



*Barker Road to Trent Bridge  
Spokane River Segment*

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*Kaiser Trentwood Area Overview  
April 2015*



# *Agenda*

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- *Site General Information*
- *Site Background Groundwater Data*
- *Casting Area Groundwater Data*
- *River Area Groundwater Data*
- *Source and Pathway Actions*
- *Treatment System Pilot Testing*
- *Overall Observations*

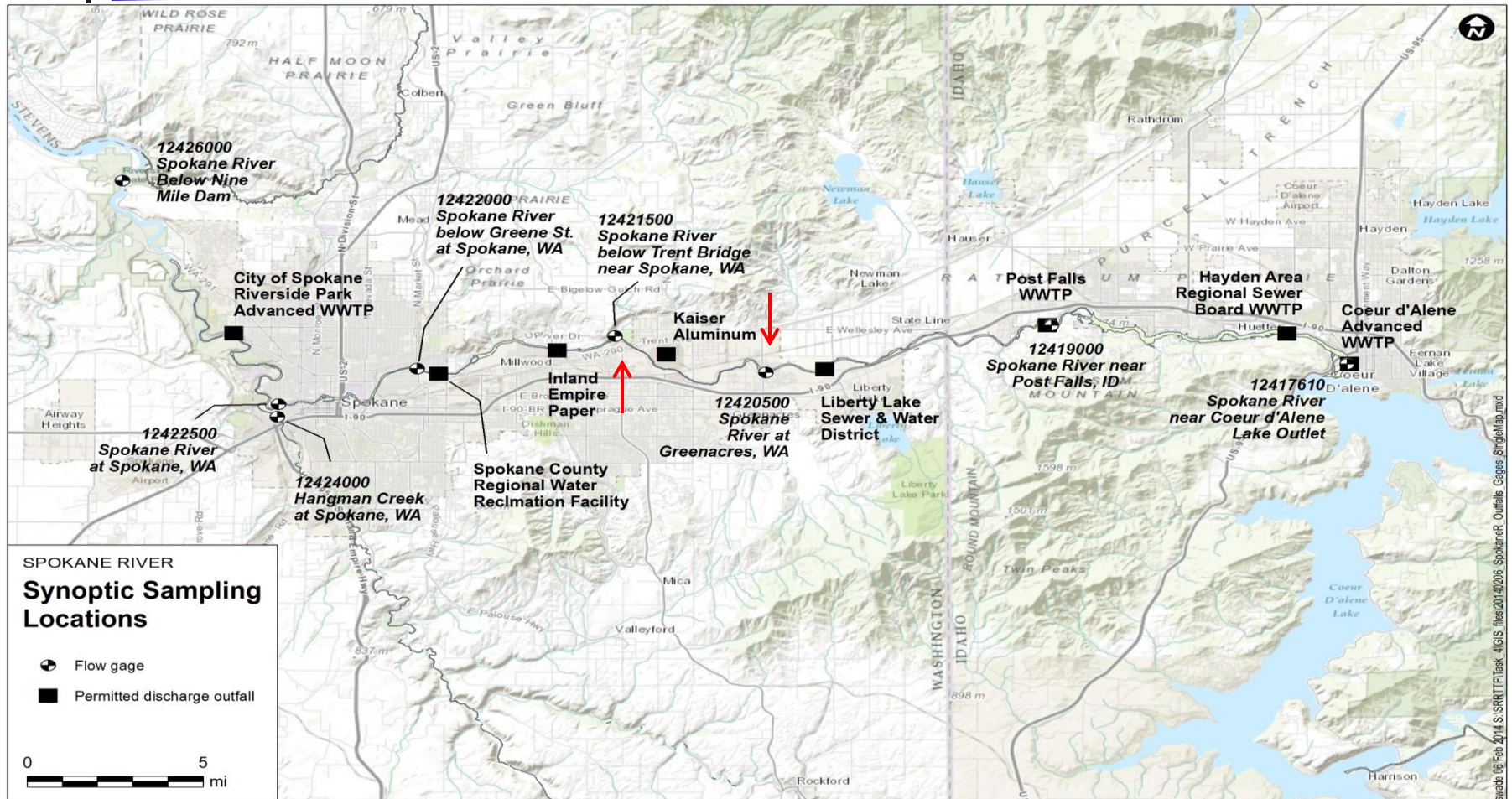


# *Agenda*

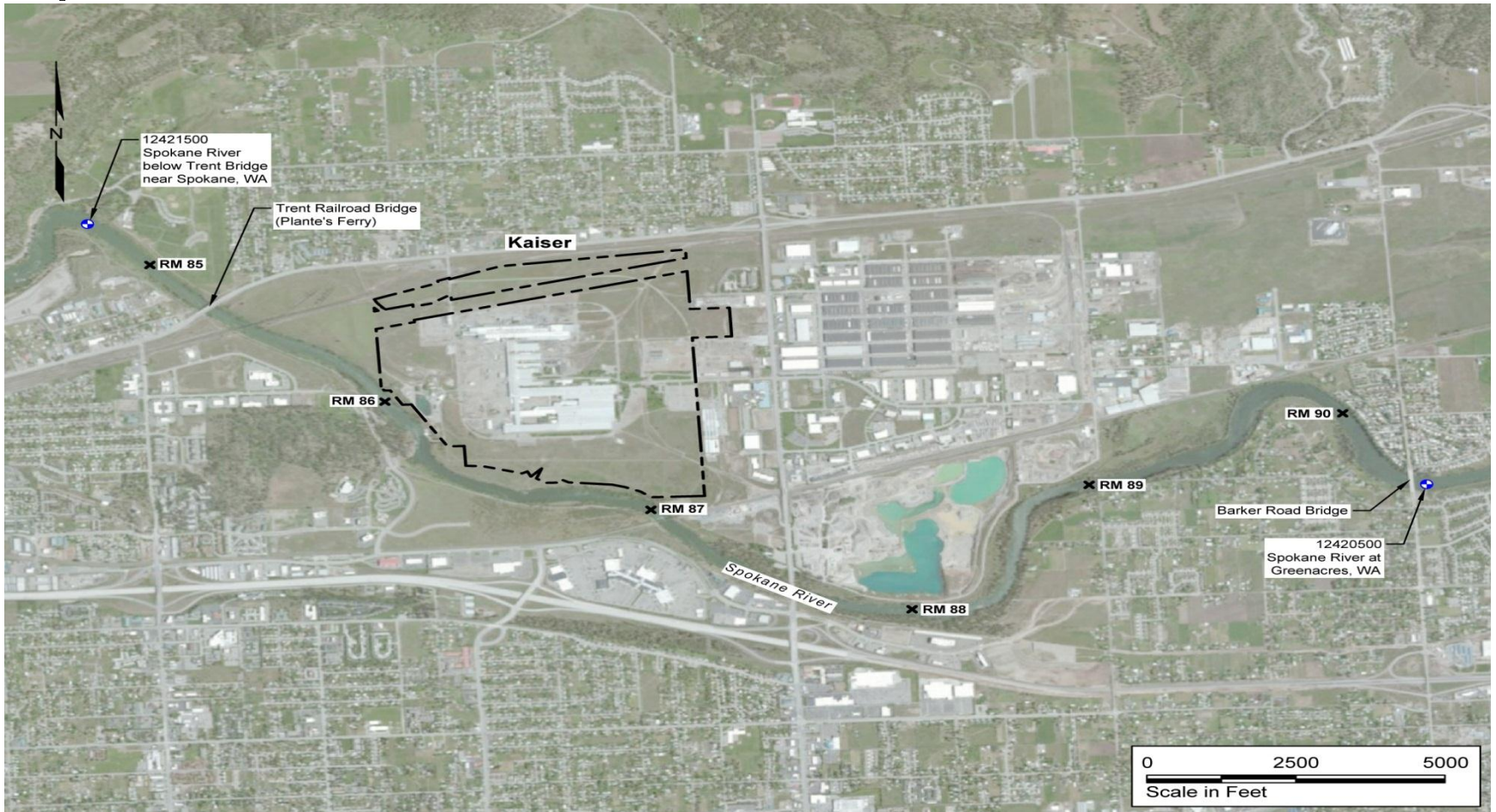
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# Spokane River Synoptic Survey Scope



# Spokane River Synoptic Survey Segment





## *Site Status*

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- *Model Toxics Control Act (MTCA)*
  - *Trentwood facility is a MTCA site*
  - *Kaiser and Ecology formalized all future activity on the site with an Agreed Order (No. 2692) in August 2005*
  - *Agreed Order scope of activities amended in September 2012*



## *Site Status*

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- *Model Toxics Control Act (MTCA)*
  - *All data, studies, and work plans are submitted to Ecology*
  - *All plans and specifications for actions are approved by Ecology*
  - *During the 2013 and 2014 Interim Actions, excavated ~34,000 cubic yards of soil and capped ~100,000 ft<sup>2</sup>*



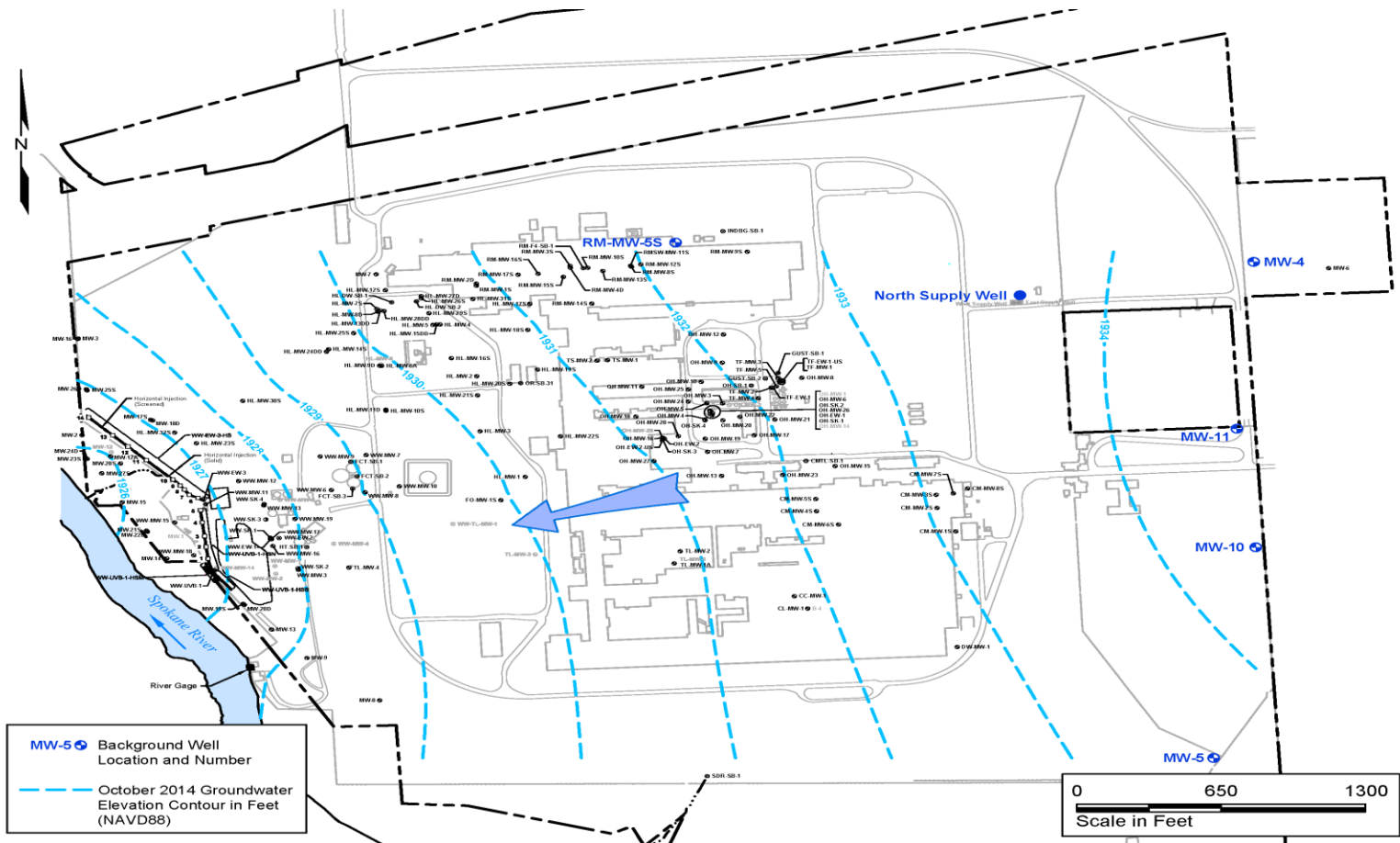
# *Site Groundwater Monitoring*

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- *Monitoring Network*
  - *153 monitoring wells on site*
  - *129 wells sampled either annually or semi-annually for various parameters*
  - *Groundwater elevation data collected during all sampling events*
    - *Groundwater flow direction is generally northeast to southwest*



# Site Groundwater Flow Direction





## *Site Groundwater Monitoring*

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- *PCB Data Sets – 2003 to Present*
  - *~1,900 samples analyzed for PCB by Method 8082ULL at ALS Global*
  - *~200 samples analyzed for PCB by Method 1668 at AXYS*



## *Background Data Collection*

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- *Data Collection Details (Congeners)*
  - *Routine sample collection since 2007*
  - *Samples collected in accordance with Ecology approved Sampling and Analysis Plan*
  - *One liter samples collected*
  - *Samples processed for PCB by EPA Method 1668 (AXYS Analytical)*



# *Background Data Collection*

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- *Data Processing*
  - *Blank Correction*
    - *Blank values subtracted from raw data on congener by congener basis*
    - *If blank value larger than or equal to raw value, corrected value is set to zero*
  - *Non-Detects*
    - *“Less than” raw data is set to zero*



# *Background Data Collection*

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- *Data Processing*
  - *Homologues*
    - *Homologues are determined following blank corrections and non-detect corrections*



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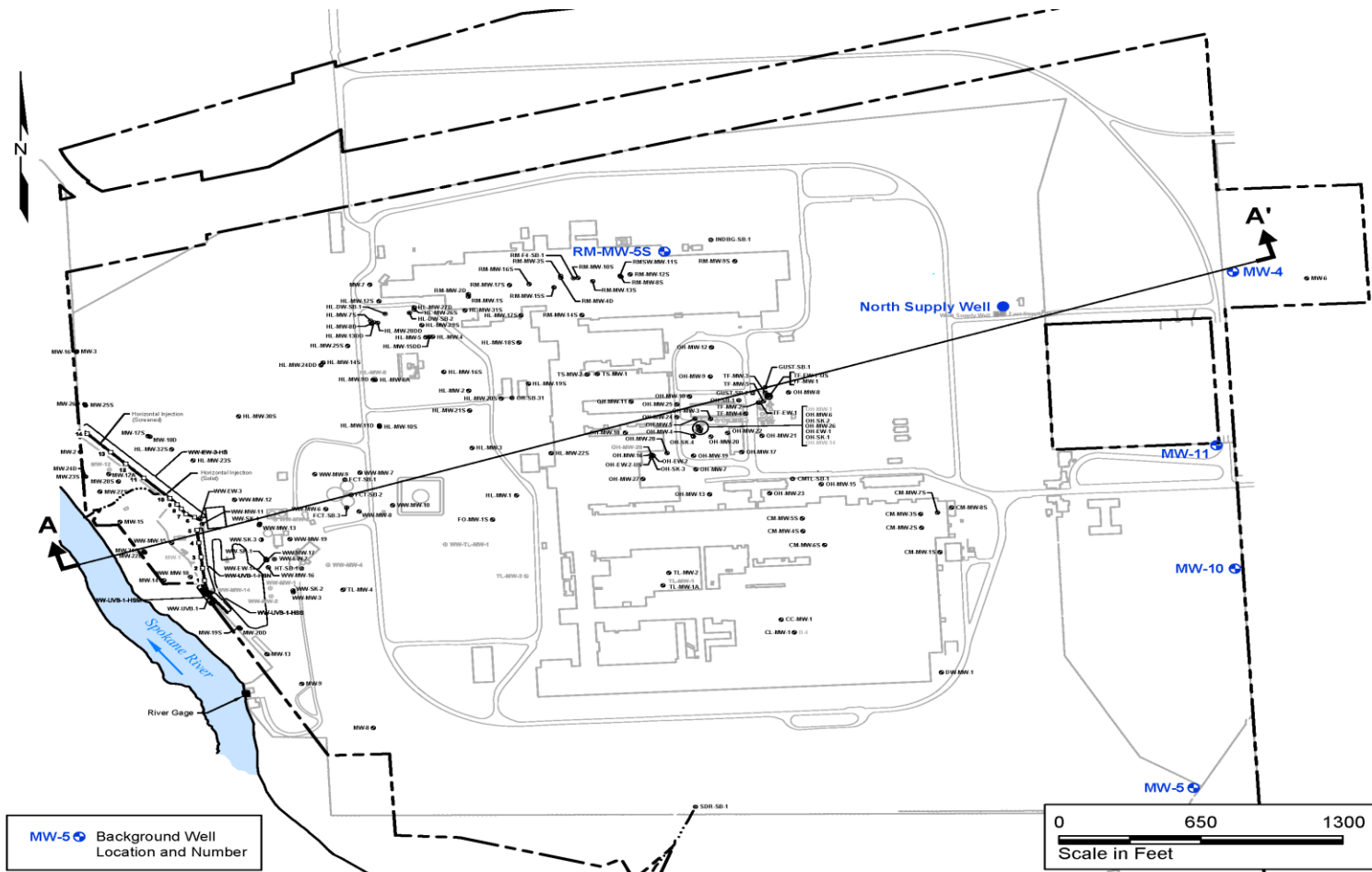


## *Background Data Collection*

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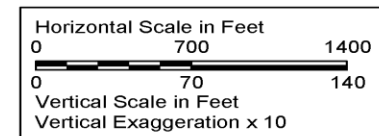
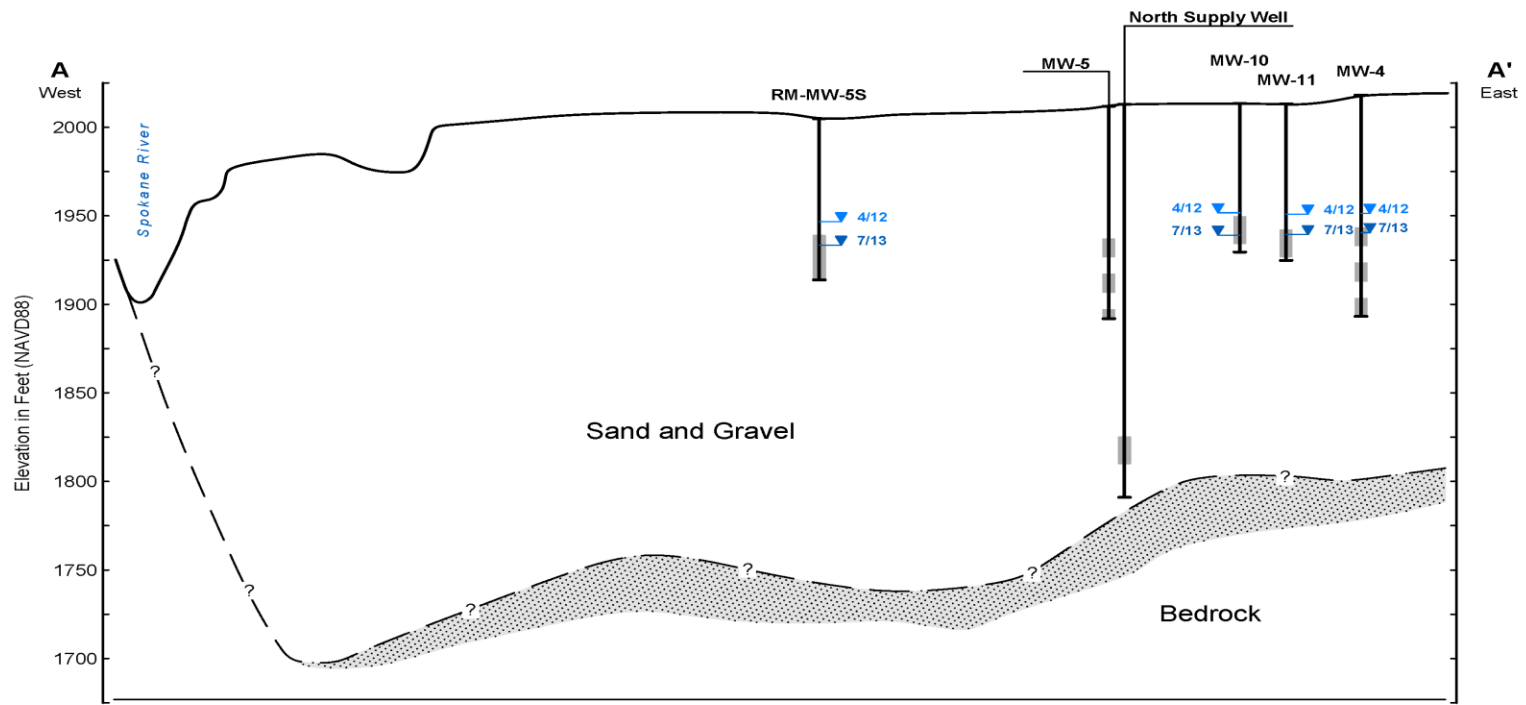
- *Site Background Groundwater Monitoring*
  - *Five wells screened in the upper aquifer*
    - *RM-MW-5S, MW-4, MW-11, MW-10, and MW-5*
  - *One water supply well screened at depth*
    - *North Well*

