

## **APPENDIX A**

### **Fifth Five-Year Review—Community Interviews**

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## **Fifth Five Year Review Community Interviews Summary Report**

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### **1. What do you know about the Rocky Mountain Arsenal (RMA)?**

All respondents knew of RMA as a former environmental cleanup site that had become a national wildlife refuge. Most respondents had extensive understanding of the history of military and agricultural manufacturing at RMA; its designation as a Superfund site; the passage of the Refuge Act; and the remediation undertaken to transform RMA into a national wildlife refuge. They learned of the site from living in the immediate vicinity, working in government, being involved with the development of nearby residential communities, or serving or volunteering with community organizations or environmental advocacy groups.

### **2. Were you in the area during the cleanup?**

Most respondents lived in the surrounding communities during the cleanup.

#### **a. Are you aware of the cleanup? *\*\*asked if not in area during cleanup***

The three respondents who lived elsewhere knew of the cleanup through their professional activities or environmental advocacy work.

### **3. Do you have any personal concerns about the cleanup?**

Most respondents had no concerns about the cleanup. Several said that refuge visitation and wildlife health gave them confidence in the protectiveness of the remedy.

Three respondents voiced concerns about the current state of the cleanup. One expressed uncertainty about whether RMA is a source of perfluoroalkyl and polyfluoroalkyl substances (PFAS) in local groundwater. The second noted that the respondent's comments had been documented in the past through written and verbal communication. In particular, the respondent said that ongoing community involvement was inadequate. The same respondent expressed concern about the maintenance of institutional controls, groundwater contamination in the areas north and northwest of the site and the decision to eliminate kestrels from the biomonitoring program.

A third respondent expressed concern about whether airborne and water contamination could be migrating onto RMA from other sources in the community. The respondent noted that residents have been alerted about air and water contamination from other community sources in the past five years, and the respondent worried that the remedy or wildlife health could be compromised from off-site contamination coming onto RMA.

Several other respondents said they had no concerns about the protectiveness of the remedy today and had confidence in RMA management. At the same time, the respondents expressed a desire to learn more about long-term operation and maintenance plans for the landfills, waste consolidation areas and groundwater treatment facilities to ensure they remained protective of human health and the environment for decades to come.

## **Fifth Five Year Review - Community Interviews Summary Report (Continued)**

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### **4. Are you aware of any community concerns about the cleanup?**

Most respondents said they had not heard of any community concerns about the cleanup, although three noted there were some concerns about environmental health in Commerce City unrelated to RMA. Several respondents expressed appreciation for the refuge, calling it a local gem and an educational asset.

Four respondents said there were some community concerns about potential hydraulic fracking near RMA. Those residents question whether fracking would disrupt the remedy, impact RMA-related groundwater plumes or disturb refuge wildlife.

Two respondents cited DIMP groundwater plumes as a community concern. They noted that concerns have lessened in recent years due to the progress of the groundwater remediation program.

Another respondent mentioned that some residents living south of the site were concerned about the prairie dog plague outbreak and the possibility it could recur.

### **5. How do you think the overall remedy is functioning?**

Most respondents expressed a high level of confidence in the remedy and in the parties responsible for its management and oversight. Several noted that they receive regular briefings from site managers or have other opportunities to get updates and ask questions. They expressed appreciation for the ongoing communication and coordination with both RMA and refuge managers.

One respondent said the commitments made to the community through the Records of Decision had been implemented well and as promised.

Another respondent said the remedy was functioning as well as current technologies allow but wondered if future advancements might enable stored waste to be destroyed, rather than permanently maintained in place.

### **6. Do you have any additional comments, questions or suggestions regarding the cleanup?**

Several respondents said they felt they knew more about RMA than most community members, especially residents who have recently moved into the surrounding communities. The respondents said new residents have limited understanding of RMA's history as a former environmental cleanup site. Although they rarely hear community questions about RMA, the respondents encouraged RMA to conduct additional outreach to educate residents about the remediation and its ongoing operation and maintenance, as well as educational and recreational opportunities at the refuge.

Two respondents who work closely with Spanish-speaking residents made similar comments. One of those respondents said the Spanish-speaking community would be more likely to trust

## **Fifth Five Year Review - Community Interviews Summary Report (Continued)**

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information if it were shared through a known community partner, rather than directly from a government agency.

Another respondent noted that institutional memory within local governing bodies was being lost, as elected officials involved with the former community advisory boards left office. The respondent said that educating new elected officials about RMA was important so they could effectively communicate with their constituents about community safety and the protectiveness of the remedy.

Additionally, several respondents reiterated the importance of the long-term maintenance of the landfills and waste consolidation areas.

Respondents asked questions about the following topics: the expected length of the groundwater remediation program; the size and location of the groundwater plumes; whether flood water or stormwater events in the surrounding community were causing community pollutants to flow onto RMA; and the relative benefit to public and environmental health of remediating contaminants to lower and lower levels as detection technologies improve.

### **7. Do you have any other information that could call into question the protectiveness of the cleanup program?**

No respondents had additional information that could call into question the protectiveness of the remedy.

Three respondents restated the importance of keeping the community informed and seeking their input on decision-making.

### **8. How would you like to receive your information about RMA?**

Several respondents said that phone calls or in-person briefings were their preferred ways to receive information. Other respondents cited email or text messages as the best way to share information.

Several respondents suggested ways to improve or expand RMA's existing communication with the larger community. Those suggestions included:

- Adding a Spanish-language translation option to RMA's website, as well as adding an online comment submittal form and a more prominent link on the home page to the online library of RMA documents and reports
- Offering Spanish-language translations or close-captioning options for RMA videos, presentations or print materials
- Hosting an annual meeting or videoconference with the U.S. Army to provide an update on the remedy and an opportunity to ask questions
- Publishing an annual or bi-annual email communication summarizing major activities at RMA and the refuge
- Recording a webinar on the overall environmental cleanup that residents could view on demand on the RMA website

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## **APPENDIX B**

### **Public Comments Received and Responses to Comments**

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SITE SPECIFIC ADVISORY BOARD OF THE ROCKY MOUNTAIN ARSENAL, INC.

Chairperson

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BOARD OF DIRECTORS:

July 23, 2021

*Re: Public Comments Submitted by the Site Specific Advisory Board (SSAB) of the Rocky Mountain Arsenal (RMA) Regarding the RMA 2020 Five-Year Review Report (FYRR)*

**1. Background:**

**Site Specific Advisory Board of the Rocky Mountain Arsenal, Inc.**

In 1994, citizens concerned with the “clean-up” of the Rocky Mountain Arsenal presented a 300-signature-petition to Colorado Governor Roy Romer, requesting that a citizen advisory group be established based on *the Report of the Federal Facilities Environmental Restoration Dialogue Committee* (FFERDC). In response to that petition, the ***Site Specific Advisory Board of the Rocky Mountain Arsenal*** was formed in early 1994 by the State of Colorado and EPA Region VIII, as the first Site Specific Advisory Board (SSAB) established at a Department of Defense (DOD) “clean-up” site.

The ***Site Specific Advisory Board of the Rocky Mountain Arsenal*** has met regularly since its inception. Its meetings are open to the public and its programs often include presentations from, and discussions with, the Army, Shell Oil Company, EPA, the State of Colorado, the US Fish and Wildlife Service, and Tri-County Health. The ***Site Specific Advisory Board of the Rocky Mountain Arsenal*** incorporated in December 2000 as a not-for-profit corporation. Regular attendees also serve, or have served, on other RMA-related or RMA-interested boards including, but not limited to, the Restoration Advisory Board (RAB), the Citizen Advisory Board (CAB), the Medical Monitoring Advisory Group (MMAG), the Sierra Club RMA subcommittee, the National Caucus of RAB Community members, Montebello community groups, the Northern Coalition, and the City Council of Commerce City.

The Rocky Mountain Arsenal is one of the largest and most expensive “clean-up” projects to date in the United States. At the completion of “clean-up”, land was transferred to the Rocky Mountain Arsenal National Wildlife Refuge, which is intended to attract national and international visitors. As such, the RMA affects citizens and communities bordering RMA, as well as those of the Denver-metropolitan area, the State of Colorado, the United States and potentially the entire planet. It is for this reason the *Site Specific Advisory Board of the RMA* seeks and encourages the involvement of all citizens and interested persons. The Site Specific Advisory Board of the Rocky Mountain Arsenal, Inc. received a Technical Advisory Grant from the U. S. Environmental Protection Agency (EPA) in 2001. Without this grant, meaningful and substantive public participation would be difficult, if not impossible. We thank the EPA for their continued support of meaningful public participation.

The members of the RMA SSAB have remained involved in the oversight of the “Clean-up” of the Rocky Mountain Arsenal for as many as 35 years. This is an amazing commitment from community members that is often overlooked, and even dismissed, by the many involved in the long-term Operations and Maintenance at RMA.

**Why are we so committed to this citizen oversight process at RMA?** The Polluters chose a cap-and-cover remedy (rather than removal or treatment of the thousands of tons of contamination at RMA). *The RMA hasn’t been “cleaned-up” as advertised: it has been “covered-up”*. The integrity of a cap-and-cover system is completely reliant on diligent, timely, pro-active, and effective long-term Operations and Maintenance at RMA. We believe that only the public and the regulators can ensure the integrity of this remedy and we bring tremendous historical knowledge and memory to this process, as well as a deep and abiding commitment.

We remember that the “clean-up” at RMA was designed to be minimally protective. By this we mean that the remedy is designed to protect the public to a level of 10 (-4). It means that after the RMA “clean-up” is complete, exposure to the contamination left at RMA will provide additional cancer risk to one in ten thousand people (this is in addition to the current cancer rates in the United States: one-in-two men will have cancer and one-in-three women will have cancer during their lifetimes). This is the minimum level of “clean-up” allowed by law and, at the time this remedy was selected, the standard level of “clean-up” was 10 (-6) or a one-in-one-million increase in the cancer risk.

The SSAB objected to a minimal “clean-up” at RMA, and has tried to be diligent in its oversight of the RMA “clean-up” precisely because a minimum “clean-up” will only remain protective of human health and the environment if the assumptions underlying the remedies are valid, if the “clean-up” is designed and performed at the highest possible level, and if long-term operations and monitoring are effective. If every step taken at RMA is as minimized and compromised as the choice of the RMA remedy was, the community surrounding and visiting the RMA will be harmed and the State of Colorado will pay a huge price to try to correct the problems.

The Five Year Review process was designed to provide regular and continuing review of a remedy, both in terms of current project operations and, most importantly, in review of the ongoing effectiveness of the operations and maintenance of remedy projects that have been

finished, in order to insure protection of public health and the environment. Such a review is of highest importance at a site like the RMA where thousands of tons of highly contaminated soils have been left in place in the ground and the contaminated groundwater will need to be treated for hundreds of years into the future. (The Natural Resource Damages Assessment Plan concludes that Shell Oil released an estimated 150,112 tons of contaminants into Colorado's environment. The Army is alleged to be responsible for another 26,405 tons. Some of the contaminated soils were placed in the Enhanced Hazardous Waste Landfill and /or the Hazardous Waste Landfill, and remaining contaminated soils were left in place with mere soil caps and covers.)

We call this a “cap-and-cover” remedy because the Polluters chose to leave soil contamination in place rather than treat or remove the contaminants even though there is also groundwater treatment, which is necessitated in perpetuity due to the fact that contaminated soils were left in place.

The Polluters made a promise to the public – that they would maintain the quality and integrity of the caps-and-covers “the containment system” and provide timely and high quality review of the effectiveness of their ‘containment’ remedy – when they fought for (and sued for) a remedy that would leave thousands of tons of contaminated waste at the RMA rather than to actually clean up, or remove, the contamination. They must be held accountable for this minimized remedy. If they had chosen to remove and/or treat the contamination they wouldn't have such a difficult and important job of safe-guarding the public and the environment from this extremely contaminated site.

### **General Comments**

1. **General Comment 1** – The SSAB is disappointed in the Army's lack of community involvement relating to its review of this document. The FYR process does not follow the EPA 2001 Five Year Guidance (EPA 2001). This guidance was used by the Army throughout the FYR 2020, but the 2020 FYR fails to acknowledge many of the policies in Appendix A *Community Involvement*. Examples include:
  - a. The Army should have notified the SSAB about the most appropriate methods for notifying and involving the community in the five-year process;
  - b. The Army should have worked with the SSAB during the initial planning stages of the five-year review to determine the appropriate level of community involvement;
  - c. During the review, the Army should have provided the SSAB information on where to find written documentation about the review (the SSAB insists this should have included access to all reference material identified in Section 12 of the FYR 2020);
  - d. The SSAB should have been involved in decisions regarding community involvement and appropriate activities.

- e. We hereby formally request at least one, 3-hour public meeting regarding the 2025 Five-Year Review, where community members can ask questions and discuss their concerns. Sending us to the Army's presentation to the Commerce City Council meeting is not adequate since public participation is not allowed.
- f. The 2020 FYR included more than 1,000 pages of report and data, and covers the activities and data collection of a five-year period of time. While we appreciate the extension of the public comment period this year by an additional two weeks, given the length of the Five-Year Review (including hundreds of supporting and reference documentation) and importance of the RMA Five-Year Review, **the public should be allowed an extensive period of time to provide comment, but not less than 90 days – as we requested in our public comments to the 2005-2010 Five-Year Review and the 2015 Five-Year Review.**
- g. Please provide all of the tables, reference materials, and supporting documents to the future Five-Year Reviews by placing them on the Army website or on a storage site such as Dropbox. These could be made available before the Five-Year Review is released to the public for comment.

2. **General Comment 2:** The “Protectiveness Statements” in Section 10 of the 2020 FYR attempt to thwart regulatory agencies and the public by creating an illusion or false impression that the current state of the On-Post and Off-Post Operable Units (OUs) are effective and in compliance with the two Records of Decision (RODs), the Federal Facilities Agreement, EPA guidance, and CERCLA. If a reader were to limit their RMA 2020 FYR review strictly to Section 10, one would conclude that the remedy is safe, sound, and protective at RMA. However, if the reader were to read the entire 2020 FYR (approximately 600 pages), one would be alarmed at numerous new remedial problems, along with bewilderment as to why issues identified in prior RMA Five-Year Reviews remain unresolved.

Section 10 of the 2020 FYR states, “The remedy for the On-Post OU currently protects human health and the environment because remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks.” Eliminating unacceptable risks from exposure pathways are not from remedial activities, but from institutional controls (ICs) defined prior to remediation and in effect today. If there were no Institutional Controls incorporated into the current remedy at RMA, risks from exposure to contamination from the current remedy would be dangerously high to human health both On-Post and Off-Post. The remedy chosen at RMA was a cap-and-cover system, where the most contaminated soils were contained in two hazardous waste landfills, and the remainder of the thousands of tons of contaminated soils were left in place and covered by less contaminated soil. Consolidating and covering contaminated

soils On-Post is beneficial to human health exposure, but the overall remedy is not responsible for eliminating exposures.

In addition, the SSAB disagrees with the Army's conclusion that the current remedy protects human health and the environment. Addressing exposure pathways does nothing to protect the environment, particularly groundwater. Throughout the 2020 FYR, the claim of protectiveness is concealed behind "human health protectiveness" (claiming that humans are not exposed to the on-going contamination at RMA) , while knowingly allowing toxic RMA contamination to be released into groundwater both On-Post and Off-Post. The Army relies on boundary groundwater treatment systems to conclude that the failure of the On-Post treatment system is acceptable since groundwater contamination will be treated at the North Boundary Containment System (NBCS) and/or North West Boundary Containment System (NWBCS). However, these systems continue to degrade the environment via, 1) ineffective treatment, 2) inability to capture groundwater plumes, and 3) allowing RMA groundwater to be discharged into off-post without treatment. On-Post treatment systems have been ineffective in capturing and treating groundwater and most, if not all, are allowing discharges that exceed Colorado Basic Standards for Groundwater (CBSGs) and continue to degrade the environment.

