



STATE OF
COLORADO

Ebert - DNR, Jared <jared.ebert@state.co.us>

Hatchery Pit, M-2014-043, TR01, Adequacy Review No. 2

Environment-Inc <Environment-inc@outdrs.net>
To: "Ebert - DNR, Jared" <jared.ebert@state.co.us>
Cc: Ben Frei <BFrei@albertfreiansons.com>

Wed, Jan 16, 2019 at 3:30 PM

Jared,

Attached are copies of the Second Adequacy Review response and the corrected and revised Groundwater Monitoring Plan that I just mailed.

Any questions please call me.

Regards,

Steve

Steve O'Brian
Environment, Inc.
7985 Vance Dr., #205A
Arvada, CO 80003
(303) 423-7297
(303) 423-7599 Fax
Environment-inc@outdrs.net

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----- Original Message -----

From: Ebert - DNR, Jared

To: Environment-Inc

Cc: Ben Frei

Sent: Tuesday, January 15, 2019 3:38 PM

Subject: Hatchery Pit, M-2014-043, TR01, Adequacy Review No. 2

[Quoted text hidden]

2 attachments



M2014043-Groundwate-Plan2018r.pdf
1771K



M2014043_TR01-Adequacy response02.pdf
93K

Environment, Inc.

LARRY E. O'BRIAN
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7985 VANCE DRIVE, SUITE 205A
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January 16, 2019

Mr. Jared Ebert
Division of Reclamation, Mining & Safety
1313 Sherman St., Suite 215
Denver, CO 80215

Dear Jared;

RE: Albert Frei and Sons, Inc. - Hatchery Pit - M-2014-043
Technical Revision 01 Adequacy Response 02

On behalf of my client Albert Frei and Sons, Inc., I am responding to your second adequacy review letter dated January 15, 2019. I have included your review points that need to be addressed in the order presented so the questions and answers will be in the same document for easy reference. I included a copy of the revised Ground Water Mitigation Plan since changes were made to it as discussed in the following text.

- 1.) The applicant proposes a trigger elevation maximum for MW01 as 5080.0 feet, however two feet above the highest water level recorded during the first seven monitoring periods was 5,076.62 feet. Given this, the trigger elevation maximum for MW01 should be 5078.62. Please revise.

I used the bottom of the french drain elevation in that area instead of the highest groundwater elevation because using the highest groundwater elevation places the MW01 trigger point 7.4 inches above the base of the french drain pipe. I'm not sure that really is a valid elevation since the top of the groundwater will not have completely eclipsed the french drian. The 5080.0 feet elevation places the trigger point approximately 10.0 inches above the top of the french drain pipe and 18 inches below the top of the liner. I believe it is better to have the trigger point above the top of the pipe but below the top of the liner and request that the 5080.0 feet remain as the upper trigger point. I also found a mistake the column for MW01 in Table Gm-1 so have corrected that too.

- 2.) The applicant proposes to reduce the water monitoring frequency to annually two years after the clay liner has been installed. The Division agrees that two years after liner installation, it may be appropriate to reduce the water monitoring frequency as proposed.

However, the Division would like quarterly monitoring to continue until the seasonal water level regime can be adequately documented to have stabilized. Please revise the monitoring plan to indicate two years after the clay liner has been installed the Operator will evaluate if the groundwater regime has sufficiently stabilized and will obtain DRMS approval prior to reducing the water monitoring frequency to annually.

I have revised the text in the *Groundwater Monitoring Data Analysis and Data Collection and Submittal* sections to incorporate the wording on seeking Division approval prior to going to once a year monitoring.

Reclamation Cost Estimate

- 3.) The Division has reviewed the reclamation cost estimate provided by the applicant. The Division cannot release liability associated with the Phase 1 slurry wall until it has been certified and approved by the Colorado Division of Water Resources. Once certified and approved, the Division can release 80% of the liability associated with the slurry wall and will hold 20% for possible repairs until mining and reclamation is complete at the site. Enclosed is a reclamation cost estimate conducted by the Division based on the information submitted with the adequacy review response. Please advise the Division if you concur with the estimate.

We concur with your numbers but request that the amount be rounded to the closest hundred dollars (\$1,056,100.00).

If you have more questions or need more information please call me at (303) 423-7297.

Sincerely,



Stevan L. O'Brian
Environment, Inc.

cc Albert Frei & Sons, Inc. - Ben Frei
Jared Ebert - via e-mail
file

Groundwater Monitoring Plan.

