Carver, Andrew <andrew.carver@dnr.iowa.gov>

Re: DMACC Legacy Plaza Geothermal Well Field Investigation

Day, Erik <erik.day@dnr.iowa.gov> Thu, Mar 28, 2024 at 12:25 PM
To: "Nelson, Jesse M" <Jesse.Nelson@terracon.com>
Cc: "Carver, Andrew" <andrew.carver@dnr.iowa.gov>, "Graesch, Matthew" <matthew.graesch@dnr.iowa.gov>, Jake Christensen <jake@christensendevelopment.com>, Chad Rasmussen <chad@christensendevelopment.com>, "Didier, Kim" <kmdidier@dmacc.edu>, Mike Derkenne <mike.derkenne@bdconstruct.com>, "Sensenbrenner, Dennis R." <Dennis.Sensenbrenner@terracon.com>, Kevin Luetters <kluetters@co.jasper.ia.us>, Jamie Elam <jelam@jasperia.org>

Jesse - A quick follow up comment - you still need to apply for and receive an approved well construction permit from Jasper County Environmental Health. Kevin Leutters and Jamie Elam (of Jasper County) are copied on this email.

On Thu, Mar 28, 2024 at 12:23 PM Day, Erik <erik.day@dnr.iowa.gov> wrote:

> Jesse,
>
> Based on your investigation, vertical geothermal at the West and North locations is not prohibited by the DNR. Containerizing and testing of any water or soil produced is not required, but should be considered based upon conditions noted during drilling as to ensure proper disposal.
>
> Let us know if you have any questions.
>
> Best regards,
> Erik Day
>
> On Mon, Mar 18, 2024 at 5:44 PM Nelson, Jesse M <Jesse.Nelson@terracon.com> wrote:
>
> > Deb,
> >
> > Our investigation report is attached. We respectively request the IDNR review and provide comment as soon as possible to be sensitive of the project design and scheduling needs. Please let us know if you have questions.
> >
> > **From:** Williams, Deb <deborah.williams@dnr.iowa.gov>
> > **Sent:** Tuesday, March 5, 2024 2:44 PM
> > **To:** Nelson, Jesse M <Jesse.Nelson@terracon.com>
> > **Cc:** Carver, Andrew andrew.carver@dnr.iowa.gov; Graesch, Matthew matthew.graesch@dnr.iowa.gov; Erik Day <erik.day@dnr.iowa.gov>; Jake Christensen <jake@christensendevelopment.com>; Chad Rasmussen <chad@christensendevelopment.com>; Didier, Kim <kmdidier@dmacc.edu>; Mike Derkenne <mike.derkenne@bdconstruct.com>; Sensenbrenner, Dennis R. <Dennis.Sensenbrenner@terracon.com>
> > **Subject:** Re: DMACC Legacy Plaza Geothermal Well Field Investigation
> >
> > Hello Jesse,
> >
> > Appreciate the early preview and the very promising sample results.
> >
> > We look forward to your plans moving forward.
> >
> > **Deborah R Williams, Geologist III**
> > Water Quality Bureau| Water Supply Engineering,
> > Well Program| Water Use Program
> > 502 E. 9th St. Des Moines | Iowa 50319

C: 515.975.1644
deborah.williams@dnr.iwoa.gov
Private Well Program

IOWA | Department of Natural Resources

On Tue, Mar 5, 2024 at 11:36 AM Nelson, Jesse M <Jesse.Nelson@terracon.com> wrote:

