ROCKY MOUNTAIN ARSENAL

Final
2010 Five-Year Review Report
for
Rocky Mountain Arsenal
Commerce City
Adams County, Colorado

Review Period: April 1, 2005–March 31, 2010

Volume III of III

Responses to Regulatory Agency Comments

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RESPONSES TO COLORADO DEPARTMENT OF HEALTH AND ENVIRONMENT COMMENTS

Remediation Venture Office's (RVO) Responses
to
Colorado Department of Public Health and Environment's (CDPHE) July 19, 2010, Technical Comments
on the
Draft 2010 Five-Year Review Report, Revision C
Rocky Mountain Arsenal, Commerce City, Colorado

General Comments

Comment 1. As stated in the introduction (Section 1, page 1) the purpose of the 2010 Five-Year Review Report (FYRR) is "…to determine whether the remedy for RMA selected in the On-Post and Off-Post Records of Decision (RODs) remains protective of human health and the environment." In the Executive Summary page ES-2, the Five-Year Review Summary Form page 2 of 3, and Section 10.0 page 173, the protectiveness statements include language stating that because the remedial actions are expected to be protective, the remedy is expected to be protective. Although this is a true statement, it seems silent about answering the question of whether the remedial actions as implemented so far actually are and have remained protective over the last five years.

Response: The text has been revised to address the protectiveness of implemented remedial actions.

Comment 2. In general, CDPHE believes the FYRR presents data to demonstrate that the remedy as implemented so far is and has remained protective during the last five years. However, there are a few components of the remedy for which protectiveness is still being evaluated either because the remedy is not yet completed or because some data (a relatively small portion) indicated some performance criteria may not have been met. The components for which evaluation is still in progress include the soil covers vegetation affect and cover percolation; dewatering at Army Complex and Shell Trenches; the dense non-aqueous phase liquid (DNAPL) at Lime Basins; and the mass removal goals for Basin A Neck System and Off-Post Intercept Systems. The components for which some data indicated performance criteria may not have been met include the occasional outward gradients and increased downgradient concentrations at the north boundary containment system (NBCS), the exposed sanitary sewer in Section 35, and the effectiveness of Land Use Controls. Although some of these have been captured in Sections 8.0 and 9.0, the CDPHE recommends that all of these issues merit discussion and acknowledgement in Sections 8.0 and 9.0.

Response: The DNAPL discovery, the exposed sewer line, and the Land Use Controls are identified as issues in the FYRR. The RVO does not agree that the other concerns identified by CDPHE meet the criteria for being identified as five-year review issues and believe it would be misleading to include these. Remedies in progress that are performing in accordance with performance criteria and expectations do not qualify as "issues that currently prevent the response action from being protective, or may do so in the future," which are the basic issues criteria in EPA guidance. Neither are these "early indicators of potential problems."

Comment 3. The total contaminant mass removed from the South Tank Farm Mass Removal System (2,264.9 kg) and the Lime Basins Mass Removal System (892.7 kg), coupled with continued steady removal rates, suggest that mass removal operations are successful. Given that one of the remedial action objectives (RAO) is to provide long-term improvement on the performance of boundary control systems by continuing to remove mass from the former Central Processing Area (CPA), the CDPHE suggests that the Five Year Review should evaluate and discuss the practicability of resuming mass removal activities, in the future, in one form or another.

Response: The Groundwater Mass Removal project (GWMRP) was successful in achieving its remedy objective of maximizing mass removal for a predetermined duration as established by the Resolution Agreement and ESD. With respect to the South Tank Farm System, any additional removal of contaminant mass is unnecessary because of natural attenuation of the plume, and it would not benefit the performance of any boundary control system. The plume has been shown to be at steady state or receding and is contained by biodegradation that has been confirmed and will continue to be verified through future monitoring. The discovery of the benzene LNAPL does not change this conclusion because the LNAPL was found in the central portion of the plume where benzene concentrations have exceeded 1,000,000 μg/L. The high-concentration portion of the plume (i.e., > 100,000 μg/L) has been extremely stable and has not moved appreciably toward the lakes since the 1990s or earlier, due to intrinsic aerobic biodegradation of the benzene plume. Biodegradation is most effective at the edges of the high-concentration plume where steep concentration gradients are consistently observed. This biodegradation mechanism was demonstrated during the RI/FS and South Tank Farm IRA and was key in selecting monitoring for the South Tank Farm Plume in the On-Post ROD. There is evidence that the high-concentration plume was receding prior to operation of the GWMRP. The historical data also show that the leading edge of the detectable plume has receded away from the lakes. Since both the high-concentration portion and the downgradient extent of the detectable plume were stable or likely receding prior to startup of the GWMR system, operation of the system is not required to protect the lakes. Likewise, additional mass removal by the Lime Basins Groundwater System of the GWMRP would not provide any increased benefit given containment of the Lime Basins contamination by the Lime Basins slurry wall and dewatering

system and the contaminant plume's extraction and treatment at the Basin A Neck System, which is located downgradient of the Lime Basins area. The FYRR text has been revised to include the information presented above.

Comment 4. The Draft 2010 Five Year Review report appears to primarily focus on evaluating the groundwater component of the remedy and overlooks, or over-simplifies, the soil remedy aspect. CDPHE acknowledges that most, if not all, of the soil remedies were not completed during the time frame covered by this Five Year Review report; however, numerous data have been collected during the FYR timeframe in an effort to evaluate performance of the soil remedy. Accordingly, CDPHE recommends that this FYR assess the following in order to assess the performance and protectiveness of the associated remedy component:

a. RCRA Landfill Caps

   i. Leachate Detection System (LDS) volumes and pumping rates (Action Leakage Rate Monitoring)

   ii. Leachate Collection System (LCS) volumes and pumping rates

   iii. Groundwater Monitoring Network

b. RCRA Equivalent Covers

   i. Lysimeter percolation volumes versus design standard

Response: Leachate collection system volumes and pumping rates for the HWL and ELF have not been compiled or reported during landfill operations or closure as they are not identified as criteria to assess the performance and protectiveness of landfill operations. The rate of leachate collected in each LDS sump is measured and reported in the post-closure Annual Covers Report for RCRA Caps. To date, only two of these reports have been completed; both for the HWL. Sections 6.3.1.6 and 6.3.1.7 in the FYRR will be further developed to describe the calculated rate of leachate collected in each LDS sump compared to the Action Leakage Rate for the sumps. Lysimeter percolation volumes (for RCRA-equivalent covers) compared to the design/compliance standard is also described in the FYRR, new Section 6.3.5.

Comment 5. The Draft Five-Year Review Report (FYRR) appears to inconsistently define the On-Post Operable Unit (OU) area, relative to the accepted area from the Record of Decision (ROD). It is described as only 5.6 square miles in southern Adams County in one instance, and then is described as the ROD On-Post Operable Unit boundary, as depicted on Figure 3.0-1. In accordance with guidance, an FYRR "may no longer be needed when no hazardous substances, pollutants, or contaminants remain on site above levels that allow for unlimited use and unrestricted exposure." Since no attempt to reduce the scope of the FYRR has been made, CDPHE assumes that the ROD defined boundary is the

correct OU definition. Please correct any discrepancies and clearly define the boundaries of the On-Post Operable Unit.

Response: Section 2.1 correctly states that there are 5.6 square miles remaining on NPL (as of March 31, 2010). Section 3.0 will be revised to clarify that the original OU was approximately 26.6 square miles and that the remaining area is 5.6 square miles.

Specific Comments

Comment 6. Executive Summary, page ES-1, 2nd paragraph – Please add "natural depressions and man-made basins" to the following sentence: "…. 180 sites contaminating soil, ditches……"

Response: The text has been revised as requested.

Comment 7. Executive Summary, page ES-1, last paragraph - This paragraph provides a brief overview of land use restrictions as dictated by the Federal Facility Agreement (FFA). It does not appear appropriate to include a statement that these restrictions will be re-evaluated in pending revisions of the FFA, as this is not the scope of the FYRR. Please revise.

Response: The statement has been removed from the text.

Comment 8. Executive Summary, page ES-1, 5th paragraph – The restrictions on residential development, groundwater as a potable source, consumption of fish and game, and agricultural use apply to the entire On-Post Operable Unit (OU). These restrictions are an integral component of the remedy as stated in the 1996 Record of Decision (ROD), as indicated on page D-8 of the ROD Declaration. Certain pathways were not evaluated during the site risk assessments because residential and agricultural developments were not considered foreseeable future land uses at RMA (page 6-26, 1996 ROD). The appropriate exposure pathways will need to be assessed as part of any re-evaluation of current land use restrictions.

Response: The evaluation of the FFA restrictions did not occur during the current five-year review period. The sentence regarding these restrictions has been removed.

Comment 9. Executive Summary, page ES-1, 5th paragraph – The institutional controls (IC) identified in the Off-Post ROD primarily require the Army to establish a program that notifies landowners if they are in a potentially contaminated area and also requires the Army to offer alternative water supplies if landowners have wells that contain contaminants that are above Colorado Basic Standards for Groundwater (CBSG). The ICs do not restrict landowners from using groundwater but instead requires the Army to be diligent in keeping landowners apprised of contaminated groundwater, and offering alternative supplies when criteria require.

Response: The text has been revised to state that the institutional controls are used to reduce the potential for exposure to groundwater exceeding remediation goals.

Comment 10. Executive Summary, page ES-2, 3rd paragraph – The first sentence appears contradictory; the remedy is "expected to be protective" upon completion, yet is "currently protective" of human health and environment. Revise, as appropriate.

Response: The statement, which has been revised in Rev D of the FYRR, is intended to reflect that the remedy is currently protective and will continue to be protective in the future.

Comment 11. Section 4.1, page 14, italicized paragraphs – The CDPHE believes the paragraphs from page D-5 of the ROD provide a more complete description of the major components of the groundwater remedy. The language selected for inclusion in this draft is focused on shut-off criterion which, in the opinion of CDPHE, is not a major focus of this FYR.

Response: The information from the ROD has been incorporated in the text.

Comment 12. Section 4.1.1.1, pages 19 to 20 – This paragraph contains a statement regarding an incident where the reverse gradient was lost for a short period in 2005. The paragraph describes this incident as being of little consequence. This statement is inconsistent with the fact that maintaining reverse gradient is the primary performance criterion. Also, the statement that contamination in downgradient wells still above CSRGs/PQLs, but is not representative of current system effectiveness, is inconsistent with the fact that these are secondary performance criteria. The wells and criteria used for remedy monitoring were presumably selected to be representative of system effectiveness, so they cannot be dismissed as inconsequential or not representative of system performance without reference to explanations and data that support these statements. If they do in fact indicate potential performance problems, then the CDPHE believes the FYRR should make a recommendation for further investigation about their causes.

Response: It should be noted that the primary and secondary performance criteria and performance well networks for the NBCS were developed in the 2010 LTMP (TtEC and URS 2010). The NBCS was evaluated against the various decision documents, including the 2010 LTMP, and was determined to be functioning as intended.

To address Regulatory Agency comments, the FYRR and FYSR were expanded to summarize information provided in this response and to include more discussion of the evaluation of the temporary loss of reverse gradient at a portion of the NBCS in 2005, which was identified as an event in the FYSR. Follow-up actions include evaluating the feasibility of increasing the extraction well pumping rates to enhance the reverse gradient. In 2005, the RVO

concluded that no further action was necessary besides monitoring of the reverse gradient more closely, and no further action was requested by the Regulatory Agencies. The reverse gradient was maintained throughout the remainder of the FYR period. Since describing the incident as "being of little consequence" was objectionable to CDPHE, the sentence will be revised to indicate that the temporary loss of reverse gradient did not have an adverse effect on protectiveness.

The NBCS conformance wells were selected in the 1996 Offpost RS/S and the network was modified in the1999 LTMP because of widening of 96th Avenue and moving of the RMA boundary fence. The conformance wells were initially selected to be representative of system effectiveness. However, it became apparent during subsequent monitoring of the wells that some of the conformance wells were not representative of system performance. This finding was related to the Regulatory Agencies during Water Team Status Meetings and documented in the 2005 FYRR (RVO 2007). The 2005 FYRR determined that the NBCS well network was to be re-evaluated during the LTMP revision:

> "Concerns about the presence of elevated contaminant levels in downgradient conformance wells will be revisited when considering the performance monitoring well network in the revised LTMP."

The revised LTMP (TtEC and URS 2010) excluded the non-representative NBCS conformance wells in the downgradient performance well network. The 2010 FYSR was expanded to further address the downgradient detections of contaminants in the NBCS conformance wells during the current FYR period and concluded that the concentration trends in the downgradient conformance wells observed during this FYR period are consistent with the evaluation in the 2005 FYRR, and no other explanations for the downgradient detections in the conformance wells (e.g., underflow or bypass) are feasible. Additional discussion of the NBCS conformance wells will be added to the FYRR.

Comment 13. Section 4.1.1.1, page 22, Performance Criteria (for Basin A Neck System) – The mass removal and mass flux have not been calculated because the standardized approach has not been fully developed. The CDPHE agreed to a goal of 75 percent mass removal as a placeholder goal in the 2010 Long-Term Monitoring Plan for this FYR. However, the methods for mass flux calculation are yet to be developed and agreed upon. It is not clear that removal performance criteria can be evaluated until the approach and criteria, which may eventually include an acceptable range of percent mass removed, are determined. Therefore, the CDPHE believes that it is premature to conclude in Section 7.2.1.5 on page 145 that the BANS fully functions as intended.

Response: The standardized approach for mass flux calculations was included in the 2010 LTMP and wells in the new performance network will be used for this purpose in the future. CDPHE is correct that the 75% goal is preliminary. However, the

data available during this FYR period were not adequate to compare with this estimate. The text has been revised to clarify that the quantitative mass removal criteria will be evaluated during the next FYR and that the conclusion is based on the IRA and ROD criteria.

Comment 14. Section 4.1.1.3, page 28, 4th paragraph – It is not clear how the dewatering system for the Complex Disposal Trenches can be said to be performing as expected during cover construction, given that dewatering goals have not yet been fully meet. Please revise or provide the performance criteria that were used during cover construction.

Response: The phrase "during cover construction" has been deleted.

Comment 15. Section 4.1.1.3, page 29, 1st paragraph – The language is not clear on whether water level performance criteria for Shell Disposal Trenches were achieved during the FYR. Please clarify.

Response: The text has been clarified to state that the dewatering goal of lowering the water levels below the bottom of the disposal trenches has not been met at one of the six boreholes where the trench bottom elevations were determined.

Comment 16. Section 4.1.1.3, page 30, 1st paragraph – Please clarify how the conclusion "…significant progress was made toward meeting dewatering goals…" for Lime Basins Dewatering Wells was determined.

Response: The text has been clarified to state that the average water level was lowered 1.2 feet inside the slurry-wall enclosure, which is approximately one-fifth of the distance required to meet the goal of lowering the water level below the Lime Basins waste.

Comment 17. Section 4.2.1.2, page 34, 2nd paragraph – The statement is made that the existence of water ponding at the anchor trench was solely resultant from rainfall that occurred during construction, and before completion of the water storage and gravel drainage layers. The narrative also states that these subsequently completed cap components "adequately prevented further water infiltration." CDPHE disagrees with this statement. Months after installation, water is still discharging from the trench drain outlets and it is probable that drainage is associated with rainfall events, not long-term construction-related drainage. The performance and overall functionality of the trench drains will be monitored under the RCRA Post-Closure Plan. As such, additional discussion is required to address these drainage features as long-term cover components, rather than as interim measures that are not longer necessary.

Response: The description of the event involving stormwater in the leak detection systems (LDSs) is excerpted from the CCR, which should be the controlling document. The description will be updated to be consistent with the CCR (currently not finalized). It may be noted that the statement "adequately prevented further water infiltration" should have been more specific (i.e., should have stated "adequately prevented further water infiltration to the LDS sumps." However, the paragraph that included the statement has been deleted, consistent with the CCR. Although the trench drains continue to collect and convey stormwater believed to be backing up in the fringes of the gravel drainage layer, rates of liquid flow into the LDS sumps have stabilized since completion of the cover and are decreasing.

The second to last paragraph of this section (Section 4.2.1.2) states that long-term inspection, monitoring and maintenance will be conducted in accordance with the approved Post-Closure Plan. It is acknowledged that the trench drain system will be inspected to evaluate the presence of flow, erosion, seepage/moisture or bare/sparse vegetation per the Post-Closure Plan.

Comment 18. Section 4.2.1.3, page 37, Table 4.2.1-1 – Please revise the notation implying that the chokestone was a ROD requirement. Chokestone was a design refinement that was developed well after the ROD.

Response: Chokestone is specifically mentioned in the Lime Basins ROD Amendment as a component of the selected remedy. Eliminating the chokestone is a change from the ROD for the Lime Basins project.

Comment 19. Section 4.2.1.4, page 40, general – CDPHE has the following comments on this section:

a. The fundamental criterion for all of the RCRA-equivalent covers is to maintain a percolation through the covers of less than 1.3 mm per year, as measured at multiple lysimeters placed throughout the cover systems, including the Shell Disposal Trenches (SDT) cover. Maintenance of the minimum vegetation quantitative standard and minimum cover thickness are other important requirements. None of these concepts is discussed or presented except in the most general of terms, yet these criteria will determine long-term success of the RCRA-equivalent covers systems. This additional discussion should be added to the report for each of the RCRA-equivalent cover sections.

b. Add further discussion, similar to that in Section 4.2.1.5, to address ancillary components including lysimeters and erosion monuments, and describe their relevance to performance standards.

Response:

a. A listing of the compliance standards for RCRA-equivalent covers consisting of the percolation, cover thickness, and vegetation standards has

been incorporated into Sections 4.2.1.3 (ICS), 4.2.1.4 (SDT) and 4.2.1.5 (Basin F).

b. Further discussion to address ancillary components, similar to that in Section 4.2.1.5, will be incorporated into this section.

Comment 20. Section 4.2.1.4, page 42, 3rd paragraph – The groundwater barrier was not part of the Shell Disposal Trenches cover project, as this paragraph implies. The appropriate project number for the groundwater barrier (#17) should be identified for clarity.

Response: The project number has been incorporated.

Comment 21. Section 4.2.1.4, page 42, 4th paragraph – Long-term Operations and Maintenance of the Shell Disposal Trenches cover project is not currently "being conducted", as stated. Per the Long Term Care Plan, Long Term O&M will begin upon completion of an Operational and Functional (O&F) determination. Please revise.

Response: The phrase "is being conducted" has been changed to "will be conducted", consistent with similar statements in Sections 4.2.1.3 (ICS) and 4.2.1.5 (Basin F).

The text has been revised to state that Interim O&M is being conducted and that Long Term O&M will begin following an O&F determination.

Comment 22. Section 4.2.1.5, page 42, general – The fundamental criterion for all of the RCRA-equivalent covers is to maintain a percolation through the covers of less than 1.3 mm per year, as measured at multiple lysimeters placed throughout the cover systems, including the Basin F/Basin F Exterior cover. Maintenance of the minimum vegetation quantitative standard and minimum cover thickness are other important requirements. None of these concepts is discussed or presented except in the most general of terms, yet these criteria will determine long-term success of the RCRA-equivalent covers systems. This additional discussion should be added to the report.

Response: A listing of the compliance standards for RCRA-equivalent covers consisting of the percolation, cover thickness, and vegetation standards has been incorporated this section.

Comment 23. Section 4.2.1.6, page 48 – This section essentially states that the remedial actions conducted under the Section 36 Lime Basins Soil Remediation Slurry/Barrier Wall project are functioning as intended. While it will ultimately be determined that the Lime Basins Slurry Wall was constructed as designed (i.e., approval of the Construction Completion Report), issues related to chemical compatibility of the piping material have been identified. This issue appears to be directly applicable to the scope of a FYRR, because relatively high concentrations of expected organic contaminants, unrelated to the DNAPL

issue, contributed to the piping degradation. A brief discussion should be added to this FYRR regarding the chemical compatibility issue along with a brief discussion regarding the proposed corrective action.

Response: The deterioration of piping was discovered in April 2010 and will be addressed in the next FYR.

Comment 24. Section 4.4.1.5, page 103, 2nd paragraph – It is not clear that some of the multi-tiered access control programs are currently in existence, for example the use of project site access badge restriction in the Central Remediation Area (CRA). Please clarify.

Response: The text has been clarified to say that the Central Remediation Area badging program was ended in April 2010 when exposure risks were minimized with the completion of the caps and covers; however, RMA orientation and project-specific health and safety training continue to be conducted for workers accessing the former Central Remediation Area.

Comment 25. Section 6.3.1.1, page 120, final full paragraph – Please consider including a map that illustrates water level differences between FY04 and FY09 along with Figure 6.3.1-1.

Response: The water level difference map will only be included in the FYSR, which provides the detailed information about the water programs.

Comment 26. Section 6.3.1.3, page 124, 1st bullet – This section, as well the Draft Five-Year Summary Report for Groundwater and Surface Water (May 2010), discusses the hypothesis that increasing trends in chloride concentrations in the Confined Flow System coincides with a 10-year climate cycle. In an effort to test this hypothesis, CDPHE believes a written plan is needed to define the boundaries of the study and the Data Quality Objectives (DQOs). As currently designed, the 2010 LTMP monitoring for the confined flow system (CFS) does not define an approach to evaluate 10-year climate cycles. Therefore, it is not acceptable, to simply state that continued monitoring will provide support for further evaluation of this hypothesis.

Response: The statements regarding climate cycles have been removed from the text as this was an observation of a possibility rather than a hypothesis that will be pursued.

Comment 27. Section 6.3.1.4, pages 125 and 126 – Although Figure 6.3.1-2 shows DIMP exceedance areas have decreased, this does not necessarily correspond to areas of groundwater that could "potentially exceed" CSRG. As discussed during meetings for the development of the 2010 Long-Term Monitoring Plan for Groundwater and Surface Water (LTMP), the CDPHE believes these maps are useful for understanding where containment system remediation goals (CSRG) are exceeded in general. However, the CDPHE does not believe that, for certain purposes, the map sufficiently identifies all areas in the Off-Post Study

Area where groundwater could potentially exceed CSRG due to lack of robustness of the data set. For example, the map could be used to assist in assessing conditions in the Well Notification Program area and for other purposes, but may no longer be sufficient to provide the sole basis to support major public health-related decisions.

