GROUNDWATER REMEDIATION OF A HIGHLY CONTAMINATED BEDROCK SITE

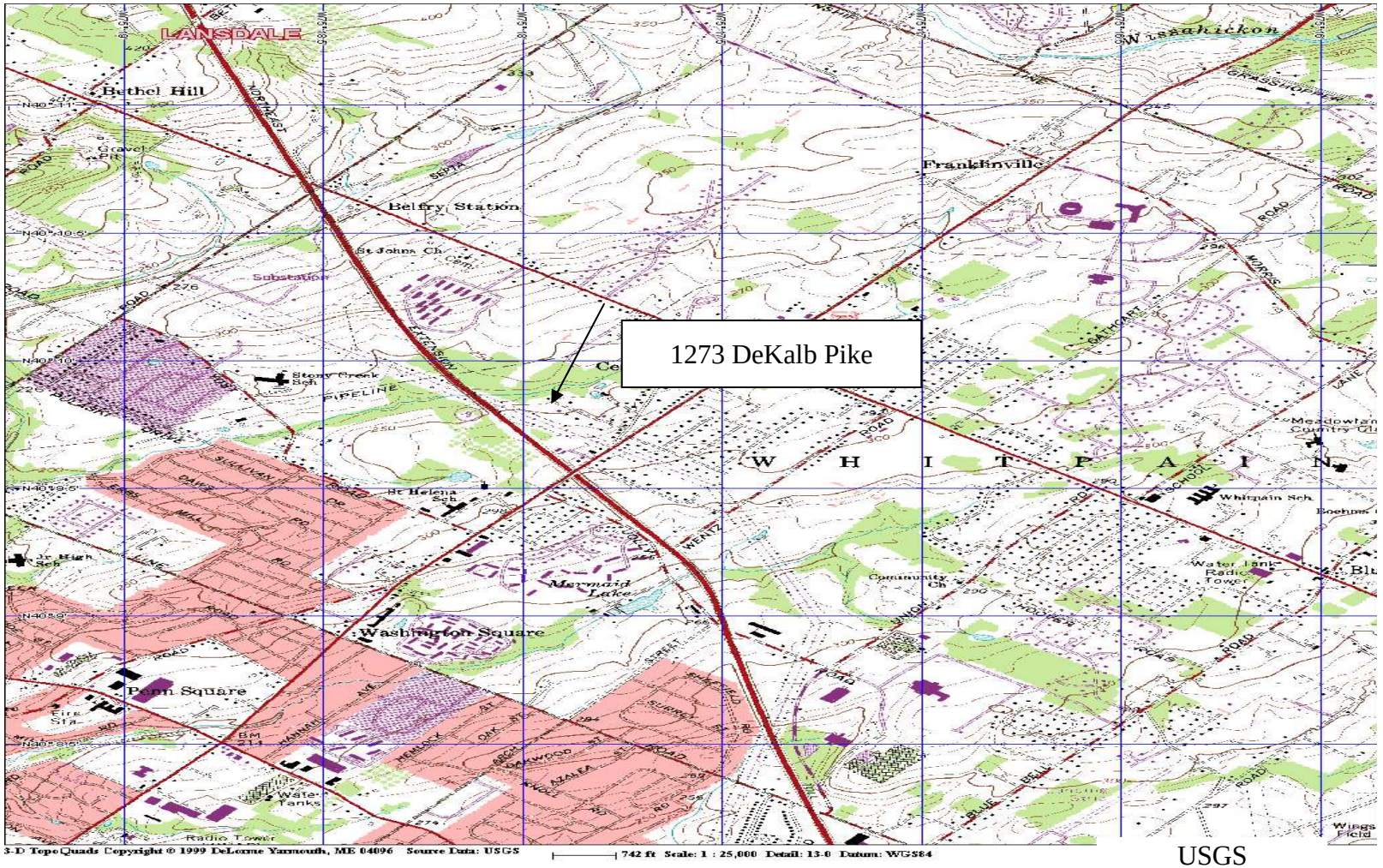
- The Oxygen Infusion Phase -

By: J. Morrow
D. Side

SITE HISTORY / LOCATION

- Gas station/auto repair 1940s-1999
- Heavy residential/commercial area in SE Pennsylvania
- Eight USTs removed between 1994-1999
- Catastrophic petroleum hydrocarbon release, 1995
- Surrounding properties include:
  - Commercial & Industrial sites with water supply wells
  - Residential properties with water supply wells
  - PA Turnpike

