

## **Meeting Summary**

### **CLG draft Deep Bedrock Investigation Work Plan**

**March 30, 2018, 11:00 – 1:00**

### **NHDES Portsmouth Regional Office**

**Present:** Skip Hull, Bill Brandon, Jim Murphy, EPA; Drew Hoffman, NHDES; James Soukup, Weston Solutions/Consultant to NHDES; Peter Britz, CLG; Mike Deyling, David Chapman, CES/Consultant to CLG

#### **Intro / Background**

CLG presented a brief history of the bedrock investigation process to date. Initial discussions were conducted at a technical meeting in March 2017 and subsequent discussions during 2017 focused around refinements and specifics (geophysics) of the locations and installation of the GMZ compliance wells. The request for a formal bedrock investigation work plan was made by EPA in January 2018. CLG's plan has been to incorporate the intent of the letter and provide a framework for the work plan by reviewing data from the two RI's, existing info available through USGS, UNH, and Aquarion, and incorporating that relevant data along with 30 years of site monitoring data. CLG is confident that its information and data about the overburden and shallow bedrock to date is reliable. Their understanding is that deep bedrock is considered to be approximately 300 feet into bedrock as many of the residential wells are in the 200 to 300-foot depth range.

#### **CLG Assumptions / Observations**

CLG has observed and maintains that the preferential groundwater flow direction at the site is west and north, where the nearest residential wells, plus the Chinburg well are located. While it is possible that there may be easterly flow from the site, residents in those areas are on public water. Thus, CLG's view is that the primary focus of the investigation should be west, northwest, and north of the site.

CLG's estimation is that the levels of contaminants in groundwater is stable overall around the site. With the exception of two water supply wells, 1,4-dioxane is not being seen. CLG believes that PFAS at 1-3 ppt levels at area residential wells may be expected as background concentrations. The golf course clubhouse well is an exception, but its use is different from the residential wells. CLG has discussed use of residential wells for geophysical surveying, and while they may be helpful, there is hesitancy to include wells not under their control for any work beyond sampling. They would consider taking over Chinburg well pending discussion on access and ownership specifics.

Other observations from CLG:

- The Packer testing of Chinburg well was useful and high angle fractures, competent sections of rock and some deeper fractures were noted among other observations.
- Beneficial information was obtained through communication with Aquarion – many of their wells are gravel wells. Not many bedrock supply wells currently exist within the company's water supply system.
- CLG believes that Berrys Brook and Little River are gaining streams.
- The Falls Way/Ridgecrest Drive residential area is outside the watersheds impacted by the Coakley Landfill.

CLG's basic approach is to complete the GMZ compliance wells, but is still unsure on the exact location of the well closest to Breakfast Hill Road and would like to discuss further today. CLG assumes a full testing package on these wells and can talk specifics today. Among questions to answer through the

bedrock investigations is whether there is information that indicates that contaminants are migrating down into deep bedrock and toward off-site receptors above applicable standards..

#### **Public access to data and info**

There was discussion of how prescribed the reporting should be as CLG develops new information during this “research phase”. The assumption is that all info would be made available to the public particularly related to decision points, i.e., a decision to do geophysics on wells based on boring logs, etc. It is envisioned that information exchanged would be comprehensive, but informal to keep things moving. Emails, letter reports, and tech memos can be used to transmit info and be made available to the public via NHDES’ OneStop database and the EPA webpage.

#### **Review / comparison of site figures and maps.**

There appears to be inconsistencies in lining up the various historic and current maps/figures which contain GMZ boundaries, the expansion lines, town lines, wetland boundaries, lineament interpretations, and other features/information which have been overlaid on figures at different points since the original RI. **Needs to be reviewed / corrected.**

#### **Discussion of surface geophysics**

EPA & NHDES noted that observation and inclusion of surface geophysics has been insufficient in determining the exact location of the proposed NW area GMZ compliance wells. Surface geophysics can be easily accomplished and would provide more confidence that wells are in the right zone and these methods should apply to any additional well installations moving forward, including the drilling of the GMZ compliance wells scheduled for June.

While there may be some surface geophysical info (seismic survey by Weston) available from the RI period that can be obtained and potentially utilized, the methods used back then for surface geophysics were quite primitive compared to methods available today. The better approach would be to look at what was done in those days supplemented by modern methods and put together a model. Due to the lack of geophysical surveying since the RI, there is a need for a lot of upfront work to provide a better result.