> Deb,
>
> We were able to complete the nested boring/well set in this third proposed well field late last month. The borings/wells were installed in a nested set at the general location presented in my 1/9/24 email and noted on the attached CAD drawing draft (Exhibit 4). The following is a quick layout of the boring/well nomenclature to reference when looking at the drawing and lab results:
>
> - GW-1S were installed within the shallow extents of the reported VOC affected groundwater area from the EC (20 feet deep) to assess petroleum and chlorinated solvent impacts.
> - GW-1I was installed within the intermediate extents of the reported VOC affected groundwater area from the EC (50 feet deep) to assess chlorinated solvent impacts.
> - GW-1D was installed in the deep extents of the reported VOC affected groundwater area from the EC at the observed depth of bedrock (65 feet deep) to assess chlorinated solvent impacts.
>
> The lab results for the shallow boring/well indicate a small hit of diesel in soil, but the concentration is significantly below the IDNR level. The remaining soil concentrations in the shallow boring/well and the groundwater concentrations in the shallow, intermediate, and deep intervals do not exceed laboratory reporting limits. Based on these results and comparison to the north proposed well field results from October 2023, it appears using this west proposed well field for the geothermal system for Buildings 1 and 2 would be acceptable. However, as with the proposed north well field we understand considerations should be made for handling impacted soil and groundwater during well drilling and that the IDNR may require the implementation of a Soil and Groundwater Management Plan (SGMP) to address impacted media, if encountered, and/or drilling spoils. This SGMP can be drafted for IDNR review prior to the project proceeding.
>
> We are working on completing our investigation report including this supplemental data and hope to have that available in the next couple of weeks, but wanted to provide these lab result preliminarily rather than waiting to be considerate of the project schedule. Please let us know if you have questions.
>
> ---
>
> **From:** Nelson, Jesse M
> **Sent:** Tuesday, January 30, 2024 8:17 PM
> **To:** Williams, Deb <deborah.williams@dnr.iowa.gov>
> **Cc:** Carver, Andrew <andrew.carver@dnr.iowa.gov>; Graesch, Matthew <matthew.graesch@dnr.iowa.gov>; Erik Day <erik.day@dnr.iowa.gov>; Jake Christensen <jake@christensendevelopment.com>; Chad Rasmussen <chad@christensendevelopment.com>; Didier, Kim <kmdidier@dmacc.edu>; Mike Derkenne

<mike.derkenne@bdconstruct.com>; Sensenbrenner, Dennis R. <Dennis.Sensenbrenner@terracon.com>
Subject: RE: DMACC Legacy Plaza Geothermal Well Field Investigation

Deb,

Appreciate the review and response. We will work on getting this nested set installed/sampled at the site and will provide results when they are available. Thanks again.

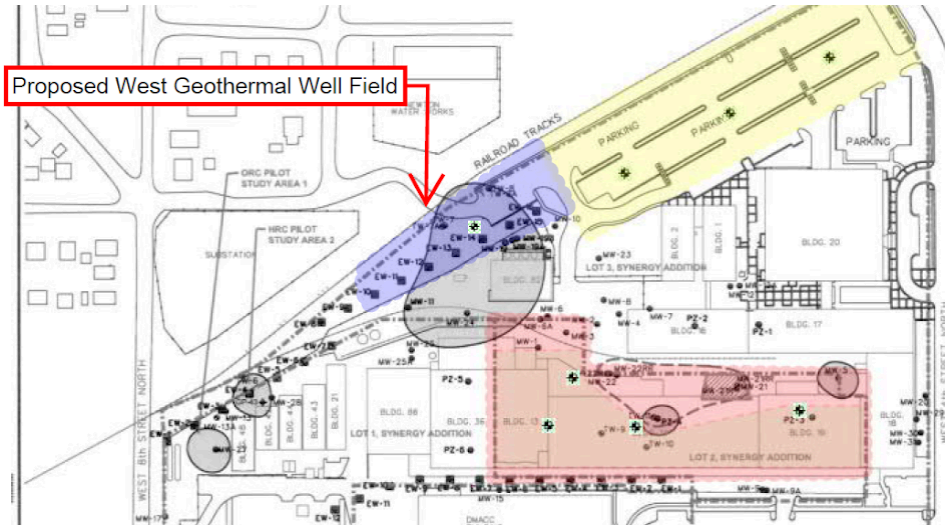
From: Williams, Deb <deborah.williams@dnr.iowa.gov>
Sent: Tuesday, January 30, 2024 9:18 AM
To: Nelson, Jesse M <Jesse.Nelson@terracon.com>
Cc: Carver, Andrew <andrew.carver@dnr.iowa.gov>; Graesch, Matthew <matthew.graesch@dnr.iowa.gov>; Erik Day <erik.day@dnr.iowa.gov>; Jake Christensen <jake@christensendevelopment.com>; Chad Rasmussen <chad@christensendevelopment.com>; Didier, Kim <kmdidier@dmacc.edu>; Mike Derkenne <mike.derkenne@bdconstruct.com>; Sensenbrenner, Dennis R. <Dennis.Sensenbrenner@terracon.com>
Subject: Re: DMACC Legacy Plaza Geothermal Well Field Investigation

Good morning Jesse,

Appreciate your patience. Andrew, Erik and I met this morning to discuss the proposed North Field for geothermal. What you have outlined for installation of nested monitoring wells looks good.

