

Danielle R. Taber

From: Joel Peterson <joel.peterson@syn-env.com>
Sent: Wednesday, January 14, 2015 3:49 PM
To: Scott R. Green; Danielle R. Taber
Cc: Donovan Neese; David Kimball; Lawrence Moore; Dennis Shirley; Andrew MacHugh
Subject: Re: Response to Dr. Halden's comments on RID draft FS Report
Attachments: Response_to_Comments_Dr._Halden.pdf

Scott and Danielle,

My apologies for my stumble but I made an error on the last electronic submittal, the response letter to Dr. Halden. I misstated Dr. Halden's title and would like to correct this before the submittal hits the public record (no other changes incorporated). The corrected submittal is provided as attached and I'll drop off hard copies to you both tomorrow.

Thanks for your understanding (and yours as well, Dr. Halden).

Jp

On 1/14/15 12:37 PM, Joel Peterson wrote:

Scott, Danielle,

Attached for your consideration is the RID response to Dr. Halden's comments and questions of 12/30/2014 regarding the RID draft Feasibility Study Report. I forwarded these comments directly to Dr. Halden a short while ago, via separate email, but wanted to make sure that you were copied through direct email as well. I'll also drop off hard copies to you both later this afternoon.

Again, don't hesitate to call with questions and/or comments.

Best regards

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January 14, 2015

Dr. Rolf Halden, Ph.D., P.E.
Professor & Director
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**Re: RESPONSE TO COMMENTS ON WEST VAN BUREN FEASIBILITY STUDIES,
dated December 30, 2014**
West Van Buren WQARF Registry Site, Phoenix, Arizona

Dear Dr. Halden:

On behalf of Roosevelt Irrigation District (RID), Synergy Environmental is providing the following brief responses to questions you raised in your "Comments on West Van Buren Feasibility Studies" dated December 30, 2014. We will primarily respond to the specific comments you raised regarding the RID FS.

First, we understand and appreciate your views concerning the desirability and efficiency that may be gained by designing a groundwater extraction well field for targeted removal of contaminants to optimize remediation at the WVBA Site. We too believe you would probably locate and configure wells differently than the existing RID well field if you were designing a groundwater remedy at a complex contaminated site from scratch. However, that is not the situation we are facing at the WVBA Site nor is it the approach taken under the WQARF Program.

RID has long operated a network of over 50 production wells in West Phoenix which includes 33 water supply wells in the WVBA vicinity that pump about 85,000 acre-feet (AF) of groundwater annually. The existing RID wells and water supply in the WVBA are a critical and indispensable resource needed to meet RID's current agricultural use and future municipal and industrial demands. The remedy in the WVBA Site must address, as a matter of law, these impacted wells and although the RID well field is not designed for remediation, the wells in the WVBA are reasonably suited for this purpose.

RID wells, originally developed to pump groundwater for dewatering purposes, are generally shallow and dominantly produce water from the highly permeable Upper Alluvial Unit, where the bulk of groundwater contamination is present. Even the few deep RID wells in the plume area that penetrate the Lower Alluvial Unit primarily produce water from the UAU. Consequently we believe the RID well field, along with the extensive network of existing canals and piping, land easements, and end uses is a solid foundation for a full and functional remedial action. In fact, the Working Group clearly argued that

RID's existing wells, "with capture zones ... existing over the WVBA plume footprint, result[s] in hydraulic control of the overall WVBA plume." Working Group FS Report, 19 (2014). All that is lacking are engineering controls (e.g. treatment) to capture and remove VOCs emitted to the ambient air in accordance with state law and other similar groundwater remedies in Arizona.

