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13-May-2022

NCDEQ/DWR/PWSS filed via e-mail
Attn: Shawn F. Guyer, PE Regional Engineer

Re: Notice of Deficiency
Reduction of Yield - Southern Trace Well 02
Water System Number: NC4392141

NCDEQ/DWR/Public Water Supply filed via e-mail
Attn: Ryan Holmes - Rad Rule Manager

Re: Notice of Violation - Gross Alpha MCL Exceedance
Southern Trace Subdivision - Well 01
NC4392141 - Wake County

N C Utilities Commission e-filed
Docket W-1075 sub 12

Gentlepeople,

This report is in response to issues of reduction of well yield and Radiological exceedances within the Southern Trace water system. It will be in the form of an expanding chronological account of KRJ Utilities' attempt to address these issues.

2-Oct-2019

As we discussed several days ago, the availability of potential well sites within the environs of Southern Trace subdivision are quite limited. It is for that reason that KRJ has enlisted the services of a douser who is recognized in the Triangle area for his expertise and high accuracy rate: Mr. Dale Miller.

He has surveyed the area, with concern focused on identifying probable subterranean water courses located such that a 100-foot protective radius could potentially be achieved. As of the first of this month, he had identified only one such location which is upon a privately held and occupied residential lot.

More recently you called to my attention that newly included provision of 15A NCACA 18C .0203(4), which opens up a number of possibilities within the environs of Southern Trace, as there is significant area much of which designated as 'open space' on the eastern perimeter of the subdivision that may, under this provision, be considered for potential well siting. This information was provided to Mr. Mathews, with the request that he explore those areas.

Mr. Miller, had contacted Mr. Bob Stafford, President of KRJ, and tentatively scheduled an on-site meeting to he held the week of 23 September.

Unfortunately, Mr. Stafford was taken gravely ill the weekend prior to 23 September, requiring multiple days of intensive hospitalization and is now recuperating at home. As soon as he is able to return to his normal work schedule, the meeting will be rescheduled so that potential sites can be explored with the interest of both water availability, compliance with regulatory requirements, constructability and to the degree possible avoidance of encroachment on privately held properties.

2-Jan-2020

Mr. Stafford's son met with Dale Miller on 7-Nov-2019 to have Mr. Miller attempt to identify probable locations for interception of subterranean water flow. Two such locations were identified within the entire subdivision.

- One encompasses a great percentage of an existing residential lot and although meeting the legal requirements of separation from potential sites of contamination or encroachment of structures within the required 100-foot protective radius the site is exceptionally difficult to access due to slope and was predicted by Mr. Miller to be likely to produce only about half of the yield necessary to address the NCAC requirements.

- The second site is located almost, if not totally, in open space owned by the Homeowners' Association. Mr. Miller predicts that due to the convergence of two different water courses, that **IF** they can both be intercepted adequate yield may be accomplished.

A survey of the site has been performed, to assure that we know with certainty all properties that may be impacted by a 100-foot protective easement are identified and the degree of encroachment of the easement on them quantified. We have not yet received a map of the survey. Once it is received, I will contact PWSS/RRO to set up a well site inspection.

Additionally, I was contacted by phone by the President of Southern Trace HOA who was inquiring as to the process associated with the accomplishment of a well in the open space. I explained in detail the steps involved in the process of site approval, acquisition of site rights subject to KRJ's being able to obtain sufficient water, installation and testing of the well and design and construction of suitable treatment. I offered to join him and the other members of the HOA Board on a conference call so that I could again explain the process so that he wasn't put in the position of attempting to explain it based on his memory of our conversation. To date, I have not been advised of a time for such a call.

4-Apr-2020

On 19-Nov-2019, Dale Miller and Rob Stafford (Bob's son) met on the ground and identified two probable locations that water may be obtained. It should be noted that these are pretty well ALL that may be productive, which supports the issues that ANC has experienced in locating and keeping water in Turner Farms.