"... to evaluate this area for geothermal use, we'd propose the installation of a nested boring/well set for shallow (20 feet), intermediate (50 feet), and deep (bedrock) groundwater evaluation in a similar fashion to how the previous well field investigation was conducted. The proposed nested set location is presented on the attached map. "

Please move forward as proposed and notify us or email if you have any additional questions. We look forward to further discussion of the sampling results.



Best regards,

Deborah R Williams, Geologist III
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C: 515.975.1644
deborah.williams@dnr.iowa.gov
Private Well Program

On Tue, Jan 9, 2024 at 10:55 AM Nelson, Jesse M <Jesse.Nelson@terracon.com> wrote:

> Deb,
>
> Our client has notified us that they intend to abandon geothermal heating/cooling for Building 16 and 50 and the use of the South Field for this project due to the findings of our previous investigation as well as the IDNR's below response. However, geothermal is still being considered for Building 1 and 2. They are now looking at a third well field to the west of Building 1 and 2 and in close proximity to Building 82. A portion of this proposed well field is identified on the map included with the environmental covenant (EC) as an area of VOC affected groundwater. Attached is the EC map indicating this VOC area and the approximate extents of the proposed west well field shaded in blue. In order to evaluate this area for geothermal use, we'd propose the installation of a nested boring/well set for shallow (20 feet), intermediate (50 feet), and deep (bedrock) groundwater evaluation in a similar fashion to how the previous well field investigation was conducted. The proposed nested set location is presented on the attached map. They'd also prefer to use this area for the well field to limit installation and pavement replacement costs as much as possible which in the parking lot areas will be significant to the project.
>
> We'd appreciate your comments on this as our client proceeds with planning for the development. Let us know if you have questions or need additional information.
>
> ---
>
> **From:** Williams, Deb <deborah.williams@dnr.iowa.gov>
> **Sent:** Monday, October 23, 2023 10:56 AM
> **To:** Sensenbrenner, Dennis R. <Dennis.Sensenbrenner@terracon.com>
> **Cc:** Nelson, Jesse M <Jesse.Nelson@terracon.com>; Carver, Andrew <andrew.carver@dnr.iowa.gov>; Graesch, Matthew <matthew.graesch@dnr.iowa.gov>; Erik Day <erik.day@dnr.iowa.gov>; Jake Christensen <jake@christensendevelopment.com>; Chad Rasmussen <chad@christensendevelopment.com>; Didier, Kim <kmdidier@dmacc.edu>; Mike Derkenne <mike.derkenne@bdconstruct.com>
> **Subject:** Re: DMACC Legacy Plaza Geothermal Well Field Investigation
>
> Good morning,

We've had a little more time to evaluate proposed elevations and levels of contamination. It is in our best judgement that due to sample results indicating high levels of TCE in the South Field that this location is no longer be considered due to the inability to control migration of TCE and related daughter products. However, as far as the potential use of the North field, due to the low levels of contamination, both vertical and horizontal can be considered. Complemented with soil, water and drilling fluids management inclusive of containment and testing.

Appreciate your consideration,

Deb

Deborah R. Williams| Geologist III
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www.iowadnr.gov

On Fri, Oct 20, 2023 at 2:31 PM Sensenbrenner, Dennis R. <Dennis.Sensenbrenner@terracon.com> wrote:

> Deb,
>
> Jesse is out until Monday. As a thought, would horizontal system be a considerations since it will not likely penetrate the intermediate zone?
>
> Food for thought.
>
> Dennis R. Sensenbrenner, PG
> Professional Geologist I Certified Groundwater Professional
>
> Senior Associate
>
> Senior Geology Consultant I Environmental Services
>
> Terracon
>
> 2640 12th Street SW I Cedar Rapids, Iowa 52404
>
> D (515] 557 3824 I F (319] 366-0032 I M (515] 491-8936
>
> Dennis.Sensenbrenner@terracon.com I Terracon.com

Please consider the environment before printing this email

From: Williams, Deb <deborah.williams@dnr.iowa.gov>
Sent: Friday, October 20, 2023 1:55 PM
To: Nelson, Jesse M <Jesse.Nelson@terracon.com>
Cc: Carver, Andrew <andrew.carver@dnr.iowa.gov>; Graesch, Matthew <matthew.graesch@dnr.iowa.gov>; Erik Day <erik.day@dnr.iowa.gov>; Jake Christensen <jake@christensendevelopment.com>; Chad Rasmussen <chad@christensendevelopment.com>; Didier, Kim <kmdidier@dmacc.edu>; Mike Derkenne <mike.derkenne@bdconstruct.com>; Sensenbrenner, Dennis R. <Dennis.Sensenbrenner@terracon.com>
Subject: Re: DMACC Legacy Plaza Geothermal Well Field Investigation