EPA guidance regarding the contents of Five-Year Reviews (FYR) states, "all issues that currently prevent the response action from being protective or may do so in the future should be documented as FYR issues in the FYRR. Such issues are to be documented along with follow-up actions needed to ensure the proper management of the remedy." Throughout the 2020 FYR, the Army instead punts many protective and corrective actions and instead relies on additional groundwater monitoring and/or installation of new groundwater monitoring wells to remediate failures. This results in continued damage to the environment while monitoring data is collected and evaluated, at times taking years.

EPA guidance also states, "...the FYR should identify early indicators of potential remedy failures." Instead of providing what would be considered "early indicators", the 2020 FYR identifies early indicators of potential remedy as "Recommendations and Follow-Up Actions" and states the recommendations "may improve remedy operations, management of O&M or completeness of the site file, but do not affect current and/or future protectiveness." By calling "early indicators" of remedy failure "Recommendations and Follow-Up Actions", it implies that the goal is to improve a well-functioning remedy instead of admitting that there are remedial breaches. Clearly this is not the intent of EPA guidance.

The SSAB has identified remedial actions that either currently "prevent the response action from being protective or may do so in the future" and/or are "early indicators of potential remedy failure." Our review concluded:

- a. NWBS and NWBCS are currently not protective of human health and the environment. RMA contaminants such as dieldrin, NDMA 1,4 dioxane, and PAFS are bypassing systems and/or are not being treated. This concern was included in the SSAB's 2015 comments;
- b. Basin F Wastepile and Principal Threat area are currently not protective of the environment. RMA contamination above Contaminant System Remediation Goals (CSRGs) has been detected in downgradient monitoring wells and in the confined flow system beneath the Former Basin F area. In addition, the vegetative cover continues to not be adequate. This concern was included in the SSAB's 2015 comments;
- c. The Hazardous Waste Landfill (HWL) and Enhanced Hazardous Waste Landfill (ELF) show indications of potential remedy failure. Additional groundwater investigations are ongoing to identify contamination downgradient of the landfills. In addition, the Army has identified RMA contaminants in both the HWL and ELF's leak detection system (LDS).? This concern was included in the SSAB's 2015 comments;
- d. Basin A has indicators of potential remedy failure. Contaminated groundwater is increasing from the former source area. Additional groundwater monitoring is necessary to determine environmental protectiveness;
- e. Off-Post groundwater and treatment systems currently are not protective of human health and the environment. There is a gap in Off-Post extraction wells, exceedances of RMA contaminants downgradient of treatment systems, and DIMP has been detected above standards in a private well;
- f. The Biomonitoring Program identifies early indicators of potential remedy failures as it is completely ineffective in determining health effects on RMA wildlife. The current testing protocol addresses only soil contamination and not the actual effects on wildlife. This concern was included in the SSAB's 2015 comments;
- g. The Biomonitoring Program was abandoned in 2013 and a new Biomonitoring program has been delayed because the Army has cut funding to the EPA, which has interfered with the ability of EPA to provide oversight and concurrence. This is an insidious ploy to minimize the efficacy and protectiveness of this "cover-up" remedy; Until EPA concurs with the current Bio Monitoring Plan, the

protectiveness of the RMA remedy cannot be considered protective.

- h. Land Use Controls, which are an essential part of the cap-and-cover remedy, have indicators of potential remedy failure. USFWS is attempting to allow RMA bison to be transported Off-Post and consumed. Commerce City is evaluating residual/commercial land uses on property previously part of RMA and integrated into RMA ICs. The Army appears to have little or no control over the Land Use Controls;
- i. On-Post groundwater treatment systems such as the Basin A Neck and Bedrock Ridge are not protective of the environment. Both systems are currently discharging RMA contamination above CSRGs. This concern was included in the SSAB's 2015 comments;
- j. Previous On-Post source areas such as the South Plants, Lime Basins, and Sand Creek Lateral are not protective of the environment. Contaminant plumes above CBSGs are migrating from these former source areas;
- k. Emerging contaminants such as 1,4 dioxane, NDPA, and PAFs have been detected On-Post. No treatment of 1,4 dioxane and PAFs exists at the boundary systems and On-Post and Off-Post treatment systems. The NDMA concern was included in the SSAB's 2015 comments. The milestone for investigating NDMA and its potential remedy failure was August 31, 2017. The 1,4 dioxane concern was included in the SSAB's 2015 comments, with a milestone for investigating this potential remedy failure on June 30, 2017.  
and,
- l. Surface water is not protective of the environment and possibly individual wildlife species. Additional toxicological studies are needed as elevated RMA contaminants have been detected in the North Plants and Basin E pond. This concern was included in the SSAB's 2015 comments.

The current RMA remedy is not protective of human health and the environment. Numerous statements and conclusions in the 2020 FYR are indefensible or misleading. A majority of current remedial failures identified in the 2020 FYR were previously identified by the SSAB and regulatory agencies in past Five-Year Reviews. Therefore, the current remedial problems are likely to remain through the 2025 FYR, while more excuses for remedial breaches are promoted as "protectiveness". Aggressive correction actions are required to reduce continued damage to the environment and to maintain the

integrity of a cap-and-cover system that is completely reliant on diligent, timely, proactive, and effective long-term Operations and Maintenance at RMA.

- 3. General Comment 3:** FYRR, The issue of fracking and its impact at RMA is of high concern in all of the communities surrounding RMA. WE are concerned about the potential impact of fracking on the contamination remaining at RMA and/or the impact on the geological formations that are relied on to contain contamination. Fracking could result in RMA contamination migrating into deeper aquifers and could actually influence the migration of contaminate plumes On-Post. This issue has still not been adequately addressed (other than an unsubstantiated denial) and was not even addressed in the 2020 FYRR.
- 4. General Comment 4:** The 2015 FYRR stated, "...prior to remedy completion the RVO has committed to provide the USFWS with military munitions awareness training. This training is intended to heighten USFWS personnel awareness of military munitions-related hazards and to inform the USFWS of the Army notification process, if potential military munitions are encountered by Refuge employees/patrons after remedy completion. The Army-provided awareness training is not intended to grant the USFWS or its representative authorization to perform any action on potential military munitions, but to ensure notification and response by trained Army representatives."

  - a. What is the status of this military munitions awareness training?
  - b. There is nothing on the Rocky Mountain Arsenal Wildlife Refuge website regarding the possible of existence of munitions at the refuge or on RMA, there are no warnings, and no emergency plans. This was not addressed in the 2020 FYRR.
- 5. General Comment 5:** The 2015 FYRR stated, "As components of the remedy have been completed and the land deleted from the NPL, administrative jurisdiction has been transferred to the USFWS or other parties purchasing the land, except for the property and facilities continuing to be used for response actions (e.g., landfills and groundwater treatment systems)."

  - a. The FYRR should describe exactly what is entailed in USFWS's "administrative jurisdiction".
  - b. In addition, the FYRR needs to explain what is meant by "other parties purchasing the land."

- c. All communications related to efforts to transfer land, as well as land transfers, should be included in the FYRR. The FFA prohibits other non-federal government parties from purchasing RMA property. This issue was not addressed in the 2020 FYRR.

**6. General Comment 6:** The SSAB opposes any and all modifications to the reduction of RMA Land Use Controls (LUCs) because the entire CERCLA process, including the remedial investigation (RI), risk assessment (RA), feasibility study (FS) and Record of Decision (ROD) were developed and implemented based on the numerous – and clearly stated - restricted land uses. (Although more restrictions, such as the public will never be allowed access to any current or former RMA land, would be acceptable.) The review and development of comments from regulatory agencies and the public on hundreds of CERCLA documents were based on these land use restrictions and the resulting CERCLA process.

Unfortunately, the SSAB has witnessed these critical LUCs being challenged through inane interpretations of what each of the LUCs allegedly restrict. It is the position of the SSAB that any attempt to modify RMA's LUCs will require a reassessment of the entire CERCLA process at RMA, starting with the RI and continuing through the ROD. This reassessment will include additional soil and water sampling as necessary to investigate all medium and contamination on RMA impacted by any change in LUCs. A modified and updated risk assessment will be needed to better define exposure scenarios not included in the original assessment, and the feasibility study must include additional remedial alternatives that were not evaluated. Finally, the ROD would need to be re-published with active public participation. The Cap and Cover remedy implemented at RMA was specifically designed based on the land use controls. The SSAB is bewildered as to why the Army would ever consider re-opening a billion-dollar remedy merely to remove LUCs and will make every attempt to stop modifications of LUCs from proceeding.

**7. General Comment 7:** As we noted in our comments on the 2015 FYR, the Army had already begun the process of reducing their financial contributions to the EPA for regulatory oversight and staffs had been significantly reduced over the prior three years. The failure to provide funding to the EPA, and related funding disputes, have continued during the past five years. These actions by the Army constitute an insidious attempt to minimize the “clean-up” of RMA by avoiding accountability for effective long-term Operations and Maintenance of this barely adequate cap-and-cover remedy, and to avoid enforcement of the Land Use Controls that are an essential lynchpin of the “protectiveness” of this “cover-up” remedy. This past ten years, the Army and other parties have engaged in processes to eliminate or minimize Land Use Controls

This is coupled with the Army's denial that the State of Colorado has jurisdiction over this remedy which has necessitated the State having to file suit in order to enforce RCRA and State regulations and standards. This remedy was agreed to by the EPA and State of Colorado with the understanding that the regulators would continue to have the ability to oversee and regulate the protectiveness and quality of this remedy. We consider the Army's actions in regard to withholding and/or decreasing funding of regulators, and the denial of Colorado's jurisdictional oversight role at RMA, coupled with the choice of a remedy that would necessitate vigilant oversight in perpetuity, to be indications of their contempt for the RMA remedy and the people of the State of Colorado.

8. **General Comment 8:** The SSAB agrees with 2020 FYR comments provided by EPA and the Colorado Department of Public and Environment regarding short and long-term protectiveness and incorporate them by reference. The SSAB provides its concerns with the "remedial activities completed" and provides following:

On-Post Operable Unit

The SSAB specific comments presented below dispute the Army's claim that the "The remedy for the On-Post Operable Unit (OU) currently protects human health and the environment because remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risk." The SSAB has identified numerous violations and deficiencies in ROD requirements, Army compliance and performance requirements, and concerns with how these remedial activities protect human health and the environment. Section 10.0 Protectiveness Statements merely identify human health risks to exposure of RMA contaminants, but precludes how the On-Post OU protects the environment, as required by the ROD, CERCLA and EPA guidance. The On-Post OU may be protective of human health due to Institutional Controls, but not Army remediation projects.

As identified below, many of the internal treatment systems are discharging RMA contaminants greater than CBRGs. These include, but are not limited to Basin A Neck and Bedrock Ridge. In addition, several capped and/or covered hazardous waste sites have unanswered exceedances in downgradient performance wells, most importantly Basin F and the hazardous waste/principle threat landfills. For the first time in 25 years the Army has detected contaminants in the confined flow aquifer, indicating possible additional damage to the environment from the former Basin F. The discovery of emerging contaminants On-Post during this FYR poses new challenges in the protection of the environment (and human health Off-Post). Finally, the Biota Monitoring Program (BMP) has not been approved by EPA, and therefore no conclusions can be drawn as to whether the surface soils that remain on RMA are protective of wildlife. In addition, as provided in our comments, the current approach to the BMP has many deficiencies including the use of composite sampling to characterize soil contamination in large areas

and eliminating critical pathways that may have additive effects to the conclusions of surface soil exposure.

### Off-Post Operable Unit

The 2020 FYR, Section 10 states, “The remedy for the Off-Post OU currently protects human health and the environment because remedial activities to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.” Again, as required by the Off-Post ROD, CERCLA, and EPA guidance, the remedy for the Off-Post of RMA definitively does not protect the environment. Again, the Army relies on current land use restrictions Off-Post (limited consumption and irrigation of groundwater) and Institutional Controls as a basis for its protectiveness conclusion. If consumption of groundwater was available off-post, the risk to human health would be extreme as numerous RMA contaminants remain throughout the RMA Off-Post Operable Unit. The Army fails to acknowledge that dieldrin is migrating around the Northwest Boundary System (NWBCS), although possibly not consumed by the public, is causing damage to the environment

The NBCS continues to discharge untreated 1,4 dioxane and nitrosodimethylamine (NDMA) to the off-post, causing irreparable damage to the environment. In addition, there are exceedances of NDMA downgradient of the Off-Post Groundwater Intercept and Treatment System, allowing continued damage to the environment.

## **Specific Comments**

### **Section 3**

#### **9. Page 11, Section 3.5**

The 2020 FYR states, “Contamination was detected on-post in soil, ditches, stream and lakebed sediments, sewers, groundwater, surface water, biota, structures, and to a much lesser extent, air”

SSAB comment:

This statement should be modified as air contamination had significant impacts on-post including fugitive dust and odors, especially with the Basin F excavation. Air contamination from the on-post caused health issues to neighboring communities off-post.

#### **10. Page 19, Summary of On-Post regulatory Comments reference 2**

The Table states, Munitions screening prior to excavation encountered ...” “All munitions encountered were detonated off-post.”

SSAB comment: All munitions encountered were detonated on-post.

### **Section 4**

**11. Page 27, Table 4.1.1 – Summary of Agency Notifications and Operational Change Notice**

SSAB comment:

The corrective action/change regarding an increasing concentration of dieldrin downgradient of the NWBCS (dated 12/3/2014) identifies an on-going evaluation to eliminate off-post migration of dieldrin.

SSAB comments:

- a. As this issue was identified in 2014, please explain why this evaluation has not yet been completed.
- b. What date will the evaluation be concluded and concurred to by regulatory agencies?
- c. What is the amount of dieldrin that has migrated off-post due to the inability of the NWBCS to capture this cancer-causing contamination?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**12. Page 27, Table 4.1.1**

The 2020 FYR corrective action/change regarding the increase of contamination downgradient of the BAN’s (dated 4/2/2015) states “contaminants in the downgradient wells decreased.” (emphasis added)

SSAB comment:

The 2020 FYR should include whether the concentrations of 1,2 dichloroethane, CPMSO<sub>2</sub>, dieldrin, and dithiane achieved CRSGs.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**13. Page 28, Table 4.1.1**

The corrective action/change regarding the possible loss of plume-edge capture at the NWBCS (dated 3/16/2016) and states “increasing sampling frequency of well 27010” and ...”if the trend to not cause dieldrin concentrations to decrease subsequent actions will be considered.”

SSAB Comment:

As this issue has been on-going for five years, the Table should provide an up-date on dieldrin concentrations in this well and whether the corrective actions were successful.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**14. Page 28, Table 4.1.1**

The 2020 FYR corrective action/change regarding concentrations of dieldrin above the PQL in performance wells downgradient of the NWBCS in FY16 states that an evaluation is ongoing.

SSAB comment:

As this issue has been on-going for five years, the Table should provide an up-date on dieldrin concentrations in these wells and whether the corrective actions were successful.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**15. Page 30, Table 4.1.1**

The 2020 FYR corrective action regarding NDMA concentrations exceeding the current PQL (dated 5/15/2017) and states “Because the NWBCS is not capable of treating groundwater for NDMA, no operational changes have been made. Quarterly monitoring will continue to evaluate frequency of detections exceeding the PQL.”

SSAB comments:

- a. The corrective action/change is unclear. Why does the corrective action rely on 2014 influent concentrations?
- b. The Table should better explain the statement “...the reason for the effluent detection above the current PQL was not apparent.” (emphasis added)
- c. Finally, the Table should include the concentrations of NDMA from the quarterly monitoring since the first quarter of FY18, particularly NDMA exceedances of the PQL.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**16. Page 30, Table 4.1.1**

The 2020 FYR corrective action regarding NDMA exceedances in the NBCS states “Two additional ultra-violet lamps were placed in service during the first quarter FY18.”

SSAB comment: The Table should state whether the addition of two UV lamps will be permanent and whether exceedances on NDMA’s PQL in the NBCS have been resolved.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**17. Page 34, Table 4.1.1**

The 2020 FYR correction action regarding the presence of NDPA above the CBSG in all treatment plant effluents merely includes adding NDPA to the LTMP and monitoring NDPA in plant influent, effluent, and water quality performance wells and adding the chemical to “select water quality tracking wells and off-post CSRG exceedance network wells.”