There was extended discussion of technologies to consider regarding running a geophysical line along Breakfast Hill Road: seismic reflection, seismic refraction tomography, multi-channel analysis of surface waves; ground roll energy which is slightly different than the refraction method, ground penetrating radar. Another method that could be useful is (ERT) electrical resistance tomography.

There was additional discussion regarding different methods to map and characterize the bedrock fracture system, including mapping outcrops; surface geophysics; borehole geophysics; groundwater elevation monitoring. In addition to methods of micro-locating a well, there is a more regional/ large scale type of geophysics which includes looking for regional features in a larger area such as the golf course or the utility easement. Aquarion has done a lot of mapping in preparation for siting of its water supply wells and other similar info is publically available.

#### **Existing bedrock boreholes**

CLG has identified eleven existing bedrock boreholes that were established as part of the RI but which have not been surveyed or recently sampled. CLG will inspect these wells to determine viability and will survey and sample where possible. There are 11 bedrock boreholes that will be located and inspected during the spring monitoring round.

### **Exact Location of the GMZ wells**

There was extended consideration of potentially revising the location of the GMZ wells. If moved at all, they would need to be kept within the GMZ extension zone as well as remaining in the general area where access has been provided by the property owner.

There was discussion of EPA's previous comment that there is a fracture pathway along Berrys Brook that should be considered when locating the well in the north/northwest near Breakfast Hill Road. It appears that the Chinburg well may not have intersected subsurface features which could have provided more extensive information. There was consideration of the approach of first drilling a shallow bedrock well attempting to hit any subsurface features (photolineament pathway along Berry Brook), followed by drilling the deep bedrock well. While there was general agreement that additional info gathering would be useful, that effort would delay the installation of the wells. The agencies will consider this further, but all generally agreed that the GMZ wells should not be delayed as they are multi-purpose. Some level of surface geophysics can be completed to micro-locate the wells without deferring the drilling schedule. Other type of work that is more regional geophysics on a larger scale can follow. There may be need for additional wells if data collected from surficial geophysics, bedrock outcrop mapping and borehole geophysics of existing boreholes warrant.

### **Wetlands / Surface water**

There is an additional complexity to the site if the contaminates have gotten out into the wetland via surface water. While discussing the feasibility of doing lateral transects, perpendicular to fracture zones in the wetlands northwest of the site, it was noted that the wetlands are difficult to access regarding surface geophysics. It may be more feasible to do any potential work further south.

CLG already knows there is discharge into the stream, so they didn't focus on that aspect. They don't have sufficient information to determine where the groundwater is coming into the stream from the subsurface. There was discussion whether seepage is going to be a significant part of the conceptual model and tools that would be involved in such an evaluation. Measuring seepage can help with contaminant and water level info and flux rate (groundwater discharge rate into surface water), overhead temperature survey and use of infrared technology were discussed as simple tools. There are known surface water impacts, but no clarity if the surface water recharges the groundwater or if the groundwater in turn migrates to bedrock. While there are some leachate seeps near the landfill and some concentrations in stream, it's possible that the wetlands may be recharging bedrock in wet/dry conditions, with the opposite occurrence in the reverse condition.

CLG commented that the discussion is morphing into everything about the site away from the deeper bedrock and that EPA/NHDES has always agreed that the overburden model was accurate. The agencies acknowledged that, noting that there is a lot of history that's been accepted over the years. Five year reviews require these types of exercises. There is always an ongoing review of whether the remedy is still performing and is protective which includes a review of past conclusions.

CLG noted that they have been performing a lot more work including the sampling of residential wells and the upcoming fish tissue sampling yet not finding anything. The agencies noted that the fundamental question we are trying to answer is whether the deep bedrock is or could potentially impact deep bedrock residential wells. The approach is to go with the deep bedrock study and if other things come out of it, we can follow.

**Next steps**

EPA will send out a written response to the CLG's draft workplan providing specific comments and direction for the bedrock investigation. In the meantime, CLG will perform surface geophysics to micro-locate the new GMZ compliance wells. CLG will also initiate inspection and review of existing bedrock boreholes that had not previously been surveyed (geophysical data collection) or sampled for emerging contaminants.