# Site Background Monitoring Wells





# Site Background Cross Section





## *Site Background*

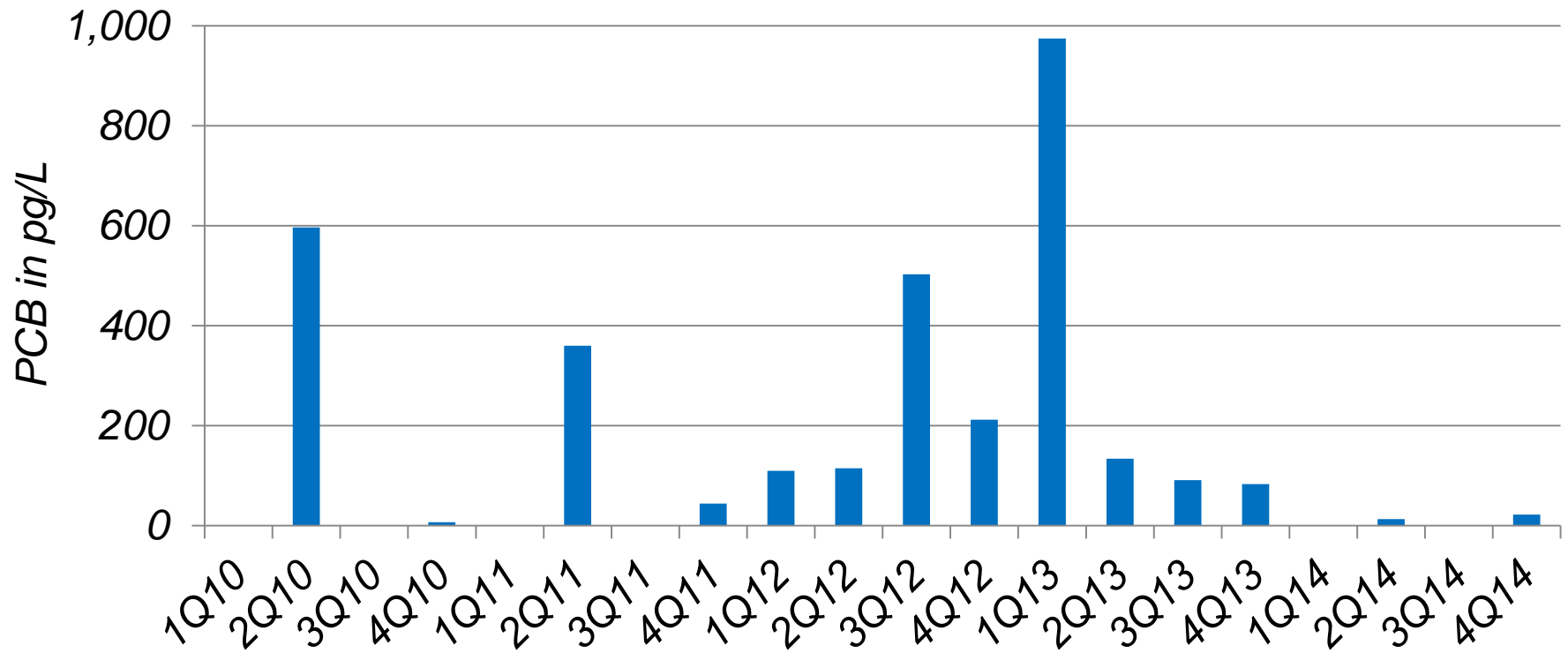
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- *PCB concentrations in site background groundwater are significant relative to the synoptic survey unidentified non-point source contribution*
- *~80% of total PCB is in the tetra to hepta homologue groups*