One of the sites encompasses the majority of the rear yard of a house located on Red Brick Road and the other located on HOA property at the end of Cabin Hill Way. The Red Brick location is predicted to provide no more than 45 gpm, which is insufficient, and has severe physical constraints of steep slopes and high rock extrusion making accessing the site with a drill rig problematic if not impossible without doing a lot of damage to the lot. The Cabin Hill location has a few constraints, such as encroachment of backwater from Swift Creek 100-year elevation that will require filling to protect the well head location; and, the necessity of diversion of surface flow from Cabin Hill away from the 100-foot protected area. The best part of this location is that Mr. Miller predicts that as much as 90 gpm may be found. A protective easement is proposed, as some of the 100-foot radius from the well head location encroaches onto a private lot.

On 17-Jan-2020, I asked you if you had access to a protective easement instrument that had already been vetted by PWSS, so I didn't have to reinvent the wheel. You advised that you did not, and suggested that I check with permitting. I contacted Sashai Bhatta who responded that she didn't have one that she could refer me to either.

On 26-Jan-2020, I requested a well site inspection appointment.
On 7-Feb-2020, I provided a draft well site map to Gregory Vital, in preparation for a meeting on site.
On 12-Feb-2020, I met with Mr. Vital and we proceeded to walk and discuss the potential well site. I explained to him that I needed some sort of preliminary indication of the suitability of the site before KRJ approaches either the HOA or the owner of the lot encroached upon by the protective easement.
On 17-Feb-2020, I provided Mr. Vital a revised "Due Diligence Letter" from KRJ concerning the potential well site.

On 27-Feb-2020, I received an e-mail from PWSS reciting why a "Well Site Approval Letter" could not be generated at that time. The underlying thread being that we could not provide a copy of an easement document executed by the affected property owners. I responded that approaching them with my hat in hand and little to demonstrate that, even if they agreed to the easement, PWSS had provided nothing to assure that under what, if any, conditions the potential well site was usable.

On 15-Mar-2020, I inquired as to the likelihood of us receiving a Tentative Well Site Approval letter, or something that would provide a level of assurance to both KRJ and the property owners that the well site could, in fact, be developed. You responded on 17-Mar-2020 that such a letter had been drafted and forwarded "to management" for review as it is an atypical request.

Understanding that we are now in the midst of the Coronavirus mess, I don't expect the Tentative Well Site Approval letter, or such, in the near future; nor could we do much about it under the current circumstances.

7-Jul-2020

On 6-May-2020, I received a letter from PWSS indicating the conditions under which the proposed site for well # 4 may be utilized. Since that time, data has been provided to our engineering consultant as to the conditions that must be addressed in a grading plan for the site, as well as the character of easement mapping to memorialize the site. As the well site is within the 100-year flood plain, the grading plan must be approved by Wake County prior to any work proceeding. The actual well site must be raised such that the well and well house are above the 100-year flood elevation. A sketch plan of the needed grading to accommodate the well within the floodplain has been forwarded to an engineer for their use in permitting the work.

Additionally, I had proposed the installation of a SCADA system at Southern Trace to affect more discrete pressure control and monitoring as well as remote surveillance of operating conditions of the system. The SCADA system installation has been completed and the system was placed in operation on 12-Jun-2020. We now have the ability to remotely: observe the system pressure, which is recorded in a permanent record; observe actual pump running status; adjust the pump start/stop pressure set points; receive high/low system pressure alarms; adjust alarm set points; and receive alarms of pumps running when they are not supposed to, and the converse. Although this is not directly related to additional well yield, it does provide a far better means of controlling and monitoring the capacity available to the system and therefore I felt it worth mention.

29-September-2020

The potential of drilling a well at the northern end of Cabin Hill Way has been abandoned. Once the site was surveyed it was turned over to an engineer who was competent in the areas associated with filling in the flood plain. What we learned was: 1) filling in the flood plain is only permitted if the soil used to construct the fill originates from within the flood plain (net-zero gain). This would have resulted in a pond being constructed within or adjacent to the well protective radius; and, 2) there is no way to drain the 'pond' due to the restrictions imposed by the Neuse River Buffer rules. So, basically, the site could not be made to conform to the logical necessities of the well head being above the 100-year elevation.