WQARF authority in statute and rule directs ADEQ to take remedial actions to protect current and reasonably foreseeable water uses of the aquifer and the well owners and water providers (including the quality and quantity of water and reliability of water supplies) impacted by contamination and address any existing well that is not now or in the reasonably foreseeable future fit for its reasonably foreseeable use without treatment. RID is the only water provider impacted by the groundwater contamination in the WVBA Site and, consequently, the groundwater remedy must address RID's supply wells. Recent water quality data indicate that 24 RID wells in the WVBA Site are impacted by VOCs and 13 of these wells exceed Arizona's numeric aquifer water quality standards (consistent with the maximum contaminant levels) for one or more of the primary contaminants of concern (i.e., TCE, PCE, and 1,1-DCE, otherwise referred to as the target VOCs).

This brings us to your other questions concerning the mass of VOCs removed by RID groundwater pumping and released into the community, before, during and after installation of the treatment systems.

An understanding of historical impacts associated with VOC releases is constrained by the limited sampling and analysis that has been conducted at RID wells, or for that matter, at ADEQ monitoring wells. RID wells were not systematically monitored until 2003. A table published in the RID FS Report (page 65) provides an estimate of VOC mass removal (primary contaminants of concern only) for the 10-year period from 2004 through 2013:

RID WATER SUPPLY WELLS – MASS REMOVAL ESTIMATES, 2004-2013
WVBA Site

(values presented are in approximate pounds of target COCs released)

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	TOTAL
3,500	2,975	3,575	3,150	3,330	2,815	2,760	2,625	2,200	2,070	29,000

This estimate is based on reported annual well pumping volumes and actual VOC concentrations measured at the RID wells during these years in samples collected by ADEQ. These data indicate annual removal of about 3,000 pounds of VOCs associated with RID pumping in the WVBA vicinity. You are correct to note that VOC mass removal has

diminished in the most recent years which is attributed to two factors: 1) RID has intentionally reduced off-season pumping of the most contaminated wells so as to limit VOC releases into the community, and 2) the TCE concentration at RID-114 has declined.

There is no way to accurately determine the timing or magnitude of VOC releases to the community in prior years. However, we do know that RID pumping in this area has been relatively constant for the past 50 years or more and information within the WVBA Site Remedial Investigation Report indicates chlorinated solvent use at some facilities began as early as the mid 1950s. Given the understanding that the current VOC concentrations observed throughout the WVBA Site were historically higher, it is reasonable to assume that RID pumping has removed in excess of 100,000 pounds of VOC mass from the contaminated aquifer to date.

The amount of VOC mass that may be pumped and treated, or alternatively extracted and not treated, in the future depends on the proposed remedial action adopted by ADEQ. The Working Group considered three remedial alternatives that would extract and treat no VOC mass (less aggressive) and up to an estimated 224 pounds (more aggressive) of VOC mass annually. The recommended remedy proposed by the Working Group features installation of a single 500-gpm extraction well and granular activated carbon (GAC) wellhead treatment system that they project will remove 74 pounds of VOC mass annually during the initial years of the remedy. The Working Group unequivocally states treatment is not required at any existing RID wells to address the uncontrolled releases of over 2,000 pounds per year of VOCs associated with RID groundwater withdrawals. As a result, the Working Group recommended groundwater remedy captures and removes approximately three percent of target VOCs released at the WVBA Site.

In contrast, RID considered four remedial alternatives that would extract and treat approximately 2,500 pounds (less aggressive) to an estimated 3,164 pounds (most aggressive) of VOC mass annually. The recommended remedy proposed by RID features installation of GAC wellhead treatment systems at the six most highly-contaminated wells capable of treating approximately 15,000 gpm of polluted groundwater. Based on anticipated groundwater production, the recommended remedy would remove a projected 2,500 pounds of VOC mass annually during the initial years of the remedy. The recommended remedy is projected to capture and remove about 77 percent of all target VOCs released at the WVBA Site.