Response: Comment noted. The off-post exceedance and notification areas will be addressed in the next FYR in accordance with the SAPC Decision Document on off-post institutional controls.

Comment 28. Section 7.1.6, page 141 – CDPHE has several comments on this section:

a. Although the Basin F cover was completed according to design and ROD requirements, on what basis can the RVO conclude that the cover is "expected to be protective and performance standards will likely be met." Please add relevant information that supports this conclusion, including a discussion of percolation monitoring, vegetation establishment, and maintenance programs.

b. The 2009 monitoring results were too early and limited, relative to the post-construction period, to assess the performance of the Basin F Cover, which was completed late in 2009. Please elaborate on how the 2009 monitoring were evaluated, and support what appears to be an overly definitive interpretation.

Response:

a. The text of Section 7.1.6 has been modified to add language that during the establishment of cover vegetation, routine percolation monitoring, vegetation assessments, and cover maintenance activities are ongoing, and that no early indicators of potential remedy failure have been identified through these activities. Also, clarification is provided that the Basin F cover is expected to be protective and performance standards will likely be met following establishment of cover vegetation.

b. The text has been revised to clarify that groundwater monitoring results during Basin F closure have been reported through 2008 and identify no early indicators of potential remedy failure. Monitoring results during the post-closure period had not been reported as of the cutoff date for this FYR period.

Comment 29. Section 7.1.7, page 141 - According to this section, the remedial actions conducted under the Section 36 Lime Basins Soil Remediation Slurry/Barrier Wall project are functioning as intended and performance standards will be met. While it will ultimately be determined that the Lime Basins Slurry Wall was constructed as designed (i.e., approval of the Construction Completion Report), issues related to chemical compatibility of the piping material have been identified. This issue appears to be directly applicable to Question A of the

FYRR, because relatively high concentrations of expected organic contaminants, unrelated to the DNAPL issue, contributed to the piping degradation. A discussion should be added to this FYRR regarding the chemical compatibility issue along with a brief discussion regarding the proposed corrective action.

Response: Please refer to the response to Comment 23.

Comment 30. Section 7.2.3.3, page 149 – Please discuss biota monitoring anomalies and any potential indication to the soil remedy protectiveness.

Response: RVO feels that the discussion in Section 6.3.3 provides sufficient detail regarding the results of the BMP to this point. The language "no early indicators of potential issues" is standard for information that supports remedy effectiveness. Additional language was added in the Section 6.3.3 text to indicate that the biomonitoring program is ongoing.

Comment 31. Section 7.3.2, page 139 – This section briefly details construction of the Hazardous Waste Landfill (HWL), and states that operating procedures and monitoring were successful in maintaining remedy effectiveness, and that containment will be addressed in the future. Although, substantially complete, construction of the HWL was not "officially completed" during this FYR time period (i.e., the CCR had not been accepted). However, waste placement was occurring during this FYR period. As such, containment and waste placement activities should be discussed in this FYR. Numerous performance criteria were evaluated to verify containment during HWL operations and, therefore, require discussion in this FYR (e.g., LCS/LDS, monitoring, and groundwater monitoring). Additional information should be provided to support the protectiveness statement that the Landfill is/will function as intended. On-going measures include monthly, storm, and semi-annual cover inspections in accordance with the Post-Closure Plan to verify integrity of the cap and 1,000 year channels, which protect the HWL from the effects of run-on/run-off.

Response: This section refers to Section 4.2.3.2 which describes operation of the HWL. That section will be expanded to further address waste placement and other activities that support the protectiveness statement. Section 4.2.1.1 (which describes the HWL cap construction), and Section 6.3.1.6 (which describes HWL groundwater and LCS/LDS monitoring) will also be referenced.

Comment 32. Section 7.3.5, page 154 – This section briefly details operations of the Enhanced Hazardous Waste Landfill, and states that operating procedures and monitoring were successful in maintaining remedy effectiveness, and that containment will be addressed in the future. Although construction of the ELF was not "officially completed" during this FYR time period, waste placement was occurring during this FYR period. As such, containment and waste placement activities should be discussed in this FYR. Compliance parameters were monitored during waste placement to verify containment during ELF operations and, thus, require

assessment in this FYR (e.g., LCS, LDS, monitoring). Additional information should be provided to support the protectiveness statement that the Landfill is/will function as intended. Furthermore, the FYR should discuss any potential impacts to ELF leak detection capabilities due to documented intrusion of surface water into the Leak Detection Systems, and especially, construction of the anchor trench drains intended to correct this condition.

Response: This section refers to Section 4.2.3.5 which describes operation of the ELF. That section will be expanded to further address waste placement and other activities that support the protectiveness statement. Section 4.2.1.2 (which describes the ELF cap construction), and Section 6.3.1.7 (which describes ELF groundwater and LCS/LDS monitoring) will also be referenced.

Comment 33. Section 7.4.8, page 168, general comment - In addition to discussing any changes in risk assessment methods, please also consider adding a section to address any changes in overall remedy risk assumptions.

Response: There have been no changes in risk assessment methods or assumptions since the last FYR. This language will be added to the Section 7.4.8 text.

Comment 34. Section 8.0, page 169, Table 8.0-1 and Section 9.0, page 171, Table 9.0-1 – Please provide information to support the conclusions that none of the issues identified in these tables effects current or future protectiveness. Since the DNAPL discovery is still under investigation and the feasibility study is still in progress it seems conclusions regarding protectiveness may be premature. Since land use restrictions may have been violated in the parcel at Prairie Gateway, CDPHE must assume that protectiveness has not been achieved until shown otherwise. It is not clear what is meant by "clarification" concerning this issue. A plan and schedule will be needed to collect data to demonstrate that protectiveness has been achieved. Finally, the exposed sewer pipe does not prevent access to the sewer as intended in the remedy. What is meant by 'evaluating' the pipe? Why shouldn't it be plugged to prevent access?

Response: Although potential remedial actions are being evaluated for the DNAPL, there is no indication that protectiveness of the overall remedy has been compromised. For the Prairie Gateway, the Commerce City Planning Division indicated that the use would be interpreted consistent with the FFA and Refuge Act restrictions regarding agricultural activities, and the protectiveness determination is based on those conversations with the Planning Division. Additional clarification on the interpretation or intent of the parcel use-by-right has been requested from the Planning Division to determine if further amendment to the Planned Unit Development Zone Document is warranted. For the exposed sanitary sewer pipe, evaluation was anticipated to determine the appropriate corrective action (removal or plugging). The pipe has been evaluated and plugged to prevent access.

The text has been modified to include the rationale for each issue. Resolution of these issues will be included in the next Five-Year Review.

Tables

Comment 35. Table 2.0-2, general – The last column heading refers to the forecast or date of final CCR approval. This information is not consistently provided and should be added to the table. It is not clear why this table column now includes references to earlier FYRRs or to the current document, when the intention is to provide a simple date summary.

Response: The table has been revised to include CCR dates for all completed projects. References to discussion in previous FYRRs will be retained where appropriate.

Remediation Venture Office's (RVO) Responses
to
Colorado Department of Public Health and Environment's (CDPHE)
April 11 and 12, 2011, Technical Comments
on the
Draft 2010 Five-Year Review Report, Revision E
Rocky Mountain Arsenal, Commerce City, Colorado

Comments for Incorporation

General Comments

Comment 1. Under CERCLA, the Five-Year Review Report's primary purpose is to serve as a vehicle for the parties to investigate, identify and review the course of the remedy as identified in the ROD and determine whether the remedy still functions as protective of public health and the environment. However, the report also serves as a vehicle by which citizens may be involved, understand, and review the course of the cleanup. Thus, the Five-Year Review serves as both an investigative tool as well as a vehicle for transparency in the cleanup process.

CDPHE believes that the practice of separating the groundwater information into the Five-Year Summary Report, and then publishing that document separately from the body of the Five-Year Review, and then only putting the 5-Year Review out for comment, is a practice that can limit transparency and potentially hamper the public's understanding of the remedy's course over the past 5 years. While the practice does not violate the letter of the law, CDPHE believes it is not in keeping with the spirit of the requirement. In the future, CDPHE requests that if the 2015 Five-Year Review continues to be split into two separate documents (2015 Groundwater Summary Report and 2015 Five-Year Review) that, at a minimum, both documents be made available simultaneously for public review and comment. There should also be clear statements in the preamble of both documents to provide some explanation about how the two documents relate to one another.

Additionally, the public outreach to notify the community of the existence of the 2010 Five-Year Review was not robust. As the clean-up enters the post-remedy construction stage, CDPHE recommends that RVO consider more comprehensive ways to notify concerned citizens when future 5-Year Reviews are released for review, including the maintenance of the mailing lists associated with community groups.

Response: The RVO does not plan to issue the FYSR for public review in the future, but as an FYRR reference, it is and will continue to be available to the public.

As it has in the past, the RVO exceeded requirements for public notification and outreach related to the most recent FYR.

The RVO issued a public notice, which was published in the *Denver Post*, *Brighton Blade*, and *Commerce City Gateway*, announcing the start of the FYR process. Another public notice appeared in those newspapers when the draft final report was available for public review.

Those notices, as well as a fact sheet that describes the purpose of the FYR and how community members can get involved, were posted to the RMA website. The draft final report was also published on the website so community members could view the report online. Community members had the option of reviewing the document at the Commerce City Library, RMA Joint Administrative Record and Document Facility and EPA Records Center as well.

In addition, the RVO went far above the CERCLA public outreach requirements and mailed information about the FYR process and upcoming release of the draft final report to more than 65,000 homes in the surrounding communities. That information was provided in the summer and fall 2010 issues of *Milestones*, the RMA community newsletter.

RVO also gave presentations to the Restoration Advisory Board about the FYR process in May and November of 2010.

To ensure that robust public notification continues as the site enters the long-term operation and maintenance phase, the RVO agrees with CDPHE's recommendation to maintain a community contacts list. This list will be used to notify interested citizens of future FYRs and the opening of public comment periods for future draft final reports. The RVO is also exploring the feasibility of adding an RSS feed to its website (a web information format used to publish frequently updated information), which would allow interested citizens to sign up to receive alerts when new documents, such as public notices about the start of the FYR process, are posted online.

Comment 2. (by addendum) In 2009, the Colorado Department of Public Health and Environment promulgated a new standard for 1,4-dioxane, which is an ether that was commonly used to stabilize 1,1,1-TCA. Although, 1,4-dioxane was not identified as a COC when the ROD was written, 1,4-dioxane now is regulated under 5 CCR 1001-41, Regulation No. 41. The current state standard is 6.1 μg/L, and that standard is expected to be revised downward in 2012. CDPHE recommends that off-post wells, particularly any domestic wells that intersect known or historic RMA plumes, be sampled for this analyte.

Response: RVO has no historical information about composition of the 1,1,1-TCA solvent used at RMA or analytical data for 1,4-dioxane. However, 1,4 dioxane is not a COC for RMA, there is no 1,4-dioxane ARAR for any water treatment system, and there are currently no complete exposure pathways to RMA groundwater that could contain 1,4-dioxane. Therefore, no changes in the protectiveness statements are needed for the 2010 FYRR.

The RVO will add language to section 7.4.7 of the FYRR indicating that a change in toxicity criteria for 1,4-dioxane occurred during this five-year review period and that the RVO will meet with the regulatory agencies during the next five-year period to evaluate whether 1,4-dioxane should be identified as a COC at RMA, and, if so, whether a groundwater sampling program is warranted.

Specific Comments

Comment 1. **Section 4.1.1.1, OGITS (#94), page 27, paragraphs 3 through 5** – The language states that 75 percent mass removal has been set as a goal for the OGITS mass removal systems pending further evaluation and that the mass removal estimates are provided for comparison with criteria but not to determine compliance. CDPHE notes that the methodology for determining mass removal has not been agreed upon and that this is an issue that needs to be addressed in the near future.

Response: An interim mass removal goal of 75 percent was set in the LTMP until 5 years of monitoring of new performance wells that will be used in future mass removal calculations had been completed and the goal can be re-evaluated. As explained in the FYRR and FYSR, the RVO used available well data as an indicator for mass removal performance. The text will be revised to provide further clarification.

Comment 2. **Section 5.2, Table 5.2-1, page 124, last row** – The Army is responsible for the Off-Post Well Notification Program. It should be made clear in the description of issues, recommendations, and follow-up actions that the Army remains responsible regardless of TCHD, SEO, or other contractor level of involvement.

Response This item will be revised to make clear the RVO's responsibility for, and commitment to, the well notification program.

Comment 3. **Section 5.2.3, page 127, 1st paragraph** – This language discusses revised shut-off criteria which are being formally modified through a ROD change document. CDPHE has not received responses to comments (letter dated September 10, 2010) on the draft ROD change document dated August 11, 2010. The draft document addressed shut-off criteria and other groundwater remediation issues including a proposed change of the CSRG for fluoride. Until comments have been resolved, CDPHE considers language in this paragraph and other portions of the document to be provisional.

Response: The RVO will revise the text to refer to the ESD in progress, thereby clarifying that the shut-off language has not been formally changed. In addition, the RVO is not pursuing a change to the fluoride CSRG at this time. The FYRR will be modified to remove statements indicating that changes to the CSRG are being considered.

Comment 4. **Section 6.3.1.4, page 144, 4th paragraph, 2nd sentence** – Please replace "The purpose of the ICs is to restrict the use of contaminated groundwater, in

particular the installation of new wells, within identified plume areas" with "The purpose of the ICs is to restrict the use of contaminated groundwater. This is done by providing notification in areas with the potential to exceed CSRG and providing alternative water supplies for wells that exceed CSRG."

Response: The text will be replaced as requested.

Comment 5. **Section 6.3.1.4, page 144, 5th paragraph, 1st** bullet – This sentence states Figure 6.3.1-2 shows the apparent decrease in size of the DIMP CSRG exceedance plume. Earlier maps up until 2002 (1989, 1993, 1995, 1997, and 1999/2000) show DIMP contaminant plumes that included contamination above detection as well as DIMP CSRG exceedance areas. The maps starting with 2002 and in 2004, 2007, 2009, do not show contamination between detection and 8 ppb DIMP. This fact should be noted in the bullet.

Response: The bullet text will be revised to clarify this difference between the maps.

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Comment 6. **RVO response to CDPHE comment 2** – CDPHE does not agree that it would be misleading to include as an issue components of the remedy for which evaluation is still in progress (soil covers vegetation affect and cover percolation; dewatering at Army Complex and Shell Trenches; and mass removal goals for Basin A Neck and Off-Post Intercept Systems) or components for which some data indicate performance criteria may not have been met (North Boundary Containment System). Although RVO believes these are not issues because they are not "early indicators of potential problems", CDPHE believes it is premature to conclude that these may or may not be early indicators of potential problems. These issues should at least be tracked. CDPHE notes that the RVO elected to include extraction well and extraction system shut-off criteria as an issue for the 2005 FYRR even though it concluded the issue did not affect remedy protectiveness.

Response: The RVO does not believe there is any basis for including the remedies that are still in progress as issues so long as these are operating and progressing according to plan. The FYRR evaluation focuses on whether the remedy is currently protective and is expected to be protective in the future, and this evaluation has not led to identification of any FYR issues other than those noted. Ongoing remedies will be tracked as they progress toward completion. The shut-off criteria were included as an issue in the 2005 FYRR as resolution of this issue involved a significant change to the ROD criteria.

Comment 7. **RVO responses to CDPHE comment 12** – CDPHE does not agree that "…no other explanations for the downgradient detections in the conformance wells (e.g., underflow or bypass) are feasible." CDPHE believes underflow or bypasses are in fact possible and that the groundwater monitoring program is in place to check whether containment has failed. Otherwise there would be no

need for a monitoring program. Future assessments may or may not indicate containment failure or the need to adjust the monitoring network. CDPHE reserves future assessments regarding underflow, bypass, or sufficiency of the monitoring network to an examination of the data at that time.

Response: The RVO concurs that the purpose of the FYR is continued assessment of the remedy.

TAB B

RESPONSES TO U.S. ENVIRONMENTAL PROTECTION AGENCY COMMENTS

Remediation Venture Office's (RVO) Responses
to
U.S. Environmental Protection Agency's (EPA) July 19, 2010, Technical Comments
on the
Draft 2010 Five-Year Review Report, Revision C
Rocky Mountain Arsenal, Commerce City, Colorado

Comments for Incorporation

General Comment

Comment 1. The *Draft 2010 Five-Year Review* (FYR) *Report* presents the status of remedy projects that were completed or are in process at the Rocky Mountain Arsenal (RMA) during the five year period 2005 - 2010. Because the discussion of the various projects is summary in nature, each project discussed should provide references to the controlling document(s) for these projects. In general, if the project is completed and a Construction Completion Report (CCR) is final, the CCR should be referenced. If the project does not have a final CCR, then the 100 Percent design document should be referenced for additional information. Please review the FYR and include these references where missing. Examples of sections that are missing this information are provided in the specific comments.

Response: The FYRR was reviewed to ensure that the appropriate references had been included.

Comment 2. The FYR does not provide adequate discussion of the North Plants (NP) light non-aqueous phase liquid (LNAPL) project. The only discussion of the NP LNAPL project in Section 5.0 is related to progress since the 2005 FYR Report. Please revise Sections 4.0 and 7.0 to include a discussion of the NP fuel release, the subsequent site characterization activities, and implementation of the NP LNAPL Pilot Project, including references to the appropriate project documents.

Response: The report has been revised to include pertinent information from the FYSR.

Specific Comments

Volume I of III, Background, Remedy, and Conclusions

Comment 3. **Executive Summary, Page ES-1, Paragraph 5**. The following are comments on the Executive Summary:

a. The Executive Summary describes Federal Facility Agreement (FFA) restrictions prohibiting residential development, use of groundwater on the site as a source of potable water, hunting and fishing for consumptive use, and agricultural use. These sections also explain that these restrictions will be reevaluated in the pending revision to the FFA. Please also explain that

the restrictions in the FFA were the basis for the Remedial Investigation (RI), Endangerment Assessment (EA), Feasibility Study (FS), and selected remedy in the Record of Decision (ROD), and that if the restrictions are modified, reevaluation of one or more of these documents may be necessary.

b. The fifth paragraph indicates that the land use in the Off-Post Operable Unit is not restricted. The discussion does not include identification of the deed restriction on the Shell Property required by the Off-Post Record of Decisions (ROD). Please revise this section as well as the last paragraph of Section 3.0 to acknowledge this requirement.

Response:

a. The evaluation of the FFA restrictions did not occur during the current five-year review period. The sentence regarding these restrictions has been removed.

b. Reference to the deed restriction for the Shell Property has been added to the Executive Summary and Section 3.0.

Comment 4. **Five Year Review Summary Form Table**. The construction completion date on this form is identified as September 30, 2011. The EPA definition of construction completion, per EPA Guidance "*Close Out Procedures for National Priorities List Sites*" (EPA 2000), is approval of a preliminary closeout report (PCOR). For RMA, the PCOR cannot be completed until all Resource Conservation and Recovery Act (RCRA)-equivalent covers are determined to be operational and functional through approval of a Part 2 CCR. This is expected to occur once the vegetation is fully established sometime in 2016. Please revise the construction completion date to September 30, 2016.

Response: Completion date has been revised to May 18, 2015, consistent with the current master schedule for completion of the Part 2 CCR.

Comment 5. **Five Year Review Summary Form, Page 1**. The second paragraph under the subsection titled "Land Use Controls Monitoring" indicates that three issues were identified. Two issues are discussed in this paragraph without discussion of the third issue, which is discussed in the first paragraph. Please revise the text to more clearly identify the three issues.

Response: The text has been revised to clarify that there are two issues identified in the 2009 report.

Comment 6. Five Year Review Summary Form, Page 2. The subsection titled On-Post OU states, "Air, water, and biota monitoring programs are comprehensive in their design and effective in their implementation." It is not clear whether this statement relates to past present or future monitoring. Please indicate that this statement pertains to the FYR period.

Response: Language has been added as requested.

Comment 7. **Section 2.0, Pages 5 and 6**. This table provides a chronology of Record of Decision (ROD) related events. The chronology does not include the second FYR Report. Please add the second FYR Report to the chronology.

Response: The second FYRR report has been added to the table.

Comment 8. **Section 2.1, Pages 6 and 7**. This section describes the deletions from the National Priorities List (NPL). The summary does not describe where and when groundwater underlying some of these deletion areas was included in the deletion. Please explain which partial deletions did or did not include groundwater, and revise the Executive Summary accordingly (Page ES-2).

Response: The text has been revised to discuss surface and groundwater deletions.

Comment 9. **Section 2.1.4, Page 7**. This section describes the Central and Eastern Surface (CES) Areas partial deletion, but does not describe the Off-Post Surface (OPS) partial deletion. Please add a brief discussion of the OPS partial deletion. It is also recommended that a brief description of the Shell Property Ready for Reuse determination be included.

Response: A section has been added to discuss the Off-Post OU partial deletion.

Comment 10. **Section 3.0, Pages 9 through 11**. This section provides background information. The following are comments on this section:

a. The second paragraph discusses the specific contaminants of concern (COC) for On-Post and Off-Post soil and Off-Post groundwater. The second paragraph does not provide a discussion of the On-Post COCs for groundwater (or equivalent). For consistency, please provide a table of the Containment System Remediation Goals (CSRGs) identified in the On-Post ROD for the On-Post groundwater systems.

b. The last paragraph states, "Refuge property must be managed in accordance with the Refuge Act." As indicated in the Executive Summary, paragraph 4, "Current and future land use for the On-Post OU has been restricted because [of] provisions in the Federal Facility Agreement and the On-Post ROD. " For consistency, please revise this section to identify that the refuge property must be managed in accordance with the FFA and On-Post ROD as well as the Refuge Act.

c. The last paragraph in this section states, "…the permitting of new groundwater wells has been regulated through a series of institutional controls (ICs) identified in the Off-Post ROD…" This statement is misleading because it suggests that installation of wells off post is controlled through the ICs. In fact, the ICs only provide an advisory with respect to

potential contamination in the area and do not regulate well installation. Please correct this section accordingly.

