Conversations from Canyon Mine 10/29/19 Inspection

At the NSI, the Apex 2.0 evaporators were shut off due to red flag conditions. We had them turn them on, to observe how they operate. Prior to arriving at the NSI, when we were reviewing some designs of the evaporators, I asked if we could take photos of the layout in order to update our records and to have an idea of what they are doing. The name on the site plan was incorrect and Scott Bakken said he was uncomfortable with this leaving the site (and becoming public record) with the wrong information. Matt Germansen said he would get us the accurate as-built designs.

We were told by Matt they have a water heater so that water from the impoundment will flow through there, heat up to 40 degrees warmer and return to the evaporators. My question is how will the water evaporate if the outside air is 10 degrees. It heats to 50, and returns? It gets sprayed out, into 10 degree air? Not sure I understood the logic. Matt talked about how they think the APEX will evaporate at a lower rate in the Winter (approximately 6 gpm) than the expected 15 gpm in Summer.

Vegetation was removed from the NSI. I recommended that a rub sheet be installed underneath the sprinklers along the sideslope of the pond to prevent them from ripping the liner (at Maribeth's observation).

When I asked about the capacity issues of having 20 gpm (average rate pumped from shaft sump) and winter conditions with low evaporation, they pointed to the installation of a new 1,011,257 gallon capacity tank. Shaft sump water can be split to report to either the NSI or to the first tank (350,129 gallon capacity) which is connected via pipe to the new tank. The shaft sump water from the tanks is used for dust suppression throughout the site. NSI water is used for dust control directly on the Development rock stockpile. I said ADEQ's previous letter (January 20, 2017 from Luke Peterson to Mark Chalmers), indicated that only clean Coconino aquifer water was to be used for dust suppression. This becomes an interesting conversation at the end.

The Apex 2.0 evaporators sit on a HDPE floating platform that can be accessed via a floating walkway made up of HDPE lined floating devices. Maribeth requested construction materials of the walkway and pad be provided to us. The concern is that the floating walkway and platform could potentially tear the liner if there are metal or other materials rather than just HDPE.

The forest service guy kept asking Scott why they didn't have to sample their sump water in the impoundment as his constituents ask him this all the time.

At the Intermediate ore stockpile (not built), there was an erosion/storwmwater control basin built.

As mentioned earlier, when I mentioned to Scott that the mine shaft sump water going into the tanks and that is being used for dust suppression is not allowed, I was told the tank exemption rule prevents ADEQ from essentially regulating them. When I said the NSI sump water isn't supposed to be used for dust suppression of the Development rock stockpile, Scott indicated that in a January 2019 conversation with Dave Dunaway, Mr. Dunaway supposedly said that this was ok to do. I said I could not recall the conversation in January and that I would need to confirm this with Mr. Dunaway. Scott then said, they could stop using the NSI sump water on the Development Rock Stockpile, and just use the tank water as ADEQ did not have authority to tell them to not use it. (Maribeth indicated to me, that the tank substantive policy does not specifically address the types of tanks constructed using panels and HDPE liner).

Again, we asked to take photos of the site diagram/plans for the Apex 2.0 evaporators in the NSI. This time Matt said he would send us the information once they could correct the site name on the drawings.

When I said I was going to put "pending" for construction drawings or as-built plans and capacity design criteria as "pending" in the inspection report, Mr. Bakken questioned why. I said the original design has been changed by the addition of evaporators. The capacity of the impoundment also has been impacted by the evaporators and the 3 gpm (original) versus the 20 gpm (current).

Prior to signing the Intermediate ore stockpile inspection, under the inspection form "recommendations and potential deficiencies" section, I had wrote "sediment catchment basin constructed to prevent sediment and stormwater runoff". Mr. Bakken was very uncomfortable signing the document without the inspection form heading being switched to "notes".

I cannot recall what Scott said about this next part, but he said EF sent Misael, Trevor and Dave a letter with information or the condensed powerpoint given in the meeting held with ADEQ a few weeks ago.

Scott Bakken also said that he had sent a letter to notify ADEQ that the tanks were going to be built.

