

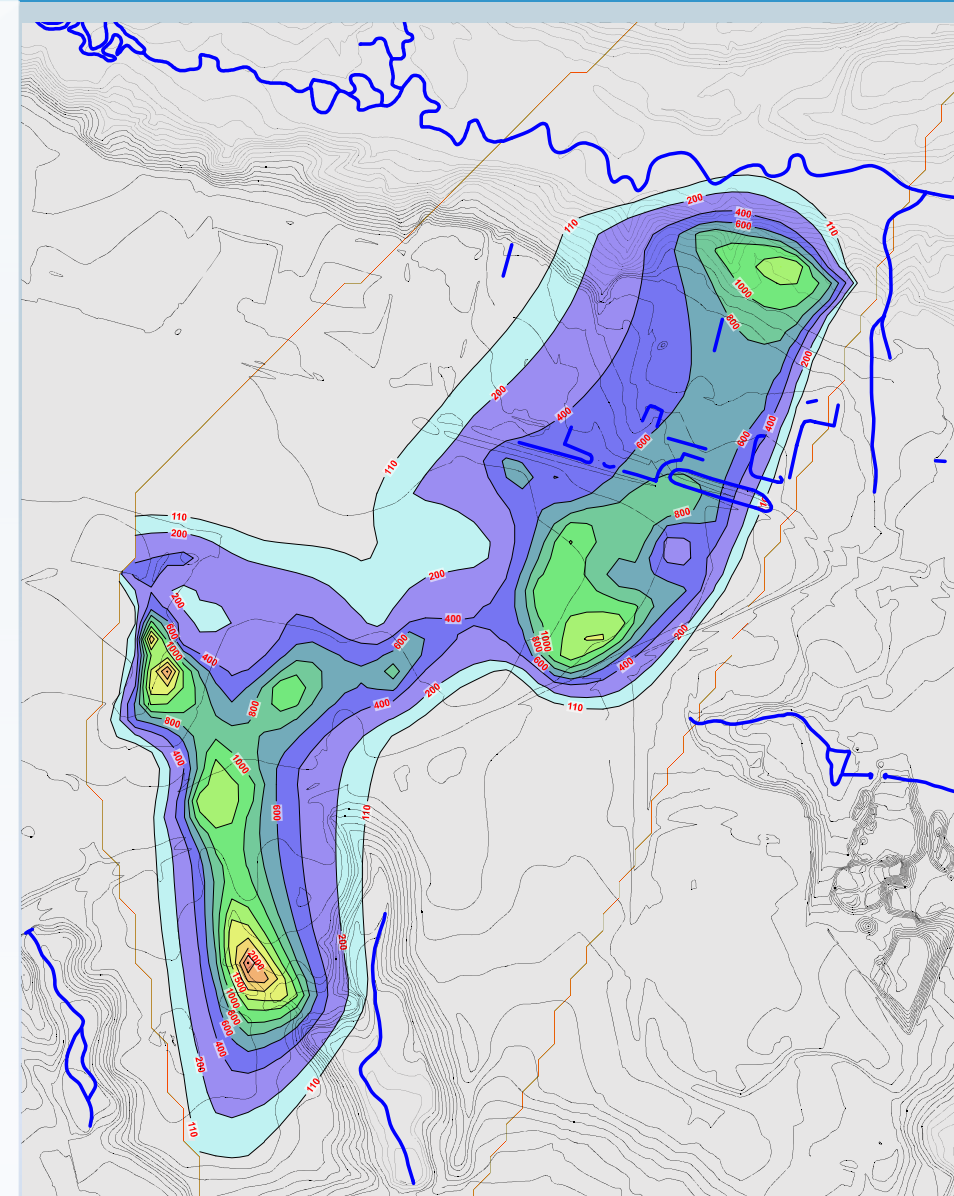
ISCR Treatment of Hydraulically Complex Hexavalent Chromium and Chlorinated Volatile Organic Plumes