Response:

a. The On-post CSRG analytes are identified in Section 4.1, so the text has been revised to include a reference to these tables.

b. The text has been revised as suggested.

c. The text has been revised as requested.

Comment 11. **Section 4.0, Page 13**. This section provides definitions for the status of each remedy project, including "Operating - defined as 'a fully operational project'." The EPA definition of operating, per EPA Guidance "*Close Out Procedures for National Priorities List Sites*" (EPA 2000), is a determination of operational and functional. This determination is documented through approval of a remedial action (RA) report (for RMA, this is a CCR), an interim RA Report for groundwater remedies, a Part 2 CCR for the RCRA-equivalent covers, or remedy components that do not require physical construction (e.g., the Medical Monitoring Program). This will result in changes to the status of several remedy projects in Table 2.0-2. Please revise the definition of "operating" to reflect EPA guidance.

Response: The definition provided is consistent with EPA Comprehensive Five-Year Review Guidance and does not rely on operational and functional determination. This more general definition is better suited for evaluating program elements that are not typical construction projects (e.g., Site-Wide Air Monitoring, Off-Post Institutional Controls) or operating portions of the remedy that have no CCR. Although these elements have no operational and functional determination, there are clearly operating "projects" during the five-year review period. In addition, the text has been revised to clarify operating status for dewatering systems and state that dewatering goals will be achieved after cover construction is complete, including establishment of vegetation and approval of final CCRs.

Comment 12. **Section 4.1, Page 15**. This section describes the groundwater remedy and the last paragraph indicates that detailed information on the status of issues identified in the 2005 FYR Report (Army 2007), and new issues identified during the current five-year review period, can be found in the Five-Year Summary Report for Groundwater and Surface Water (FYSR) (TTECI and URS 2010c). The discussion of issues identified in the 2005 FYR Report and new issues identified during the current five-year review is expected to be part of this FYR Report, as indicated by the EPA FYR guidance (EPA 2001), and not solely in the FYSR. Please revise the text to indicate that discussion of these issues can be found in Sections 5.0 and 8.0 of this FYR Report.

Response: Since the 2005 FYR issues were the reasons for most of the changes to the monitoring programs and evaluation processes during this FYR period, the implementation of follow-up actions and their status are included in the 2010 FYSR. The assessments of 2005 FYR issues in accordance with CERCLA Guidance are included in the FYRR. No new issues are identified in the Final FYSR, which identifies events that in some cases may be identified as FYR issues in Section 8.0 of the FYRR. The revised FYRR includes evaluations of the events presented in the FYSR to identify potential FYR issues among them. Sections 5.0 and 8.0 of the FYRR have been revised to reflect these changes.

Comment 13. **Section 4.1.1.1, Pages 16 through 27**. This section discusses the groundwater extraction and treatment systems. The following are comments on this section:

a. The subsection titled "Bedrock Ridge Extraction System" (page 22) does not describe the ROD remedy specific to this system, as was included in the 2005 FYR Report (Army 2007). Please revise the text to include a discussion of the ROD remedy for the Bedrock Ridge Extraction System.

b. The last paragraph in the subsection titled "Off-Post Groundwater Intercept and Treatment System (OGITS)" (page 25) discusses the attenuation of chloride and sulfate. This discussion does not include the timeframes for achieving the Containment System Remediation Goals (CSRG) for these compounds. Please add the timeframes for achieving the CSRGs for these two compounds to the text.

c. The subsection titled "South Plants and Lime Basins Mass Removal Project" (pages 25 and 26) does not discuss the discovery of benzene LNAPL in the area of the South Tank Farm Plume. Please revise this subsection to describe the discovery of the benzene LNAPL.

d. The subsection titled "South Plants and Lime Basins Mass Removal Project" (pages 25 and 26) does not include the remedial objectives identified in the 100 percent design (TTECI 2007a). Please include the remedial objectives for the project in this section.

Response:

a. The text has been revised as requested.

b. The timeframes for attenuation of chloride and sulfate have been added to the text.

c. The benzene LNAPL discovery has been added as requested.

d. The reference in EPA's comment is for the Lime Basins Slurry Wall Dewatering project, not the Groundwater Mass Removal project. The text will be revised to state, "Regulatory goals and conditions for termination of the Groundwater Mass Removal project were established in the Resolution

Agreement, and included as the project goals in the Design Analysis Report (Washington Group International 2005) and are provided below as follows:…"

Comment 14. **Section 4.1.1.2, Pages 27 and 28**. This section identifies "noteworthy events" associated with the operation of the groundwater systems. This section does not include a discussion of the implications of these events (e.g. why is the shutdown of the LB mass removal system for 232 days noteworthy). Please provide a brief discussion of the implications of each event.

Response: The requested explanations have been added to the text.

Comment 15. **Section 4.1.1.3, Pages 28 through 30**. This section discusses the other on-post groundwater remedial actions. The following are comments on this section:

a. The subsection titled "Shell Disposal Trenches Slurry Walls" (page 29) does not identify that the dewatering goal was not attained during the five-year review period for portions of the Shell Trenches slurry wall. Please provide an update of the dewatering status, similar to that included in the subsection for the Complex (Army) Disposal Trenches Slurry Wall. EPA recommends placing the update prior to the statement that indicates that the dewatering goals may only be achieved after construction of the Resource Conservation and Recovery Act-equivalent cover.

b. The subsection titled "Lime Basins Dewatering Wells" (pages 29 and 30) does not discuss the discovery of dense non-aqueous phase liquid (DNAPL) in the dewatering wells, the need to shut down the extraction system to evaluate the DNAPL, and the need to replace components of the extraction system due to the impact of the DNAPL on some well components. Please add discussion of the DNAPL discovery and the impacts of the discovery on the operational and functional determination for the dewatering system. For consistency with the other portions of Section 4.1.1.3, it is also recommended that this subsection be titled "Lime Basins Slurry Wall (Dewatering)."

Response:

a The descriptions of the individual remedial actions in Section 4.0 have been made more consistent; however, the details of the assessment for each remedial action are provided in Section 7.

b: The DNAPL discovery occurred in August 2009 and the RI/FS did not start until FY10, which is after the data cut-off for this FYR. The follow-up actions, the RI/FS, and the pipe deterioration, which was discovered in April 2010, will be addressed in the next FYR. A discussion of the DNAPL discovery, shut down of the extraction and dewatering wells, monitoring activities conducted during the FYR period, and identification as a FYRR issue was added to the text. The section was renamed as requested.

Comment 16. **<u>Section 4.2.1.2, Pages 32 through 35</u>.** This section describes design and construction of the Enhanced Hazardous Waste Landfill (ELF) Cap. The following are comments on this section:

a. The discussion of the ELF cover construction in the fourth paragraph on page 33 includes a sentence that describes the 1,000-year siting criteria, and refers to a "waste" storage layer. Please revise this description to correctly identify the "water" storage layer.

b. The fifth paragraph on page 33 initiates discussion of the occurrence of stormwater in the leak detection systems (LDSs) during high precipitation events that occurred during the ELF Cover construction. Please expand this description to explain that the heavy precipitation in the spring and summer of 2009 brought to light the fact that, based on the designed configuration of the ELF cover and the ELF liner anchor trenches, it is possible for stormwater to enter the LDSs. Please also explain that, to remedy this situation, permanent trench drains were constructed to drain stormwater and additional monitoring, sampling and analysis, and reporting is being conducted, as defined in the *Enhanced Hazardous Waste Landfill Post Closure Plan* (TTECI 2010b).

c. The second complete paragraph on page 34 describes personal health and safety sampling and analysis, and indicates that there were two action levels that were exceeded requiring personal protective equipment (PPE) upgrade during the ELF Final Cap Construction project. Section 6.2 of the *Draft Enhanced Hazardous Waste Landfill Final Cap Construction Project, Draft Construction Completion Report (CCR)* (TTECI 2010c) states that no action levels were exceeded. Please revise appropriately for consistency between the CCR and the FYR Report.

Response:

a. This error has been corrected.

b. The description of the occurrence of stormwater in the leak detection systems is excerpted from the CCR, which should be the controlling document, as stated in EPA's Comment #1. The description has been updated to be consistent with the CCR (currently not finalized).

The second to last paragraph of this section (Section 4.2.1.2) states that long-term inspection, monitoring, and maintenance will be conducted in accordance with the approved Post-Closure Plan. It is acknowledged that the trench drain system will be inspected to evaluate the presence of flow, erosion, seepage/moisture, or bare/sparse vegetation per the Post-Closure Plan.

c. This section has been corrected to be consistent with the CCR.

Comment 17. **Section 4.2.3.4, Pages 54 and 55**. This section describes construction of the ELF and explains that one of the ROD standards is to minimize percolation by limiting the hydraulic conductivity of the clay layer to $1x10^{-7}$ cm/sec or less. Please correct this section to refer to the hydraulic conductivity of the compacted clay layer, as stated in the ROD, Table 9.5-1.

Response: This phrase has been corrected.

Comment 18. **Section 4.2.3.5, Pages 56 and 57**. This section describes operation of the ELF and explains that a total of 1,100,930 compacted cubic yards (ccy) of contaminated waste and cover soils was placed in the ELF. The *Enhanced Hazardous Waste Landfill and Facilities Operations Project Construction Completion Report* states that a total volume of 940,712 ccy of waste was received at the ELF. Please check these two values and explain the difference or correct if necessary (TTECI 2009a).

Response: The difference is that the first volume includes contaminated waste and cover soils, as stated. The FYRR has been revised to cite only the volume of waste (940,712 compacted cy) to eliminate confusion.

Comment 19. **Section 4.2.3.11, Page 74**. This section describes the South Plants Balance of Areas and Central Processing Area Soil Remediation Project and indicates that during Phase 2, Part 1, 150,932 cy of contaminated soil was disposed in the Hazardous Waste Landfill (HWL) and 34,235 cy of contingent soil volume (CSV) was excavated. Revision of the *South Plants Balance of Areas and Central Processing Area Soil Remediation Project – Phase 2, Part 1 and Part 2 Construction Completion Report* indicates that 155,727 bank cubic yards (bcy) of contaminated soil and 31,332 bcy of CSV were excavated during Phase 2, Part 1 (TTEC 2009b). Please correct this section to be consistent with the CCR.

Response: These volumes have been corrected to be consistent with Table 5.2-1 of the *South Plants Balance of Areas and Central Processing Area Soil Remediation Project – Phase 2, Part 1 and Part 2 Construction Completion Report.*

Comment 20. **Section 4.3.1.1, Page 97 and Section 7.1.4, Page 140**. These sections describe the Miscellaneous RMA Structures Demolition and Removal, Phase IV Project. Please update these sections to reflect the expanded scope for this project (e.g., to include plugging of sanitary sewers) and to explain that part of the project is also located outside of the Army Maintained Area (AMA).

Response: The text in these sections has been revised to reflect the expanded scope of the Miscellaneous RMA Structures Demolition and Removal, Phase IV Project, and to explain that part of the project is located outside of the Army Maintained Area (AMA).

Comment 21. **Section 4.4.1.3, Pages 101 and 102**. This section describes the remedy for unexploded ordnance (UXO) management. This section does not include a discussion of long-term operations or maintenance. Please include a discussion

of the *Response Plan for Recovered Material Potentially Presenting an Explosive Hazard* (TTECI 2010a) that addresses long-term management of munitions.

Response: The text has been revised to include a limited discussion of munitions-related, long-term operations.

Comment 22. **Section 4.4.2.1, Page 104**. This section discusses the Lime Basins groundwater relocation and the Basin A Neck expansion. This discussion does not include a reference to the 100 percent design that documents the relocation and expansion project. Please include a reference to the 100 percent design.

Response: The requested reference has been included.

Comment 23. **Section 4.4.3.1, Pages 104 through 107**. This section describes the medical monitoring program and indicates that intrusive work at RMA was completed in the autumn of 2008. Additional intrusive work was conducted after this time including the Lime Basins slurry wall construction, removal of Biota soil around monitoring wells at NCSA-4b, removal of CSV from the South Plants 1-foot backfill areas, and/or removal of borrow area operations for cover construction. Please verify the accuracy of this statement and revise appropriately.

Response: Clarifying language has been added.

In addition, this section does not describe outstanding action items for the medical monitoring program, including preparation of a medical monitoring completion report, as identified in the Memorandum of Agreement, signed on January 14, 2010 (CDPHE/PMRMA 2010). Please revise this section to describe the outstanding action items needed to complete this remedy component.

Response: Reference to the sole remaining element of the MMP, namely the MCR, has been added to the text as requested. Please note that no additional mention of the follow-up cancer surveillance evaluation to be done by CDPHE in needed for this FYRR because it is not a required element of the MMP. As currently stated in the document, the CDPHE supplemental evaluation will be an addendum to the MCR and reviewed as part of the next FYR period.

Comment 24. **Section 5.2, Pages 109 through 115**. This section discusses the recommendations and follow-up actions resulting from the 2005 FYR. The text provides the resolution language for the various issues identified in the 2005 FYR though the issue itself is not discussed. Consistent with the EPA FYR Guidance (EPA 2001), please provide the issues identified in the 2005 FYR along with the issue resolution in this section.

Response: The text has been revised to include an expanded discussion of the issues.

Comment 25. **Section 6.1, Page 117**. This section lists individuals who participated in the FYR. For the PWT representatives, please remove Levi Todd and add Bill Lutz. For the EPA representatives, please add Greg Hargreaves.

Response: The requested revision has been made.

Comment 26. **Section 6.3.1.1, Pages 119 through 121.** This section discusses water level tracking. The second and third paragraphs on page 120 list source areas where water level tracking is conducted, but the lists of source areas discussed in these two paragraphs are inconsistent. In addition, the Complex (Army) Trenches and Shell Disposal Trenches are incorrectly listed under water level tracking. While water levels for these two sources are monitored, it is conducted as part of the performance monitoring category rather than the water level tracking category. Please update these sections to provide consistency with respect to the source areas monitored, and remove the Complex (Army) Trenches and Shell Disposal Trenches from the water level tracking discussion.

Response: This section addresses the monitoring categories in the 1999 LTMP, which governed the monitoring program during this FYR period. The Complex Trenches and Shell Trenches were included in the water level tracking category in the 1999 LTMP. The section has been expanded to include discussion of the operational monitoring component for each site as specified in the design documents and 1999 LTMP, and project-specific performance monitoring under the 2010 LTMP.

Comment 27. **Section 6.3.1.3, Pages 124 and 125**. This section discusses the confined flow system. This discussion does not include the ROD language pertaining to monitoring of the confined flow system. Please add the ROD language to this section.

Response: The ROD language pertaining to monitoring confined aquifer wells in the South Plants, Basin A, and Basin F areas has been added to the FYRR text in Section 6.3.1.3.

Comment 28. **Section 6.3.1.2, Page 121 through 124**. This section discusses the water quality tracking network. The following are comments on this section:

a. Table 6.3.1-1 lists the wells used for water quality tracking. The table does not indicate if the wells listed are from the 1999 Long-Term Monitoring Plan (LTMP) (FWENC 1999) or the 2010 LTMP (TTECI-URS 2010a). Given that the data collected for the FYR should have been collected under the 1999 LTMP, this table should represent the water quality tracking wells monitored under the 1999 LTMP. Please confirm that the table represents monitoring under the 1999 LTMP and label the table accordingly.

b. This section provides information on the contaminant concentrations in various parts of Rocky Mountain Arsenal (RMA) based on the water quality tracking data, and the last bullet in this section discusses the results from the

single well monitoring the North Plants area. This discussion does not include results from the wells designated as supplemental operational monitoring (SOM) wells. These wells are used for monitoring upgradient of the HWL and are also used to monitor the North Plants plume. Please include a discussion of the data from the SOM wells in this bullet.

Response:

a. The text states that the wells in Table 6.3.1-1 are from the 1999 LTMP, but the reference will also be added to the table.

b. Section 6.3.1.2 discusses the water quality data for wells in the water quality tracking network in Table 6.3.1-1, which does not include the SOM wells from the HWL. The FYSR discussion of the SOM well data was included in Section 6.3.1.6 of the FYRR. A brief discussion of the concentration trends in the SOM wells has been added to the FYSR and to Section 6.3.1.6 of the FYRR.

Comment 29. **Section 6.3.1.6, Pages 127 and 128**. This section discusses the operational monitoring for the HWL. The following are comments on this section:

a. The title of this section is presented as "Hazardous Waste Landfill Operational Groundwater Monitoring." During the FYR period, there were three phases of monitoring conducted for the HWL including operational, closure and post closure monitoring. Please change the title to reflect all phases of monitoring conducted such as "Hazardous Waste Landfill Groundwater Monitoring."

b. This section discusses the monitoring results from the HWL, and indicates that during the FYR the HWL was in operational, closure and post-closure mode. The discussion of the monitoring results does not consistently indicate whether these results are from the operational, closure or post-closure monitoring periods. Please discuss the results with reference to the appropriate monitoring phase.

c. This section discusses the groundwater monitoring results from the HWL but does not discuss the results of the leachate collection system (LCS) and LDS monitoring. Please discuss the results of the LCS and LDS monitoring.

d. The third paragraph discusses Well 25121 but does not indicate that this well is an upgradient well for the HWL. Please identify this well as an upgradient monitoring well.

Response:

a. The title of Section 6.3.1.6 has been revised as requested.

b. The HWL monitoring phases have been clarified as requested.

c. Leachate collection system monitoring results for the HWL have been described in Section 6.3.1.6.

d. The text has been revised as requested.

Comment 30. **Section 6.3.1.7, Page 128**. This section discusses the operational monitoring for the ELF. The following are comments on this section:

a. The title of this section states "Enhanced Hazardous Waste Landfill Pre-Operational Groundwater Monitoring." During the FYR period, there were three phases of monitoring conducted for the ELF including pre-operational, operational, and closure monitoring. Please change the title to reflect all phases of monitoring conducted such as "Enhanced Hazardous Waste Landfill Groundwater Monitoring."

b. This section discusses the monitoring results from the ELF, but does not consistently indicate whether these results are from the pre-operational, operational, or closure monitoring periods. Please discuss the results with reference to the appropriate monitoring phase.

c. This section discusses the groundwater monitoring results from the ELF but does not discuss the results of the LCS and LDS monitoring. Please incorporate a discussion of the results of the LCS and LDS monitoring.

e. This section does not discuss the discovery of numerous contaminants that were detected in the ELF LDS during the FYR reporting period. These detections occurred in the second quarter of 2007, though the regulatory agencies were not notified of these detections. These detections were reported a year after their occurrence through the issuance of an annual groundwater monitoring report. In addition, the requirements in the *Enhanced Hazardous Waste Landfill Operations Manual* (TTECI 2007b) for follow-up of these detections were not implemented until the fall of 2008, which was a year and a half after the detections were discovered. Please revise this section to incorporate a discussion of the detections in the ELF LDS, and identify the lack of notification to the regulatory agencies and delayed implementation of the follow-up actions, both required by the *Enhanced Hazardous Waste Landfill Operations Manual* (TTECI 2007b), as an issue in Section 8.0 of the FYR.

Response:

a. The title has been changed as suggested.

b. The results are described in terms of the appropriate monitoring phase in the revised FYRR, as suggested.

c. Leachate collection system and leak detection system monitoring results for the ELF have been described in Section 6.3.1.7.

d. The text has been revised to include a discussion of the contaminant discovery and of the follow-up actions. Since the problem was addressed during the FYR period, RVO does not agree that this qualifies as a FYR issue, but it has been identified as an event in the revised FYRR. Please refer to the response to Comment 47c for further explanation.

Comment 31. **Section 6.3.2.1, Page 129**. This section discusses the on-post surface water quality monitoring. The following are comments on this section:

a. The first paragraph in this section indicates that the Upper Derby Lake site and the First Creek at Highway 2 site were not sampled in 2006. Please provide discussion of why these locations were not sampled.

b. The text inappropriately states that the on-post surface water monitoring program is no longer necessary. As you are aware, decisions to discontinue the on-post surface monitoring program will not be completed until the *Draft Final Surface Water Quality Monitoring Report* (RVO 2008) is finalized and a monitoring completion report (MCR) for the surface water program is approved. Therefore, discussions in this section that conclude that the on-post surface water program is unnecessary are premature. Please remove these conclusions regarding the surface water program and revise the FYR Report to indicate that surface water decisions will be made through the MCR approval process.

c. This section does not discuss that surface water monitoring was discontinued for five of the twelve on-post surface water monitoring locations identified in the *Surface Water Sampling and Analysis Plan* (Surface Water SAP) (FWENC 2001). As a result, it is difficult to make surface water quality conclusions in the five-year review. These sampling locations were removed without updating the Surface Water SAP and without notification and discussion of these changes with the Regulatory Agencies. Please revise this section to describe the changes in the surface water SAP and identify this change as an issue in Section 8.0 of the FYR Report.

Response:

a. The text was revised to state that samples were not collected in 2006 at SW37001 and Upper Derby Lake because they were dry.

b. The report has been revised to state that surface water decisions will be made through the MCR approval process.

c. The discussion of the discontinued monitoring of the five surface water sites from the FYSR has been added to the report. The RVO disagrees that

discontinued monitoring of surface water at the five south boundary sites warrants identification as a FYR issue because it does not affect current or future protectiveness of the remedy. It is identified as an event, but will also be included in the lack of notification issue, which addresses several events as for ELF LDS notification. This subject was addressed in the LTMP and summarized in the FYSR.

Comment 32. **Section 7.0, Page 139**. This section discusses the assessment process. The second paragraph indicates that interim remedial action (IRA) projects that were transferred from IRA status to ROD-defined projects are reviewed concurrently with the ROD project to which they have been transferred. It would be more appropriate to state that these groundwater remedies were "incorporated into the final remedy" rather than transferred, because additional requirements were added for these systems in the ROD. The incorporated IRAs should be reviewed as a ROD project rather than concurrent with a ROD project. Please correct the text to indicate that these IRA projects were incorporated into the ROD. Please revise Section 4.0 to be consistent with this revision.

