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February 12, 2010

Ms. Jacquelyn Hayes
Remedial Project Manager
USEPA Region 9
75 Hawthorne Street
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Subject: Response to EPA January 29 and February 4, 2010 Comments on the December 11, 2009 Draft Addendum to the Site-Wide Quality Assurance Project Plan, Domestic Well Monitoring Plan for the Yerington Mine Site; Submittal of Domestic Well Monitoring Plan - Revision 1; Administrative Order for Remedial Investigation and Feasibility Study, EPA Docket No. 9-2007-0005

Dear Ms. Hayes:

Atlantic Richfield Company (ARC) has prepared the attached responses to comments on the Draft Addendum to the Site-Wide Quality Assurance Project Plan, Domestic Well Monitoring Plan (DWMP) dated December 11, 2009 for the Yerington Mine Site (Site). Comments were provided to ARC by the U.S. Environmental Protection Agency - Region 9 (EPA) on January 29 and February 4, 2010. The attached responses and Domestic Well Monitoring Plan - Revision 1 dated February 12, 2009 reflect these comments and several e-mail exchanges (e.g., January 13 and 26, and February 4, 2010). In addition to adding the domestic wells suggested by EPA, ARC has also included 25 Sunset Hills domestic wells in the revised DWMP that were not identified and designated until January 2010.

Although the revised DWMP incorporates the majority of EPA comments, ARC has retained the domestic well sampling procedures described in the draft DWMP for the reasons described in the attached responses. ARC recognizes the importance of initiating domestic well sampling in March, and suggests that further technical discussions with EPA regarding domestic sampling procedures, if required, be scheduled as soon as possible. ARC looks forward to EPA's review and approval of the responses and the attached revised DWMP.

If you have any questions regarding ARC's attached responses to the comments, please contact me at (714) 228-6774 or via e-mail at jack.oman@bp.com.

Sincerely,



Jack Oman
Project Manager

A BP affiliated company



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cc:

Dave Seter (EPA)
Nadia Hollan Burke (EPA)
Robert Ford (EPA) via CD
Steve Acree (EPA) via CD
Tom Olsen (BLM)
Paul Meyer (BLM) via CD
Joe Sawyer (NDEP)
Chairman Sammaripa, (WRPT)
Roxanne Ellingson (WRPT)
Raymond Montoya (WRPT) via CD
Peggy Pauley, (YCAG)
Chairman Emm (YPT)
Justin Whitesides (YPT)

John Krause (BIA) via CD
Lyon County Library System
Roy Thun (Atlantic Richfield Company)
Jim Chatham (Atlantic Richfield Company)
John Batchelder (EnviroSolve)
James Lucari (Atlantic Richfield Company)
Ken Greene (CH2M Hill) via CD
Victor Early (TetraTech)
Rich Curley (Curley & Associates LLC) via CD
Greg Davis (Brown and Caldwell)
Dietrick McGinnis (M&A)
Dan Newell (City of Yerington)

Response to EPA Comments on the Draft Addendum to the Site-Wide Quality Assurance Project Plan, Domestic Well Monitoring Program, Yerington Mine Site Dated December 11, 2009

EPA General Comment #1:

Cite analytical methods and add citations to reference section.

ARC Response:

Analytical methods are provided in Table 2-2 “Analyte List for Domestic Well Sampling” of the Domestic Well Monitoring Plan (DWMP). These analytical methods are described in the Quality Assurance Project Plan (QAPP), Yerington Mine Site - Revision 5 (Environmental Standards, Inc. and Brown and Caldwell, 2009), which is referenced in Section 7.0 of the DWMP.

EPA Acronyms Comment #2:

The following acronyms are not used in the document: TOC, PEL, “g” for gram, “cm” for centimeter, “ft” for foot, mL/min, and USGS. Remove s.u. for pH units.

ARC Response:

These acronyms have been removed from the revised DWMP.

EPA Comments #3 (Section 2.1, Page 2):

“The primary data quality objective (DQO) for domestic wells sampling is to obtain groundwater samples that are representative, to the extent practicable, of the quality of water used for drinking water or other domestic water supply purposes.”

Variations in the volume of water purged, well construction, and well use, in addition to other factors, may affect the representativeness of domestic well samples. A section on data limitations should be added to this QAPP Addendum. Clearly indicate known data limitations. Other data limitations may be identified as the program progresses – this should be acknowledged in the discussion as well.