Group 2 Posters
Abstract #995
Poster Session D9
Board #136

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Background

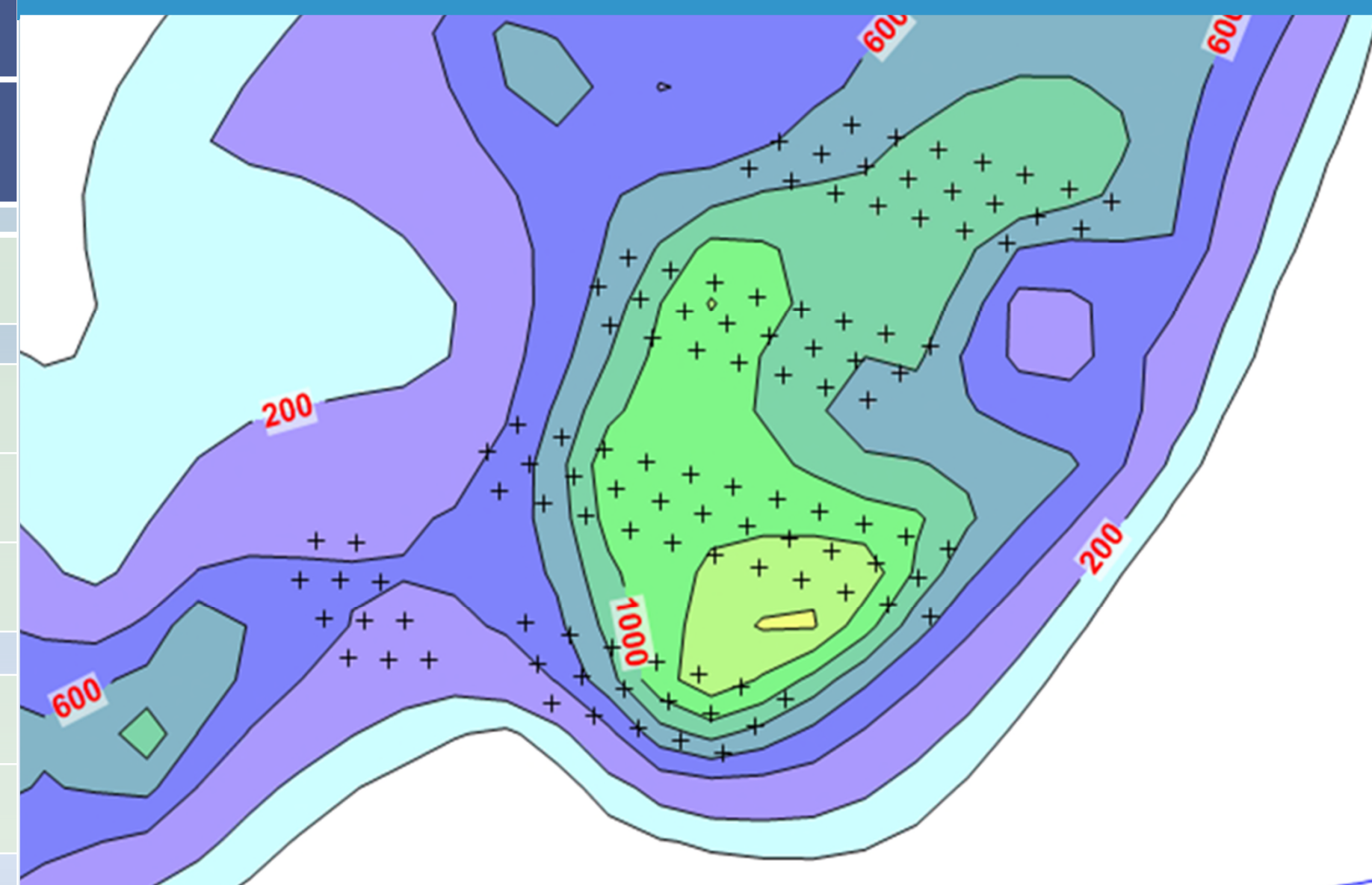
- ❖ Co-mingled plumes from metal finishing and degreasers.
- ❖ Release located on hydraulic divide
- ❖ Resulted in two (2) bifurcated plumes
- ❖ Plumes migrated up to 3,500 feet
- ❖ Distal deltaic sediments comprising fine sand, silt, clays
- ❖ Desiccated clays permitted vertical migration and buffered pH
- ❖ Contaminants 50 to 80 feet deep