LOCATION



USGS

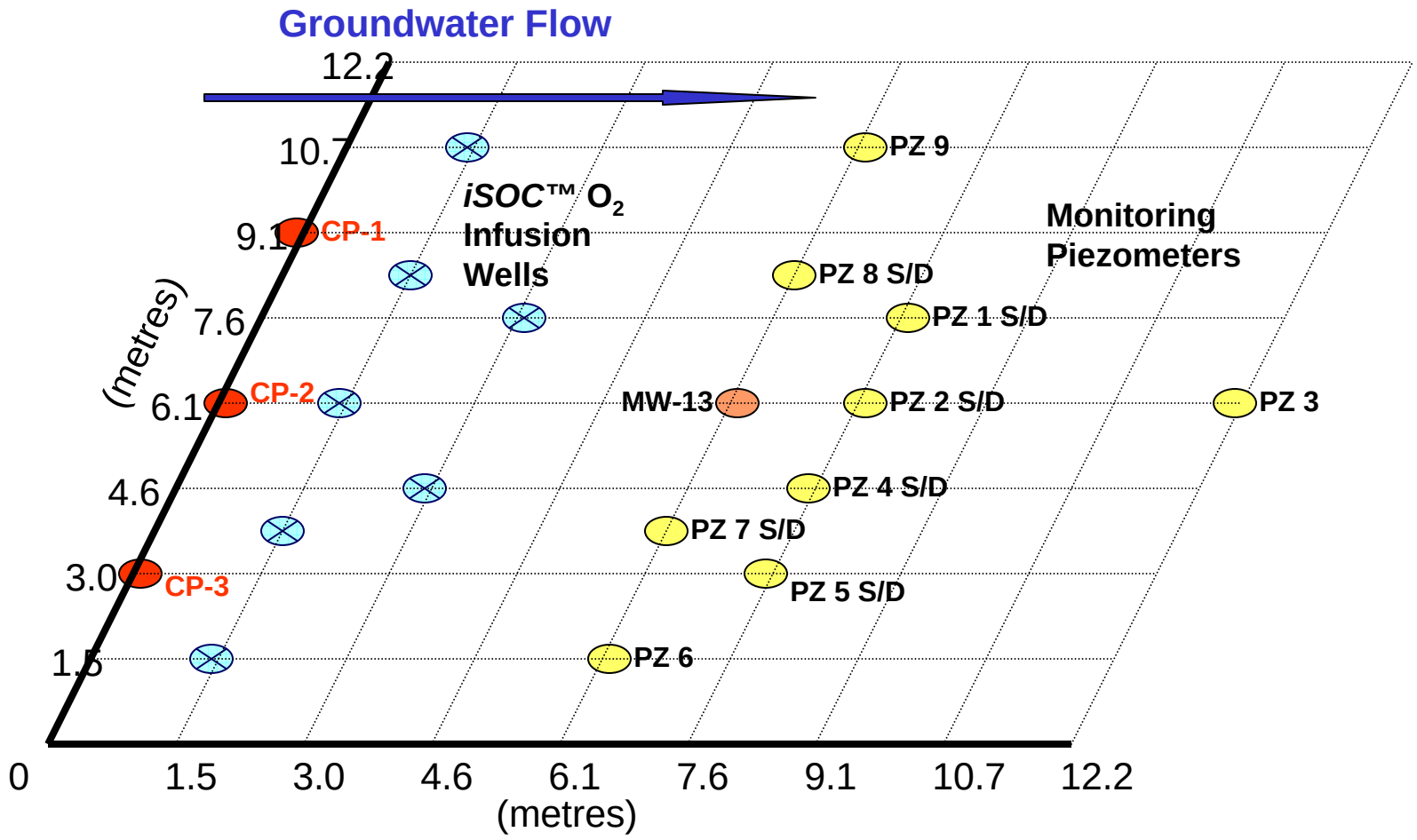
HYDRAULIC CONDITIONS

- Bedrock
  - Begins 7-10’ below ground surface
  - Sandstone w/interbedded shale
- Three saturated zones
  - 15’ to 50’
  - 60 to 75’
  - 80’ to 93’?
- Groundwater flow, north w/components west and south