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ARC Response:

ARC agrees with this DQO and recognizes that a number of factors may affect the representativeness of domestic well samples (e.g., the volume of water purged, well construction, well use patterns, and chemical reactions that occur in the borehole environment) with the potential to affect chemical concentrations in pumped well water. The DWMP has been revised to include a discussion of these factors, potential limitations of the data for the DWMP objectives, and an acknowledgement that additional factors may be identified as the program progresses. ARC believes that the sample collection procedures described in the DWMP (which approximate a first-flush approach to determining water chemistry) represent a consistent approach to determining the concentrations of chemicals in well water used by domestic well owners.

ARC acknowledges that a data quality objective (DQO) may be established during some future phase of the Site-Wide Groundwater RI Work Plan that includes a comparison of chemical concentrations in domestic well water with groundwater sampled from properly constructed, nearby monitor wells. However, such a comparison is not a DQO of the Domestic Well Monitoring Program.

EPA Comments #4 (Section 2.1, Page 2):

“Additional specific domestic well monitoring objectives include, but are not limited to: ...”

Delete “but are not limited to” and include all domestic well monitoring objectives. Also, results from domestic well sampling will help determine if residents (who are currently not receiving bottled water) qualify to receive bottled water. This should be added to the list of domestic well monitoring objectives.

ARC Response:

The DWMP has been modified as requested.

EPA Comments #5 (Section 2.1, Page 2):

“Monitoring temporal trends in the magnitude and distribution of chemicals in groundwater extracted by domestic wells that is used for drinking water or irrigation purposes;”

The water is also used for livestock and pets, it may be more appropriate to state “agricultural purposes” than to limit it to irrigation.

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Specify criteria used to identify data subsets that will be used when determining temporal trends. Prior to trends analysis, it is recommended that analysis of variance (ANOVA) be used to identify critical parameters to be considered in the trends analysis.

ARC Response:

The DWMP has been revised to indicate that one of the objectives of the program is to monitor temporal trends in the magnitude and distribution of chemicals in groundwater extracted by domestic wells that are used for drinking water or agricultural purposes. ARC proposes to evaluate chemical concentration trends using the non-parametric Mann-Kendall statistical method. In addition, ARC proposes to discuss the use of ANOVA) to identify critical parameters in the trend analysis with EPA in a technical meeting prior to conducting this evaluation.

EPA Comments #6 (Section 2.1, Page 2):

“Assessing what, if any, potential risk is posed to human health and the environment by the use of groundwater extracted by domestic wells for drinking water or irrigation purposes.”

The objective should specify that the potential risk posed to human health and the environment by mine-related contaminants in groundwater extracted by domestic wells is being assessed.

ARC Response:

The DWMP has been revised to specify this objective. ARC believes that the objective of the Domestic Well Monitoring Program is to determine the concentrations of chemicals in well water extracted from the alluvial aquifer and used for drinking water or agricultural purposes, and to use this information to make decisions regarding potential risks to water users. The differentiation between mine-related groundwater and naturally-occurring (background) chemicals in groundwater will be addressed in the Site-Wide Groundwater Remedial Investigation.

EPA Comments #7 (Section 2.2, Page 3):

The discussion should acknowledge that a vertical gradient exists in the alluvial aquifer, as mentioned in the Second-Step Hydrogeologic Framework Assessment Data Summary Report (Brown and Caldwell, 2008).

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ARC Response:

The DWMP has been revised as suggested.

EPA Comments #8 (Section 2.2, Page 3):

“The hydrostratigraphic zones are defined by elevation as follows:

Shallow: > 4,300 feet amsl

Intermediate: 4,420 to 4,300 feet amsl

Deep: <4,240 feet amsl”

Change 4,420 in the Intermediate zone interval to 4,240.

ARC Response:

The DWMP has been revised as requested.

EPA Comments #9 (Table 2-1, Page 4):

It is recommended that Table 2-1 be expanded to include information on the interval that was gravel packed during well construction. It is also recommended that the State of Nevada, Division of Water Resources log number from the Well Drillers Report be included to allow easy reference to all available construction information and lithologic logs.

There is no discussion on the source of the construction information provided in Table 2-1. If difference sources (*e.g.*, well drillers reports, records of well owners) were used, this should be noted in the table. Otherwise, the text should state the source.

Several well entries for which the screened elevations are listed indicate that the hydrostratigraphic zone is unknown. The reason for the “unknown” designation in this situation is unclear and should be clarified in the text or corrected in the table.