Baseline Data

| Parameters | Low Level | High Level |
|--------------------------|-----------|-------------|
| Hexavalent Chromium | 0.41 mg/L | 38.2 mg/L |
| Dissolved Oxygen | 4.0 mg/L | 8.6 mg/L |
| Nitrate | 2.9 mg/L | 6.5 mg/L |
| Sulfate | 266 mg/L | 4,570 mg/L |
| pH | 6.1 | 9.5 |
| ORP | 116 mV | 550 mV |
| Heterotopic Plate Counts | 64 cfu/mL | 1,030cfu/mL |

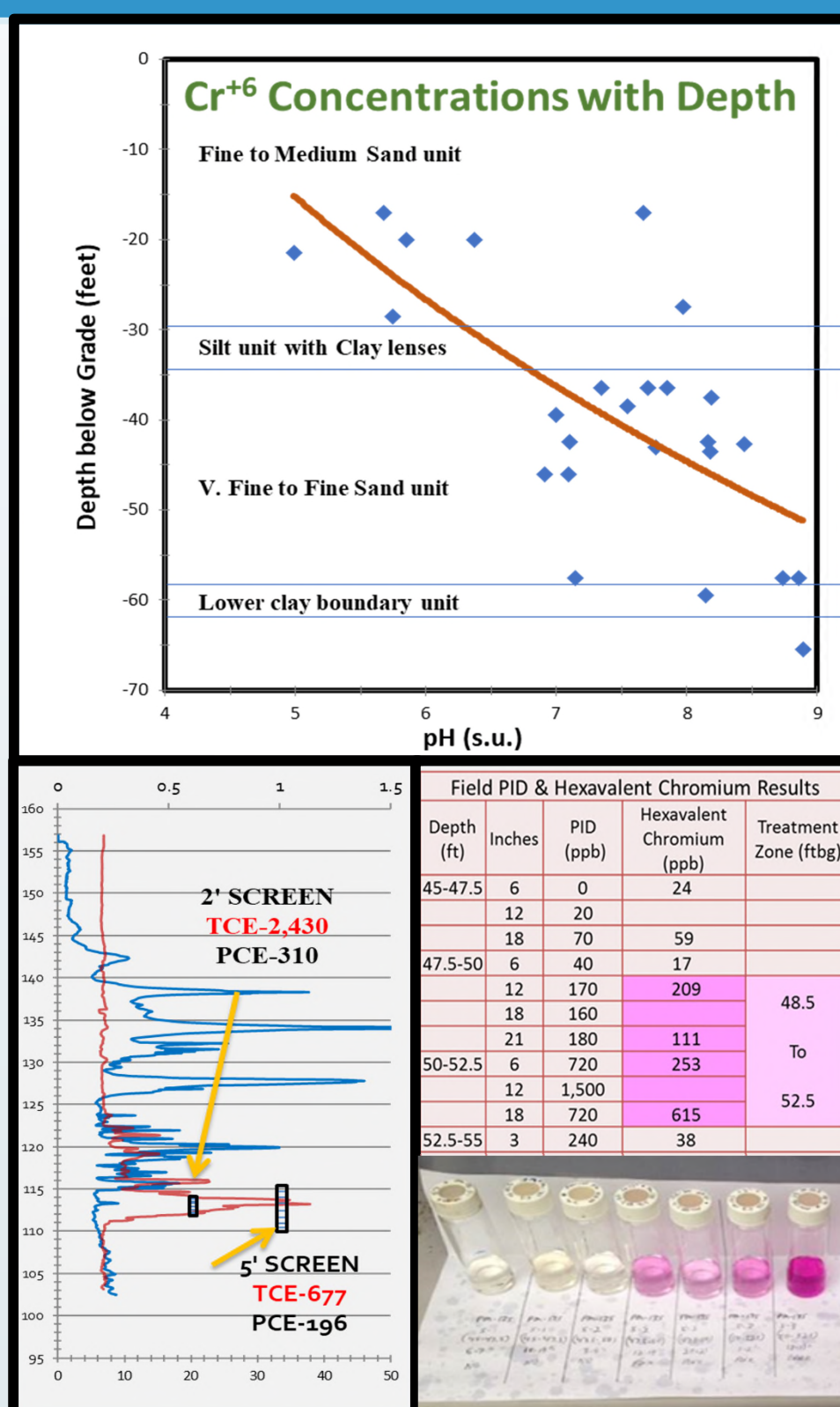
Barrier Design



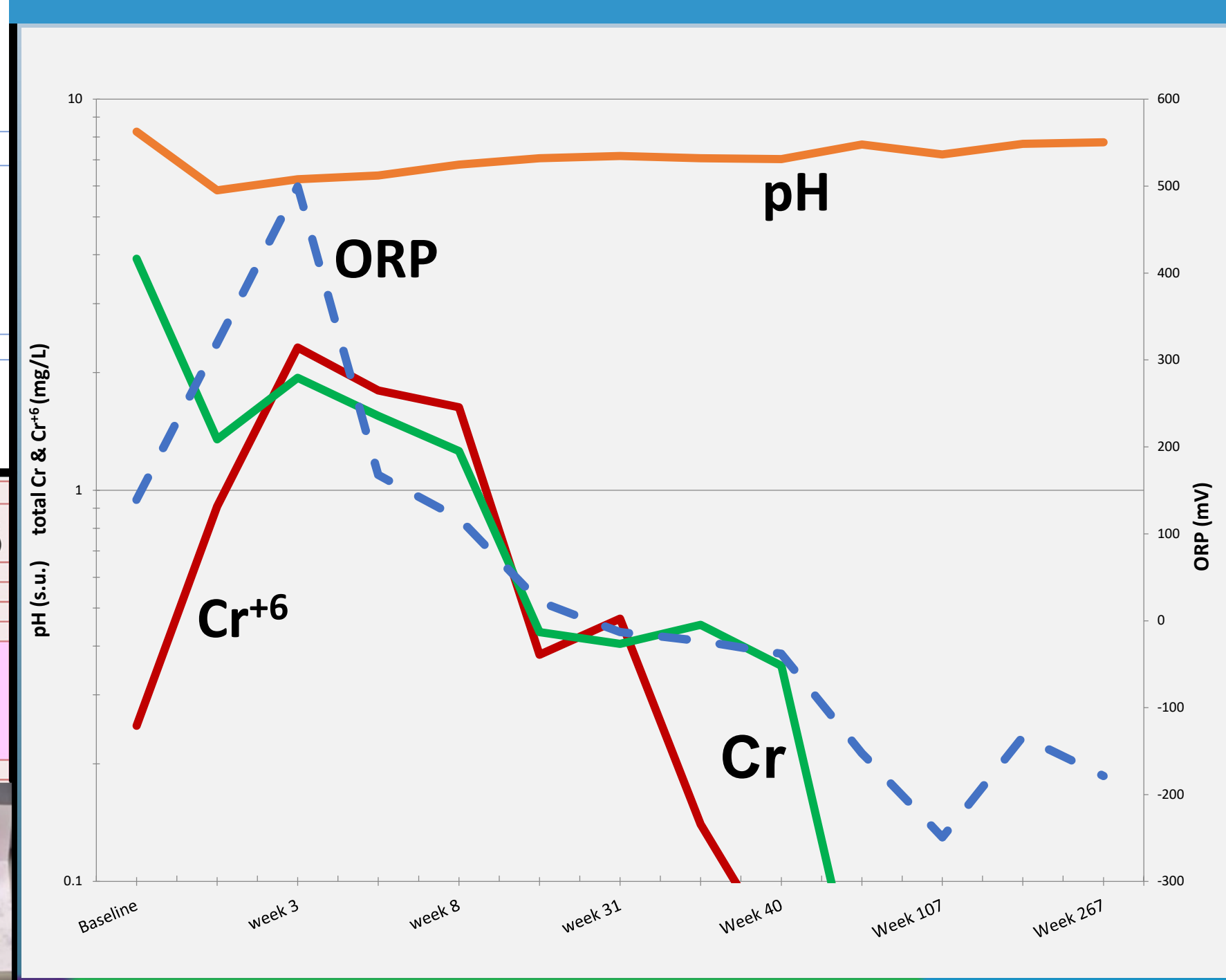
| | |
|---|-----------------------------|
| Seepage velocity | 35-feet/year |
| Effectiveness of Pilot | 8+ years |
| Plume migration | 280-feet |
| Distance between injection zones | 80-feet |
| Effective radius of influence | 15-feet (177 sf) |
| Sodium Lactate | 2.7 to 3.3 gallons per foot |
| 3-DME | 3.7 to 6.0 gallons per foot |
| Total injection area (barrier) | 5-acres, 155-points |
| 1-foot injection probe, Bottom-up injection | |
| Injection Thickness | 10 to 29-feet |

