

# **Responsiveness Summary – Warm Springs Ponds Operable Units**

The responsiveness summary includes comments received on the draft report during the December 12, 2010 through January 31, 2011 comment period. The comments are shown as received but were edited to include only those comments pertaining to the WSPOUs. EPA responses are included in italicized text.

## Comments from Atlantic Richfield

### WARM SPRINGS PONDS OPERABLE UNIT

AR appreciates the level of data analysis incorporated into EPA’s review of the Warm Springs Ponds Operable Unit (WSPOU) site and agrees with its major finding on the amount of progress made in water quality improvement to date.

*EPA Response: Comment noted.*

### Specific Comments

1. EPA concludes that “The soil and groundwater remedies at the WSPOUs are protective of human health and the environment in the short term” (Vol. 4, pg 10-1): AR agrees with this conclusion. Water effluent chemistry; biomonitoring studies conducted by AR in 2006, 2009, and 2010, and benthic macroinvertebrate monitoring conducted by EPA contractor Dan McGuire all indicate that the remedy has been, and continues to be, protective.

*EPA Response: Comment noted. Please see the revised protectiveness findings contained in the final five year review report.*

EPA also indicates that the long-term effectiveness of the remedy is not necessarily assured: “information gathered in the last five years calls into question the long-term protectiveness of the remedy” (p. 10-1). AR questions what specific information leads to this conclusion, and requests that EPA identify the specific “information” that supports this statement.

*EPA Response: EPA findings have been revised in the final five year review report. The report’s conclusions are explained in the document itself.*

As described below, EPA’s statement regarding catch and release regulations at the ponds to prevent consumption of contaminated fish is incorrect; there is no indication of bioaccumulation of metals in fish tissue to concentrations that would be a concern to human health or other ecological receptors. Also, there have been no population level effects observed in wildlife receptors such as waterfowl, as documented in the biomonitoring reports. All indications are that the current remedy will be effective in the long-term, and on-going monitoring will continue to be used to confirm this.

*EPA Response: See response to detailed comment on this subject.*

2. EPA recommends continued arsenic treatment optimization studies (Table 9-1): AR agrees that this ongoing effort does not affect the protectiveness of the remedy. The peak arsenic concentration observed in the discharge during the remedy review period was 78 ug/L, which is 77% below the acute aquatic life standard of 340 ug/L.

*EPA Response: Comment noted. However, CERCLA requires that remedial actions meet all performance standards, and the ponds system is currently exceeding arsenic standards, including*

*human health arsenic standards, on occasion. Treatment optimization to control arsenic in better and more consistent ways, as well as improvement in incoming water quality, must continue under the interim remedies, and these considerations will be an important part of the final remedy decisions for the ponds area.*

In 2008, AR initiated a study of arsenic, nutrient, and metals cycling in the ponds system in an attempt to better understand release mechanisms. This ongoing study led to a hypothesis that increased mixing of the active treatment lagoon cells, to increase gas exchange with the atmosphere and sediment and to reduce temperatures, may help to mitigate the seasonal release of arsenic from the bed sediments. Therefore, in 2010, AR began a pilot study with SolarBee® mixers in Ponds 2 and 3 and the West Wet Closure. Data collection and analysis are on-going. To date, AR is not able to draw definitive conclusions with respect to the Solar Bee's effectiveness. However, based upon performance to date it does not appear that the solar mixers are able to achieve compliance with the 20 ug/L arsenic discharge standard at all times. AR plans to continue the study into 2011. Existing institutional controls prevent consumption of water: from the WSP, the UCFR, and groundwater affected by these surface water bodies. Therefore, protection of human health is assured. Ecological health is also protected as arsenic concentrations discharged from the ponds system do not exceed concentrations protective of aquatic life.