# *Background PCB Levels*

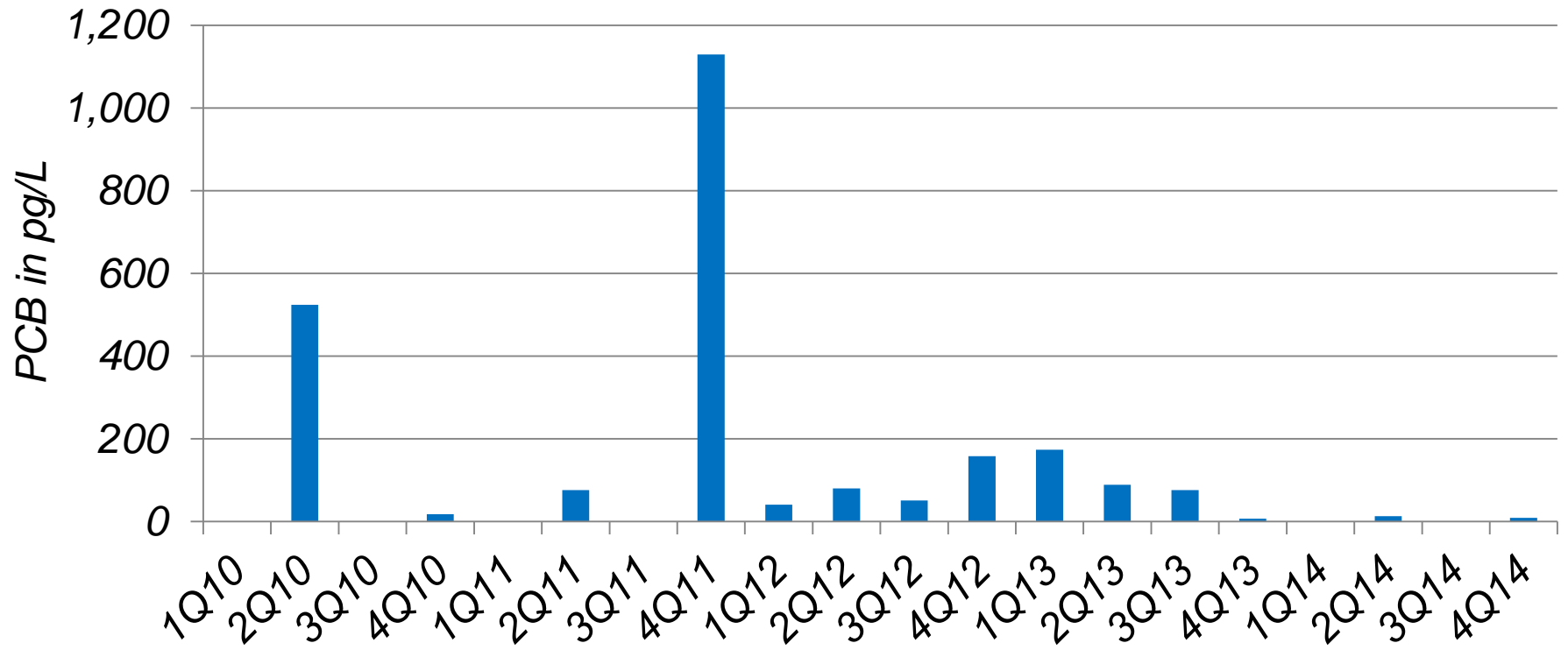
*RM-MW-5S*





# Background PCB Levels

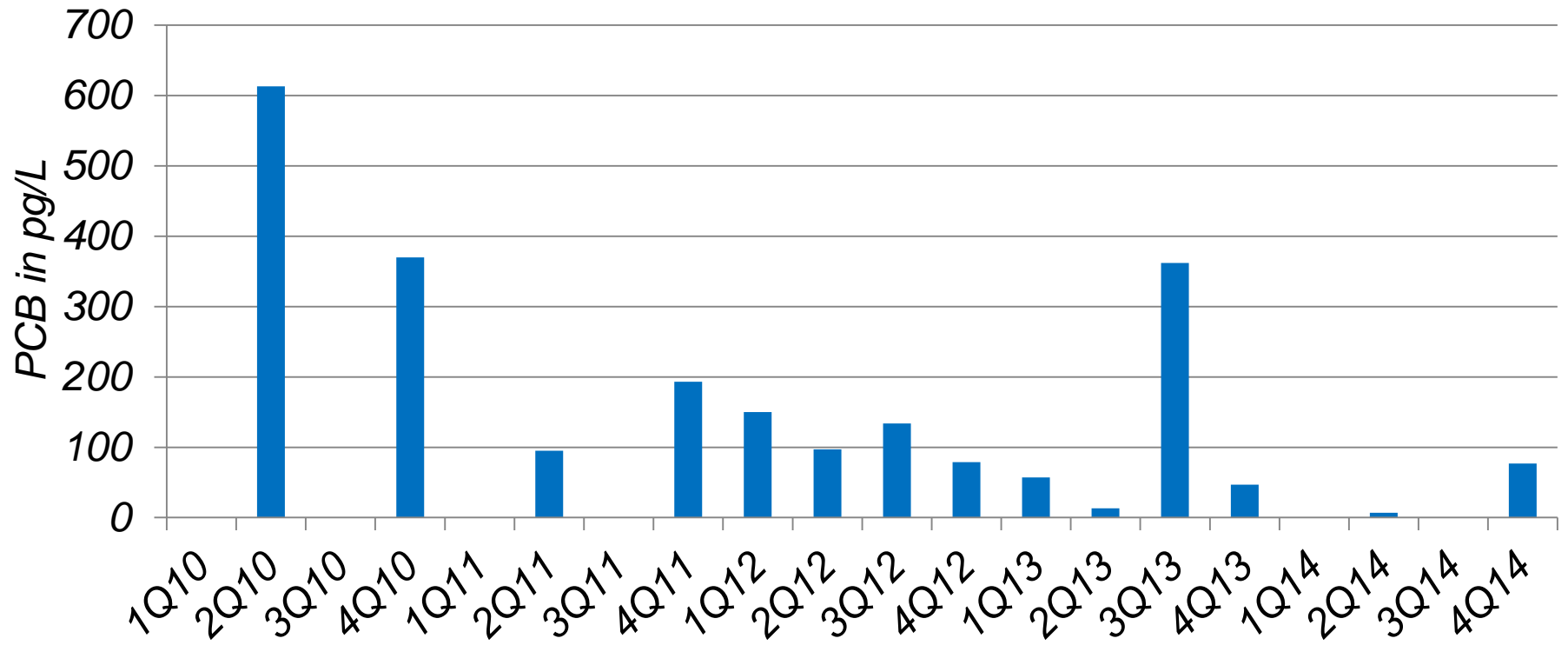
MW-4





# Background PCB Levels

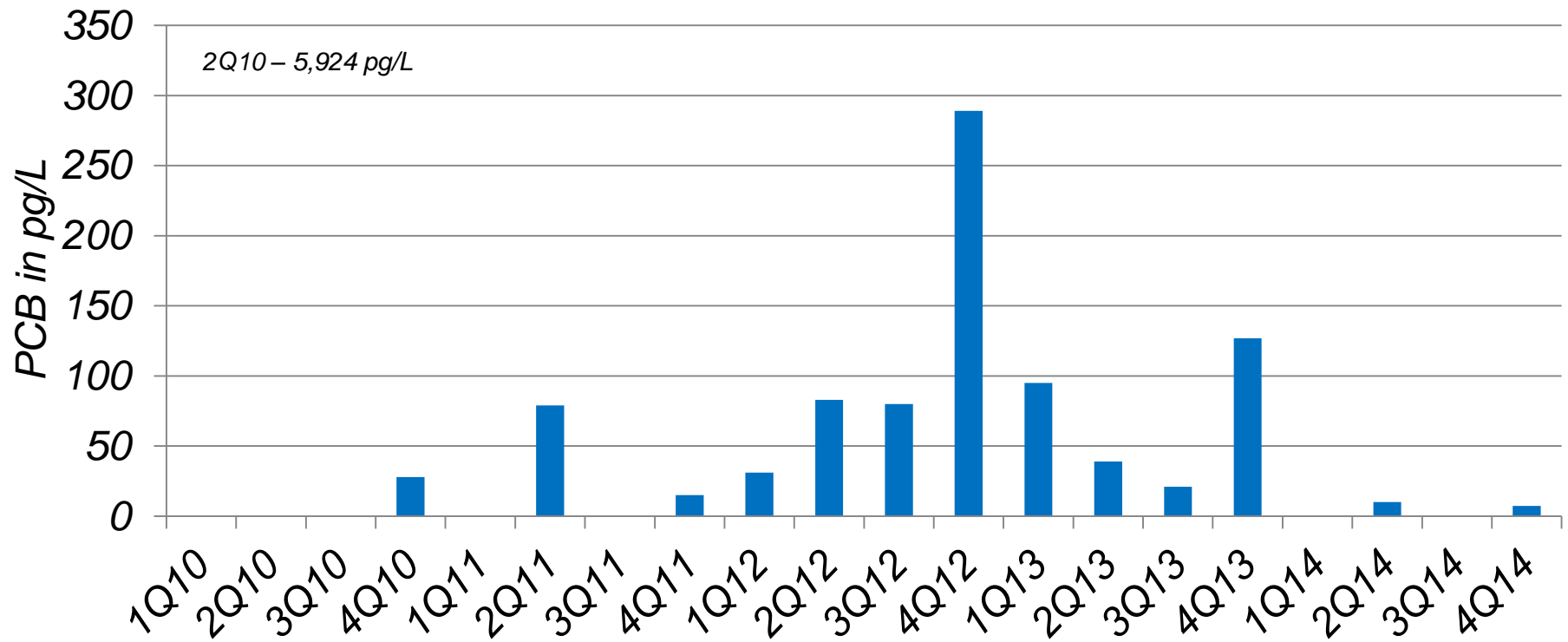
MW-11





# Background PCB Levels

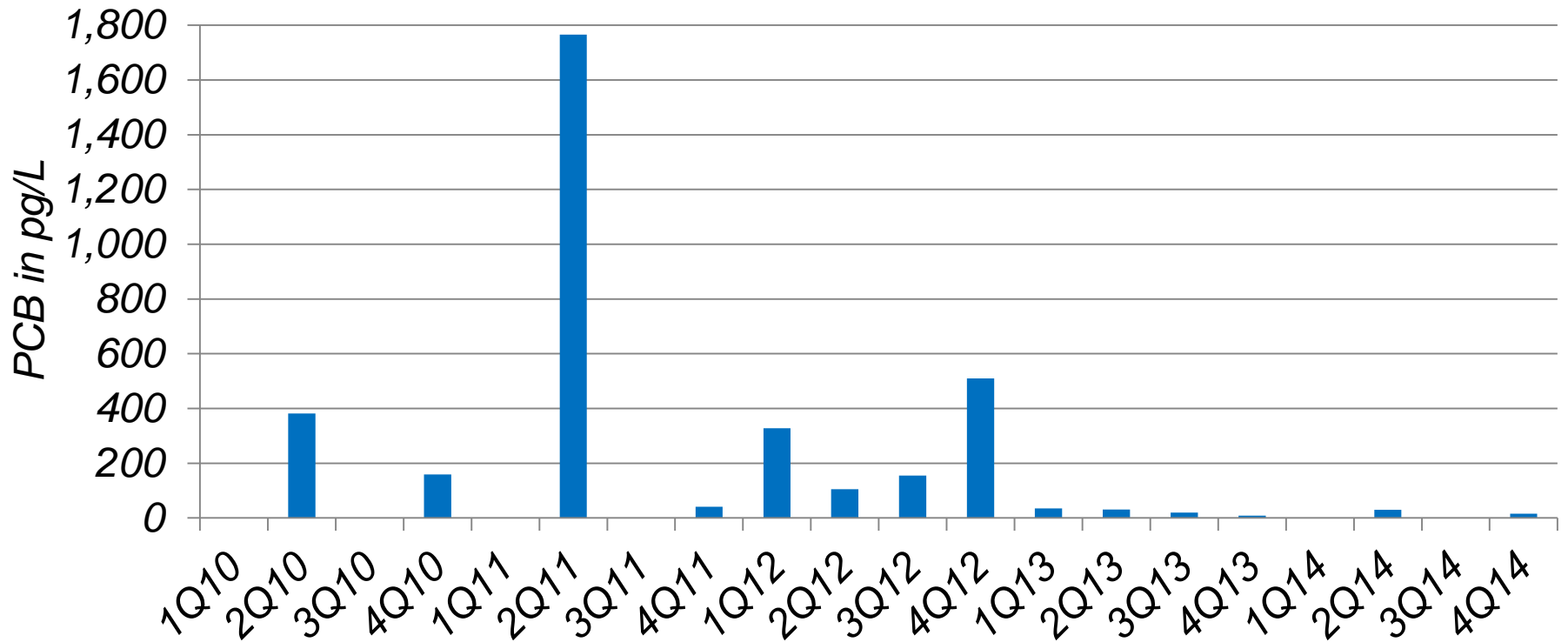
MW-10





# Background PCB Levels

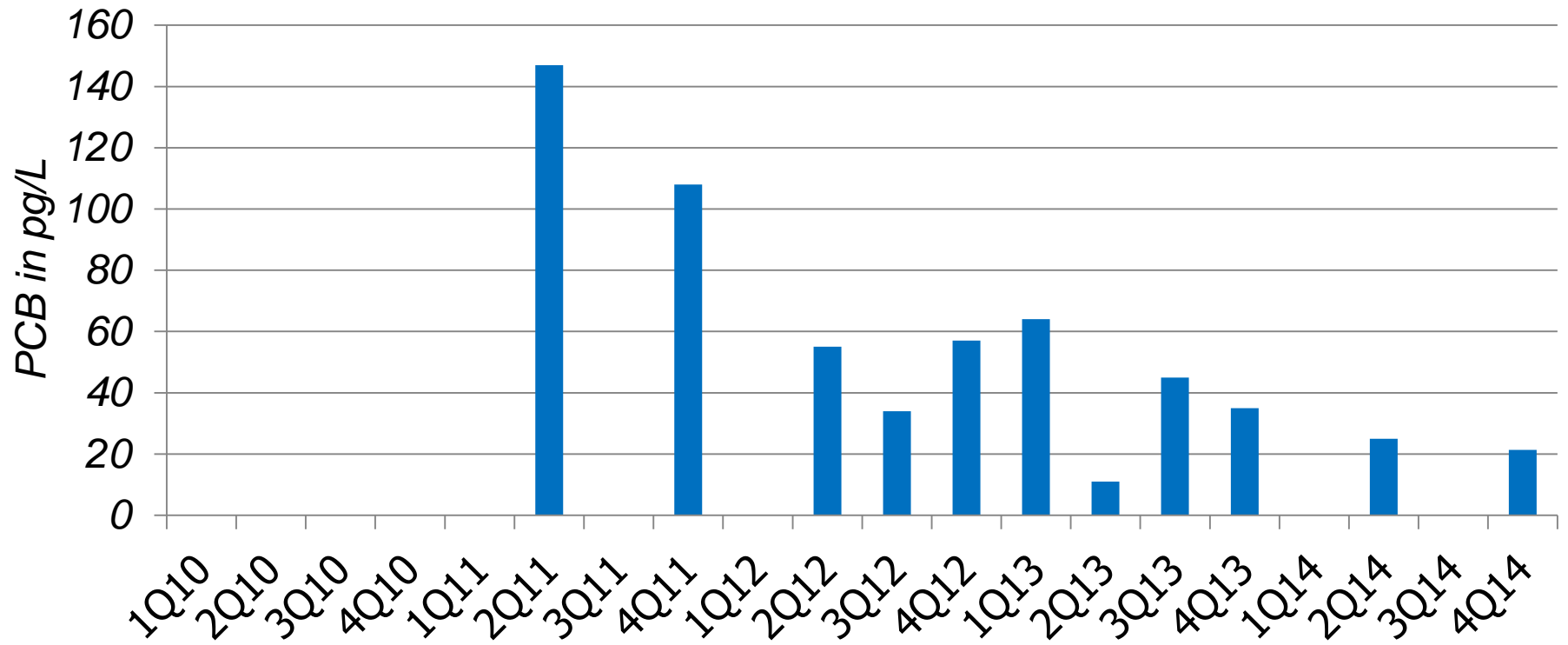
MW-5





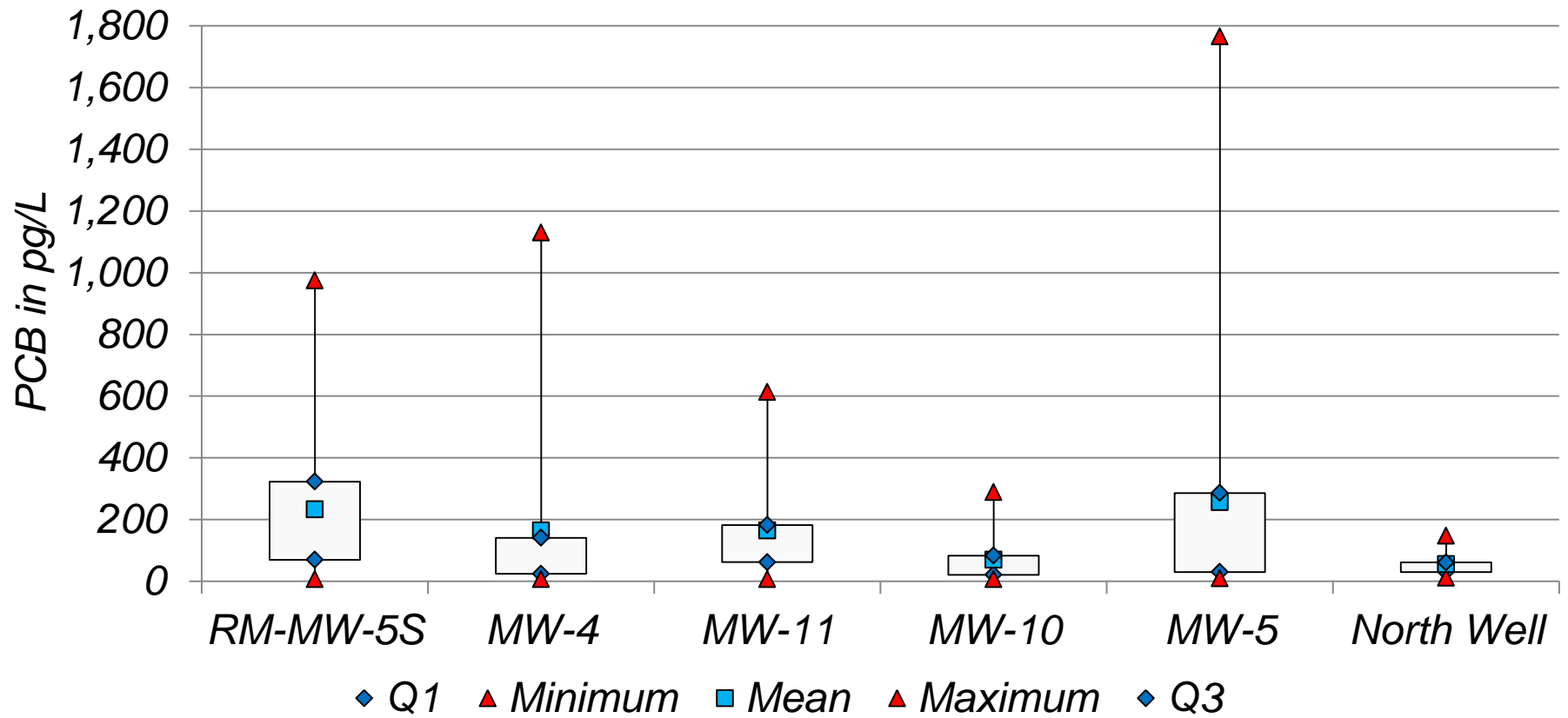
# Background PCB Levels

## North Well





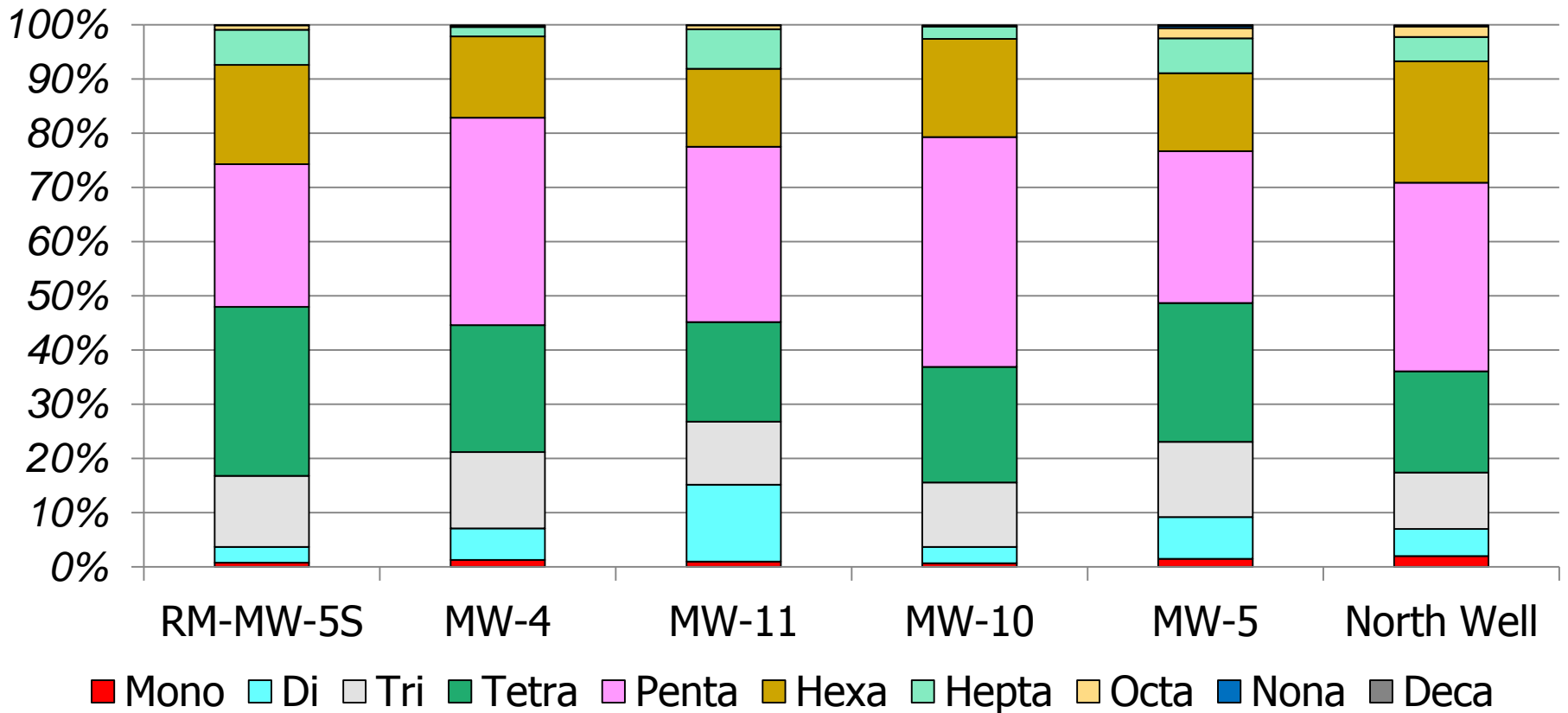
# Background PCB Levels



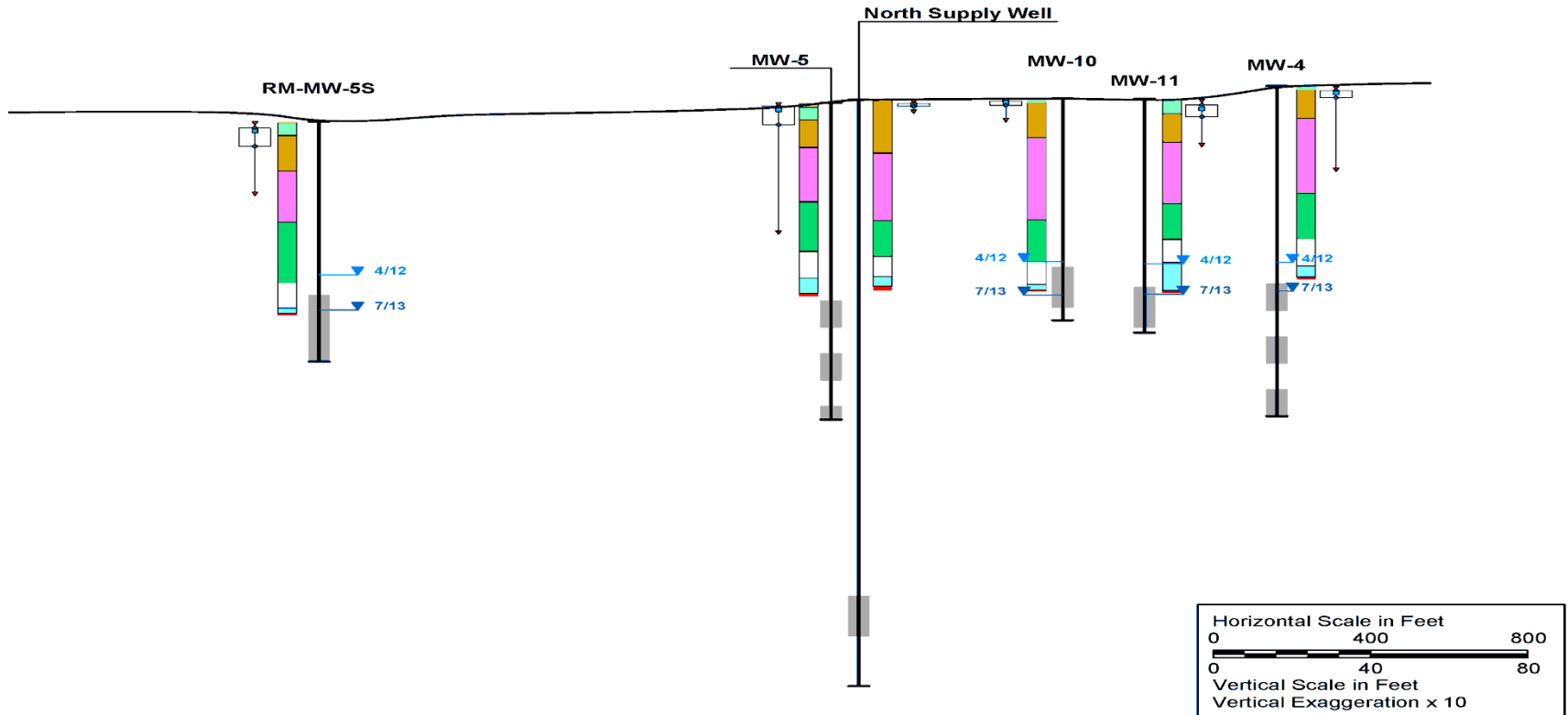
The 5,924 pg/L result for MW-10 not included

Q1 and Q3 refer to data quartiles – 50% of data is within the box shown for each location

# Background PCB Homologues



# Site Background Overview





## *Background Area Observations*

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- *Background wells have variable PCB levels*
- *Homologue fingerprint is fairly stable*
- *Tetra through hepta homologue groups represent about 80% of the total PCB*



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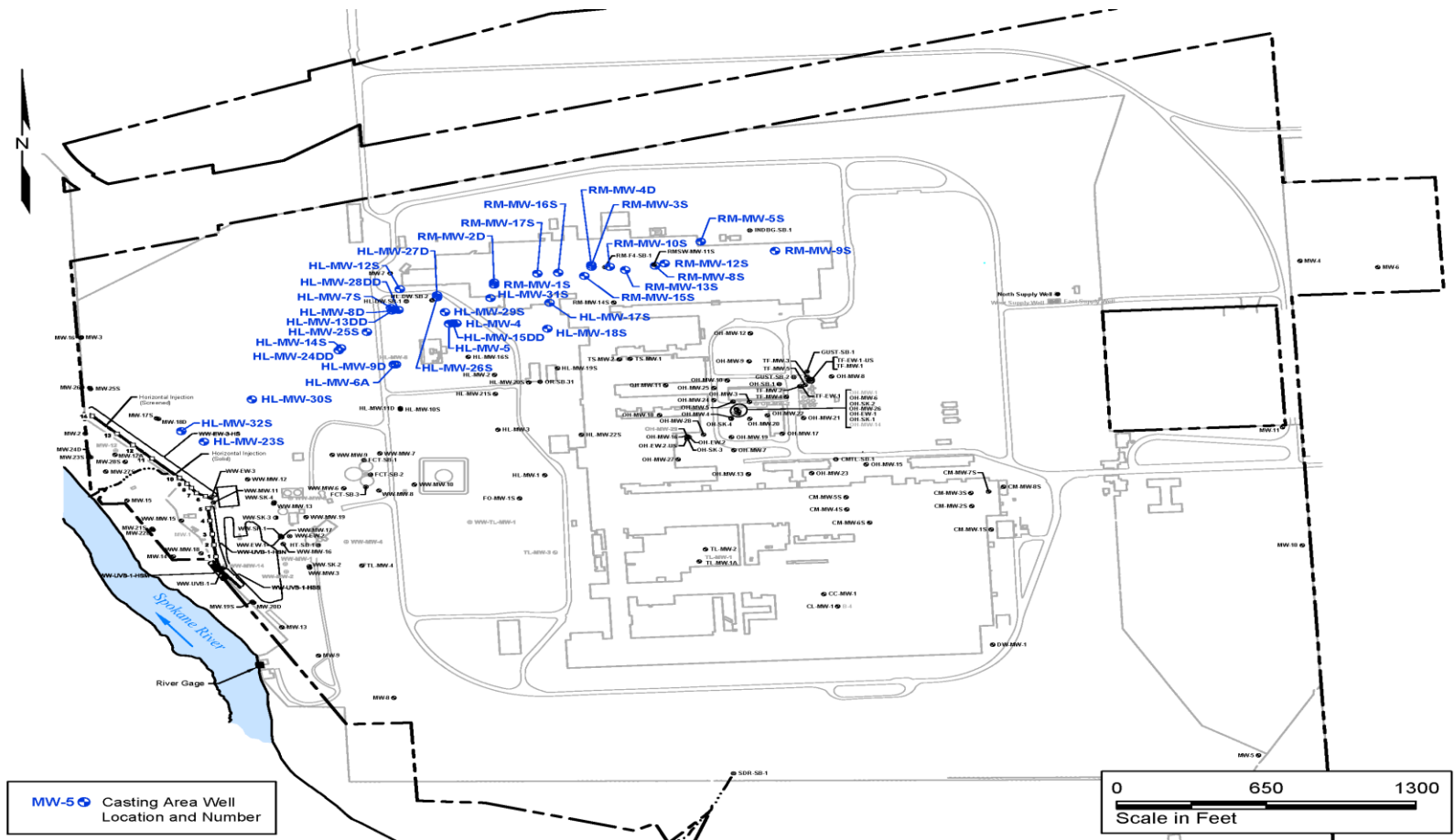


## *Casting Area Data Collection*

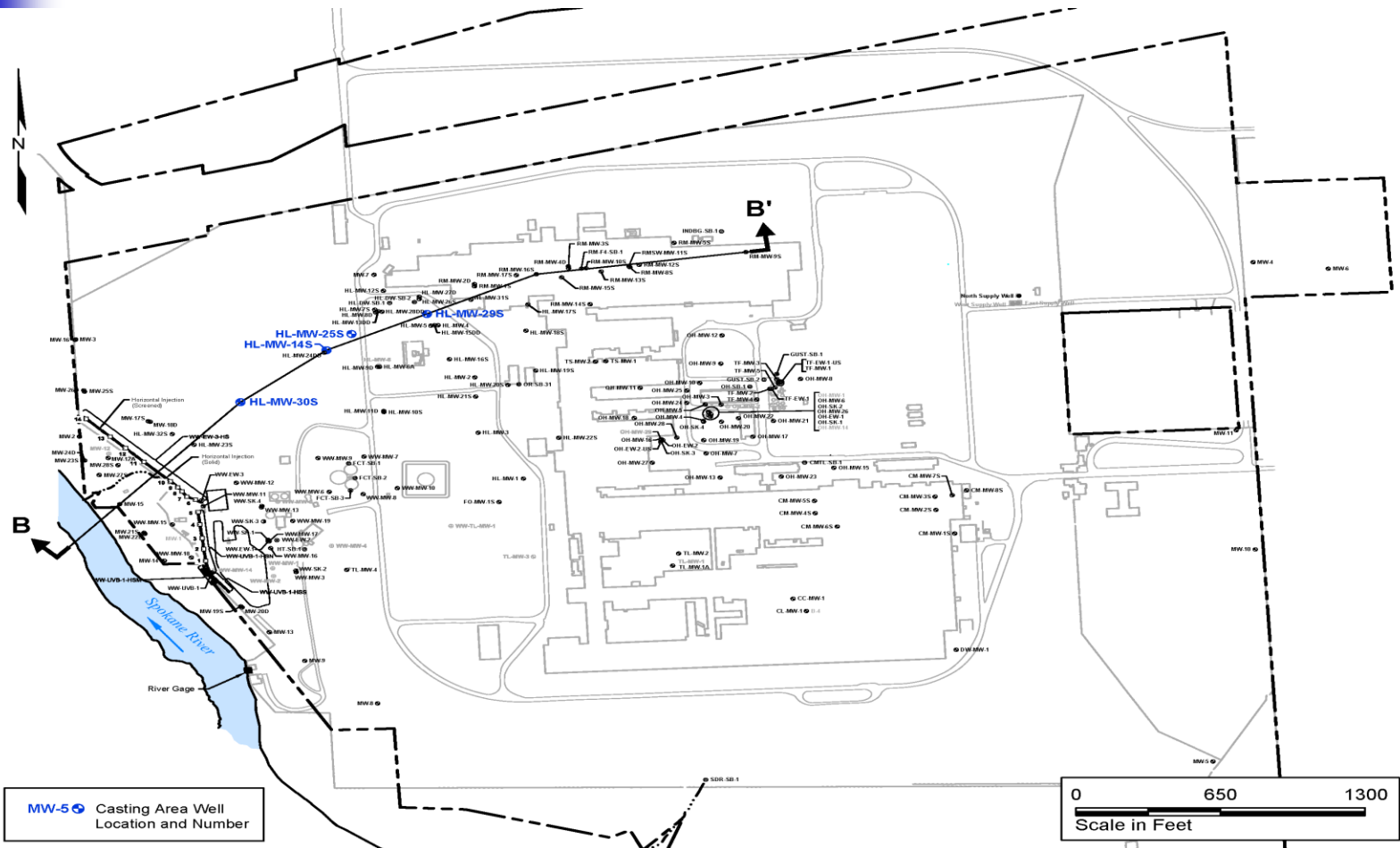
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- *Casting Area Groundwater Monitoring*
  - *Approximately 35 wells screened mainly in the upper aquifer*
  - *Four upper aquifer wells are tracked as “centerline” wells*

