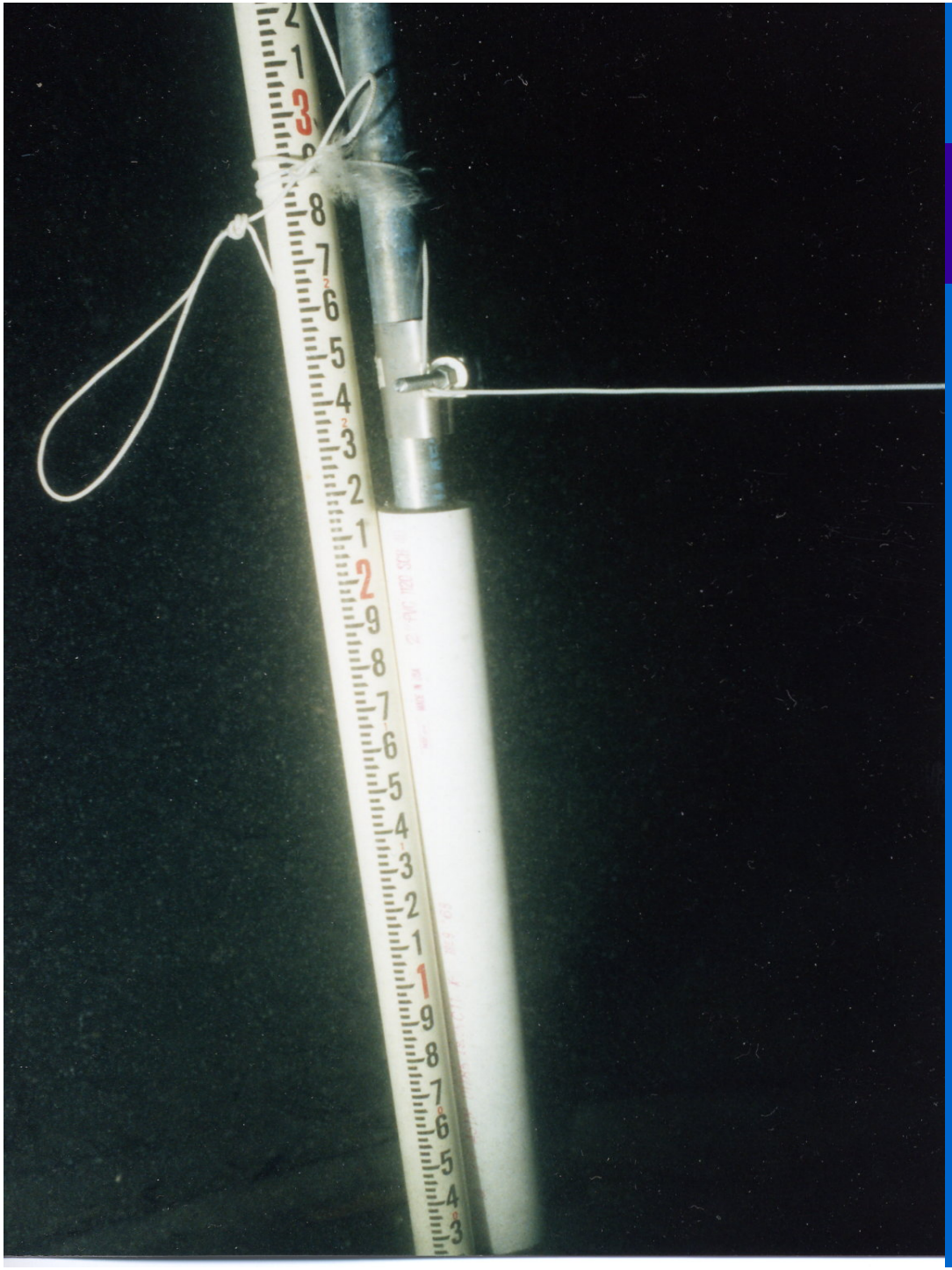
- Field sampling -- KC field crew
- Sample preparation and analysis -- KC labs
  - (conventionals lab, metals lab, organics lab, aquatox lab)
- Monitoring reports-- KC marine monitoring