*EPA Response: Comment noted. EPA understands these limitations. However, performance standard compliance is legally required and must be pursued. EPA is not aware of institutional controls which prevent the consumption of surface water in the area, but does note that the area is not used currently to provide domestic drinking water.*

### 3. Metals Bioaccumulation:

The WSPOU provides a diverse and valuable habitat for wildlife and an opportunity for the public to enjoy these natural resources, while maintaining protectiveness of human health and the environment. AR does not perceive a need for additional metals bioaccumulation studies. If deemed necessary, the studies should be conducted consistent with AR's comments on issues and recommendations related to site-wide integrated monitoring, and the potential need to evaluate (from a risk perspective) new pathways associated with ecological improvements that have followed response actions. AR recommends that this issue be addressed via a DQO process which carefully considers goals and objectives of additional studies. Goals and objectives of additional data collection should consider the overall objective of the five-year review process, (i.e., "to determine whether the remedies or other response actions in place or under construction within the Site are protective of human health and the environment and otherwise in compliance with the decision documents"), and specific data collected should directly support the stated goals and objectives. Goals and objectives should furthermore, be directly linked to specific management decisions. This should all be pursued in a coordinated manner with other similar efforts on a site-wide basis, recognizing that "one size may not fit all" and specific approaches will likely need to be developed for individual OUs, such as WSPOU.

- *EPA Response: EPA agrees. In consideration of AR's and others' comments on the site-wide biological monitoring program, EPA will modify its recommendation for development and implementation of a more narrow plan with appropriate DQOs and measurement endpoints on this issue to ensure usefulness of the data, if funding allows.*
4. Final Remedy (begin final ROD planning - data collection, risk assessment):

The recommendations here discuss working toward the final ROD for the WSPOU as well as developing a site-wide ecological study “for determining if a stream is supporting or not supporting a designated aquatic life use”. Given that upstream remedial and municipal activities will continue to impact the WSP system and SBC water quality, consideration should be given to these activities on the WSP system as part of a Final Remedy assessment. That said, biomonitoring activities have been in place at several locations, and for several COCs, within the WSPOU from 1995 through 2010. This includes monitoring for metals bioavailability in different receptor species as well as in the sediment (assessing both toxicity and bioavailability). Species diversity and abundance have also been monitored for the benthic macroinvertebrate (BMI) community during this time. While there has been no comprehensive ecological risk assessment performed with the data collected, as this was not one of the original objectives, temporal trends have been evaluated with the datasets as well as comparisons among sites within the ponds (e.g., comparing whole body metal residues near the influent versus the outfall). As stated, the ponds may be operating at their maximum capacity until upstream activities are resolved, including nutrient inputs.

In moving forward with the planning for the final ROD, AR understands that an integrated “site-wide” approach to evaluating potential risks across different OUs may be required, and if pursued correctly may be useful, as many of the issues are similar within the drainage basin. Consistent with AR's comments on issues and recommendations related to site-wide integrated monitoring, and the potential need to evaluate (from a risk perspective) new pathways associated with ecological improvements created by remediation and restoration, AR recommends that, if pursued, this issue be addressed via a DQO process which carefully considers goals and objectives of additional studies.

Goals and objectives of additional data collection (if pursued) should consider the overall objective of the five-year review process, (i.e., “to determine whether the remedies or other response actions in place or under construction within the Site are protective of human health and the environment and otherwise in compliance with the decision documents”), and specific data collected should directly support the stated goals and objectives. Goals and objectives should furthermore, be directly linked to specific management decisions. This should be pursued in a coordinated manner with other similar efforts on a site-wide basis, recognizing that “one size may not fit all” and specific approaches will likely need to be developed for individual OUs (such as WSPOU). For example, differences between stream and lake systems need to be considered, as metrics and endpoints developed for lotic (i.e., stream) systems may not be appropriate for lake (lentic) systems (e.g., periphyton and BMI metrics). In addition

to developing specific DQOs which are appropriate and provide realistic and achievable (remedial) objectives for this site, specific sediment management and risk management principals should be considered. For example:

