

Memorandum

Date: 18 February 2011

To: Mr. Stephan Cobb c/o Ms. Brandi Little; Alabama Department of Environmental Management

Copies to: Ms. Julie Carver, Mr. Wesley Dickinson, and Mr. Richard Satkin; Matrix Environmental Services, L.L.C.

From: Ms. Leslie Griffin, Mr. Peter de Haven, and Mr. Duane Graves; Geosyntec Consultants

Subject: Addendum 1 to the Final Corrective Measures Implementation Plan for Groundwater
Landfill 3, Parcel 80(6) and Fill Area Northwest of Reilly Airfield, Parcel 229(7)
McClellan, Anniston, Alabama
Geosyntec Project: GR4116

On behalf of the McClellan Development Authority (MDA), Geosyntec Consultants (Geosyntec), in collaboration with Matrix Environmental Services, LLC (MES) hereby presents Addendum 1 to the *Final Corrective Measures Implementation (CMI) Plan for Groundwater, Landfill 3, Parcel 80(6) and Fill Area Northwest of Reilly Airfield, Parcel 229(7), McClellan, Anniston, Alabama* (Final CMI Plan) dated August 2008 to the Alabama Department of Environmental Management (ADEM). The purpose of Addendum 1 is two-fold:

- 1) to document a revised conceptual design approach for remediating contaminated groundwater at and in the vicinity of Landfill 3 (LF3) and the Fill Area Northwest of Reilly Airfield (FANWR) using the same technologies originally proposed in the Final CMI Plan, and
- 2) to establish that all previous references in the Final CMI Plan to the Joint Powers Authority (JPA), which was dissolved in late August 2008, shall now reference the MDA, the legally official successor of the JPA.

BACKGROUND

In August 2008, Geosyntec and MES submitted the Final CMI Plan to ADEM. The Final CMI Plan identified three technologies that were most suitable for remediating contaminated groundwater at LF3 and FANWR: Enhanced *In Situ* Bioremediation (EISB), *In Situ* Chemical Oxidation (ISCO), and Monitored Natural Attenuation (MNA). EISB was selected as the primary active treatment technology for remediating the groundwater near LF3 and FANWR.

The EISB conceptual design presented in the Final CMI Plan includes the installation of lines of injection wells that transect the primary downgradient flow paths for constituents of concern (COCs), i.e., the fractured bedrock zone along the inferred splay fault. The first part of implementation included one injection well transect installed near the downgradient leading edge of the COC plume. Based on performance monitoring data, additional transects would be installed, as needed, upgradient from the initial transect and nearer to LF3.

Since submittal of the Final CMI Plan, and as part of on-going corrective measures design efforts, Geosyntec conducted a detailed review of the geologic, hydrogeologic, and chemical data collected as part of the LF3 and FANWR RCRA Facility Investigation (RFI) efforts. This review has enhanced Geosyntec's understanding of optimal treatment locations, both from the standpoint of COC depth horizons as well as the relative patterns of bedrock weathering and drilling requirements throughout the area of study. Additionally, Geosyntec has refined its understanding of favorable operating conditions for *in situ* microbial cultures as the state of the practice has advanced. These expanded reviews of both the site setting and technology considerations together showed that placement of the initial treatment transect much closer to LF3, the primary source of groundwater contamination, would improve remediation performance compared to the transect placement approach originally presented in the August 2008 Final CMI Plan.

REVISED CONCEPTUAL DESIGN

The revised EISB conceptual design focuses primarily on an optimized field implementation approach and continues to use lines of injection wells that transect the primary downgradient flow path for COCs. Figure 1 presents the revised EISB conceptual design. The initial transect will be installed immediately downgradient of LF3 in two phases. Phase 1 will consist of: (i) 16 injection wells sited in the southwestern end of the transect and screened in the COC-impacted zone of the aquifer; and (ii) four performance monitoring wells installed immediately downgradient of the injection transect. Based on results of the performance monitoring data, the Phase 1 transect will be extended, as necessary, to the northeast in a Phase 2 installation

deployment. Up to 12 additional injection wells and 4 additional performance monitoring wells will be installed.

