



# MEMORANDUM

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Geomatrix performed a batch bench-scale test to evaluate the efficacy of using nano-scale iron to treat trichloroethene (TCE) and perchlorate in groundwater at the Phoenix Goodyear Airport North Superfund (PGAN) site. Polyflon shipped nano-scale zero-valent iron (Polyflon PolyMetallix) directly to Geomatrix's Waterloo office, where the bench-scale test was conducted.

Nano-scale zero-valent iron (ZVI; Polyflon PolyMetallix) was mixed with groundwater from well EA-01. Well EA-01 has a perchlorate concentration of about ~ 50 µg/L and TCE concentration of ~1,900 µg/L. Groundwater and PolyMetallix Particles were mixed in 40 ml VOA vials and analyzed by Con-test Analytical Laboratories. One sample was also amended with a surface soil sample from the site.

All but one sample was tumbled (shaken) for 5 days at room temperature prior to analysis. Geomatrix used PolyMetallix dosings of ~ 5 g/L and 0.5 g/L for the tests. The results of the TCE and perchlorate are summarized in the table below.

Test ID Number	PolyMetallix dose	Reported TCE concentration	Reported ClO <sub>4</sub> <sup>-</sup> concentration
ZVI2-OC	0 (Control)	1480 µg/L	53.7 µg/L
ZVI2-5	5 g/L	< 1 µg/L	53.2 µg/L
ZVI2-5	0.5 g/L	552 µg/L	51.9 µg/L
ZVI2-5NSH	5 g/L Not shaken	3.9 µg/L	54.5 µg/L
ZVI2-5P	5 g/L Purged	<1 µg/L	55.0 µg/L
ZVI2-5S	5 g/L Soil	<1 µg/L	55.2 µg/L

Based on the results, the ZVI was effective at removing TCE, but not effective at removing perchlorate in groundwater from the PGA-N site. The presence of soil in the samples did not affect treatment. The TCE treatment effectiveness was slightly reduced in samples that were not tumbled. The lower dose of ZVI (0.5 g/L) reduced TCE from 1,480 µg/L to 552 µg/L, which indicates that the groundwater matrix may be causing interferences with TCE removal at a 0.5 g/L ZVI dosing level. Perchlorate removal was not effective under the test conditions applied.

<b>TABLE 3</b>							
<b>CHLORINATED ORGANICS AND PERCHLORATE RESULTS</b>							
Phoenix-Goodyear Airport North Superfund Site							
Goodyear, Arizona							
Test ID Number	PolyMetallix Dose (g/L) <sup>1</sup>	TCE/RL <sup>2</sup> (mg/L) <sup>3</sup>	Cis 1, 2 DCE/RL (mg/L)	Trans 1,2 DCE/RL (mg/L)	1, 1 DCE/RL (mg/L)	VC/RL (mg/L)	Perchlorate/RL (mg/L)
ZVI2-OC	0 (Control)	1,480/20	ND <sup>4</sup> /10	ND/16	ND/12	ND/6	53.7/2
ZVI2-5	5 (Shaken)	ND/1	ND/0.5	ND/0.8	ND/0.6	ND/0.3	53.2/2
ZVI-05	0.5 (Shaken)	552/20	ND/10	ND/16	ND/12	ND/6	51.9/2
ZVI-5 NSH	5 (Not Shaken)	3.9/1	ND/0.5	ND/0.8	ND/0.6	ND/0.3	54.5/2
ZVI2-5P	5 (Purged TCE Shaken)	ND/1	ND/0.5	ND/0.8	ND/0.6	ND/0.3	55.0/2
ZVI2-5S	5 (Soil Added Shaken)	ND/1	ND/0.5	ND/0.8	ND/0.6	ND/0.3	55.2/2
Notes:							
<sup>1</sup> g/L = grams per liter							
<sup>2</sup> µg/L = micrograms per liter							
<sup>3</sup> RL = Reporting Limit							
<sup>4</sup> ND = Not Detected							