Canyon Mine Notes

Timeline

- July 1985 – EFN (predecessor of EFRI) filed a Notice of Disposal with ADHS.
- August 1986 – USFS issued Final EIS indicating no expected adverse impacts to perched or regional groundwater.
- September 1986 – Record of Decision issued.
- May 1988 – GWPP issued to EFN.
- March 2002 – ADEQ denies individual APP application for failure to respond.
- 2008 – ADEQ denies general permit coverage applications for mine. Lined impoundment due to age of liner, other permits due to no permitted source for outflow.
- March 2009 – Denison submits new applications for general permit coverage.
- June 2009 – Denison agrees to additional conditions.
- July 2009 – ADEQ hold public hearings.
- 6/25/2012 – USFS issued re-review of EIS and ROD.
- 08/01/2019 – ADEQ received renewal application for the 3.04 lined impoundment.
- 10/07/2019 – Meeting with Energy Fuels and legal counsel.
- 10/29/2019 – ADEQ Inspection of Canyon Mine facilities. Potential deficiency observed with enhanced evaporation system installed in (and in contact with) the 3.04 lined impoundment.
- 11/18/2019 – Request for additional information letter sent to address some data and regulatory gaps.
- 11/26/2019 – Tentative expiration of LTF for 3.04 general permit.

Data Gaps

- Mine Plan of Operations contemplated completion of mining within 2 to 3 years of initiating mining. Was there time or plan allowed for pre-mining lifecycle and sufficient water storage?
- Will aeration and heating system negatively impact lined impoundment?
- Uranium levels in impoundment/storage tanks?
- Ability of dust control water to infiltrate to the Coconino – area with exploration wells and karst limestone formations.

Regulatory Gaps

- Very little groundwater protection at federal level; USFS determinations may not be sufficient.
- Activities on site don't match requirements of R18-9-D304. Mine shaft water is not "seepage from unleached rock pile." Process solution is for "temporary" use.
- Original 3.04 application cites 432 gpd vs. 26,000 gpd shown; plans for impoundment don't include installed aeration system.
- EFRI references plan of operations that is not in the purview of existing general permits. References to "expected amount of water" come from North Rim mine sites.
- Use of sump water for dust suppression. Historic process is to request DOA or codify in APP.

Canyon Mine Notes

Questions Posed

1. What authority does the State have to regulate the water with uranium levels above MCLs established under the Safe Drinking Water Act used for dust control.
    a. ADEQ: Regulate as discharge under APP or require Determination of Applicability
    b. ADEQ: Hazardous waste/radioactive waste rules don't apply due to the Bevill exemption for mining waste.
    c. ADHS: Minimal authority on issue.
2. What is a usable quantity of water? A usable quantity of water is five gallons per day.
3. See attached spreadsheet relaying breakdown of background data for the Coconino versus results from the impoundment.
4. Outside of regulation, what does good look like?
    - Segregating water from the Coconino from all process and contact storm water.
    - Install an additional well into the Coconino near the shaft for dust control. Develop an "oasis" for wildlife to preferentially use over water at the mine site using Coconino water.
    - Haul all process and contact storm water off site and cover storage tanks to prevent animal access. Cease spraying and enhanced evaporation.
    - Regularly monitor uranium levels in soil and develop plan to remove top layer of soil if action level is exceeded.
    - Routine monitoring at the EFRI well.
    - Post-closure monitoring of Coconino and EFRI wells.

ADEQ Arizona Department of Environmental Quality

Memorandum

Date: Type date here
To: Type recipient's name here
From: Type sender's name here
Subject: Canyon Mine Inspection on October 29, 2019

Introduction

This memorandum summarizes the inspection, observations and findings during the October 29, 2019 inspection of Energy Fuels Resources Inc~~.~~'s (EFRI's) Canyon Mine.

Inspection

The inspection was conducted by Joshua Litt (ADEQ Inspector) and Maribeth Greenslade (ADEQ Engineer). Scott Bakken (Senior Director) and Matt Germansen (Mine Geologist) from Energy Fuels Resources and Jeremy Haines (Acting public services staff officer with Kaibab National Forest) were present during the inspection.
~~The first stop of the inspection was at the Development Rock Stockpile (Type 2.02 General Permit (GP)). The stockpile appeared to be in a good working condition and the berms were well built. Stormwater runoff would flow from the stockpile to the Non-stormwater impoundment (NSI).~~

Prior to physically inspecting the facilities, while going over paperwork and inspection rights, EFRI showed Maribeth and myself plans of their new Apex 2.0 evaporators in the Non-stormwater Impoundment (NSI). When I asked to take photos of these documents, Mr. Bakken ~~became uncomfortable with that request as it would become public records and~~indicated there were mistakes on them and was not comfortable with the incorrect information becoming public record. The mistakes included incorrect name for the project and a design for the water line to the Apex 2.0 evaporators that was not implemented. It was requested EFRI submit to ADEQ the plan and diagram files. In an email dated November 5, 2019, the corrected diagrams and plans were sent to ADEQ.