# Casting Area Monitoring Wells

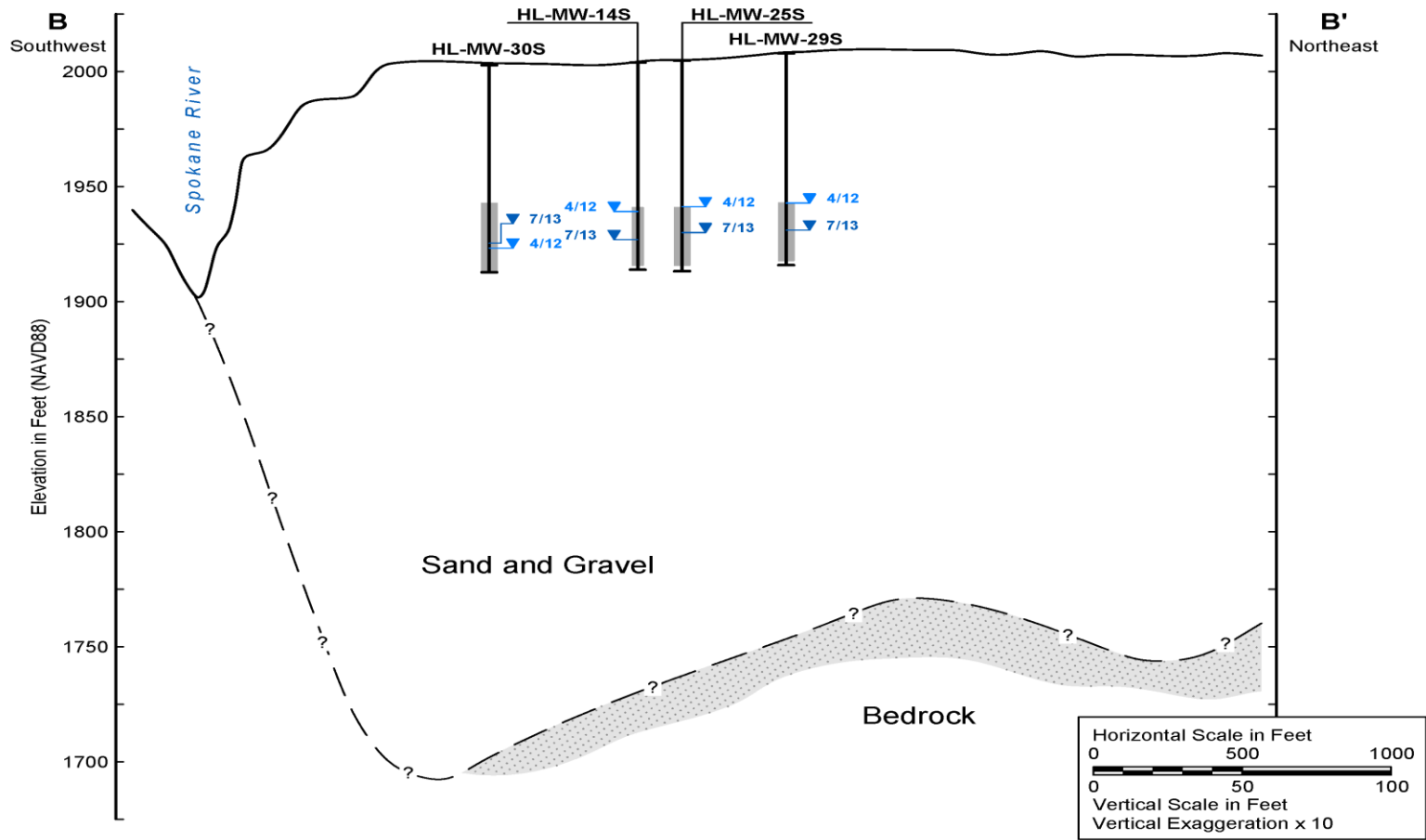


# Casting Area Centerline Monitoring Wells

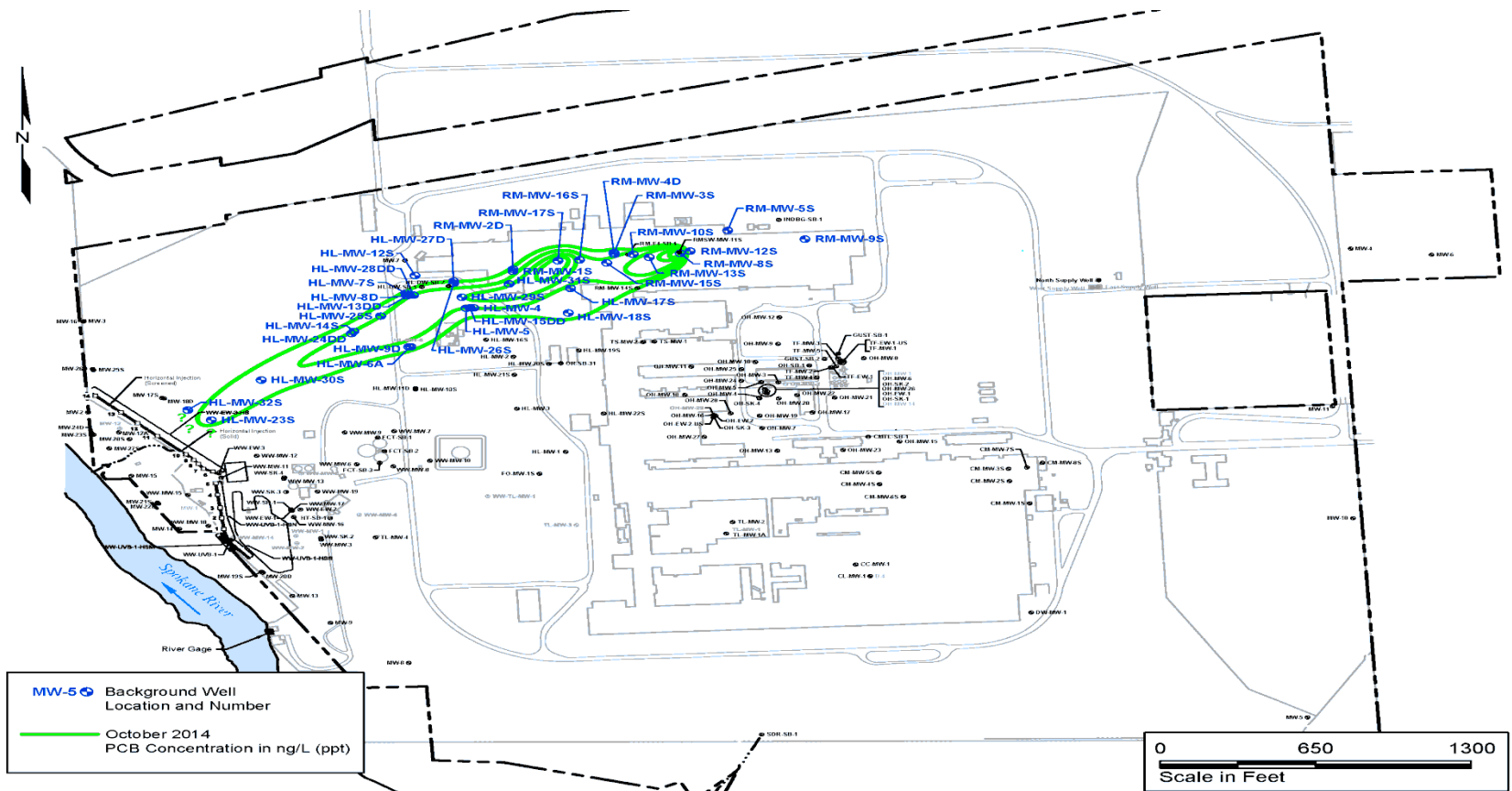




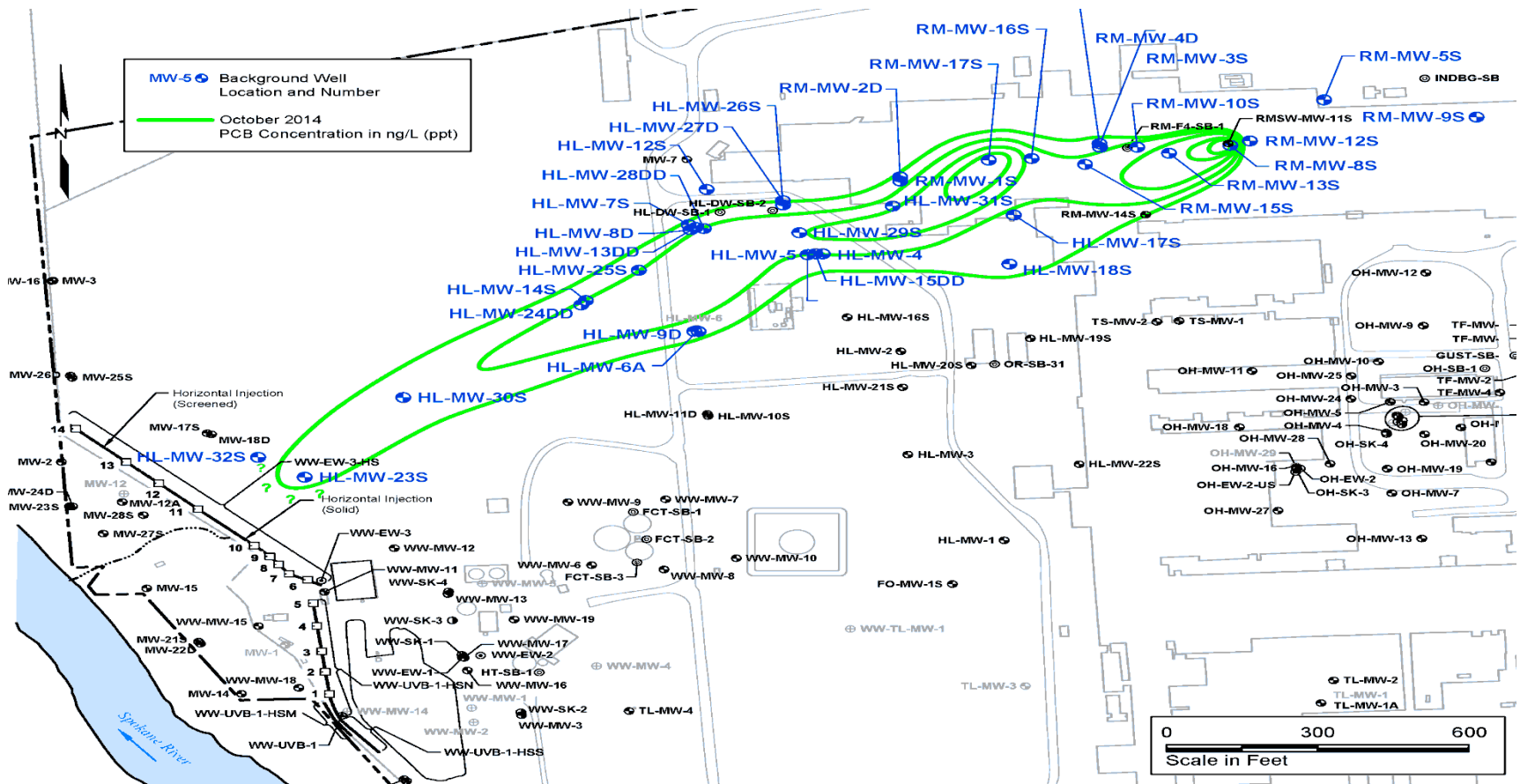
# Casting Area Cross Section



# Casting Area PCB Contours



# Casting Area PCB Contours





## *Casting Area*

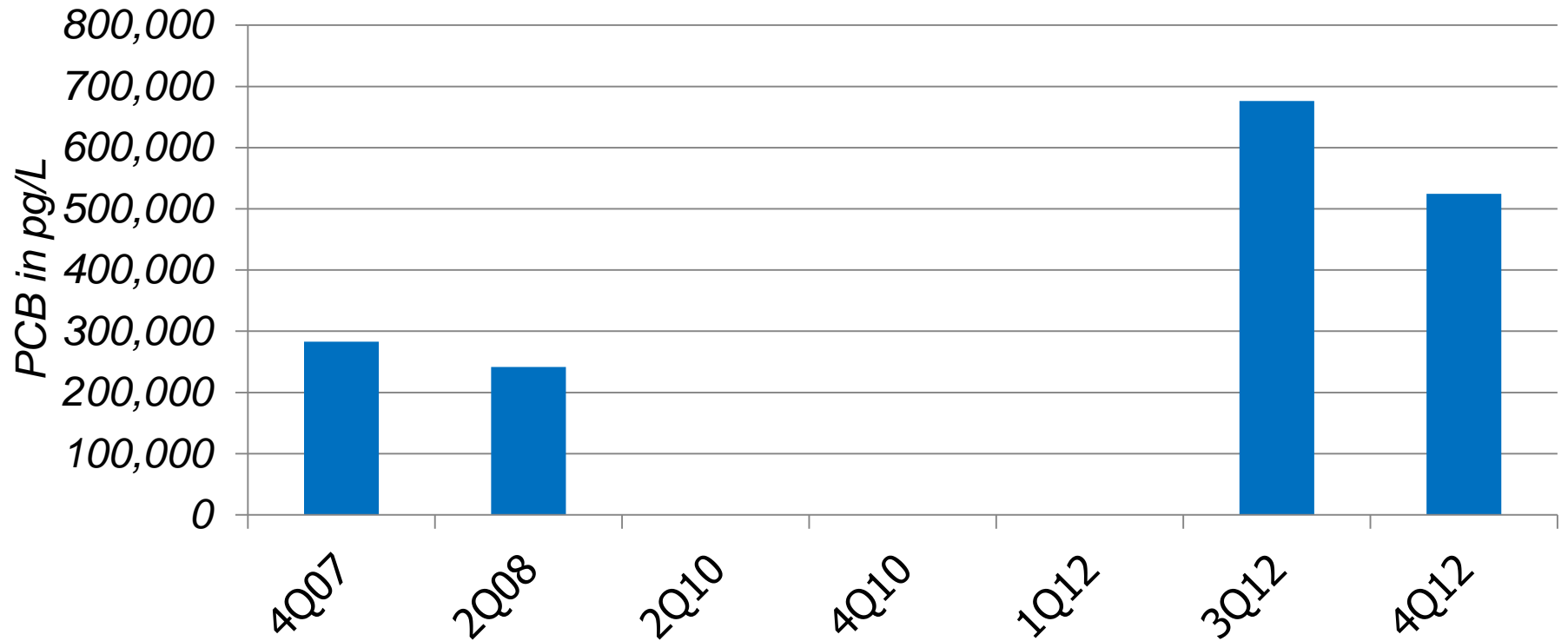
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- *Relative to site background, there is a significant difference in homologue patterns*
  - *~94% of total PCB is in the tri and tetra homologue groups*



