CTS# 308441
R: 53601
V: 1

FENNEMORE CRAIG, P.C.

2394 East Camelback Road, Suite 600
Phoenix, Arizona 85016-3429
(602) 916-5000

Scott K. Ames
Direct Phone: (602) 916-5339
Direct Fax: (602) 916-5539
sames@fclaw.com

Law Offices

Denver	(303) 291-3200
Las Vegas	(702) 692-8000
Nogales	(520) 281-3480
Phoenix	(602) 916-5000
Reno	(775) 788-2200
Tucson	(520) 879-6800

May 6, 2013

Arizona Department of Environmental Quality
Attention: Tina Le Page
1110 West Washington Street
Phoenix, AZ 85007
tl1@azdeq.gov

Re: Comments and Request for Written Interim Decision Disapproving the West Van Buren Working Group's Feasibility Study Work Plan for the West Van Buren WQARF Area

Dear Director Ms. Le Page:

The following comments addressing the West Van Buren Working Group's ("Working Group's") March 2013 Feasibility Study ("FS") Draft Work Plan ("Work Plan") are submitted on behalf of Nucor Corporation and BNSF Railway Company (collectively, "Stakeholders"), pursuant to the Notice of 30 Day Public Comment Period on Request of Approval of Feasibility Study Work Plan for the West Van Buren Water Quality Assurance Revolving Fund (WQARF) Registry Site.

There are three principal reasons why the Working Group's Work Plan should be disapproved. First, it is premature for anyone to be performing an FS. The Roosevelt Irrigation District ("RID") has received approval from ADEQ to implement its Modified Early Response Action ("MERA") that is to include, when completed, wellhead treatment systems on eight of its production wells. To date, however, RID has installed only four of the planned wellhead treatment systems. RID has also indicated that, as a result of installing wellhead treatment systems on certain wells, the production capacity for those wells has declined and modifications to the infrastructure may be required to compensate for the reduced pumping capacity. Any FS to be performed on the West Van Buren WQARF Site should await full implementation of the MERA and an evaluation of the extraction efficiency of all eight wellhead treatments after RID has completed whatever modifications to its infrastructure it intends to perform.

Second, the Working Group failed to include in its Work Plan the identities of "persons whom the applicant believes to be responsible parties under A.R.S. § 49-283 and a summary of the basis for that belief." A.A.C. R18-16-413.A.7. Instead, the Working Group claims that "ADEQ has indicated that its Potentially Responsible Party (PRP) search for the WVBA is ongoing and PRPs will not be identified until ADEQ issues the Proposed Remedial Action Plan." Work Plan, p.6. Stakeholders were unaware that ADEQ had made such a representation; however, to the extent that it has, it is in clear contravention of its own regulations. *See* A.A.C. R18-16-413.A.7. Failure to comply with this regulatory requirement all but eliminates the opportunity to provide meaningful comments on the Work Plan.

Not only is it illogical to perform an FS before the potential sources are identified, it is contrary to Arizona law. ADEQ issued the Final Remedial Investigation for the West Van Buren WQARF Area in August 2012 ("RI"). Under A.R.S. § 49-287.03(E), the purpose of the RI was to "collect the data necessary to adequately characterize the site." In fact, the very first requirement of an RI is to "[e]stablish the nature and extent of the contamination and the sources thereof." Only after these basic requirements have been met is it appropriate to perform an FS. Otherwise, the requirements that the reference remedy be based on the information in the RI and that the FS be fully integrated with the results of the RI would be rendered nullities. See A.R.S. § 49-287.03(F) and A.A.C. R18-16-407.E.2.a.

The third reason that the Work Plan should be disapproved is that the groundwater model the Working Group claims to be using to support its FS is not adequate for that purpose. Although the Working Group claims that one of the steps it will implement is "[t]he preparation of a groundwater flow model" (Work Plan, p.3), members of the Working Group have represented to the U.S. District Court of Arizona that they are using the Univar groundwater model that was previously prepared by Harding Lawson for Univar and sold to ADEQ in or about 1999. *See Roosevelt Irrigation District v. Salt River Project Agricultural Improvement and Power District, et al.*, 810 F.Supp.2d 929, 969-70. (D. Ariz. 2011). That groundwater model, as it existed in 1999, is not satisfactory for the performance of an acceptable FS for the West Van Buren WQARF Area and Univar has represented to the court that "most, if not all, of the underlying assumptions and judgments that formed the technical foundation of the initial model remain the same." Id. See also the attached technical comments addressing the Univar groundwater model from Conestoga-Rovers & Associates ("CRA"), consultants for the Stakeholders.

For the reasons set forth above, Stakeholders request a written interim decision from ADEQ disapproving the Working Group's FS Work Plan.

Sincerely,

FENNEMORE CRAIG, P.C.