SSAB comments:

- a. Adding NDPA to the LTMP is not a corrective action.
- b. The Table should describe:
  - i. the source of NDPA contamination;
  - ii. the number and locations of treatment plants with NDPA exceedances; and
  - iii. how the corrective action will reduce NDPA concentration below CBSGs.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**18. Page 35, Table 4.1.1**

The 2020 FYR table states “Downgradient monitoring at the NBCS has shown concentrations of some contaminants above the CSRG. Evaluations of system effectiveness were indictive of residual contamination present before construction and slow migration of contaminants through fine grained sediments.”

SSAB comment:

The Table should identify these contaminants, the basis of determining they were residual contamination, and whether detections continue above CSRGs.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**19. Page 43, Section 4.1.1.1**

In regards to treating 1,4 dioxane at the NBCS, the 2020 FYR states “The FS recommended treatment using advanced oxidation at the NBCS; however, treatability studies are required to determine the most appropriate specific advanced oxidation potential system.”

SSAB comments:

- a. The 2020 FYR should identify when the treatability studies and implementation of treatment for 1,4 dioxane will be coordinated with design and construction.
- b. It should also estimate the period of time during which 1,4 dioxane has migrated off-post.

- c. Is 1,4 dioxane currently being treated by the NBCS.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**20. Page 48, Section 4.1.1.1**

Regarding groundwater treatment in the Off-Post, the 2020 FYR states, “Modifications were made to the NPS (Northern Pathway System) were made in 2006 due to residential and commercial development in the area. “Extraction and recharge wells in the development area were abandoned. However, due to funding issues, the modification was not fully completed by the landowner, leaving a gap in the extraction.”

SSAB comments – The 2020 FYR identifies a “gap” in the extraction system in the Off-Post groundwater intercept and treatment system.

- a. The 2020 FYR should provide a timeframe of when additional extraction wells will be installed.
- b. The 2020 FYR should provide what impacts the gap has on contamination on off-post groundwater.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**21. Page 50, Table 4.1-7 - Off-Post Groundwater Intercept and Treatment System (OGTIS) CSRG Analytes**

SSAB comments: The Table does not include NDMA as an OGITS CSRG analyte.

- a. This chemical should be part of the OGITS CSRG analyses.
- b. The Table also identifies the inclusion of NDPA in 2020.
- c. What is the source of NDPA and what is the extent of the off-site plume?

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**22. Page 56, Section 4.2 Ecological Protection**

The 2020 FYR states, “Ensure that biota are not exposed to COCs in surface water, due to migration from soil and sediments at concentrations capable of causing acute or chronic toxicity via direct exposure or bioaccumulation”

SSAB comment –

- a. The 2020 FYR should expand “ecological protection” to include biota’s consumption of contaminated wildlife and plant life. Previous biota sampling identified acute concentrations of RMA contaminants in lower trophic level biota.

Due to bioaccumulation, consumption of these can result in toxic effects on upper tropic biota.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**23. Page 57, Section 4.2.1 Shell Disposal Trenches RCRA-Equivalent Cover Interim Operations and Maintenance**

SSAB comment –

- a. The 2020 FYR should provide a timeframe when the Operational and Functional (O&F) determination will be made, i.e., when will there be enough performance data and percolation exceedance measures to make the O&F determination?
- b. Were the percolation exceedance measures of 2019 and 2020 effective?
- c. In addition, the 2020 FYR should describe requirements of the mandatory compliance period.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**24. Page 63, Section 4.3.1.1 Site-Wide Biota Monitoring**

The 2020 FYR states, “Although the starling evaluation was completed as planned, the kestrel portion of the BMP could not be completed as outlined in the BMP due to lack of nest box occupancy. As a result, sampling requirements for program completion were revised to focus on soil sampling rather than collection of kestrel samples.”

SSAB comments :

- a. The conclusions of the starling study portion of the BMP should be included in the report.
- b. The Army should have considered similar RMA biota to the kestrel in evaluating the effects of RMA soil contamination on biota that reside on the site.
- c. The locations of soil sampling are not referenced in the report and should be included.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**25. Page 64, Section 4.3.1.2 – Land Use Controls**

The 2020 FYR states, “Areas of RMA where property and management authority have been transferred\_ to the USFWS are governed by the *National Wildlife Refuge System* regulations... “These regulations close all areas of RMA included in the National

Wildlife Refuge System to the public unless these areas are opened by regulation, individual permit, or public notice.”

SSAB comments:

a. The 2020 FYR should describe what is entailed for the public to access closed areas of the refuge, i.e., what specific regulations, individual permits, and/or public notices are acceptable. The 2020 FYR should include:

- i. Where are these requirements published specifically for RMA,
- ii. Are they published by signage at the RMA Wildlife Refuge lakes and other areas where people engage in fishing and other contact with wildlife?
  - a. If not, why not?
- iii. To date, have these requirements been met by the public and what areas were opened and for what purpose?
- iv. How often do the USFWS law enforcement monitor the public participation at the RMA Wildlife Refuge?
- v. What areas of the refuge are designated for public use?
- vi. How does the Army monitor LUCs at the RMA Wildlife Refuge and/or control and enforce LUCs?

b. This Section also states, “Project specific health and safety training continued (emphasis added) to be conducted....”

SSAB comment: Does this training continue to be part of land use controls? Who is trained and how often?

c. This Section also 2020 FYR states, “The USFWS provides information at the Visitor Center to help visitors understand which areas of RMA are accessible.”

SSAB comments:

- i. Have these members of the public been issued access via the requirements identified above?
- ii. Have there been instances where violations of LUCs or activities inconsistent with LUCs occurred?
  1. What were these activities and when?
  2. How were these violations corrected?
  3. Are activities, violations, and enforcement actions reported to the Army, EPA, and CDPHE?
    - a. If not, how are LUCs enforced and the public protected?

- iii. The 2020 FYR identifies a “formal process” initiated by USFWS to remove and/or modify the game consumption restriction with respect to bison on RMA. What is this formal process? It should include public comment.
- iv. Why were the bison introduced to RMA, knowing it would eventually require removal of bison from the RMA Wildlife Refuge?
- v. Is there a Memorandum of Understanding or other legal document evidencing the agreement between the Army and USFWS regarding the enforcement of LUCs and other regulations necessary to maintain the integrity of the remedy and to protect human health and the environment? Please provide a copy of the document(s) and include this issue in the future Five-Year Reviews.
- vi. The 2020 FYR states, “when appropriate and consistent with the Department of Interior Bison Conservation Initiative 2020 animals may be transferred to other Department of Interior lands.” Does the initiative allow such transfers when it violates federal requirements such as the LUCs identified in the FFA, the On-Post ROD, and the legislation that established the Rocky Mountain Arsenal Wildlife Refuge?
- vii. Does the initiative include “other conservation partners, including tribes, states, or other intertribal organizations” as these may not be “other Department of Interior lands”?
- viii. There is no reference to the “Tissue Contaminant Study” which will evaluate risks associated with human consumption of RMA bison.
  - 1. What is the expected date of the draft study and how will it be published for public comment?
  - 2. This should include the EPA-approved risk assessment identified in this report.
- ix. The 2020 FYR states, “If risks are determined to be acceptable, the ROD and LUCP may (emphasis added) be modified. Such changes to the RMA’s LUCs will require a ROD modification at a minimum, with public comment included.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

## Section 5

### 26. Section 5.2 - Status of Recommendation and Follow-up Actions from 2015 FYR

The 2020 FYR states, “unresolved concerns from EPA, CDPHE or TCHD identified in the 2015 FYR were addressed as part of ongoing consultation with the regulatory agencies with operational adjustments as appropriate.”

SSAB comment:

- a. What were these concerns?
- b. Were these concerns identified in regulatory comments?
- c. The SSAB should have equal opportunity to discuss its FY 2015 comments and unresolved concerns with the Army (see Background and General Comment 1 above).

### 27. Section 5.2

The 2020 FYR states, “Two issues from the 2015 FYRR dealt with emerging contaminants.” “Groundwater monitoring during the FYR period confirmed the presence of NDPA above the CBSG upgradient of the NBCS, NWBCS, FCS and NPS.”

SSAB comment:

- a. The 2020 FYR should identify the source(s) location and history of NDPA use on RMA.
- b. Including NDPA in the long-term performance and water quality tracking does not resolve NDMA from protecting human health and the environment. What corrective actions are planned to eliminate NDPA groundwater above CBSGs?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

### 28. Section 5.2

The 2020 FYR states a feasibility study was performed regarding remedial actions for 1,4-dioxane.

SSAB comment:

The 2020 FYR does not include a reference or the results of the study. This should be included in the 2020 FYR.

### 29. Section 5.2

The 2020 FYR states, In addition, per- and polyfluoroalkyl substances (PAFS) were

identified as emerging contaminants during this FYR period.” The results of the investigation indicated detected detectable levels of POFA and PFOS in RMA groundwater, although only a location near the South Plants spill area was above the EPA health advisory level. Treatment plant and off-Post data indicated that RMA is not a significant source of PAF contamination in groundwater.”

SSAB comment:

- a. What is meant by “significant source of PAF contamination,” if it exceeds EPA health advisory levels On-Post? The 2020 FYR should describe the risk, the concentrations found throughout RMA, and explain how the conclusion was reached that RMA is not a significant source.
- b. Was the chemical not investigated and identified during the analyses of NDPA?
- c. The SSAB was unable to identify the Department of Defense guidance referenced, it should be included in the report.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**30. Section 5.2** The 2020 FYR provides only one location near the South Plants spill area with PAFS above the EPA health advisory level.

SSAB comment:

- a. The 2020 FYR should include maps showing the South Plants spill area, as there were many concentrations detected. Were there adjacent locations sampled? These results should be included in the 2020 FYR.
- b. Which select wells will be monitored for PAFS? How were these locations selected?

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**31. Table 5.2.1 Status of Follow-up Actions to Address 2015 Issues**

SSAB comment: The 2020 FYR should include a map of and schedules of the long-term monitoring network for dieldrin.

**32. Table 5.2.1**

SSAB comment:

The Table describes the 2017 NDAA provisions for Commerce City to modify or remove the restriction that prohibits the use of the PUD property for residential and industrial use.

It states Commerce City can modify or remove the restriction if a determination is made that the property will be protective of human health and the environment for the proposed use.

- a. Will Commerce City make the required determination or will the land use be limited to compliance with current LUCs?
- b. One visual inspection in 2018 was listed as the method of enforcement of LUCs; it should not be the basis to conclude that the PUD land use is consistent with the existing land use controls or objectives.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**33. Table 5.2.1**

SSAB comment:

Well 359D exceeds the DIMP CBSG. As the exceedance was identified two years ago, why is the projected date regarding the evaluation of the new well and potential alternate solutions to be finalized in 2022?

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**34. Table 5.2.1**

SSAB comment:

NDPA was detected above CBSG in RMA groundwater. The 2020 FYR should provide the sources of NDPA on RMA.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**35. Table 5.2.1**

For the BMP, the Table states, “Results indicated no concentrations of dieldrin above the screening criteria indicating that the remedy effectively eliminated significant exposure pathways in the area sampled.”

SSAB comments:

- a. What was the screening level and how was it determined?
- b. Where was the area sampled?
- c. Were the soil samples composited?
- d. The 2020 FYR should include the sampling methodology, the sample locations, and soil sample results.

## Section 6

### 36. Section 6.2 - Community involvement and Public Notices

SSAB comment: See General comment #1

### 37. Section 6.3.1.1 Northwest Boundary Contaminant System

The 2020 FYR states, “Effluent concentrations for all contaminants were below their respective CSRGs except dieldrin in FY15...” Dieldrin was also detected in FY18. The review also states detections of NDMA were detected above their PQLs in the second quarters of FY17 and isodrin above its CSRG in FY19.”

SSAB comment:

- a. The 2020 FYRR also states “In FY2015, several analytes in addition to dieldrin were detected...” The 2020 FYRR should identify these contaminants and the reason they were detected. Why do none of these additional analytes or contaminants exist in the 2020 FYR?
- b. The 2020 FYRR discusses an evaluation to determine where there is a potential for flow around the northern terminus of the Northeast Extension slurry wall requiring additional extraction in the area. The 2020 FYR should describe the initial exploratory investigation, the results, and conclusions. When will the evaluation be complete?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

### 38. Section 6.3.1.2 North Boundary Containment System

The 2020 FYR states, “Effluent concentrations for all contaminants were below their respective CSRGs except for NDMA.”

SSAB comments:

- a. Why does this section omit all data regarding 1,4 dioxane? The compound is not included in Table 6.3-4 Five-Year Summary of CSRG Analyte Sampling from NBCS Downgradient Performance Wells. In several Sections of the 2020 FYR 1,4 dioxane is described as a substantial failure of the NBCS and Off-Post of RMA. This Section should be modified to provide a complete description of the ineffectiveness of the NBCS to adequately capture all contaminants migrating into the system.
- b. The 2020 FYRR is confusing as to the PQL for NDMA. At times the PQL is 0.009 ug/L while Table 7.2-1 identifies the 2020 CBSG for NDMA as 0.00069 ug/L. The 2020

FYRR should better explain the differing values.

- c. Is the range of years for chloride and sulfate to achieve CBSGs 2026-2031? The 2020 FYRR needs correction.
- d. Why does the 2020 FYR use “five-year concentrations of effluent contaminant discharge” to determine treatment effectiveness for fluoride?
- e. The 2020 FYR describes “primary performance criteria” and “secondary performance criteria” in evaluating NBCS system optimization. The 2020 FYRR should describe what is meant by both criteria.
- f. The 2020 FYR consistently relies on the Mann-Kendall test for evaluating contaminant trends. It does not, however, explain what the test is, what data it relies on, and how/why the test is used.
- g. The 2020 FYR identifies placement of alternate wells north of the NBCS to provide “continuity in system performance monitoring” This modification was due to concerns related to monitoring continuity and lack of complete information regarding water quality downgradient of the system and the mechanisms causing contaminant concentrations to be above the CSRG. Where are locations of the five alternate wells along with the locations of existing wells being replaced. How does incorporating new wells north of the NBCS alleviate contaminant discharges that are not protective of the environment?
- h. Figure 6.3-13 states that NDMA detections in downgradient performance wells were identified as “Laboratory contamination resulting in methodblank detections.”
  - i. As these appear to be critical data points, were there duplicate samples?
  - ii. Were the wells resampled?
  - iii. How were these results considered in NDMA contamination in the performance wells?
- i. Table 6.3-4 provides sample concentrations for numerous RMA groundwater contaminants, however, seven contaminants were identified as N/A. Assuming this is not applicable, the 2020 FYRR should explain why they are labeled N/A and whether additional sampling will be performed in these contaminants. Why wasn’t 1,4 dioxane included in these analyses?
- j. The 2020 FYR should describe in detail why the Army believes “downgradient detections are most likely (emphasis added) caused by residual contamination and not representative of system effectiveness.” Terms like “most likely” regarding

downgradient detections of dieldrin are not definitive, and additional monitoring and evaluations are necessary to confirm this conclusion.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

### **39. Section 6.3.1.4 Basin A Neck System**

SSAB comment:

- a. The 2020 FYRR indicated a “compliance requirement” for the system’s reverse hydraulic gradient. Are there compliance requirements for each groundwater system, both internal and at the boundaries? These need to be included in each section of the 2020 FYR.
- b. The 2020 FYRR also indicates a “performance requirement.” Is this similar to the compliance requirement provided above? As with the compliance requirement, all performance requirements should be included in each section of the 2020 FYR.
- c. The 2020 FYR states that during the five-year reporting period for the BANS, only 1,2 DCLE, CPMSO<sub>2</sub>, dieldrin and PPDDT occurred in downgradient performance at concentrations exceeding CSRGS/PQLs. The Section includes no discussion as to why these exceedances exist and what corrective actions will be implemented to rectify this remedy failure. Does this failure violate the compliance or performance requirements?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**40. Section 6.3.1.5 Bedrock Ridge Extraction System** - The 2020 FYR describes numerous RMA contaminants detected in downgradient performance wells identifying plume capture and remedy failure at the Bedrock Ridge Extraction System.