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ARC Response:

As requested, Table 2-1 has been revised to include information on the interval that was gravel packed during well construction (if available), the Nevada Division of Water Resources well log number, and the Assessor's Parcel Number (APN). Hydrostratigraphic zone designations have been updated to reflect known well construction information. In addition, EPA-suggested domestic wells (February 4, 2010 comment letter) and 25 domestic wells in the Sunset Hills area that were not previously designated have been included in Table 2-1.

EPA Comments #10 (Section 2.4, Page 8):

The recent shallow zone characterization work indicated that lithium and molybdenum may be elevated in a portion of the shallow zone north of the site boundary. In addition, chromium, lead, and selenium are on the analyte list for monitor wells and should also be monitored in domestic wells. It is recommended that these five analytes be added to Table 2-2.

ARC Response:

Table 2-2 of the DWMP has been revised to include chromium, lead, lithium, molybdenum and selenium.

EPA Comments #11 (Section 2.4, Pages 8-9):

In Table 2-2, change the unit for Alkalinity, hydroxide from Mg/L to mg/l. In addition, provide the corresponding MCL(s) for each analyte for comparison to the reporting limits.

Also, measuring field parameters would be helpful in interpreting the results for distribution of parameters already listed in Table 2-2. Please add the following field parameters to Table 2-2: ORP, DO, pH, conductivity, and turbidity. In addition, please modify the SOPs appropriately to include the measurement of these field parameters.

ARC Response:

Table 2-2 has been modified as requested, with the exception of what is discussed below. Because EPA Comment #11 and Comment #13 both pertain to domestic well sampling procedures and program objectives, ARC is responding here to both of the comments.

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As presented in the response to comment #3, ARC does not believe that it is appropriate to use domestic well data for groundwater characterization purposes such as interpretation of the distribution of chemicals in groundwater and/or factors that affect the fate and transport of chemicals in the alluvial aquifer. As discussed in the Site-Wide Groundwater Monitoring Plan, Revision 1 (Brown and Caldwell, 2009), Gotkowitz et al. (2004) and others have shown that the quality of water under typical water use patterns differs from that of groundwater in the aquifer because of geochemical reactions that occur in the well during various withdrawal scenarios. Conditions in wells that may affect chemical concentrations include: 1) changes in redox related to pump action, which introduces oxygen into well water; 2) the potential for the growth of microorganisms that facilitate a variety of biogeochemical reactions (Taylor et al., 1997; van Beek and van der Kooij, 1982); and 3) the residence time of the water stored within the borehole.

These factors and data limitations have been discussed during previous groundwater technical working group meetings involving ARC, EPA, BLM, NDEP, YPT and other stakeholders. In recognition of these limitations, the consensus approach to fulfilling groundwater characterization objectives at the Site has been to design and install properly constructed monitor wells and collect groundwater samples using a consistent methodology (low-flow, minimal drawdown) procedures to help ensure that ground water samples are representative of the alluvial groundwater.

Measurements of ORP, DO, pH, conductivity, and turbidity are not needed to fulfill the objective of the Domestic Well Monitoring Program, which is to determine the concentrations of chemicals in wells used for drinking water and/or agricultural purposes, and to use that information to make decisions regarding potential risks to users. In addition, field ORP measurements and their interpretations are not simple and the pitfalls of redox measurements in the environment have been well documented (EPA, 2002; Langmuir, 1971; Nordstrom and Wilde, 1998; Lindburg and Runnells, 1984). Furthermore, the EPA (2002) has noted that the time required for stabilization of the ORP electrode may make the measurement impracticable in the field and, in some instances, may not even be suitable as a stabilization parameter for low-flow ground-water sampling.

ARC understands that the patterns of domestic well water pumping are likely to be variable, but believes that purging 3 to 5 well casing volumes until field parameters stabilize would yield water quality information that would not likely represent the concentrations in water typically used for drinking water and/or agricultural purposes. The volumetric purging and field parameter stabilization approach to groundwater sample collection is typically associated with groundwater characterization, which is not an objective of the Domestic Well Monitoring Program.

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During past sampling events, the attempt to utilize higher discharge rates and/or longer purging times was considered to be a nuisance by a number of domestic well owners or residents. Also, because the maximum discharge rate of many of the domestic wells is about 10 gallons per minute, and 3 to 5 casing volumes can represent volumes up to a thousand gallons of water, many domestic well owners or residents may not agree this approach. ARC does not believe that a volumetric-based approach to purging and sampling domestic wells is practicable or, more important, provides the water quality information needed to fulfill the risk-based data quality objective of the Domestic Well Monitoring Program.

