

From: [Masters - CDPHE, Lindsay](#)
To: [Thomas Harp](#); [Becky Almon](#); [J Lon](#)
Cc: [Emily Splitek](#); [Robert Beierle - CDPHE](#); [Chad Howell](#); bhlavacek@tchd.org; tbutts@tchd.org
Subject: (External) Re: Thornton, LLC 2-25-21 biweekly memo - more information requested by 3/4/21
Date: Friday, March 5, 2021 12:03:11 PM
Attachments: [image001.png](#)

Hello Tom,

Thank you for this information and photographs, provided by R3 on behalf of Thornton, LLC and Jay Brown (collectively, Thornton, LLC). -- A few thoughts and questions:

First, regarding the possibly stolen drum of purge water that "went missing", Thornton, LLC and R3 must secure any waste generated. CDPHE expects Thornton, LLC and Mr. Brown will ensure any solid or hazardous waste will now be stored in a locked and secure location, such as behind a locked fence on-site at Thornton Shopping Center. I have never heard of anyone stealing environmental investigation waste. Please let CDPHE know where all Thornton, LLC waste will be stored going forward. We do not expect this to happen again.

Second, CDPHE observed field work in OFS-2 on March 2nd, 2021 and discussed direct push work conducted with Keith Pollman of R3's subcontractor, Bronco. CDPHE is pleased this phase of OFS-2 BOS-100 injections have been completed and BOS-100 direct push injections continue to progress. However, I observed no decontamination of direct push equipment during my visit.

Third, CDPHE has noted your comments about direct push refusal. Hold off on using "pre-drilling" in BOS-100 injection locations in OFS-3 and OFS-1 where refusal is encountered by the direct push rig using the auger. Continue to proceed with direct push injections, but document where refusal is encountered on a map and other information for CDPHE review. -- We need to know (1) where and at what depth direct push refusal occurred; (2) what percentage of each OFS's horizontal area was able to receive BOS-100; and, (3) how much of the total BOS-100 was actually injected, and at what depths.

As to your proposal to change application methods, CDPHE requires more information to evaluate R3's plan to use an auger to "pre-drill" BOS-100 injection locations, where refusal has been encountered by the direct push rig, fill the hole with bentonite clay, and then direct push into the bentonite to inject BOS-100. **Further explanation and details are needed to assess the rationale for and merit of this proposal within the next couple business days:**

- Provide CDPHE with case studies, site examples, and technical materials illustrating the use of this proposed auger/bentonite/direct push BOS-100 application methodology through bentonite. I am not familiar with the practice of bentonite clay (possibly already hydrated) being used as an infiltration gallery for a remediation amendment/liquid injection. Typically, bentonite clay is used as a sealant given its properties. Has BOS-100 been injected at any other site this way? Is this an approved or certified BOS-100 application method?
- Provide CDPHE with a figure showing a diagram of your proposal to injection BOS-100 liquid through bentonite clay to reach the targeted area.
- What other options would be available to inject BOS-100 into the formation (e.g. could packers be used to seal injection intervals)?

Thank you again for your prompt reply.

Sincerely,
Lindsay Masters

Environmental Protection Specialist
Corrective Action Unit
Colorado Department of Public Health & Environment



New! Phone: 720-644-6314
4300 Cherry Creek Drive South
Denver, CO 80246-1530

On Thu, Mar 4, 2021 at 7:17 PM <tharp.rrrllc@gmail.com> wrote:

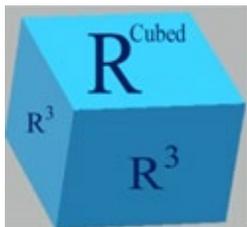
Dear Lindsay,

Below, please find Thornton LLC's responses in **red** to your questions. Please do not hesitate to contact me should you have further questions.

Best Regards,

Thomas A. Harp, P.G., M.S.C.E., M.B.A.

Principal



ASSESSMENT / REMEDIATION / PROPERTY TRANSACTIONS / EXPERT WITNESS

Remediation Risk Reduction, LLC

138 Rudi Lane

Golden, Colorado 80403

(303) 642-9212 office

(303) 903-4858 cell

(303) 642-9214 fax

tharp.rrllc@gmail.com

Hello Mr. Harp,

Thank you for the latest biweekly memorandum, attached, provided on behalf of Mr. Jay Brown and Thornton, LLC (collectively, Thornton, LLC). However, this February 25th biweekly memorandum is inadequate. As a reminder, since offsite treatment has started, we require substantially more detail and documentation of Thornton, LLC's corrective action efforts. In addition, the burden of proving that BOS-100 treatment may be effective is Thornton, LLC's responsibility. To monitor corrective action work and compliance, the Colorado Department of Public Health and Environment (CDPHE) requires more information by close of business on Thursday, March 4th:

- How much BOS-100 has been ordered and delivered for this February-March 2021 phase off offsite injection work to date?