# Casting Area PCB Levels

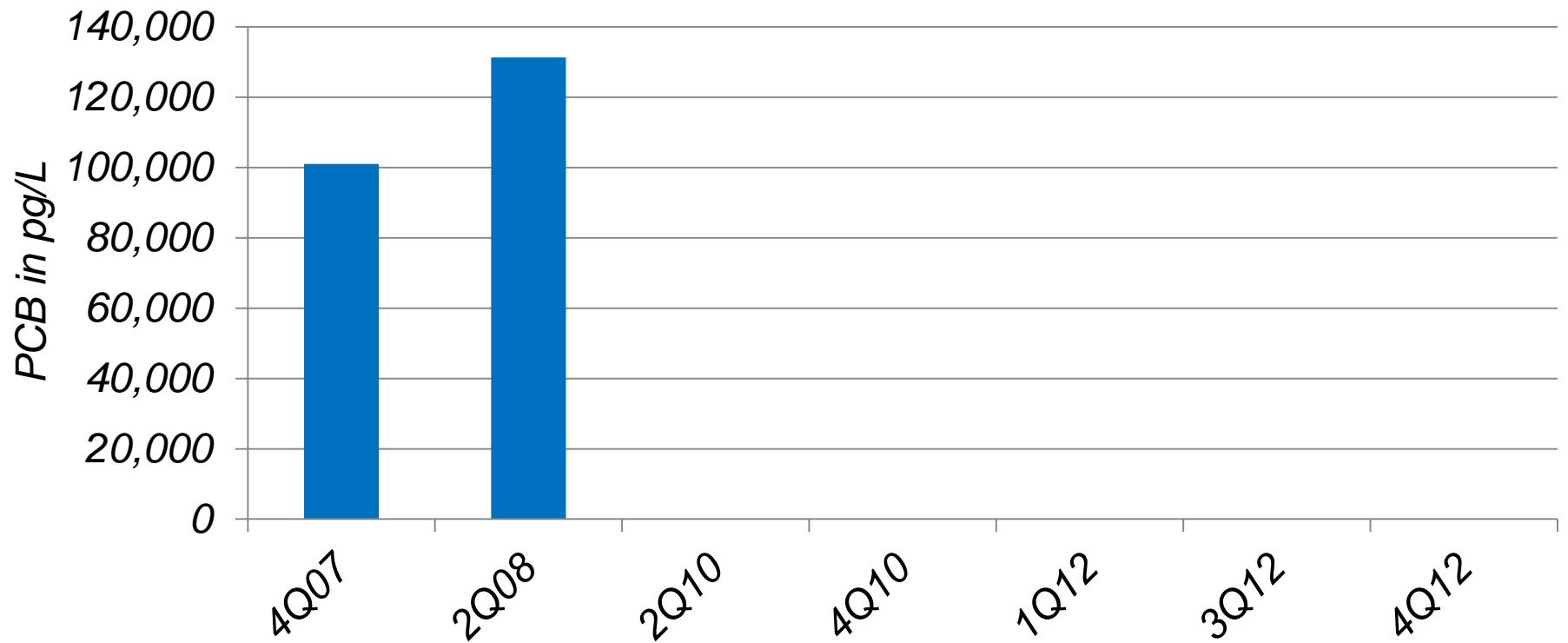
HL-MW-29S





# *Casting Area PCB Levels*

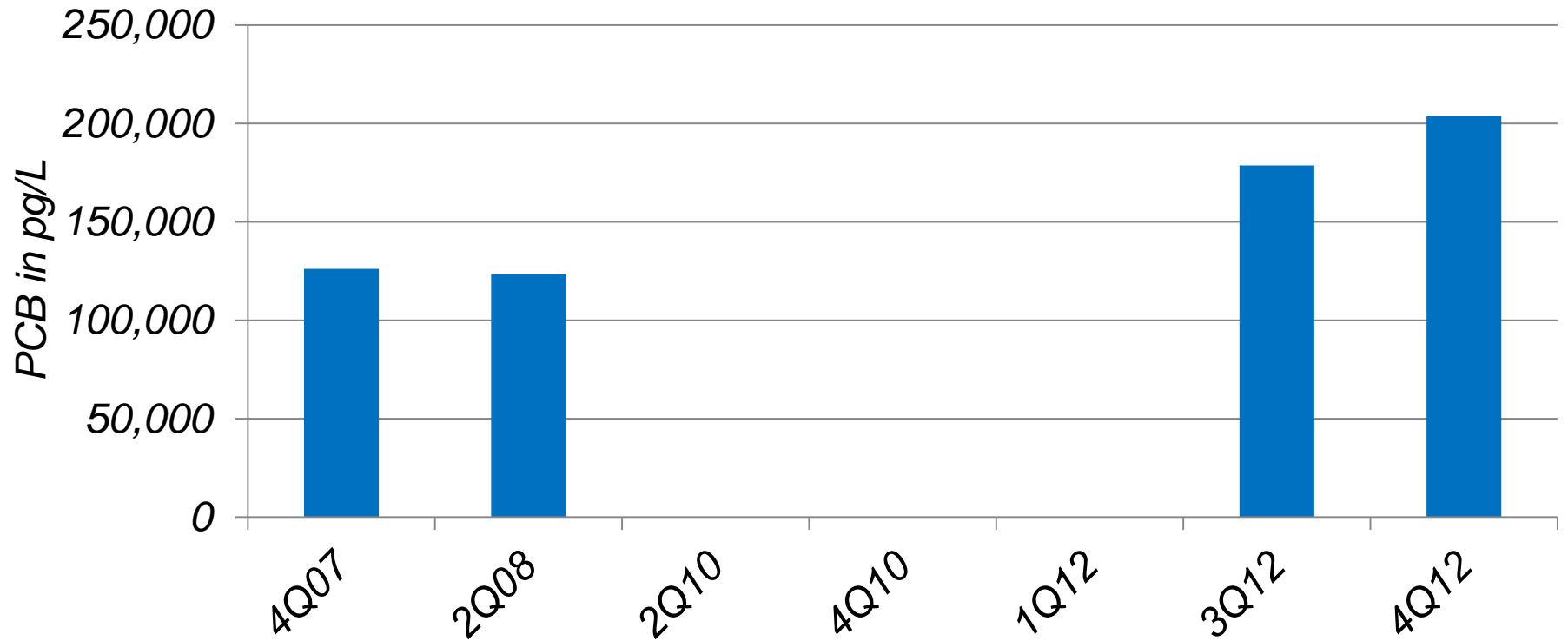
*HL-MW-25S*





# *Casting Area PCB Levels*

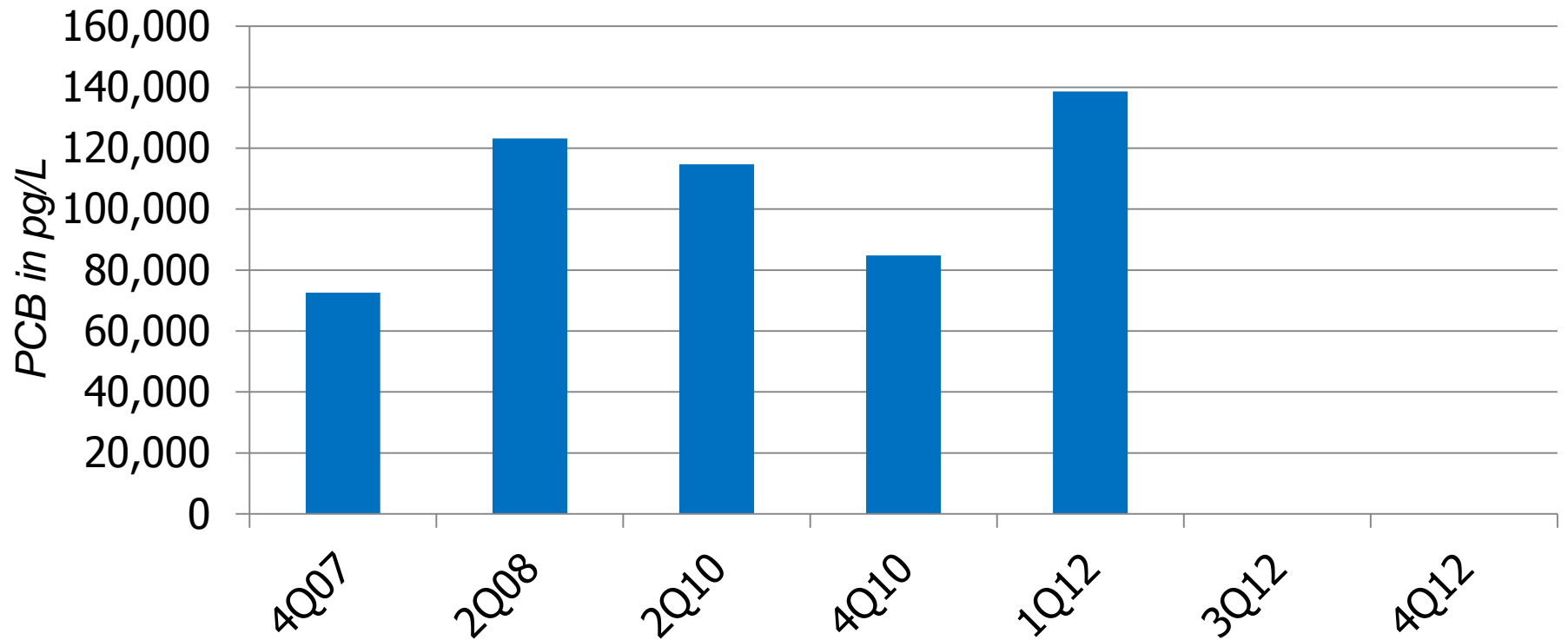
*HL-MW-14S*





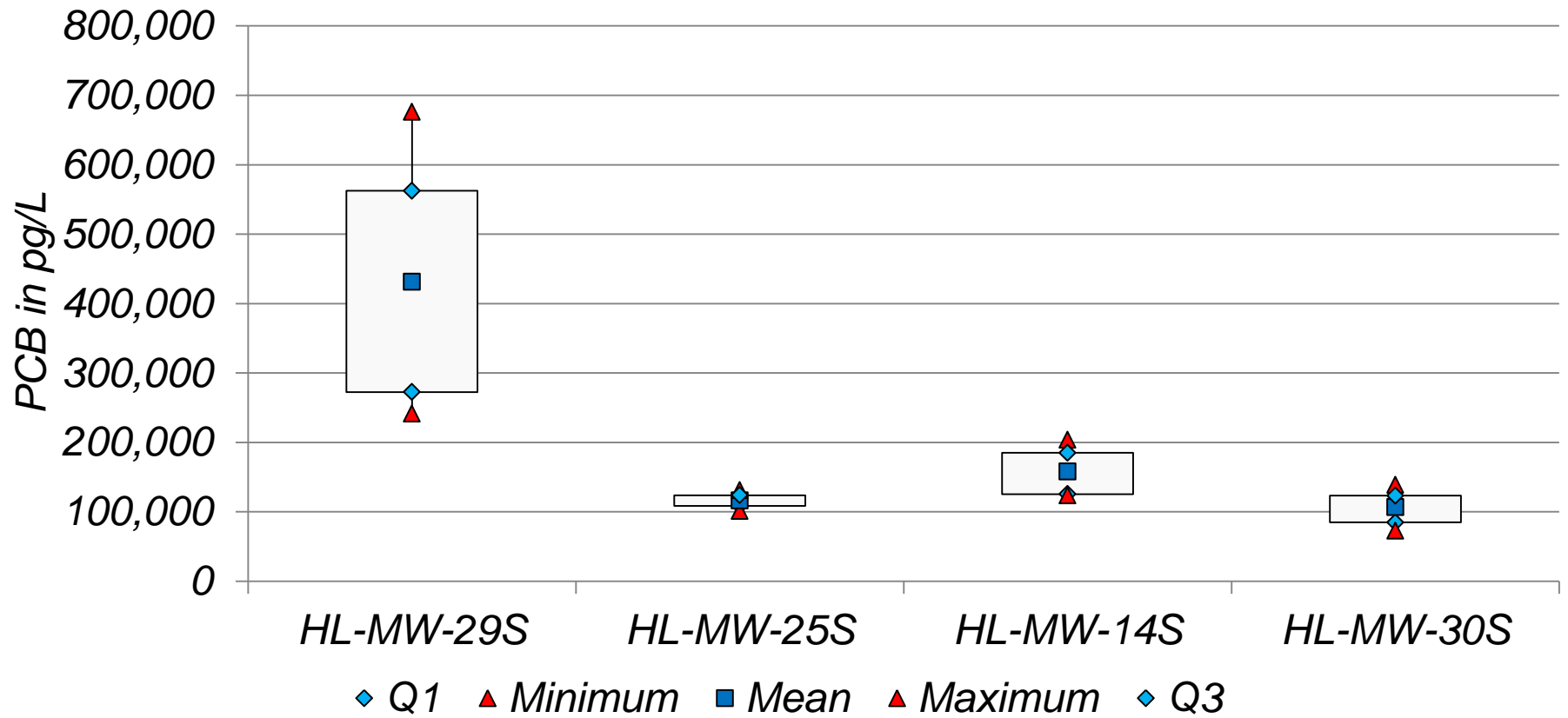
# *Casting Area PCB Levels*

*HL-MW-30S*



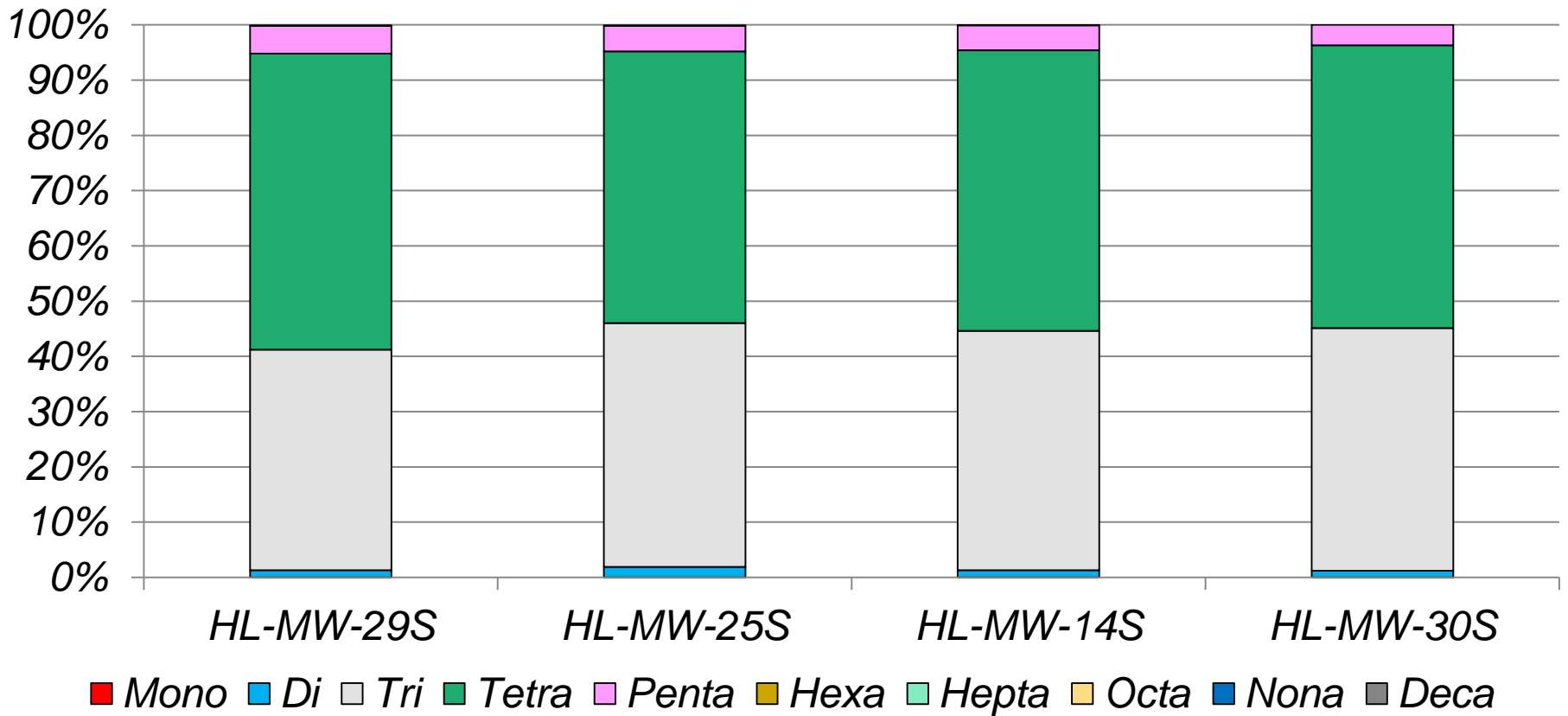


# Casting Area PCB Levels

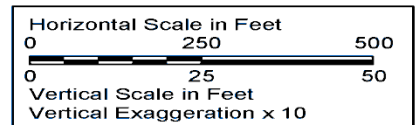
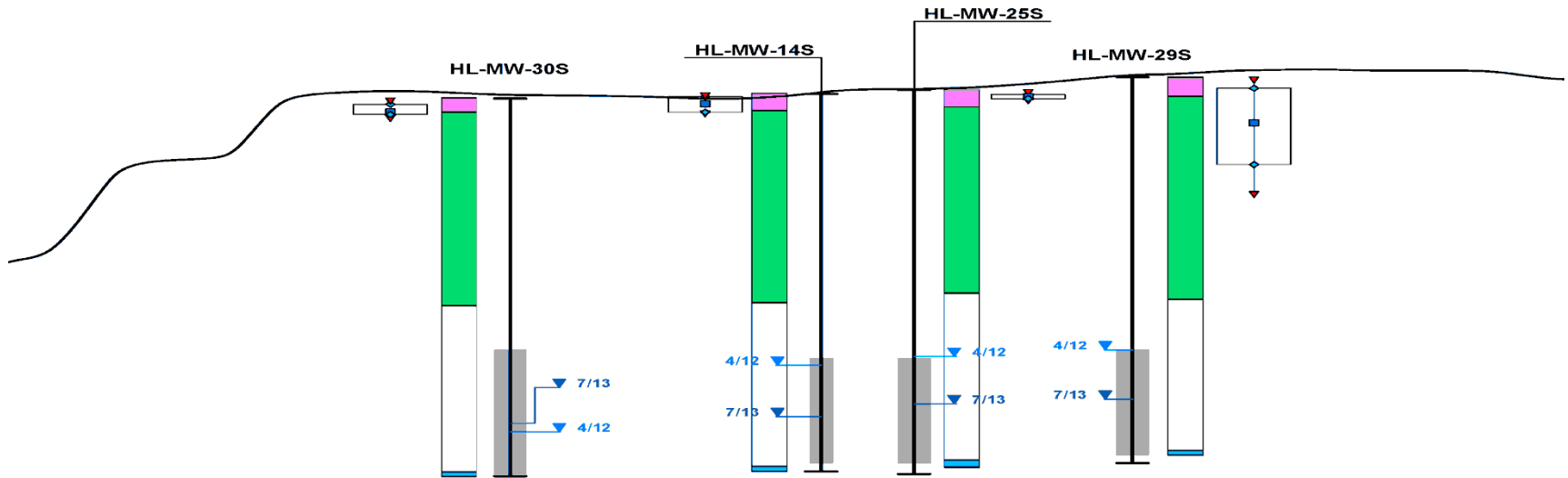


Q1 and Q3 refer to data quartiles – 50% of data is within the box shown for each location

# Casting Area PCB Homologues



# Casting Area Overview





## *Casting Area Observations*

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- *PCB homologue profile is very stable in “centerline” monitoring wells*
- *PCB profile in “centerline” monitoring wells is dominated by Tri and Tetra homologue groups and represents about 94% of the total PCB*



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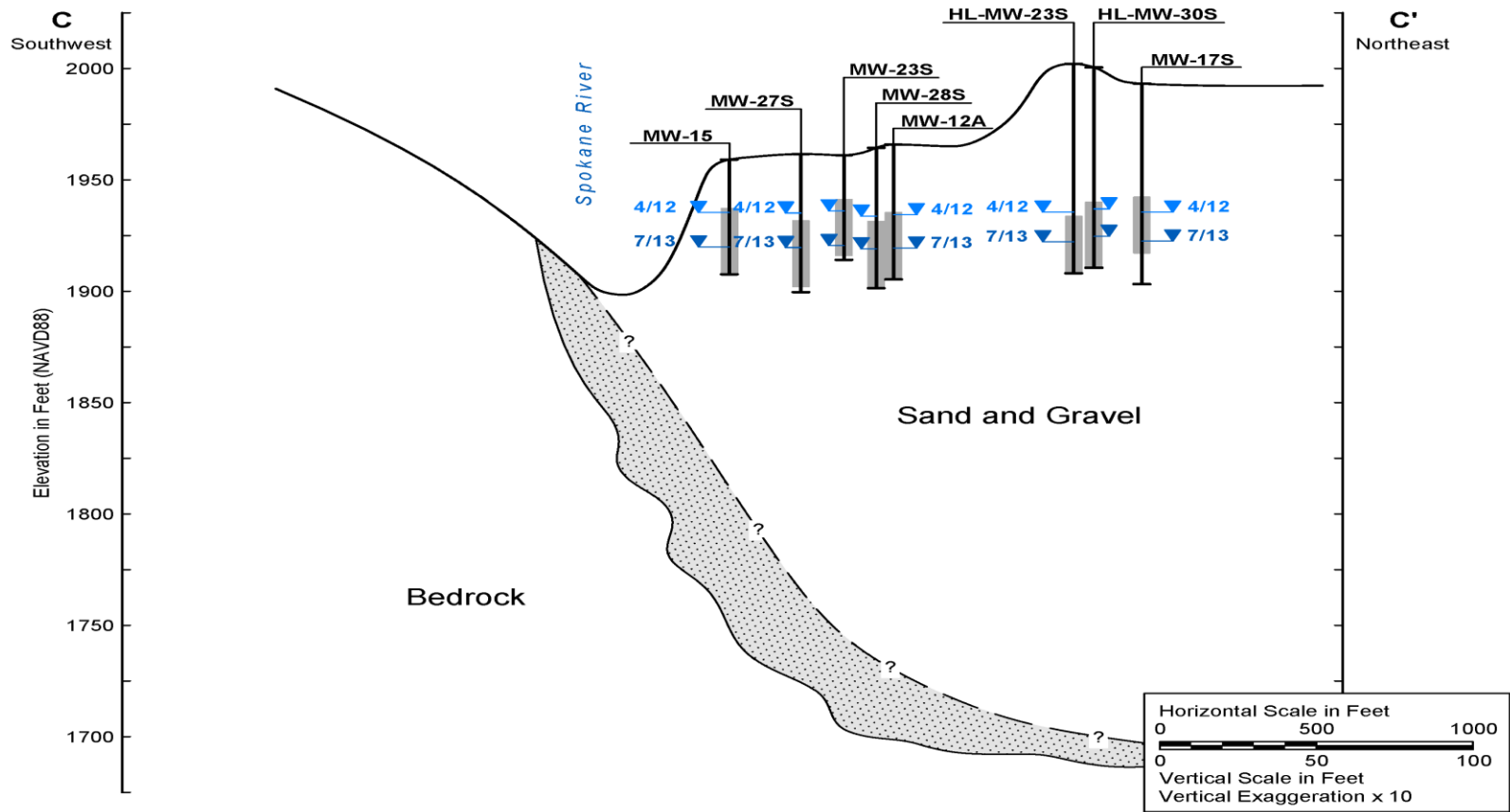
## *River Area Data Collection*

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- *River Area Groundwater Monitoring*
  - *8 wells screened in the upper aquifer*
  - *13 additional wells are located at the western edge of the site running north and south*



# River Area Cross Section







## *River Area Groundwater*

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- *The relationships between groundwater elevation, flow direction, and PCB levels in the vicinity of the river are complicated*



## *River Area Groundwater Flow*

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- *From September 2009 to January 2011 a pressure sensor network operated in 9 wells and in 2 locations in the river to collect water elevation data to better understand groundwater flow directions near the river*



## *River Area Groundwater Flow*

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- *Sensor data showed that groundwater flow direction changes significantly when river elevation increases*



