Message

From: Kutty, Arvind [AKutty@TechLawInc.com]
Sent: 3/21/2017 6:00:27 PM
To: Davis, Eva [Davis.Eva@epa.gov]; d'Almeida, Carolyn K. [dAlmeida.Carolyn@epa.gov]; Dan Pope [DPope@css-inc.com]; Brasaemle, Karla [KBrasaemle@TechLawInc.com]; Henning, Loren [Henning.Loren@epa.gov]; Cosler, Doug [DCosler@TechLawInc.com]; Wayne Miller (Miller.Wayne@azdeq.gov) [Miller.Wayne@azdeq.gov]; Steve Willis [steve@uxopro.com]; Eleanor Jennings [ejennings@teci.pro]
Subject: RE: Slightly extended DFP Notes on the 3/17/2017 WAFB Conference Call and Path Forward

One other thing that I thought we could add to the reasons for phased implementation is that it could potentially save the Air Force a lot of money.

Given the expensive nature of the remedy which is driven by the cost of deep injection/extraction wells, a phased remedy approach should allow for cost savings by providing better data for subsequent phases. Additionally, if the first phase indicates that the remedy is unsuitable for the site, massive cost savings will be accomplished by pivoting to a more suitable remedy.

Best Regards,
Arvind

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From: Davis, Eva [mailto:Davis.Eva@epa.gov]
Sent: Tuesday, March 21, 2017 8:41 AM
To: d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; Dan Pope <DPope@css-inc.com>; Brasaemle, Karla <KBrasaemle@TechLawInc.com>; Henning, Loren <Henning.Loren@epa.gov>; Kutty, Arvind <AKutty@TechLawInc.com>; Cosler, Doug <DCosler@TechLawInc.com>; Wayne Miller (Miller.Wayne@azdeq.gov) <Miller.Wayne@azdeq.gov>; Steve Willis <steve@uxopro.com>; Eleanor Jennings <ejennings@teci.pro>
Subject: FW: Slightly extended DFP Notes on the 3/17/2017 WAFB Conference Call and Path Forward

I've made the first attempt to put forward the reasons why the Agencies believe a phased implementation approach is necessary. I'm leaving the lab and field test descriptions to those who know more about it – please fill it in. I am purposely forwarding Dan's compliation of comments/concerns again, as he made some very good points about expected reactions from the AF/Amec, and we should try to head off those responses now by providing all the information he is suggesting.

From: Dan Pope [mailto:DPope@css-inc.com]
Sent: Monday, March 20, 2017 4:02 PM
To: d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; Brasaemle, Karla <KBrasaemle@TechLawInc.com>; Davis, Eva <Davis.Eva@epa.gov>; Henning, Loren <Henning.Loren@epa.gov>; Arvind Kutty <AKutty@TechLawInc.com>; Cosler, Doug <DCosler@TechLawInc.com>; Wayne Miller (Miller.Wayne@azdeq.gov) <Miller.Wayne@azdeq.gov>

Cc: Eleanor Jennings <ejennings@teci.pro>; Steve Willis <steve@uxopro.com>
Subject: Slightly extended DFP Notes on the 3/17/2017 WAFB Conference Call and Path Forward

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From: d'Almeida, Carolyn K. [mailto:dAlmeida.Carolyn@epa.gov]
Sent: Friday, March 17, 2017 5:55 PM
To: Brasaemle, Karla; Dan Pope; Davis, Eva; Henning, Loren; Arvind Kutty; Cosler, Doug; Wayne Miller (Miller.Wayne@azdeq.gov)
Cc: Eleanor Jennings; Steve Willis
Subject: RE: DFP Notes on the 3/17/2017 WAFB Conference Call

I added some afterthoughts in purple to consider how we use results of (ahem) phased implementation to inform the full scale

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From: d'Almeida, Carolyn K. [mailto:dAlmeida.Carolyn@epa.gov]
Sent: Friday, March 17, 2017 3:10 PM
To: Dan Pope <DPope@css-inc.com>; Davis, Eva <Davis.Eva@epa.gov>; Brasaemle, Karla <KBrasaemle@TechLawInc.com>; Henning, Loren <Henning.Loren@epa.gov>; Kutty, Arvind <AKutty@TechLawInc.com>; Cosler, Doug <DCosler@TechLawInc.com>; Wayne Miller (Miller.Wayne@azdeq.gov) <Miller.Wayne@azdeq.gov>
Cc: Eleanor Jennings <ejennings@teci.pro>; Steve Willis <steve@uxopro.com>
Subject: RE: DFP Notes on the 3/17/2017 WAFB Conference Call

My notes from today:

- Adopt Phased Approach to implementation to collect site specific data to refine model, remedial timeframe estimate and performance criteria.
- Collect samples for microbial analysis to determine bacteria present, evaluate need for bioaugmentation.
- Perform lab testing to evaluate impact of temperature and sulfate loading rates on microbial population
- Incorporate phased implementation in specified areas differentiating between heavy LNAPL areas and dissolved phase areas in LSZ,UWBZ and CZ 3-6 months should be sufficient to evaluate degradation rate in dissolved phase areas, up to a year to evaluate degradation rate in heavy LNAPL areas Will need observation wells spaced within 6 months travel time of injection wells; bromide tracer useful for evaluating flow distribution around well.