In early September the dowser again visited Southern Trace with the purpose of attempting to locate water veins of sufficiency to address both the yield loss from Well 2, and the newly surfaced radiological issues with Well 1. He identified: two water veins crossing each other at a point within the 100-foot radius of Well 3; and, one vein located to the north of well 2, again within the 100-foot radius of Well 2. Our surveyor was on site on September 22, locating the points identified by the dowser. Once those maps are provided to us, we will request consent of PWSS to drill test wells at those locations to determine if quantity and quality warrant development of a well at those locations.

29-Dec-2020

As reported in our previous status reports, evaluation of potential treatment of water emanating from well 1, as Southern Trace, was dismissed due to inability to identify a viable means of waste disposal and, although not mentioned therein but also a consideration, the absurdly high cost of operation of such a system, which would be ultimately borne by the customers/users of the Southern Trace water system.

A proving sample was drawn, as a "special" and sent to a second laboratory to contrast with the results from Florida Radiochemistry, which did in fact confirm the findings of Florida Radio.

As Southern Trace is experiencing issues due to loss of yield in another well, our efforts to acquire additional well sites to augment the water flow we currently have available and replace that from Well 1, has been redoubled. In June, a potential site was identified by a certified Dowser retained by KRJ. The idea of use of a dowser was embraced due to the hyper variability of the geology in the area and the clear lack of success in acquiring significant well yields in an adjoining water system operated by Aqua NC.

The dowser visited the site in September in an effort to identify multiple potential well sites to achieve the yield to address the issues of Well 1 and loss of yield in Well 2. That information was referred to an engineering/surveying firm that KRJ Utilities has used in the past. Unfortunately, in this year-of-disease, they were not immune with the PLS principal of the firm first suffering a significant heart attack that resulted in his being hospitalized for nearly two months, and then shortly after returning to work being stricken with Shingles.

Survey data of the potential sites has been transmitted to PWSS/RRO for evaluation for approval of the installation of test wells on 14-Dec-2020.

On 28-Dec-2020 a SREC Preliminary Well Site Approval letter was issued for Wells # 4 & # 5, which are proposed on the existing lots of wells # 2 and # 3, respectively. Based on this information KRJ's current plan is to proceed with the installation of test wells at the sites designated by the Dowser, and memorialized by coordinates within the SREC letter.

Consistent with the requirements of the NOV associated with the Radiological issue with Well 1, the following ***TENTATIVE*** schedule is submitted:

	Completion
Construct access to the sites for wells 4 & 5	01-Feb-2021
Drill test wells 4 & 5	01-Mar-2021
Evaluate yield reports to determine feasibility	03-Mar-2021
Receive analytical data from laboratory	03-Apr-2021
Complete design of treatment systems	30-Apr-2021
Design Permitting phase	15-May-2021
Install improvements for wells 4 & 5	01-Jul-2021
Receive Authorization to Operate	15-Jul-2021

23-Mar-2021

Due to weather delays, access to future well 3 (adjacent to well 2) was delayed until mid-March. The access road has been constructed and a contract has been entered into with N W Poole Well Company for the drilling, yield testing and sampling of that well. As the sufficiency of the yield to serve multiple purposes is uncertain, the development of well 5 is being delayed until the efficacy of well 4 can be ascertained.

An updated ***TENTATIVE*** schedule for well 4 follows:

	Completion
Construct access to the sites for wells 4 & 5	15-Mar-2021
Drill test wells 4	15-Apr-2021
Evaluate yield reports to determine feasibility	25-Apr-2021
Receive analytical data from laboratory	25-May-2021
Complete design of treatment systems	01-Jul-2021
Design Permitting phase	15-Jul-2021
Install improvements for wells 4	15-Aug-2021
Receive Authorization to Operate	25-Aug-2021

Once it is determined whether well 4 will be sufficient to address the issues at hand, the installation of well 5 will be schedule, if required.

29-Jun-2021

On 3-Jun-2021, N W Poole set up a drill rig at the site of well #4 - the point designated by the dowser as being a probable location of 49-59 gpm @ 364' of depth. Over the next 48-hours the well was drilled to competent rock, the casing set into the rock and tremie grouted, and drilled to 425' deep. A water bearing strata (the ONLY water bearing strata) was encountered at approximately 150', yielding what the driller estimated to be 20 gpm.

