



Monitoring & Maintenance Engineering, Inc.

PHOSter Performance Update

Kwik Foods

MGPTF Site 8805

Kosciusko, Mississippi

Site Description:

This site is located on the north side of Kosciusko and is a retail gasoline and convenience store. Soil is highly plastic clay with fine sand. Groundwater elevation fluctuated between 3' and 8' below grade. An aged petroleum release resulted in 2.5 inches of LNAPL near a former tank pit. Manual bailing and vacuum extraction events provided no measureable reduction in product thickness. The site consultant recommended the use of gas-phase nutrient injection.

PHOSter System

Although originally designed as a twelve injector system, the site consultant was only able to install eight injection wells due to site structure constraints. The injection well layout was based on a ten foot radius of influence (ROI) because of the highly plastic soil. The site constraints led to an injector layout with a large potentially untreated area in the former tank pit (See Figure 1). The system used for this site was a rebuilt unit that had been in operation for 27 months and had been used to successfully close a site in Opelika, Alabama (See P&ID Figure 2). Injection wells were screened at the at 25' below grade using 1" x 20" Schumasoil screens as shown in the typical injection well detail, Figure 3.

Performance

Sparge injection began at extremely low air flow (about 0.1 cfm) and relatively high pressure (50 psi). Wells were operated either individually or in pairs during the first five months. Air flow rates increased over that period to 1.0 to 1.6 cfm with backpressures of 30 to 40 psi. Once the sparge wells were fully developed the system was operated in pairs, then up to four at a time in five minute intervals. Using this method of well development and operation, almost 18,000 pounds of oxygen was delivered to the aquifer. Over twenty (20) months of system operation 256 pounds of nitrous oxide and 18 pounds of triethyl-phosphate were applied.

Remediation Progress

No measureable product was detected after the first six months of operation. A sheen was noted during some of the sampling events up to one year after start-up. Dissolved phase concentrations of BTEX rarely exceeded 1 mg/L. Remediation was extended until high oxygen concentrations could be achieved and maintained at the most contaminated monitoring well. We then reduced the rate of air sparge, to the site, to allow the oxygen scavenging of any residual nitrate.

Total operational time on-site was 20 months with an operational efficiency of 95%. Total power consumed was 17,655 kWh. The final biological sampling event indicated a maximum reactive phosphate concentration 0.1 mg/L and nitrate at less than detection at 0.1 mg/L.