We feel it is important to highlight three final points associated with the RID recommended groundwater remedy:

- The first point pertains to RID's ability to optimize plume containment and mass removal through their proposed remedial alternatives. In general terms, there is a somewhat limited opportunity to optimize remediation within the RID well field because all wells operate to meet water demands for about seven months annually. In

the remaining five months, generally from October through February, RID production decreases significantly and RID can prioritize pumping to focus groundwater extraction at the highly-contaminated wells to enhance plume containment and mass removal. Had RID optimized well operations in 2013 rather than avoid pumping contaminated wells in the low demand season, as required by ADEQ's Modified ERA approval, an estimated 2,500 pounds of VOC mass would have been extracted rather than the 2,070 pounds of VOC mass removal reported above. In sum, although there are certain limitations in how the RID wells can be operated, there are meaningful opportunities to enhance remediation (e.g. in this case enhance VOC mass removal by an estimated 20%).

- The second point to highlight is the cost effectiveness of the RID recommended remedy. As stated earlier, the existing RID water infrastructure and end use are already in place for a functioning groundwater remedy. The use of existing water infrastructure provides significant cost savings. The only notable cost attached to the RID recommended remedy is for installed treatment systems. As a case in point, RID was able to install a nominal 2,000-gpm GAC treatment system at the existing site of RID well 95 for approximately \$1.0 million. In contrast, the Working Group estimated it would cost \$2.5 million to develop and install a new 500-gpm extraction well and GAC treatment in the WVBA Site. By way of another example, the capital cost of the RID recommended remedy is \$9.4 million compared to the actual \$12 million capital costs expended 14 years ago for the OU2 groundwater pump and treat remedy at the Motorola 52nd Street CERCLA Site. Significantly, the RID recommended remedy is less costly than the OU2 groundwater remedy and provides nearly three times the installed treatment capacity.
- The third and final point is in response to questions you raise concerning risks posed from background exposure to non-site VOCs and the added risk resulting from WVBA Site VOC contamination. Neither RID nor ADEQ have conducted a quantitative human health risk assessment related to exposure to WVBA contaminants of concern (COCs). RID has conducted limited scope sampling of surface water and air quality at two contaminated RID well sites and the downstream receiving water system to measure COC concentrations relative to health-based screening levels. Although the findings indicate there does not appear to be an acute exposure risk from these contaminants, the results revealed the presence of COCs in all air samples obtained in and proximal to the RID water supply wells and water conveyance system while no COCs were detected at background locations. Based on the sampling event, ADEQ subsequently noted, "*... long-term health effects are uncertain and data also shows that significant volatilization and transfer of contaminants, from the water into the air, is occurring and ongoing*" in a letter dated February 1, 2013 approving RID's Modified Early Response Action (ERA).

In fairness, it should also be noted that the Working Group conducted a human health risk assessment in which they conclude the estimated risks to potentially exposed receptors to

COCs within the WVBA Site are acceptable. However, we would add that the Working Group risk characterization is based on prospective exposures to COCs at current concentrations and ignores the fact that the community has likely been exposed to higher COC concentrations through multiple routes of exposure for the past 30 to 50 years. For this reason, RID agrees with your assertion that *“it is desirable to keep further increases in health risks to community members to an absolute minimum as site cleanup progresses”* and why RID proposed focused efforts to reduce uncontrolled VOC emissions through the Modified ERA and in the RID FS Report, which is consistent with remedial actions required at other similar groundwater cleanup sites in Arizona to prohibit the transfer of hazardous contaminants from one environmental media (groundwater) to another (air).

We appreciate your continued interest in RID’s efforts to address remediation of the West Van Buren Area groundwater contamination and are available to discuss your questions and concerns in more detail should you so desire.

Best Regards,
Synergy Environmental, LLC



Joel Peterson, PE

cc: Scott Green, Arizona Department of Environmental Quality
Danielle Taber, Arizona Department of Environmental Quality
Donovan Neese, Roosevelt Irrigation District
David Kimball, Gallagher & Kennedy
Lawrence Moore, Lawrence Moore & Associates
Dennis Shirley, Synergy Environmental