- The performance of multi-year field studies at Superfund sites to try to quantify or predict long-term changes in local populations is not necessary for appropriate risk management decisions to be made (OSWER Directive 9285.7-28).
- Ensure that any sediment cleanup is consistent with and supported by site-specific risk management goals. While it is generally more practical to use measures such as contaminant concentrations in sediments to identify areas to be remediated, other measures should be used to ensure that human health and/or ecological risk reduction goals are being met. (OSWER Directive 9285.6-08)
- Long-term impacts (e.g., recreational uses if the waterbody) of each alternative on societal and cultural practices should be identified and considered as appropriate, and a comparative analysis of impacts may be useful to fully assess and balance tradeoffs associated with each alternative (OSWER Directive 9285.6-08).

*EPA Response: EPA recognizes the importance of the biological monitoring done to date. In fact, these data should be assessed for their usability and completeness prior to recommending any further data collection for the purposes of any further action. EPA will also consider this input as it plans for regulatory steps that will be necessary to issue final, as opposed to interim, RODs for the Ponds sites. A date for beginning this process has not yet been set, and EPA agrees that upstream water quality and remedial actions are an important part of that planning process.*

5. Page 4-2. EPA correctly states that the Mill Willow Bypass (MWB) channel was designed to safely route 70,000 cfs (one half the estimated Probable Maximum Flood [PMF]). Recent analysis completed by AR indicates that the PMF is lower than originally calculated, and the appropriate design flow for the MWB would be 55,055 cfs. Supporting documentation for this change was provided to EPA with submittal of the revised WSPOU O&M manual.

*EPA Response: EPA will continue to have discussions with DNRC about the effect of recalculating the PMF may have on vegetation efforts in the bypass. Although the information described above and provided by ARCO is appreciated, a formal re-evaluation of the PMF for the MWB channel is not necessary since the channel is already constructed.*

6. Page 4-6, first bullet and paragraph labeled “Lime Addition”: These sections state that lime is added to raise the pH. It should be pointed out that this is not always the case; during those times of the year when photosynthesis naturally raises the pH of the pond system, no lime is added.

*EPA Response: EPA agrees. The bullet and paragraph will be clarified as suggested.*

7. Table 5-1, EPA states that “Increased abundance observed in latest surveys (2009) is considered an indication of reduced toxicity at the WSP.” AR acknowledges that there was increased abundance in the 2009 surveys, which would suggest better overall habitat conditions (as correctly stated by EPA in the 5-year review on page 6-28, first full paragraph). However, it is important to note that the overall trend at this station has been positive since monitoring was started in 1986. Regarding recent and slight declines in invertebrate biointegrity indices below the Pond 2 outfall, McGuire (2008) and others have hypothesized that such impacts may be related to intermittent or episodic events regarding pulses of ammonia, arsenic and/or elevated pH. A variety of aquatic toxicity data for arsenic and ammonia, were combined with a review of the taxonomic composition of the fauna documented at the SBC station below the Pond outfall (CFR 04.5; McGuire, 2009). One of the most abundant invertebrates at Station CFR 04.5 (the amphipod *Hyaella azteca*) is also one of the most sensitive species to ammonia as determined by laboratory toxicity testing reported in the EPA ammonia criteria database (EPA, 1999a). In quantitative macroinvertebrate samples collected in 2004 and 2007 at Station CFR 04.5, *Hyaella azteca* densities averaged ~1,800 and ~1,200 per square meter of river bottom, respectively, one of the most abundant species in both years. A related amphipod (genus *Gammarus*) was also a common invertebrate at station CFR 04.5, occurring in 2004 and 2007 at average densities of ~230 and ~110 per square meter of river bottom, respectively. At least one species of this crustacean genus (*Gammarus pseudolimnaeus*) is documented to be sensitive to arsenic in both the EPA arsenic criteria database (EPA, 1985) as well as the EPA’s web-based ECOTOX database. In addition to amphipod data from Station CFR 04.5, amphipod data from WSP indicate that *Hyaella azteca* as well as a species of *Gammarus* (*Gammarus lacustris*) occurred abundantly or commonly in substrate cores and/or qualitative sweep net samples throughout the WSP System as indicated by sampling conducted between 1995 and 2006. Proximate to the Pond 2 discharge location, average *Hyaella azteca* density represented 48% of total macroinvertebrate sample density while *Gammarus lacustris* averaged 7% of total macroinvertebrate density during sampling years 1995-2006. Similar to the amphipod data from Station CFR 04.5, these WSP data do not support a thesis of explicit/episodic toxicity in the Ponds. Indeed, observations of the macroinvertebrate community during periodic WSP biomonitoring collections (during AR sampling periods), amphipods have always occurred in dense accumulations on and among these plant substrates in each of the sampled ponds.