Approach

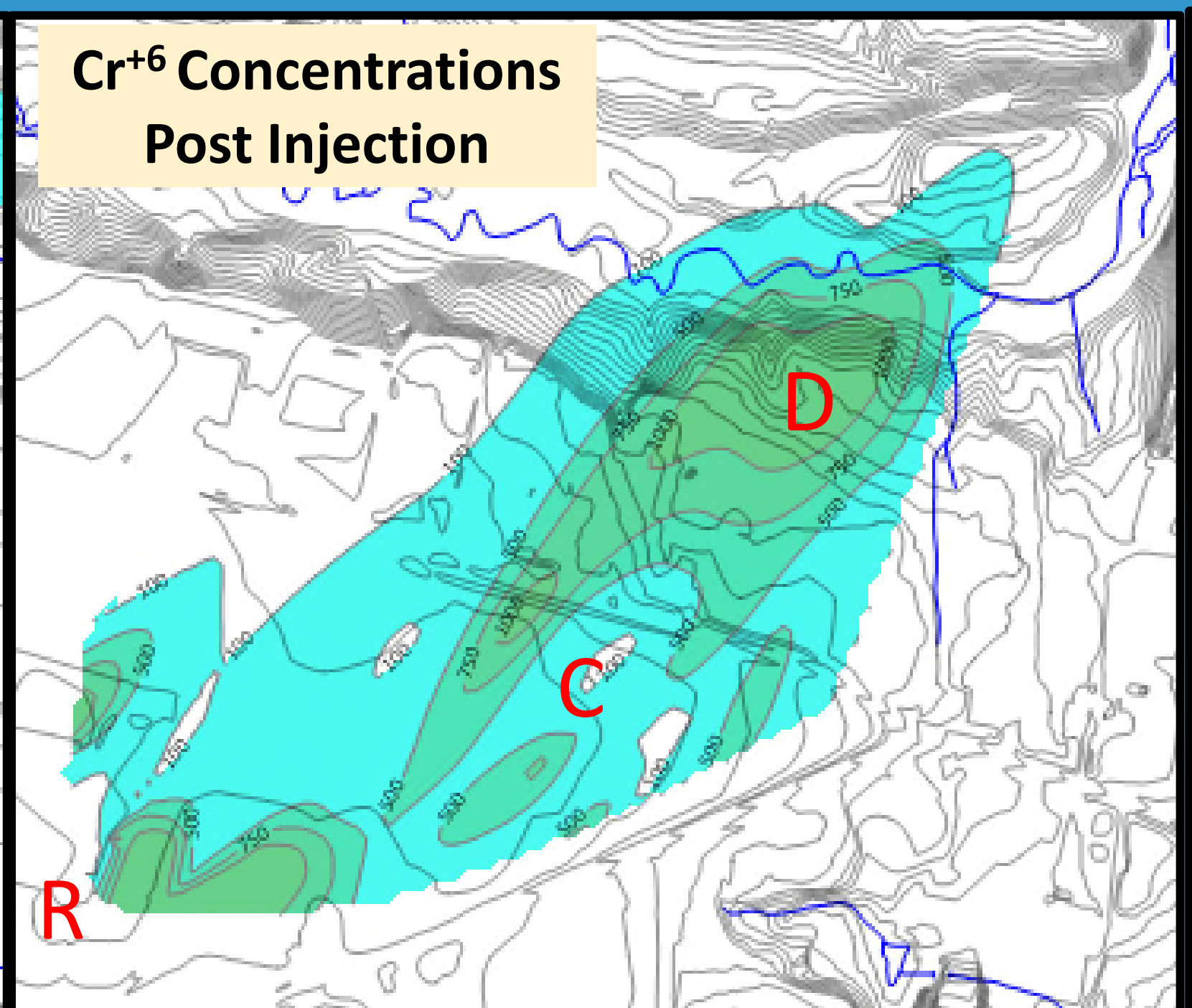
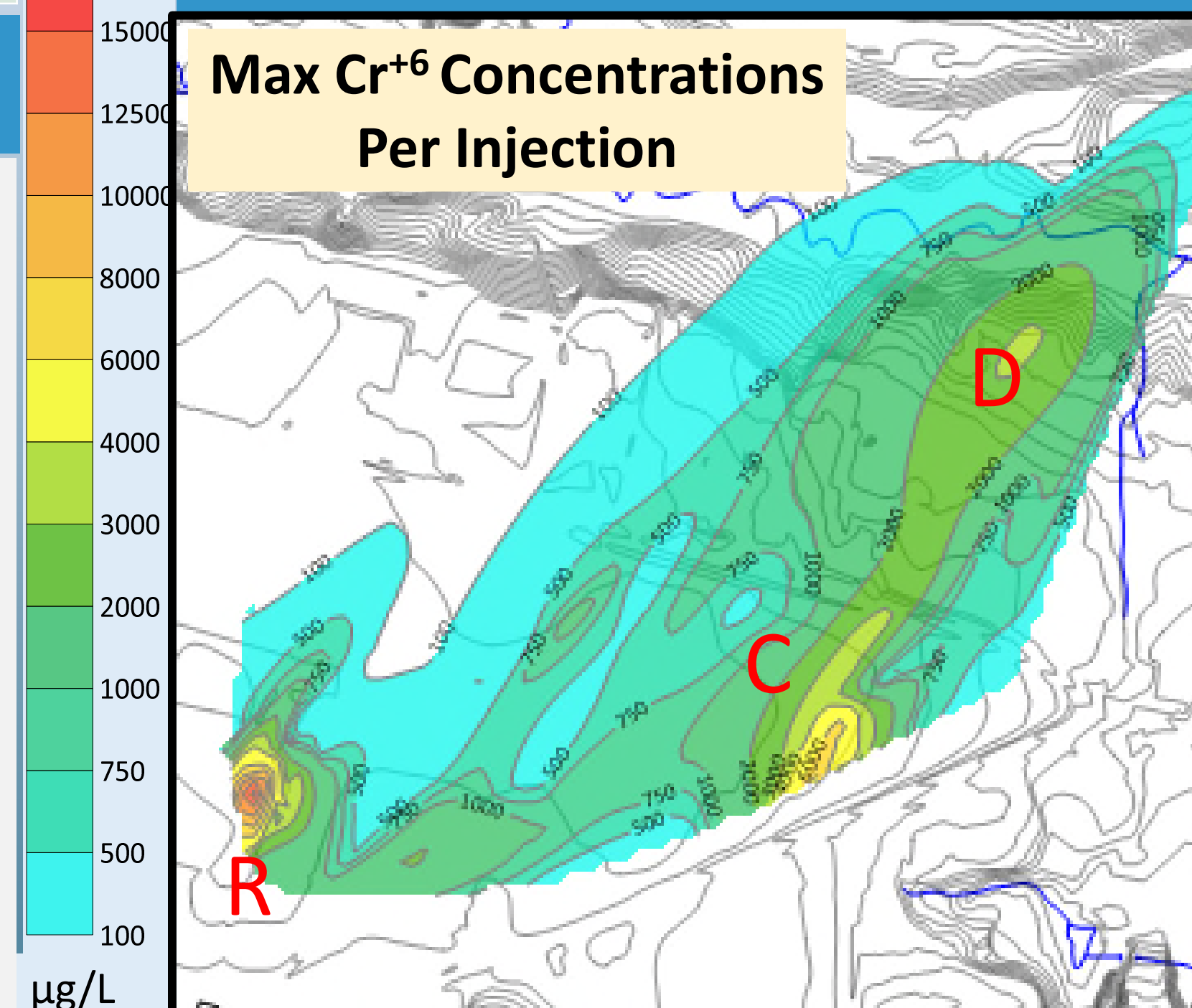
- ❖ Completion of HRSC to target the contaminant transport zones
- ❖ Completion of ISCR Pilot – pilot identified methanogenesis > 10 Yr.
- ❖ Aquifer geochemistry resulted in high pH and strong oxidizing conditions
- ❖ Contaminant migrating in thin stratigraphic units
- ❖ Develop geochemical reducing condition using electron donors (molasses, lactic acid, long-term release amendments - 3DmE)



Pilot Results



Results



12 months -Post Injection Concentrations

| | |
|------------------------------|---|
| R – Release Zone | 92% CR ⁶⁺ reductions 38,200 µg/L to 8.2 µg/L |
| C – Core Zone | 80% CR ⁶⁺ reductions 7,270 µg/L to 355 µg/L |
| D – Downgradient Zone | 53% CR ⁶⁺ reductions 3,390 µg/L to 1,570 µg/L |