The plans are to install slurry wall liner or compacted liner around the 2 excavated areas and then backfill them to present ground levels. To do this there are two different scenarios that have to be addressed in a different manner. They also have common issues that can be addresses in general. We use the term line as a general term to describe either the Slurry wall liner or compacted liner depending on the state being discussed

Phase 1 involved installing a Slurry Wall around the area to be mined and then mining the alluvial deposit of gravel. The slurry will be place at grade around the area to be mined and backfilling will start when all of the gravel is removed. Stage 2 is mostly a terrace deposit with the water table located approximately 30 feet below the surrounding surface at approximately 5079.8. The plan is to install a compacted liner around the bottom of the excavated area that is keyed into the bedrock. The high point of the liner is 5083.3, at a point hat is approximately 300 feet south of the northeast corner and slopes to 5077.3 on the northwest corner of Stage 2 and 5077.6 on the Southwest corner of Stage 2. This places the top of the slurry wall approximately 3.5 feet above the average ground water elevation. The bottom of the French drain pipe is installed at a maximum elevation of 5079.4 and slopes to 5073.2 on the northwest corner of Stage 2 and 5073.6 on the Southwest corner of Stage 2. The French drain will maintain the height of the groundwater table at 2013 elevations. The higher liner top will provide adequate height to prevent ground water from entering the filled area when reclamation is complete.

When the Certificate of Designation was approved by Adams County they did not include a groundwater monitoring requirement since all fill was to be isolated from the groundwater table. Seven (7) monitoring wells were installed around the mine site on June 14, 2016 (prior to mining commencing) to be used to monitor the height of the groundwater table and to determine the height of the liners. Map **Exhibit Gm-1(revised)** shows the locations of the piezometers as installed. From June 2016 to March 2018 samples were collected prior to dewatering starting on Stage 2 to establish background elevations for the water table.

The Groundwater Monitoring Data Analysis discussion explains how the data collected will be used to address the proposed mitigation measures if problems occur to the surrounding groundwater table.

This site and surrounding properties have existing groundwater and surface water features that impact groundwater elevations due to their proximity to the mine. On the north is an old gravel mine that was backfilled with inert materials similar to what is proposed at this site. Along the west side, the Bull Seep parallels the property line from the SW corner, where the property line turns back to the east, to the northwest corner where it leaves the site. The Bull Seep is a warm water slue that carries water year around. West of the Bull Seep is a slurry wall liner installed by the City of Thornton around a water storage reservoir that runs the entire length of the west side of the permit area. An old gravel lake is located in the northwest part of the mine area and previous owners installed lateral ditches and ponds along the interface of the terrace deposit and the alluvial deposit to divert water that comes to the surface, around the site and back to the Bull Seep. All of these water features have an impact on the current groundwater conditions and the flow of it across, around and thru the permit area.

The location of the Bull Seep and Thornton's slurry wall will limit the amount of ground water shadowing along the west side of the mine. The Bull Seep will recharge the groundwater and limit the mounding behind the slurry wall on the Thornton site will keep the groundwater elevations constant on this site.

The backfilling along the entire north side may have already limited water flow thru this area and is forcing the water to back up on this site. That may be why there is a constant flow of water thru the lateral drain that runs along the north side and along the base of the hill. This may also explain why the water elevation of the old gravel mine lake appears to be higher than it was prior to that area being filled. On the other hand if it has restricted flow thru that site it has not had a significant impact to the east.

Most of the existing lateral ditches and small ponds will be removed as mining progresses. They now serve to direct the seepage water and surface waters around the property and back to the western drainage. The existing ditches will be rerouted to more direct routes and new ones will be installed around the mined areas to preserve the historic flow of the water. On the north they will be directed into the existing lake so the water returns to the system. On the south a lateral ditch was built along the south side of the slurry wall so water can be diverted back to the Bull Seep drainage. This ditch also acts as a surface drain for groundwater that may backup along the slurry wall in that area and will carry the flow from the French drain to Bull Seep.

Groundwater Monitoring Data Analysis

As the data is collected, it will be recorded in a spread sheet and graphed to establish the baseline data that can be used to determine what if any impacts the slurry wall and compacted liner are having on the groundwater table. The data collected to date has allowed us to determine what the new trigger point elevations are. These elevations determine what actions are needed. Data collection will continue on a monthly basis until 13 consecutive samples have been collected and then go to a quarterly basis until 2 years after the liners are complete. Two years after the clay liner has been installed the Operator will evaluate the data and if the groundwater regime has sufficiently stabilized and will obtain DRMS approval prior to reducing the water monitoring frequency to annually. From then on till reclamation is complete, the monitoring will be done once a year. The data collected in the first 3 samples were used to determine the elevations of the compacted liner and French drain elevation in Stage 2 as discussed above. Future data will be used to determine if a trigger point has been reached and what actions will be needed.