Scott K. Ames

cc: Henry Darwin, Director (HRD@azdeq.gov)
Kevin Snyder, Project Manager (snyder.kevin@azdeq.gov)

Enclosure: Technical Comments

CONESTOGA-ROVERS
& ASSOCIATES

651 Colby Drive, Waterloo, Ontario, N2V 1C2
Telephone: (519) 884-0510 Fax: (519) 884-0525
www.CRAworld.com

May 6, 2013

Reference No. 036752/077060

Mr. Scott K. Ames, Esq.
Fennemore Craig, P.C.
2394 E. Camelback Road, Suite 600
Phoenix, Arizona
85012-3429

Dear Mr. Ames:

Re: Univar/Van Waters & Rogers Groundwater Flow Model, West Van Buren Water Quality Assurance Revolving Fund (WQARF) Study Area (WVBSA)

This letter presents Conestoga-Rovers & Associates' (CRA's) comments on the utility of the above-referenced model as the basis for groundwater flow and transport modeling in the WVBSA. Harding Lawson Associates (HLA) prepared this model in 1997 and the West Van Buren WQARF Site Working Group (Working Group) intends to use this groundwater model as part of the Feasibility Study (FS) it is preparing.

CRA has reviewed the 1997 HLA modeling report at your request and has prepared this letter to document our observations and comments. CRA has asked for the computer code and electronic files that HLA generated when it produced this modeling report but those files have not been available to us as of the date of this letter. You have advised CRA that Fennemore Craig has made two attempts with ADEQ to obtain the electronic files, but that ADEQ has not yet produced the material.

CRA understands that the Working Group has been reviewing and revising this model. We do not have the results of their work and condition these comments on the review of the Working Group's work product and revisions to the model.

BACKGROUND

1. The model domain covers an area of approximately 125 square miles (10 miles by 12.5 miles) bounded by 99th Ave to the west, 7th St to the east, Camelback Road to the north, and Elliot Road on the south.
2. The modeling report includes two phases of modeling: a Phase 1 Model and a Phase 2 Model. The purpose of the Phase 1 Model was "to provide quantitative support for limiting the modeled vertical extent of a subsequent Phase 2 Model."

3. The following points summarize the Phase 1 Model:
   a. The Phase 1 Model has a uniform model grid size of 0.5 mile by 0.5 mile (or 2,640 feet (ft) by 2,640 ft). This uniform grid size turns the Phase 1 Model into a horizontal finite-difference discretization of 25 columns and 20 rows.
   b. The Phase 1 Model has a three-layer vertical discretization of the entire vertical profile of Upper Alluvial Unit (UAU), Middle Alluvial Unit (MAU), and Lower Alluvial Unit (LAU) with a total thickness ranging from less than 500 ft in the south east corner to 2,000 ft north of the Salt River.
   c. Layer 1 - UAU - 150 to 350 ft thick, 40 to 80 percent sand and gravel with horizontal hydraulic conductivity (K_H) values from 50 ft per day (ft/day) to 250 ft/day.
   d. Layer 2 - MAU - 125 to 500 ft thick, 10 to 60 percent sand and gravel with K_H from 0.1 ft/day to 20 ft/day.
   e. Layer 3 - LAU - recognizes two LAU subdivisions, the Upper LAU (ULAU[1]) and the Lower LAU (LLAU[2]) but the model combines these into one model layer. K_H from 0.1 ft/day to 10 ft/day.
   f. HLA assumed the vertical hydraulic conductivity (K_V) of the UAU is 0.05K_H and assumed K_V is equal to K_H for the MAU and LAU. HLA used these values to determine the rate of vertical groundwater flux in the model.
   g. HLA assigned no-flow boundary conditions and assumed that there was no vertical recharge.
   h. HLA did not calibrate the Phase 1 groundwater flow model.
   i. HLA modeled pumping from Layer 3 from 11 extraction wells completed in the LAU.
   j. HLA averaged pumping rates for 1984 through 1990 and then extrapolated these rates for the entire 30 year (1960 through 1990) simulation period.
   k. The model predicts that after 30 years of pumping, a particle released in the UAU would travel 1,350 ft horizontally and migrate 2.5 ft downward in response to this LAU pumping. HLA concluded that LAU pumping does not cause contamination in the UAU to migrate downward into the underlying units.

[1] 0 to 750 ft thick, 0 to 60 percent sand and gravel, with K_H values from 0.1 ft/day to 10 ft/day
[2] 0 to 1,250 ft thick. Composition of the LLAU at some locations was not known. HLA assigned a K_H value of 9 ft/day at these locations. Sand and gravel content ranged from 10 to 80 percent.