Evaluate whether sulfate and tracer reach observation wells, then whether amendment is achieving biodegradation or not

- Update model to verify remedial timeframe, performance evaluation criteria and optimize full scale implementation
- Grid the full treatment area into optimization zones based upon existing conditions identified during characterization: Heavy LNAPL vs dissolved phase, temperature, microbial population, available sulfate, etc for optimized treatment, including possible bioaugmentation
- Install or designate observation wells within gridded optimization zones to evaluate remedy progress

- ADEQ working on alternative model

Carolyn d'Almeida
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"Because a waste is a terrible thing to mind..."

From: Dan Pope [mailto:DPope@css-inc.com]
Sent: Friday, March 17, 2017 2:35 PM
To: Davis, Eva <Davis.Eva@epa.gov>; d'Almeida, Carolyn K. <dAlmeida.Carolyn@epa.gov>; Brasaemle, Karla <KBrasaemle@TechLawInc.com>; Henning, Loren <Henning.Loren@epa.gov>; Arvind Kutty <AKutty@TechLawInc.com>; Cosler, Doug <DCosler@TechLawInc.com>; Wayne Miller (Miller.Wayne@azdeq.gov) <Miller.Wayne@azdeq.gov>
Cc: Eleanor Jennings <ejennings@teci.pro>; Steve Willis <steve@uxopro.com>
Subject: DFP Notes on the 3/17/2017 WAFB Conference Call

DFP Notes on the Friday March 17, 2017 WAFB Conference Call:

Loren has said that **performance criteria** are to be emphasized.

Why are regulators proposing a phased implementation?

- Site conditions have changed from those contemplated in the ROD for EBR/MNA
- EBR/MNA has not been tested and proven effective at a site of this size, complexity, and source mass – particularly in terms of the timeframe contemplated
- Therefore, a phased implementation (initially limited in terms of the volume of the subsurface applied) is indicated for proof of concept, and to provide data for EBR design and performance criteria.

Modeling

AF should provide a predictive modeling approach suited to determining timeframes for EBR and MNA to reach the respective goals for those remedy approaches. This modeling will include items related to performance criteria (timelines, triggers, COC concentrations, etc.)

Pre-injection Analyses

Have AF propose their ideas for pre-injection analysis to assess microbiology and geochemistry initial conditions, for comparison to post-injection analyses.

We can propose our own pre-injection analyses to assess microbiology and geochemistry initial conditions, and try to come to a meeting of the minds with AF.

These pre-injection and post-injection tests (for the phased implementation) would form another set of performance criteria; that is, to determine if the appropriate bug populations are developed to proper levels and activity.

Phased Implementation

A phased implementation, applied to a limited area of the site (but all vertical zones) would be the first major milestone (performance criterion) for success; i.e., if the COCs concentrations are lowered to the required concentrations, and stay there, that would be a major step to indicate feasibility of EBR.

A phased implementation could consist of starting EBR at selected sections of the site (i.e., essentially just a portion of what they have already planned for full-scale EBR, so there would not have to be any major changes in terms of approach). That is, pick wells with substantial LNAPL, at least one well in each of the various vertical zones, have injection wells upgradient of the LNAPL wells, and monitoring wells immediately downgradient of the wells, and inject sulfate, etc., as planned for the full-scale EBR. If AF can timely remediate that well so that the COC GW concentrations in those representative wells and the downgradient monitoring wells are (and remain over time) below EBR goals, then that would be strong evidence that a full-scale approach could work.

The chosen LNAPL well should have significant LNAPL – more than a sheen – at least two inches of LNAPL fairly consistently, so that actual remediation of GW in contact with substantial LNAPL can be assessed.

Chosen well should be at elevated temperature, to correspond with the general site conditions.

Reagent injections (sulfate, etc.) should reflect those concentrations, rates, volumes, etc. that are proposed for full-scale EBR.

Assuming the phased implementation continues for at least a year, the changes around the injection wells in terms of microbiology, sulfate concentrations, sulfide production, hydrogen sulfide generation, precipitation of iron sulfides, possible aquifer plugging, changes in pH, etc., can be monitored and evaluated for viability of a full-scale remedy, and any likely dangers, showstoppers, etc.

Fouling should be assessed for all wells (injection, LNAPL, monitoring), to determine the likely needs for well reworking, refurbishing, eventual replacement, etc. This is particularly important for the follow-on contractor (after AMEC's contract expires) to have an idea of long-term costs, and how to bid.

The downgradient monitoring transect can not only monitor COC changes, but also assess the geochemical footprint of downgradient locations, which would be pertinent to evaluating possible enlargement of a sulfate/etc. plume at full scale.

Also, the distribution and concentrations of sulfate achieved downgradient of the injection transect is of great interest. The AF model indicates they can get a reasonable (to them) sulfate distribution, but reality in subsurface environments is often different from the models. The field study should designed to provide suitable data to design injection well spacing, injection rates, injection concentrations, pressures, etc., so as to achieve useful sulfate concentrations across the site.