



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION 4  
SAM NUNN ATLANTA FEDERAL CENTER  
61 Forsyth Street, S.W.  
Atlanta, Georgia 30303-3104**

August 24, 2016

4SF-RSEB

Ms. Angela J. Dohl  
Consulting Engineer  
Legacy Asset Management  
AkzoNobel Inc.  
525 West Van Buren St.  
Chicago, Illinois 60607

Mr. Thomas Darby II, P.G.  
ARCADIS G&M of NC, Inc  
30 Patewood Drive, Suite 155  
Greenville, South Carolina 29615

**SUBJ: Comments on the August 08, 2016 Single Well Tracer and Transducer Study, National Starch & Chemical Company Superfund Site in Salisbury, Rowan County, North Carolina**

Dear Ms. Dohl & Mr. Darby:

The Agency received a copy of the above referenced Study Work Plan on August 08, 2016 via email. This submittal was prepared on behalf of AkzoNobel Surface Chemistry LLC (AkzoNobel) by ARCADIS. A copy of this Study Work Plan was provided to Noman Ahsanuzzaman, Scientific Services Section, EPA/Region 4 for review. A copy of this document was also sent to North Carolina Department of Environmental Quality (NCDEQ) for the State's review and Site file. Below and enclosed are the Agency's comments generated from the review of this document. NCDEQ did not have any comments to offer based on their review of the referenced document.

The comments below are arranged in the order as they appear in the Study Work Plan.

**Comments:**

1. Page 1 of 5, last paragraph on page, second sentence: Please provide some detail about the offsite wells, specifically how many and their locations.
2. Page 1 of 5, last paragraph on page, second sentence: This sentence states that if no hydraulic influence is evident in the hydraulic monitoring, then no additional characterization will be recommended. Does this statement mean that the dye trace text will not be conducted? This is confusing as the first sentence of the paragraph states two lines of evidence will be collected. Please clarify.
3. Page 2 of 5, Table, Row for NS-31: Will the transducer straddle the packer or will there be two separate transducers, one above the packer and one below the packer? Please clarify.

4. Page 2 of 5, Table, Row for NS-31: If there are going to be two different transducers then the language in the Column entitled "Transducer Placement" needs to be revised.
5. Page 2 of 5, Table, Row for NS-32: If artesian conditions in NS-32 prevent this well from being useful, what other options are there?
6. Page 3 of 5, first full paragraph, first sentence. This sentence refers to two stream gauges. The Agency is assuming this sentence is referring to Stream gauges SG-A and SG-B as shown in Figure 2.
7. Page 3 of 5, first full paragraph, second sentence. This sentence states these gauges will be read once a day. The Agency is assuming for consistency that these readings will occur at the same time of the day.
8. Page 3 of 5, second paragraph, first sentence. This sentence refers to "off-site wells". If feasible, the locations of these off-site wells should be shown of Figure 2.
9. Page 4 of 5, first paragraph, first sentence: This sentence states that a bailer will be used to collect groundwater samples after the groundwater column has been adequately mixed. However, at the top of page 3 of 5, this sentence states that the packer will remain in place during the tracer test. How will the bailer get by the packer?
10. Page 4 of 5: Will any water samples be collected from the Unnamed Tributary and tested for the presence of the dye to see if groundwater from the eastern side of the stream is discharging into the Unnamed Tributary? This data would help support the LeGrand based conceptual site model.
11. A general comment based on the 2015 Site Monitoring Report, Appendix E - Historical Groundwater Data - OU1: Obviously, there is something going on at this location in the groundwater; the concentration of 1,2-dichloroethane has remained above 100 µg/L since 2007, the concentration of 1,2-dichloropropane has remained basically above 200 µg/L since 2007, and the concentration of acetone appears to have jumped up to 4,300 µg/L.

If you have any questions, I can be reached at (o) 404-562-8820, (c) 404-217-8565, or [bornholm.jon@epa.gov](mailto:bornholm.jon@epa.gov).