Following a period that is sufficiently long to measure system function and progress toward groundwater remediation (at least six to twelve months), the remainder of the Corrective Action will be refined, if needed, based on performance of the Phase 1/Phase 2 initial transect. Refinement options may include any of the following: (i) an additional EISB transect; (ii) ISCO enhancement of the first EISB transect to target persistent hot spots or to accelerate treatment; and (iii) potential replacement of EISB with ISCO or an alternative remedy.

Geosyntec and MES made these revisions to the conceptual design on the basis of the additional data review performed subsequent to the Final CMI Plan submittal in August 2008. With the initial transect (i.e., Phases 1 and 2) installed immediately downgradient from LF3, this revised conceptual design presents the following significant strategic benefits, each of which is well-founded in the Final CMI Plan Corrective Action Objectives:

- A large portion of the area exhibiting elevated COC concentrations, including areas immediately downgradient of the LF3 source area in the Highway 21 corridor, will be treated more quickly than in the original plan.
- Mobile source area COC mass in the LF3 footprint will also be treated more rapidly than in the original plan.
- Because the initial transect will be installed close to the source, the continued migration of solvents off-site will be rapidly and significantly reduced, if not eliminated.

The installation of this transect offers other important advantages as well:

- The higher COC concentrations in this area compared to those in the original transect area provide much more favorable substrate (i.e., COC) concentrations for the microbial cultures to accomplish and sustain reductive dechlorination with greater efficiency and effectiveness.
- Treatment (injection) wells will be installed to shallower depths because the revised implementation location is closer to the source area. This affords greater stability and accuracy during well installation.
- Bedrock is expected to be more competent in this area compared to the highly weathered lithology on the northeast end of the Highway 21 corridor. As above, the greater degree

of competence will lend greater stability and accuracy to well installation and screen interval selection. This will increase the probability of intersecting more fractures that actively transport contamination which improves the delivery of the remediation technology and enables improved monitoring and overall understanding of the effectiveness of treatment along the transect length.

- The installation will occur on McClellan property rather than off-site in the Highway 21 right-of-way, thereby greatly increasing worker safety during installation and operation and reducing inconvenience to the community.
- If an off-site transect is determined to be needed in the future, the experience gained from the installation of the Phase 1/Phase 2 transect will be applied to minimize disruptions to the public and traffic along Highway 21.