4. The following points summarize the Phase 2 Model:
   a. The Phase 2 Model has a similar model domain size to the Phase 1 Model and a variable grid size. The finest grid size is 500 ft by 500 ft near the WVBSA and Roosevelt Irrigation District (RID) wells. The grid becomes coarser towards the model boundaries with grid spacing reaching 3,400 ft by 2,400 ft along the model boundaries.
   b. The model thickness ranges from 500 ft in the eastern portion of the WVBSA to 750 ft in the north. The bottom of the model is the depth of the deepest irrigation wells and the depth where the MAU transitions to lower well yield, rather than the actual geological conditions.
   c. HLA divided the stratigraphic section into four model layers as follows:
      i. Layer 1 - extends from the water table to the top of the perforated zone of the irrigation wells (140 - 200 ft below ground surface {bgs}).
      ii. Layer 2 (high permeability zone in the UAU) – extends from the bottom of layer 1 to 230 - 300 ft bgs.
      iii. Layer 3 - extends from the bottom of the perforated zone to the bottom of the UAU marked by the base of a sand and gravel layer or by the top of a thick fine-grained (clay) layer (300 - 450 ft bgs).
      iv. Layer 4 extends down to the "deepest of the shallow wells" (450 - 600 ft bgs).
   d. There are no details in the report as to how HLA created the model layers. The report does not include figures that describe the model layer bottom elevations. There is no representation of the model layer elevations outside the WVBSA (i.e., the northern 3 miles and the southern 2 miles).
   e. HLA assigned three stress (pumping) periods to each year. The three stress periods remain constant through the model simulation duration from 1971 to 1991. HLA based the stress periods on the average annual groundwater pumping. All the other key input parameters were equalized to the same as the three stress periods.
   f. The model calibration targets were not described in the report. The number of targets are only shown either on Figures 43 and 65 (for the scatter plots of observed versus simulated heads for December 1982 and December 1991, respectively) or in Tables 10 to 23 (for calibration statistics). As shown in the tables, the calibration targets are production wells, not monitoring wells.

CRA COMMENTS

A. It does not appear that the Phase 1 Model can realistically represent site conditions. The Phase 1 Model has a coarse discretization and arbitrarily and sometimes unrealistically assumed material properties and boundary conditions. Conclusions based solely on this Phase 1 Model do not appear to be reliable.

B. The Phase 2 model discretization appears to be too coarse to be used as a tool to evaluate detailed groundwater flow and transport. Coarse discretization of a model usually results in numerical dispersion and inaccuracy in contaminant transport modeling.

C. The Phase 2 Model failed to represent the presence of the continuous clay layer where it exists in UAU. The clay layer plays a significant role in controlling groundwater flow within the UAU. The presence of the clay layer results in a strong vertical gradient within the UAU, especially when pumping occurs in lower portions of the UAU. Where the clay layer is not present, groundwater extraction from the lower portion of the UAU has a direct and profound impact on groundwater flow in the upper UAU. The existing Phase 2 Model does not appear to represent these fundamental hydraulic conditions.

D. The model construction is outdated and does not appear to reflect the current understanding of geology and hydrogeology in the WVBSA and in the area where RID operates its wells.

E. The definition of stress periods based on groundwater pumping would tend to result in bias and would likely not represent the actual key aquifer stress conditions over the simulation duration. In fact, models like this typically define variable stress periods from one year to another; each year may be very different.

F. HLA's selection of the key flow model input parameters appears to be arbitrary. For example, specific yield values in the model are generally too low. This fundamentally impacts flow and transport model calibration and reliability. Based on this understanding of the specific yield values, HLA would have to increase hydraulic conductivities during a transient model calibration to compensate for the lower assumed specific yield values in order to have the simulated groundwater elevations match the observed data.

G. The calibration targets were water levels obtained from production wells. The water levels in the production wells were "flash" static water levels and may not represent true static conditions in the aquifer. A flash static water level is a water level in a production well measured usually in minutes after the well is turned off for a short period of time. Using such "flash" static water levels as flow model calibration targets generally makes the model calibration results less reliable and therefore not representative of the actual groundwater flow conditions.

H. Most production wells are screened in multiple subunits and therefore represent a blend of aquifer properties that are unlikely to accurately represent each individual subunit.

I. The model calibration result is a scatter plot of measured versus modeled groundwater elevations for December 1982. Where the observed groundwater elevations are low (920 to 950 ft above mean sea level {AMSL}) the model over-predicted the groundwater elevations. Where the observed groundwater elevations are higher (above 950 ft AMSL, a much larger area) the model under-predicted the groundwater elevations: the higher the observed groundwater elevations are, the more under-predicted the modeled elevations are. An elevation discrepancy of more than 10 ft to as much as 30 ft exists between the observed and the simulated groundwater elevations. The precision of the elevation data is +/- 5 ft. The model does not appear to be representative of the actual conditions because of:

   a. Incorrect geometry or properties of the geological units.

   b. Inappropriate boundary conditions.

   c. Improper stress periods definition.

J. Based on the comments herein, it is not practical to fine-tune this model. A complete re-configuration of this model would be required using appropriate discretization both horizontally and vertically and the aquifer characterization information collected in the area since 1997; this would be in effect a new model. However, such a reconfiguration would be needed for this model to make reliable predictions with respect to groundwater flow and contaminant transport.

Should you have any questions on the above, please do not hesitate to contact us.

CONESTOGA-ROVERS & ASSOCIATES

Stephen M. Quigley, P.E.

AD/mg/1