Response: The text has been corrected to reflect that these were incorporated into the final remedy.

Comment 33. **Section 7.1.2, Pages 139 and 140**. This section evaluates the ELF Cap construction. Please expand this discussion to identify the potential for stormwater to migrate into the LDSs, as observed during the spring and summer of 2009, and that this a potential operating problem for the ELF because the LDSs no longer exclusively identify landfill leakage. Please also explain that to remedy this potential operating problem, the design was modified to add permanent trench drains to drain the liner anchor trenches, and additional monitoring, sampling, analysis, and reporting will be conducted as identified in the ELF PCP (TTECI 2010b). Please revise the text to indicate that the presence of stormwater in the ELF LDSs is a potential remedy concern and include this concern as an issue in Section 8.0.

Response: The RVO disagrees with this comment's (and comment 16b's) inference that "based on the designed configuration of the ELF cover and the ELF liner anchor trenches, it is possible for stormwater to enter the LDSs." It is true that it was possible (and did occur, as stated) prior to completion of the cover. Although the trench drains continue to collect and convey stormwater, believed to be backing up in the fringes of the gravel drainage layer, rates of liquid flow into the LDS sumps have stabilized since completion of the cover and are decreasing. The ELF Post-Closure Plan does indeed contain provisions for inspection of the trench drains for the presence of flow, erosion, seepage/moisture, or bare/sparse vegetation. This was an event that occurred prior to cover completion. It does not warrant identification as a FYR issue.

Comment 34. **Section 7.1.6, Page 141 and/or 7.3.20, Page 159**. These sections describe the Basin F Cover Project and the Basin F/Basin F Exterior Soil Remediation

Projects, respectively. These sections do not describe the use of soil from former human health exceedance (HHE) areas as backfill and gradefill when areas outside of the cover were cut to grade. The soil from former HHE areas was used for fill in areas near the RMA fenceline and to fill-in the NCSA-2d CSV trench excavation, and some was stockpiled for future purposes. The ROD remedy for Basin F Exterior was to excavate and landfill HHE soil and backfill HHE areas (FWENC 1996). As explained for other remediation projects that had un-backfilled HHE excavation areas, in 2002 the Biological Advisory Subcommittee identified a concern with the unknown risk potential for unbackfilled HHE excavations, and 5-point composite sampling was conducted. However, this sampling had not been conducted in the area exterior to Basin F. To remedy this problem, the soil that was excavated from former HHE areas was either removed and disposed appropriately or was sampled following the 5-point composite procedure and disposed appropriately depending on the sample results. In addition, the final graded surface exterior to Basin F was sampled to identify areas of unacceptable risk to biota and/or human health, and exceedance areas were excavated and backfilled with 1-foot of soil. Please expand one or both of these discussions to describe the use of soil from former HHE areas as backfill and gradefill when areas outside of the cover were cut to grade.

Response: As noted in the comment, other projects dealt with the issue of concern for unknown risk potential of unbackfilled HHE excavations and addressed that concern by backfilling and/or sampling the area of concern. These situations are described in Section 4.0 of the FYRR, not in Section 7.0. Section 4.2.3.14 alludes to additional actions related to the use (and removal) of fill from the area exterior to Basin F at NCSA-2d. It seemed most appropriate to expand this discussion in Section 4.2.1.5, which has been done.

Comment 35. **Section 7.1.7, Pages 141 and 142**. This section describes the Section 36 Lime Basins Soil Remediation Slurry/Barrier Wall Project and explains that an RI/FS is currently underway to determine the nature and extent of DNAPL. Please also explain that investigations are underway to determine whether there is a detrimental impact to the slurry/barrier wall integrity from the DNAPL, as discussed in the Lime Basins Dense Non-Aqueous Phase Liquid RI/FS Work Plan (TTECI-URS 2010c).

In addition, the text discusses a CCR that is in process but does not include the reference for the design document. Please provide the reference for the 100 percent design document in the discussion.

Response: The text has been revised to include the general scope identified in the DNAPL Work Plan and the requested reference is provided in the revised FYRR.

Comment 36. **Section 7.1.8, Page 142**. This section discusses the relocation of contaminated groundwater to the Basin A Neck system and the expansion of the system, and indicates that the design specifications were approved by the Regulatory

Agencies on May 4, 2010. The reference is not provided for the design specifications. Please provide the reference for the 100 percent design document in the discussion.

Response: The reference has been provided (URS Washington Division 2009 (Jan), Lime Basins Groundwater Treatment Relocation Project Final Design Package).

Comment 37. **Section 7.2.1.1, Page 143.** This section discusses the Shell Disposal Trenches Slurry Wall and indicates that the effectiveness of the remedy will be evaluated after the soil covers have been installed and vegetation is established. The discussion does not include a date for this remedy evaluation as established in the 2010 LTMP. Please add the evaluation date for the Shell Disposal Trenches remedy to this section.

Response: The requested date has been included in the text.

Comment 38. **Section 7.2.1.3, Page 144**. This section discusses the addition of a fourth well at the Bedrock Ridge extraction system, but does not indicate that a final CCR was then issued for the system. Please explain that a final CCR was issued to document construction of this system and provide the CCR reference.

Response: The requested information and reference have been added.

Comment 39. **Section 7.2.1.4, Page 144.** The second paragraph discusses the Railyard Containment System and indicates that the contaminant concentrations in downgradient wells were below the CSRGs. Review of the data for these downgradient wells indicates that samples were not collected for Wells 03507, 03508, 03509, and 04506 for Water Years 2008 and 2009. Please revise this section to explain why samples from these wells, as identified in the Well Networks Update (TTFW 2004), were not collected during 2008 and 2009 and identify the missed sampling as an issue in Section 8.0.

Response: The RVO disagrees that sampling of the listed wells was required in 2008 and 2009; thus, no missed sampling occurred and there is no FYR issue to be identified in Section 8.0. Wells 03507, 03508, 03509, and 04506 were identified as operational water level and operational water quality wells in Figure 2.2-9 in the WY04 Well Networks Update. An excerpt from Section 2.2.3 in the Update concerning operational monitoring for the groundwater containment systems (including the Rail Yard) is provided below.

> "The uses of wells in system operation are subject to change in response to groundwater flow and contaminant migration conditions.
>
> Because these networks change from year to year, and these changes are documented in the annual SAP (WGI, 2003b) for each system, this WY04 Update does not discuss in detail the changes in operational monitoring or potential operational monitoring networks."

Wells 03507, 03508, 03509, and 04506 are located downgradient of the RYCS recharge wells and were monitored quarterly under the RYCS operations monitoring program during the first year after startup of the RYCS recharge wells in 2001 to monitor for DBCP potentially mobilized by the recharge flow. DBCP was not detected above the CSRG, and the sampling frequency of three of these wells was reduced. Wells 03507, 03508, and 04506 were sampled annually from 2002 through 2007. Well 03509 contained the highest DBCP concentrations (but were still below the CSRG), and it was sampled quarterly from 2001 through 2007. DBCP was not detected above the CSRG in the four wells during the 7 years they were sampled. In 2007, the highest concentrations were an order of magnitude lower than the CSRG of 0.2 µg/L, and the sampling of these wells was discontinued. They were not included in the RYCS SAPs for WY08 and WY09 and thus, they were not sampled in 2008 and 2009. The four wells were included in the RYCS performance water level and performance water quality networks in the 2010 LTMP and will be sampled biannually.

Comment 40. **Section 7.2.2.1, Pages 146 and 147**. This section discusses the performance of the OGITS. The following are comments on this section:

a. The first paragraph discusses modifications to the Northern Pathway System (NPS) extraction/recharge system but does not reference the design document that controlled these modifications. Please include the design document reference in the discussion.

b. The first paragraph indicates that modifications were not required to meet ROD requirements but were funded by the property owner to develop the property. The discussion of property-owner funding should be removed from the discussion because the NPS, including the modifications, is the responsibility of the Army regardless of how it was funded. Please update the text accordingly.

c. The second paragraph in this section discusses the attenuation of chloride and sulfate at the OGITS. The discussion does not include the timeframes for achieving the CSRGs for these two compounds. Please add the timeframes for achieving the CSRGs for these two compounds to the text.

d. In 2006, a draft Fact Sheet was issued by the Army to document the significant modifications made to the NPS system. To date, this Fact Sheet has not been finalized. Please revise this section to reflect the current status of this Fact Sheet.

e. Section 5.2.1.2 of the FYSR (TTECI and URS 2010c) discusses the shutoff monitoring that was performed for four extraction wells at the NPS. The text indicates that the last quarterly sample for substitute monitoring well 37032 was above the CSRG for diisopropyl methylphosphonate (DIMP) but that the sample was rejected through the *Post Laboratory Water Quality Assessment Procedure* (RVO 2007). The text does not explain whether the

rejected data was subject to laboratory validation, or discuss the justification for rejecting the result. In addition, the Regulatory Agencies were not notified of problems with the shutoff monitoring, were not involved in the decision to re-sample the well, the rejection of the original sample, or the decision to terminate the shutoff monitoring. Please acknowledge this oversight and identify this potential remedy concern as an issue in Section 8.0.

Response:

a. The NPS Modifications design document is referenced in the discussion in the revised FYRR.

b. The RVO believes that the public should know why the NPS Modifications Project was constructed and that it was not needed to meet ROD requirements. However, the text has been revised to indicate that the operation of the NPS is the responsibility of the Army.

c. The timeframes for achieving the CSRGs for chloride and sulfate have been added to the text.

d. The current status of the NPS Fact Sheet has been added.

e. The RVO disagrees that the lack of notification of the Regulatory Agencies concerning re-sampling of well 37032 and termination of shut-off monitoring is a FYRR issue that should be identified in Section 8.0. The RVO followed its procedure and both the application of this procedure and the collection of a confirmatory sample are part of the data review process. Since the initial result was flagged through a standard data validation procedure before the data were reported, the RVO did not consider this a situation that required Regulatory Agency Notification. Consequently, the RVO has not identified this as an issue in the FYRR. The RVO will revise the *Post Laboratory Water Quality Data Assessment Procedure* in a manner that data will not be rejected based on the procedure. Data evaluated by the procedure that is not considered usable will be assigned a "Z" qualifier (questionable data). The RVO will notify the Regulatory Agencies in the future of potential application of the *Post Laboratory Water Quality Data Assessment Procedure,* and when resampling is performed due to data assessment. A CCR/MCR will be prepared to document completion of the shut-off monitoring requirement.

Comment 41. **Section 7.2.3.7, Page 152**. This section is an evaluation of UXO management. As part of the FYR evaluation, please review the UXO management program at RMA against the new EPA Guidance, *EPA Munitions Response Guidelines* (EPA 2010), and revise this section appropriately.

Response: EPA guidance, EPA Munitions Response Guidelines (July 27, 2010), was transmitted after the March 2010 cutoff; consequently, significant effort will not

be expended to compare RMA's UXO management program against the interim guidance, nor will Section 7.2.3.7 of the FYR be revised per the guidance. This said, a cursory review of the aforementioned guidance indicates that management of UXO/munitions response operations performed on RMA substantively comply with the EPA guiding principles and references.

Comment 42. **Section 7.3.22, Page 160 and Table 2.0-2**. This section and table indicate that the medical monitoring program is complete. As identified in the Memorandum of Agreement, signed on January 14, 2010, there are several reports that remain to be prepared, including preparation of a medical monitoring completion report. Please correct the FYR Report to indicate that the medical monitoring program is still operating until these reports are finalized.

Response: The only remaining deliverable for the Medical Monitoring program is the MCR, which is already mentioned in this section. Language has been added to Section 7.3.22 to clarify the completed status of the Medical Monitoring Program. Table 2.0-2 has been modified to show the status of the Medical Monitoring Program as operating, pending acceptance of the MCR.

Comment 43. **Section 7.4.1, Page 161**. This section discusses the Lime Basins DNAPL discovery, and indicates that the investigation of the nature and extent of the DNAPL is ongoing. Please update the discussion to indicate that the compatibility of the DNAPL with the slurry wall is also included in the ongoing evaluation.

Response: The text has been revised as requested.

Comment 44. **Section 7.4.2, Pages 161 and 162.** This section discusses the water treatment system Applicable or Relevant and Appropriate Requirements (ARARs), To Be Considered (TBCs) information, and practical quantitation limits/method reporting limits (PQLs/MRLs), and lists the treatment systems for which ARARs were identified. The Irondale System is not identified. Please identify the Irondale System.

Response: The Irondale Containment System has been identified in the text.

Comment 45. **Section 7.4.2.1, Pages 162 through 165**. This section discusses the PQLs, Certified Reporting Limits and MRLs. The following are comments on this section:

a. Table 7.4.2-1 presents the existing and potential new ARARs for the water treatment systems. The footnote for the arsenic ARAR in the table indicates that the CSRG for the OGITS is 2.35 micrograms per liter (µg/L) for OGITS. The 2.35 µg/L CSRG also applies to the Northwest Boundary Containment System (NWBCS) and the North Boundary Containment System (NBCS). Please correct the footnote for arsenic to indicate that the arsenic CSRG is 2.35 µg/L for the NBCS, NWBCS and OGITS.

b. Table 7.4.2-2 provides a list of PQLs that have changed as a result of a recent PQL study performed by RVO. The PQL study report that supports the PQL changes was not issued to the regulatory agencies for review and approval by the cutoff data for this FYR, and has still not been issued. Because the data and discussion supporting PQL changes have not been presented, the proposed changes cannot be accepted. Therefore, it is premature to publish the results of the PQL study in the FYR. Please update the text to remove the PQL study results and indicate that these results will be discussed during the next FYR period.

Response:

a. The footnote has been revised to include arsenic as a CSRG analyte for all three systems.

b. The RVO agrees that it is premature to include the results of the PQL study, as the associated performance evaluation study has not yet been initiated and the PQLs for aldrin, dieldrin, and NDMA have not yet been established.

Comment 46. **Section 7.5, Page 168**. This section introduces Question C, asking if any other new information has come to light that could call into question the protectiveness of the remedy, and concludes that the answer is no. The discovery of DNAPL at the Lime Basins (which is discussed under Question B but should be moved to Question C), and the discovery of benzene LNAPL at the South Tank Farm, should be discussed under Question C. Both of these discoveries were made during the FYR period and the long-term effects of these NAPLs will need to be assessed during the next FYR period. Please discuss these two NAPL discoveries in this section.

Response: The text has been revised to include a discussion of the DNAPL discovery as an issue and the discovery of benzene LNAPL in the South Tank Farm as an event since this represented the first confirmed presence of benzene LNAPL.

The presence of benzene contamination in the South Tank Farm area was documented during the RI, but LNAPL that was exclusively benzene had not previously been detected in recoverable quantities. Consequently, the discovery of the benzene LNAPL is identified as an event in Section 7.0.

Comment 47. **Section 8.0, Page 169**. This section discusses the issues identified during the FYR period. Please identify the following issues in this section and provide the follow-up actions that have been implemented, or recommendations for follow-up actions, in Section 9.0:

a. The discovery that 12 wells were not sampled during 2007 at the HWL, constituting a non-conformance with the HWL Operations Manual (FWENC 2001b), and failure to notify the Regulatory agencies until a year after the event occurred;

b. Discovery of benzene LNAPL at the South Tank Farm Plume;

c. The discovery of contaminant of concern (COC) compounds and non-COC compounds in the LDS for the ELF without notification to the Regulatory Agencies and the delay in implementing the follow-up procedures in the *Enhanced Hazardous Waste Landfill (ELF) Operations Manual* (TTECI 2007b);

d. Cessation of annual surface water sampling at five surface water locations in 2007 without updating the Surface Water SAP (FWENC 2001), and without notification and discussion of these changes with the Regulatory Agencies;

e. Missed sampling from wells downgradient of the Railyard System;

f. Rejection of shutoff monitoring data for one of the extraction wells at the NPS without consultation with the Regulatory Agencies or providing justification for the rejection of the data; and the presence of stormwater in the LDSs of the ELF.

Response:

a. The non-conformance with the HWL Operations Manual and resulting delay of the Regulatory Agency notification was addressed and documented as required and it was determined that there was no significant impact of the missed sampling. Therefore, RVO does not agree that this qualifies as a FYR issue that "currently prevents the response action from being, protective, or may do so in the future" or that is "an early indicator of a problem." However, RVO agrees that the lack of notification for this and other events that occurred during the FYR period be identified as an FYR issue in Section 8.0 of the FYRR.

b. The presence of LNAPL in the South Tank Farm Plume is identified as an event in the FYSR, but the RVO does not believe that it is appropriate to make this an FYR issue. Although a large spill of benzene (approximately 100,000 gallons) in the South Tank Farm area was documented in the RI, the discovery of free-product benzene is significant as it is the first time benzene LNAPL has been confirmed in this area. Consequently, the confirmed presence of LNAPL has been addressed as an event that was readily addressed through modifications to the mass removal system in the revised FYRR.

c. The discovery of COC compounds and non-COC compounds in the LDS for the ELF has been included as an event in the revised FYRR since the presence of COC and non-COC compounds was investigated and addressed and there were no remaining concerns at the end of the FYR period. The RVO does therefore not agree that the presence of these compounds qualifies as an issue that "currently prevent the response action from being,

protective, or may do so in the future" or is "an early indicator of a problem." However, the lack of notification will be addressed as an issue.

d. The RVO does not agree that the cessation of the surface water monitoring and its potential impact on the RMA remedy constitute an FYR issue, but has included this as an event in the revised FYRR. However, the lack of notification will be addressed as an issue.

e. Monitoring of the downgradient RYCS wells was performed in accordance with the plans in place at the time of sampling and there were no missed sampling events. The wells in question are operational wells that have variable monitoring frequencies.

f. As stated in Response to Comment 40e, the RVO disagrees that the lack of notification to the Regulatory Agencies concerning re-sampling of well 37032 and termination of shut-off monitoring is a FYRR issue that should be identified in Section 8.0. The RVO followed its procedures and both the collection of a confirmatory sample and application of the RMA Post-Laboratory Data Assessment Procedure (RVO 2007b) are currently part of the data review process even though the application of this procedure is rare. Consequently, the RVO did not consider this a situation that required Regulatory Agency notification.

   The RVO has included the presence of stormwater in the LDSs of the ELF as an event rather than an issue in the revised FYRR since the problem was resolved during the FYR period.

Comment 48. **Section 8.2, Pages 169 and 170**. This section discusses the issues associated with the land use controls. Background information with respect to these issues is missing from Section 4.4.1.5, so that the first discussion of these issues is presented here. Please update Section 4.4.1.5 to provide the basis for identifying the land use control issues presented in Section 8.2.

Response: Section 4.4.1.5 has been revised to provide additional discussion.

Comment 49. **Section 9.0, Page 171**. This section presents Table 9.0-1, which summarizes the recommendations for follow-up actions. This table does not include a milestone for the exposed sanitary sewer pipe. Please provide a milestone for this follow-up item.

Response: A milestone for 2010 has been added to the text.

Comment 50. **Table 2.0-2**. This table summarizes the status of CCRs and CCR approval for the RMA remedy projects. The following are comments on this table:

a. The status of many of the operating groundwater remedies is identified as "transferred" in the status column on the table. It would be more appropriate to state that these groundwater remedies were "incorporated into

the final remedy" rather than transferred, because additional requirements were added for these systems in the ROD. Please update the table accordingly.

b. The status of several remedy projects (e.g. slurry wall projects) will change based upon correcting the definition of "operating" discussed in Section 4.0. Please update the status for these projects accordingly.

c. For projects with forecast completion dates (e.g. treatment systems other than Railyard system), please identify if the referenced CCR is a final or an interim document.

Response:

a. The table has been revised as requested.

b. No change has been made to the definition of operating in Section 4.0. See response to Comment 11.

c. The column is titled to indicate Final CCRs. Interim indications have been added where appropriate.

Comment 51. **Table 6.4.1-1**. This table summarizes observations of the site inspections performed as part of the FYR. The notation for Well 24105 indicates that the well was severely damaged but that the well was not in a monitoring program during the FYR period. EPA agrees with this statement though, at the time of inspection (April 28, 2010), Well 24105 was identified as a performance water quality monitoring well for the 2010 LTMP. Please indicate that this well is identified as a performance monitoring well in the 2010 LTMP, and that a commitment was made during the inspection to fix or replace the well.

Response: Table 6.4.1-1 has been revised to state that well 24105 was identified as a performance water quality monitoring well in the 2010 LTMP and that a commitment was made to repair or replace the well. The well has since been repaired and it was sampled according to the schedule specified in the 2010 LTMP.

Comment 52. **Figure 6.3.1-1**. This figure is a groundwater level comparison contour map for Water Years 2004 through 2009. Review of the map indicates that it is a comparison map for water levels from 2004 and 2009. Please correct the title appropriately. In addition, the RVO has recently produced a water level difference map to be included in the FYSR. Please consider adding the water level difference map to the FYR Report or replacing Figure 6.3.1-1 with the water level difference map.

Response: The title has been revised as requested. The water level difference map will only be included in the FYSR, which provides the detailed information about the water programs.

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Response to RVO Responses on the Laboratory Data Quality Assurance Review and Evaluation

RVO General Response regarding the EPA's Laboratory Data Quality Assurance Review and Evaluation

In addressing EPA comments 53 to 58 regarding the EPA's Laboratory Data Quality Assurance Review and Evaluation, it should be pointed out that the RMA laboratory data quality program was developed over 20 years ago based on USATHAMA procedures and protocols. At the time that was the best system available, as EPA CLP protocols had not been developed for chemical agent analytes. To maintain program and data quality consistency, these processes have been kept in place. The RVO *Chemical Quality Assurance Plan* provides requirements for data to be assessed, qualified, and documented, and specifies that the RMA Quality Assurance Program (QAP) shall be used as the basis for development and implementation of quality requirements for project-specific plans and the analytical chemistry support program data collection and reporting requirements. The RVO CQAP details the analytical requirements necessary to meet the RMA QAP. Subtier documents required by the RVO CQAP, including the PMC CQAP and Data Validation Plan, demonstrate a traceable flowdown of requirements for implementation. Outside laboratories contracted to provide analytical laboratory support are required by contract to comply with the CQAP requirements and are subject to audits to ensure compliance. The RVO is not aware of any breakdowns or disconnects in the implementation of this approved process that would call into question the assessment of chemical data produced over the course of the RMA remedy, and plans no changes to the processes in place except as indicated in the comment responses below.