SSAB comments:

- a. As commented above, do these exceedances violate compliance and/or performance requirements?
- b. These contaminant exceedances date back to the 2015 FYR: why does it take the Army greater than five years to evaluate data, improve monitoring of the downgradient performance wells, and ultimately optimize plume capture?
- c. What is the estimated date to complete a corrective action on this system?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

#### **41. Section 6.3.1.6 Off-Post Groundwater Intercept and Treatment System**

SSAB comments:

- a. This Section includes the need to demonstrate “compliance with remediation goals.” Are these similar to compliance and/or performance requirements? Where are the remediation goals for the system identified in the 2020 FYR?
  - i. There are exceedances of NDMA identified in both FY16 and FY17.
  - ii. The review should describe what is meant as “The effluent met the four-quarter moving average throughout the five-year period...” Is the four-quarter moving average used as a remediation goal?
  - iii. As the NBCS does not treat NDMA, what corrective actions are planned to alleviate NDMA exceedances of CSRGs?
- b. What is meant by the “mass removal criterion” and how was the “performance goal” of removing 75% of the contaminant developed?
- c. Table 6.3-13 identifies dieldrin exceedances downgradient of the system. The 2020 FYR states “It is expected that the dieldrin levels within the FCS (First Creek System) will generally continue (emphasis added) to decrease over time.” The 2020 FYR should provide data that supports this conclusion.
- d. The 2020 FYR states, “It is unlikely that the dieldrin detected downgradient is caused by bypass of the system, but rather dieldrin in soil was mobilized in groundwater due to fluctuating water levels in the vicinity of First Creek.” Do the assumptions provided fully support this conclusion?
- e. It is evident from this section that the inability of the NBCS to treat NDMA and NDPA (and 1,4 dioxane) has resulted in groundwater plumes Off-Post exceeding CSRGs, and therefore, the remedy does not protect the environment. Is it the Army’s intention to allow continued environmental degradation of groundwater by these compounds, or will the NBCS be optimized to capture and discharge all RMA contaminants below CSRGs?
- f. There is a significant plume of dieldrin approaching, within, and downgradient of the Off-Post groundwater “gap.” The 2020 FYR indicates a system modification to capture groundwater flowing through the gap.
  - i. When is this modification expected to be completed?

- ii. How much dieldrin will have passed through the gap and at what concentrations?
- iii. How far Off-Post is it estimated this dieldrin plume will migrate?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**42. Section 6.3.3.1 Water Level Tracking**

The 2020 FYR states, “Overall, based on a year-to-year water level comparison for 2015 through 2019, groundwater flow directions and associated migration of contaminant plumes have not changed significantly.”

SSAB comment:

- a. The 2020 FYR should include plume maps from these years identifying changes in flow directions and migration of RMA contaminants.
- b. Do these changes require modifications to On-Post and/or Off-Post monitoring well locations?

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**43. Table 6.3-16 - Water Quality Tracking Wells and Analyses Demonstrating Increasing Statistical Trends**

SSAB comment:

- a. There are numerous increases in dieldrin and/or chloroform downgradient of South Plants source, Basin F source, and the Sand Creek Lateral source migrating towards the NWBCS. Why are these compounds increasing with the current remedy in place?
- b. In addition, there are increases in chloride migrating towards the NBCS along with arsenic and trichloroethylene groundwater concentrations increasing downgradient of Basin A and migrating towards the Basin A Neck. The 2020 FYR should explain definitively why are these compounds continue to increase in groundwater with the current remedy in place?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**44. Table 6.3-17 – Summary of FY19 Water Quality Tracking Data for Emerging Contaminants**

The 2020 FYR identifies 1,4 dioxane and NDPA exist in high concentrations from the South Plants, Lime Basins, Basin F, and Basin A.

SSAB comment:

- a. Has the Army identified the sources of these RMA contaminants?
- b. What is the rate of groundwater migration for these compounds i.e, when will they reach the RMA boundaries?
- c. Why is there no groundwater data regarding the NBCS and these compounds?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**45. Section 6.3.3.3 Confined Flow System Monitoring**

SSAB Comment:

Dieldrin detections in the confined flow system beneath Basin F were identified for the first time in 2017 and again in FY2019. Have these wells been sampled yearly since 1994 and 2002?

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**46. Section 6.3.3.4 Off-Post Exceedance Monitoring**

The 2020 FYR states, “Exceedance monitoring is also conducted in support of the institutional control component of the off-post remedy. The purpose of the institutional control is to restrict the use of contaminated groundwater – in particular by restricting the installation of new wells – within identified plume areas.”

SSAB comments:

- a. The exceedance monitoring should not be limited to human health consumption of contaminated groundwater, but to protect the environment as required by the RODs and CERCLA.
- b. The 2020 FYR should describe how exceedance monitoring is designed to ensure the environment is not continually damaged by RMA contaminants discharged into Off-Post groundwater.

- c. The list of RMA Off-Post groundwater contaminants identified on the two pages of Table 6.3-21 is extensive.
- d. The 2020 FYR should clearly describe the reasons for the considerable amount of contaminated groundwater that remains Off-Post of RMA, i.e., is this a boundary treatment system(s) failure?
- e. Will all these contaminants be treated by Off-Post systems?
- f. What is the corrective action to remove arsenic, carbon tetrachloride, dieldrin, 1,4 dioxane, and NDPA, which appear downgradient, or possibly not captured by the Off-Post treatment systems?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

#### **47. Section 6.3.3.5 Private Well Network**

SSAB comment:

The 2020 FYR does not identify a corrective action regarding the DIMP exceedance in the Off-Post private well. What is the Army’s proposed future action to resolve this, and possibly other neighboring private wells contaminated with DIMP above the CBSG?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

#### **48. Section 6.3.3.6 Hazardous Waste Landfill Post Closure Groundwater Monitoring**

SSAB comments:

- a. The 2020 FYR should describe how the upper prediction limit (UPL) is derived and its relevance to concentration exceedances.
- b. The 2020 FYR should describe what additional investigations are proposed to conclude that elevated dieldrin in well 25194 “is likely sources of pre-existing soil contamination in the vicinity of the HWL.”
- c. The 2020 FYR should include the locations of subsurface dieldrin sampling collected during the program.
- d. Was dieldrin detected in previous groundwater sampling events or during the soil RI?

- e. What is CUSUM an abbreviation for?

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**49. Section 6.3.3.8 Basin F Post-Closure Groundwater Monitoring**

SSAB comments:

- a. The 2020 FYR should better describe the date, location, and length of time the breach in the Basin F liner. How was the breach repaired?
- b. The 2020 FYR indirectly concludes that arsenic and chloroform are leaking from the Basin F Wastepile liner as identified in increases in wells 26015 and 26017, which are the only wells monitoring groundwater downgradient of the site.
  - i. The current groundwater monitoring program is insufficient to characterize contaminants migrating from the Wastepile and should be modified to better characterize the extent of the remedy failure.
  - ii. What were the sampling results of well 26016 located between wells 26015 and 26017?
- c. Table 6.3.25 identifies the increase of chloroform in wells 26015 and 26017 as “likely caused by higher water levels mobilizing residual chloroform.”
  - i. What data was used as a basis of this conclusion?
  - ii. What soils samples during the remedial investigation were taken beneath the Basin F Wastepile prior to construction of the liner?
  - iii. The 2020 FYSR concludes “Groundwater quality downgradient of the Basin F WP area has potentially been affected in the vicinity of wells 26015 and 26017.” This indicates remedy failure at the Basin F Wastepile; what corrective actions are in place, or being considered, to alleviate the continued migration of contamination from the wastepile?
- d. The 2020 FYR states for the Basin F Principal Threat area, “Several indicator compounds – including chloroform, DIMP, sulfate, and tetrachloroethylene – appear to be increasing in more than one downgradient well. The exceedances likely (emphasis added) are caused by residual contamination and are consistent with pre-existing contamination that was present before the Basin F Post-closure period.”

- i. What additional RMA contaminants were identified in addition to these four?
  - ii. What data was used as a basis of this conclusion?
  - iii. The 2020 FYR concludes that the downgradient groundwater quality has potentially been affected in all four Basin F Principle Threat monitoring wells. This indicates remedy failure at the Basin F PT area; what corrective actions are in place, or being considered, to alleviate the continued migration of contamination from the Basin F PT area?
  - iv. Do groundwater level data confirm that the contamination is from “rising water levels and mobilization of pre-existing residual contamination from the Former Basin F”?
  - v. Later in this Section the 2020 FYR it states, “Groundwater elevations have generally decreased in all downgradient and upgradient wells since 2015.” The 2020 FYR should explain this discrepancy.
- e. The 2020 FYR states “...there are no chemical-specific standards that apply to Basin F groundwater since the RMA remedy addresses contaminated groundwater downgradient at the NBCS and NWBCS, where it is extracted and treated.”
  - i. The Army must explain if this is the intention/direction of the overall remedy on RMA.
  - ii. If so, why were Basin F, and all other internal hazardous waste source areas within RMA, capped and/or covered?
  - iii. Why are there internal treatment systems if RMA contaminated groundwater is and will be addressed at the NBCS and NWBCS?
  - iv. Why is the Army monitoring internal groundwater?
  - v. The statement above, which is a repeated assertion that the Army doesn’t need to address failures in On-Post remedies since the contaminants will be picked up by the boundary groundwater treatment systems, violates the FFA, the On-Post ROD, regulations, and defies reason.

- f. The 2020 FYR acknowledges that contaminants increasing downgradient of the Former Basin F are not limited to chloroform, DIMP, sulfate, and tetrachloroethylene. In addition to these RMA contaminants, arsenic, chloride, copper, DCPD, and NDMA are also increasing.
- g. The 2020 FYR states, "...it appears that the PT groundwater flow path is having a greater impact on water quality downgradient of the former Basin F compared to the WP flow path."
  - i. Does this statement consider that the monitoring wells for the WP are half (2) the number as the PT area (4)?
  - ii. It is evident that all groundwater monitoring wells, from both WP and PT areas, are showing increases in RMA groundwater contamination. What corrective actions beside additional groundwater monitoring are proposed to alleviate this remedy failure?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

#### **50. Section 6.3.3.9 Emerging Contaminants**

SSAB comments:

- a. The 2020 FYR provides the Army’s definition of emerging contaminants; it should also provide EPA’s definition.
  - i. Does the Army consider 1,4 dioxane an “emerging contaminant”? The Army has been monitoring the compound on RMA since 2011; it is no longer an emerging contaminant.
- b. The 2020 FYR should provide a reference to the 2016 Army guidance regarding PFOA/PFOS.
- c. The 2020 FYR should include a plume map, instead of monitoring results, for NDPA.
- d. The 2020 FYR should include a plume map, instead of monitoring results, for PFAS.
  - i. The 2020 FYR identifies one location where PFAS was above the EPA health advisory.

- ii. Figure 6.3-73 identifies four locations in the South Plants where PAFS exceeded the health advisory.
- iii. The 2020 FYR states, “All of the wells were located in the vicinity of the South Plants source area associated with documented use.” However, Figure 6.3-73 identifies PFAS detections upgradient of South Plants, and downgradient of Basin A, north and east of the Army Complex Trenches, west of Basin F, Off-Post, and in Sections 27 and 33.
- iv. As these are individual well results, additional groundwater monitoring is necessary to better define PFAS on and off RMA.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

#### **51. Section 6.3.4 Surface Water Monitoring**

SSAB comment:

Was the contamination detected in surface water evaluated to determine impacts on biota other, than aquatic, as part of the BMP? Exposures to biota from surface water would include dermal absorption and ingestion. While likely not a primary route of exposure, these pathways should be included in the BMP and overall protectiveness of RMA wildlife.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

#### **52. Section 6.3.5 – Site-Wide Biota Monitoring**

The 2020 FYR states, “Although the majority of the dieldrin concentrations in the eggs collected were below detection, there was insufficient data to evaluate the decision rule described in the BMP for all nest box decisions. Dieldrin residues above the No Observable Adverse Effect Concentration (NOAEC) were detected once in each of seven different kestrel nest boxes during the four seasons that the kestrel nest boxes were monitored.”

SSAB comments:

- a. The 2020 FYR should include the percentage of total eggs sampled that contained dieldrin above the NOAEC and the locations and concentrations of the eggs.
- b. The 2020 FYR states, “The Army conducted a series of meetings with Regulatory Agencies to determine requirements for completion of the program.” The 2020 FYR also states, “... sampling requirements for program completion were revised to focus on soil sampling rather than collection of kestrel samples.”



- l. Figure 6.3.78 does not identify the “59 soil sample decision units.” The figure needs to be revised to include these decision units.
- m. The 2020 FYR should include a discussion why decision unit 35NW, located in a highly contaminated area of RMA, was identified as “No Additional Monitoring Needed.”
- n. Was there consideration to include other RMA contaminants to the revised BMP? These should include contaminants such as DDT, DDE, and/or endrin.
- o. The 2020 FYR should include how the selected screening criteria of 110 ug/g was calculated.
- p. The 2020 FYR should identify where decision units are located.
- q. The 2020 FYR should identify which agencies and/or regulators determined the results to be acceptable.
- r. The 2020 FYR should explain why the Data Summary Report is still awaiting EPA review three years after completion.

The 2015 FYRR stated that there is a ROD requirement “Ensure that biota are not exposed to COCs in surface water, due to migration from soil or sediment, at concentrations capable of causing acute or chronic toxicity via direct exposure or bioaccumulation.” In addition, the 2015 FYRR stated, “Although the ROD requirement will continue to be evaluated as part of annual land use control monitoring, the ecosystem has no bearing on remedy effectiveness and will not be evaluated in future five-year reviews.”

- i. The SSAB disagrees that this evaluation be terminated. Ensuring that all biota are not exposed to CoC’s capable of causing acute or chronic toxicity via direct exposure or bioaccumulation has a definitive bearing on remedy effectiveness.
- ii. This is particularly important since there appears to be meager enforcement of the “catch and release” fishing program at the RMA Wildlife Refuge. This issue was not addressed in the 2020 FYR. Monitoring of aquatic biota needs to be evaluated in this and future FYRRs.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**53. Section 6.3.6 – Hazardous Waste Landfill Monitoring**

The 2020 FYR states, “The integrity of the HWL Cap will be maintained by the U.S. Army for the duration of the post-closure period.”

SSAB comments:

- a. The 2020 FYR should make it clear that the post-closure groundwater monitoring and maintenance of the HWL will be the responsibility of the U.S Army in perpetuity.
- b. The 2020 FYR discusses issues with adequate vegetation on the HWL cover. As required by regulation, vegetation is required to reduce erosion. The 2020 FYR failed to provide the current status of vegetation on the cap’s cover, especially as erosion continues to be an issue with cap integrity.
- c. The 2020 FYR identifies the LS/LF Building and shipments of LCS/LDS wastewater being shipped off site for treatment and disposal.
  - i. The 2020 FYR should identify the locations of the treatment/disposal facility.
  - ii. What are the transportation routes for these shipments?
  - iii. Are these “wastewaters” being regulated as hazardous wastes?
- d. The 2020 FYR states, “the HWL LCS liner system appear (emphasis added) to be intact.” The 2020 FYR also states “Typically, the detections are attributed to contaminants in the LCS clay liner material rather than indications of leaks in the liner system.”
  - i. The 2020 FYR should include what analytes (and concentrations) were detected in the clay liner prior to installation.
  - ii. It should make definitive conclusions why contaminants were detected in the LDS.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**54. Section 6.3.6.2 Enhanced Hazardous Waste Landfill Monitoring**

SSAB comment:

- a. Many of the vegetation and erosion concerns on the ELF are similar to the HWL (see SSAB comments above).

- b. Table 6.3-37 should identify the locations of the sumps beneath the ELF. Including the statement that “detections are attributed to contaminants in the LCS clay liner material rather than indications of leaks in the liner system.”

- i.

- c. The 2020 FYR should provide the locations of lysimeters 04 and 014. It should include the “recommended path forward” for the excess percolation in these lysimeters.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**55. Section 6.3.6.4 – Basin F RCRA-Equivalent Cover Monitoring**

The 2020 FYR provides three conditions which are not being met: percolation, cover thickness, and vegetation. It states that each of these conditions has been resolved. These conclusions are based on additional measurements provided after these conditions were identified.