The first stop of the inspection was at the Development Rock Stockpile (Type 2.02 General Permit (GP)). The stockpile appeared to be in a good working condition and the berms were well built. Stormwater runoff would flow from the stockpile to the ~~Non-stormwater impoundment (~~NSI~~)~~.

At the NSI, the Apex 2.0 evaporators (two of them), were shut off due to very windy conditions. I had EFRI turn them on in order to evaluate how they operate. When asked about the cold weather affecting the evaporators, Mr. Germansen told us there is a water heater at the NSI so that water from the NSI will heat up to 40 degrees warmer and be returned to the evaporators. This would in theory help evaporation. A question that arose here is how will water evaporate if the outside air is 10 degrees and this "heated" water is being sprayed outwards? Mr. Germansen

also said they believe the Apex 2.0 evaporators will evaporate at a lower rate in the winter (approximately 6 gallons per minute (gpm)) than the expected 15 gpm in the summer.

When I asked EFRI about their storage capacity issues and the 20 gpm average pump rate from shaft sump combined winter conditions with low evaporation, they pointed to the installation of a new storage tank. This new tank holds 1,011,257 gallons. Their original~~other~~ tank holds 350,129 gallons. Shaft sump water can be split to report to either the NSI or to the original tank. ~~(350,000) which~~Water can be pumped from the original tank ~~is connected by pipe~~ to the new ~~(1,000,000)~~ tank via a pipeline. The shaft sump water in these tanks is then used for dust suppression throughout the entire mine site. NSI water is used for dust control only on the development rock stockpile.

I mentioned that in an ADEQ January 20, 2017 letter from Luke Peterson (ADEQ Engineer) to EFRI's president Mark Chalmers, only clean Coconino aquifer water was to be used for dust suppression. When I told Mr. Bakken, that mine shaft sump water was not to be used for dust suppression, he claimed the ADEQ tank exemption rule essentially prevents ADEQ from regulating what they do with their tanks and water within. When I indicated to Mr. Bakken that the development rock stockpile should~~was~~ not be using water from the NSI for dust suppression, Mr. Bakken indicated that during a ~~in~~ January 2019~~, in a~~ conversation, ~~with~~ David Dunaway (Groundwater Protection (GWP) Section Manager) ~~had supposedly~~ said ~~it~~this practice was okay (Upon return from the inspection, it was clarified that dust suppression was okay to use on the development rock stockpile, as the runoff returns to the NSI. Using NSI water for dust suppression for the rest of the mine site was never agreed too~~Mr. Dunaway has denied he ever said it was okay)~~. Mr. Bakken then said, EFRI could just send all the water to the tanks and then use it as dust suppression on the development rock stockpile as ADEQ did not have the authority to tell EFRI they could not do that. Maribeth indicated to me the tank exemption substantive policy does not specifically address the types of tanks constructed using panels and HDPE liners. Further, just because a tank may meet the tank exemption, the policy does not indicate the content of the tanks become exempt if it is removed from the tank.~~and this is not what the policy was created for.~~

Vegetation was not observed in the NSI. At Maribeth's recommendation, I included in the inspection report that a rub sheet be installed underneath the sprinklers along the sideslope of the pond to prevent ripping of the liner.

The Apex 2.0 evaporators sit on a floating HDPE platform that can be accessed by a floating bridge made up of HDPE lined floatation devices. Maribeth requested construction materials be provided for the walkway and platform pad. The concern is both the walkway and pad could tear the liner if other materials other than HDPE were used for construction.

Mr. Haines (USFS) kept asking Mr. Bakken why EFRI did not have to sample their mine sump water in the NSI as his constituents constantly ask him.