- Diver work -- Outside contract
- Bentic taxonomy -- Outside contract

Liberty RV and Diver Boat

Buoys mark stations

Diver measures stakes on bottom



Bottom stake

and

measuring rod

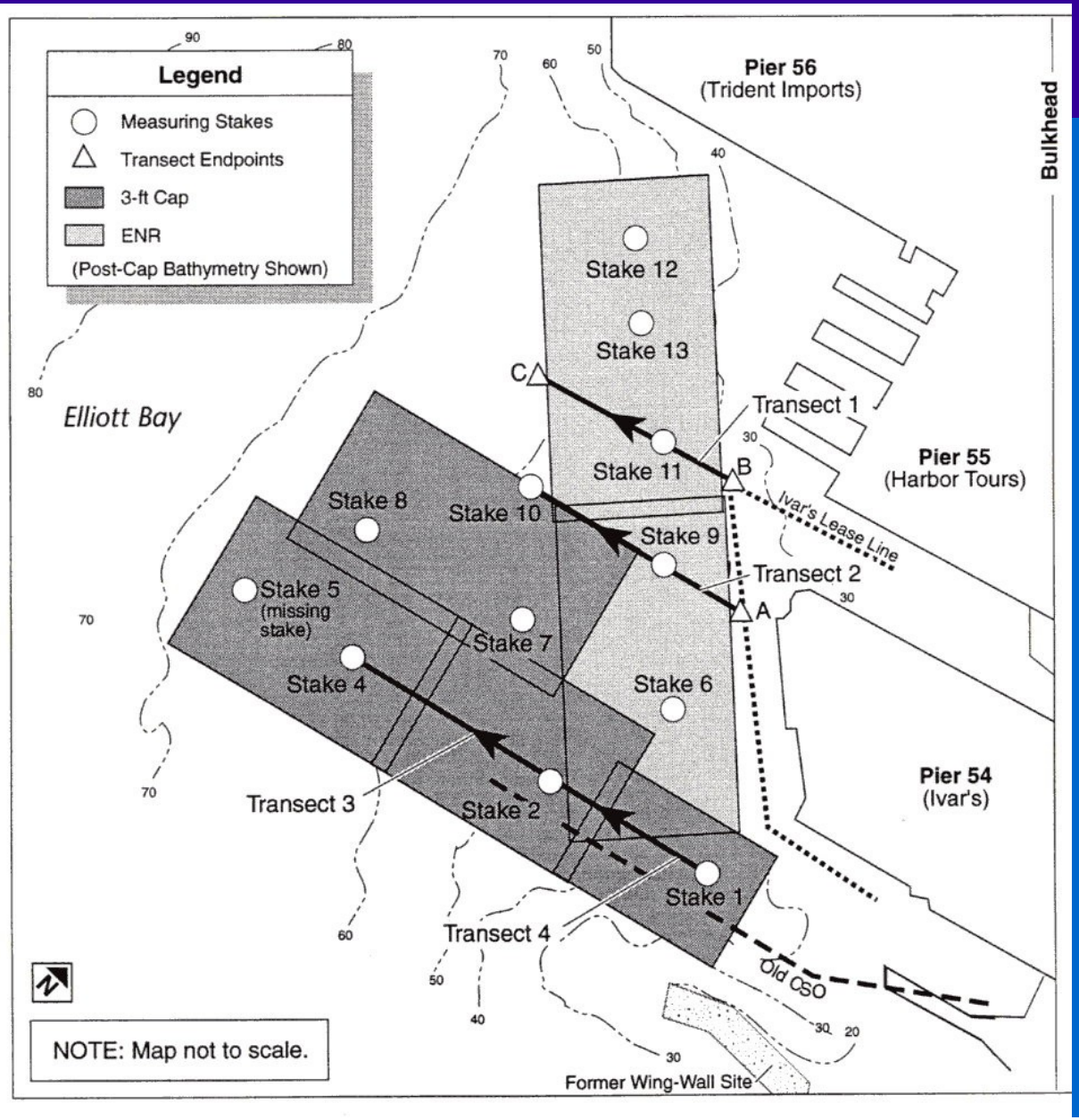
Surface grab sampler

Coring equipment and diver

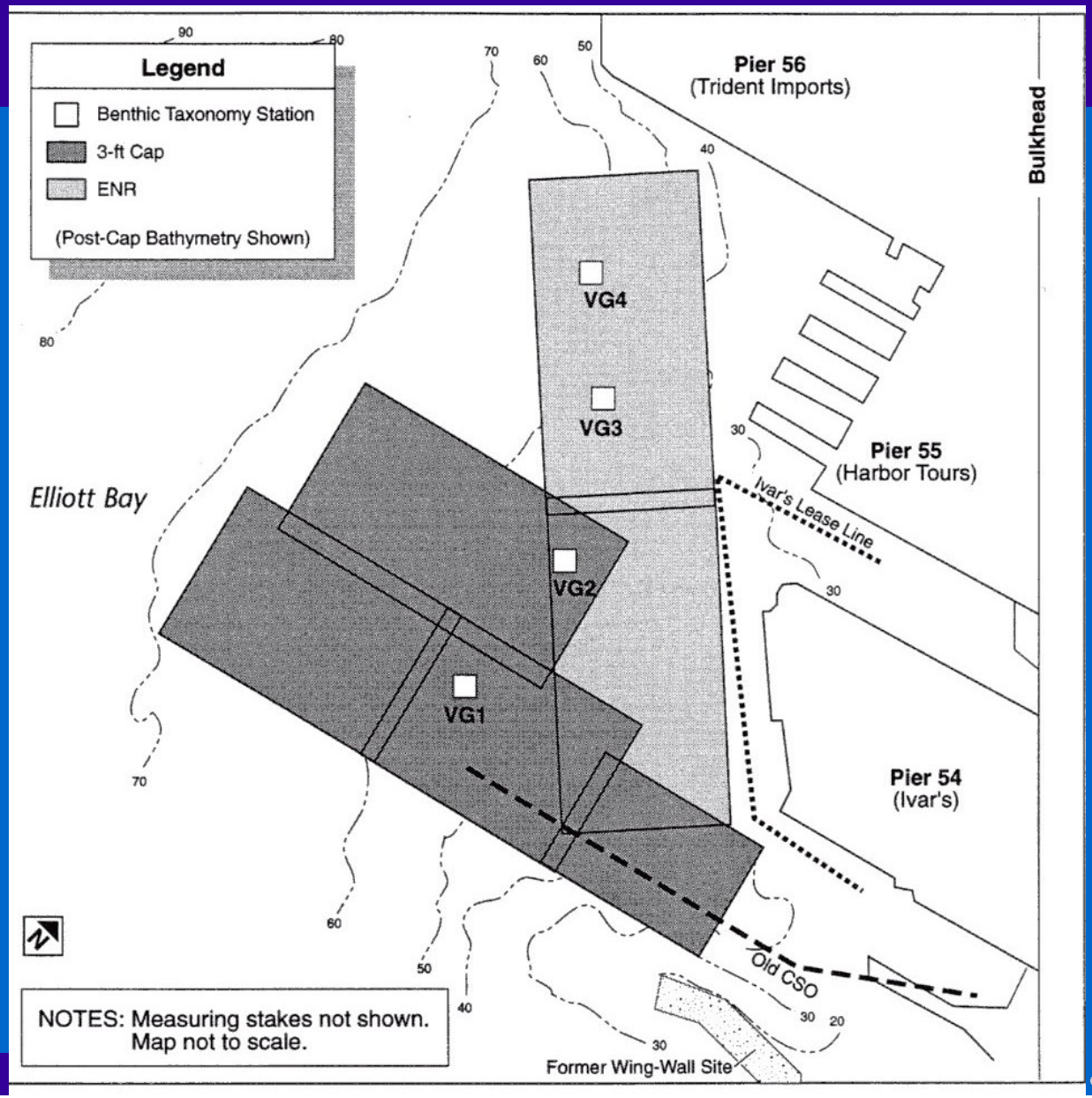
