Exhibit No.: 06
Issue(s): Utility Waste Landfill Design/Engineering Issues Raised by Charles H. Norris
Witness: Steven F. Putrich, P.E.
Sponsoring Party: Union Electric Company
Type of Exhibit: Sur-Surrebuttal Testimony
Case No.: EA-2012-0281
Date Testimony Prepared: October 11, 2013

MISSOURI PUBLIC SERVICE COMMISSION

Case No. EA-2012-0281

SUR-SURREBUTTAL TESTIMONY

OF

STEVEN F. PUTRICH, P.E.

ON

BEHALF OF

UNION ELECTRIC COMPANY
d/b/a AMEREN MISSOURI

Cleveland, Ohio
October, 2013

SUR-SURREBUTTAL TESTIMONY

OF

STEVEN F. PUTRICH, P.E.

CASE NO. EA-2012-0281

Q1. Please state your name and business address.

A. Steven F. Putrich, P.E., 6500 Rockside Road, Suite 200, Cleveland, Ohio 44131.

Q2. By whom are you employed and in what capacity?

A. I am employed by Haley & Aldrich, Inc., as the National CCR Program Lead and Senior VP of Engineering.

Q3. Are you the same Steven F. Putrich, P.E., who filed surrebuttal testimony in this matter on September 13, 2013?

A. Yes.

Q4. What is the purpose of your sur-surrebuttal testimony in this proceeding?

A. The purpose of my testimony is to respond to certain portions of the cross-surrebuttal testimony of Intervenors' witness Charles H. Norris.

Q5. Mr. Norris claims that the proposed UWL would not meet USEPA's proposed CCR regulations that call for the base of a UWL's liner to be two feet above the upper limit of the natural water table. Is he correct?

A. No, he is not. Mr. Norris in effect ascribes an intention to the proposed CCR rule that does not make sense by claiming that because the sumps are located at an elevation that is lower than 99.8% of the area of the rest of the landfill cells (i.e., the sump combined footprint area represents less than 0.15% of the entire UWL acreage), they will have intermittent contact with upper limit of the natural groundwater table (i.e., what has been very conservatively assigned as the maximum average groundwater level, elevation

464 feet) under the UWL. This means that the "base" of the liner, for purposes of the proposed rule in Mr. Norris's opinion, would not meet the requirements of the rule.

As I discussed in my surrebuttal testimony, by their very nature, the sumps must be located at a lower level so that gravity will cause the leachate to drain into them. The proposed CCR rule is not explicit on this point; however, it is my opinion that the "base" referred to in the proposed rule has to exclude the extremely small portion (less than 0.15% of the liner acreage) associated with the liner sumps. As I have previously noted, this is consistent with how MDNR applies its rules.

Q6. You noted that the upper limit of the natural groundwater table is "very conservatively assumed." What do you mean?

A. There is no prescribed method in either the MDNR or proposed CCR rules which describes the exact measures to be taken to determine the upper limit of the natural groundwater table. Instead, sound engineering judgment must be used to evaluate the data. Reitz & Jens used an elevation of 464[1] feet to very conservatively define the maximum average ground water level even though this level as observed during the one year of groundwater monitoring corresponds to a high river condition that occurred only two times in an almost 11-year monitoring period. This was a very conservative determination, but an appropriate application of engineering judgment, in my opinion.

Q7: How was the upper limit of the natural groundwater table determined to be at an elevation of 464 feet?

A: In support of developing the groundwater elevation determination for the Labadie UWL, measurements of groundwater elevation were monitored monthly from within the limits of the Labadie Energy Center for one year (December 2009 to November 2010). Daily measurements for the Missouri

[1] Mr. Norris incorrectly refers to an inferred elevation of 464.75 feet. As the documents in the CPA demonstrate, the maximum average groundwater level of 464 feet is very conservative and is associated with a high sustained river level for more than 30 days (which includes a peak river elevation exceeding 471 feet) that has only occurred twice in the almost 11 years of river monitoring associated with this project.

River were taken at the Labadie Energy Center measurement point for a nearly 11-year period between December 1999 and November 2010. Due to proximity and the geography of the UWL site relative to the Missouri River, the Missouri River has an influence on groundwater elevations underlying the proposed UWL footprint.

From the data presented in Appendix Z of the Construction Permit Application ("CPA"), the groundwater table at the site is typically at a higher elevation than the river level, resulting in a flow gradient toward the river (i.e., groundwater flows to the river from the site). It has been observed that instances when the Missouri River exceeds elevations of 465 feet and sustains that elevation for a period of time, the groundwater flows in a reverse direction away from the river. Figure 32 of Appendix Z of the CPA provides a graphical representation of the nearly 11-year river elevation data. This almost 11 years of data shows that the Detailed Site Investigation ("DSI"), which was performed from December 2009 to November 2010, was conducted during an atypical period of consistently high elevations within the Missouri River as compared to more representative river elevations as shown by daily data collected over nearly an 11-year period.