Comment 53. **General Comment 1**. This comment describes the need for transparency for database users and also the need for having indications in the database that individual data might have been examined, or validated but confirmed with no change. The RVO response indicates that a "1" in the "Loc_comm_num" field indicates that the data has not been changed as result of data review or validation. However, the response does not alter EPA's comment that it is impossible to identify data that have been validated but not rejected from data that have been automatically accepted without validation. The first paragraph of the response suggests that the Sample Tracking Program (STRACK) could be modified to provide this information, but does not commit to actually modifying the database.

The RVO provided two examples to illustrate the process currently in force for changing the qualifiers on data that had been automatically rejected due to hold time exceedances to "accepted." In both cases the data were changed to "accepted" because someone sent an email requesting the change. No justification is provided by the reviewer for the change, and the technical qualifications established for those individuals who can request a change to the data are not clear. Therefore, the existing change control process is questionable and the comment remains unresolved. Please update the database as suggested in RVO's comment response.

Response: The Sample Tracking (STRACK) program will be modified to indicate, for laboratory data going forward, which lots have been validated. Data users can then calculate the percentage of the data that has been validated, and identify data that have been validated but not rejected from data that have been automatically accepted without validation. The initial RVO response to this comment in the Draft FYRR has been revised to clearly state the STRACK program will be modified. In addition, for the example provided in the initial response regarding data lot ULN, the database manager will be requested by a change letter to change the flag code from 'A' back to 'R' (rejected) on the basis of the missed holding time.

Comment 54. **EPA General Comment 2**. This comment suggests that the operational documents for data validation (i.e., the PMC *Chemical Quality Assurance Plan* and the PMC *Data Validation Plan*) be part of the Administrative Records Facility (ARF). The RVO response indicates that the PMC *Chemical Quality Assurance Plan* (PMC 2007) and PMC *Data Validation Plan* (PMC 2006) will not be submitted to the ARF, in part because these plans must comply with and follow the RVO *Chemical Quality Assurance Plan* (RVO 2009), which is in the ARF. However, EPA review of the PMC *Data Validation Plan* indicates that there are important details and checklists that are not included in the RVO *Chemical Quality Assurance Plan*. Therefore, it is unclear how the PMC *Data Validation Plan* can mimic the RVO *Chemical Quality Assurance Plan* when this topic is not covered in significant detail by the RVO *Chemical Quality Assurance Plan*. It is agreed that the RVO *Chemical Quality Assurance Plan* is an acceptable substitute for these "proprietary" plans when it can be shown that the RVO *Chemical Quality Assurance Plan* contains all of the information that is in these other plans. Please update the RVO C*hemical Quality Assurance Plan* to include the details that are presented in the PMC *Data Validation Plan*.

Response: The RVO *Chemical Quality Assurance Plan* requires data to be assessed, qualified, and documented, and references the EPA National Functional Guidelines for informational purposes only. Additional requirements documented in the RVO CQAP are designed to provide specific validation guidance for Performance Based Methods (PBM). PBMs were developed at the inception of the RMA program to address the analysis of target analytes not certified by the EPA CLP Program. The PMC CQAP includes guidance for Method Certification which includes calculation of the Method Reporting Limit (MRL). Data validation is addressed in the PMC *Chemical Quality Assurance Plan* by reference to the PMC *Data Validation Plan*. As a subtier document under the PMC *Chemical Quality Assurance Plan*, the PMC *Data Validation Plan* implements these requirements and includes data evaluation checklists that utilize the EPA National Functional Guidelines for guidance. The Guidelines are referenced in the PMC *Data Validation Plan*. Therefore the PMC *Data Validation Plan* does not mimic the RVO *Chemical Quality Assurance Plan*; rather, it implements the RVO plan requirements. With this flow down and traceability adequately documented in the plans, no revisions to the RVO *Chemical Quality Assurance Plan* are necessary. The initial version of the PMC

Chemical Quality Assurance Plan (Revision 0) was transmitted to the RVO for review to ensure that the content and structure met the expectations of the RVO, and is on file at the JARDF. The updated versions of the PMC *Chemical Quality Assurance Plan* (Revision 4) and PMC *Data Validation Plan* will be submitted to the JARDF to further support the RVO CQAP. The initial RVO response to this comment in the Draft FYRR will be revised to include the above discussion.

Comment 55. **EPA General Comment 3**. This comment questions to what degree the PMC *Chemical Quality Assurance Plan* adheres to the EPA National Functional Guidelines as required in the RVO *Chemical Quality Assurance Plan* (i.e., whether the validation procedures used by the PMC were linked to the National Functional Guidelines). Because the RVO response has not specifically addressed this question, and because the PMC *Chemical Quality Assurance Plan* (the operational validation document) does not make reference to the Guidelines, it is unclear that the "professional judgment" used for data validation at RMA is or has been consistent with the Guidelines. Therefore the issue remains unresolved. Please explain where/how the National Functional Guidelines are addressed in the PMC Chemical Quality Assurance Plan.

Response: The RVO CQAP references Functional Guidelines for informational purposes. Additional requirements documented in the RVO CQAP are designed to provide specific validation guidance for Performance Based Methods. Performance Based Methods were developed at the inception of the RMA program to address the analysis of target analytes not certified by the EPA CLP Program. Performance Based Methods are the basis for the RMA analytical program and have been since its inception, and therefore supersede Functional Guidelines for the program at RMA. Guidelines present in the RVO CQAP for Performance Based Methods are present in the PMC CQAP including the use of identified qualifiers. The PMC *Data Validation Plan* references Functional Guidelines and in conjunction with the PMC CQAP contains specific guidance for the evaluation of analytical data generated by Performance Based Methods. The initial RVO response to this comment in the Draft Five Year Review Report will be revised to include the above discussion.

Comment 56. **EPA General Comment 4**. This comment addresses the question of the availability of protocols for data validation and that the use of "professional judgment" may not provide consistency with respect to the data validation effort over the FYR period. The EPA recommended that procedures for applying the data qualifiers based on data validation checklists, be identified and documented (similar to National Functional Guidelines – see comment 3).

The RVO response indicates that the program is based on "professional judgment", and has been implemented the same way since the inception of the program. It should be acknowledged that, by nature, professionals in any industry are individuals and can change opinions based on new information and research. Further, the PMC *Data Validation Plan* does not include written

procedures for applying qualifiers to the data. The RVO response cited laboratory contracts in place as a source of consistency for data quality. Therefore, these contracts are an integral part of the validation procedure and should be part of the PMC *Data Validation Plan*. It is suggested that the relevant parts of these contracts defining data quality for the database be part of the PMC Data Validation *Plan* and also be described in the RVO *Chemical Quality Assurance Plan*.

Response: The PMC *Data Validation Plan* in conjunction with the PMC *Chemical Quality Assurance Plan* contains specific guidance for the evaluation of RMA analytical data. The quality control requirements for the development of certified methods and required laboratory audits are clearly defined in the PMC *Chemical Quality Assurance Plan*. The individual laboratory contracts include applicable sections of the PMC *Chemical Quality Assurance Plan.* The laboratory data are evaluated for adherence to these requirements, and data qualifiers specific to the program and identified in the PMC *Chemical Quality Assurance Plan* are applied when appropriate. The data qualifiers utilized are not those identified in EPA Functional Guidelines but are those specific to the RMA program and have been utilized since its inception. In addition, the contracted laboratories are periodically audited to ensure compliance with the laboratory quality assurance requirements. All laboratories performing work in support of RMA remediation activities are also required to analyze Performance Evaluation samples prepared by an independent source. The PMC uses the results of the Performance Evaluation samples as an additional tool to evaluate the performance of the laboratories. The initial RVO response to this comment in the Draft Five Year Review Report will be revised to provide the above clarification.

Comment 57. **EPA General Comment 5**. This comment questions whether *the Post-Laboratory Water Quality Assessment Procedure* (RVO 2007) is appropriate to reject data, or whether it should only be used to determine data usability. The RVO response does not provide significant justification for using *the Post Laboratory Water Quality Data Assessment Procedure* (RVO 2007) to reject data. The *PMC Data Validation Plan* is used to validate all data on a routine basis whereas *the Post Laboratory Assessment Procedure* is not routinely applied for the data at RMA, and appears to only be used on data that ”looks” anomalous relative to other data collected for the same location. Therefore it is a “judgment” on the part of the reviewer that triggers a decision as to whether to use the procedure. In the case of water data, the analyses are dynamic due to natural factors (such as plume shifting, precipitation, etc.), such that the data are always changing at any point in time, and makes reliance on laboratory data validation more critical to the quality of the result than the observational approach used in *the Post Laboratory Water Quality Assessment Procedure.*

The RVO response also indicates that a data validation is always performed before the *Post Laboratory Water Quality Data Assessment Procedure* is used. However, in response to EPA Comment 1 the RVO has provided two examples where data were automatically rejected due to hold time issues yet data

qualifiers were changed by the reviewer (it is unclear if the changes were done using the *Laboratory Water Quality Data Assessment Procedure*) with no indication that a validation was performed on the auto-rejected data prior to changing the qualifier. The RVO response indicates that the data validation specialist is always consulted prior to the post-laboratory investigation, but the two emails quoted in the response to Comment 1 show no concurrence from the data validation specialist.

It is suggested that data that are not rejected through the formal data validation process should not be rejected through the Post Laboratory Water Quality Assessment process because the data validation process is quantitative and the *Post Laboratory Water Quality Data Assessment Procedure* is in part qualitative and only focused on a subset of the data values received at RMA. Changing validation codes because of suspected errors is not consistent with standard industry practice. Determining that a result is a false value without specific proof of an error compromises the validation process. Data is valid unless it fails the validation procedure; this is consistent with the previous RVO response citing the reproducibility of the validation effort over the FYR period. Data should be considered valid, but can be assessed as "unlikely" or "unusable" with an explanation provided. Degrading a laboratory data result quality compromises the design, sampling, analysis, and validation effort established in the RMA chemical quality assurance program. EPA suggests that a usability qualifier, that may result from the *Post Laboratory Water Quality Data Assessment Procedure*, be used in a way that does not compromise or supersede the more rigorous laboratory validation process, and does not agree that data should be rejected based on a usability assessment.

Response: The EPA is correct that the *Post Laboratory Water Quality Data Assessment Procedure* is only used on data that appear anomalous relative to other data collected for the same location. The decision to utilize the procedure is the responsibility of the entity generating the data and is based on an internal review of the data conducted by the data generator. The RVO recognizes the dynamic nature of water quality data; however the *Post Laboratory Water Quality Data Assessment Procedure* is utilized for data that appear anomalous to a degree that exceeds what one would expect due to natural factors. The procedure is implemented on an extremely limited basis; in fact it has been utilized on only 0.0027 percent of the CSRG data generated since the procedure was implemented in February 2007 (two out of over 74,000 data points).

The data referred to by the EPA in Comment 1 were not evaluated using the *Post Laboratory Water Quality Data Assessment Procedure,* thus further discussion in this response is not warranted.

The RVO will revise the *Post Laboratory Water Quality Data Assessment Procedure* in a manner that data will not be rejected based on the procedure. Data evaluated by the procedure that are not considered usable will be assigned a "Z" data qualifier (questionable data). Also, in regard to the DIMP detection

above the CSRG in well 37032 that occurred in August 2009, the RMA Environmental Database will be amended to change the August 10, 2009, sample result flagging code for the DIMP result from "R" (rejected) to "Z" (questionable). The RVO will notify the Regulatory Agencies in the future of potential application of the *Post Laboratory Water Quality Data Assessment Procedure*, and when resampling is performed due to data assessment.

The initial RVO response to this comment in the Draft FYRR will be revised to add the discussion provided above.

Comment 58. **EPA General Comment 6 and 7**. These comments dealt with the change control process and subsequent document control for Rocky Mountain Environmental Database (RMAED) data entries. The RVO response indicates that an improved process for change control of data in the RMAED will be implemented. The response indicates that the data QC change requests will go to PMC. However, it is not clear who in PMC is to receive these letters and what qualifications they possess to ensure they are the appropriate judge to make data qualifier changes. The procedure should identify the requisite qualifications (such as the analytical program manager) for an individual who serves as the focal point for these correspondences and indicate that this individual has the authority to review and approve these requests.

Response: DPRA, Incorporated maintains the RMAED under contract to the Army. DPRA proposed a centralized approval process. Please refer to the original responses to EPA Comments 6 and 7 and specifically to the database change approval process discussed in the response to Comment 6. The process has been addressed and implemented as stated in the original response.

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Remediation Venture Office's (RVO) Responses
to
U.S. Environmental Protection Agency's (EPA)
April 8, 2011, Technical Comments
on the
Draft Final 2010 Five-Year Review Report, Revision E
Rocky Mountain Arsenal, Commerce City, Colorado

Comments for Incorporation

General Comments

Comment 1. The Five-Year Review Report (FYRR) is intended to be a site-wide evaluation of the remedy but is discussed on an operable unit (OU) basis. The Rocky Mountain Arsenal Site (RMA) has had 28 Interim Remedial Actions IRAs that EPA tracks as separate OUs. Twenty-four IRAs contributed to and/or were incorporated into the final remedy for OU 3, the OnPost OU, and another 4 IRAs contributed to and/or were incorporated into the final OffPost (OU 4) remedy. Two of the OffPost IRAs became part of the Chemical Sales Company Superfund Site. The development of the 2005 FYRR without discussing the relationship of the IRAs to the OnPost and OffPost OUs was raised as a concern during the Inspector General audit recently conducted on Five-Year Reviews.

It is recommended that Section 1.0 (fifth paragraph of page 1?) and the Executive Summary be revised to include language such as: "The RMA Site consists of 30 OUs (numbers 0 through 29) including 24 Interim Response Actions (IRA) conducted between October 1985 and June 1996 as part of the On-Post (OU 3) remediation and 4 IRAs completed in 1993 for remediation of the Off-Post (OU 4). The IRAs were conducted to prevent or minimize further migration of groundwater contaminants and eliminate potential releases from source areas through isolation or destruction of the contaminants. The 24 IRAs (OUs 6 through 29) either contributed to or were incorporated into the final remedy for OU 3 (OnPost OU). Four IRAs (OUs 00, 01, 02, and 05) contributed to the final remedy for the OU 4 (OffPost OU). One IRA (OU 5) was incorporated into the final remedy for OU 4 and two IRAs (OUs 01and 02) became part of the Chemical Sales Company Superfund Site. Five-Year reviews for these two OUs are conducted as part of the Chemical Sales Company Superfund Site.

Response: The RVO does not agree with changing the OU nomenclature referenced in the FYRR. The Off-Post and On-Post OU grouping of ROD implementation projects has been in place since the RI/FS phase of the RMA project and, for consistency, will continue to be used in the document. However, the FYRR text in Section 1 and the Executive Summary was revised to include general language regarding the OUs as they are addressed in the FYRR, and a reference to an appendix listing the OUs as they are tracked by EPA. The appendix will

include a summary of the information requested by EPA as well as a table provided by EPA that cross-references the FYRR project numbers and the OUs.

Comment 2. Based on the discussion in the previous comment, please indicate the OU number for each protectiveness statement (OU 3 for the OnPost and OU 4 for the OffPost). Issues & recommendations should also be identified on an OU-specific basis. For issues and recommendations that are relevant to both OU 3 and 4, they only need to be listed once but should indicate both OUs.

Response: Please refer to Response to General Comment 1 for further explanation.

Comment 3. A sitewide protectiveness statement should not be issued until all OUs have achieved construction completion, i.e., once an operational and functional (O&F) determination has been made for all remedy phases, if appropriate, and a Construction Completion Report (CCR) is approved. For the 2010 FYRR, an O&F determination and approved CCR have not been achieved for the Miscellaneous Structures Demolition IV, Groundwater Mass Removal, Landfill Wastewater Treatment System, Basin F Exterior II, and Integrated Cover System projects. Please revise the Executive Summary and Section 10.0 to remove the sitewide protectiveness statement.

Response: As stated in Response to General Comment 1, the RVO will perform the evaluations for the On-Post and Off-Post OUs, and will make protectiveness statements on this basis.

Comment 4. Protectiveness statements are made based on the status of each OU and should follow the language in Exhibit 4-6 of the FYR guidance verbatim. The first part of Exhibit 4-6 is for OUs that have not achieved construction completion such as OU 3, the OnPost OU; and the second part is for OUs like OU 4, the OffPost OU, which are operating or completed. It is inconsistent to “remain protective” and use the “expected to be protective” language for the same OU.

The rationale used to support the protectiveness should be revised to include specific reasons. For example, while it is true that institutional controls (IC) are in place, the rationale should describe what is controlled by the ICs (new permit owners are notified of groundwater contamination, intrusive activities at remedy consolidation projects are prohibited to prevent exposure to contaminants and protect remedy effectiveness, etc.). In addition, the protectiveness statement should discuss how each OU is meeting the respective remedial action objectives established in the Records of Decision (ROD). The protectiveness statement rationale should also identify if adequate systems are in place (remedy construction, (O&M plans, ICs) to ensure long-term protection.

Response: As explained in Response to General Comment 1, the RVO does not plan to revise the established OU concept for the site. The FYRR was revised to include the reasons for remedy protectiveness. RAOs are included where applicable.

Comment 5. Throughout the FYRR, please answer 3 questions as you describe each component of the remedy, as follows:

a. Which OU is this component in?

b. How does the description relate to protectiveness, both short-term and long-term? For example, water treatment systems have been constructed and are operating properly to reduce contaminant concentrations in groundwater to below remediation goals.

c. Are adequate systems in place to provide protectiveness? For example, Operation and Maintenance (O&M) plans associated with each water treatment system have been developed and implemented effectively, and groundwater ICs are in place and effectively prohibiting use of groundwater.

Response:

a. As stated in Response to General Comment 1, the OU definitions requested by EPA will be included in an appendix and will not be included in the review and evaluation sections of the FYRR. Please refer to Response to General Comment 1 for further details.

b. The protectiveness discussion was expanded as requested.

c. Appropriate text regarding whether "adequate systems are in place" was added for each component.

Comment 6. Anywhere concentrations of a contaminant are mentioned in the text, identification of the remedy standards would be informative to the reader. This would be especially true for DIMP because it is not a common contaminant. Discussion of benchmarks, state standards, and whether DIMP is a human health or environmental risk issue, possibly in Section 6.3.1.4 or Section 3.0. This would provide a context for the discussion in Section 6.3.2.3 that indicates the frequency of DIMP standard exceedances has increased in offsite surface water sampling since the last 5YR.

Response: Remedy standards frequently are mentioned when contaminant concentrations are discussed in the Draft Final FYRR. However, the text was reviewed and remedy standards were added where appropriate.

Comment 7. The Environmental Protection Agency (EPA) approved a new standard promulgated by the State of Colorado in 2009. The standard establishes a limit of 6.1 ug/1 for 1,4-dioxane for domestic water supply uses. 1,4-dioxane is not an identified Chemical of Concern at RMA though 1,1,1-trichloroethane (1,1,1-TCA) is COC for the Basin A Neck System. 1,4-dioxane is associated with 1,1,1-TCA because of its use as a stabilizer for 1,1,1-TCA. Also, because 1,4-dioxane has a higher mobility and is more toxic than TCA, screening or testing for 1,4-dioxane is needed where 1,1,1-TCA is found, even when the TCA is

below the MCL. Can the Remediation Venture Office provide any historical information regarding the composition of the 1,1,1-TCA that is present at RMA or if analytical data is available for 1,4-dioxane?

Once an initial assessment is made regarding information available about 1,1,1-TCA and 1,4-dioxane at RMA, Section 7.5 and, potentially, the protective statements made need to be revised.

Response: RVO has no historical information about composition of the 1,1,1-TCA solvent used at RMA or analytical data for 1,4-dioxane. However, 1,4 dioxane is not a COC for RMA, there is no 1,4-dioxane ARAR for any water treatment system, and there are currently no complete exposure pathways to RMA groundwater that could contain 1,4-dioxane. Therefore, no changes in the protectiveness statements are needed for the 2010 FYRR.

The RVO will add language to section 7.4.7 of the FYRR indicating that a change in toxicity criteria for 1,4-dioxane occurred during this five-year review period and that the RVO will meet with the regulatory agencies during the next five-year period to evaluate whether 1,4-dioxane should be identified as a COC at RMA.

Specific Comments

Comments due to Inaccuracies, Omissions, or Incompleteness

Comment 8. **Section 4.2.2.1, Pages 54 and 55.** The first complete paragraph on Page 55 discusses the LWTS and indicates that the LWTS is monitored based on the Landfill Wastewater System Closure Plan. However, the LWTS was also monitored prior to initiation of the Closure Plan during the FYR period. Please discuss the LWTS monitoring and reporting during the FYR period prior to the closure monitoring, and provide the reference for the monitoring plan under which the monitoring was conducted.

Response: Discussion of the LWTS monitoring and reporting during the FYR period prior to the closure monitoring, along with appropriate references, were added to Section 4.2.2.1.

Comment 9. **Section 5.0, Page 121.** The header to this Section refers to the "2005 Five-Year Review" that was completed in 2007. Please revise the header to reflect "2005 Five-Year Review (completed 12/20/2007)" so it can be tracked with the database that EPA maintains.

Response: The heading was revised to include completion date.

Comment 10. **Section 5.2, Pages 121 - 134.** All issues identified in the last FYRR are presented in this section. The Shell Dewatering Trench is listed twice in Table 5.2-1 and should be corrected. Table 5.2-1 as well as the subsequent narrative does not identify the status of each issue (complete or on-going), the OU

associated with each OU (for issues that are applicable to both OU 3 and OU 4, such as the Extraction Well and Extraction System Shut-Off Criteria issue, list the issue only once and indicate both OUs), and the date (mo/day/yr) that each follow-up action was completed or the milestone date when the on-going follow-up actions will be completed. EPA's Annual Update for the Five-Year Review is provided as an example.