# *River Area Groundwater Flow*

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*Video Clip*



## *River Area Groundwater Flow*

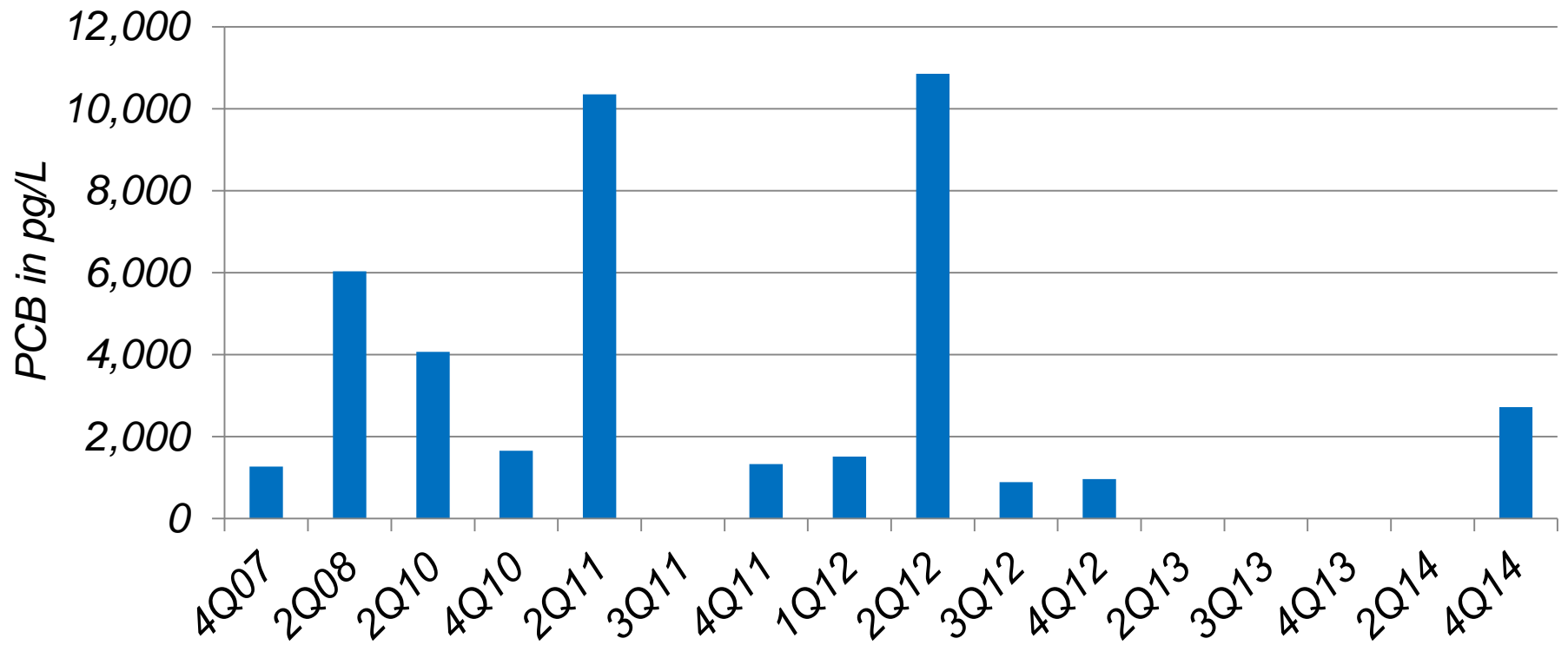
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- *Sensor data shows that these flow direction changes are frequent and variable in duration*
  - *May 2010 – 6 events (2 to 72 hours)*
  - *June 2010 – 10 events (1 to 91 hours)*
  - *December 2010 – 2 events (2 to 16 hours)*
  - *January 2011 – 2 events (2 to 37 hours)*