BOS 100® necessary to complete the entirety of both Phase I and Phase II installations, per the approved Corrective Action Plan, as amended, was ordered on February 1, 2021. The first shipment was delivered on February 15, 2021 and the second shipment was delivered today, March 4, 2021; therefore, all BOS 100® has been purchased and delivered for installation.

- Have OFS-2 offsite BOS-100 injections been completed? And, have BOS-100 injections commenced in OFS-1 or OFS-3?

Yes, OFS-2 injections have been completed. Injections began in OFS-3 on March 1, 2021; however, we are experiencing refusal issues, so ceased injections in OFS-3 on March 3, 2021 to prepare to mobilize an auger rig to the site to "pre-drill" the remaining injection locations. The process will be to use solid-stem, flight augers to drill just past the deepest proposed injection depths at each location; then backfill the boreholes with hydrated bentonite and allow to "setup" for ~ 24 hours; then use the (previous) direct-push rig to penetrate down through the bentonite to each prescribed depth and inject, as planned. Soil cuttings generated during pre-drilling activities will be drummed and characterized. Since OFS-3 is a significant distance from the Thornton Shopping Center source area, it is very unlikely that the cuttings will be impacted by constituents-of-concern and can; therefore, likely be disposed of as solid waste. While R3 develops the "pre-drill" program, the

injection contractor will move to and commence injecting in OFS-1 on Friday March 5, 2021, in part, to determine if OFS-1 is “more like OFS-2” and can be injected using the direct-push rig or if OFS-1 is “more like OFS-3”, where we may have to pre-drill before injecting. Today, March 4, 2021 was expected to be “a snow” day, so we were not in the field today.

- What days and locations do you plan to conduct field work over the next two weeks? Specifically, what locations, what injections and what monitoring?

We will commence injecting in OFS-1 on Friday, March 5, 2021. It is expected to take 4 – 5 days to complete OFS-1, assuming we do not have to pre-drill. We will also possibly work on Saturday, March 6, 2021, so we hope to finish OFS-1 on or about March 10, 2021. We will return to OFS-3 on or about March 10, 2021 to commence pre-drilling the remaining injection locations in that area. Pre-drilling could take up to 2 – 3 days to complete. In the event that backfilled borings are “ready for injection” before all the pre-drilled holes are completed, the injection contractor might bring in a second crew to begin injecting, while remaining locations are being pre-drilled. Once injections resume in OFS-3, it is expected to take 4 -5 days to finish injecting in that area; hence, Phase I will not likely be completed by March 15, 2021, but can likely be completed by March 19, 2021.

Due to the unanticipated weather and refusal delays, Thornton, LLC will be requesting an extension of time to complete Phase I and are hopeful that CDPHE will work with us to accommodate these unexpected delays, as authorized in the Order.

As for groundwater sampling, there will be no planned “performance monitoring” during this timeframe. If any samples are collected during the remaining injection activities, they will be analyzed by Remediation Products, Inc. (RPI) as “supplemental analyses”.

- Has this phase of work generated any solid or hazardous waste - either soil generated by the remediation process or groundwater from purging and sampling monitoring wells? If not, why is there no waste from groundwater sampling or remediation activities?

There has been no solid waste e.g., soil cuttings, generated to date, though there clearly will be in the future, as a result of pre-drilling with an auger rig. We have generated a very small quantity of purge water, as a result of sampling MW-20 and MW-18; however, the purge drum “went missing”, and is assumed to have been stolen from the temporary storage location (behind the former dry cleaners at the Thornton Shopping Center) . A new purge-water drum was delivered to the Thornton Shopping Center location yesterday, March 3, 2021.

- Where is the BOS-100, equipment, and any waste currently being stored? And, do any of these locations change?

The BOS 100® is stored at the injection contractor's warehouse in Golden, Colorado and "daily needs of BOS 100®" are brought to the site each day. Injection equipment is typically left onsite, at respective locations in which we are working. There is no waste currently being stored; however, the new purge-water drum is located behind the former dry cleaner unit at the Thornton Shopping Center.

- An important part of the corrective action process monitoring and sampling groundwater, before, during, and after treatment. Please see CDPHE's 6/23/2020 Corrective Action Plan Addendum as approved with modifications by CDPHE letter.