The "Establishing Practical Quantitation Limits" (PQL) and "Off-Post Groundwater Intercept and Treatment System Performance Objectives Clarification" issues have not been completed and will have a status of "continued in the next FYR." As a result, these issues should be added to the evaluations in section 7 and the issues and recommendations in sections 8 and 9.

Response: The second Shell Trenches Dewatering listing was removed from Table 5.2-1. Please refer to Response to General Comment 1 regarding OU concept. The available dates were included as requested.

The RVO agrees that the PQL issue status be revised to "continued in next FYR." However, the objectives clarification for OGITS as a mass removal system was first documented as part of the 2005 issues resolution in Section 9.8 of the 2005 FYRR, which states:

> *This FYRR clarifies that the OGITS has been and will continue to be operated as a mass removal system in accordance with the design and ROD documentation. The revised LTMP will provide specific performance criteria for evaluation of system mass removal effectiveness to facilitate future system evaluation presented in the OARs and FYRs. The Army believes that the need to clarify the overall remedial objectives of the system has not affected the system operation or protectiveness of the remedy during the FYR period.*

The performance criteria for the system were developed during the FYRR period and were included in the 2010 LTMP, which was issued on March 9, 2010, before the document cut-off date of March 31, 2010.

Comment 11. **<u>Section 6.3.1.7, Page 149</u>.** This section describes the Enhanced Hazardous Waste Landfill (ELF) groundwater monitoring and Leachate Collection System/Leak Detection System (LCS/LDS) monitoring. New text has been added describing the leak detection sumps and the action leakage rate (ALR) calculations. Please correct the following two statements which are inaccurate:

a. This section explains that leak detection water is defined as the liquid that is collected in the landfill LDS including any consolidation water draining from the clay liners overlying the LDS. Please correct this description to accurately describe three sources of flow into the LDS sumps. As described in the ELF Post Closure Plan (PCP), Appendix D, *ELF Operational Action*

Leakage Rate/Response Action Plan: "Potential flow to the LDS sumps can include three sources. The first contributor is consolidation water released from the clay liner as the clay void ration decreases due to increased load. The second contributor to the LDS sumps is potential leakage through the composite system. The last contributor is potential surface water that collects at the liner anchor trench." (TtEC 2010).

b. This section also states that "The ALR is the liquid flow rate that, when withdrawn from the secondary leak detection and LDS sumps, warrants follow-up actions." Please correct this definition to accurately describe the ALR as defined in the ELF PCP, Appendix D, *ELF Operational Action Leakage Rate/Response Action Plan*, which states: "The ALR is the liquid flow rate that, when withdrawn from the primary of secondary leak detection and removal system (LDS) sumps, warrants follow-up actions." (TtEC 2010).

Response:

a. The text was revised as suggested.

b. The text was revised as suggested.

Comment 12. **Section 6.3.5, Page 157.** This section is new and describes the Resource Conservation and Recovery Act (RCRA)-Equivalent cover percolation monitoring. This discussion does not describe the soil moisture monitoring that was conducted on the Shell Disposal Trenches (SDT) RCRA-Equivalent cover during the five-year review (FYR) period, as defined in the *Shell Disposal Trenches Soil Remediation Project, Soil Cover Moisture Monitoring System Operations and Maintenance Plan* (TtEC 2007). Please include a brief summary of the soil moisture monitoring and data reporting for the SDT RCRA-Equivalent Cover.

Response: Section 6.3.5 was revised to add discussion of soil moisture monitoring and data reporting for the SDT RCRA-Equivalent Cover.

Comment 13. **Section 7.1, Pages 161 - 165.** This section evaluates remedy components that are under construction, i.e., not completed. The Groundwater Mass Removal (GWMR) project, required as part of a modification to the OnPost ROD is not evaluated within Section 7. The GWMR is briefly mentioned in Section 7.2.3.8 related to operation of the CERCLA Wastewater Treatment Facility. The GWMR project has not been completed and should be evaluated in Section 7.1 utilizing Question A: "Is the remedy under construction functioning as intended by the decision documents?" Please provide the required evaluation of the GWMR project in Section 7.1.

Response: The requested evaluation of the GWMR project was added to Section 7.2.1.8.

Comment 14. **Sections 7.1.1 through 7.6, Pages 161 - 194.** Sections 7.1.1 through 7.6 evaluate the various RMA remedy components grouped by their construction status. It is preferred that the evaluation be conducted for all work components within an OU so that issues and/or protectiveness statements can be developed for each OU, consistent with the FYR guidance.

Response: The OU definitions as requested by EPA will not be included and no change will be made to the document organization. Please refer to Response to General Comment 1 for further explanation regarding how the OUs were addressed.

Comment 15. **Sections 7.1.1 through 7.1.9, Pages 161 - 165.** Several of these sections make reference to ICs that satisfy the OnPost ROD requirements though there is no detailed discussion of the OnPost ROD requirements though there is no detailed discussion of the OnPost ICs that are in effect for the entire, original OnPost OU of RMA regardless of the deletion status of the various remedy components. Please provide a detailed discussion of the OnPost ICs, similar to Section 7.2.2.3that discusses the OffPost ICs, to support the IC statements within Sections 7.1.1 through 7.1.9. c.

Response: Discussion was added to Section 7.2.3 for on-post ICs.

Comment 16. **Sections 7.2 and 7.3., Pages 165 - 186.** Comments related to these sections are provided below.

a. These sections primarily discuss optimization from an implementation perspective. The FYRR evaluation should also focus on conditions currently present. For example, water treatment may be post-construction but can still benefit from optimization. Please provide additional evaluation of potential optimization opportunities for the current status of the RMA remedy.

b. In addition, evaluation of the RMA remedy for Question A should address if the timeframe for groundwater cleanup, especially for the natural attenuation portion of the remedy, is on track with expectations in the ROD.

c. Due to the presence of volatile contaminants like TCE in groundwater, it would be beneficial to include a discussion of the efforts that have been completed to address vapor intrusion for both the OffPost and OnPost OUs. This would include an understanding of the buildings that remain at RMA and their relative location to the relevant groundwater plumes, the prohibition to constructing buildings with basements in the OnPost OU and the conduct of a vapor intrusion assessment in the OffPost OU. Please revise the FYRR to include a vapor intrusion discussion that includes these considerations.

Response:

a. Optimization of operation of the groundwater containment and mass removal systems is ongoing under the individual system operations

programs. Opportunities for optimization were discussed in the FYRR for the groundwater systems where appropriate. Examples of actual and potential optimizations include (1) optimization of extraction well pumping and recharge rates relative to current reverse gradient conditions; (2) optimization of extraction well pump sizes relative to current flow rate requirements; (3) optimization of UV treatment for NDMA at the NBCS; (4) optimization of extraction well pumping requirements relative to current plume conditions; (5) evaluation of potential shutdown of the NWBCS SWE and RYCS; (6) evaluation of potential shutdown of portions of the original OGITS NPS extraction well field; and (7) evaluation of the addition of manganese treatment at BANS.

b. The Draft Final FYRR already addresses whether the remedy is on track with respect to chloride and sulfate attenuation. For example, Section 7.2.1.7 in the Draft Final FYRR states that chloride and sulfate concentrations were below CSRGs in the NBCS effluent during the FYR period. A statement was added in Section 7.2.1.7 that both chloride and sulfate concentrations have consistently met CSRGs in the NBCS effluent since 2005, which is earlier than predicted in 1996 when the remediation goals for the NBCS were developed (MKE 1996) and when the On-Post ROD was signed. Section 7.2.2.1 already states that the CSRGs have already been met at the NBCS and it is anticipated that the chloride and sulfate concentrations in the OGITS effluent also will meet CSRGs earlier than the timeframes in the ROD.

Comment noted, but RVO does not feel that any additional discussion in the 2010 FYRR is warranted. There was no ROD remedy identified to address the potential migration of volatile chemicals from RMA groundwater, so there is no remedy project to review. The prohibition against basement construction is an existing land use control that does not require explicit reiteration in the FYRR. The EPA evaluation of vapor intrusion for the Offpost OU was completed in 2004 and was discussed in the 2005 FYRR. This evaluation does not require discussion again in the 2010 FYRR.

Comment 17. **Table 7.2.3-1, Pages 172 and 174.** This table lists formal notifications and follow-up actions for the LWTS. Revision C of the FYR Report (FYRR) included documentation of a break in the dual containment piping on September 20, 2005. This event has been removed from the table in Revision E of the FYRR. Please include the event, or provide rationale for removing it from Table 7.2.3-1.

Response: Upon further review, this event was determined to be more appropriately labeled as routine maintenance. A Regulator Notification did not occur and thus the event was removed from the table. There was not a release to the environment since the manhole captured the liquid and the link seal was repaired.

Comment 18. **Table 7.4.2-2, Pages 189 and 190.** This table lists the PQLs for the various treatment systems. The PQL changes for the Off-Post Groundwater Intercept and Treatment System (OGITS) do not include chlordane so it is not clear if the PQL for this compound is still in place or whether chlordane is now being monitored to the Containment System Remediation Goal (CSRG). Review of recent analytical results for chlordane in the Rocky Mountain Arsenal Environmental Database (RMAED) indicate that the method reporting limit (MRL) for alpha chlordane is below the CSRG of 0.03 ug/L, but the MRL for gamma chlordane is not below the CSRG. Please add chlordane to Table 7.4.2-2 and provide discussion as to whether chlordane isomers are being monitored to the CSRG or to the PQL. If the chlordane isomers are monitored to the PQL, please discuss why this compound was not included in the recent PQL study.

Response: The MRL for alpha-chlordane is 0 .0287 µg/L, and the MRL for gamma-chlordane is 0.0386 µg/l. The chlordane method is being recertified and should meet the CSRG.

Comment 19. **Section 8.0, Page 195.** This section presents issues arising from the FYR evaluation. Missing from this section are the "Establishing Practical Quantitation Limits" and "Off-Post Groundwater Intercept and Treatment System Performance Objectives Clarification" issues which are a carryover from the 2005 FYRR. Because these issues have not been resolved within the review period for the 2010 FYR, please add them as issues in this section.

For the issues identified in Table 8.0-1, please identify the respective OU and include a reference to the section in Chapter 7 where each issue is addressed. Alternatively, the table could be expanded to include a discussion of how the issue presents a concern for short- or long-term protectiveness.

Response: "Establishing Site-Specific Practical Quantitation Limits" was added to the Table 8.0-1 issues. Please refer to Response to Specific Comment 10 as to why the OGITS objectives clarification will not be included as a carryover issue.

The respective OUs, as requested by EPA and addressed in Response to General Comment 1, will not be included, but the requested section reference was added to the table.

Comment 20. **Table 8.0-1 and Section 8.3, Pages 195 and 196.** The table identifies the sanitary sewer pipe as an issue, though Section 8.3 indicates that the evaluation and follow-up actions have been completed. As a result, it is not clear why this issue was carried into Section 9. If the work is completed, no follow-up action is required and the issue can be removed from Section 9.

Additionally, Section 8.3 does not provide the rationale for why the discovery of the sanitary sewer pipe potentially affected protectiveness of the remedy. Please revise the text to discuss the rationale underlying the OnPost remedy,

i.e., that sewer piping could act as conduits for transporting contaminants through the soils/groundwater.

Response: The RVO agrees. This issue was removed from Section 9.0 since no follow up is needed. The discussion in Section 8.3 was revised to describe the potential effect on protectiveness.

Comment 21. **Table 9.0-1, Page 197.** Rather than repeat the protectiveness assessments from Table 8.0-1, the responsible party for implementing the follow-up action, the oversight party, and the completion milestone (mo/day/yr) should be provided for each issue. In addition, it is recommended that the language of the follow-up actions for the Land Use Controls be stronger than "clarify" or "request" to ensure their effectiveness.

Response: Because the Army is the lead party it is ultimately responsible for implementing all follow-up actions. The protectiveness column was removed and the milestones were revised to include a month and year. Although the language of the follow-up actions for Land Use Controls seems vague, it is necessarily so because the Army is requesting action from Commerce City where they have no authority to implement change.

Comment 22. **Section 9.4, Page 199.** This section is new and addresses follow-up actions for addressing the issue with the lack of Regulatory Agency notification. This section explains that as additional plans are prepared or existing plans are revised, they will include notification triggers to ensure the Regulatory Agencies are informed. It is recommended that his section include a minimum list of plans for review and incorporation of notification triggers, such as the Long-Term Environmental Management System Plan, the Land Use Control Plan, the Response Plan for Recovered Material Potentially Presenting an Explosive Hazard, etc.

Response: This section was revised to include a list of plans that require completion with notification requirements or revision for inclusion of notification triggers.

General Comments

The U.S. Environmental Protection Agency (EPA) submitted the following comments on the draft version of the 2010 FYRR to the Remediation Venture Office (RVO) on September 22, 2010. The FYRR, as revised, does not fully address EPA's expectations for their resolution.

Comment 23. **EPA Comment 9.** This comment recommended that Section 2.4.1 include a brief description of the Shell Property Ready for Reuse (RfR) Determination. Because the Shell Property RfR area is shown on Figure 6.3.2-1, a brief description of the Shell RfR Determination is appropriate in Section 2 or another applicable section of the FYRR.

Response: Section 2.1.5 was revised to include discussion about the Shell Property RfR determination.

Comment 24. **EPA Comment 11.** This comment on Section 4.0 indicated that there is a difference of opinion between EPA and the RVO as to what projects should be considered "operating" versus what projects should be considered "operational and functional" in the FYRR. The RVO response to this comment indicates that this issue remains unresolved. Additional discussion of what projects should be considered "operational and functional" should be included in a comment resolution meeting on this version of the FYRR.

Response: As stated previously, the RVO believes the definition provided is consistent with EPA Comprehensive Five-Year Review Guidance and does not rely on operational and functional determination, which is used to determine when remedial actions have entered the long-term O&M phase.

Comment 25. **EPA Comment 31c.** This comment on Section 6.3.2.1 indicated that due to the undocumented changes in the surface water monitoring program, failure to change the SAP governing the surface water program, and failure to notify the Regulatory Agencies of the changes constitutes an issue in the FYR. Based on this comment, the text in the FYR was updated to try and justify this program change. However, EPA does not agree with the justification provided in the updated text. The second paragraph in this section should be re-written as follows, based on language negotiated in the 2010 Long-Term Monitoring Plan for Groundwater and Surface Water (LTMP).

"In 2004, the RVO discontinued water quality monitoring of surface water flowing onto RMA from the south and resulted in collection of samples from only 7 of the 12 sites identified in the 2001 Surface Water SAP (FWENC 2001c). The Regulatory Agencies were not notified about the change in the monitoring program, and the lack of notification is identified as an issue in Section 8.0."

In addition, the last paragraph in this section states, "Since contaminated soil excavation for the On-Post remedy has been completed, an MCR for the On-Post ROD-required surface water monitoring will be prepared. On-Post surface water quality monitoring will be discontinued with the FY10 implementation of the LTMP." This statement is incorrect. Section 6.3 of the LTMP states, "Short term surface water monitoring needs related to remedy completion and establishing vegetation on soil covers will be addressed separately from the LTMP." Therefore, the LTMP does not curtail On-Post surface water monitoring. Also, RVO's response to Comment 7a on the Five Year Summary Report for Groundwater and Surface Water states, "Short-term surface water sampling will be conducted until the vegetation is established in selected areas where borrow area soils were placed and revegetated." However, this sampling has not been conducted to date. Please update the FYR in Sections 6.3.2.1 and 7.2.3.5 to remove statements justifying the removal of the surface water monitoring upstream of RMA, and that the LTMP documents the discontinuance of surface water monitoring On-Post. In addition, the third paragraph in Section 6.3.2.1 should be re-written to the following:

"Monitoring of surface water occurred while remedial actions were being conducted. At the end of FY09, the soil contaminant remedy areas had clean backfill, Subgrade and intermediate or final cover on the surface, thereby eliminating movement of contaminated soil to surface water. Short-term surface water sampling identified by RVO to be conducted until the vegetation is established in selected areas where borrow area soils were placed and revegetated has not yet been implemented."

Response: The RVO believes that providing the rationale for discontinuing monitoring of some of the south boundary surface water sites in the FYRR is appropriate for the public's benefit. The description of the lack of notification of the Regulatory Agencies and identification as an issue in the FYRR addresses the programmatic concerns.

The last paragraph in this section was clarified that "long-term" on-post surface water monitoring will be discontinued with the FY10 implementation of the LTMP.

The RVO has agreed to conduct short-term confirmatory surface water sampling on-post as requested by the Regulatory Agencies. However, the DQOs and scope for this additional monitoring are not clear to the RVO. Please provide EPA's suggestions for the DQOs and scope to the RVO to help facilitate discussion of this issue and/or implementation. The third paragraph in Section 6.3.2.1 was revised as requested by EPA, but with a minor change, as follows:

> Monitoring of surface water occurred while remedial actions were being conducted. At the end of WY09, the soil contaminant remedy areas had clean backfill, subgrade and intermediate or final cover on the surface, thereby eliminating movement of contaminated soil to surface water. <u>Short-term confirmatory surface water sampling identified by RVO is to be conducted until the vegetation has been established in selected areas where borrow area soils had been placed and where revegetation has not yet been implemented</u>.

Comment 26. **<u>EPA Comment 33</u>.** This comment requested that Section 7.1.2 of the FYRR be expanded to discuss the identification of potential stormwater migration into the LDSs of the ELF and to explain that this was a potential operating problem. The response states that the RVO disagrees with this comment and no changes were made to the document. However, as discussed in the comment/resolution meeting with RVO and the Regulatory Agencies on November 30, 2010, the fact that stormwater can enter into the LDSs of the ELF, during post-closure as well as during the cover construction, has been acknowledged by RVO and is well documented (e.g., in the ELF PCP), and additional monitoring for this situation is required. As agreed upon on November 30, 2010, please revise the discussion of the ELF in Section 7.1.6 to identify the potential for stormwater to enter the

LDSs, to note that this may complicate the detection of leakage from the landfill, and to note that to mitigate this situation 1) the design was modified to add permanent trench drains, and 2) additional monitoring, sampling, analysis, and reporting requirements are identified in the ELF PCP to assess the possible presence of stormwater in the LDSs during the post-closure period. Please also correct the response to EPA Comment 33, as discussed on November 30, 2010.

Response: The RVO's understanding of this discussion in the November 30, 2010, comment/resolution meeting was that during cover construction, when the BBM drainage layer, water storage layer, and vegetative layer had not yet been constructed, stormwater did enter into the ELF WP LDSs. But the RVO's discussion also concluded that after construction of the full cover, to include the DCN for the trench drain system, empirical data indicated that stormwater was not entering into the ELF WP LDSs. The RVO's analysis of the empirical data was that any fraction of stormwater that might soak into and migrate through the water storage layer and drainage layer, and eventually enter the anchor trench, would preferentially flow out the trench drains and not collect/pool in the anchor trenches. The ELF PCP does list stormwater as a potential contributor to the LDS sumps if it collects at the anchor trench. But the trench drain system prevents the collection/pooling of any stormwater in the anchor trench. For this reason, the RVO agreed in the ELF PCP to "additional monitoring, sampling, analysis, and reporting requirements" that would help to confirm the continued functioning of the trench drain system.

The empirical data collected during this five -ear review period (after the construction of the full cover and trench drain system) indicate stormwater is not entering into the ELF WP LDSs. EPA speculates that data collected during some future FYR period could indicate failure of the trench drain system, which could manifest itself in some stormwater entering the ELF WP LDSs. If such a scenario were to occur during a future FYR period, it would be an issue for that FYRR. It cannot be an issue for this FYR period.

Comment 27. **EPA Comment 34.** This comment requested a discussion of the use of soil from former Human Health Exceedance (HHE) areas as backfill and gradefill when areas outside of the Basin F Cover were cut to grade. The response indicates that the discussion in Section 4.2.1.5 will be expanded to address this comment, but Section 4.2.1.5 has not been revised. There is also discussion of this situation in Section 4.2.3.14 which is probably sufficient. Please either include a brief summary of the use of soil from former HHE areas as backfill and gradefill in Section 4.1.1.5, or revise the response to the comment.

Response: Section 4.2.1.5 was revised to discuss the actions completed as part of the Basin F Cover project.

Comment 28. **EPA Comment 35.** This comment requested that Section 7.1.7 include a statement to indicate that another goal of the RI/FS for the Lime Basins Dense Non-Aqueous Phase Liquid (DNAPL) project was to assess whether the

DNAPL has had or could have a detrimental impact on slurry wall integrity, as discussed in the RI/FS Work Plan. The FYRR has not been revised to add this component of the RI/FS. Please revise the FYRR as requested.

Response: The section was revised to be consistent with the slurry wall impact goal identified in the RI/FS Work Plan.

Comment 29. **EPA Comment 45b.** This comment requested that the PQL values for aldrin, dieldrin, and n-nitrosodimethylamine (NDMA) not be updated because the PQL study that supports these changes has not been completed. The RVO agreed and removed the changes to the PQL for dieldrin, but did not remove the updated PQL for aldrin, and left the PQL for NDMA as TBD [to-be-determined]. Please replace the PQL values for aldrin and NDMA with the previous PQL values.

Response: The 2005 PQL values for aldrin, dieldrin, and NDMA were included in the Final 2010 FYRR in Table 7.4.2-2.

Comment 30. **EPA Comment 47.** This comment includes the possible issues that were identified during the 2010 FYR period. RVO has included some of these issues in Section 8.0, and has identified some of these issues as "events." The FYRR provides very little discussion of how the term "event" is defined and used. Given that term "event" is not part of EPA's Five-Year Review Guidance. Please provide additional discussion of what qualifies as an "event" as opposed to an "issue" in the FYRR.

Response: The event definition presented to the Regulatory Agencies in the November 2010 Comment Review meeting for the Draft FYRR was included in the Final FYRR.