Therefore, the reduced abundance of benthic macroinvertebrates in the years immediately preceding the 2009 surveys cannot be attributed to metals or arsenic concentrations in the WSP discharge. The text in Table 5-1 should be modified accordingly. As noted in AR's site-wide comments regarding the impacts of the BPOTW and comments regarding fish toxicity in SSTOU, nutrient management is an important aspect of future surface water quality and beneficial use attainment in SBC and downstream in the CFR. However, this particular instance of periodic reductions in BMI abundance downstream of the WSP cannot be directly attributed to toxicity of ammonia discharging from the WSP.

*EPA Response: This comment acknowledges the decreased measurement of aquatic biota immediately downstream of the Pond 2 discharge, and then hypothesizes causes and presents additional data. All of this information is interesting and an important part of the discussion, but does not change the legal requirement that Superfund remedial actions must meet performance standards, including arsenic standards.*

8. Page 6-14, 3<sup>rd</sup> full paragraph: EPA states that the groundwater point of compliance shifts to the south side of the interception trench if the “pump-back system is deemed by EPA to be no longer needed”. The ROD specifies that the decision to shut down the pump-back system is to be based on demonstrated compliance with the groundwater performance standard. As stated in Section 1 of Exhibit 4 of the Inactive Area UAO (EPA, 1993), this can be done “upon demonstration of consistent compliance with groundwater standards immediately south of the groundwater interceptions trench for a period of twenty four months”.

*EPA Response: The comment is noted but there is no real inconsistency between the ARCO comment and the text of the report. EPA must approve of any change to the pump-back system and/or groundwater compliance points.*

9. EPA correctly points out that the ESD and ROD include ICs that ban fish consumption. EPA goes on to indicate that it believes that the catch and release institutional control may not be appropriate (Sec 6.5.1, p. 6-36). In Section 7.2, EPA says that “Fishing...is restricted to catch and release only protecting recreational anglers from possible contaminants in fish” (p. 7-5, first full paragraph). Section 10 includes similar statements. This infers that the decision to implement the catch and release IC is based on protection of human health. This is not correct based on the record.

The Active Area ROD was issued with a ban on fish consumption. AR commented at the time that there was no human health reason for the ban, and EPA agreed. Therefore, the catch and release restriction was clarified in the June 1991 ESD issued by EPA. This clarification is quoted from the ESD in the Five-Year Review (p.7-5), as follows:

*“The ROD describes institutional controls which would ban fish consumption at the Site. EPA has considered this issue further, in consultation with the DFWP, and has determined that the ban on taking fish for consumption may not be appropriate for the Site. EPA will continue to evaluate this issue, and may require such action at a later time, if data indicates such a ban is appropriate. DFWP retains the ability to implement catch and release policies in order to manage the fishery most effectively.”*

Therefore, EPA’s recommendation in the Five-Year Review report to assess the “continued appropriateness” of the catch and release policy is at odds with EPA’s conclusion in 1991 that it was not necessary to protect human health.