- Item 5 of that letter, requires monitoring wells within and downgradient of OFS treatment areas to be sampled: "**Performance monitoring will include collecting groundwater samples from monitoring wells within and downgradient of treatment areas**". For instance, the 2-25-21 biweekly memorandum indicates monitoring well MW-20 was sampled on 2/16/2021. This well is within OFS-2. But no other monitoring well sampling is documented. For example, monitoring well MW-24 is immediately downgradient of OFS-2. Was this monitoring well also sampled before commencing February injections of BOS-100 in OFS-2? More generally, what are Thornton, LLC's performance groundwater sampling plans under the 2020 as-approved CAP Addendum?

As required, all groundwater samples collected for "performance monitoring purposes" will be analyzed by a certified laboratory (Summit Scientific, of Golden, Colorado). All pre-injection groundwater samples were collected in either October 2020 or December 2020, as presented in the December 2020 *Second Semi-Annual 2020 Groundwater Monitoring Report* and associated January 2021 *Addendum*. All of those samples were analyzed by Summit Scientific. Samples recently collected from MW-20 and MW-18 were analyzed by RPI and are considered "supplemental" samples, i.e., not performance-monitoring samples, and the RPI results will not be used "for any decision-making purposes". Supplemental samples will likely be collected from MW-19 and MW-24 on Friday, March 5, 2021 and analyzed by RPI.

Future performance-monitoring samples will be collected following the completion of Phase I injection activities, per monthly (every 30 days) and quarterly requirements stipulated in Item 5 of the June 23, 2020 CDPHE correspondence. Included in those (monthly and quarterly)

sampling programs are all wells within and downgradient of Phase I and Phase II treatment areas.

o Who is performing the field work and laboratory analysis? As stated in CDPHE's 6-23-20 approval with modifications letter, "A **certified laboratory shall be used for performance monitoring analysis,**" and "Remediation Products, Inc. in Golden, Colorado is not a certified laboratory." Again, Thornton, LLC is welcome to have Remediation Products, Inc. perform *supplemental* analyses; however, a certified laboratory must perform any performance monitoring analyses. Any samples to be used for decision-making purposes must be analyzed by a certified laboratory.

R3 and R3 contract personnel are conducting the field work. Summit Scientific has been, and will continue to be the certified laboratory for all performance-monitoring and "decision-making" sample analyses. RPI will continue to provide supplemental analyses, as needed.

o Item 5 of CDPHE's 6-23-20 approval with modifications letter requires groundwater be tested for chlorinated VOCs. The 2/25/21 memo notes one 2/16/21 analyte was detected at 34.6 ug/L. Yet it is unclear what this means. No analyte is identified. I assume the reported analyte is PCE, but please confirm. Also, was groundwater sampled from well MW-20 tested for other chlorinated solvents like TCE, cis and trans-1,2-DCE, etc? If so, what are these results?

Yes, the sample collected from MW-20 was analyzed by RPI for PCE: 34.6 ug/L; TCE: <0.5 ug/l; Cis-DCE: <0.5 ug/l; trans-DCE: <0.5 ug/l; 1,1-DCE: <0.5 ug/l; 1,1,1 TCA: <0.5 ug/l; and chloride: 394 mg/L.

- Per the 6/23/2020 letter, Item 8, Thornton, LLC's biweekly memos must include photographs of offsite injection areas. These were not included in the 2-25-2021 biweekly memo. Please provide photographs of injection work from February. Please be sure to include injection photographs of each area where work is performed in every biweekly update with location information, date, time, etc.

Photographs of OFS-1, OFS-2, and OFS-3 are attached, respectively. They were taken on March 3, 2021 between 3:15p and 3:30p.

- Quarterly groundwater monitoring and sampling is a distinct requirement from remediation-related monitoring. When is the groundwater monitoring and sampling scheduled to occur?

Specific dates have not been set, but combined monthly and quarterly sampling will be conducted sometime between when Phase I injections are complete, i.e., ~March 19, 2021, and March 31, 2021.

6/23/2020 letter. Instead, the court (1) mandated certain new deadlines for 2021, and (2) incorporated other CDPHE 2020 CAP Addendum requirements by reference. Please see Item 4 in the court's 12-1-2020 order. These are enforceable requirements.

Please let me know if you have questions. Thank you in advance for your prompt reply.

With kind regards,

Lindsay

Environmental Protection Specialist

Corrective Action Unit

Colorado Department of Public Health & Environment

New! Phone: 720-644-6314
4300 Cherry Creek Drive South