Sincerely,



Jon K. Bornholm  
Remedial Project Manager

Enclosure (1):

1. Comments from Noman Ahsanuzzaman, SS, EPA

cc: Noman Ahsanuzzaman, SSS, EPA (w/encl)  
David Mattison, NCDEQ (w/encl.)



United States Environmental Protection Agency  
Region 4  
Atlanta Federal Center  
61 Forsyth St. SW, Atlanta, GA 30303-8960

August 22, 2016

4SSS-SRSIB

MEMORANDUM

**SUBJECT:** Comments on "Single Well Tracer Test and Transducer Study" at the Former National Starch & Chemical Company Site

**FROM:** Noman Ahsanuzzaman, PhD, PE  
Groundwater Hydrologist  
Scientific Services Section

**THROUGH:** Glenn Adams, Chief  
Scientific Services Section

**TO:** Jon Bornholm  
Remedial Project Manager

On behalf of AkzoNobel, ARCADIS inc. submitted a work plan for single well tracer test and transducer study for the Former National Starch & Chemical Company Site. Primary objectives of the study are to evaluate 1) hydraulic connection with the off-site wells, and 2) vertical gradient at the NS-31 well cluster, which is located on the other side (south side) of the unnamed tributary. In addition, two stream gauges will be placed near adjacent wells to evaluate relationship between surface water and groundwater. Following are the comments from the Scientific Support Section on the work plan.

1. The work plan explained the transducer setup and sampling plan, but did not explain the conceptual methodology for accomplishing the objectives. For example, it is unclear how setting up transducer at on-site wells will help evaluating the hydraulic connection with the off-site well. The off-site private wells are located far away from NS-31 and NS-32, which are the two on-site wells closest to the private wells where transducers will be setup. In order to evaluate any hydraulic connection between these wells and the private wells, water elevation at the private wells are necessary.

In case access to the private wells is not possible, additional wells to the south and southwest of NS-31 and NS-32 should be installed.

2. Conceptual Site Model (CSM) for the site assumes that groundwater flow converges on the unnamed tributary from both north and south sides. Because of the fact that some of the contaminants of concern (COCs) have already passed the tributary to the south and the concentration of those COCs are not subsiding, validity of the CSM has become questionable. It may be possible that groundwater from both sides are disconnected by the tributary during wet season; however, when the water table drops during the dry season the influence of the tributary to disconnect groundwater from the north and south might become insignificant. In other words, there may be seasonal effect on the hydraulic connection between groundwater from both sides. Therefore, the work plan should address the issue of seasonality on the hydraulic connection between groundwater and the unnamed tributary.
3. In order to evaluate the interaction between groundwater and surface water, two stream gauges will be placed near NS-31 and NS-32. Comparison between the stream gauge elevations and nearby groundwater elevations should provide the direction of gradient between surface water and groundwater. The limitation of this technique is that the comparison will be between two points, while the tributary is a non-point or a line source (or, sink). Therefore, it is possible that the sampling points may miss the groundwater to surface water discharge areas, since the discharge areas could be anywhere along the path of the tributary. Thermal imaging is a reliable technique for finding groundwater discharging points along a surface water body. It uses the difference between groundwater and surface water temperatures to identify the discharging points. EPA Region 4 has successfully applied this technique recently. For further information, a reference to thermal imaging is included in this memo.
4. The work plan did not include any reference to application of a single well tracer test. It is not clear what criteria would justify whether the transport potential from the single well is significant or not from this test, as stated on page 2 (1<sup>st</sup> paragraph) of the work plan. Details of the methodology of a single well tracer test along with the mathematical equations should be presented in the work plan.

**Reference:**

Roper, T., J. Greskowiak, and G. Massmann. 2014. Detecting Small Groundwater Discharge Springs Using Handheld Thermal Infrared Imagery. *Ground Water* 52, no. 6: 936-942

If you have any questions, please feel free to email me at [ahsanuzzaman.noman@epa.gov](mailto:ahsanuzzaman.noman@epa.gov) or call me at (404)562-8047.