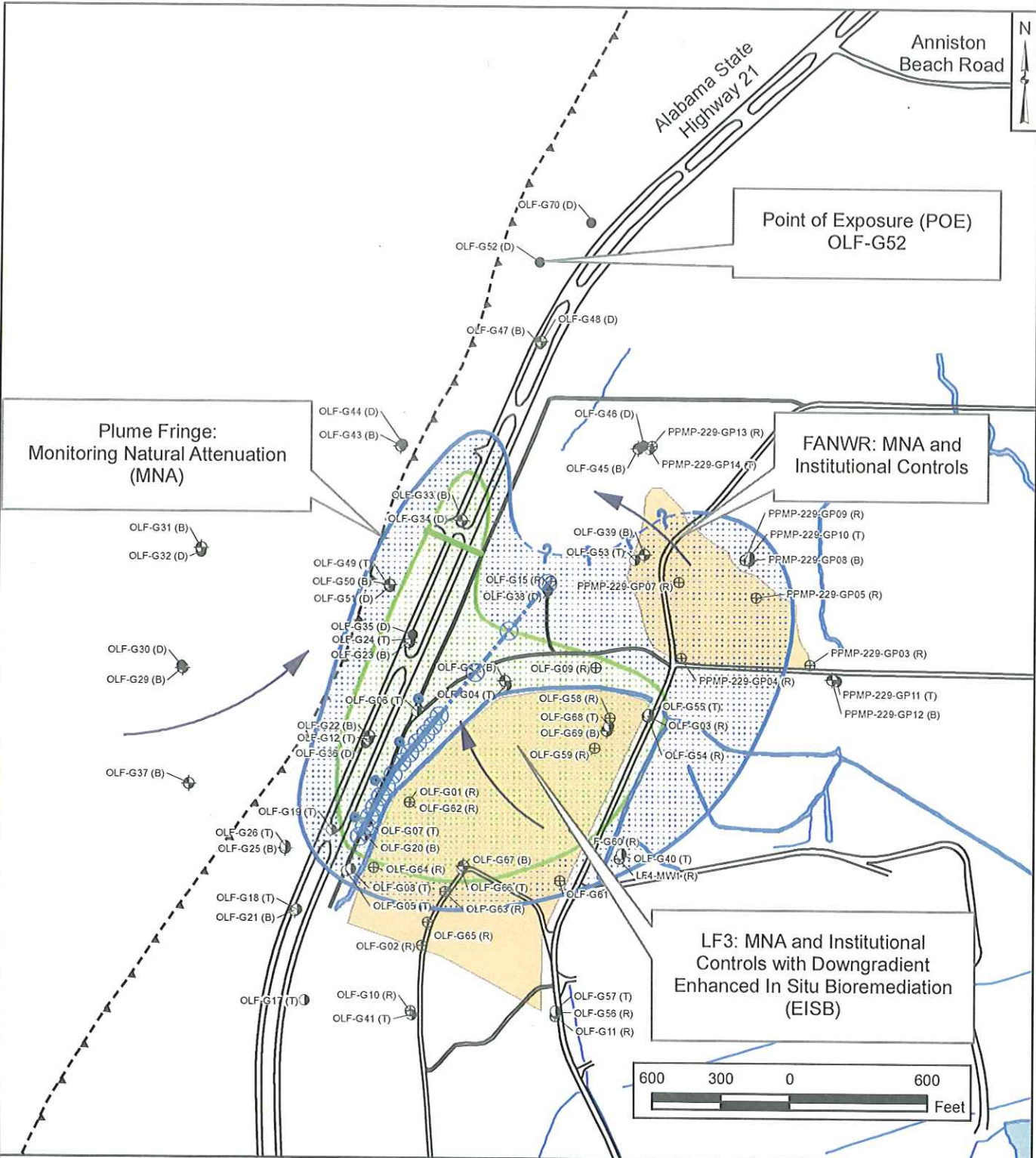
The revised EISB conceptual design provides a more aggressive and robust approach to implementing a remedy that will achieve the Corrective Action Objectives as stated in the August 2008 Final CMI Plan.

CLOSING

All other aspects of the August 2008 Final CMI Plan remain the same with the exception of the information presented in this Addendum. With ADEM's acknowledgment of this Addendum to the Final CMI Plan, Phase 1 installation of borings along the initial transect is planned to begin later in 2011 depending upon the timing of funding.

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FIGURES

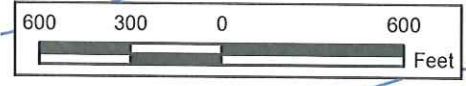


McClellan_LF3_OGCA110006_Jan 2011 Action Item 01_CMP Technical Memo and Replacement Pages/Figures, DSA, 15-February-2011

LEGEND

- | | |
|---|---------------------------|
| Preliminary Injection Transects: | Conceptual Flow Direction |
| Initial, Phase 1 | LF3/FANWR |
| Initial, Phase 2 | Estimated Fault |
| Subsequent - If Necessary | Residuum Well |
| Injection Wells | Transition Well |
| Performance Monitoring Wells | Bedrock Well |
| Estimated Extent of Chlorinated Solvent above RBTLs | Deep Bedrock Well |
| Estimated Extent of Plume Core | Roads |

Note:
RBTL = Risk Based Target Level



Preliminary Remedy Overview
McClellan, Anniston, AL

		<p>Figure 1</p>
<p>Kennesaw, GA</p>	<p>February 2011</p>	