SSAB comments:

- a. The 2020 FYR should provide a list of the improvements that were done to make these conditions acceptable to regulatory agencies, including the dates of completion.
- b. The 2020 FYR should identify how the burrowing owls and black-footed ferrets were “eliminated” and the dates of such eliminations.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Section 7**

**56. Section 7.1.1. - On Post Soil Remedies Under Construction**

The 2020 FYR states routine percolation monitoring, vegetation assessments, and cover maintenance activities are “expected to be protective and performance standards will likely be met.”

SSAB comments:

- a. It appears these ongoing projects may not be protective and/or capable of meeting performance standards. When and how will the results of these critical requirements be published for public comment?
- b. Does CDPHE have overall RCRA regulatory authority at RMA, including when the O&M period moves into Operational and Functional (O&F)?
- c. Approximately when will the draft CCR – Part 2 be available for public review?

- i. What performance data will be included in this report?
- ii. Why has it been a year for EPA to support the O&F determination?

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**57. Section 7.1.1.2 – Shell Disposal Trenches RCRA Equivalent Cover Interim Operations and Maintenance**

The 2020 FYR states, “Once enough performance data are collected and corrective measures performed on the cover is validated...”

SSAB comments:

- a. What corrective measures are ongoing at the Shell Trenches?
- b. Approximately when will the draft CCR – Part 2 for the Shell Trenches be available for public review?

**58. Section 7.1.2.1 – Shell Disposal Trenches Slurry Walls**

The 2020 FYR states, “The report concluded that Bore 3453 may not be an appropriate location to evaluate groundwater/disposal trench interaction as it is uncertain that disposal trenches extended to the area of Bore 3453.”

SSAB comments:

- a. It’s unclear why there’s uncertainty as to locations of Shell’s trenches.
- b. Was the RI insufficient to define all trench locations?
- c. Does it remain questionable where additional, unidentified Shell trenches extend?
- d. Did the Army’s investigation of the SW portion look for the boundaries of other Shell Trench boundaries?

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**59. Section 7.1.2.3 – Bedrock Ridge Extraction System**

The 2020 FYR states, “Analytes 1,2 DCLE and trichloroethylene in downgradient performance well 36566 show increasing concentration trends.”

SSAB comments:

- a. The remedy at the Bedrock Ridge Extraction System cannot be considered “protective” when the report clearly identifies CRSG exceedances of RMA wastes in a downgradient performance well.
- b. The definition of protectiveness includes the environment, not just human health. Why does 2020 FYR omit the evaluation of the protectiveness of the environment?

- c. Depending on capture of contamination at the NBCS should not be the goal of a protective remedy. It calls into question why there are any on-post treatment systems if capture of contamination and “protectiveness” are reliant upon extraction and treatment at the RMA’s boundary.
- d. When will there be a corrective action that is available for public comment on how the Army plans to remedy this violation of the On-Post ROD?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**60. Section 7.1.2.5 – Section 36 Lime Basins Slurry/Barrier Wall**

The 2020 FYR states, “The Lime Basins dewatering system is functioning as intended...” Then states, “...the inward gradient goal will not be achieved by this date the date (sic) for meeting the inward gradient performance goal cannot be reliably projected” However, a new goal of September 2024 was established to track progress towards meeting the goal.”

SSAB comment:

The 2020 FYR identifies a problem with the Lime Basins dewatering system. Explain how the Army considers this to be “functioning as intended.”

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**61. Section 7.1.2.8 Basin A Neck System**

The 2020 FYR states, “The BANS met the 75 percent mass removal criterion throughout the FYR period.”

SSAB comments:

- a. Was the 75% mass removal criteria for the Basin A Neck System identified in the On-Post ROD?
- b. The 2020 FYR states, “The BANS is operating as intended...” The 2020 FYR previously stated, “Concentrations of most analytes (except dieldrin, PPDDT, 12 DCLE and CPMSO2), are below CSGG/PQL in the downgradient performance wells.”
  - a. Were these exceedances intended in the in the On-Post ROD?
  - b. What are the dimensions of these plumes?
  - c. What corrective action will be implemented to resolve these exceedances?

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**62. Section 7.1.2.9 – Northwest Boundary Containment System:**

The 2020 FYR states, "...the NWBCS is functioning as intended..." It also states that effluent concentrations for all contaminants were below their respective CSRGs except dieldrin and NDMA. The Army then relied on the effluent meeting the "four-quarter moving averages." The 2020 FYR also states, "Although dieldrin was detected above the PQL in Original System and Northeast Extension downgradient performance wells, the performance criteria were met because the long-term trend is not increasing in downgradient performance wells." The 2020 FYR also states, "...dieldrin concentrations above the PQL in downgradient performance wells is an early indicator of potential remedy failure..." The 2020 FYR then states the exceedances "appear to be unrelated to system performance."

SSAB comments:

1. Does the Army consider the NWBCS to be functioning "as intended" with RMA contaminants exceeding CSRGs downgradient and off-post, and based on trends of dieldrin not increasing?

**As per EPA Guidance, this remedy "currently prevents the response action from being protective or may do so in the future."**

**63. Section 7.1.5.1 Site-Wide Biomonitoring**

The 2020 FYR states, "although the starling evaluation was completed..."

SSAB comments:

- a. The 2020 FYR should include a location map along with the results of the starling collection. This data needs to be included by the Army's BMP in defining RMA impacts on biota. How were the starling results used in defining soil sample locations?
- b. The 2020 FYR states soil samples were conducted in the area where limited kestrel results indicated potential exposure. The 2020 FYR should provide the locations and concentrations of the limited kestrel results.
- c. What toxicology studies were used to develop the "selected screening criteria of 110 ug/g" for sampled soil? Was this agreed to by all regulators? This information should be included in the 2020 FYR.

**As per EPA Guidance, this remedy "currently prevents the response action from being protective or may do so in the future."**

#### **64. Section 7.1.5.2 Site Wide Surface Water Monitoring**

The 2020 FYR states that exposed surface soil from the Shell Plants cover and landfill caps did not impact biota at Lake Ladora and Borrow Area 5.

SSAB comments:

- a. It was assumed that soils used for RMA covers and caps were clean fill material.
  - i. What sampling has been performed to define contamination on Shell Plant's cover and caps?
  - ii. Were contaminated soils used on all RMA caps and covers?
  
- b. The 2020 FYR should explain the statement "Based on local topography, contaminants at this location (North Plants) do not have the potential to migrate to downstream receptors off-post and exceed the remediation goals in off-post surface water."
  - i. FYR 2020 should describe why surface water in the North Plants that exceeds aquatic life standards remains on RMA.
  - ii. Are these surface water concentrations harmful to other RMA biota through absorption and/or consumption?
  
- c. The 2020 FYR should explain what is meant by off-post surface water being "consistent with the historical trend in arsenic within First Creek."
  - i. When did this historical trend begin?
  - ii. Did this historical trend first appear prior to RMA contamination migrating into First Creek?
  - iii. What background data and analysis were used to reach the conclusion that arsenic in First Creek is naturally occurring?
  
- d. The 2020 FYR states, "With the continuing removal of organic contamination from the groundwater in the area, concentrations of the suite of organic constituents in surface water at off-post station SW37001 are expected to decrease." What organic contaminants exist in off-post SW 37001?
  - i. What data/calculations and analysis were used to conclude these organic constituents "are expected to decrease"?
  - ii. Are they currently decreasing? If so, based on what data?
  - iii. When are they estimated to completely dissipate?

**As per EPA Guidance, this remedy "currently prevents the response action from being protective or may do so in the future."**

**65. Section 7.1.5.3 Site-Wide Groundwater Monitoring**

The 2020 FYR describes increasing statistical trends of numerous groundwater contaminants at numerous RMA sites including Basin F and Basin A.

SSAB comments:

- a. Why do each of these increases exist?
- b. Why do you conclude that these increases do not represent changes in site conditions that affect remedy performance and/or remedy failure?
- c. These increases could be due to remedy failure of Basin F and Basin A caps and/or covers. What have you done to determine if there is remedy failure of the caps and covers at Basin F, Basin A?
- d. What contingencies and/or corrective actions are being considered if these increasing trends continue?
- e. What groundwater modeling or other hydrogeologic considerations have been evaluated to better understand why dieldrin has been detected for the first time (or in 25 years) in the confined flow system (CFS) beneath basin F?
- f. The 2020 FYR states the four wells “should” be evaluated to determine the source of CFS contamination.
  - i. How long has the Army known or believed that the four wells should be evaluated?
  - ii. Why haven’t the four wells been evaluated at this point?
  - iii. What is the estimated date for evaluation of these four wells?
  - iv. What is the process, groundwater modeling, or other hydraulic considerations that will be used in this evaluation?
  - v. This evaluation should be an Army priority since it may be due to remedy failure of the Basin F liner.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**66. Section 7.1.5.4 Land Use Controls (LUCs)**

The 2020 FYE states, “...the LUCP incorporates controls for other specific areas, including additional ICs for the previously excavated lake sediments.”

SSAB comments:

- a. There is little or no discussion in the 2020 FYR regarding the excavated lake sediments.

- i. Please describe the locations these sediments and concentrations of RMA contaminants in the sediments.
  - ii. Describe what actions will be done to remove the contaminants of protect human health and the environment from any threat by this contamination.
- b. The 2020 FYR states that LUCs have effectively protected individuals from exposure to unacceptable levels of risk.
  - i. Are these individuals members of the public, RMA contractors or both?
  - ii. Do RMA contractors continue to receive hazardous waste training at the site?
- c. Does the Department of Interior support USFWS's attempt to change RMA's LUCs regarding consumption of RMA bison?
  - i. Are the USFWS and DOI prepared to re-open the On-Post ROD to make the LUC modification?
  - ii. Will all aspects of the process of re-opening the ROD be opened to public comment?
- d. The 2020 FYR should include the bison sampling program report.
  - i. Was/is this report available for public comment?
  - ii. What is the status to the reporting requirements and risk evaluation needs?
  - iii. The SSAB requests public review and comment on all aspects of these critical issues regarding the proposed consumption of RMA bison and attempts to re-open the ROD.
- e. The 2020 FYR is vague regarding Commerce City's proposal to violate and/or change LUCs.
  - i. Why hasn't this issue been resolved since it was addressed in the 2015 RMA FYR?
  - ii. Is Commerce City prepared to perform a risk assessment to justify and prove that a change to LUCs remains protective to human health and environment? This risk assessment must be available to public review and comment.
- f. Why would a modification to the LUCP resolve a violation of the FFA and ROD regarding past transfers of land outside federal control? How was this violation resolved?

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**67. Section 7.1.6.2 Secondary Basins Remediation Part 3, Basin C Supplemental Soil Excavation Project** – The 2020 FYE states, “...the Basin C Supplemental Excavation Project has been completed.”

SSAB comments:

- a. The 2020 FYR cannot, as was done previously throughout the 2020 FYR, simply reference a Navarro document instead of describing actual details of an issue.
- b. The 2020 FYR should describe in detail the investigation and remediation of Basin C soils.

**68. Section 7.1.7 Cost**

SSAB comment:

- a. Has the Army estimated the overall cost, including the yearly costs, to maintain groundwater treatment systems, caps, covers, groundwater monitoring etc. in perpetuity?

**69. Section 7.2.1.1 Changes to Water Standards** The 2020 FYR provides that the 2020 CSRG for chloroform is 6.0 ug/L while the new or revised standard (CBSG) is 3.5 ug/L.

SSAB comment: Are the boundary systems meeting the chloroform ARAR of 3.5 ug/L?

**70. Section 7.2.1.3 PQLs , Certified Reporting Limits, and MRLs**

The 2020 FYR states that there was agreement with CDPHE in 2012 for an interim PQL for NDMA as twice the calculated PQL. In 2015 the PQL was replaced to 0.009 ug/L . The 2020 FYR states Reporting limits have not changed significantly during the review period while Table 7.2.1 identifies the 2020 NDMA CSRG as 0.00069 ug/L.

SSAB comment: What is the CSRG value for NDMA treatment at the boundary systems and at all internal treatment systems?

**71. Section 7.2.5 Changes in Exposure Assessment Variables; Vapor Intrusion**

SSAB comment: 1,4 dioxane, NDMA, and NDPA exist in both On-Post and Off-Post groundwater, they should be included in the risk screening evaluation in regards to vapor intrusion.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

## **72. Section 7.2.5 Changes in Exposure Assessment Variables; Emerging Contaminants**

The 2020 FYR states a feasibility study and risk assessment were performed for 1,4 dioxane, but were limited to “potential off-post exposure pathways.” The Army concluded that “remedial action for 1,4 dioxane in the off-post OU was not warranted.”

SSAB comments:

- a. The feasibility study should include groundwater treatment options for protection of the environment as required by CERCLA and the RMA RODs, and not merely risks to human health.
- b. The On-Post treatment systems should also meet CBSG for NDPA, not merely the boundary systems and the OGITS.
- c. The 2020 FYR states that Army and EPA guidance were used to determine whether PFOA/PFOS were present in RMA groundwater above the EPA health advisory level of 0.07 ug/L. There is no reference to either of these guidance documents and they should be included in the 2020 FYR.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

## **73. Section 7.4 Technical Assessment Summary**

SSAB comment:

The Section contradicts itself, the remedy is not “generally functioning as intended.” As stated throughout Section 7, groundwater contaminants continue to exceed state and/or federal standards with no clear corrective actions identified. These remedy failures have been identified for years with no resolution as to remediation of the violations of ARARs, the RODs, and CERCLA. The 2020 FYR states that emerging contaminants have been assessed and remediation goals and monitoring requirements have been incorporated where appropriate. The 2020 FYR does not include how remediation goals and monitoring requirements protect the environment, but instead merely human health. In conclusion, the current remedy is not protective in the short-term and long-term of human health and the environment.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

## **Section 8**

### **74. Section 8 Issues**

SSAB comment:

The Army references a portion of 2001 EPA to justify its determination of “Issues Identified and Effects on Current or Future Protectiveness” at RMA (Table 8.0.1). In the ten years since this guidance, numerous additional EPA guidance documents have been published to better characterize remedy protectiveness determinations.

It is evident in this Section that the Army misinterprets the 2001 guidance. The table merely identifies issues that currently prevent the response action from being protective; it fails to identify issues that may affect protectiveness in the future and/or early indicators of potential remedy failure.

Instead, the 2020 FYR inappropriately lists these future protectiveness issues in Section 9 “Recommendations and Follow-Up Actions” of the Review. Each of the SSAB’s comments in Section 9 are in response to remedial issues should be included in Section 8 because they clearly meet the 2001 EPA FYR guidance as they relate to future issues of protectiveness and/or early indicators of potential remedy failure.

## **Section 9**

### **75. Section 9 – Recommendations and Follow-Up Actions**

SSAB comments:

- a. Section 9.1 states the recommendations identified during the 2020 FYR “may improve remedy operations, management of O&M or completeness of the site file, but do not affect current and/or future protectiveness.” These “recommendations” are instead follow-up actions to resolve issues that may affect protectiveness in the future and/or early indicators of potential remedy failure.
  
- b. Without EPA concurrence, the Biota Monitoring Program (BMP) remains an issue that may affect protectiveness in the future. Without EPA concurrence, the BMP may reveal that remaining RMA surface soils adversely impact RMA biota now and in the future.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

- c. The Bedrock Ridge Extraction System has identified three RMA organic contaminants downgradient of the system, an evident indication of potential remedy failure.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

- d. Basin F groundwater monitoring has identified a minimum of four increasing RMA contaminants downgradient of the basin. This issue has resulted in the Army evaluating Basin F groundwater data, the Basin F monitoring network, and statistical data evaluation. It is evident these studies are being done due to indicators of potential remedy problems, not to improve remedy operations, manage the O&M and/or completeness of the site. The Army needs to acknowledge this is a remedy failure and initiate corrective actions to remedy the failed response action.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

- e. The identification of dieldrin in the confined flow system below Basin F has become a possible remedy failure.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

- f. Increasing chloride concentrations in Well 35083 (location unidentified) indicates potential remedy problems. The Army recommendation of further evaluation of chlorine in the vicinity would be evidence of a remedy protectiveness concern.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

- g. The USFWS’s desire to allow consumption of bison (or other animals from RMA, for that matter) is a clear violation of RMA’s LUCs.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

- h. The 2020 FYR identifies many issues concerning inadequate community involvement. While this may not directly impact remedy protectiveness, the SSAB agrees that without meaningful public input on remedial issues on RMA, there will be significant delays on implementation of important remedy decisions, an early indicator of remedy problems. Any updates, improvements, and/or communications with the community must be in coordination with the public and the RMA SSAB.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

## Conclusion

It is important for everyone to remember that the “clean-up” at RMA is designed to be minimally protective. The remedy is designed to protect the public to a level of 10<sup>-4</sup>. This means that after the RMA “clean-up” is complete, exposure to the contamination left at RMA will provide additional cancer risk to one in ten thousand people (this is in addition to the current cancer rates in the United States: one-in-two men will have cancer and one-in-three women will have cancer during their lifetimes). This is the minimum level of “clean-up” allowed by law and, at the time this remedy was selected, the standard level of “clean-up” was 10<sup>-6</sup> or a one-in-one-million increase in the cancer risk.