Core samples through cap

Removing Old Wing Wall Greatly Impacted Cap Surface

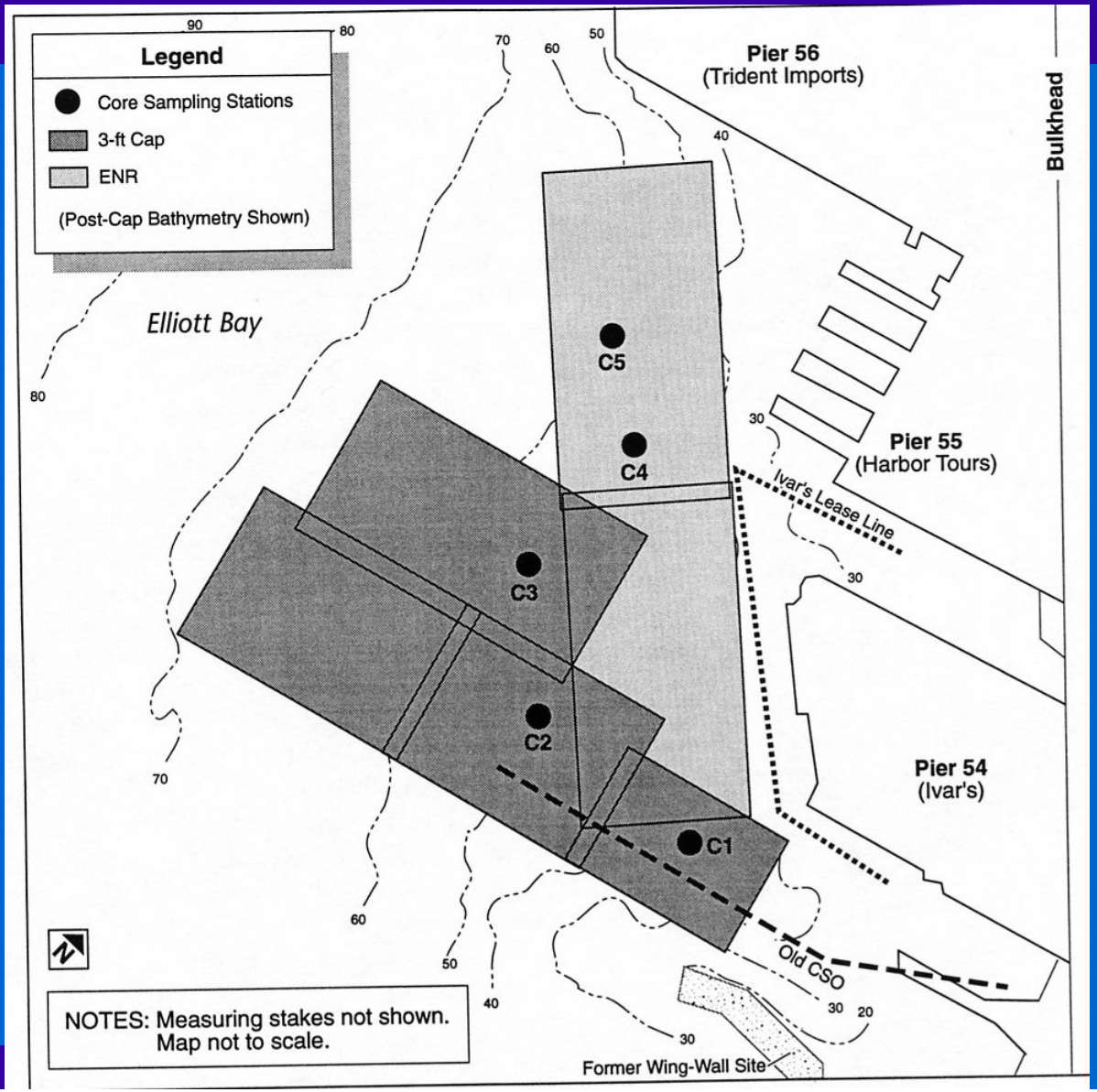
13 Measuring Stake Locations



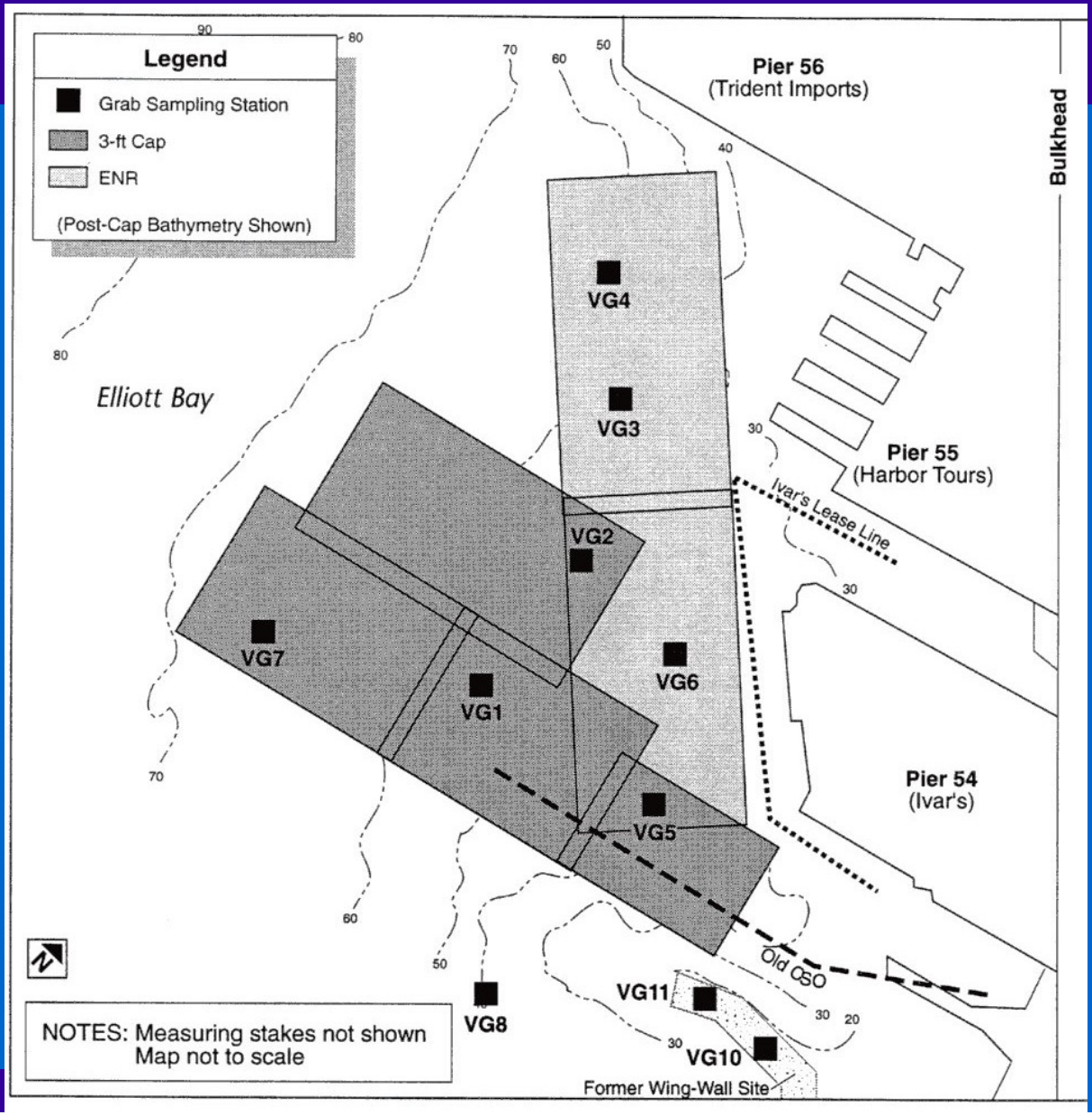
4 Benthic Taxonomy Stations



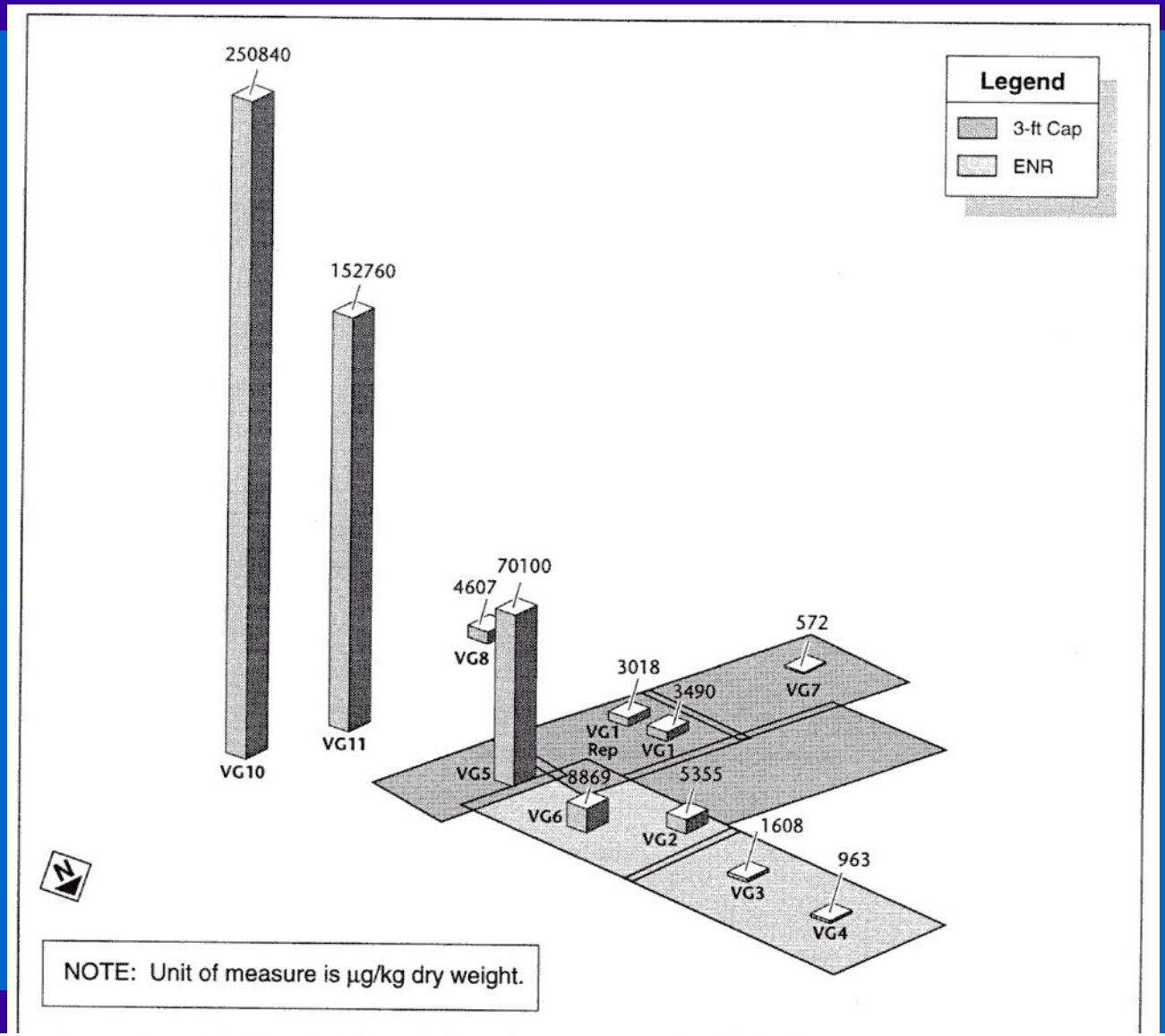
5 Coring Station Locations