Hello Jesse,

Erik and I met yesterday with contaminated sites to discuss the recent LSI data submitted for the proposed north and SSouth Geothermal Fields. It is clear from the data from the intermediate monitoring in the proposed south field that it's still heavily impacted with residual chlorinated solvents. As stated in your email. "The groundwater samples from the intermediate wells in the south proposed well field (GS-1I and GS-2I) had several hits in groundwater including Trichloroethene (TCE) which unfortunately both exceed the IDNR levels for groundwater. " Hence, it is with our best judgement to deny installation of any geothermal loop in the proposed South Geothermal Field based upon overall concerns for potentially moving the contamination deeper or laterally.

However, in the North Geothermal Field, appears from the sampling to be the most promising and less concerning for the loops to a depth of 50' or migration of contaminants. We know this short of what you are requesting; however, the Private Well Program is charged with protecting groundwater impact and further migration of known contamination.

If the project moves forward with additional consideration for geothermal in the North Geothermal Field, as stated, implementing a soil and groundwater management plan will be required to properly handle impacted soils and groundwater.

Our calendar is open next week if you wish to further discuss.

Thank you for your consideration.

-d

Deborah R. Williams| Geologist III
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On Mon, Oct 16, 2023, 4:33 PM Nelson, Jesse M <Jesse.Nelson@terracon.com> wrote:

> Deb,
>
> We've received the soil and groundwater lab results from the well field investigation completed a couple weeks ago for this project. The borings/wells were installed in nested sets at the general locations discussed in our call on September 14th and noted on the attached CAD drawing draft (Exhibit 4). The following is a quick layout of the boring/well nomenclature to reference when looking at the drawing and lab results:
>
> - GN-1S through GN-3S and GS-1S through GS-3S were installed within the shallow extents of the site (20 feet) to assess petroleum and chlorinated solvent impacts.
> - GN-1I through GN-3I and GS-1I through GS-3I were installed within the intermediate extents of the site (50 feet) to assess chlorinated solvent impacts.
> - GS-1D was installed in the deep extents of the site at the observed depth of bedrock (79 feet) to assess chlorinated solvent impacts as requested by the IDNR.
>
> Note: GN = Geoprobe boring/well north field; GS = Geoprobe boring/well south field.
>
> The lab results for the shallow borings/wells indicate some impacts in soil and groundwater, but not at concentrations that exceed the IDNR levels. The groundwater sample collected from the deep well set at the top of bedrock (GS-1D) did not exceed the lab reporting limits. The groundwater samples collected from the intermediate wells in the north proposed well field (GN-1I through GN-3I) had a few hits in groundwater, but not at concentrations that exceed the IDNR levels and a majority of the results do not exceed the lab reporting limits. The groundwater samples from the intermediate wells in the south proposed well field (GS-1I and GS-2I) had several hits in groundwater including Trichloroethene (TCE) which unfortunately both exceed the IDNR levels for groundwater. The groundwater sample collected from intermediate well GS-3I in the proposed south well field did not exceed the lab reporting limits. The lab report is attached for reference.
>
> The south proposed well field is the desired option for the project due to construction scheduling and the associated cost in comparison to the north proposed well field. The IDNR indicated during the September 14th call that a horizontal well system may be an option for the project. Christensen Development's geothermal well driller has indicated horizontal wells are feasible in the south well field and that drilling depths would only need to go to 45 feet below grade for the project. We'd recommend the horizontal well system in the south well field be utilized to meet project design needs based on the results of the investigation. However, we understand the IDNR may require specific procedures while drilling to seal off the shallow/intermediate aquifers to prevent horizontal/vertical migration of existing impacts and/or create preferential pathways. Considerations should

also be made for handling impacted soil and groundwater if encountered during well drilling. Implementation of a Soil and Groundwater Management Plan may prove beneficial to address impacted media, if encountered, and/or drilling spoils.

We are working on finishing up the report and hope to have that available yet this week, but wanted to a preliminarily update to the IDNR with the lab results now rather than waiting given the sensitive timelines of the project. Please let us know if you have questions.

Jesse Nelson, REM, CGP
Senior Scientist

600 SW 7th Street, Suite M **I** Des Moines, Iowa 50309

P (515) 557-3848 **I** M (515) 554-4863

Jesse.Nelson@terracon.com **I** **Terracon.com**