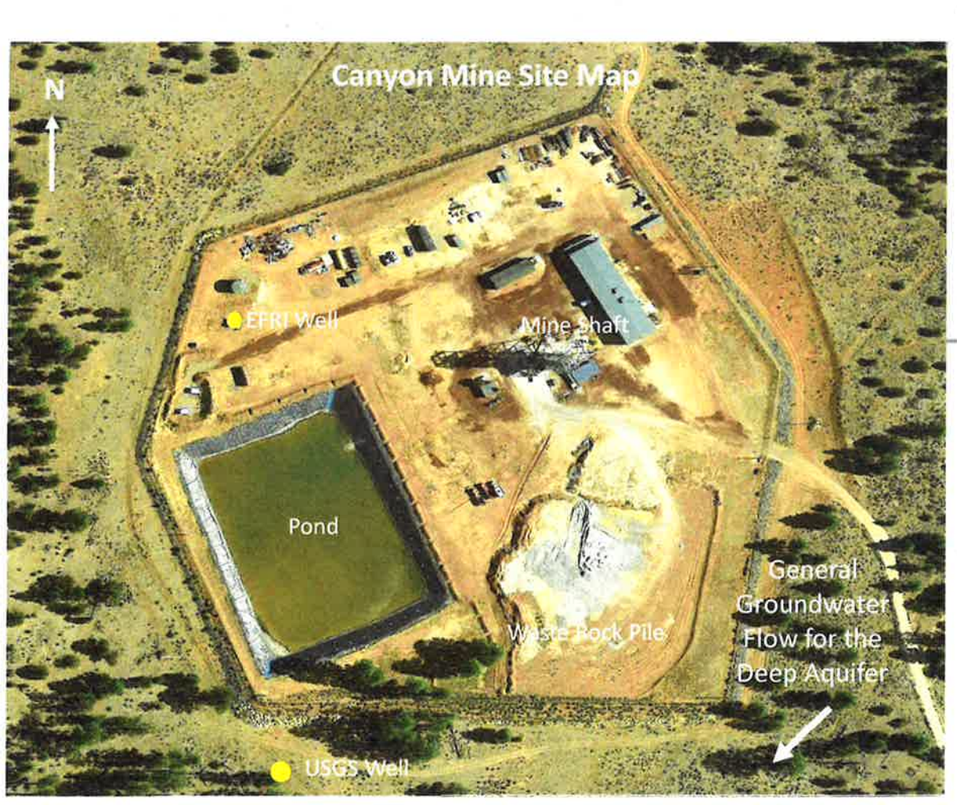
The intermediate ore stockpile was not built. However, there was a sediment catchment basin built partially in the stockpile location to prevent sediment and stormwater runoff.

Findings

Post-inspection, while I was writing up my inspection reports at Canyon Mine, on the Type 3.04 GP report, I told EFRI I was marking pending for the site diagram/construction drawings and capacity design criteria., Mr. Bakken questioned why this item was pending. I indicated the original NSI design had been changed by the addition of the Apex 2.0 evaporators. The capacity of the impoundment has also been impacted by the Apex 2.0 evaporators and the 3 gpm (original estimate of sump water flow rate) versus the 20 gpm (current sump flow rate).