Baselines and Trigger Points

The baselines for each well have been determined by taking the high and low elevations of each well from the data collected in the first 7 samples. The proposed trigger points have been determined to be elevations that are greater than two (2) foot above the highest elevations and/or less than one (1) foot above bedrock elevation in the monitoring Wells 1, 2, & 3. Based on the data collected it appears that mounding may not be a problem since there is none apparent from the filling done on the adjoining property. In addition, the natural groundwater, pre dewatering, elevations in Stage 2 averaged 5079.8 or approximately 30 feet below the surface.

The following table shows the proposed trigger elevations for each well now that site specific information is available. On Stage 1 the trigger point elevations were based on plus or minus 2 feet of change. In Stage 2 the maximum is based on the maximum elevation measured, pre-dewatering, in each monitoring wells and added 2 feet. The minimum was picked as 1 foot above bedrock since there are no surface wells within 800 feet of the dewatering area that would be impacted. The water table is normally 30 plus feet below the surface.

Table Gm1

MONITORING WELL	MW01	MW-02	MW-03	MW-04	MW-05	MW-06	MW-07
BEDROCK ELEVATION	5065.8	5064.7	5066.4	5063.1	5063.0	5047.3	5037.67
TOP OF LINER ELEVATION	5081.5	5082.0	5080.0	NA	5071.2	5068.4	NA
BOTTOM OF FRENCH DRAIN ELEVATION	5078.0	5078.0	5076.0	NA	NA	NA	NA
TRIGGER ELEVATION MAXIMUM	5080.0	5082.3	5081.7	5068.7	5068.46	5067.5	5066.3
TRIGGER ELEVATION MINIMUM	5066.8	5065.7	5067.4	5063.94	5063.14	5062.57	5061.67

The possibility of adjusting the baseline ranges if needed in the future will be discussed between the Division and the operator at that time. The baseline range changes would be documented with a Technical Revision.

If the groundwater levels in a monitoring well pass their trigger points for more than 3 months in a row, the operator will investigate to determine causes, and do mitigation as necessary. The operator will notify the Division of the trigger investigations and any subsequent mitigation.

A neighbor complaint could also be a "trigger". Examples of possible issues that may cause a trigger are: water well levels low, flooding fields, and vegetation suffering. Albert Frei & Sons would investigate to determine causes and mitigate if necessary as needed following the mitigation plan outlined below.

Mitigation Plan.

If the trigger is reached based on data collected, the following actions should be undertaken:

- An evaluation of the data to confirm that Albert Frei & Sons, Inc. (Frei) is responsible for the change shall be completed.
- Implementation of mitigation measures.

Mitigation measures that could be implemented (not necessarily in the order listed) include:

Up Gradient Mitigation

- In Stage 2 an inspection of the surface groundwater diversion drain (French Drain) on the outside the compacted liner will be done. If it is found there is a problem with the drain it will be cleaned or repaired as needed to preserve the drainage.

Down Gradient Mitigation

- Well improvements. Affected surface water wells could be deepened to bedrock or modified to increase yield. Alternatively, new alluvial wells could be constructed to provide a new water supply.

- Frei would provide temporary replacement water, if needed, while studies to determine fault are being conducted, or while mitigation measures are in the process of being implemented.

The exact mitigation measure or combination of measures would be determined based on additional investigations and consultations with the affected party. Costs for implementation and maintenance of mitigation measures needed resulting from Frei operations would be borne by Frei.

Data Collection and Submittal to the Division

The seven monitoring wells installed around the perimeter of the operation will have data collected on a monthly basis until 13 consecutive months of data has been collected then go to a quarterly basis until 2 years after the liners are complete. From then on, if approved by the Division, until reclamation is complete, the monitoring will be done once a year. The data from these wells will be used to monitor for compliance to stay within the baseline ranges proposed.

The operator will give the Division a groundwater monitoring well data summary report that includes, groundwater level data, times the trigger points were exceeded, investigations into cause, and any needed mitigation analysis/plans, with the annual report. The operator will also contact the Division with this information when/if a trigger point is reached and there seems to be a trend.