The SSAB objected to a minimal “clean-up” at RMA, and has tried to be diligent in its oversight of the RMA “clean-up” precisely because a minimum “clean-up” demands that the assumptions underlying the remedies are valid, that the “clean-up” is designed and performed at the highest possible level, and that long-term monitoring is effective and the long-term remedy is protective of human health and the environment. If every step taken at RMA is as minimalized and compromised as the choice of the RMA remedies, the community surrounding and visiting the RMA will be harmed and the State of Colorado will pay a huge price to try to correct the problems.

Given the fact that the public has had to accept the presence of thousands of tons of contaminated soil being left at the RMA, and that over one-square mile of contaminated land has become a sacrifice zone, and that there is no quantification or cataloguing of the remaining contamination in throughout RMA, the institutional controls that are used and will be used to control contamination and protect the public must be absolute and fool-proof. That is nowhere near the case at RMA.

In our limited survey, we have been able to identify hundreds of land transfers in the Off-Post area that have NOT included the required notice of below-surface contamination emanating from the RMA. Deed restrictions are one of the only institutional controls used Off-Post and have been discussed many times with the public. The fact that there are no groundwater or CERCLA easements contained in thousands of sales documents shows that that the deed restrictions put in place by the Polluters are inadequate and not functioning as intended by the public.

All Off-Post contamination pathways have not been closed and the public has not been protected. We are aware of homeowner/developer struggles to acquire the so-called replacement water, provided in the ROD, at properties where existing wells continue to analyze “positive” for military contamination. In addition, we are aware of a landowner in the contaminated Off-Post area of RMA who was able to obtain a permit to drill a well, contrary to the “advertised” institutional controls required by the ROD.

This issue also raises the concerns about the inadequate number of sampling and monitoring wells, which are necessary to provide data to insure long-term protection. In order to protect the community and to ensure that there are no open pathways to the tons of contamination that have been left in place, the amount of information and data should be increasing over time, rather than

decreasing. For all these reasons, the public cannot consider the assurances of protectiveness as adequate, let alone fool-proof.

**We look forward to seeing these comments and your responses incorporated into the Final RMA 2020 FYRR.**

Respectfully submitted on behalf of the Rocky Mountain Arsenal Site Specific Advisory Board,



RMA-SSAB Chairperson

RMA SSAB TAG Coordinator

**U.S. Army Responses to  
the Site-Specific Advisory Board Comments on the  
Fifth Five-Year Review Report for  
Rocky Mountain Arsenal, Revision E, May 6, 2021**

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SITE SPECIFIC ADVISORY BOARD OF THE ROCKY MOUNTAIN ARSENAL, INC.

[REDACTED], Chairperson  
[REDACTED]  
[REDACTED]  
[REDACTED]

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BOARD OF DIRECTORS: [REDACTED]  
[REDACTED]  
[REDACTED]

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July 23, 2021

*Re: Public Comments Submitted by the Site Specific Advisory Board (SSAB) of the Rocky Mountain Arsenal (RMA) Regarding the RMA 2020 Five-Year Review Report (FYRR)*

**1. Background: Site Specific Advisory Board of the Rocky Mountain Arsenal, Inc.**

In 1994, citizens concerned with the “clean-up” of the Rocky Mountain Arsenal presented a 300-signature-petition to Colorado Governor Roy Romer, requesting that a citizen advisory group be established based on *the Report of the Federal Facilities Environmental Restoration Dialogue Committee (FFERDC)*. In response to that petition, the ***Site Specific Advisory Board of the Rocky Mountain Arsenal*** was formed in early 1994 by the State of Colorado and EPA Region VIII, as the first Site Specific Advisory Board (SSAB) established at a Department of Defense (DOD) “clean-up” site.

The ***Site Specific Advisory Board of the Rocky Mountain Arsenal*** has met regularly since its inception. Its meetings are open to the public and its programs often include presentations from, and discussions with, the Army, Shell Oil Company, EPA, the State of Colorado, the US Fish and Wildlife Service, and Tri-County Health. The ***Site Specific Advisory Board of the Rocky Mountain Arsenal*** incorporated in December 2000 as a not-for-profit corporation. Regular attendees also serve, or have served, on other RMA-related or RMA-interested boards including, but not limited to, the Restoration Advisory Board (RAB), the Citizen Advisory Board (CAB), the Medical Monitoring Advisory Group (MMAG), the Sierra Club RMA subcommittee, the National Caucus of RAB Community members, Montbello community groups, the Northern Coalition, and the City Council of Commerce City.

The Rocky Mountain Arsenal is one of the largest and most expensive “clean-up” projects to date in the United States. At the completion of “clean-up”, land was transferred to the Rocky

Mountain Arsenal National Wildlife Refuge, which is intended to attract national and international visitors. As such, the RMA affects citizens and communities bordering RMA, as well as those of the Denver- metropolitan area, the State of Colorado, the United States and potentially the entire planet. It is for this reason the *Site Specific Advisory Board of the RMA* seeks and encourages the involvement of all citizens and interested persons. The Site Specific Advisory Board of the Rocky Mountain Arsenal, Inc. received a Technical Advisory Grant from the U. S. Environmental Protection Agency in 2001. Without this grant, meaningful and substantive public participation would be difficult, if not impossible. We thank the EPA for their continued support of meaningful public participation.

**Why are we so committed to this citizen oversight process at RMA?** The Polluters chose a cap-and-cover remedy (rather than removal or treatment of the thousands of tons of contamination at RMA). *The RMA hasn't been "cleaned-up" as advertised: it has been "covered-up"*. The integrity of a cap-and-cover system is completely reliant on diligent, timely, pro-active, and effective long-term Operations and Maintenance at RMA. We believe that only the public and the regulators can ensure the integrity of this remedy and we bring tremendous historical knowledge and memory to this process, as well as a deep and abiding commitment.

We remember that the "clean-up" at RMA was designed to be minimally protective. By this we mean that the remedy is designed to protect the public to a level of 10 (-4). It means that after the RMA "clean-up" is complete, exposure to the contamination left at RMA will provide additional cancer risk to one in ten thousand people (this is in addition to the current cancer rates in the United States: one-in-two men will have cancer and one-in-three women will have cancer during their lifetimes). This is the minimum level of "clean-up" allowed by law and, at the time this remedy was selected, the standard level of "clean-up" was 10 (-6) or a one-in-one-million increase in the cancer risk.

The SSAB objected to a minimal "clean-up" at RMA, and has tried to be diligent in its oversight of the RMA "clean-up" precisely because a minimum "clean-up" will only remain protective of human health and the environment if the assumptions underlying the remedies are valid, if the "clean-up" is designed and performed at the highest possible level, and if long-term operations and monitoring are effective. If every step taken at RMA is as minimized and compromised as the choice of the RMA remedy was, the community surrounding and visiting the RMA will be harmed and the State of Colorado will pay a huge price to try to correct the problems.

The Five-Year Review process was designed to provide regular and continuing review of a remedy, both in terms of current project operations and, most importantly, in review of the ongoing effectiveness of the operations and maintenance of remedy projects that have been finished, in order to insure protection of public health and the environment. Such a review is of highest importance at a site like the RMA where thousands of tons of highly contaminated soils have been left in place in the ground and the contaminated groundwater will need to be treated for hundreds of years into the future. (The Natural Resource Damages Assessment Plan concludes that Shell Oil released an estimated 150,112 tons of contaminants into Colorado's environment. The Army is alleged to be responsible for another 26,405 tons. Some of the contaminated soils were placed in the Enhanced Hazardous Waste Landfill and /or the

Hazardous Waste Landfill, and remaining contaminated soils were left in place with mere soil caps and covers.)

We call this a “cap-and-cover” remedy because the Polluters chose to leave soil contamination in place rather than treat or remove the contaminants even though there is also groundwater treatment, which is necessitated in perpetuity due to the fact that contaminated soils were left in place.

The Polluters made a promise to the public – that they would maintain the quality and integrity of the caps-and-covers “the containment system” and provide timely and high quality review of the effectiveness of their ‘containment’ remedy – when they fought for (and sued for) a remedy that would leave thousands of tons of contaminated waste at the RMA rather than to actually clean up, or remove, the contamination. They must be held accountable for this minimalized remedy. If they had chosen to remove and/or treat the contamination they wouldn’t have such a difficult and important job of safe-guarding the public and the environment from this extremely contaminated site.

**Response:** The Army recognizes the SSAB’s sustained commitment to providing input on the Rocky Mountain Arsenal remediation program. However, the Army disagrees with characterization of the remedy as minimally protective.

It is important to note that the decision to contain waste on site was made in consultation with the community and regulatory agencies during numerous public meetings about the overall design of the remedy. During those meetings, the public reviewed several alternatives and preferred on-site containment over transporting waste through the community to another location.

As stated in the response to this SSAB comment on the 2005, 2010, and 2015 FYRRs regarding risk, while the risk assessments and remediation strategies made use of  $10^{-4}$  and  $10^{-6}$  risk levels for decision-making, the remedy has been implemented in ways that have significantly lowered potential health risks even lower than ROD requirements. In addition, CERCLA requires protectiveness to be a threshold criterion, meaning the remedy is either protective or it is not. Based on the review performed, the status of the remedy remains protective. This is due in part to the multiple layers of protection afforded by the integrated remedy components, as the cover systems, groundwater treatment systems, connections of homes to the SACWSD water system or a new drinking water well, land use restrictions, and continued monitoring of all remedy components work together to maintain protectiveness.

Both EPA and CDPHE continue to provide oversight for the remedy, and the Army actively engages with the regulatory agencies to discuss all matters associated with operation and maintenance of the remedy. The Army remains committed to maintaining the integrity of all remedy components to ensure continued protection of human health and the environment.

## GENERAL COMMENTS

**General Comment 1:** The SSAB is disappointed in the Army's lack of community involvement relating to its review of this document. The FYR process does not follow the EPA 2001 Five Year Guidance (EPA 2001). This guidance was used by the Army throughout the FYR 2020, but the 2020 FYR fails to acknowledge many of the policies in Appendix A Community Involvement. Examples include:

- a. **Comment:** The Army should have notified the SSAB about the most appropriate methods for notifying and involving the community in the five-year process;
- b. **Comment:** The Army should have worked with the SSAB during the initial planning stages of the five-year review to determine the appropriate level of community involvement;
- c. **Comment:** During the review, the Army should have provided the SSAB information on where to find written documentation about the review (the SSAB insists this should have included access to all reference material identified in Section 12 of the FYR 2020);
- d. **Comment:** The SSAB should have been involved in decisions regarding community involvement and appropriate activities.

**Response a-d:** The Army values public input and has a long history of involving the community around issues and decisions related to the site. For the 2020 Five-Year Review, the Army followed the most recent EPA guidance (EPA 2001 Five-Year Guidance [EPA 2001]) in notifying and soliciting input from the community throughout the process.

In addition to placing public notices at the start of the Five-Year Review in four community newspapers, as well as on the RMA website, the Army contacted representatives from the SSAB, community members, the former Restoration Advisory Board (which the Department of Defense recognized as the official community advisory board for the site), and others to notify them of the start of the Five-Year Review and request their participation in the community interview process. Those interviews were conducted cooperatively with the regulatory agencies and included soliciting input on community involvement needs and preferences.

In addition, RMA is one of the few Superfund sites in the nation that invites the public to submit comments for inclusion in the final Five-Year Review Report. To facilitate this process, the Army again published public notices in

four community newspapers and on the RMA website to notify the community about the public comment period and specify where the draft final Five-Year Review Report could be reviewed. A hard copy of the report was placed in local libraries, as well as published in digital form on the RMA website. The Army contacted a representative of the SSAB, as well as other community members with a history of involvement in the site, to notify them about the opening of the public comment period.

The Army recognizes and respects the SSAB's long involvement with the site. The Army participated in a public meeting at the SSAB's request on July 12, 2021, and provided additional information following the meeting. The Army also notified the SSAB in advance of its presentation to the Commerce City Council about the 2020 Five-Year Review on June 7, 2021. The Army's intent throughout this process has been to involve and solicit input from a diverse array of residents representing the surrounding communities.

- e. **Comment:** We hereby formally request at least one, 3-hour public meeting regarding the 2025 Five-Year Review, where community members can ask questions and discuss their concerns. Sending us to the Army's presentation to the Commerce City Council meeting is not adequate since public participation is not allowed.

**Response:** Based on community input received through the 2020 Five-Year Review, the Army will evaluate its community involvement program to identify opportunities to expand outreach. Historically, RMA has reached the most residents by communicating with community members through established community forums. For the 2025 Five-Year Review, we will assess whether it would be beneficial to host a separate public meeting in addition to presentations given through existing community forums. We will make that determination during the 2025 Five-Year Review planning process.

- f. **Comment:** The 2020 FYR included more than 1,000 pages of report and data, and covers the activities and data collection of a five-year period of time. While we appreciate the extension of the public comment period this year by an additional two weeks, given the length of the Five-Year Review (including hundreds of supporting and reference documentation) and importance of the RMA Five-Year Review, the public should be allowed an extensive period of time to provide comment, but not less than 90 days – as we requested in our public comments to the 2005-2010 Five-Year Review and the 2015 Five-Year Review.

**Response:** At the SSAB's request, the Army extended the public review period by 20 days to allow more than 60 days for public review and comment. Our desire is to give the public ample time to review the draft final report, while still enabling us to meet the schedule required by the EPA and Department of Defense.

- g. **Comment:** Please provide all of the tables, reference materials, and supporting documents to the future Five-Year Reviews by placing them on the Army website or on a storage site such as Dropbox. These could be made available before the Five-Year Review is released to the public for comment.

**Response:** The Army will evaluate the most effective way to make supporting RMA documents referenced in future Five-Year Review Reports available as part of the public comment process. This may include publication on the RMA website.

**General Comment 2:** The “Protectiveness Statements” in Section 10 of the 2020 FYR attempt to thwart regulatory agencies and the public by creating an illusion or false impression that the current state of the On-Post and Off-Post Operable Units (OUs) are effective and in compliance with the two Records of Decision (RODs), the Federal Facilities Agreement, EPA guidance, and CERCLA. If a reader were to limit their RMA 2020 FYR review strictly to Section 10, one would conclude that the remedy is safe, sound, and protective at RMA. However, if the reader were to read the entire 2020 FYR (approximately 600 pages), one would be alarmed at numerous new remedial problems, along with bewilderment as to why issues identified in prior RMA Five-Year Reviews remain unresolved.

Section 10 of the 2020 FYR states, “The remedy for the On-Post OU currently protects human health and the environment because remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks.” Eliminating unacceptable risks from exposure pathways are not from remedial activities, but from institutional controls (ICs) defined prior to remediation and in effect today. If there were no Institutional Controls incorporated into the current remedy at RMA, risks from exposure to contamination from the current remedy would be dangerously high to human health both On-Post and Off-Post. The remedy chosen at RMA was a cap-and-cover system, where the most contaminated soils were contained in two hazardous waste landfills, and the remainder of the thousands of tons of contaminated soils were left in place and covered by less contaminated soil. Consolidating and covering contaminated soils On-Post is beneficial to human health exposure, but the overall remedy is not responsible for eliminating exposures.