# River Area PCB Levels

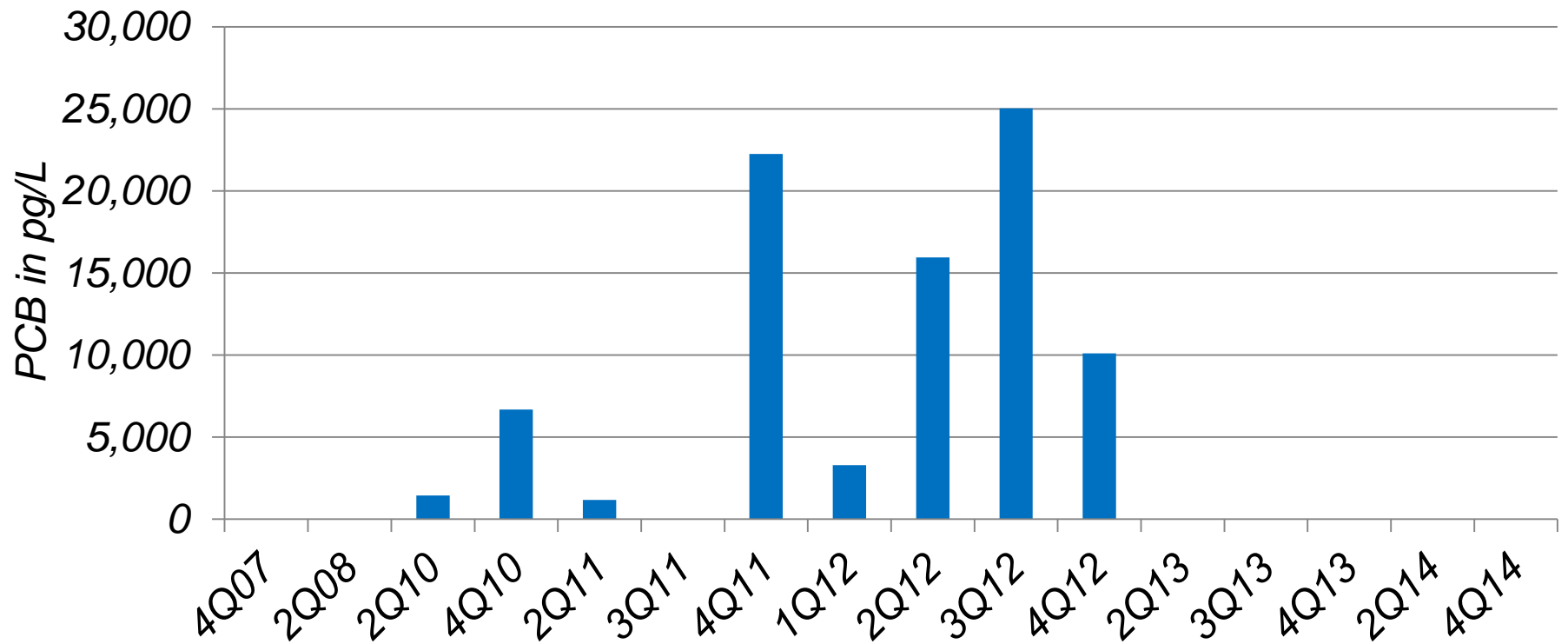
MW-17S





# River Area PCB Levels

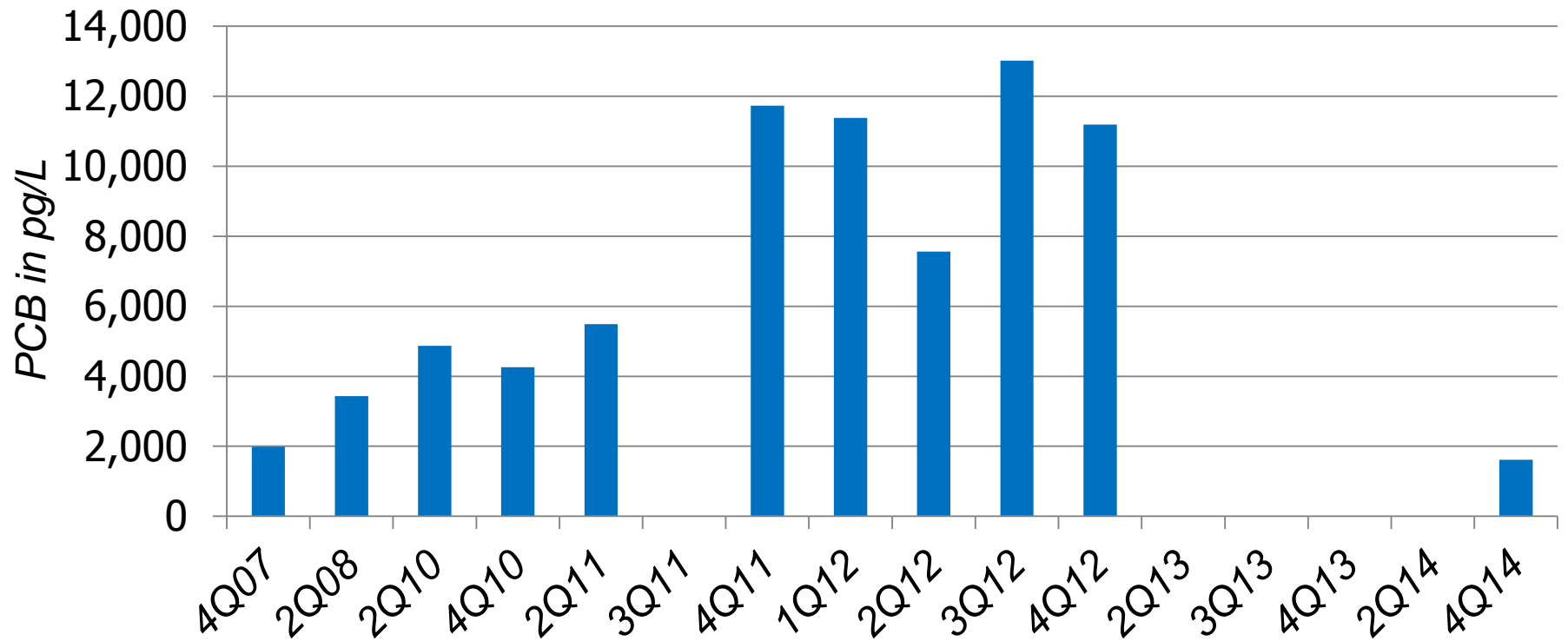
HL-MW-32S





# River Area PCB Levels

HL-MW-23S

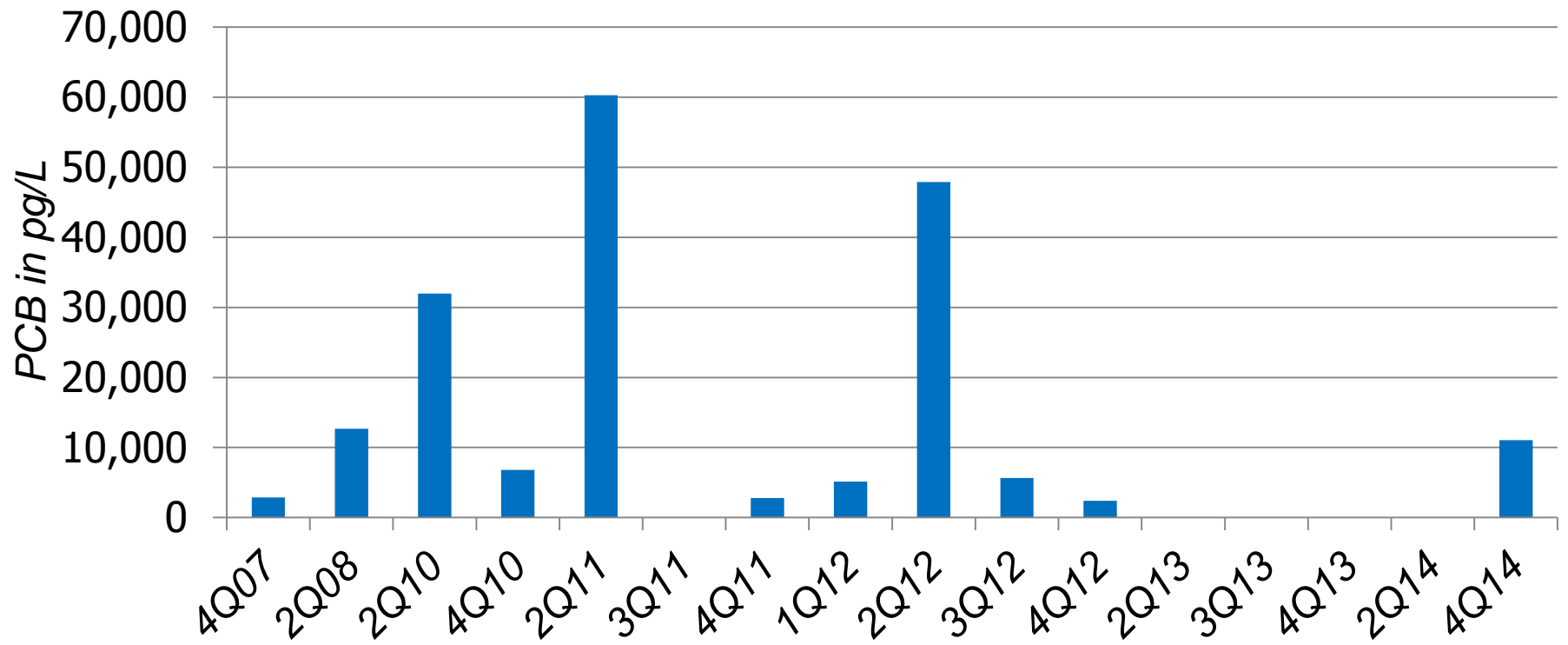






# River Area PCB Levels

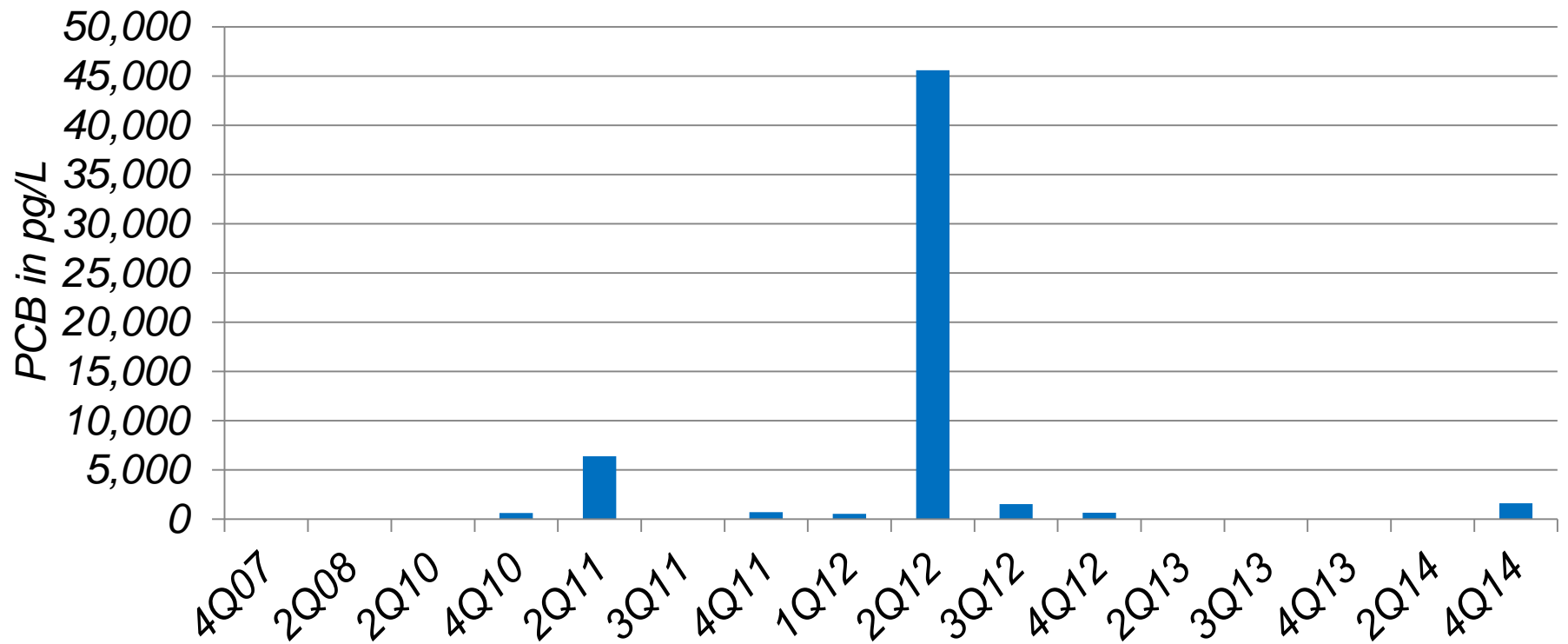
MW-12A





# River Area PCB Levels

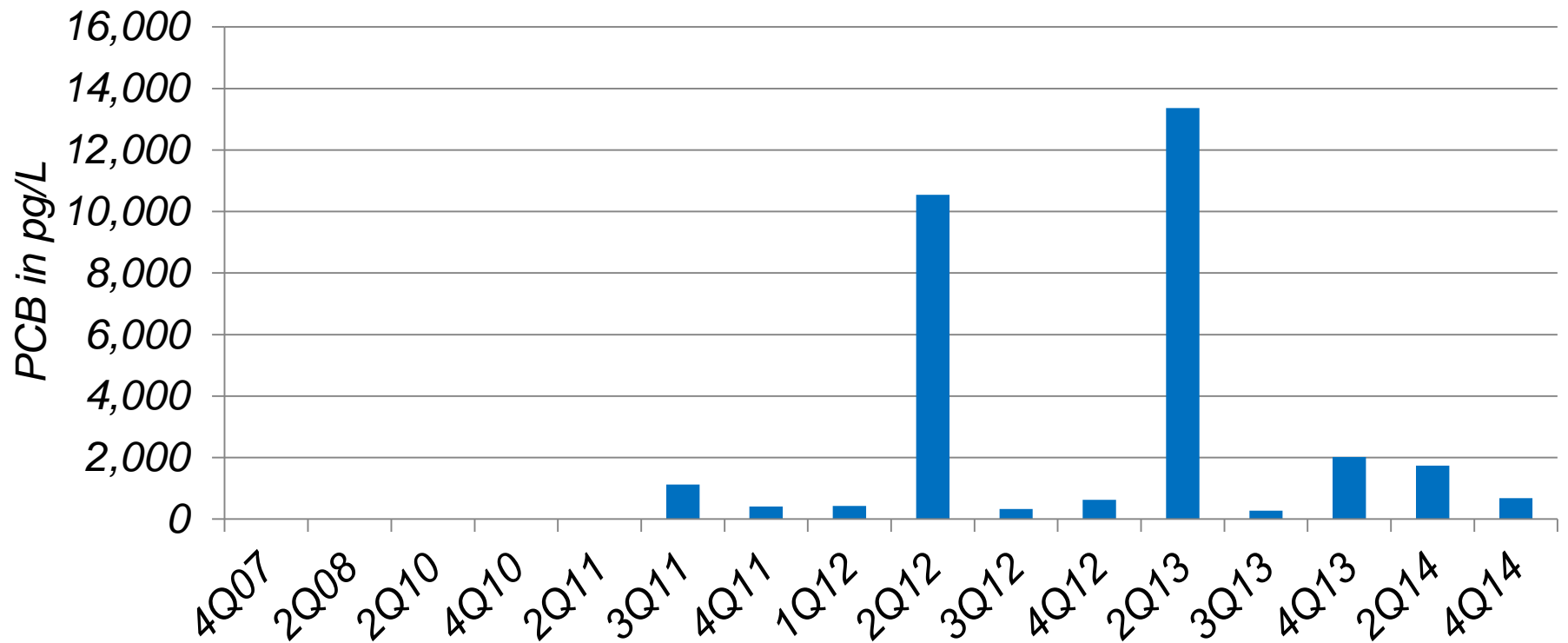
MW-23S





# River Area PCB Levels

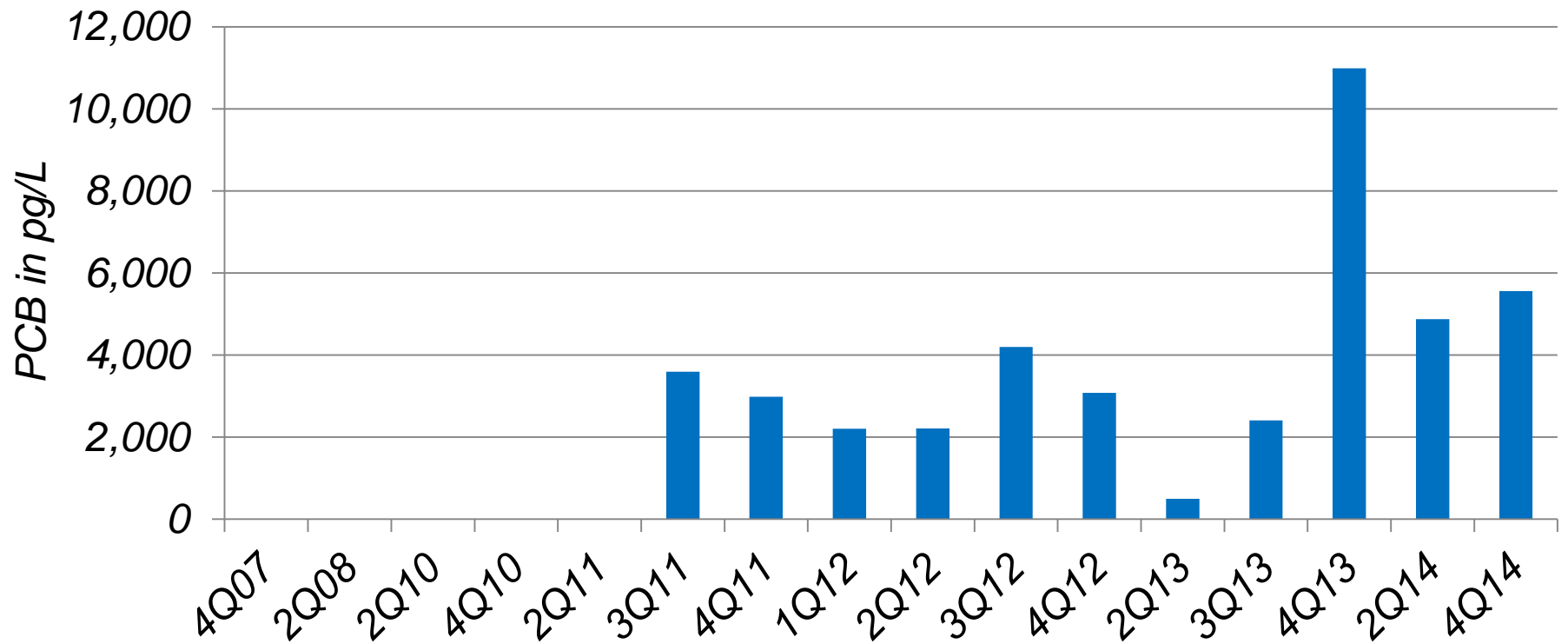
MW-27S





# River Area PCB Levels

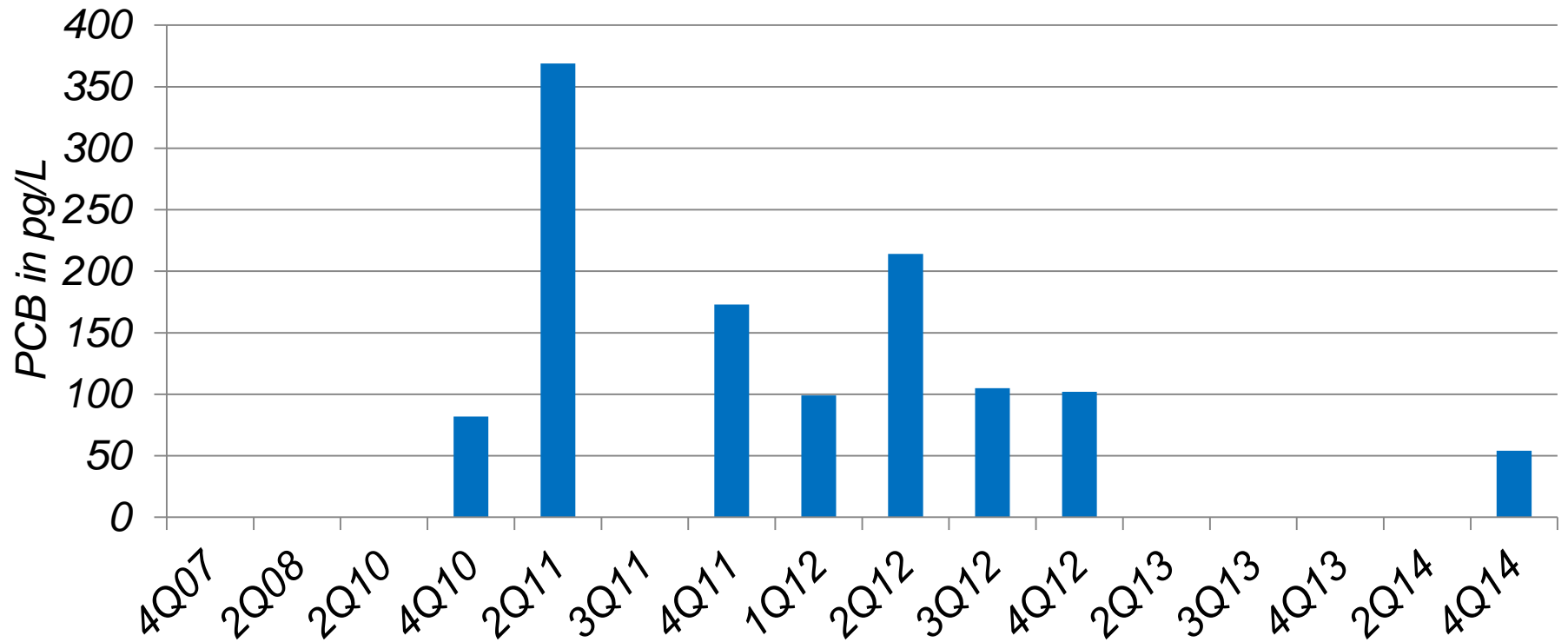
MW-28S



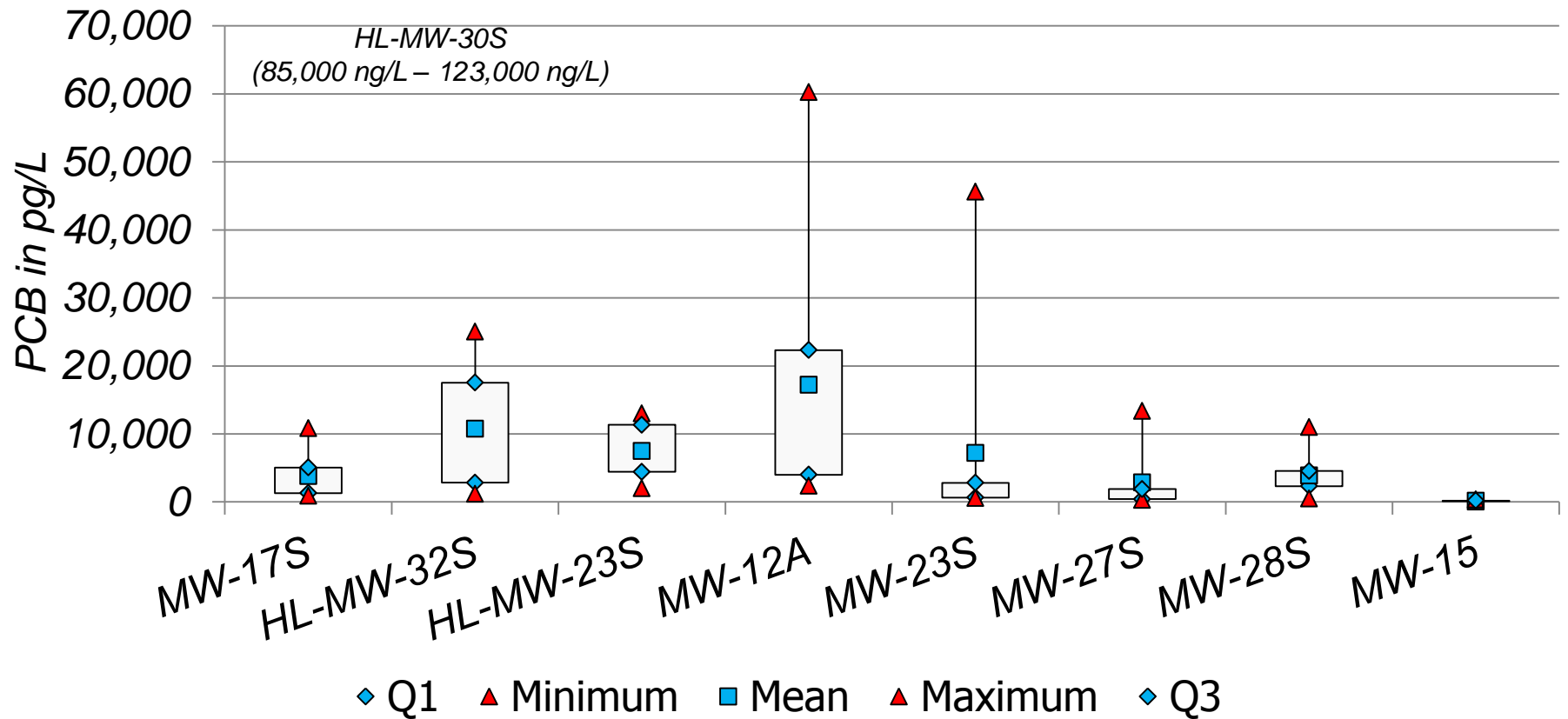


# River Area PCB Levels

MW-15

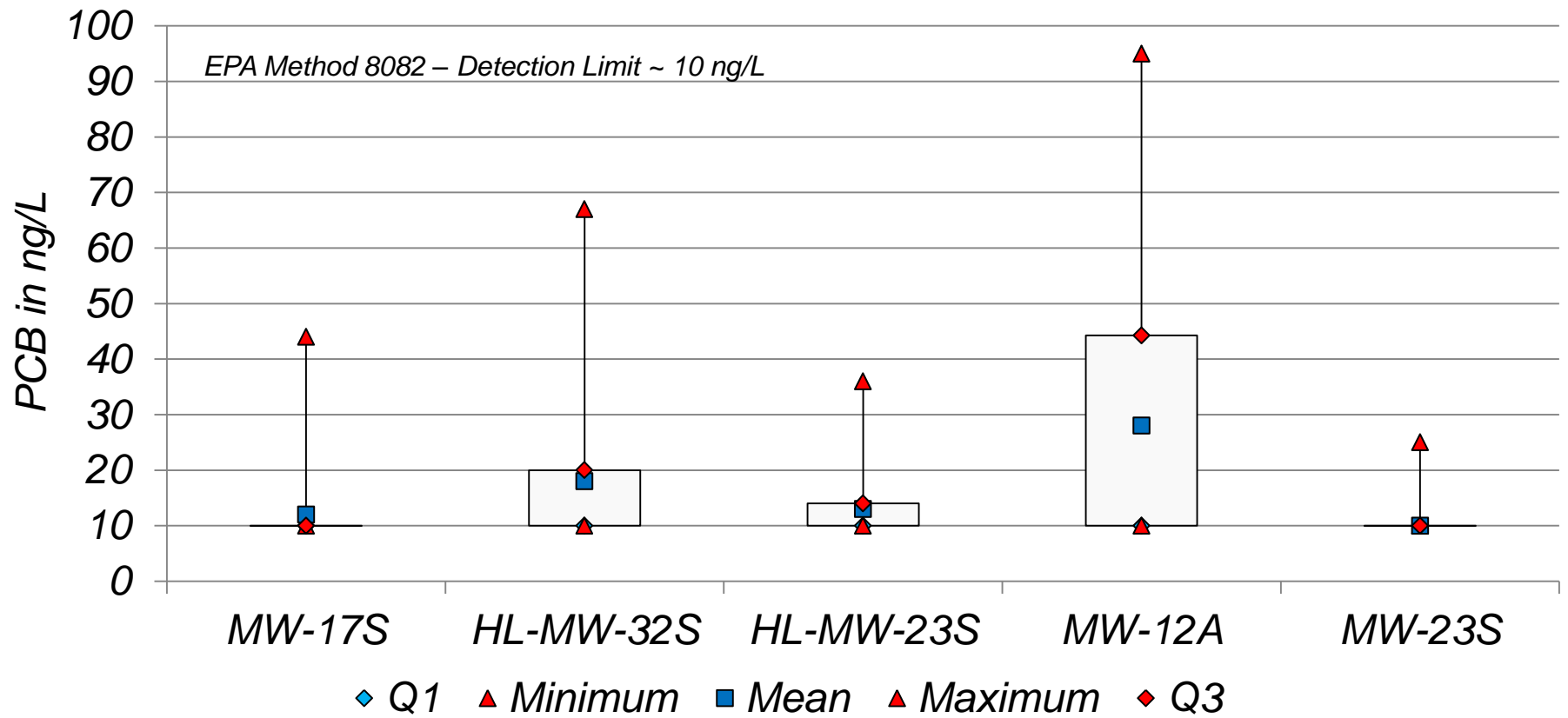


# River Area PCB Levels



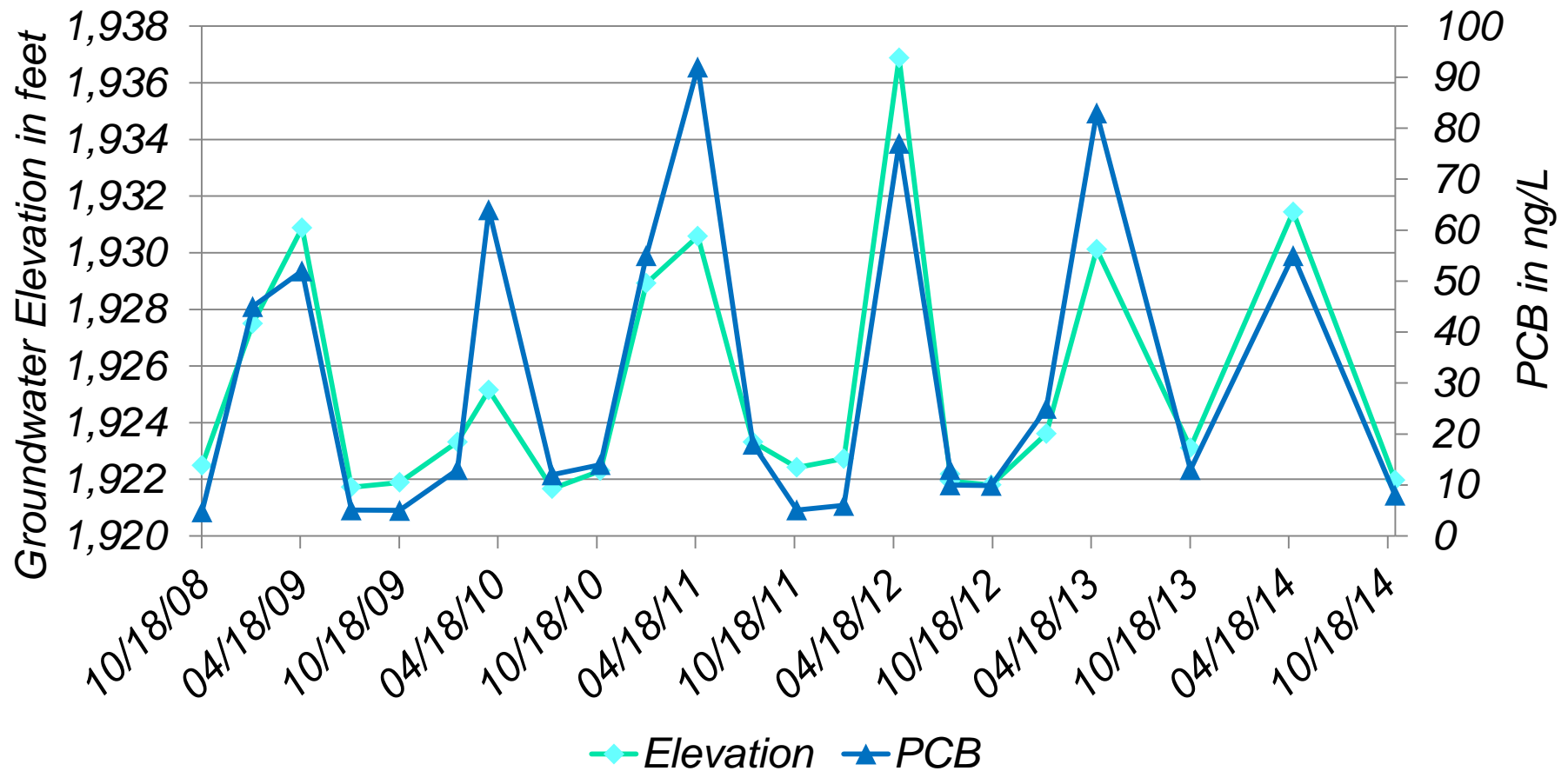
Q1 and Q3 refer to data quartiles – 50% of data is within the box shown for each location

# River Area PCB Levels



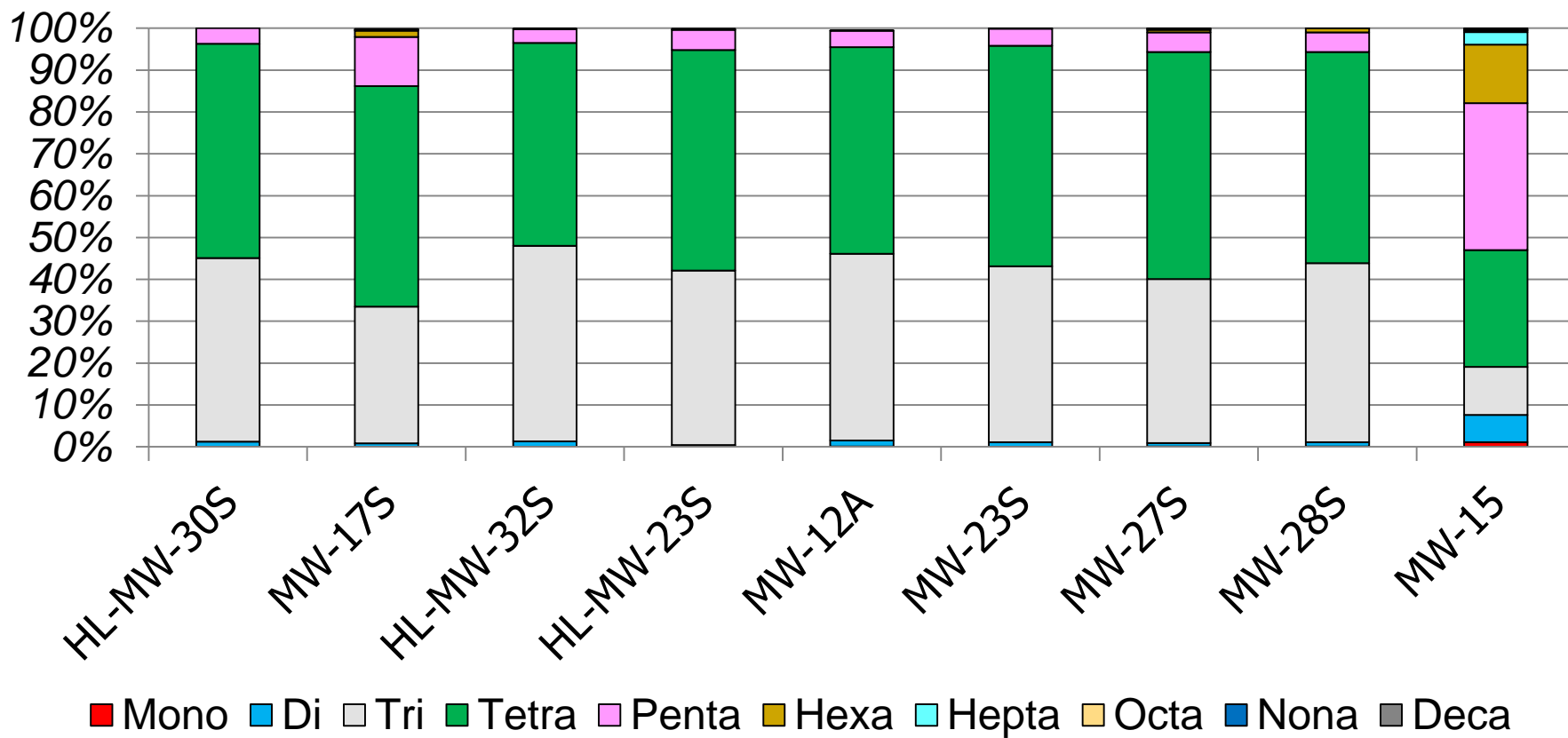
Q1 and Q3 refer to data quartiles – 50% of data is within the box shown for each location