Comment 31. **EPA Comment 50b.** This comment indicated that operating groundwater remedies in Table 2.0-2 be changed from "transferred" to "incorporated" to reflect that these systems were part of the final remedy and included additional requirements to those assigned at the time of the Interim Response Actions (IRAs) for these systems. The name change was made in Section 7.0 of the document but this table was not updated. Please update Table 2.0-2 to adopt the same language that was changed in Section 7.0.

Response: Table 2.0-2 was revised to indicate where IRAs were incorporated into the final RA, consistent with the change in definition in Section 4.0. There are no references to transferred projects remaining.

References

TtEC (Tetra Tech EC, Inc.

2010 (May) *Enhanced Hazardous Waste Landfill Post Closure Plan*. Revision 0.

2007 *Shell Disposal Trenches Soil Remediation Project, Soil Cover Moisture Monitoring System Operations and Maintenance Plan*. Revision 0.

2006 (June) *Shell Disposal Trenches Soil Remediation Project, Soil Cover Moisture Monitoring System Operations and Maintenance Plan*. Revision 2.

Walker, D. Lewis (Deputy Assistant Secretary of the Army, Environment, Safety, and Occupational Health)

1993 (Feb.) Letter to Jack McGraw Acting Regional Administrator of EPA Region VII Regarding the Construction of Buildings with Basements at RMA. February 3.

TECHNICAL COMMENTS ON THE
2010 FIVE-YEAR REVIEW REPORT, REDLINE/STRIKEOUT VERSION
REVISION G, JUNE 9, 2011
ROCKY MOUNTAIN ARSENAL, COMMERCE CITY, COLORADO

COMMENTS FOR INCORPORATION

GENERAL COMMENTS

Comment 1: In a meeting on June 6, 2011, with the Remediation Venture Office (RVO) and the Regulatory Agencies regarding reassessment of institutional control requirements, it was revealed that seasonal interns working for the U.S. Fish and Wildlife Service (USFWS) have been living on the Rocky Mountain Arsenal (RMA) during summer months. It is the understanding of the U.S. Environmental Protection Agency (EPA) that seasonal USFWS employees have lived at RMA during the summers of 2009, 2010, and again in 2011. The EPA considers this to be a residential use of RMA land and is therefore a violation of the intent of the institutional control established under the Federal Facility Agreement that prohibits residential development on RMA. Please revise the 2010 Five Year Review Report (FYRR) to include this violation of the institutional control as an issue in Section 8.0. Information regarding this issue should also be added to supporting sections of the FYRR, such as Section 7.2.3.9, 8.2, Table 9.0-1, and Section 9.2.

Response: The FFA restriction cited by EPA specifically prohibits residential development. The RVO understands EPA's perspective; however, the RVO considers the use of a trailer on RMA as living quarters for seasonal USFWS employees to be an occupational use, not residential development. Therefore, in the RVO's view, there has been no violation of the residential development institutional control established under the FFA.

Since occupational residential use on RMA was not specifically addressed in the FFA or the ROD, the USFWS requested a qualitative risk assessment from the RVO for this use in 2009, prior to allowing the seasonal workers to reside in the bunkhouse. In 2009, a qualitative risk assessment, based in large part on results from the previous RMA baseline risk assessment (Ebasco 1994), identified no unacceptable potential health risks for the Biological Worker in the bunkhouse area (Klingensmith 2009). The 2009 qualitative risk assessment was an internal document within the RVO and was not provided for Regulatory Agency review. Occupational residential use was therefore approved by the RVO.

The Regulatory Agencies have requested, and the RVO has agreed to perform, a quantitative risk assessment to provide additional information regarding the occupational residential exposure scenario before the 2012 field season.

Text was added to Section 7.4.6.2 that will identify this item as an issue for follow-up in the next Five Year Review.

Comment 2: EPA Comment 7 on the Draft Final FYRR (Revision E) stated that, depending on an initial assessment for information available about 1,1,1-trichloroethane and 1,4-dioxane, the protectiveness statements may need to be revised. The RVO response indicates that there is currently no analytical data for 1,4-dioxane at RMA. Therefore, conclusions made with respect to the nature and extent of this compound are unsupported and should be removed. Please identify this as an issue in Section 8.0.

Response: Based upon historical information, past sampling results for RMA-related 1,1,1 TCA and new sampling and analysis data, the RVO and the Regulatory Agencies will evaluate whether 1,4-dioxane is present in RMA groundwater, and if it is, whether 1,4 dioxane should be identified as an RMA COC and included in the list of ARARs. Text has been added to Section 7.4.7 to indicate the scope of this evaluation.

Comment 3: EPA Comment 63 c, requested that the FYRR include a vapor intrusion discussion that identifies the buildings that remain at RMA and their relative location to the relevant groundwater plumes, the prohibition of constructing buildings with basements in the On-Post Operable Unit (OU), and reference to the vapor intrusion assessment that was conducted in the Off-Post OU. The response explains that RVO does not feel that any additional discussion in the FYRR is warranted because there was not a remedy related to vapor intrusion. Despite the fact that there was not a remedy related to vapor intrusion, it is appropriate for the FYRR to evaluate whether this is a potential exposure pathway. Please describe and reference the Off-Post OU vapor intrusion evaluation. Also, please evaluate whether vapor intrusion is an exposure pathway of concern for On-Post OU (e.g., describe buildings remaining on site, relative locations of these buildings to groundwater plumes, concentrations of VOCs within those plumes), and assess whether evaluation of vapor intrusion for the On-Post OU should be identified as an issue requiring follow-up action.

Response: The following text was added to Section 7.4.8 of the document:

EPA performed a formal evaluation of the vapor intrusion pathway for off-post groundwater in 2004 and concluded that there were no unacceptable health risks from this pathway (EPA 2004).

The RVO has informally evaluated the vapor intrusion issue for on-post groundwater at RMA and concluded that vapor intrusion is not a pathway of concern for exposure to RMA contaminants. The only VOC-containing groundwater plume that is in the vicinity of public buildings is under the RMA Administration Area, which includes Buildings 112, 112A, 120, 121, 124, 128, 128A, 129, 130, 132, 133, 180, 181, NID35-1, NID35-2, and NID35-3. The only VOC contained in this plume is chloroform. The most recent chloroform

concentration measured in this plume was 3.1 µg/L (USGS 1997). This concentration is well below the screening level contained in the vapor intrusion guidance document (80 µg/L; EPA 2002) and, as per the guidance, no further evaluation is necessary. The vapor intrusion pathway, therefore, is not a pathway of concern at RMA and no further follow-up action is required.

Comment 4: In light of these three issues (seasonal workers 1,4-Dioxane and vapor intrusion), there are several portions of the FYRR where additional information/evaluation is required to address unknown risks. Until this additional information/evaluation has been completed, the protectiveness statements for both the On-Post and Off-Post Operable Units should be revised to reflect the "protectiveness deferred" statement identified in the EPA Five Year Review Guidance (Page 4-21).

Response: As explained above, none of the three items identified in this comment raise any concern regarding protectiveness of the remedy. Two of the issues (occupational residential use by seasonal USFWS workers and potential presence of 1,4 dioxane in groundwater) will be identified as issues requiring further follow-up in the next Five Year Review.

SPECIFIC COMMENTS

Comments Due to Inaccuracies, Omissions, or Incompleteness

Comment 5: **Section 2.1.5, Page 8.** This section describes the Off-Post partial deletion and new language has been added regarding the Ready for Reuse determination for the Shell Property. Please revise this information to clarify that most of the Shell Property is ready for use for any purpose allowed under local land use and zoning laws subject only to restrictions put in place pursuant to the Offpost Record of Decision (ROD) which include prohibition against construction of alluvial wells until groundwater standards in the ROD are met, and prohibition against use of deeper groundwater until groundwater standards in the ROD are met (EPA 2009).

Response: The text has been revised to reflect the land use restrictions specified in the Off-**Post ROD.**

Comment 6: **Section 3.0, Page 10.** This section provides background information for RMA and explains that no risk assessment was conducted for on-post groundwater contaminants of concern (COCs). The FYRR should discuss that there were no risk assessments conducted for any of the primary institutional controls identified in the Federal Facilities Agreement (FFA). Please revise this section to correctly describe all of the FFA restrictions and to correctly summarize Section 6.0 of the On-Post ROD that states, "At RMA, a risk assessment called the Integrated Endangerment Assessment/Risk Characterization (IEA/RC) was performed and used as the baseline risk assessment. In this instance, the IEA/RC defined baseline to include … enforcement of the FFA's use restrictions. The FFA prohibits residential development; potable use of groundwater and surface water; agricultural activities for the purpose of

raising livestock, crops, or vegetables; and the consumption of fish and game taken from RMA. Therefore, these uses were not considered during the IEA/RC." (FWENC 1996).

Response: The text has been revised to clarify this issue.

Comment 7: **Table 5.2.1, Pages 123 through 125.** This table provides the status of follow-up actions from the 2005 Five-Year Review. The following are comments on this table:

a. This table discusses the site specific practical quantitation limits (PQL) issue. The status of the follow-up action for this issue has been revised to indicate that the new PQLs, resulting from the PQL study, will be documented in an RMA decision document and language referring to an Explanation of Significant Difference was removed. At this time, EPA is not aware that the Regulatory Agencies have agreed that an RMA decision document will be appropriate for the purpose of documenting the PQL changes. Please indicate that the PQL changes will be documented in a ROD change document (Fact Sheet, ESD or ROD Amendment).

b. This table includes discussion of the North Plants Fuel Release issue. New information is included that describes the follow-up actions and explains that the pilot study project is ongoing as of the end of the five-year review period. Because this issue from the previous five-year review is not yet resolved, the discussion of the progress on the evaluation of the North Plants Fuel Release should be included as a follow-up action in Section 9.0.

Response:

a. The change to the process for establishing PQLs is included in the groundwater ESD that is under revision. Changes to standards/ARARs are typically evaluated at each FYR and no ROD change documentation is necessary. In this case, however, it is recommended that a fact sheet be issued to inform the public that the PQLs for aldrin, dieldrin and NDMA have been lowered.

b. The 2005 FYR recommendation was that the "The LNAPL will be evaluated in accordance with applicable requirements during the next FYR period." The performance of the pilot study and the FYR conclusion that "Through the end of the FYR period (September 30, 2009), no LNAPL had accumulated in the recovery wells" address the 2005 FYR issue and no follow-up action is required.

Comment 8: **Section 6.3.5, Page 160.** This section describes percolation monitoring for the RCRA-Equivalent Covers. New text is included that describes the soil moisture monitoring conducted on the Shell RCRA-Equivalent Cover. The new text states, "Data, to date, demonstrate that a functional capillary barrier has formed in the Shell Disposal Trenches RCRA-Equivalent Cover and is performing as expected." To date, the soil moisture evaluation of the capillary barrier is in the initial stages.

Please revise this statement to explain that there are initial indications of capillary barrier development, but that a full evaluation of the performance of the capillary barrier cannot be completed until additional wetting and drying cycles are monitored.

Response: Section 6.3.5 has been revised to generally discuss how current monitoring data are used, when performance standards are enforceable, and how monitoring data will be used to support the O&F determination.

Comment 9: **Section 7.2.1.4, Page 170.** This section describes the Railyard Containment System. New text indicates that potential optimization activities at the Railyard Treatment System may include shutdown monitoring. Shutdown of a system is not an optimization opportunity. Please remove the discussion of system shutoff as an optimization activity.

Response: The discussion will be removed as requested.

Comment 10: **Section 7.2.1.8, Page 174.** This section is new and describes the groundwater mass removal (GWMR) project. The following are comments on this section:

a. First Full Paragraph: As identified in Table 2.0-2, the GWMR project was in an "operating" status during the FYR period and did not terminate operations until June 2010. Therefore, statements that discuss whether the project functioned as intended, its success in achieving the remedy objectives, or that discuss/justify the termination of the project are premature and should be removed. Please revise the FYRR text to factually discuss the construction and operation phases of the GWMR project during the FYR period, as is already done within the rest of this Section.

b. This section states that there are no early indicators of potential issues that have been identified. It would seem that discovery of the benzene light non-aqueous phase liquid (LNAPL) media, whose nature and extent is currently unknown, should be identified as an early indication of a potential issue.

Response:

a. The text has been revised to state that the project *is functioning* as intended. The statement regarding meeting remedy objectives has been removed.

b. The LNAPL discovery in the South Plants mass removal wells does not constitute new information or a potential issue for the GWMR project as the presence of LNAPL in this area was documented in the RI.

Comment 11: **Section 7.2.3.9, Page 182.** This section is new and provides an assessment of On-Post institutional controls during the five-year review period. This section explains that a monitoring report was issued to document land use control monitoring activities for fiscal year 2009. Please correct this statement to explain

that a monitoring report was issued to document land use control monitoring activities for fiscal years 2006 through 2009 (RVO 2010)

This section also indicates that two issues related to land use controls were identified that required corrective actions. However, four corrective actions are identified in the report (RVO 2010). Please revise this section to correctly identify that there were four corrective actions. In addition, please summarize the discussion of low water levels in Lake Ladora and Lower Derby Lake and explain why there are no associated corrective actions associated with the low water levels (RVO 2010).

Response: The text has been revised to discuss issuance of the revised report for fiscal years 2006 through 2009. The text has also been revised to state that there were three corrective actions associated with the two issues discussed. The fourth corrective action was associated with the exposed sewer pipe, which is identified as a separate issue in Section 8. Clarifying text has been added to address this issue as it relates to the land use control monitoring effort. Also, a summary of the monitoring results for lake level maintenance has been added as requested.

Comment 12: **Section 7.4.2.1, Pages 192 and 193.** The last paragraph in this section is new and discusses that, since 2008, the analytical method for gamma chlordane has not been able to achieve the containment system remediation goal (CSRG) of 0.03 micrograms per liter (µg/L) which had been achieved previously. The last sentence in this paragraph indicates that it is not expected that chlordane would be present above the CSRG in effluent compliance samples from 2008 through 2011. However, this statement is unsupportable without data analyzed at a level that would indicate whether the CSRG had been exceeded. Also, this discussion includes 2011, which is beyond the five year review period. Please remove the 2011 discussion from this section.

Response: The discussion has been removed as requested.

Comment 13: **Section 7.4.7, Page 198.** This section discusses changes in toxicity assessment variables. New text in this section indicates that 1,4–dioxane has a newly promulgated groundwater standard that has not been detected in RMA groundwater. Review of the Rocky Mountain Arsenal Environmental Database indicates that there have been almost no historic groundwater analyses for 1,4–dioxane, and the two analyses that exist (from 1984) are above the standard. Please revise this section to explain that there has been very little analysis for 1,4–dioxane in the groundwater at RMA, and that because 1,1,1-trichloroethane is a COC, and has a close association with 1,4-dioxane, this is an issue for the five year review. Please identify the need to evaluate the presence of 1,4-dioxane at RMA as an issue in Section 8.0.

Response: The RVO agrees that no groundwater analysis for 1,4-dioxane has been performed at RMA. It should be noted that EPA's example of 1,4-dioxane concentrations in groundwater samples that were above the standard in 1984 were

actually from two drilling water source samples (identified site_type 'DRWM'), not from groundwater wells. The need to evaluate the potential presence of 1,4-dioxane in groundwater has been identified as a FYRR issue in Section 8.0 with a recommendation to do sampling in the next FYR period. Because 1,4-dioxane typically is present at levels of 2 percent or less in commercial 1,1,1-TCA, which was never used extensively at RMA and which is not a major RMA groundwater constituent, the RVO does not expect that 1,4 dioxane will become a COC. Additionally, because there is no complete pathway for exposure to RMA groundwater contamination, there is no expected impact on remedy protectiveness even if 1,4 dioxane is present. Based upon historical information, past sampling results for RMA-related 1,1,1 TCA, and new sampling and analysis data, the RVO and the Regulatory Agencies will evaluate whether 1,4-dioxane is present in RMA groundwater, and if it is, whether 1,4 dioxane should be identified as an RMA COC and included in the list of ARARs. Text has been added to Section 7.4.7 to indicate the scope of this evaluation.

Comment 14: **Section 9.6, Page 207.** This section is new and discusses the recommendation for follow-up for the evaluation of 1,4-dioxane. The following are comments on this section:

a. The text indicates that 1,1,1-trichloroethane has only been detected occasionally, has been limited in extent, and are of low concentrations. EPA's review of the RMAED identified hundreds of detections of 1,1,1-trichloroethane both On-Post and Off-Post and that the highest concentration in groundwater has been 2,200 µg/L. Please correct the statements made in this section to reflect the information within the RMAED with respect to the nature and extent of 1,1,1-trichloroethane.

b. The text suggests that, based on the conclusions made with respect to the nature and extent of 1,1,1-trichloroethane, that 1,4-dioxane would exist well below detection limits and is, therefore, unlikely to be a potential health concern. This is counter to known characteristics of 1,4-dioxane which make it more persistent in the environment and more toxic than 1,1,1,-trichloroethane. To date, there has been no focused program to collect or analyze groundwater for 1,4-dioxane at RMA and, therefore, conclusions made with respect to the nature and extent of this compound are unsupported and should be removed.

c. This section indicates that a technical memorandum will be prepared during the next five-year review period to document the evaluation for 1,4-dioxane. Also, please explain that, if appropriate, a ROD change document will also be prepared (Fact Sheet, ESD or ROD Amendment).

Response:

a. No correction is necessary. Many of the historical 1,1,1-trichloroethane detections in groundwater are associated with the Scott's Liquid Gold and

Chemical Sales Company plumes on post in western Sections 4, 9, and 33, and off-post south and west of RMA. In the 2009–2011data sets, 1,1,1-TCA was detected in only 7 of 304 wells at concentrations ranging from 0.292 µg/L to 1.86 µg/L. EPA's example of a groundwater sample concentration of 2,200 µg/L was a questionable value (Z flag) with a corresponding sample (using a different analytical method); previous, subsequent, and adjacent well samples were below reporting limits.

b. Please see the response to Comment 13.

c. The results and evaluation of the 1,4-dioxane sampling program will be documented in a technical memorandum. Further documentation needs for potential changes will be determined based on the evaluation and identified in the memorandum.

Comment 15: <u>Appendix B</u>. Appendix B contains the RVO responses to the comments from the Site Specific Advisory Board (SSAB). Please make the following clarifications to these responses:

a. SSAB Comment 6 addresses the adequacy of the 2010 Long Term Groundwater Monitoring Plan (LTMP). The RVO response indicates that the 2010 LTMP addresses all current and future monitoring needs. This statement is incorrect because project-specific monitoring and deletion monitoring are not included in the LTMP. In addition, the LTMP does not identify the requirements for monitoring Basin F, the Hazardous Waste Landfill, or the Enhanced Hazardous Waste Landfill. Please correct the response accordingly.

b. The third issue identified by RVO in the Geofirma Engineering Ltd./Intera Inc. report is with regard to the Off-Post Groundwater Intercept and Treatment System. The RVO response indicates that the number of upgradient wells used for performance monitoring of the Off-Post systems is considered adequate by RVO and the Regulatory Agencies. It would be more appropriate to explain that the upgradient performance well information from the Off-Post systems will be evaluated after a five-year monitoring period because changes to the monitoring program were implemented with the 2010 LTMP. Also, please explain that the determination of the adequacy of upgradient monitoring networks to provide sufficient data for the mass flux estimates will be evaluated at that time.

c. The RVO response to the third issue also indicates that there were no wells downgradient of the Northern Pathway System that were above the CSRGs, and only diisopropylmethly phosphonate (DIMP) was found downgradient of the First Creek System. This statement is incorrect. Based on the 2009 Offpost Exceedance Map, arsenic, chloride, and sulfate were all above the CSRG in downgradient wells at the Northern Pathway System; and sulfate and chloride, in addition to DIMP, were above the CSRG in downgradient wells at First Creek. Please revise the text accordingly.

Response:

a. The response has been revised to reflect that the monitoring programs identified by EPA are not included in the LTMP.

b. The response has been revised to reflect that the upgradient well information will be evaluated after a 5-year monitoring period to assess the mass removal performance criteria established in the 2010 LTMP. The upgradient well data will also be evaluated because changes to the monitoring program were implemented with the 2010 LTMP.

c. The response will be revised to apply to organic contaminants.

Previously Submitted Comments

Comment 16: **EPA Comment 25**. This comment was on Section 6.3.2.1 and questioned the discussion of the termination of the surface water monitoring locations On-Post. The EPA provided suggested language for this topic. The RVO did not include this language and left the original language supporting the termination of these monitoring locations in the document. The language in the second paragraph of this section is acceptable if the first part of the paragraph is changed to read, "In 2004, the RVO discontinued water quality monitoring of surface water flowing onto RMA from the south because, in RVO's opinion, sufficient historical data had been collected…."

Response: The text has been revised as requested.

References

Ebasco (Ebasco Services Incorporated)

1994. Integrated Endangerment Assessment/Risk Characterization. Version 4.2. (4 Volumes).

EPA (U.S. Environmental Protection Agency).

2009. Ready for Reuse Determination, Shell Property. September 3.

2004. Rocky Mountain Arsenal, Off-Post Area Vapor Intrusion Assessment.

2002. OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance). U.S. Environmental Protection Agency, Washington, DC, November 2002.

FWENC (Foster Wheeler Environmental Corporation)

1996. Record of Decision for the On-Post Operable Unit. June.

Klingensmith, J.S.

2009 Risk Evaluation for FWS Bunkhouse. May.

RVO (Remediation Venture Office)

2010 *Land Use Control Monitoring Report for Fiscal Years 2006 through 2009*. Revision 1. June.

TAB C

RESPONSES TO TRI-COUNTY HEALTH DEPARTMENT COMMENTS

Remediation Venture Office's (RVO) Responses
to
Tri-County Health Department's (TCHD) July 19, 2010, Technical Comments
on the
Draft 2010 Five-Year Review Report, Revision C
Rocky Mountain Arsenal, Commerce City, Colorado

General Comments:

Comment 1. In several sections the natural attenuation of chloride and sulfate is mentioned. It has been a substantial period of time since the ROD was adopted with this requirement. Has there been evidence collected to date that demonstrates this occurrence? If so can this be added to the text?