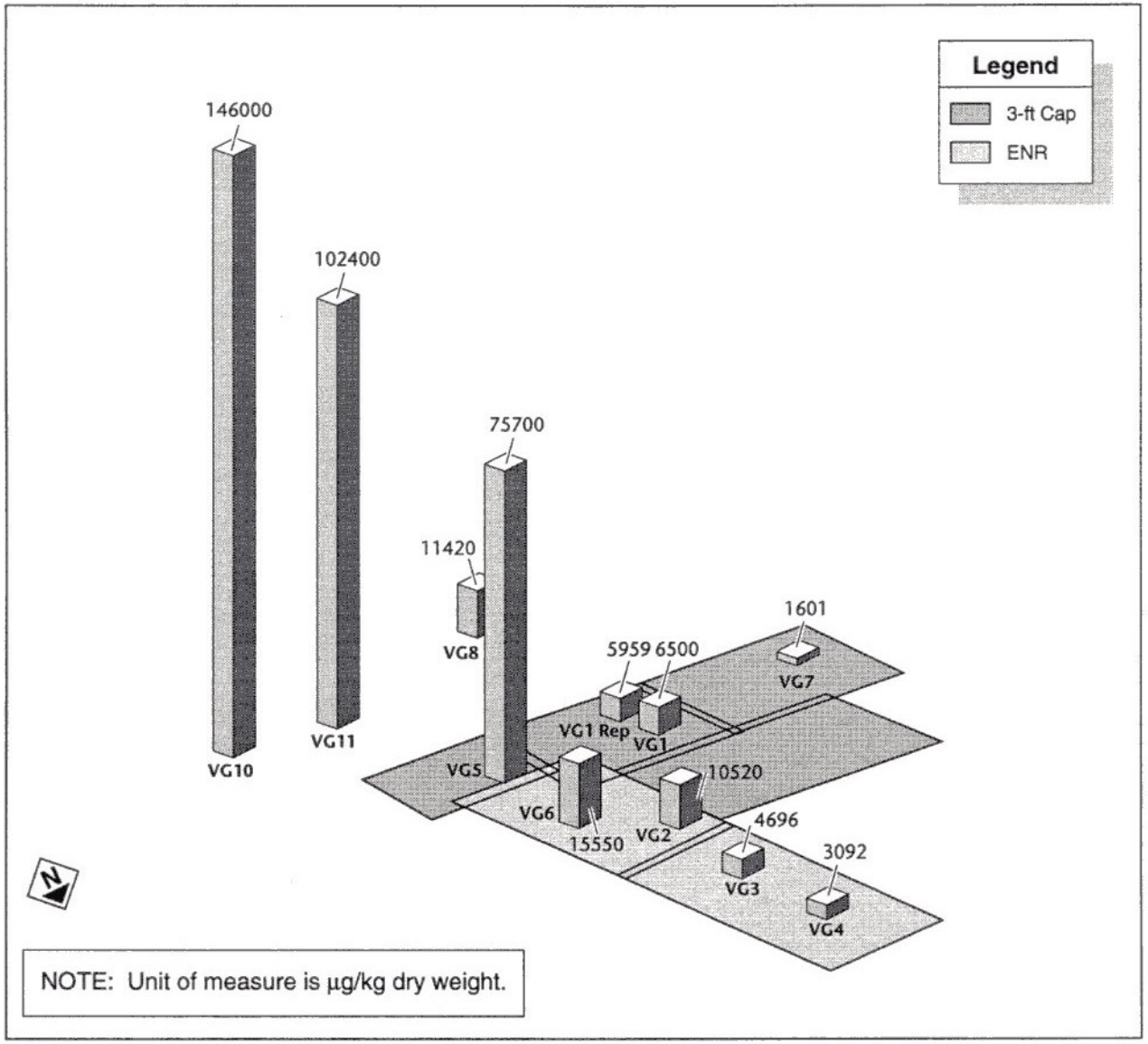
7 Surface Chemistry Stations



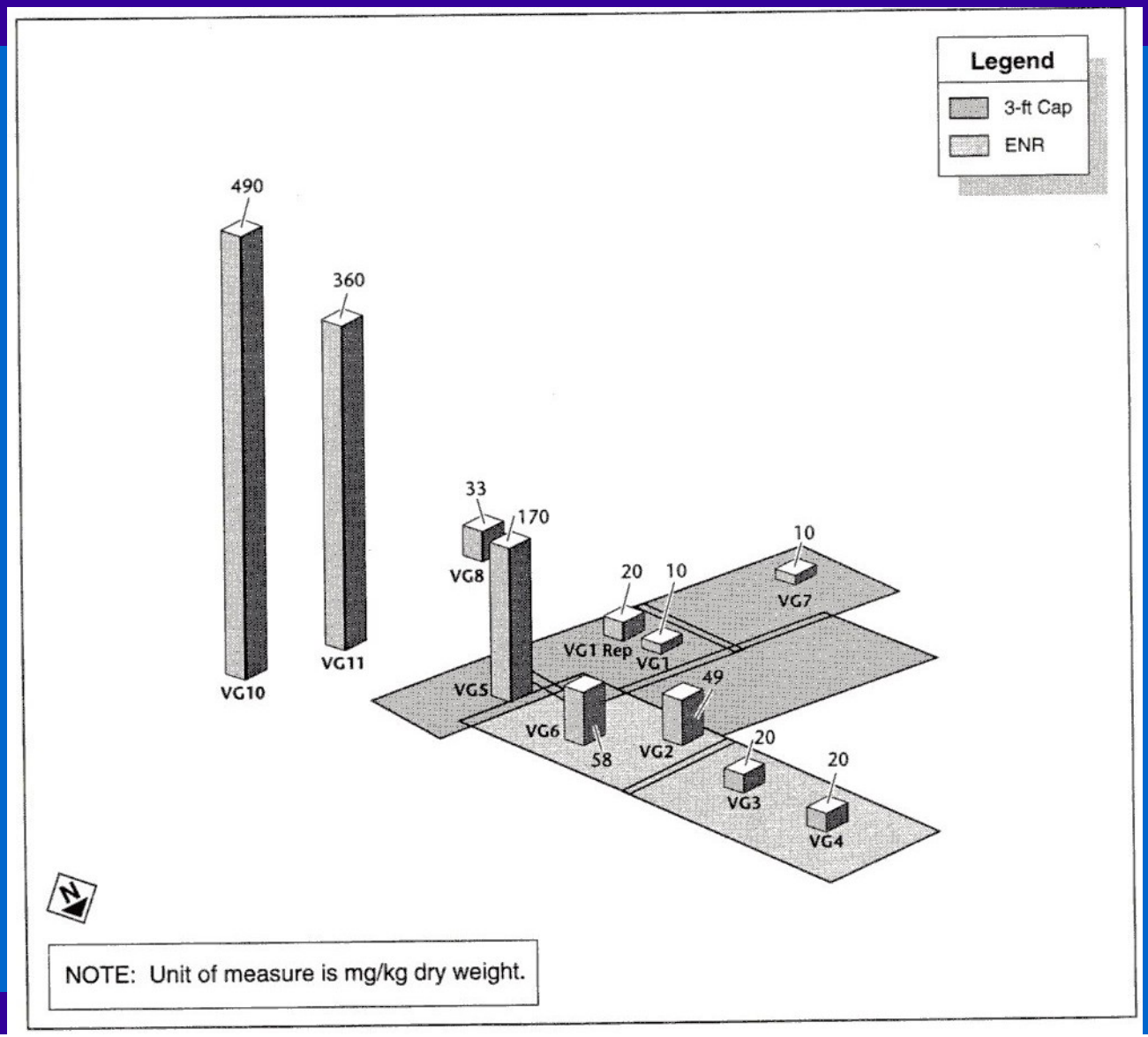
LPAH Source Spreads To Cap



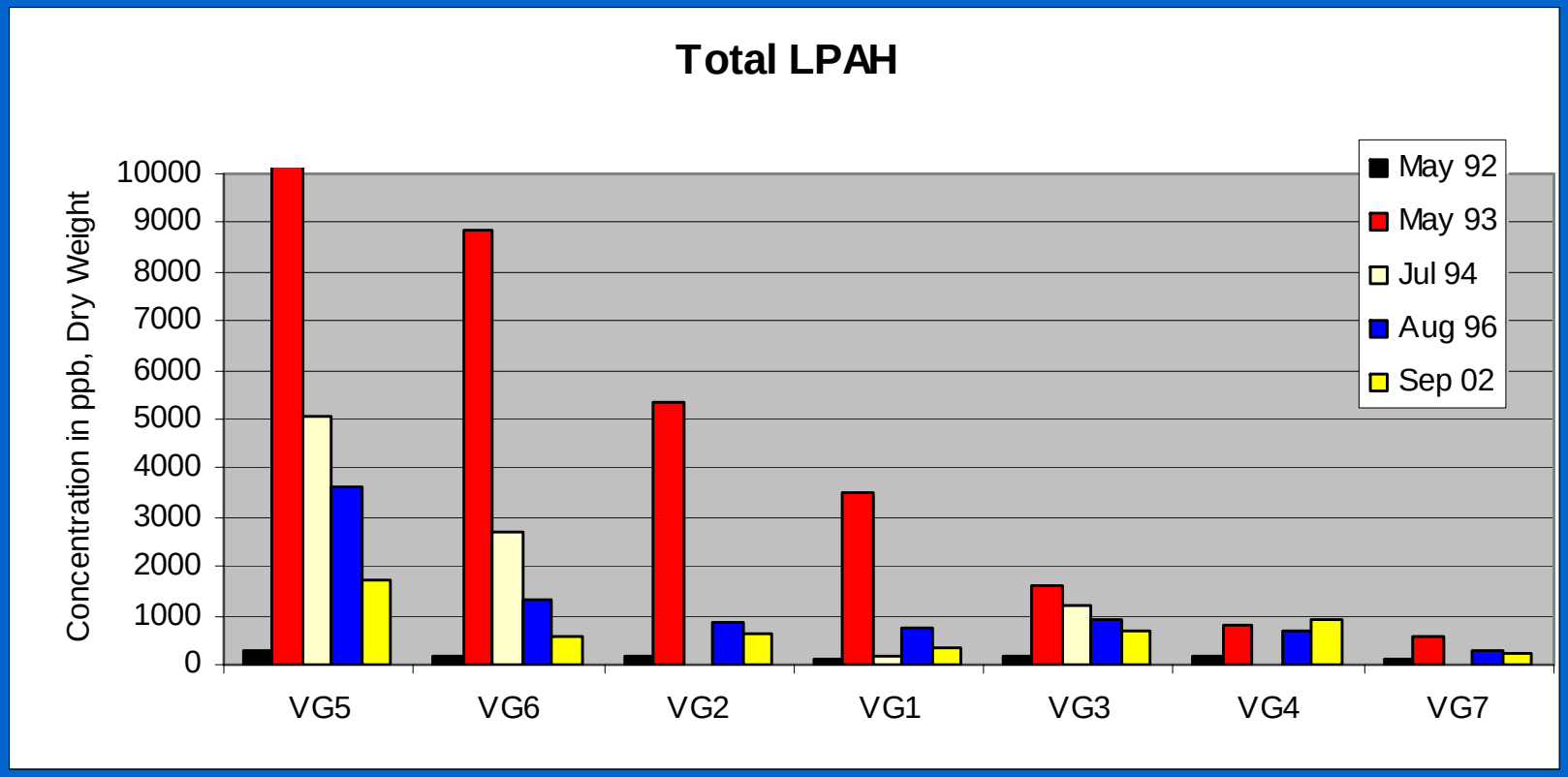
HPAH Source Spreads To Cap



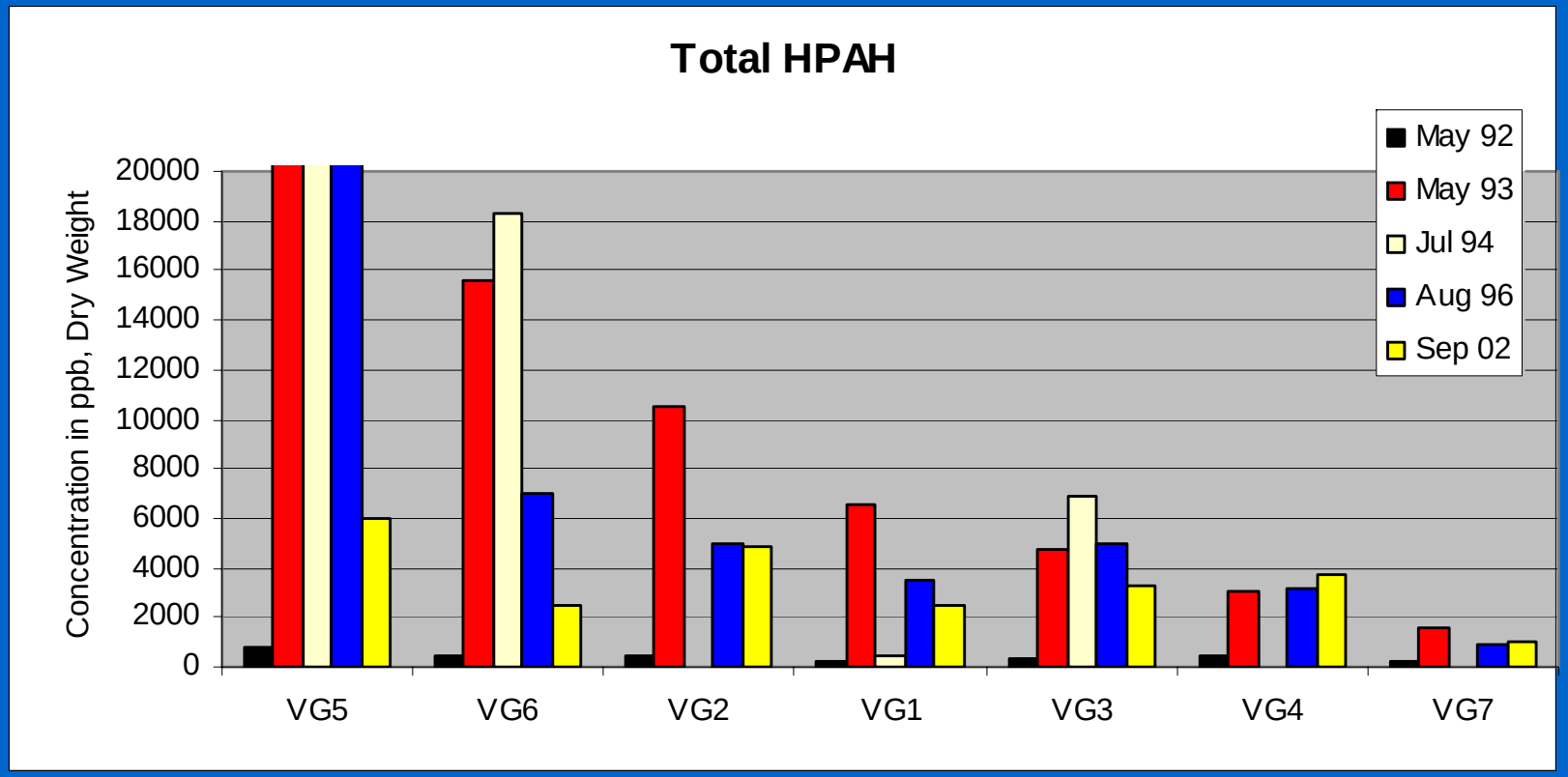
Lead Source Spreads To Cap



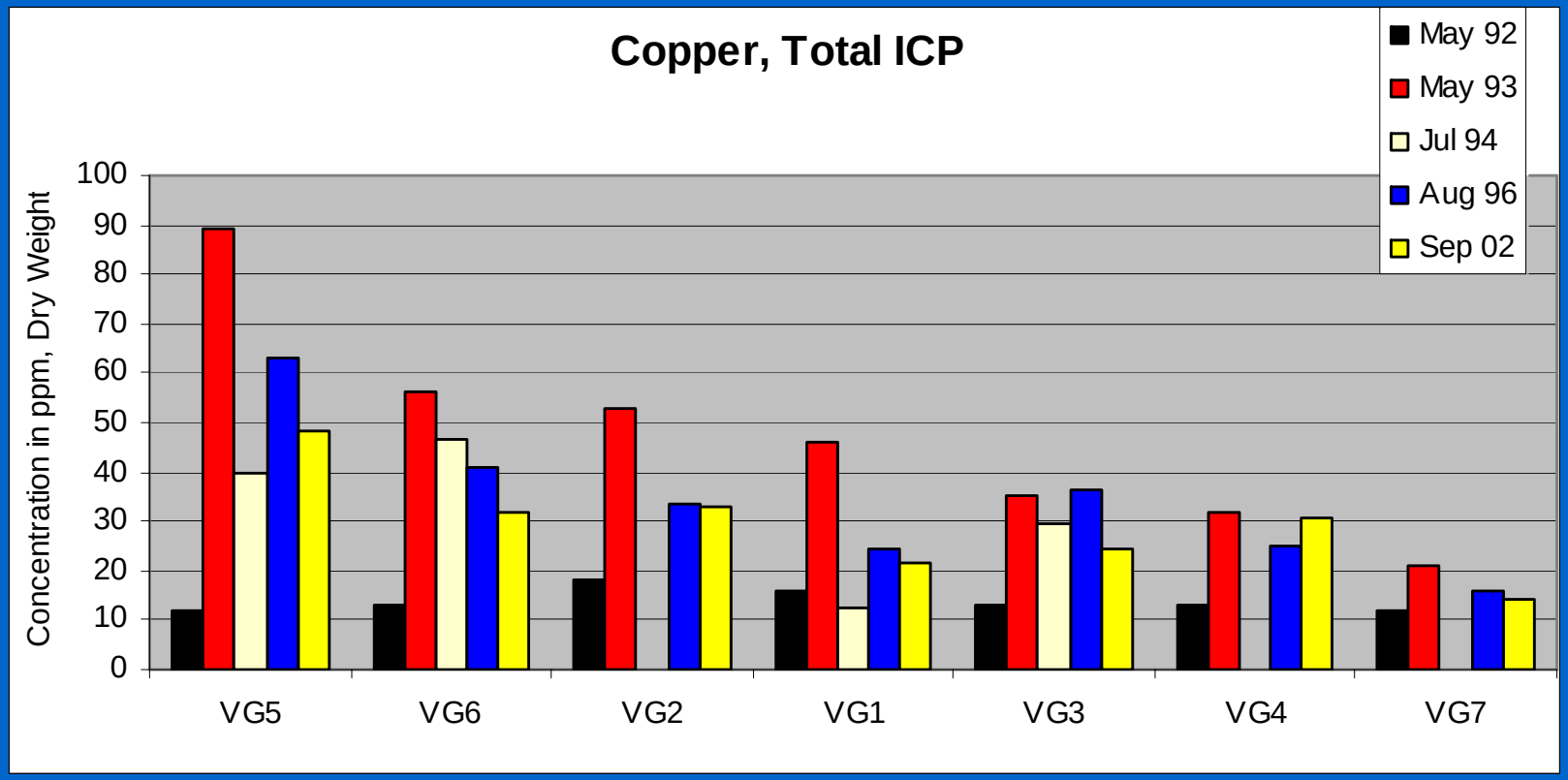