The results of the DSI show that there is a correlation between the river level and the groundwater table elevations at the site. For periods of time when the Missouri River exceeds an elevation of 465 feet for approximately 30 days with the peak river elevation exceeding 471 feet, the groundwater table below the proposed UWL reaches a maximum average elevation determined to be 464 feet. This river elevation/duration phenomenon where the river elevation exceeds 465 feet for approximately 30 days and during that period exceeded elevation 471 feet occurred just twice over an approximately 3,900 day-period (nearly 11 years) of river monitoring.

What this means is that by representing the maximum average groundwater level at elevation 464 feet, the engineers engaged by Ameren Missouri to perform the DSI were very conservative. In other

words, they in effect, assumed that the river was at or above flooding conditions[2] continuously. Based on nearly 11 years of data, we know that it was not the river level condition 99.8% of the time (i.e., two 30-day periods out of approximately 3,900 days, which is nearly 11 years of monitoring). This means that the upper limit of the maximum average groundwater level within the UWL site was below elevation 464 feet, 99.9% of the time.

Q8. Regardless of whether the very conservative 464 feet, or a considerably lower realistic level is used, is the base of the liner two feet or more above it?

A. Yes, The base of the liner will be constructed at 466 feet or higher, which is two feet above the very conservative maximum average groundwater level of 464 feet below the UWL site.

Q9. Mr. Norris also claims that settlement of the UWL has to be taken into account, and therefore claims that if it is taken into account, the base of the liner under the sumps will be at 465.2 feet, which would be just 1.2 feet above the natural groundwater level used by Ameren Missouri's engineers. Is he correct?

A. No, he is not. First, as noted, the proposed CCR rule does not require two feet of separation between the sumps and the groundwater table. Second, the proposed CCR rule does not require two feet of separation once settlement occurs. To the contrary, it requires two feet of separation from the base of the liner when the UWL is constructed. In accordance with the proposed CCR rule Section 257.60(a), "New CCR landfills and new CCR surface impoundments and lateral expansions **must be constructed** with a base that is located a minimum of two feet above the upper limit of the natural water table."

[2] In this instance, that case is defined as sustained elevated river levels of 465 feet or higher for 30 days where the river peaks above 471 feet during that timeframe.

Q10. At lines 18 to 22 on page 17 of his testimony Mr. Norris presents some calculations. Have you been able to replicate them?

A. Yes.

Q11. Can you explain them and whether they are correct?

A. Yes. Mr. Norris's math is correct, except that he bases his calculations on an inferred data point (elevation 464.75) which he mistakenly associates with the natural groundwater table elevation throughout the site. As mentioned earlier, the maximum average groundwater elevation of 464 feet should be used. Consequently, his 2.55 feet estimate should have been 1.8 feet, his 0.55 feet estimate should have been 1.3 feet, and his 0.45 foot estimate should have been 1.2 feet. Also, his discussion confuses two different issues. The first two sentences of the cited lines on page 17 are discussing the separation between the sumps (which are not included in the "base") in a post-settlement elevation and his inferred ground water table elevation. He then switches back in the last sentence to a discussion of his comparison of a post-settlement elevation of the base of the liner and his inferred ground water table elevation.

Q12. What is the point he is trying to make?

A. He is claiming that his calculations show less than two feet of separation, and therefore goes the argument, the proposed CCR rule requirement is not met.

Q13. Is he correct?

A. No, he is not correct for the reasons I explained earlier. The separation between the very conservatively estimated maximum average groundwater level of 464 feet and the sumps is not what is addressed by the proposed rule, and as noted, the rule applies to conditions at construction of the base, which will be at or above 466 feet.

Q14. Mr. Putrich, does this conclude your Sur-Surrebuttal Testimony?

A. Yes.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Application of Union Electric Company d/b/a Ameren Missouri for Permission and Approval and a Certificate of Public Convenience and Necessity Authorizing it to Construct, Install, Own, Operate, Maintain, and Otherwise Control and Manage A Utility Waste Landfill and Related Facilities at its Labadie Energy Center.	)	File No. EA-2012-0281

AFFIDAVIT OF STEVEN F. PUTRICH, P.E.

STATE OF OHIO)
) ss
COUNTY OF CUYAHOGA)

Steven F. Putrich, P.E., being first duly sworn on his oath, states:

1. My name is Steven F. Putrich, P.E. I work in the City of Independence, Ohio, and I am employed by the environmental and engineering consulting firm of Haley & Aldrich, Inc.

2. Attached hereto and made a part hereof for all purposes is my Sur-Surrebuttal Testimony on behalf of Union Electric Company d/b/a Ameren Missouri consisting of 5 pages, all of which have been prepared in written form for introduction into evidence in the above-referenced docket.

3. I hereby swear and affirm that my answers contained in the attached testimony to the questions therein propounded are true and correct.

Steven F. Putrich, P.E.

Subscribed and sworn to before me this 11th day of October, 2013.

Notary Public

My commission expires: March 11, 2018

JEANNINE MURRAY
NOTARY PUBLIC • STATE OF OHIO
Recorded in Medina County
My commission expires Mar. 11, 2018