An unusual issue was encountered in an area to be sealed out by the casing, a gravel bed approximately 10-feet deep. The lack of yield at the dowser's location puts into question both the presence of sufficient water; and, the efficacy of the dowser's input. The gravel bed brings to the fore some interesting geological observations and hypotheses. It is a fact, evidenced by the NC Geological Maps, that the rock formation in the vicinity of Southern Trace is far from homogenous, as it is comprised of so many varying intrusions and lens of different types of rock that I have described it as "rock salad" (think "fruit salad"). The identification of the gravel bed, is clearly an indication of major upset of the geology in the area during an ice age that resulted in, among other things the overtopping of an old river bed, albeit currently dry. This only goes to further explain the irregular and unpredictable rock formation and thereby water storage zones.

As the site of well #4 was further complicated by the expanse of the 100-foot protective radius onto multiple third-party properties, one of which including a building, causes the question of whether the further investment in the site to clear the protective radius for a mere 20 gpm is a responsible decision.

A more recent issue of elevated Gross Alpha in well # 1, had also appeared resulting in NOVs for exceedances of the MCL for Gross Alpha. The most recent quarterly samples for Gross Alpha indicated a

reduction in concentration to a degree that the sliding 12-month average dropped below the MCL thereby ending the period of non-compliance. This same phenomenon was witnessed approximately 12 years ago, when the radiological levels in well #1 raised and inexplicably dropped in succeeding sampling quarters. My take on this issue is that a "wait and see" approach is the only advised course of action.

We are exploring the potential of acquiring and reactivating one or more well in Indian Creek Overlook, a mobile home park located adjacent to the northern boundary of Southern Trace, near Swift Creek. Indian Creek initially operated a Public Water Supply and wastewater plant under an NPDES Permit. Due to ongoing non-compliance, NCDENR (now DEQ) pressed the ownership to abandon the discharge in favor of connection to the greater Raleigh wastewater system. Accordingly, the mobile home park was required to: 1) convey its water and sewer underground systems to Raleigh, at no cost; 2) connect to the Raleigh potable water system; and, 3) petition for annexation. The Public Water Supply system was deactivated.

Recent reconnaissance indicates that one of the three wells in Indian Creek Overlook has been demolished to the end of adding additional rental spaces. The remaining two sites are being explored, as their location was unknown at the time of my most recent visit to the area, on June 22.

Although there is pressure from PWSS for a Time Schedule, none is offered at this time. IF the remaining wells at Indian Creek Overlook are unspoiled, testing will need to be performed to assure that water quantity and quality are acceptable for reactivation of the wells, by KRJ. Given the previous rejection of KRJ's inquiry into the potential of its acquisition of one or more of the wells it is anticipated that acquisition by KRJ's exercise of its power if eminent domain may be required, which introduces the greater unknown of time of legal process.

Please accept this letter as KRJ's request that any deadline for action regarding acquisition of additional water capacity be extended to the extent possible. Given the uncertainties of real estate acquisition, particularly so if eminent domain is employed, the greatest extension possible is requested.

26-Sep-2021

Mr. Guyer was kind enough to research old Sanitary Survey files in the RRO and identify coordinates for the nearest of the wells of record in Indian Creek Overlook. A field reconnaissance was made of the area, based on those coordinates. No evidence whatsoever is visible of the previous water supply well at or near the coordinates. A large percentage of the 100-foot protective radius is currently being used as overflow parking from the mobile home park. Thus, any provenance has been lost. A strong concern was also voiced by several people involved in the search for a new water source for Southern Trace that should KRJ pursue a well, by whatever cause and at whatever location, that would result in the deprivation of enjoyment of the current parking use by Indian Creek tenants, that a high probability exists that ongoing vandalism would result to any facility installed by KRJ at the site. The idea of installing a well in Indian Creek Overlook is currently being placed in a 'dormant' status, pending further findings.