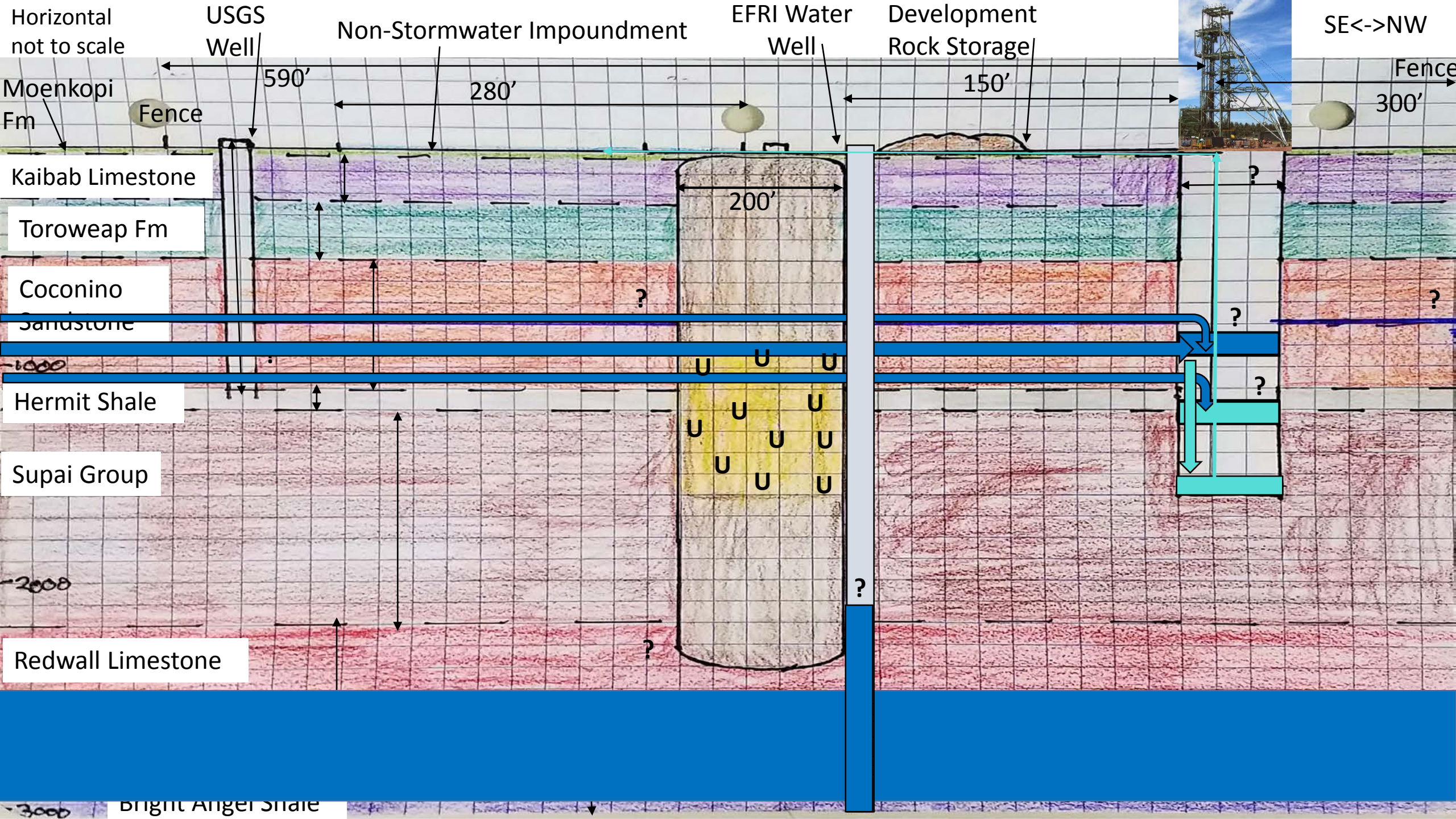
Mr. Bakken indicated to us that EFRI sent Misael Cabrera (ADEQ director), Trevor Baggiore (ADEQ Water Director) and David Dunaway (ADEQ GWP Section Manager) a letter with information from the powerpoint that was given weeks before the inspection. Mr. Bakken also indicated he sent a letter to notify ADEQ that the tanks were going to be built.

Canyon Mine Conceptual Site Model



Dust Control
Fence
USGS Well
Aerator
Land Shark
Pond
Outflow from Mine Shaft
EFRI Well
Waste Rock Pile
Mine Headframe
Fence
Breccia Pipe
200 ft
Mine Shaft
550 ft BLS
Coconino
?
1,125 ft BLS
Average Depth to water = 941ft BLS
Perched Aquifer
1,160 ft BLS
Uranium Ore
80 ft
Perched Aquifer
?
?
1,470 ft BLS
2,242 ft BLS
Redwall - Muav Aquifer
Average Depth to water = 2,564 ft BLS
3,086 ft BLS
?
?

Schematic Conceptual Site Model Not to Scale


Horizontal not to scale
USGS Well
Non-Stormwater Impoundment
EFRI Water Well
Development Rock Storage
SE<->NW
Moenkopi Fm
Fence
590’
280’
150’
Fence
300’
200’
Kaibab Limestone
Toroweap Fm
Coconino Sandstone
Hermit Shale
Supai Group
Redwall Limestone
Bright Angel Shale
-1000
-2000
-3000
U
?

Development Rock Storage

200’

Non-Stormwater Impoundment

590’

280’

Wind Direction

?