Furthermore, there are no new data to suggest the need for such a ban to protect human health. One comment that is unclear in the 5-year report is that “fish tissue metals are slightly elevated”. To our knowledge fish metals residues have not been collected at the ponds since the 1998 biomonitoring effort, so we are not aware of fish data supporting

this statement. While aqueous arsenic concentrations and BMI residues have increased at the outfall of the WSP or just below, aqueous arsenic concentrations are below chronic aquatic life standards. Furthermore, concentrations measured in various BMI receptors are below dietary toxicity reference values. Therefore, the interim remedy remains protective of the environment.

In summary, EPA (p. 7-5) misstates the purpose of the present ban to be “protecting recreational anglers from possible contaminants in fish”. The catch and release policy has been implemented by the Department of Fish Wildlife and Parks (DFWP) as DFWP’s preferred approach to managing sport fishing at WSP.

The text in the above referenced sections should be removed or modified to correct the error caused by this apparent mis-interpretation of the ESD text.

*EPA Response: EPA agrees with this comment in part. The cited ESD did clarify that the fish ban was not needed for protection of human health but also noted continued evaluation of this issue would be done. Currently, the fish ban is in place at the ponds as part of the Fish, Wildlife and Parks efforts at wildlife management. Continued evaluation will continue. EPA will clarify the text accordingly.*

10. Page 7-2, first paragraph: AR agrees with EPA’s conclusion that silver and selenium could be dropped from the analytical list, since they are rarely detected in the influent or effluent from the system. AR also believes that other constituents that are rarely detected or are consistently well below their discharge standards should be considered for deletion from the analyte list or at least measured on a reduced frequency.

*EPA Response: Comment noted. ARCO should submit a proposal that silver and selenium be dropped from the required monitoring plan and EPA will consider this and respond. EPA does not believe other constituents should be considered for deletion or reduced frequency at this time based on its review of the existing data. ARCO is free to submit a more detailed proposal for reduced monitoring of other constituents, with appropriate justification, at a future date.*



## Comments from Clark Fork Coalition

### **Warm Springs Ponds OU**

7. Arsenic, pH, and Ammonia. We recognize that research continues into the geochemical status of the Warm Springs Ponds and the increasing problem of arsenic release to the Clark Fork River and to groundwater. The five year review recognizes the arsenic problem, but does not mention that pH and ammonia have also become issues at the WSP. As the ponds have become more and more eutrophic, these issues are becoming more pronounced, with worsening water quality in the ponds and just downstream of the outlet. Aquatic life in the river is affected, including macroinvertebrates and fish, most likely from pH over 9, as ammonia becomes stable in alkaline conditions. Although the impact may be in the Clark Fork River Superfund site, the WSP are the source, and this overlapping problem between operable units should be acknowledged and explained in the five year review.

- *EPA Response: EPA recognizes the arsenic, ammonia, and pH issues raised by this comment. First, EPA notes that the main source of these constituents is not the ponds system but upstream sources. These problems can largely be traced to incoming water quality issues, such that both the Silver Bow Creek/Butte Area site and the Anaconda Smelter Site affect water quality in the Clark Fork River. Work is ongoing to constantly improve water quality in the watersheds, and address these issues. As noted above and in the report, optimization studies to improve pond performance are ongoing. If the CFC has technically sound suggestions on how to improve the water quality discharging from the ponds that are not being planned (WWTP nutrient removal and optimization, storm water improvements in Butte), and implemented (ongoing remediation in SSTOU and in BPSOU), EPA would welcome specific suggestions and ideas.*

## Comments from CTEC

8) CTEC would like to be assured that a flood will not severely recontaminate the rebuilt reaches of Silver Bow Creek or overwhelm the Warm Springs Ponds and release contaminants further downstream.