We are revisiting well 4, drilled in early June, adjacent to well 2. Although the driller's estimate of yield was 20 gpm, the dowser has again visited the site and is adamant that the yield of well 4 will be determined to be significantly greater than 20 gpm. Regardless, given lack of suitable sites, we are rapidly approaching the condition of "any water is better than none". On August 23, I contacted N W Poole Well Company and requested that they install a test pump into the well and run a 24-hour yield

test and obtain a full series of 'new well' samples and have them analyzed. I was advised, the week of September 20, that the test pump would be installed the end of the following (last) week. Presumably, the yield test result and samples will be obtained next week.

Another site was considered approximately a year ago which is located at the distal end of Cabin Hill Way. It was not pursued due to the issues encountered in positioning the well within the Flood Fringe of Swift Creek and filling the well head site. Although those issues remain, we are forced to revisit the site for the simple reason that alternatives are few for finding additional acceptable water sources. Once the results of the yield test and analytics of well 4 are available we will be able to make a fact-based decision on whether pursuit of the permitting of well site at the Cabin Hill location is advised.

As to the Gross Alpha exceedance of MCL, more recent samples have resulted in the sliding 4-quarter average falling into compliance. This is not the first time that well 1 have evidenced variation in radiological levels, and most likely won't be the last.

26-Dec-2021

A 24-hour yield test and analytical results have been received for well #4. The confirmed yield is 31 gpm, which is below the yield loss associated with well # 2. The water quality is good, with only a minor detect of a single VOC which is believed to be transient, possibly due to handling of pump, wire or drop pipe used in yield test.

A draft deed of easement was prepared and transmitted to corporate counsel for clean-up. Subsequently, both a final deed of protective easement and protective easement map have been prepared. The protective easement map identified a minor (6± feet) encroachment of an existing structure into the 100-foot protective well radius. A request for guidance in obtaining a waiver for that encroachment has been transmitted to Mr. Guyer.

As to the Gross Alpha exceedance of MCL, no further NOV's have been received.

25-Mar-2022

The form of the protective easement deed has been revised somewhat to avoid potential issues with mortgagors which could severely protract the acquisition of the protective easement.

Physical land survey of the site has been performed, which will be the basis of a Proposed Protective Easement plat which will be prepared and recorded once negotiations with the two affected property owners mature sufficiently. The encroachment into the 100-foot radius remains an issue. A property acquisition agent has been retained to proceed with the contact and negotiation with the property owners.

The acquisition has not yet been able to make contact with the property owners to begin negotiation for acquisition of the protective easement. He has been requested to redouble his efforts to contact them and proceed with the negotiation process.

The most recently reported 4-quarters of radiological monitoring of well 1 indicate an average uranium and gross alpha level below MCL. As this well has a history of variation in radiological levels over time, both in and out of MCL compliance, it must continue to be kept under observation.

13-May-2022

On 11 April, a Notice of Violation was issued by PWSS for Gross Alpha MCL Exceedance by Well 1. This is the same well that had exhibited excess Gross Alpha and then the level fell below the MCL to the extent that the NOV issued in 2020 was resolved by the well itself. This is not an uncommon occurrence with this well, however the reappearance of excess Gross Alpha in this short of time is a bit unusual.

A Notice to the Public was transmitted by First Class Mail to all customers on 18 April.

The level of Gross Alpha identified in the most recent analysis of Well 1 does not comport with the concentrations of Uranium or Ra-226 and Ra-228. It is obvious that there is at least one additional radioisotope present that is not directly regulated under the SDWA. Both Ra-224 and Polonium appear to be potential contributors of Gross Alpha, neither of which are regulated and therefore they are not routinely analyzed for; but rather are regulated indirectly via Gross Alpha. We have located a laboratory who is certified to analyze for both Ra-224 and Polonium and have transmitted samples to them. It is essential that we know exactly what radioisotopes are contributing the Gross Alpha before an appropriate treatment system can be designed. Regardless of what treatment process is ultimately chosen it appears that the disposal of treatment wastewater will have to be addressed by transportation off-site to a wastewater treatment facility as neither on-site disposal system nor NPDES Permit appear to be viable at this time.

Efforts are ongoing to address the yield loss from Well 2, via acquisition of a protective easement for Well 4 which is locate on the well lot of existing well 2 but does not enjoy the required 100-foot protection radius due to the configuration of the existing well lot.

Respectfully,

James R. Butler, PE
Contract Manager of KRJ