Response: Since, as discussed during the LTMP meetings conducted during this FYR period, the attenuation does not just refer to natural process, but also to decreasing groundwater flow from the former Basins C/F source area upgradient of the north boundary, the term was changed to "attenuation." Also, as confirmed in the 2010 LTMP, the attenuation is tracked through effluent monitoring at NBCS and OGITS, in addition to the off-post CSRG Exceedance monitoring. The effluent results for the systems have been presented annually in the OAR and are summarized in the FYRR. The chloride and sulfate CSRGs already are met in the NBCS effluent. The text has been reviewed and revised to ensure that information stating that the attenuation is on track to meet the goals by 2021 and 2026 as required by the On-Post ROD is included.

Comment 2. The document refers to the various partial deletions that have occurred at the RMA, yet this text is misleading since only the surface area has been deleted. Can the text be revised to make this distinction in the appropriate sections?

Response: The text has been revised to discuss surface and groundwater deletions.

Comment 3. There are several references to the LTMP within this document, but it is not always specified if this is the 1999 or 2010 LTMP. Can the document be checked for consistency since both documents are used for evaluations? In addition, can the language included at the end of Section 6.3.1.4 be included with all sections that pertain to monitoring networks that have recently been changed in the 2010 LTMP?

Response: The requested revisions have been made.

Specific Comments

Comment 4. **ES-1, 5th paragraph, last sentence:** Institutional Controls in the Off-post do not "restrict" groundwater use. Can this language be checked?

Response: The text has been revised to state that the institutional controls are used to reduce the potential for exposure to groundwater exceeding remediation goals.

Comment 5. **Five-Year Review Summary Form, page 1 of 3, Issues: second paragraph Land Use Controls Monitoring:** The three issues noted in the first sentence are not clearly presented. It appears that there are only two issues. Can this be clarified?

Response: The text has been revised to clarify that there are two issues.

Comment 6. **Five-Year Review Summary Form, page 2 of 3, Exposed Sanitary Sewer Pipe:** Please consider taking out the language "if necessary" at the end of the sentence.

Response: The text has been deleted as requested.

Comment 7. **Five-Year Review Summary Form, page 2 of 3, Recommendations, Land Use Controls Monitoring, second sentence:** It is noted that four corrective actions were identified, but only three are presented in the bullets following the paragraph. Can this be clarified?

Response: The fourth item is the exposed sanitary sewer, which is separate from the Land Use Controls. The text has been revised to state that there are three corrective actions from Land Use Controls Monitoring.

Comment 8. Section 3.0, page 11, last paragraph, and last sentence: Should the referenced section be 7.2.2.3?

Response: Yes, the section number should be 7.2.2.3. As a result of changes made in response to other comments, however, the reference to the section is no longer needed.

Comment 9. **Section 4.1, page 15, first full paragraph:** The last sentence of this paragraph states that the FYSR "presents any new issues identified for the review period." It is TCHD's understanding that the FYSR would be used to analyze data and that any issues would be presented in the FYRR. Can this statement be removed?

Response: The text has been revised to refer to operational, compliance, and monitoring events identified in the FYSR, since FYR issues are now only identified in the FYRR.

Comment 10. **Section 4.1.1, page 15, second paragraph:** This paragraph states that the 1999 LTMP satisfies the requirements of the On-post and Off-post RODs. However, it is not clear that the new 2010 LTMP will do the same. Can an explanation be provided that discusses how both documents have and will continue to satisfy ROD monitoring requirements?

Response: This section refers to the monitoring program conducted during the FYR period assessed in this document, which was the 1999 program. The assessment of the 2010 monitoring program will be included in the next FYRR.

Comment 11. **Section 4.1.1.1:** This section discusses each extraction and treatment system and whether the system has achieved its stated performance criteria. This section is also very large and does not separate each system into subsections as was done in the 2005 FYRR. In addition to the comments below, can each system be separated into unique subsections for easier reference?

- Northwest Boundary Containment System, page 17, Secondary Performance Criterion: Can it be clarified how "performance" and "conformance" wells relate to each other in these two paragraphs? Can a reference to the language in Section 5.2.11 be included here? Also see NBCS secondary performance criteria.

- North Boundary Containment System, page 17, second paragraph: It is stated that chloride and sulfate levels are to be attenuated over time periods of 30 and 25 years, respectively. Can the start date for these time periods be provided?

- North Boundary Containment System, page 18, Table 4.1.1-2: 1,2 Dichloroethane and carbon tetrachloride are not footnoted in this table as they are in Table 4.1.1-1. Can this be reviewed for consistency?

- Off-Post Groundwater Intercept and Treatment System, page 23, first paragraph, last sentence: Can it be explained why the two original extraction wells will continue to be operated? In the first bullet on page 25 that notes mass removal as a performance criterion, should it be noted that this performance criterion was evaluated without data from the First Creek System? Also in the last paragraph of this section, it is noted here and in several sections that chloride and sulfate will meet CSRGs by attenuation. Since this ROD requirement is a stated goal should evidence be provided that this is occurring?

- South Plants and Lime Basins Mass Removal Project, page 27, last paragraph in section: This summary statement is in contrast to similar evaluations made in the 2010 FYSR (Section 5.1.1.6.2) since mass removal projections were not met due to unanticipated circumstances. Can text be added to specify how project goals have been achieved and what criteria were used?

Response:

- Section 4.1.1.1 has not been divided into numbered subsections as this would require use of 5th order headings.

- The text has been revised to explain that the downgradient conformance wells from the 1999 LTMP and the downgradient performance wells in the 2010 LTMP serve similar purposes – to monitor downgradient concentration trends.

- The compliance dates of 2026 and 2021 for meeting the chloride and sulfate CSRGs in the NBCS effluent, respectively, have been added.

- 1,2-Dichloroethane and carbon tetrachloride are not footnoted in Table 4.1.1-1 and no footnotes in Table 4.1.1-2 appear needed.

- The text has been revised to explain that a Design Change Notice (DCN-NPS-FCD-03) to the NPS Modifications design document was issued after the new system became operational, and indicated that two more wells may be required in the vicinity of NE-13 (well 37817) and NE-14 (well 37818) to allow for the shutdown of the old system. The final DCN for the project clarified that a new well was not required in the area of DW-13, and that downgradient extraction wells 37809 and 37810 would continue to operate to intercept flow that bypasses NE-14 (well 37818). The OGITS mass removal criteria are discussed further in Section 7.2.2.1. The progress toward meeting the chloride and sulfate CSRGs is also discussed.

- Although mass removal for the Groundwater Mass Removal Project was less than estimated in the design document, achieving the estimated mass removal was not a requirement. The Groundwater Mass Removal Project was functioning as intended in the decision documents because the mass removal was maximized as much as practicable.

Comment 12. Section 4.1.1.3

- Complex (Army) Trenches Slurry Walls (Dewatering), Page 28, last paragraph in section, first sentence: Can the dewatering well that did not attain the dewatering goal be provided?

- Shell Disposal Trenches Slurry Walls, Page 29, last paragraph: Can it be stated what progress has been made in lowering the water table within the slurry wall and can the actual target water elevations be given as is done with CAT?

- Lime basins Dewatering Wells, Page 30, last paragraph in section: Can the progress that was achieved during the four month period be provided?

Response:

- The compliance well (36217) that did not achieve the dewatering goal has been identified.

- The progress toward lowering the water table within the slurry wall is discussed. The trench bottom elevations were determined in six boreholes. The trench bottom elevation for the boring where the water level is still above the bottom of the trench is included in the revised text. The term "target water elevation" has not been used for the Shell Trenches because monitoring wells are not located at the borehole locations, which serve as the compliance points. Attainment of the dewatering goal is determined by interpolating the water elevation contours between wells located near the slurry wall and comparing the contours to the trench bottom elevations in the boreholes.

- The progress toward meeting the Lime Basins dewatering goals during the 4-month operating period is provided in the revised text.

Comment 13. **Section 4.2.3.2, page 53, second full paragraph**: Please check the code title, "Standards for Owners and Operators of Interim Hazardous Waste Treatment, Storage, and Disposal Facilities".

Response: The title has been corrected.

Comment 14. **Section 4.2, pages 30-94**: The On-Post soil projects listed in this section and subsections often state that revegetation, air emissions and odor controls, are ROD standards and goals for the respective projects yet there are many projects where these requirements are not discussed in the subsequent text. Can text be included that addresses these requirements? See the following sections.

- Section 4.2.3.7, Existing (Sanitary) Landfills Remediation Section 1, page 59

- Section 4.2.3.9, Munitions (Testing) Soil Remediation Parts II - IV, page 63

- Section 4.2.3.10, Miscellaneous Northern Tier Soil Remediation, page 67

- Section 4.2.3.11, South Plants Balance of Areas and Central Processing Area Soil Remediation Phase 2, Parts 1 and 2, page 70:

- Section 4.2.3.12, Sanitary Sewer manhole Plugging Project Phase II, page 74

- Section 4.2.3.13, Section 36 Balance of Areas Soil Remediation Parts 1 and 2, page 76

- Section 4.2.3.14, Secondary Basins Soil Remediation, NCSA-2d, page 80:

- Section 4.2.3.16, Miscellaneous Southern Tier Soil Remediation, page 83:

- Section 4.2.3.17, Basin F Wastepile Remediation, page 85:

- Section 4.2.3.18, Former Basin F Principal Threat Soil Remediation, page 87

- Section 4.2.3.19, Basin F/Basin F Exterior Remediation Part 1/Phase1, page 89

- Section 4.2.3.20, Basin F/Basin F Exterior Remediation Part 1/Phase II, page 92

Response: Text has been added to the relevant sections of the FYRR to discuss air emissions and odor controls for the on-post soil remedy projects that have corresponding ROD standards and goals. Revegetation is discussed in the project sections where revegetation was a component of the remedy.

Comment 15. **Section 5.2.4, page 111**: The final sentence implies the study was "conducted" in early 2010. From page 163, it appears there were 3 studies of which two are complete. Can the text be updated and clarified before this 5YRR is finalized?

Response: The PQL studies, as described in the RVO PQL Procedure and Work Plan, were completed in early 2010. However, based on the variability in analytical results, it was decided, in consultation with CDPHE chemists and members of the Work Group for the CDPHE PQL Guidance, to conduct additional performance evaluation studies to establish more realistic PQLs based on statistical analysis of results from multiple laboratories. The FYRR text has been revised to include the current status.

Comment 16. **Section 5.2.9, page 113, last paragraph of section**: Can the text that regarding the final DCN be incorporated into the discussion on page 23 as it is done here? Also see Section 7.2.2.1.

Response: The requested revisions have been made.

Comment 17. **Section 6.1, page 118, first paragraph**: This section indicates that this volume of the FYRR only addresses "significant inspection findings", yet it is stated in Section 8.0 that the five year review process also identifies issues "during the technical assessment or other FYR activities." Can this be clarified in the text?

Response: The discussion referred to here addresses the inspection findings specifically and this discussion is not related to the issues identification and discussion in Section 8.0.

Comment 18. **Section 6.2, page 118**: Can this section be expanded to include:

- What concerns or issues were raised by the community through public notices, meetings and interviews?

- What documentation is available memorializing those concerns or issues?

- A reference to where public comments and responses regarding the FYRR can be found.

Response: The text has been expanded to include the most recent information on the public review process.

Comment 19. **Section 6.3.1, Groundwater, page 119**: Since the frequency for the water quality and water level tracking categories are referenced in the first two bullets, can the frequency for the remaining categories also be stated in the final three bullets?

Response: The frequencies have been added as requested.

Comment 20. **Section 6.3.1.2, page 124, first bullet top of page**: Based on the data presented in the Five-Year Summary Report (Section 5.1.1.4) it appeared that DDT was increasing in wells 26006 and 35505. Can this be clarified?

Response: The text has been revised to state that DDT had an increasing trend in one well in Basin A Neck downgradient of the BANS, but this is a small-scale, short-term variation within a relatively stable long-term trend.

Comment 21. **Section 6.3.1.3, page 124:**

- This section discusses the CFS monitoring network in accordance to the 1999 LTMP but neglects to address any assessments or changes made to the network in the 2010 LTMP as was done with other programs. Can this be included?

- Can a figure or language geographically identifying the wells be provided to facilitate the reader as is done on the last bullet of the section?

- What is the basis for the 10-year climate and precipitation cycle that was noted? How many cycles have been observed?

Response:

- The CFS section has been revised to be consistent with the other sections.

- The first sentence of the section identifies the three areas that are being monitored.

- The 10-year climate cycle discussion has been removed from the text.

Comment 22. **Section 6.3.1.4, page 126, first partial paragraph, last sentence:** The SEO does not restrict potential well owners from drilling and constructing a well. The SEO only provides a notice that contamination is present in the area. Can this be revised?

Response: "Restriction" has been changed to "notification."

Comment 23. **Section 6.3.1.6, page 127, second paragraph:** Is there any indication what caused the increase in lead? If there is adequate information provided in the FYSR, can the appropriate section be referenced?

Response: The cause for the increase in lead concentration cannot be determined at this time. This will continue to be evaluated in subsequent annual groundwater monitoring reports.

Comment 24. **Section 6.3.1.6, page 128:** There appears to be gaps in the monitoring data regarding the referenced annual monitoring reports. There are only two reports providing monitoring data from July 2005-June 2006 and from July 2007-May 2009. Can this be checked? Also, is the reference to (TtEC 2009u) correct?

Response: The reference to the July 2005–June 2006 and the July 2007–May 2009 monitoring data are specific references to the information discussed in the paragraph and not intended to reference every Annual Groundwater Report or monitoring period. The reference has been corrected.

Comment 25. **Section 6.3.1.7, page 128:** Can references be provided for the relevant groundwater monitoring reports or appropriate section from the FYSR?

Response: Section 5.1.2.5 in the FYSR has been referenced.

Comment 26. **Section 6.3.2.1, page 129, third paragraph:** Can the concentration of the dieldrin detection be provided?

Response: Dieldrin was detected in Upper Derby Lake (SW01004) on August 18, 2008, at a concentration of 0.037 µg/L.

Comment 27. **Section 6.3.2.3, page 131, first paragraph:** Can a reference be included to facilitate the reader in locating any results from Off-Post surface water sampling?

Response: The surface water monitoring report has not been finalized so the FYRR references the FYSR for the surface water results.

Comment 28. **Section 6.3.3, page 132, first partial paragraph:** Can the use of the word "eliminating" be changed since unlikely exposure pathways may still exist?

Response: RVO feels that the statement as written is accurate and contains sufficient caveats. No additional language has been added. Additional language was added in the Section 6.3.3 text to indicate that the biomonitoring program is ongoing.

Comment 29. **Section 7.1.4, page 140:** Can more detail be provided with regard to the remaining scope of work and any estimated date of completion?

Response: The text in Section 7.1.4 has been modified to add the suggested detail.

Comment 30. **Section 7.1.7, page 142, first partial paragraph:** This section identifies the Lime Basins Soil remediation as a subject of issue during this FYRR and referencing the further discussion provided in Section 8.0. This is, however, the only example of this being done throughout the document. Can all other issues also be referenced in their respective sections throughout the document?

Response: Issues have been referenced as requested when applicable.

Comment 31. **Section 7.2.1.1, page 143:** Can an estimated date of compliance be given for Shell Trenches as is done in Section 7.2.1.2?

Response: The date has been provided as requested.

Comment 32. **Section 7.2.1.5, page 145, first partial paragraph:** Can a reference be provided that supports the conclusion that the mass removal system has improved the performance of the boundary systems?

Response: The statement has been revised to explain that BANS mass removal improved the performance of the boundary systems by reducing contaminant loading. This clarification does not require a reference.

Comment 33. **Section 7.2.1.7, page 145 and 146:** The summary statements included in this section do not appear to be supported by the data available within this report as well as the FYSR. Performance criterion outlined in the 2010 LTMP as well as the *Remediation Scope and Schedule for the Offpost* have not been fully realized. Although the reverse hydraulic gradient was not lost for a significant period of time and increasing or persistent concentrations in downgradient conformance wells seems to be limited to Dieldrin, these two issues cannot be disregarded as non-consequential. Though protectiveness might still be maintained at this system, evaluations during the five year review period may have identified early indicators of potential issues and should be labeled as such.

Response: It should be noted that the primary and secondary performance criteria and performance well networks for the NBCS were developed in the 2010 LTMP (TtEC and URS 2010). The NBCS was evaluated against the various decision documents, including the 2010 LTMP, and was determined to be functioning as intended.

To address Regulatory Agency comments, the FYRR and FYSR were expanded to summarize information provided in this response and to include more discussion of the evaluation of the temporary loss of reverse gradient at a portion of the NBCS in 2005, which was identified as a significant event in the FYSR. Follow-up actions include evaluating the feasibility of increasing the extraction well pumping rates to enhance the reverse gradient. In 2005, the RVO concluded that no further action was necessary besides monitoring of the reverse gradient more closely, and no further action was requested by the

Regulatory Agencies. The reverse gradient was maintained throughout the remainder of the FYR period. Since describing the incident as "being of little consequence" was objectionable to the Regulatory Agencies, the sentence has been revised to indicate that the temporary loss of reverse gradient did not have an adverse effect on protectiveness.

The NBCS conformance wells were selected in the 1996 Off-Post RS/S and the network was modified in the1999 LTMP because of widening of 96th Avenue and moving of the RMA boundary fence. The conformance wells were initially selected to be representative of system effectiveness. However, it became apparent during subsequent monitoring of the wells that some of the conformance wells were not representative of system performance. This finding was related to the Regulatory Agencies during Water Team Status Meetings and documented in the 2005 FYRR (RVO 2007). The 2005 FYRR determined that the NBCS well network was to be re-evaluated during the LTMP revision:

> *Concerns about the presence of elevated contaminant levels in downgradient conformance wells will be revisited when considering the performance monitoring well network in the revised LTMP*.

The revised LTMP (TtEC and URS 2010) excluded the non-representative NBCS conformance wells in the downgradient performance well network. The 2010 FYSR was expanded to further address the downgradient detections of contaminants in the NBCS conformance wells during the current FYR period and concluded that the concentration trends in the downgradient conformance wells observed during this FYR period are consistent with the evaluation in the 2005 FYRR, and no other explanations for the downgradient detections in the conformance wells (e.g., underflow or bypass) are feasible. Additional discussion of the NBCS conformance wells has been included the FYRR.

Comment 34. **Section 7.2.1.7, page 145, second paragraph:** Can the short period when the reverse hydraulic gradient was not maintained be quantified?

Response: The text has been revised to include that the maximum duration for the loss of the reverse gradient was 55 days in one well pair.

Comment 35. **Section 7.2.2.1, page 146, second paragraph:** Can the On-Post ROD assumptions with respect to chloride and sulfate be stated?

Response: The requested ROD requirements have been included in the revised text.

Comment 36. **Section 7.2.2.1, page 147, first partial paragraph:** Can information be provided that supports the statement regarding the applicability of a down-gradient well with sporadic arsenic detections?

Response: The discussion of the arsenic detections in downgradient well 37008 was expanded in Section 5.2.1 in the FYSR. In Section 7.2.2.1, the statement, "and

may not be indicative of NPS system performance." has been deleted and replaced with, "While the arsenic detected in the downgradient well may be related to the upgradient plume, other explanations suggest that the arsenic plumes are separate and different sources of arsenic may exist downgradient of the NPS extraction wells."

Comment 37. **Section 7.2.3.1, page 148:** Can a reference be provided for where the reader can find more information on the incidences listed in Table 7.2.3-1?

Response: The incidences referenced were initially mentioned in the Quarterly Discharge Monitoring Report. Each incident also had a formal notification letter developed which was sent to the agencies. Each letter outlined the occurrence and corrective actions taken to prevent further occurrences. References to the notification letters have been added to the report.

Comment 38. **Section 7.2.3.4, page 150:** Can this section be reviewed with the respect to the correct status of the PM-10 monitoring program?

Response: Although the PM-10 sampling was completed May 1, 2010, the PM-10 Addendum to the Air MCR is still in process, as is stated in Section 6.3.4. As these events occurred or will occur after the March 31, 2010, FYR data cutoff date, the FYRR text as written is accurate as to status as of March 31, 2010.

Comment 39. **Section 7.4.2.1, page 162:** Footnote number three at the bottom of Table 7.4.2-1 is the first mention of the ROD CSRG change for NDMA. Can the reason and supporting documentation for this change be included in this section?

Response: The text has been expanded to explain the change in the CSRG.

Tables

Comment 40. **Table 6.4.1-1:** Well 04029 was located with a cluster of two other wells 04027 and 04026. None of the wells had protective well covers. Well 04029 was damaged as noted in the table. However, well 04027 was also damaged and the PVC casing for well 04026 was loose at the surface. Please review TCHD's notes on the Five-Year review forms and update the corresponding table.

Response: Text has been added to Table 6.4.1-1 to indicate well 04027 was also damaged and the PVC casing for well 04026 was loose at the surface.

Minor Grammatical

Comment 41. **Section 4.2.1.1, page 30, first italic:** Can TSCA be defined in the text?

Response: TSCA has been defined in the acronym list because the italic text represents a quote.

Comment 42. **Section 4.2.1.2, page 34, third full paragraph, third sentence:** Does this sentence refer to revegetation "of" the cap or should it be "off" the cap?

Response: It should be "off" and has been corrected.

Comment 43. **Section 4.2.1.3, Page 37, first paragraph:** This paragraph seems redundant. Can this paragraph be removed?

Response: The first paragraph will be retained, as it serves as an introduction improving the readability and context of this section by describing the linkage of the several implementation projects comprising the ICS project.

Comment 44. Section 5.1, page 109, Off-Post Operable Unit, first sentence: Should "On-Post OU" be changed to Off-Post OU?

Response: The sentence has been corrected as suggested.

Comment 45. **Section 5.2.13, page 115, last paragraph:** Can the year be added after "September 15th" to show that this information is a summary of the whole FYR period?

Response: The requested revision has been made.

Comment 46. **Section 9.0, page 171, Table 9.0-1:** Can the last two columns be completed for the Exposed Sanitary Sewer?

Response: The information has been added to the table.