Original flow: 0.3 – 0.5 gallons per minute (gpm)(2009)
2018 flow: 18.4 gpm
2018 Data:
Antimony: 0.0068 – 0.0086 mg/l (AWQS: 0.006 mg/l)
Arsenic: 0.144 – 0.226 mg/l (AWQS: 0.05 mg/l)
Nickel: 0.227 – 0.284 mg/l (AWQS: 0.1 mg/l)
Uranium: 0.0915 – 0.128 mg/l (EPA MCL: 0.03 mg/l)

ARIZONA DEPARTMENT
OF
ENVIRONMENTAL QUALITY

Douglas A. Ducey
Governor

Misael Cabrera
Director

Comprehensive Request for Additional Information

November 13, 2019

Via Electronic Mail

Scott Bakken, Senior Director
Regulatory Affairs
Energy Fuels Resources Inc.
225 Union Blvd. Suite 600
Lakewood, CO, 80228

Re: Canyon Mine, Energy Fuels Resources
Non-Stormwater Impoundment (NSI)
Renewal of Type 3.04 Aquifer Protection Permit
Inventory No. 100333, Licensing Timeframe No. 77847

Dear Mr. Bakken:

The Arizona Department of Environmental Quality received the above-referenced application on August 1, 2019. The application was submitted in accordance with Arizona Administrative Code (A.A.C.) R18-9-A303.C. At this time, the application is in the Substantive Phase of the Licensing Timeframe (LTF) for this application.

Required Information

The following information is required to lift the suspension of the timeframe and continue the processing of this application as per Arizona Revised Statues (A.R.S.) § 41-1075:

1. Provide information that demonstrates which category of discharge under A.A.C. R18-9-D304.A.1 applies to mine shaft dewatering.
2. In the original application dated March 17, 2009, EFRI indicated that the non-stormwater impoundment (NSI) is designed to hold multiple discharge streams from the site. EFRI estimated that the mine would generate approximately 10 gpm, and that most of this water would be used for underground dust control or would be lost to evaporation due to intensive mine ventilation. Therefore, the discharge of mine water to the NSI would be very small, typically ranging from 0.3 to 0.5 gpm (original application page 9). ADEQ understands that currently, the mine shaft generates approximately 19-20 gpm, and that none of the water is used underground for dust control as only the shaft has been constructed and mining has not started. Provide information on how EFRI is managing the excess water given the NSI is designed for a smaller amount of discharge and

demonstrate that the requirements of A.A.C. R18-9-D304.C.1-2 are met under these conditions including the following:

a. Information that describes the location(s) where mine water and/or NSI water is used on site, specifically what water is being used as dust control and if this dust control is above ground or underground.
b. Information on the amount of mine water and/or NSI water used at each location.
c. Documentation and updated designs of the spray evaporation and heated water system and discussion of any impacts on the NSI liner.
d. Design, capacity and location information for all tanks EFRI has installed to contain excess mine shaft discharge.

Recommendations

The suggestions below are not required by State law and there are no legal consequences should you choose to disregard them; however, ADEQ appreciates your cooperation and asks you to consider the following:

3. Provide documentation that the tanks used to contain excess mine shaft discharge are exempt from APP in accordance with A.R.S. § 49-250. The tank exemption substantive policy statement may be useful for making this demonstration, available here: http://legacy.azdeq.gov/function/laws/download/150403_WQD_Tank_Substantive_Policy.pdf
4. Provide information describing why the water from the mine shaft sump exceeds Aquifer Water Quality Standards for several metals and EPA Maximum Contaminant Levels for Uranium in comparison to the nearby U.S. Geological Survey well that samples the Coconino Aquifer and is not exceeding Aquifer Water Quality Standards or EPA MCLs.
5. Please provide demonstration that the use of mine shaft sump water for dust control will have no impact on the Coconino Aquifer.

Consequences of Failure to Submit Required Information

Your response to the above listed items must be received by ADEQ on or before December 16, 2019. Failure to submit any of the above required information by the deadline will result in initiation of the denial process for this APP amendment application.

How to Submit

Please submit your response to this letter using one of the following methods:

- Hard copy to:
  Arizona Department of Environmental Quality
  Attention: David Dunaway, Value Stream Manager, APP Unit
  1110 W. Washington Street, Phoenix, AZ 85007

- E-mail to:
  dunaway.david@azdeq.gov

Thank you for your efforts to comply with Arizona's environmental requirements. Should you have any comments or questions regarding this matter, please do not hesitate to contact me at (602) 771- 6176 or dunaway.david@azdeq.gov.

Sincerely,

David Dunaway, Value Stream Manager
Groundwater Protection Value Stream

cc: Jeremy Haines, USDA Kaibab National Forest