References cited in this response are listed below:

EPA, 2002, Workshop on Monitoring Oxidation-Reduction Processes for Ground-Water Restoration, Workshop Summary, Dallas, Texas – April 25-27, 2000. EPA/600/R-02/002. January 2002.

Gotkowitz, M.B., M.E. Schreiber, and J.A. (Toni) Simo, 2004, Effects of Water Use on Arsenic Release to Well Water in a Confined Aquifer. Ground Water Vol. 42, no. 4: 568-575.

Langmuir, D, 1971, Eh-pH determination. In Procedures in Sedimentary Petrology, Chapter 26, ed. R.E. Carver, Wiley-Interscience, New York, pp. 597-635.

Lindburg, R.D. and D.D. Runnells, 1984, Ground water redox reactions: An analysis of equilibrium state applied to Eh measurements and geochemical modeling. Science, Vol. 225, pp. 925-927.

Nordstrom, D.K. and F.D. Wilde, 1998, Reduction-oxidation potential (electrode method). In National Field Manual for the Collection of Water-Quality Data, eds. F.D. Wilde, D.B. Radtke, J. Gibs, and R.T. Iwatsubo, U.S. Geological Survey Techniques in Water-Resources Investigations Book 9, Handbooks for Water Resources Investigations, A6.5.

van Beek, C.G.E.M., and D. van der Kooij, 1998, Sulfate-reducing bacteria in ground water from clogging and nonclogging shallow wells in the Netherlands river region. Ground Water Vol. 20, no. 3: 298-302.

Taylor, S.W., C.R. Lange, and E.A.L. Lesold, 1997, Biofouling of contaminated ground water recovery wells: Characterization of microorganisms. Ground Water Vol. 35, no. 6: 973-980.

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EPA Comments #12 (Section 2.6.2, Pages 10-11):

The discussion should mention that water samples will be drawn upstream of any treatment systems, (i.e., only untreated water will be sampled). The fifth procedural step on page 11 alludes to this; however, it is suggested that this be emphasized in the discussion.

ARC Response:

The DWMP has been revised as requested. The fifth procedural step associated with sample collection has been revised as follows:

“Go to the “preferred sample location” as identified on previous field sampling records (i.e., the outside spigot closest to the well). A spigot closest to the well (i.e., upstream of any treatment system) should be used for purging and sampling so that only untreated water is sampled. However, an alternate spigot requested by the homeowner may be used as long as it is upstream of and does not draw water from a water softener tank, in-line filter, or other treatment system.”

EPA Comments #13 (Section 2.6.2, Pages 11):

The well water should be purged for a minimum of 3 to 5 casing volumes (for known well construction) and until water quality parameters (including pH, temperature, specific conductance) are stabilized before the sample is collected.

ARC Response:

Please see ARC’s response to EPA Comment #11.

EPA Comments #14 (Section 2.6.3, Pages 12):

It is recommended that a consistent order of sample collection be established and documented in the steps outlined in this section.

ARC Response:

As requested, the DWMP has been revised to indicate that sample containers will be filled in the following order during each monitoring event: physical parameters and cations/anions, metals, and radiochemicals.

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EPA Comments #15 (Section 2.6.3, Pages 12):

It is stated that the laboratory will check whether the pH condition for preservation is met for acidified samples (pH<2). It is recommended that a review be conducted to determine that the acid preservation condition is met for all sampled wells. If it is not met, then it is recommended that the amount of acid added to sample bottles be increased for all sample locations to insure uniform adherence to the preservation condition for future sampling events.

ARC Response:

The pH of the water samples are checked at the analytical laboratory to confirm preservation for acidified samples (pH<2). If the pH is above 2, it is standard laboratory practice to add more acid to ensure that the pH is below 2 and let the sample sit for 16 hours so that constituents either desorb or re-dissolve back into the aqueous solution prior to analysis. Re-acidification of the sample in the lab, if necessary, does not affect the quality of the analytical results. Consequently, ARC does not believe it necessary to perform the evaluation describe above, especially because the analytical laboratory reports that this situation has occurred very infrequently, if at all, with Yerington groundwater samples.

EPA Comments #16 (Section 2.6.3, Pages 13):

Table 2-3 should indicate whether preservation includes cooling to 4°C.

