LimnoTech

Updated High Level Scoping for Groundwater Contamination Up-gradient of Kaiser

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Purpose

- Update original May 2015 groundwater scoping analysis to estimate magnitude of groundwater PCB concentrations up-gradient of Kaiser
  - Consider data from additional background wells
  - Revise assumption for area of impact

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Original Analysis

- Simple mass loading analysis conducted to assess
  - How much load coming from Kaiser plume?
  - How much load coming from Kaiser property contamination outside of Kaiser plume?
- Background load estimated from concentration observed at a single well (RM-MW-9s)

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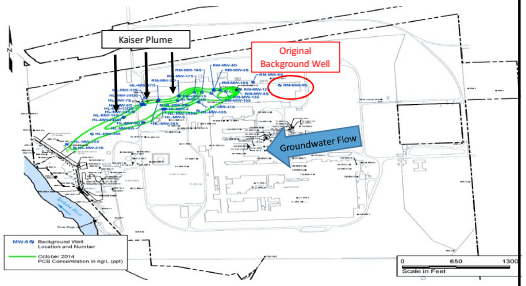
Original Analysis



Update of Original Analysis

- Background well used in original analysis located in close proximity to stormwater dry wells
  - May not accurately represent background concentrations
- Analysis repeated using data from additional background wells

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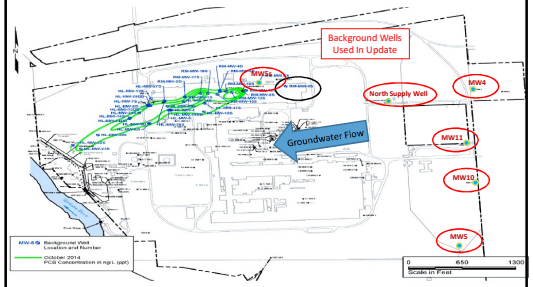
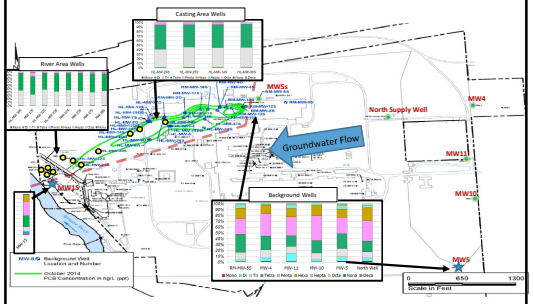
Background Wells Used In Update



How Can We Tell What Is Background?



Groundwater Mass Loading Model*

- Calculates PCB loading based upon calculated seepage rate and specified concentration
- Model inputs include
  - Hydraulic conductivity
  - Horizontal groundwater gradient
  - Horizontal length of impacted zone
  - Vertical length of bank seepage face
  - PCB concentration in groundwater

*Model and key assumptions provided on SRRTTF web site

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Updated Calculations

- Identical model framework used as from original analysis
- Two inputs updated from original calculations
  - Hydraulic conductivity
  - Horizontal groundwater gradient
  - Horizontal length of impacted zone
  - Vertical length of bank seepage face
  - PCB concentration in groundwater

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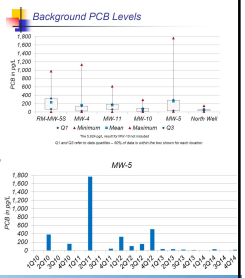
Updated Background Concentration

- Options considered
  - Which well(s) to use?
    - MW-5
    - Average of all wells
    - Both options result in avg. concentration of 380 pg/l
  - Consideration of variability
    - "Spikes" observed in most wells
    - Analysis repeated using median value of 100 pg/l



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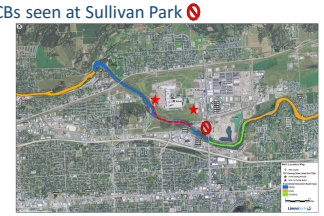
Updated Seepage Face

- Over what length do the background concentrations enter the river?
- 1.1 mile seepage face (---)assumed, based on:
  - Background signal seen at wells MW-15 and MW-5 ★
  - No PCBs seen at Sullivan Park ⃠



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Estimated Up-Gradient Loading

- Up-gradient load estimated at 14 to 55 mg/day
  - 55 mg/day if average well concentration data is assumed
  - 14 mg/day if spikes are dismissed
- 2015 synoptic survey data may lend some credence to spikes

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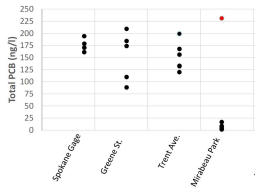
River Data May Lend Credence to Spikes

- 2015 Mirabeau Park river station located just upstream of Kaiser also show a spike in PCBs
  - Originally considered an outlier, but maybe not



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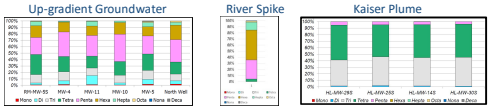
Homologue Pattern Not Too Dissimilar to Background Wells

- Difficult to say too much with a single (relatively low concentration) river sample, but worth investigating



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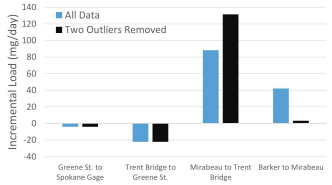
River Data May Lend Credence to Spikes

- Mass balance analysis with consideration of "outlier" gives results consistent with above analyses



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Conclusions

- Analysis is not rigorous enough to "prove" that a significant up-gradient source exists
  - Rigorous enough to show that up-gradient sources merit additional consideration
  - 40 to 55 mg/day load, if accurate, corresponds to one of the largest sources of loading to the river
- More difficult questions
  - Who is responsible?
  - How feasible is it to remediate?

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