LPAH Distribution Gradient



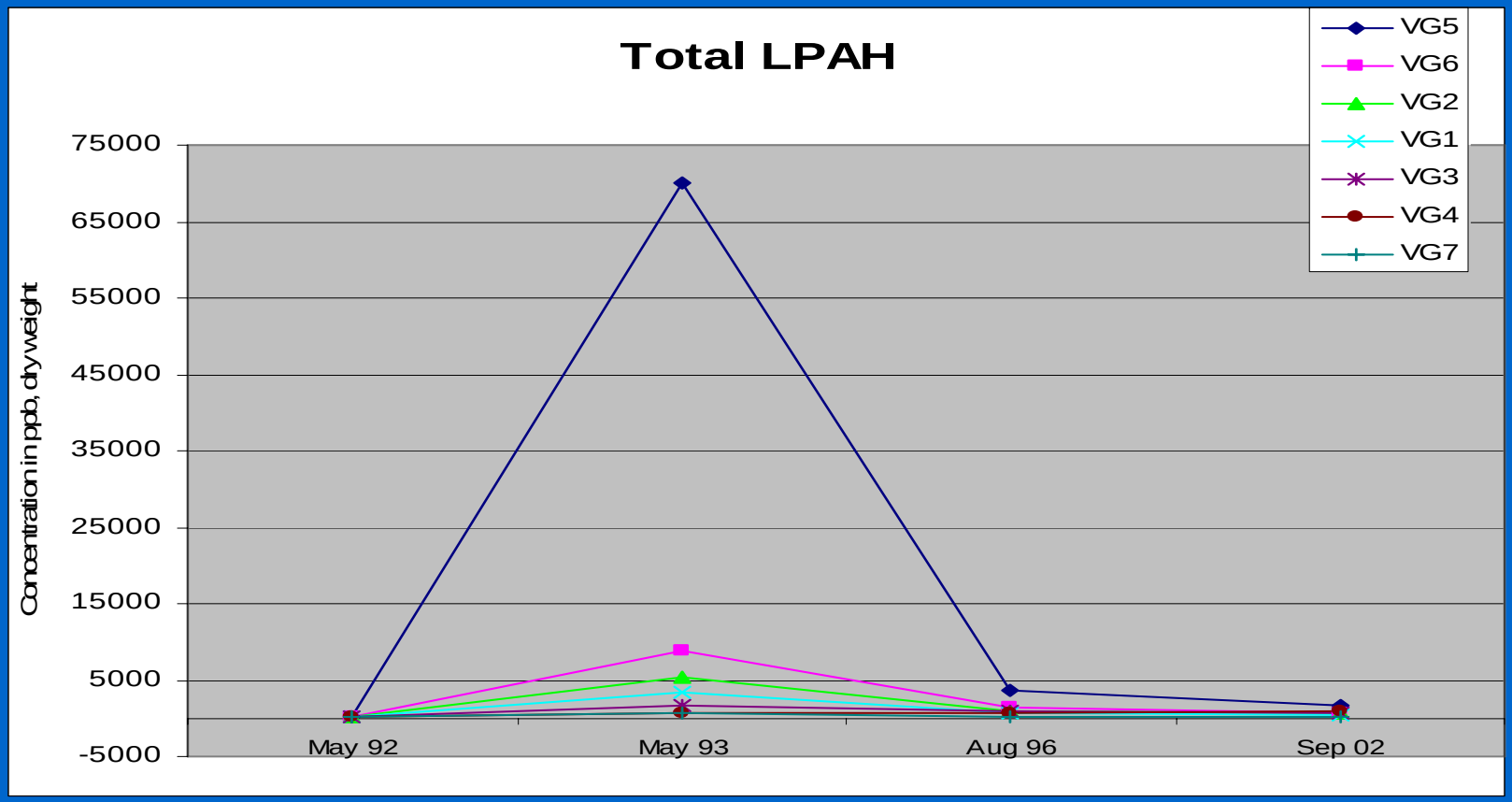
HPAH Distribution Gradient



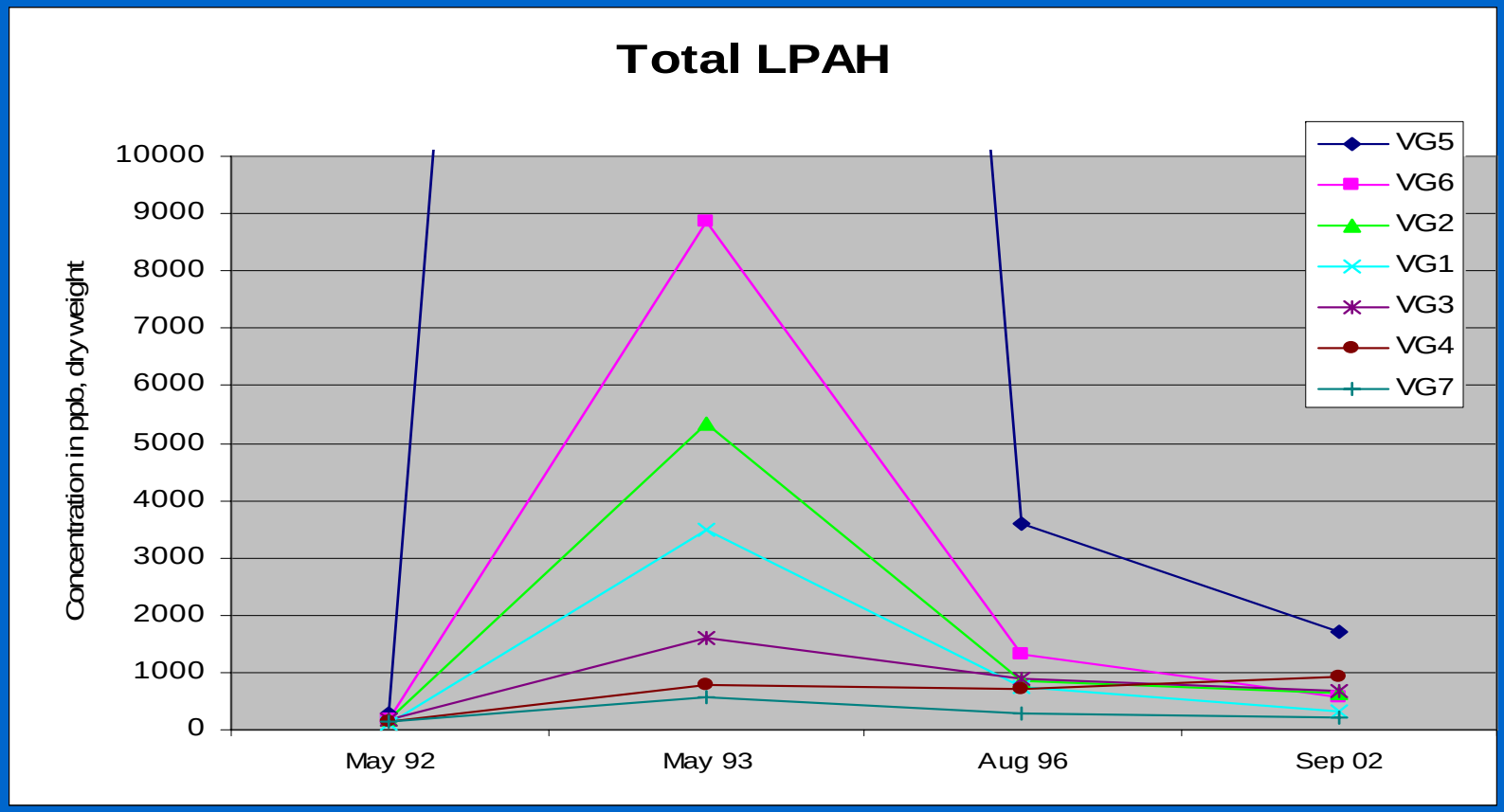
Copper Distribution Gradient



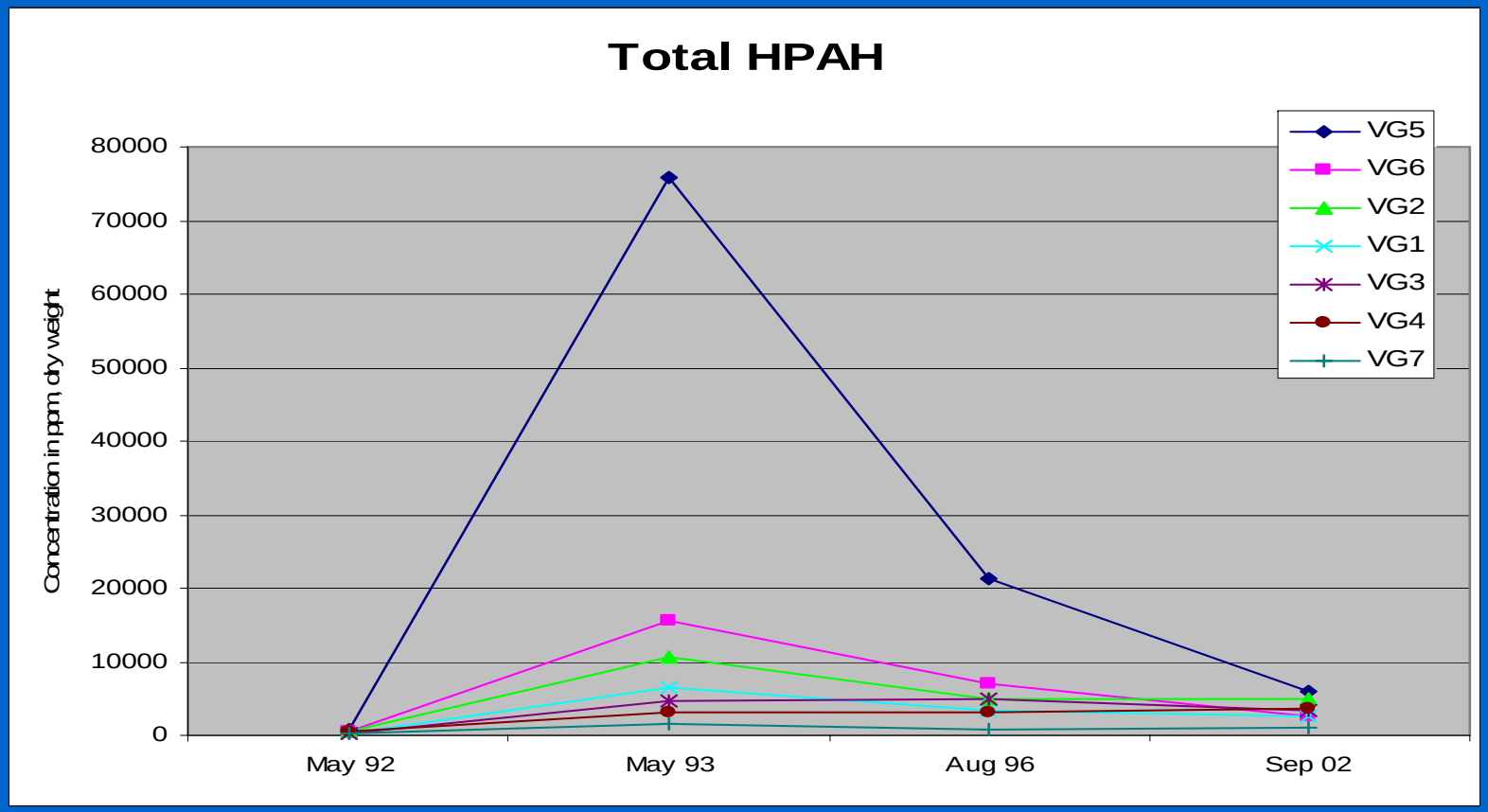
LPAH Change With Time



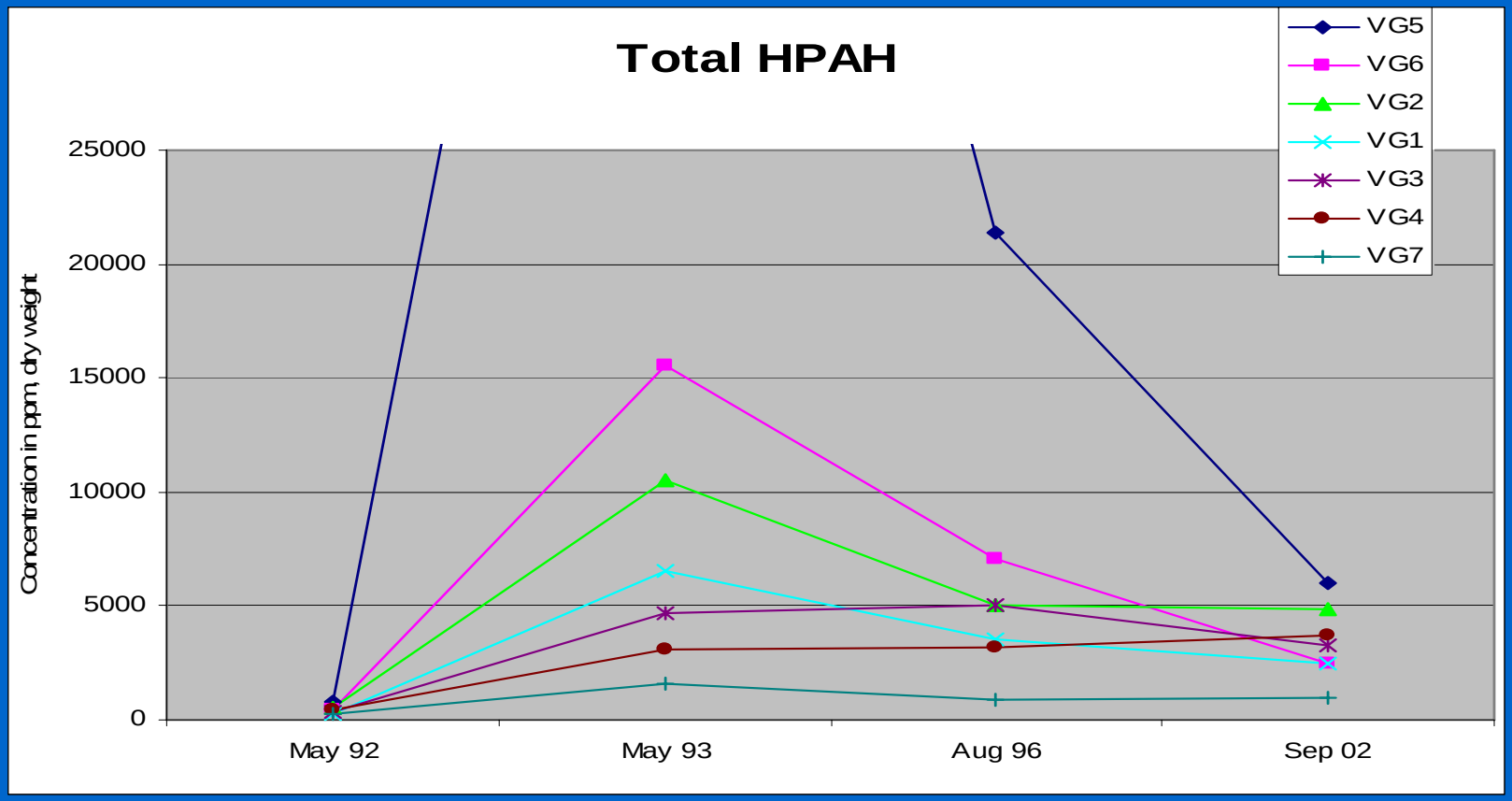
Expanded LPAH Change



