MEMO: Question regarding interaction of CO2 and LCP Caustic Brine Pool

To: Daniel Parshley, Glynn Environmental Coalition
From: Environmental Stewardship Concepts, LLC
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Question – What chemical is produced when the CO2 reacts with the Caustic Brine Pool?

The purpose of CO2 sparging is to neturalize (decrease) the pH of the caustic brine pool. When dissolved in water, CO2 forms a weak acid, and no other chemicals are left behind (ESC, LLC). In other words, no new chemical is produced when CO2 is introduced to the caustic brine pool.

To put the reaction in chemical terms: CO2 reacts with an alkali (OH-), the pH is neutralized, and a pH buffer (HCO3-) is produced, which prevents excessive pH decline. The reaction looks like this: CO2 + OH- = HCO3- ("CO2 Sparging...Report." Figure 1-3, pg. 78). Figure 1-3 in the report I just sited (full reference at bottom) provides an illustrated diagram that is helpful for understanding the chemical process.

In Section 2.7.1 of the Final Work Plan for CO2 Sparging for the LCP Chemical Site, Mutch Associates, LLC addresses the concern that injected CO2 may interact with and affect metals in the subsurface. The authors of the report explain that CO2 sparging will not directly interact with metals in the subsurface. CO2 sparging imparts carbonate and bicarbonate to the water to lower the pH. Bicarbonate and carbonate are not strong ligands (ions or molecules that bind to a central atom to form a bond) for the metals in the caustic brine pool (Mercury, Arsenic, Chromium). Therefore, when CO2 interacts with metals in the caustic brine pool, there is no formation of new chemicals.

References

Environmental Stewardship Concepts, LLC. September 2014. “CO2 Sparging Results Phase 1 for LCP Chemical Site.”

Mutch Associates, LLC. September 11, 2012. “Final Work Plan for CO2 Sparging Proof of Concept Test: LCP Chemicals Site, Brunswick, GA.”

Mutch Associates, LLC. June 20, 2014. "CO2 Sparging Phase 1 Full-Scale Implementation and Monitoring Report: LCP Chemicals Site, Brunswick, GA.”