In addition, the SSAB disagrees with the Army’s conclusion that the current remedy protects human health and the environment. Addressing exposure pathways does nothing to protect the environment, particularly groundwater. Throughout the 2020 FYR, the claim of protectiveness is concealed behind “human health protectiveness” (claiming that humans are not exposed to the on-going contamination at RMA), while knowingly allowing toxic RMA contamination to be released into groundwater both On-Post and Off-Post. The Army relies on boundary groundwater treatment systems to conclude that the failure of the On-Post treatment system is acceptable since groundwater contamination will be treated at the North Boundary Containment System (NBCS) and/or Northwest Boundary Containment System (NWBCS). However, these systems continue to degrade the environment via, 1) ineffective treatment, 2) inability to capture groundwater plumes, and 3) allowing RMA groundwater to be discharged into off-post without treatment. On-Post treatment systems have been ineffective in capturing and treating groundwater and most, if not all, are allowing discharges that exceed Colorado Basic Standards for Groundwater (CBSGs) and continue to degrade the environment.

EPA guidance regarding the contents of Five-Year Reviews (FYR) states, “all issues that currently prevent the response action from being protective or may do so in the future should be documented as FYR issues in the FYRR. Such issues are to be documented along with follow-up actions needed to ensure the proper management of the remedy.” Throughout the 2020 FYR, the Army instead punts many protective and corrective actions and instead relies on additional groundwater monitoring and/or installation of new groundwater monitoring wells to remediate failures. This results in continued damage to the environment while monitoring data is collected and evaluated, at times taking years.

EPA guidance also states, “...the FYR should identify early indicators of potential remedy failures.” Instead of providing what would be considered “early indicators”, the 2020 FYR identifies early indicators of potential remedy as “Recommendations and Follow-Up Actions” and states the recommendations “may improve remedy operations, management of O&M or completeness of the site file, but do not affect current and/or future protectiveness.” By calling “early indicators” of remedy failure “Recommendations and Follow-Up Actions”, it implies that the goal is to improve a well-functioning remedy instead of admitting that there are remedial breaches. Clearly this is not the intent of EPA guidance.

The SSAB has identified remedial actions that either currently “prevent the response action from being protective or may do so in the future” and/or are “early indicators of potential remedy failure.” Our review concluded:

**Response:** The Army disagrees with the narrative of this comment. The containment elements of the selected remedy are critical to preventing exposure to contaminated material and providing protection of human health and the environment. This protectiveness has been achieved through implementation of the entire remedy to eliminate exposure pathways and does not rely solely on LUCs for exposure control.

The FYRR evaluates overall protectiveness of human health and the environment. The selected remedies presented in the On-Post and Off-Post RODs, determined to be protective of human health and the environment in accordance with CERCLA, were designed to eliminate exposure pathways for human and wildlife receptors and minimize further migration of contaminants to groundwater. Based on the evaluations performed for the FYR, these objectives have been met and the remedy is protective of human health and the environment.

Treatment plant effluent monitoring demonstrates that the systems are effectively meeting the compliance requirements for all contaminants with one exception. The emerging contaminant 1,4-dioxane occasionally exceeds the groundwater standard in the NBCS effluent. Although the NBCS was not specifically designed to treat 1,4-dioxane (as it is an emerging contaminant), some reduction of 1,4-dioxane appears to be occurring based on comparison of influent and effluent concentrations. During this FYR period, a treatment option has been identified and is planned for implementation as part of construction of a new Consolidated Water Treatment Plant that will replace the NBCS and NWBCS. Construction of the new treatment facility is tentatively scheduled to begin in FY23, pending funding and regulatory agency approval of the design.

The Army continues to consult with the regulatory agencies to identify remedy issues and necessary actions to maintain protectiveness. In many cases, additional data are needed to determine appropriate actions and these monitoring requirements are also coordinated with the regulatory agencies. Issues that the Army has determined could affect future protectiveness are included in the FYR with corrective actions identified. Consistent with the most recent EPA FYR guidance, Section 9.1, Other Findings, includes recommendations for concerns identified that do not affect protectiveness.

For the concerns identified below, specific comments presented by the SSAB and responses to those comments are provided in the following sections and relevant specific comment response numbers are referenced.

- a. **Comment:** NWBS and NWBCS are currently not protective of human health and the environment. RMA contaminants such as dieldrin, NDMA 1,4 dioxane, and PAFS (sic) are bypassing systems and/or are not being treated. This concern was included in the SSAB's 2015 comments;

**Response:** See responses to comments 11, 15, 19, 27, 37, 38 and 62.

- b. **Comment:** Basin F Wastepile and Principal Threat area are currently not protective of the environment. RMA contamination above Contaminant System Remediation Goals (CSRGs) has been detected in downgradient monitoring wells and in the confined flow system beneath the Former Basin F area. In addition, the vegetative cover continues to not be adequate. This concern was included in the SSAB's 2015 comments;

**Response:** See response to comment 49.

- c. **Comment:** The Hazardous Waste Landfill (HWL) and Enhanced Hazardous Waste Landfill (ELF) show indications of potential remedy failure. Additional groundwater investigations are ongoing to identify contamination downgradient of the landfills. In addition, the Army has identified RMA contaminants in both the HWL and ELF's leak detection system (LDS). This concern was included in the SSAB's 2015 comments;

**Response:** See response to comment 53.

- d. **Comment:** Basin A has indicators of potential remedy failure. Contaminated groundwater is increasing from the former source area. Additional groundwater monitoring is necessary to determine environmental protectiveness;

**Response:** See response to comment 39.

- e. **Comment:** Off-Post groundwater and treatment systems currently are not protective of human health and the environment. There is a gap in Off-Post extraction wells, exceedances of RMA contaminants downgradient of treatment systems, and DIMP has been detected above standards in a private well;

**Response:** See responses to comments 20 and 41.

- f. **Comment:** The Biomonitoring Program identifies early indicators of potential remedy failures as it is completely ineffective in determining health effects on RMA wildlife. The current testing protocol addresses only soil contamination and not the actual effects on wildlife. This concern was included in the SSAB's 2015 comments;

**Response:** See responses to comments 24, 35, 51, 52 and 63.

- g. **Comment:** The Biomonitoring Program was abandoned in 2013 and a new Biomonitoring program has been delayed because the Army has cut funding to the EPA, which has interfered with the ability of EPA to provide oversight and concurrence. This is an insidious ploy to minimize the efficacy and protectiveness of this "cover-up" remedy; Until EPA concurs with the current Bio Monitoring Plan, the protectiveness of the RMA remedy cannot be considered protective.

**Response:** See response to General Comment 7.

- h. **Comment:** Land Use Controls, which are an essential part of the cap-and-cover remedy, have indicators of potential remedy failure. USFWS is attempting to allow RMA bison to be transported Off-Post and consumed. Commerce City is evaluating residual/commercial land uses on property previously part of RMA and integrated into RMA ICs. The Army appears to have little or no control over the Land Use Controls;

**Response:** See responses to comments 25 and 66.

- i. **Comment:** On-Post groundwater treatment systems such as the Basin A Neck and Bedrock Ridge are not protective of the environment. Both systems are currently discharging RMA contamination above CSRGs. This concern was included in the SSAB's 2015 comments;

**Response:** See responses to comments 40 and 59.

- j. **Comment:** Previous On-Post source areas such as the South Plants, Lime Basins, and Sand Creek Lateral are not protective of the environment. Contaminant plumes above CBSGs are migrating from these former source areas;

**Response:** Contaminant plumes originating from South Plants, Lime Basins, and the Sand Creek Lateral are captured and treated at the BANS. The boundary containment systems provide further protection against the migration of contaminants from these source areas off-post. In addition, migration of contaminants from these source areas has been minimized through excavation of contaminated soil and/or construction of RCRA-equivalent soil covers to minimize percolation through waste left in place.

- k. **Comment:** Emerging contaminants such as 1,4 dioxane, NDPA, and PAFs (sic) have been detected On-Post. No treatment of 1,4 dioxane and PAFs (sic) exists at the boundary systems and On-Post and Off-Post treatment systems. The NDMA concern was included in the SSAB's 2015 comments. The milestone for investigating NDMA and its potential

remedy failure was August 31, 2017. The 1,4 dioxane concern was included in the SSAB's 2015 comments, with a milestone for investigating this potential remedy failure on June 30, 2017 and,

**Response:** All emerging contaminants have been addressed through the CERCLA process. The RMA treatment systems are successfully treating for NDPA, and effluent concentrations are below the Colorado Basic Standard for Groundwater (CBSG). Although the comment mentions NDMA, NDMA is not an emerging contaminant, and is treated by the existing treatment systems. This comment appears to be a reference to the NDPA concern from 2015. The ROD was modified to incorporate the NDPA treatment requirement in April 2020. See also responses to comments 17 and 27.

For PFAS, although no groundwater standard exists, effluent concentrations are below the EPA health advisory level. See also response to comment 30.

The ROD was modified to incorporate the 1,4-dioxane CBSG for the North Boundary Containment System (NBCS) in April 2020. The current NBCS was not specifically designed to treat 1,4-dioxane (as it is an emerging contaminant); however, some reduction of 1,4-dioxane appears to be occurring based on comparison of influent and effluent concentrations. A new treatment plant (the Consolidated Water Treatment Plant) has been designed to treat the flow from the Northwest Boundary Containment System and the North Boundary Containment System, replacing the existing two treatment systems. The North Boundary treatment train within the new treatment plant has been designed to accommodate treatment for 1,4-dioxane for the North Boundary flow. Construction of the new treatment facility is tentatively scheduled to begin in FY23, pending funding and regulatory agency approval of the design. See also responses to comments 19, 38, 41 and 50.

1. Surface water is not protective of the environment and possibly individual wildlife species. Additional toxicological studies are needed as elevated RMA contaminants have been detected in the North Plants and Basin E Pond. This concern was included in the SSAB's 2015 comments.

**Response:** See responses to comments 51 and 64.

**General Comment 2 (continued):** The current RMA remedy is not protective of human health and the environment. Numerous statements and conclusions in the 2020 FYR are indefensible or misleading. A majority of current remedial failures identified in the 2020 FYR were previously identified by the SSAB and regulatory agencies in past Five-Year Reviews. Therefore, the current remedial problems are likely to remain through the 2025 FYR, while more excuses for remedial breaches are promoted as "protectiveness". Aggressive correction actions are required to reduce continued damage to the environment and to maintain the integrity of a cap-and-cover system that is completely reliant on diligent, timely, pro- active, and effective long-term Operations and Maintenance at RMA.

**Response:** As stated above, the Army continues to consult with the regulatory agencies to identify remedy issues and necessary actions to maintain protectiveness. Remedial response actions have been developed and implemented to address issues identified in the previous five-year reviews. In some cases, additional evaluation is underway to provide information needed to determine appropriate actions. As discussed in the FYRR and responses to the specific comments that follow, the review included evaluation of remedy components against ROD requirements and RAOs, remedial designs, and performance goals identified in long-term management plans. There were several issues identified in the FYRR that could affect future protectiveness and other findings not affecting protectiveness that warrant attention; however, the remedy is generally functioning as intended and is protective of human health and the environment.

**General Comment 3:** FYRR, The issue of d (sic) fracking and its impact at RMA is of high concern in all of the communities surrounding RMA. We are concerned about the potential impact of fracking on the contamination remaining at RMA and/or the impact on the geological formations that are relied on to contain contamination. Fracking could result in RMA contamination migrating into deeper aquifers and could actually influence the migration of contaminate plumes On-Post. This issue has still not been adequately addressed (other than an unsubstantiated denial) and was not even addressed in the 2020 FYRR.

**Response:** Fracking is regulated by the State of Colorado, although typically fracking companies will also contact Commerce City to make them aware of their plans. Commerce City in turn will then typically notify the Army of nearby activity. The Army has met previously with companies conducting fracking activities in the vicinity of RMA and have made them aware of contaminated groundwater plumes related to RMA. These plumes are clearly identified on the CRSG Exceedance maps provided periodically to the State Engineer's Office, most recently in 2020. In these meetings, fracking companies have indicated that they isolate the aquifer where RMA contamination exists (alluvial aquifer) by sealing it off with an outside casing before they drill deeper. By using this drilling technique, the fracking companies can keep cross-contamination between aquifers from occurring. Additionally, fracking companies have indicated that they conduct their own groundwater monitoring to ensure that they are not impacting groundwater plumes in the area.

**General Comment 4:** The 2015 FYRR stated, "...prior to remedy completion the RVO has committed to provide the USFWS with military munitions awareness training. This training is intended to heighten USFWS personnel awareness of military munitions related hazards and to inform the USFWS of the Army notification process, if potential military munitions are encountered by Refuge employees/patrons after remedy completion. The Army-provided awareness training is not intended to grant the USFWS or its representative authorization to perform any action on potential military munitions, but to ensure notification and response by trained Army representatives."

- a. What is the status of this military munitions awareness training?

- b. There is nothing on the Rocky Mountain Arsenal Wildlife Refuge website regarding the possible of existence of munitions at the refuge or on RMA, there are no warnings, and no emergency plans. This was not addressed in the 2020 FYRR.

**Response:** All RMA and RMA NWR employees are provided munitions awareness training initially as part of new employee training and then periodically as part of ongoing health and safety training. Although there was extensive remediation performed in areas with munitions history, these areas remain closed for public access and appropriate signs are posted indicating the closure. RMA has a Munitions Response Plan, which documents procedures to be taken in the event of an unexpected discovery of a munitions-related item.

**General Comment 5:** The 2015 FYRR stated, “As components of the remedy have been completed and the land deleted from the NPL, administrative jurisdiction has been transferred to the USFWS or other parties purchasing the land, except for the property and facilities continuing to be used for response actions (e.g., landfills and groundwater treatment systems).”

- a. The FYRR should describe exactly what is entailed in USFWS’s “administrative jurisdiction”.
- b. In addition, the FYRR needs to explain what is meant by “other parties purchasing the land.”
- c. All communications related to efforts to transfer land, as well as land transfers, should be included in the FYRR. The FFA prohibits other non-federal government parties from purchasing RMA property. This issue was not addressed in the 2020 FYRR.

**Response:** Property transferred to the USFWS is managed by USFWS in accordance with regulations governing the National Wildlife Refuge System (50 CFR Parts 25-29). In addition, the USFWS maintains LUCs on Refuge property that are required as part of the CERCLA remedy. The property that has been transferred to the USFWS and other parties is clearly described in Section 2.0 of the FYRR. Changes in land ownership are considered on an annual basis as part of the Land Use Control Monitoring Reports. These documents are also referenced in the FYRR and are fully considered as part of the FYR process.

**General Comment 6:** The SSAB opposes any and all modifications to the reduction of RMA Land Use Controls (LUCs) because the entire CERCLA process, including the remedial investigation (RI), risk assessment (RA), feasibility study (FS) and Record of Decision (ROD) were developed and implemented based on the numerous – and clearly stated - restricted land uses. (Although more restrictions, such as the public will never be allowed access to any current or former RMA land, would be acceptable.) The review and development of comments from regulatory agencies and the public on hundreds of CERCLA documents were based on these land use restrictions and the resulting CERCLA process.

Unfortunately, the SSAB has witnessed these critical LUCs being challenged through inane interpretations of what each of the LUCs allegedly restrict. It is the position of the SSAB that

any attempt to modify RMA's LUCs will require a reassessment of the entire CERCLA process at RMA, starting with the RI and continuing through the ROD. This reassessment will include additional soil and water sampling as necessary to investigate all medium and contamination on RMA impacted by any change in LUCs. A modified and updated risk assessment will be needed to better define exposure scenarios not included in the original assessment, and the feasibility study must include additional remedial alternatives that were not evaluated. Finally, the ROD would need to be re-published with active public participation. The Cap and Cover remedy implemented at RMA was specifically designed based on the land use controls. The SSAB is bewildered as to why the Army would ever consider re-opening a billion-dollar remedy merely to remove LUCs and will make every attempt to stop modifications of LUCs from proceeding.