In addition, Note (3) of Table 2-3 states “Total Organic Carbon not included”. Measuring Total Organic Carbon would be helpful in interpreting the results; it is recommended that Total Organic Carbon be added to Table 2-2.

ARC Response:

As requested, Table 2-3 has been modified to indicate whether preservation includes cooling to 4°C.

As requested, total organic carbon (TOC) has been added to the analyte list in Table 2-2.

EPA Comments #17 (Section 3.2.2, Pages 21):

“Wells selected for duplicate analysis will likely change with each sampling event, and will be identified on the sampling log.”

“Wells selected for MS/MSD analysis will likely change with each sampling event, and will be identified on the sampling log.”

Response to EPA Comments on the Draft Addendum to the Site-Wide Quality Assurance Project Plan, Domestic Well Monitoring Program, Yerington Mine Site Dated December 11, 2009

Please explain how wells for duplicate analysis and MS/MSD analysis will be chosen.

ARC Response:

Duplicate and MS/MSD samples will be collected from wells selected at random prior to each sampling event. However, the actual location where duplicate and MS/MSD samples are collected may change during the event based on access and/or field conditions.

EPA Comments #18 (Section 4.2, Pages 22):

Trends analysis for domestic wells should be included in the Annual Domestic Well Monitoring Report. As mentioned in Comment 5 above, ANOVA should be used to identify critical parameters to be considered in trends analysis.

ARC Response:

The revised DWMP indicates that the Annual Domestic Well Monitoring Reports will include a statistical analysis of chemical trends. ARC proposes to evaluate trends in the concentrations of all of the chemicals using the non-parametric Mann-Kendall statistical method, and looks forward to discussing with the EPA how ANOVA can be used to identify critical parameters in the trend analysis.

EPA Comments #19 (Section 5.0, Pages 24-25):

Eliminating wells and analytical parameters from the Program requires EPA approval. This QAPP Addendum should indicate that any changes to the Program, including the removal of wells and analytical parameters for the reasons listed on pages 24-25, will only occur after EPA approval is received. In addition, an explanation of why eliminations were made should be provided in the Domestic Well Monitoring Report following the elimination.

ARC Response:

Similar to statements in Section 4.2 of the DWMP, this section of the DWMP has been revised to indicate that: "ARC will propose any changes to the DWMP, including the removal of wells and analytical parameters, to the EPA and provide the technical basis for the requested change. Changes to the DMWMP will only occur after EPA approval is received. An explanation of the rationale for eliminations to the program will be documented in the Domestic Well Monitoring Report following the elimination."

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EPA Comments #20 (Figure 1):

Figure 1 outlines the Anaconda/Yerington Mine Site boundary. The project location for the Domestic Well Monitoring Program is not the Site itself, but the areas north and west of the Site containing residential communities. Please modify Figure 1 to include the correct project location for the Domestic Well Monitoring Program in relation to the Anaconda/Yerington Mine Site.

ARC Response:

The revised DWMP includes a figure showing the domestic wells located to the west and north of the mine site that will be monitored pursuant to the DWMP.

EPA Comments #21 (SOP-25, Page 7):

“Proper packaging is necessary to protect the sample containers, to maintain the samples at or below a temperature of 4°C, and to comply with the applicable transportation regulations.”

It is unclear if the temperature of sample packages prepared for shipping to the laboratories will be measured prior to shipment to ensure that samples are at or below a temperature of 4°C. Please indicate whether preservation includes cooling to 4°C. It is recommended that a temperature blank be included in the cooler.

ARC Response:

Because temperature equilibration between the sample containers and the ice within the shipping cooler may take several hours, instances will arise when it is not practical to measure the temperature of the cooler contents prior to shipment to ensure that samples are at or below a temperature of 4°C unless provisions are made to refrigerate samples for a period of time prior to shipment to the laboratory. ARC believes that this effort is unnecessary and that it is sufficient for the analytical laboratory to confirm whether they have received samples at the proper temperature. Furthermore, it will not be feasible to meet the short hold time requirements for some parameters in order to allow time for equilibration and temperature measurements in sample coolers prior to shipment.

In addition, the revised DWMP explicitly states: “Consistent with the requirements of Revision 5 of the Site-Wide Quality Assurance Project Plan (ESI and Brown and Caldwell, 2009), each cooler containing samples that require temperature preservations will contain a temperature blank.”