# MW-12A Groundwater Elevation and PCB Concentration History

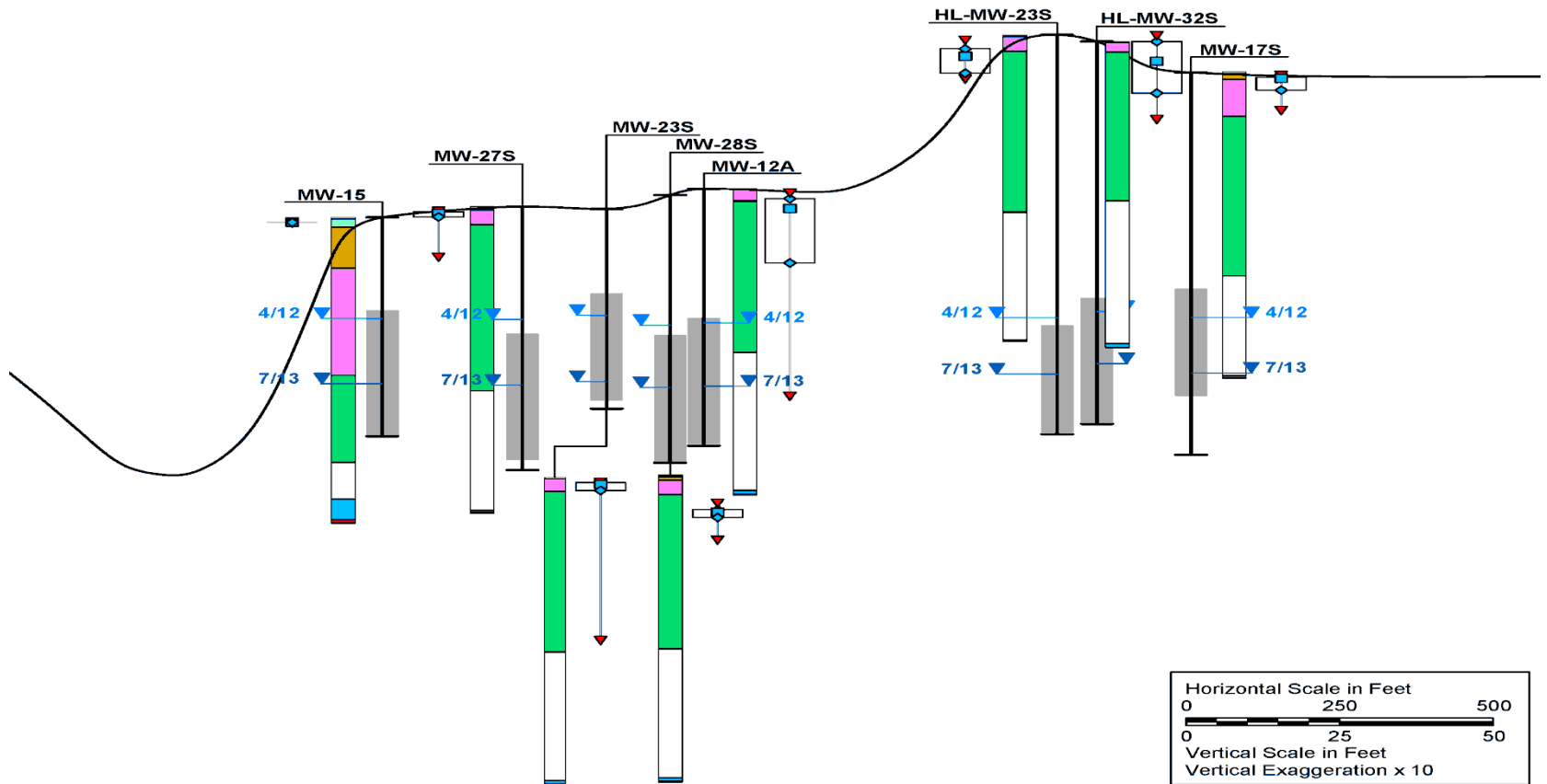




# River Area PCB Homologues



# River Area Overview





## *River Area PCB Observations*

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- *The relationships between groundwater elevation, flow direction, and PCB levels in the vicinity of the river are complicated*



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## *Source and Pathway Actions*

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- *Hydraulic Systems in Casting*
  - *Soybean oil derivative (Bio-Syn)*
  - *Double containment system for embedded hydraulic system piping*
- *Water Systems in Casting*
  - *Cooling water supply line relocation*
  - *Casting pit integrity*
  - *Sewer system relining*



## *Source and Pathway Actions*

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- *Soil Removal*
  - *West Discharge Ravine*
    - *Lower/Lower Area*
- *Soil Removal and Capping*
  - *West Discharge Ravine*
    - *Upper/Lower Area*
    - *Upper Area*



## *Source and Pathway Actions*

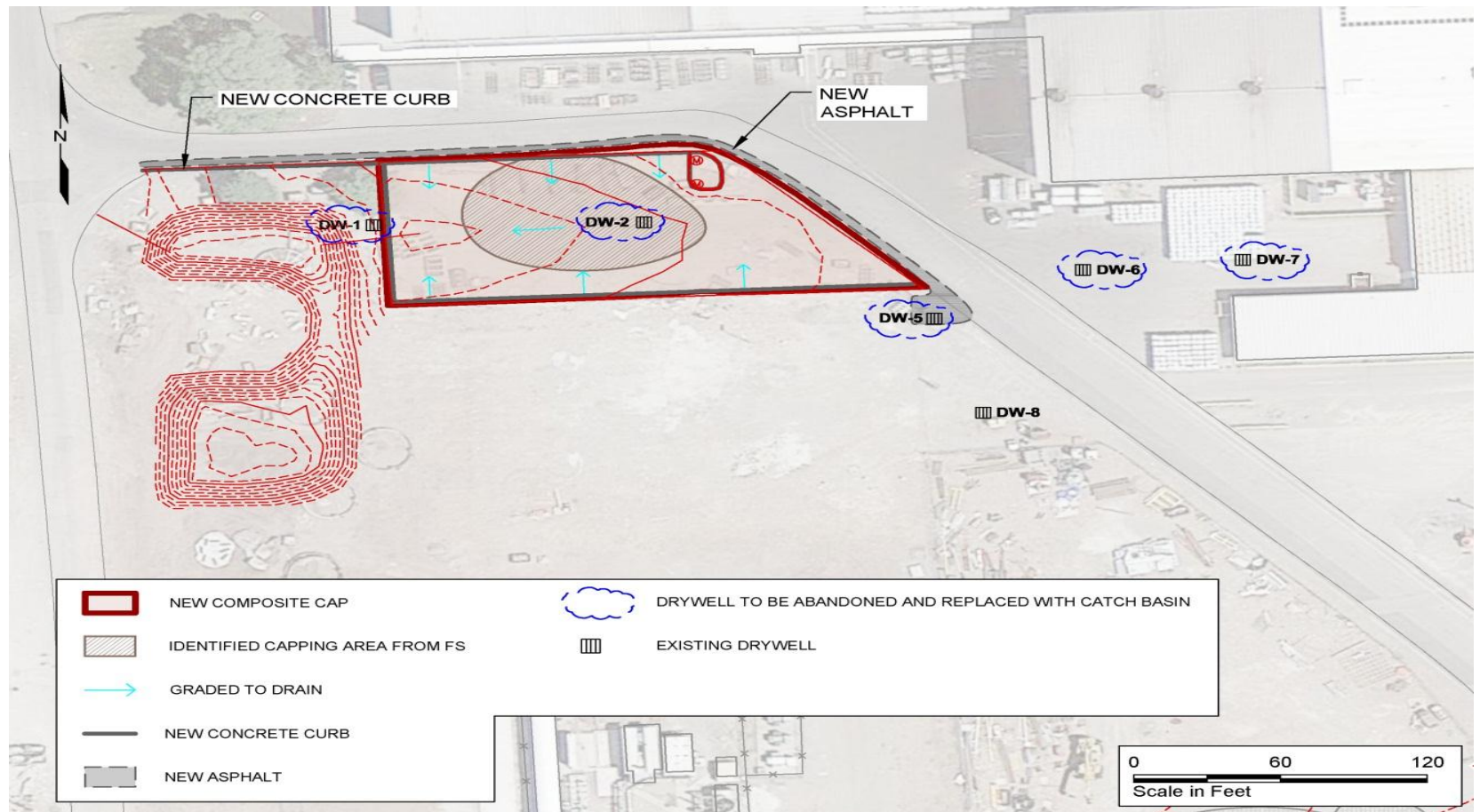
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- *Capping and Drainage Modifications*
  - *Casting Area*
    - *Capping of Suspect Area*
    - *Elimination of Dry Wells Over Impacted Area*

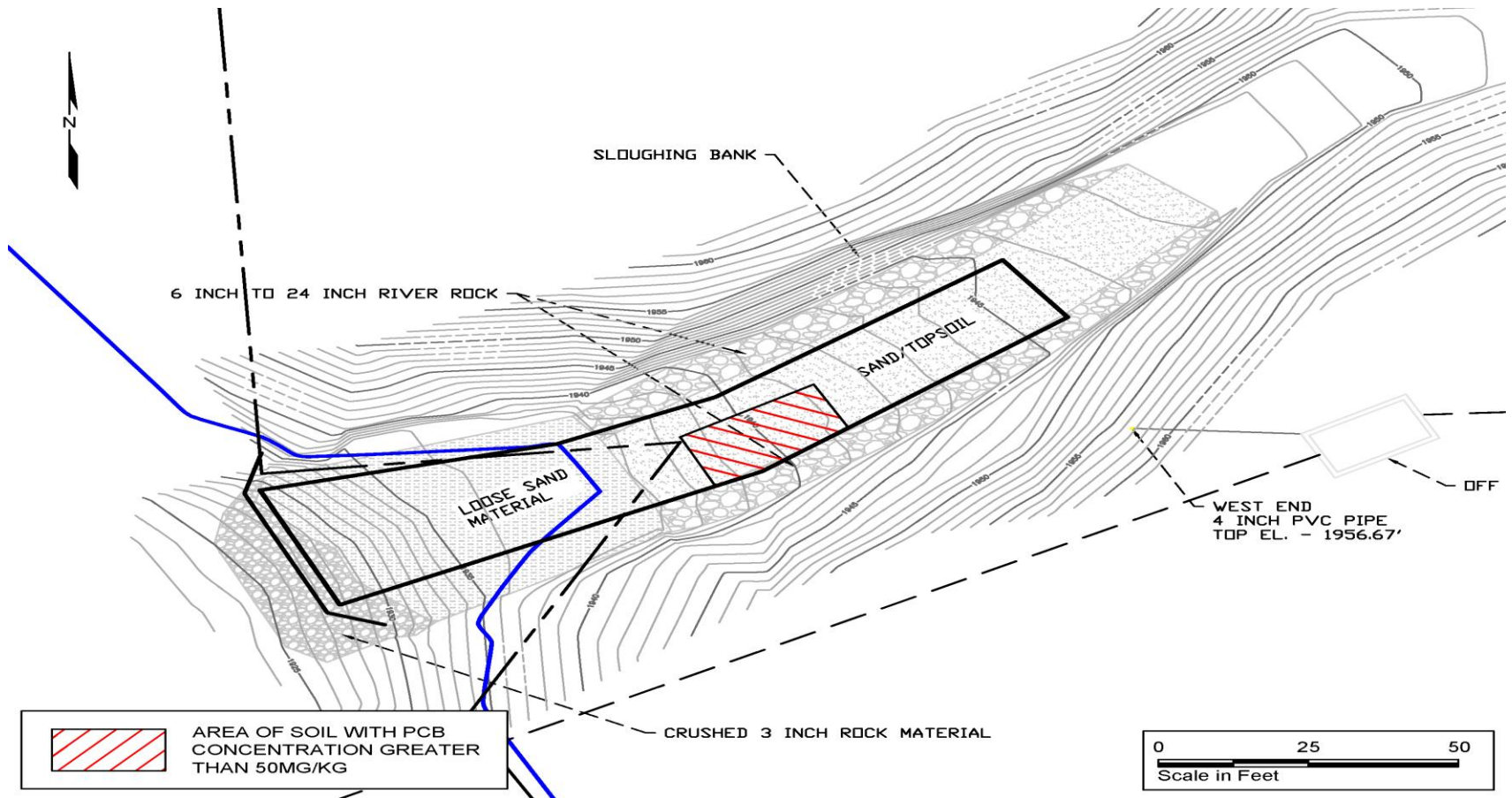




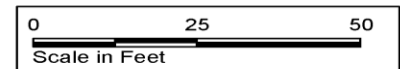
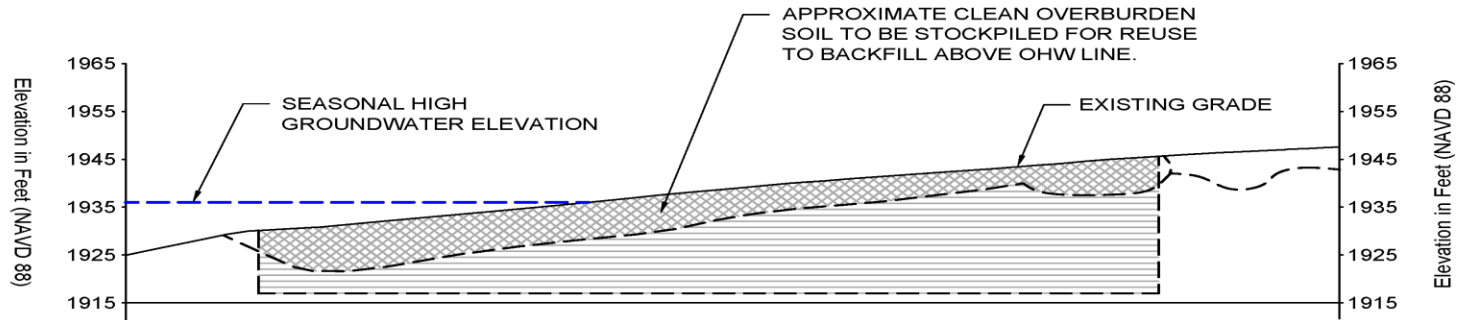
# Casting Area



# West Discharge Ravine Area



# West Discharge Ravine Area





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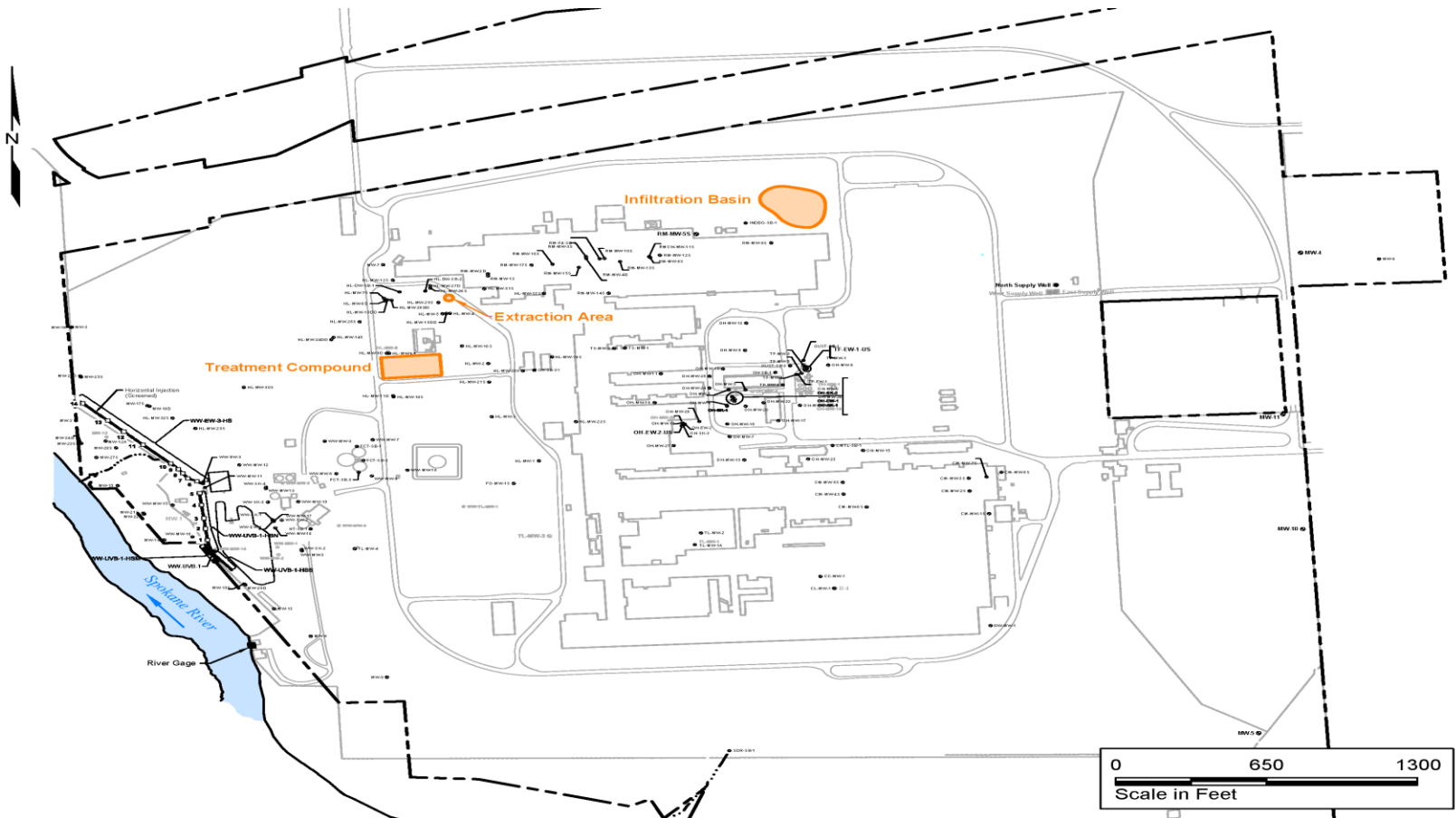


## *Treatment System Pilot Testing*

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- *Groundwater Extraction*
  - *Vicinity of HL-MW-29S*
- *Pilot System*
  - *50 gpm walnut shell filtration unit*
  - *Pretreatment with castor oil and coagulants*
  - *Upgradient infiltration of treated discharge*
  - *Storage of system backwash*

# Pilot Testing Layout





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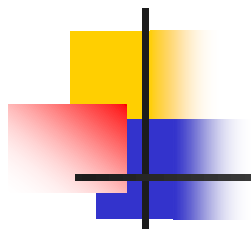


## *Overall Observations*

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- *Site background data indicates PCB is present in groundwater over at least a mile wide arc at significant levels relative to the PCB increase in river calculated from the synoptic sampling event*





*Questions?*