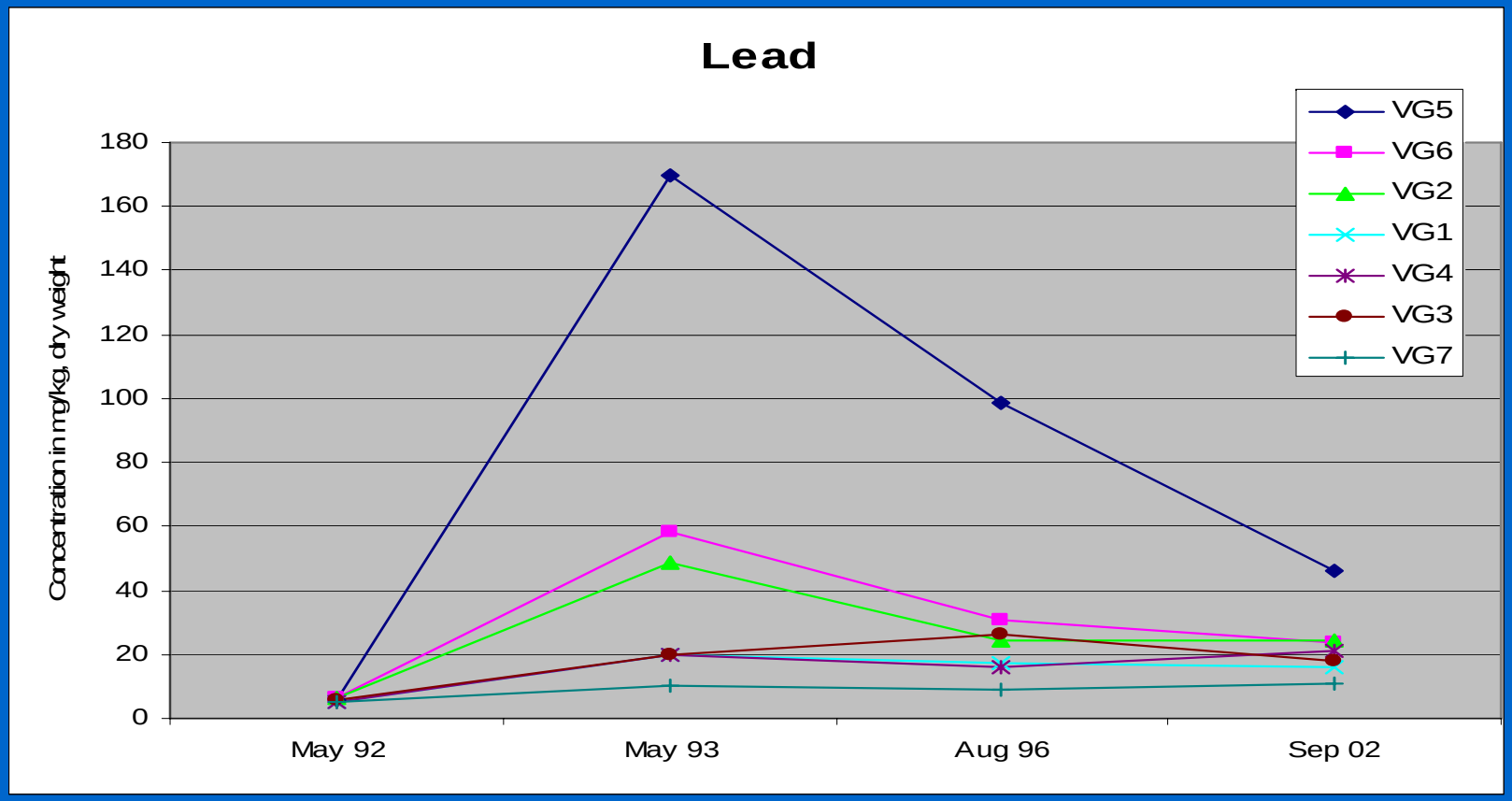
HPAH Change With Time



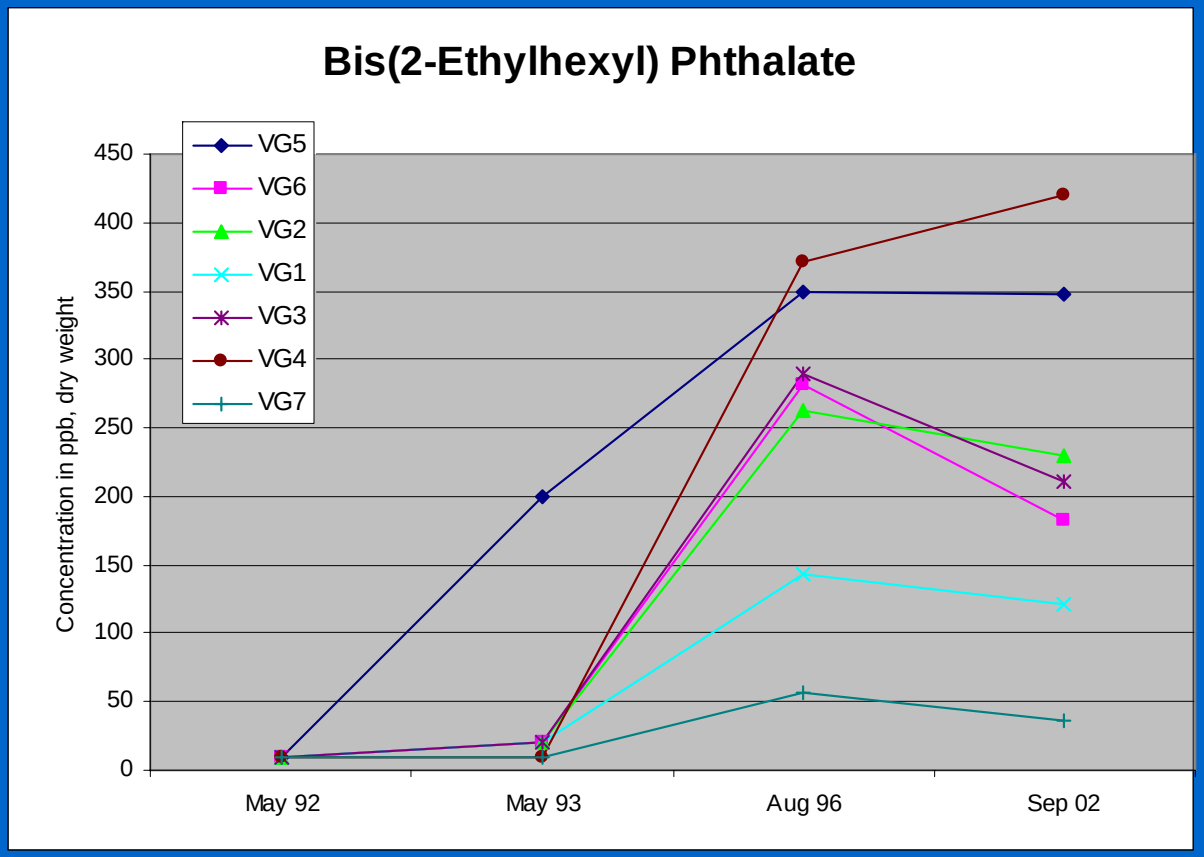
Expanded HPAH Change



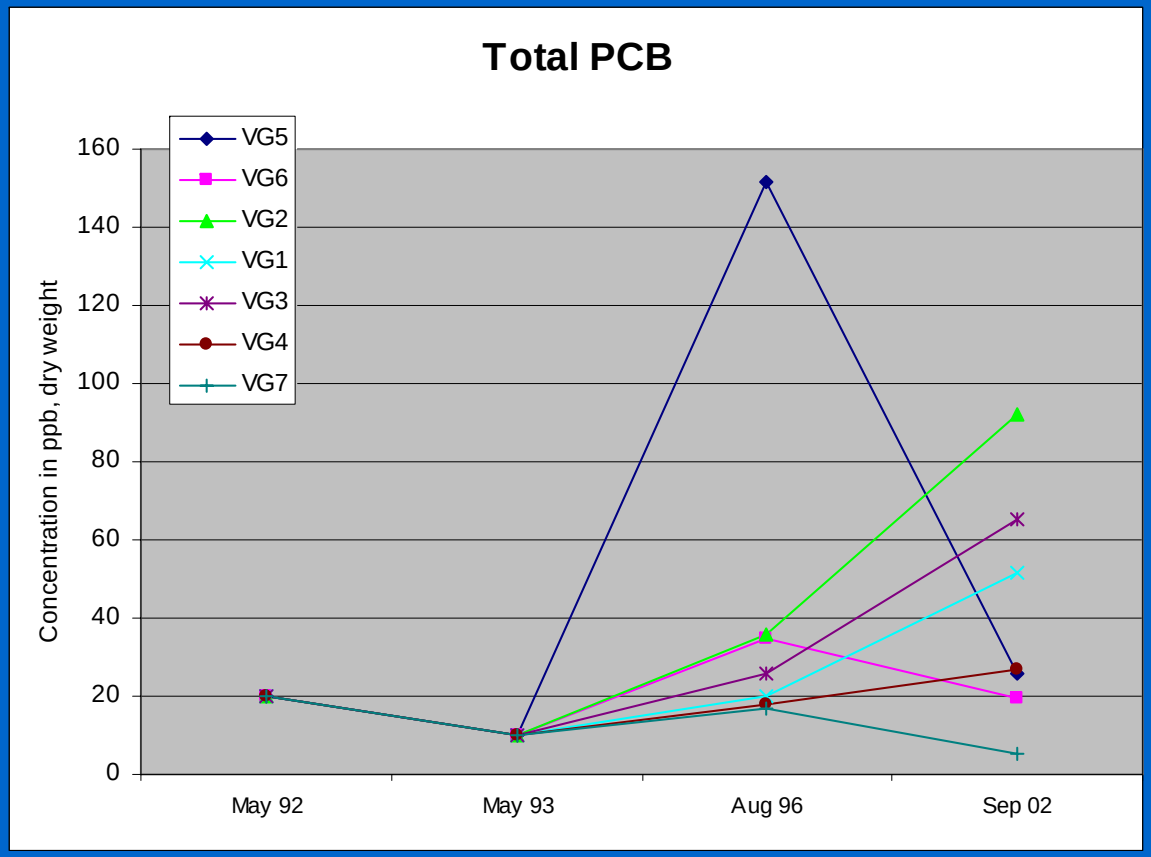
Lead Change With Time



Phthalate Change With Time



PCB Change With Time



CONCLUSIONS:

- Adjacent activities can recontaminate cap.
- Impact gradient with distance from source.
- PAHs and metals at moderately impacted stations drop to equilibrium in 3 years.
- Takes more than 9 years at most impacted.
- PAHs and metal way below standards.
- PCBs and Phthalates increasing.
- One phthalate exceeds standard at one site.

Why More In-Place Capping Is Appealing For Seattle Waterfront

- Provides clean bottom for biota.
- Less expensive than dredging and disposal.
- Less dispersion of contaminate sediment.
- Useful for cleaning up large area of bottom.
- Can be used near existing pier structures.
- Can be used under existing piers
- Reduces resuspension and recontamination.