145 Merrill Avenue; Decatur, Georgia 30030

Phone: 404 371-9332 FAX: 404 373-3296

e-mail: rick@smmeinc.com

Website: www.bioremediationsmme.com

FIGURES

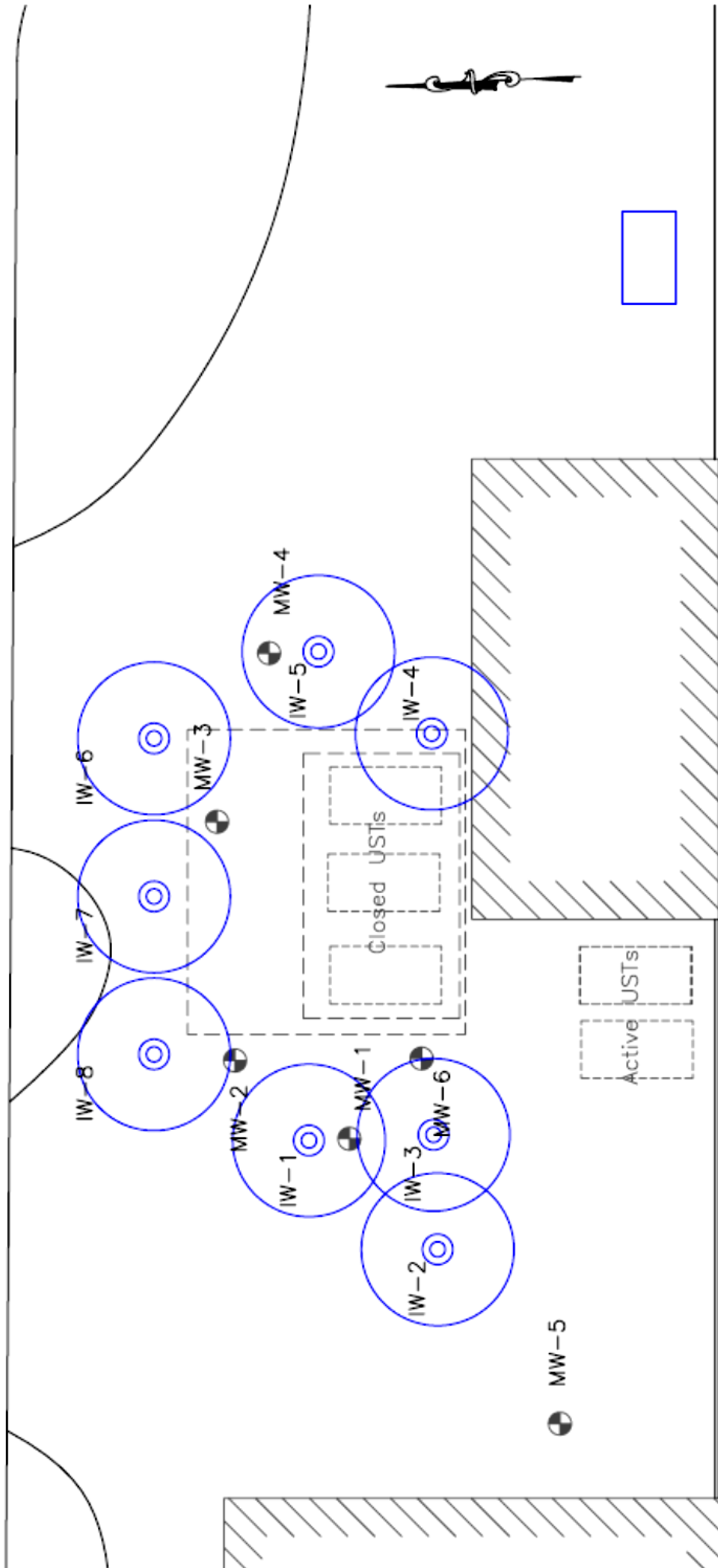


Figure 1

Biologic Sampling Results

Kwik Foods
Kosciusko, Mississippi

December 18, 2017

Smith Monitoring & Maintenance Engineering, Inc.
145 Merrill Avenue
Decatur, Georgia
(404) 229-3096