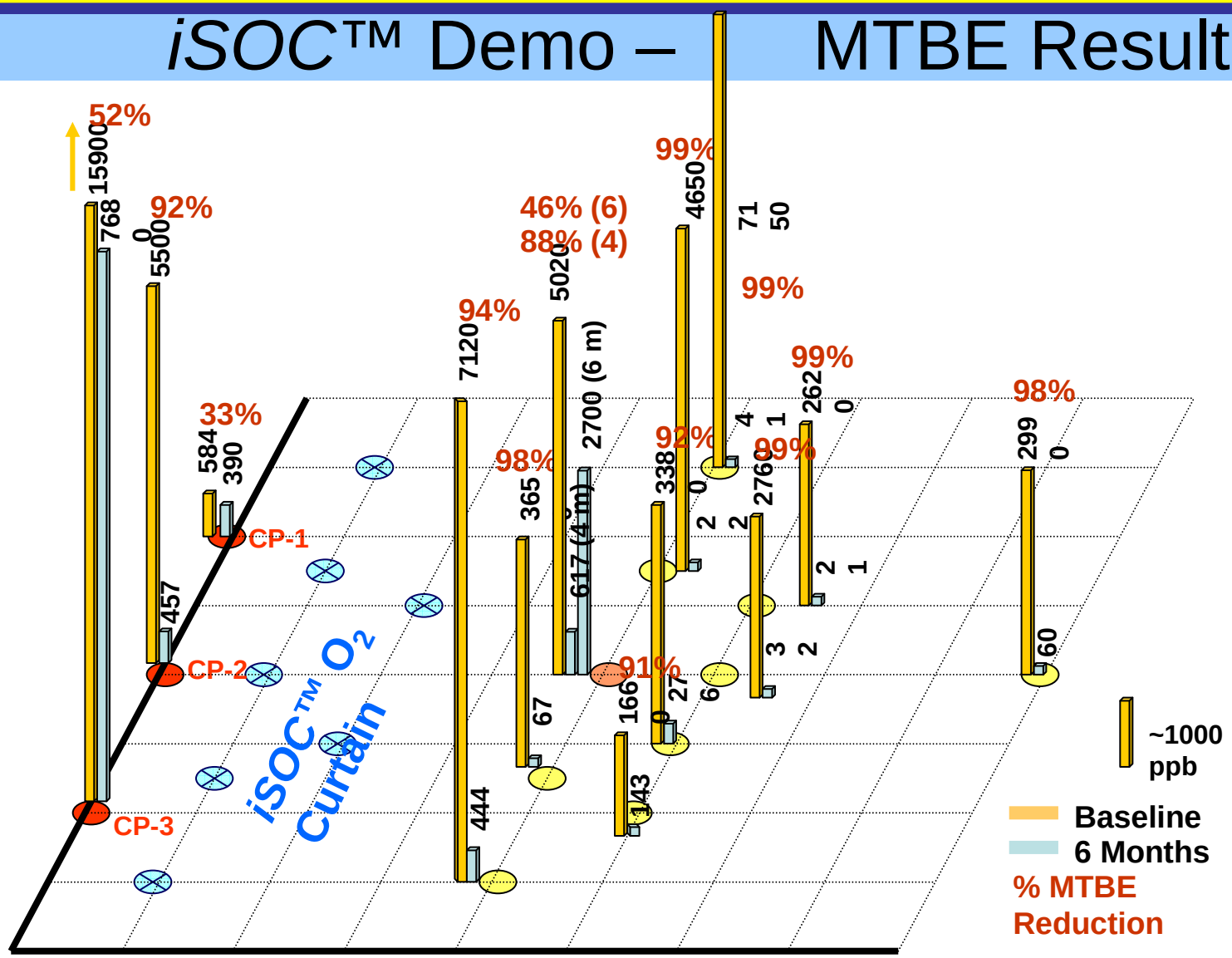
GROUNDWATER CHARACTERISTICS

- Bedrock
  - Begins 7-10’ below ground surface
  - Sandstone w/interbedded shale
- Three saturated zones
  - 15’ to 50’
  - 60 to 75’
  - 80’ to 93’?
- Groundwater flow, north w/components west and south