*EPA Response: All remedial designs were completed using conservative, engineering practices and standards to account for reasonably foreseeable high flows with appropriate design standards. In addition, at the WSP, there are overflow structures within the dikes in the constructed channel above the lime addition system. The elevations are specifically lower, and the dike is constructed of a material purposefully designed to give way in a large flow event, to prevent massive flooding of the ponds. In addition, the ponds themselves have emergency overflow structures in the dikes.*

### **1.1 Warm Springs Ponds**

13. Warm Springs Ponds (WSP) is an interim action and not necessarily the final remedy for the downgradient edge of the SBC NPL site. While work is ongoing upstream, the ponds will continue to store water and sediment, after which the ponds could be removed to naturalize the river, similar to Milltown Dam. During the interim period while final remedy is underway upstream, there is concern about the ability of WSP to handle large flow events. There is also concern about the downstream water quality and sediment impacts of extreme high flow conditions. The review states that improvements made to the ponds during the early 1990's

increased the storage capacity of Pond 3 to receive and treat flows up to the 100-year flood. However, the review does not evaluate whether improvements to pond infrastructure or operations will prevent flows below the 100-yr flood from bypassing the ponds and dumping into the Mill-Willow Bypass as occurred during the approximate 2-5 year flood on March 13, 2003. The Five Year Review on WSP should include an evaluation of flood capacity of the ponds as well as potential aquatic impacts downstream from large flood events. Lastly, CTEC would like to know whether sedimentation in the WSP could reduce the amount of time the ponds can be used while a final remedy is developed for the area.

*EPA Response: The overflows in 2003 were a result of the inlet trash rack becoming clogged with debris, not because of underdesign of overflow structures. The overflow structures performed as designed. EPA has since required ARCO, the pond operator, to take actions which should prevent the trash rack clogging problem and it has not re-occurred. The requested evaluation of the flood capacity of the ponds is outside of the scope of the 5 year review, however, as a part of the planning towards the final site remedy, the capacity and hydraulic control structures will be re-evaluated to ensure their protectiveness. AR has been looking into conducting a bathymetric survey of the pond bottom and sediment capacity, but the results of these evaluations were not available at the writing of the five year review report. The results will be provided to interested public members when they are available.*

**14.** The Five Year Review should evaluate bioaccumulation of metals and arsenic in wildlife and the fishery associated with WSP. Some ecological risk work has been done, but the quality and completeness of this work needs assessment. Now that the ponds have been operating for some time, it is ideal to evaluate prior assumptions concerning exposure of biota to metals and arsenic from WSP. CTEC recommends the Five Year Review evaluate information available on metal and arsenic levels in animal tissue and how these contaminants are passed up the food chain. Additionally, the levels of contaminants in fish tissue that humans may be exposed to by eating fish from the ponds or discharge area should be reported. If adequate information is not available to understand these exposures, the Five Year Review should provide a plan for more detailed bioassessment.

The final review should present and describe the data used to reach the conclusion in table 8-1 (vol. 4): “Fish tissue metals are slightly elevated; however, there is no observable effect on the health of individuals within the fish population, or the population as a whole.” The fish tissue data appears to be omitted from the draft review. Additionally, it needs to be made clear whether human consumption of fish at WSP is currently controlled. If catch and release rules are not in-effect, the review should evaluate risks of human consumption using available fish tissue data.

*EPA Response: A fish consumption ban is currently in place at the ponds, which prevents human consumption of fish and therefore protects human health from any exposure pathway described in this comment. The need for a more detailed look at these ecological issues is an issue that should be addressed when a final remedial action is chosen for the ponds area. In the meantime, existing bio-monitoring efforts are sufficient to address any near term concern regarding wildlife exposure or food chain uptake in EPA’s opinion.*

CTEC supports EPA's proposal for a comprehensive ecological screening study. The screening study should include metal and arsenic concentrations in fish tissues from WSP and downstream in Silver Bow Creek and evaluate the potential pathway for human consumption exposure.

*EPA Response: Additional biological monitoring may be considered appropriate after careful consideration of the use of the data and also the specific data needs for an ecological risk assessment. As noted, this is an issue that will be discussed and addressed in more detail, on a pond-specific basis, when the evaluation for a final remedy is done at the Warm Springs Ponds. EPA is considering suggestions for more comprehensive ecological monitoring or assessment.*