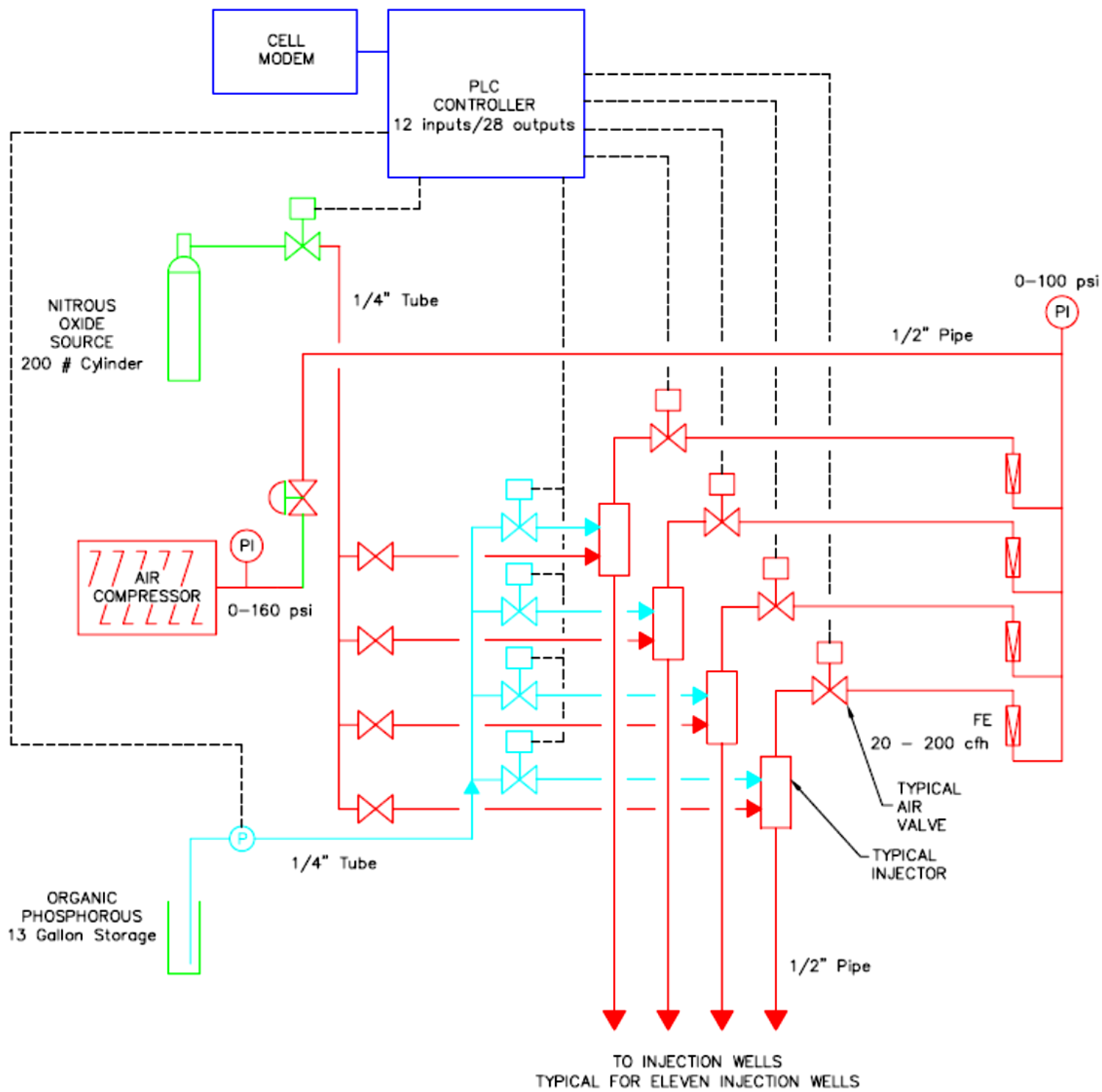
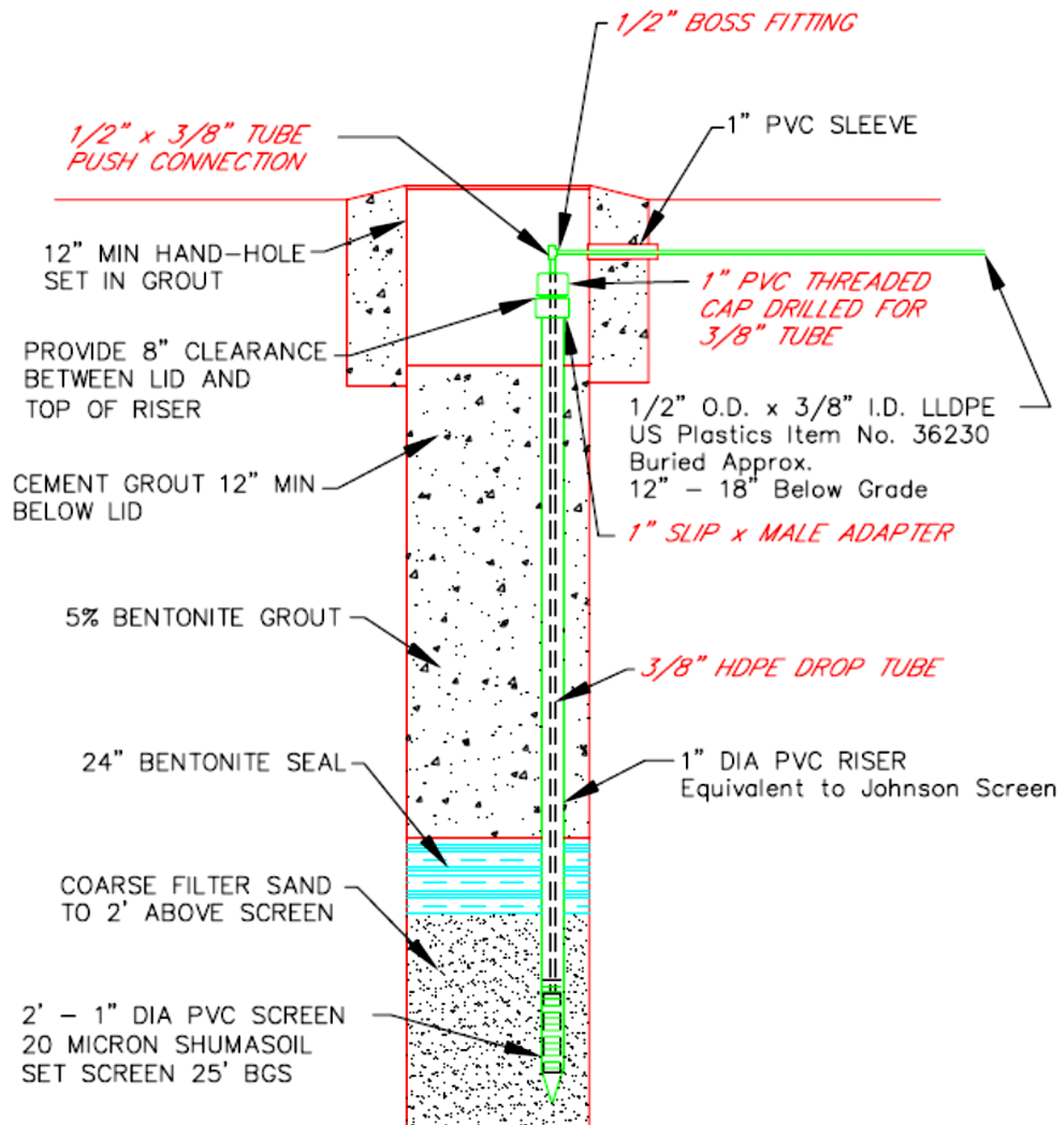


FIGURE 2

PHOSter
PROCESS DIAGRAM

TYPICAL P&ID FOR AEROBIC BTEX TREATMENT



MATERIAL SUPPLIED AND INSTALLED BY CLIENT

MATERIAL SUPPLIED AND INSTALLED BY SMME

FIGURE 3

INJECTION WELL DETAIL

Kwik Foods, 105 Highway 12 West
Kosciusko, Mississippi

Smith Monitoring & Maintenance Eng., Inc.
145 Merrill Avenue
Decatur, Georgia
(404) 371-9332

NOT TO SCALE
August 16, 2017