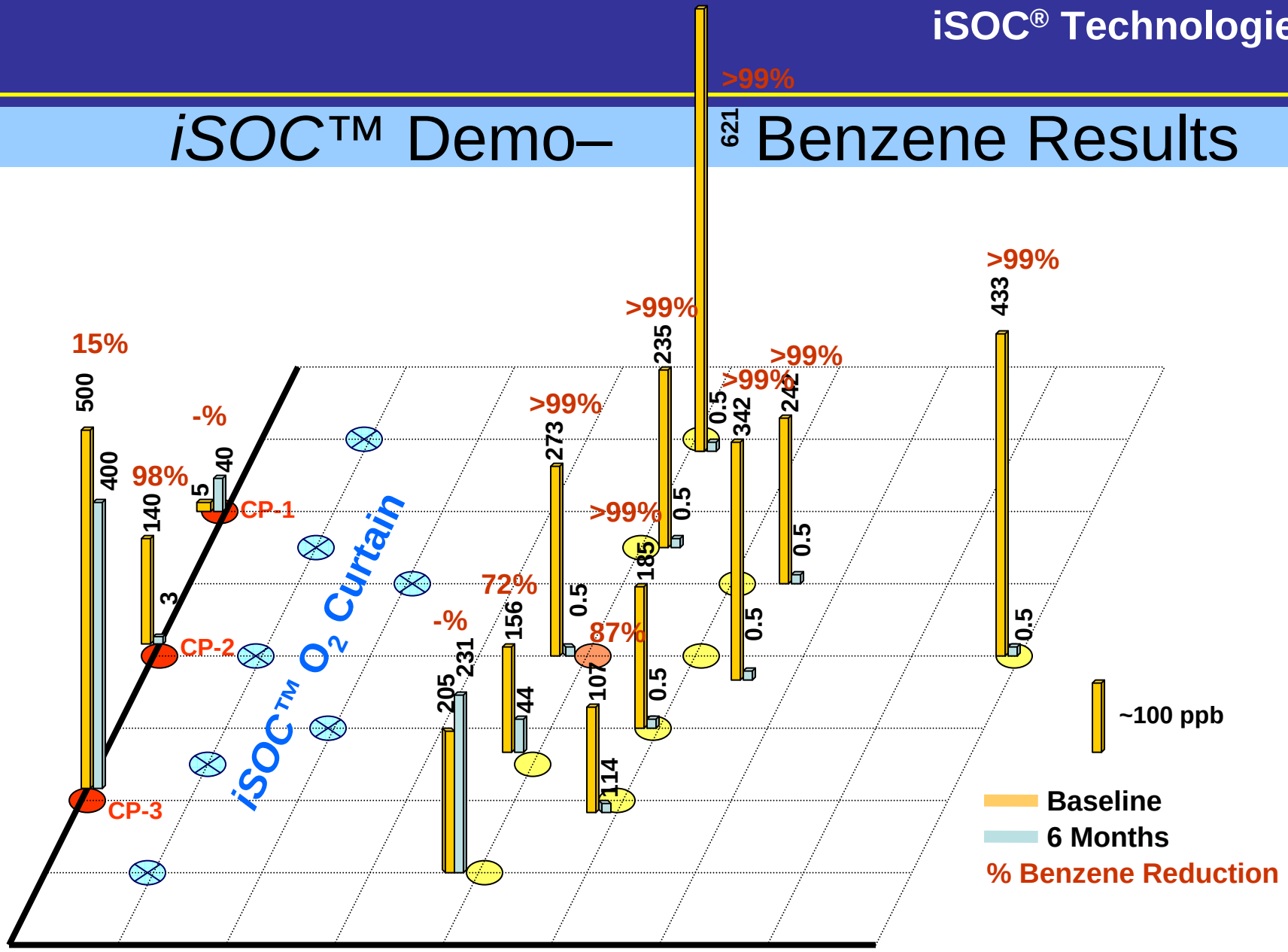
iSOC™ Demo – Treatment Area Schematic



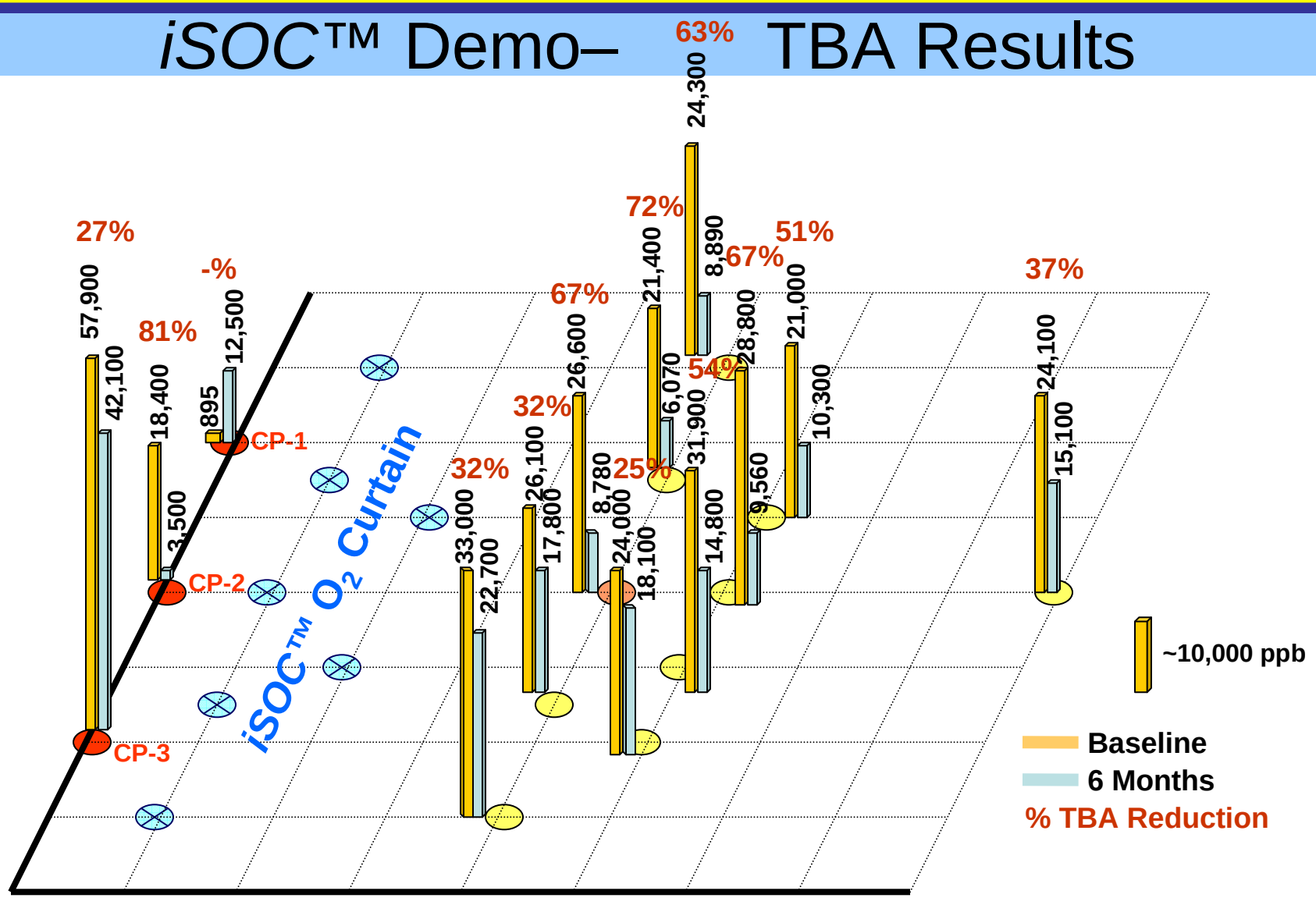
iSOC™ Demo – MTBE Results



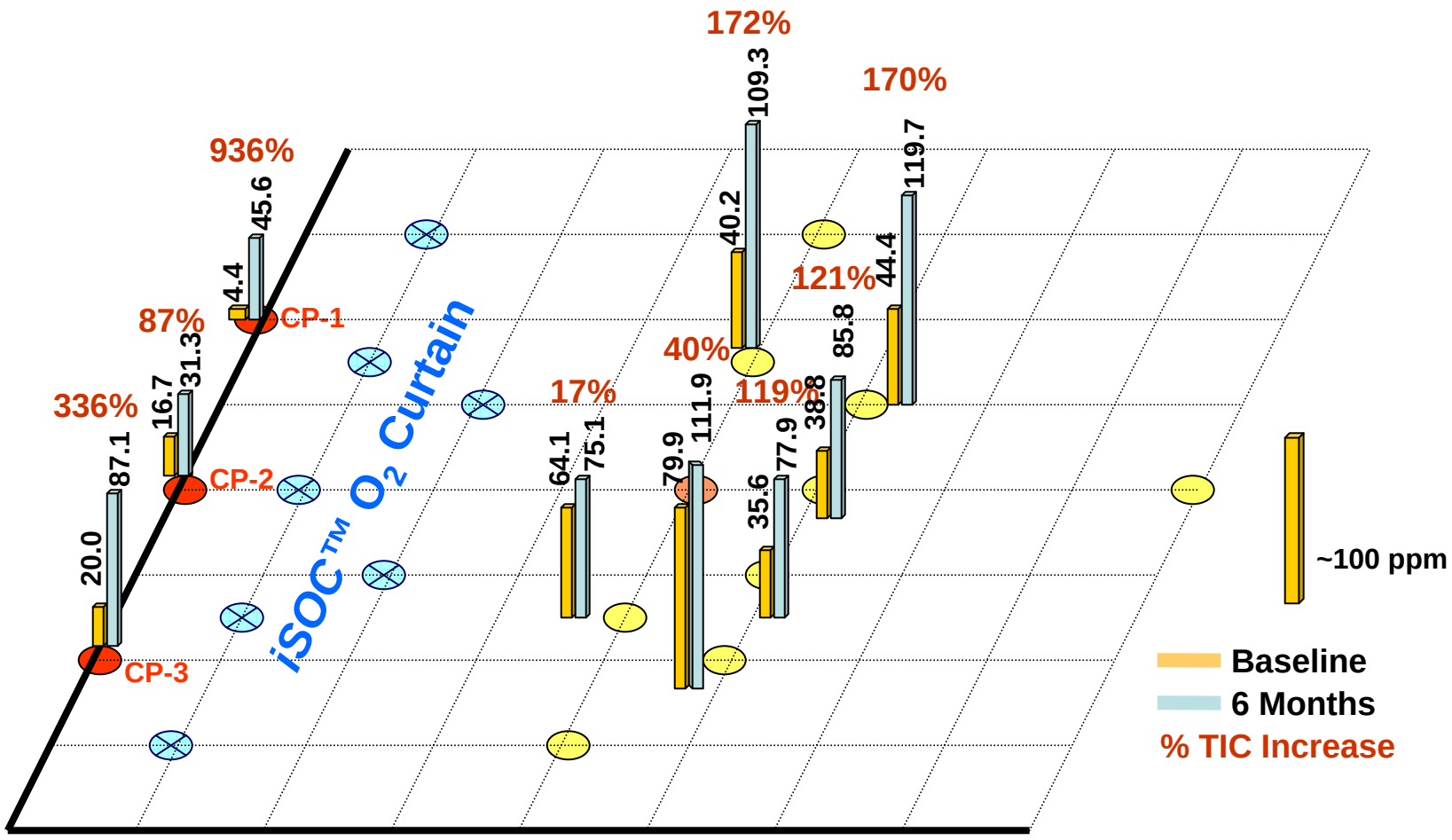
iSOC™ Demo– Benzene Results



iSOC™ Demo– TBA Results



iSOC™ Demo – Groundwater TIC Results



iSOC™ Demonstration– Conclusions

- 3 months after *iSOC*™ system installed, an effective barrier of DO was established
- *iSOC*™ O_2 barrier effective in attenuating MTBE, TBA & Benzene throughout 6-month study period
- Significant reductions downgradient of *iSOC*™ O_2 barrier were comparable for shallow & deep piezometers: MTBE - 89%, TBA – 54%, Benzene - >96%
- Data indicates aerobic degradation of MTBE downgradient of *iSOC*™ O_2 barrier—possible anaerobic biodegradation outside of test location

iSOC™ Demonstration– Conclusions

- Comparable attenuation rates estimated for MTBE & Benzene and lower attenuation rates estimated for TBA
- Reductions in MTBE, TBA & Benzene mirror decreasing trend in BOD_5 to COD, & VOC to COD ratios
- Total VOC to BOD_5 ratios indicate a significant portion of VOC's not readily degradable
- Elevated levels of ferrous iron, BOD_5, & COD did not inhibit aerobic degradation or interfere with *iSOC*™ system performance