**Response:** Land use controls are a significant part of the remedy process at RMA, although evaluation and modification of LUCs, just like any remedy component, is not precluded and may be part of the future vision for the site, if warranted. However, the Army will not modify any land use controls without appropriate evaluation of the impacts of the changes and their effect on protectiveness of human health and the environment. Any potential changes to LUCs are assessed to determine the appropriate investigation, evaluation, and ROD change process under CERCLA to support the change. Such evaluation will include considerable coordination with the regulatory agencies and the USFWS, as appropriate. Changes that require modification of the RODs will include public participation as required by the National Contingency Plan (NCP).

**General Comment 7:** As we noted in our comments on the 2015 FYR, the Army had already begun the process of reducing their financial contributions to the EPA for regulatory oversight and staffs had been significantly reduced over the prior three years. The failure to provide funding to the EPA, and related funding disputes, have continued during the past five years. These actions by the Army constitute an insidious attempt to minimize the "clean-up" of RMA by avoiding accountability for effective long-term Operations and Maintenance of this barely adequate cap-and-cover remedy, and to avoid enforcement of the Land Use Controls that are an essential lynchpin of the "protectiveness" of this "cover-up" remedy. This past ten years, the Army and other parties have engaged in processes to eliminate or minimize Land Use Controls.

This is coupled with the Army's denial that the State of Colorado has jurisdiction over this remedy which has necessitated the State having to file suit in order to enforce RCRA and State regulations and standards. This remedy was agreed to by the EPA and State of Colorado with the understanding that the regulators would continue to have the ability to oversee and regulate the protectiveness and quality of this remedy. We consider the Army's actions in regard to withholding and/or decreasing funding of regulators, and the denial of Colorado's jurisdictional oversight role at RMA, coupled with the choice of a remedy that would necessitate vigilant oversight in perpetuity, to be indications of their contempt for the RMA remedy and the people of the State of Colorado.

**Response:** The Army disagrees with the commentary and certainly has no disdain or contempt for the public or for the selected remedy. Both EPA and CDPHE continue to provide oversight for the remedy and the Army actively and cooperatively engages with the regulatory agencies to discuss matters associated with operation and maintenance of

the remedy. There have been no instances where the Army has attempted to eliminate or minimize existing land use controls.

The Army acknowledges your stated concerns and has and will continue to comply with legal requirements related to cleanup at RMA. The litigation has had no adverse impact on the effectiveness of the remedy and the regulatory agencies continue to work cooperatively to ensure that the remedy remains protective of human health and environment.

**General Comment 8:** The SSAB agrees with 2020 FYR comments provided by EPA and the Colorado Department of Public and Environment regarding short and long-term protectiveness and incorporate them by reference. The SSAB provides its concerns with the “remedial activities completed” and provides following:

#### On-Post Operable Unit

The SSAB Comments presented below dispute the Army’s claim that the “The remedy for the On-Post Operable Unit (OU) currently protects human health and the environment because remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risk.” The SSAB has identified numerous violations and deficiencies in ROD requirements, Army compliance and performance requirements, and concerns with how these remedial activities protect human health and the environment. Section 10.0 Protectiveness Statements merely identify human health risks to exposure of RMA contaminants, but precludes how the On-Post OU protects the environment, as required by the ROD, CERCLA and EPA guidance. The On-Post OU may be protective of human health due to Institutional Controls, but not Army remediation projects.

As identified below, many of the internal treatment systems are discharging RMA contaminants greater than CBRGs. These include, but are not limited to Basin A Neck and Bedrock Ridge. In addition, several capped and/or covered hazardous waste sites have unanswered exceedances in downgradient performance wells, most importantly Basin F and the hazardous waste/principle threat landfills. For the first time in 25 years the Army has detected contaminants in the confined flow aquifer, indicating possible additional damage to the environment from the former Basin F. The discovery of emerging contaminants On-Post during this FYR poses new challenges in the protection of the environment (and human health Off-Post). Finally, the Biota Monitoring Program (BMP) has not been approved by EPA, and therefore no conclusions can be drawn as to whether the surface soils that remain on RMA are protective of wildlife. In addition, as provided in our comments, the current approach to the BMP has many deficiencies including the use of composite sampling to characterize soil contamination in large areas and eliminating critical pathways that may have additive effects to the conclusions of surface soil exposure.

#### Off-Post Operable Unit

The 2020 FYR, Section 10 states, “The remedy for the Off-Post OU currently protects human health and the environment because remedial activities to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.” Again, as required by the Off-Post ROD, CERCLA, and EPA guidance, the remedy for the Off-Post of RMA definitively does not protect the environment. Again, the Army relies on current land use

restrictions Off-Post (limited consumption and irrigation of groundwater) and Institutional Controls as a basis for its protectiveness conclusion. If consumption of groundwater was available off-post, the risk to human health would be extreme as numerous RMA contaminants remain throughout the RMA Off-Post Operable Unit. The Army fails to acknowledge that dieldrin is migrating around the Northwest Boundary System (NWBCS), although possibly not consumed by the public, is causing damage to the environment.

The NBCS continues to discharge untreated 1,4-dioxane and nitrosodimethylamine (NDMA) to the off-post, causing irreparable damage to the environment. In addition, there are exceedances of NDMA downgradient of the Off-Post Groundwater Intercept and Treatment System, allowing continued damage to the environment.

**Response:** The FYRR evaluates overall protectiveness of human health and the environment. The selected remedies presented in the On-Post and Off-Post RODs, determined to be protective of human health and the environment in accordance with CERCLA, were designed to eliminate exposure pathways for human and wildlife receptors and minimize further migration of contaminants to groundwater. Based on the evaluations performed for the FYR, these objectives have been met and the remedy is protective of human health and the environment. This protectiveness has been achieved through implementation of the entire remedy to eliminate exposure pathways and does not rely solely on LUCs for exposure control. The issues identified in the FYRR require additional evaluation and remedy adjustments as determined to be necessary to be protective in the long term. Specific concerns identified in this comment are addressed in detail in the responses to the specific comments that follow.

## **Specific Comments**

### **Section 3**

**Comment 9. Page 11, Section 3.5** The 2020 FYR states, “Contamination was detected on-post in soil, ditches, stream and lakebed sediments, sewers, groundwater, surface water, biota, structures, and to a much lesser extent, air.”

**SSAB comment:** This statement should be modified as air contamination had significant impacts on-post including fugitive dust and odors, especially with the Basin F excavation. Air contamination from the on-post caused health issues to neighboring communities off-post.

**Response:** This section is discussing results of the Remedial Investigation and is an accurate statement taken directly from the On-Post ROD.

**Comment 10. Page 19, Summary of On-Post regulatory Comments reference 2** The Table states, Munitions screening prior to excavation encountered ...” “All munitions encountered were detonated off-post.”

**SSAB comment:** All munitions encountered were detonated on-post.

**Response:** The table provides information about the selected remedy as presented in the ROD; however, the comment is correct that all munitions discovered during remedy were detonated on post. All munitions destruction was completed with CDPHE approval.

#### **Section 4**

#### **Comment 11. Page 27, Table 4.1.1 – Summary of Agency Notifications and Operational Change Notice**

**SSAB comment:** The corrective action/change regarding an increasing concentration of dieldrin downgradient of the NWBCS (dated 12/3/2014) identifies an on-going evaluation to eliminate off-post migration of dieldrin

- a. As this issue was identified in 2014, please explain why this evaluation has not yet been completed.
- b. What date will the evaluation be concluded and concurred to by regulatory agencies?
- c. What is the amount of dieldrin that has migrated off-post due to the inability of the NWBCS to capture this cancer-causing contamination?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** As discussed in the FYRR, several actions have been taken to address this issue including plant operational changes, well redevelopment, and installation of new monitoring wells. Data collection from the most recently installed wells is scheduled to continue through 2022. Because dieldrin migrates very slowly in groundwater, adequate monitoring time is needed to determine if bypass is occurring. The slow-moving nature of dieldrin also provides time to make remedy changes if they are warranted.

Although potential bypass is discussed for the Northeast Extension, all LTMP performance evaluation criteria for the system are being met and the system is functioning as intended. System evaluation has acknowledged the potential for a small amount of flow around the Northeast Extension. However, based on water levels and groundwater flow paths, this bypass migrates along the slurry wall and is captured at the south end of the wall by the extraction well located there. To date, the Army has not identified a flow path leading off post. As noted, the potential bypass is identified as an early indicator of a potential remedy problem and additional evaluation is warranted.

**Comment 12. Page 27, Table 4.1.1** The 2020 FYR corrective action/change regarding the increase of contamination downgradient of the BAN’s (dated 4/2/2015) states “contaminants in the downgradient wells decreased.” (emphasis added).

**SSAB comment:** The 2020 FYR should include whether the concentrations of 1,2 dichloroethane, CPMSO<sub>2</sub>, dieldrin, and dithiane achieved CRSGs.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** Concentrations of these contaminants decreased to below their respective CSRGs. The table has been revised to include this information.

**Comment 13. Page 28, Table 4.1.1** The corrective action/change regarding the possible loss of plume-edge capture at the NWBCS (dated 3/16/2016) and states “increasing sampling frequency of well 27010” and ...”if the trend to not cause dieldrin concentrations to decrease subsequent actions will be considered.”

**SSAB comment:** As this issue has been on-going for five years, the Table should provide an up-date on dieldrin concentrations in this well and whether the corrective actions were successful.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** The Current Status discussion on Table 4.1-1 provides this information. The dieldrin concentrations in well 27010 are below the PQL.

**Comment 14. Page 28, Table 4.1.1** The 2020 FYR corrective action/change regarding concentrations of dieldrin above the PQL in performance wells downgradient of the NWBCS in FY16 states that an evaluation is ongoing.

**SSAB comment:** As this issue has been on-going for five years, the Table should provide an up-date on dieldrin concentrations in these wells and whether the corrective actions were successful.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** The Current Status discussion on Table 4.1-1 provides this information. A new monitoring well was installed to provide additional information for this ongoing evaluation. Because the issue is not yet resolved, it is identified as a FYR issue in Section 8.0.

**Comment 15. Page 30, Table 4.1.1** The 2020 FYR corrective action regarding NDMA concentrations exceeding the current PQL (dated 5/15/2017) and states “Because the NWBCS is not capable of treating groundwater for NDMA, no operational changes have been made. Quarterly monitoring will continue to evaluate frequency of detections exceeding the PQL.”

**SSAB comments:**

- a. The corrective action/change is unclear. Why does the corrective action rely on 2014 influent concentrations?
- b. The Table should better explain the statement “...the reason for the effluent detection above the current PQL was not apparent.” (emphasis added)?

- c. Finally, the Table should include the concentrations of NDMA from the quarterly monitoring since the first quarter of FY18, particularly NDMA exceedances of the PQL.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** As stated in the discussion on Table 4.1-1, the reason for the detections in the effluent was not apparent because both the influent and upgradient well concentrations have been non-detect since 2014. Although there have been individual occurrences in the plant effluent that exceed the PQL, compliance and protectiveness are evaluated using a four-quarter moving average for each contaminant. The four-quarter moving averages have remained in compliance below the PQL and no operational changes were made.

**Comment 16. Page 30, Table 4.1.1** The 2020 FYR corrective action regarding NDMA exceedances in the NBCS states “Two additional ultra-violet lamps were placed in service during the first quarter FY18.”

**SSAB comment:** The Table should state whether the addition of two UV lamps will be permanent and whether exceedances on NDMA’s PQL in the NBCS have been resolved.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** The additional lamps were operated until effluent concentrations returned below the PQL. As stated on Table 4.1-1, the effluent concentration has remained below the PQL since.

**Comment 17. Page 34, Table 4.1.1** The 2020 FYR correction action regarding the presence of NDPA above the CBSG in all treatment plant effluents merely includes adding NDPA to the LTMP and monitoring NDPA in plant influent, effluent, and water quality performance wells and adding the chemical to “select water quality tracking wells and off-post CSRG exceedance network wells.”

**SSAB comments:**

- a. Adding NDPA to the LTMP is not a corrective action.
- b. The Table should describe:
  - i. the source of NDPA contamination;
  - ii. the number and locations of treatment plants with NDPA exceedances; and
  - iii. how the corrective action will reduce NDPA concentration below CBSGs.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** The table has been revised to state that the ROD was modified to include the NDPA CBSG as an ARAR for the NBCS, NWBCS and OGITS. Inclusion of NDPA as a ROD modification for the treatment systems is shown on Tables 4.1-3, 4.1-4 and

4.1-7 and is also stated on Table 5.2-1. NDPA is a contaminant associated with some dinitroaniline-based herbicides. The herbicide Planavin, a dinitroaniline-based herbicide, was produced in South Plants and associated wastes were disposed on site. The existing treatment systems effectively treat NDPA to below the groundwater standard and there have been no exceedances in treatment plant effluents.

**Comment 18. Page 35, Table 4.1.1**, The 2020 FYR table states “Downgradient monitoring at the NBCS has shown concentrations of some contaminants above the CSRG. Evaluations of system effectiveness were indicative (sic) of residual contamination present before construction and slow migration of contaminants through fine grained sediments.”

**SSAB comment:** The Table should identify these contaminants, the basis of determining they were residual contamination, and whether detections continue above CSRGs.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** This table is intended to catalog required notifications to the regulatory agencies and provides only a summary of the concern. Details related to the specific contaminants and the overall performance evaluation are provided in section 6.3.1.2.

**Comment 19. Page 43, Section 4.1.1.1** In regards to treating 1,4 dioxane at the NBCS, the 2020 FYR states “The FS recommended treatment using advanced oxidation at the NBCS; however, treatability studies are required to determine the most appropriate specific advanced oxidation potential system.”

**SSAB comments:**

- a. The 2020 FYR should identify when the treatability studies and implementation of treatment for 1,4-dioxane will be coordinated with design and construction.
- b. It should also estimate the period of time during which 1,4-dioxane has migrated off-post.
- c. Is 1,4-dioxane currently being treated by the NBCS.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** The treatability study was completed in January 2021, after the FYR period, and is not discussed in the FYRR. The results indicate that RMA groundwater can be treated to reduce 1,4-dioxane concentration to below the CBSG.

A Feasibility Study was submitted to the regulatory agencies in November 2019. In that study, it was determined that 1,4-dioxane would be added to the CSRG list for the Northwest Boundary Containment System (NWBCS) and the North Boundary Containment System (NBCS). During the reporting period, the four-quarter moving average for 1,4-dioxane in the effluent for both treatment systems has generally decreased, with the average concentration detected at the NWBCS being below the CSRG since 2017. As such, treatment for 1,4-dioxane would only be necessary for the flow from the NBCS extraction wells. Even at the NBCS, the four-quarter

moving average in effluent samples in FY19 (the last year of the FYRR reporting period) was below the CRSG in 3 of the 4 quarters.

The current NBCS was not specifically designed to treat 1,4-dioxane (as it is an emerging contaminant); however, some reduction of 1,4-dioxane appears to be occurring based on comparison of influent and effluent concentrations. A new treatment plant (the Consolidated Water Treatment Plant) has been designed to treat the flow from the NWBCS and the NBCS, replacing the existing two treatment systems. The North Boundary treatment train within the new treatment plant has been designed to accommodate treatment for 1,4-dioxane for the North Boundary flow. Construction of the new treatment facility is tentatively scheduled to begin in FY23, pending funding and regulatory agency approval of the design.

**Comment 20. Page 48, Section 4.1.1.1** Regarding groundwater treatment in the Off-Post, the 2020 FYR states, “Modifications were made to the NPS (Northern Pathway System) were made in 2006 due to residential and commercial development in the area. “Extraction and recharge wells in the development area were abandoned. However, due to funding issues, the modification was not fully completed by the landowner, leaving a gap in the extraction.”

**SSAB comments:** The 2020 FYR identifies a “gap” in the extraction system in the Off-Post groundwater intercept and treatment system.

- a. The 2020 FYR should provide a timeframe of when additional extraction wells will be installed.
- b. The 2020 FYR should provide what impacts the gap has on contamination on off- post groundwater.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** New extraction wells were installed in May 2021, after the FYR period. Although dieldrin was identified in the area between two of the modified system extraction wells, the plume has been captured by the downgradient original system wells. The addition of the new extraction wells will improve capture along the alignment of the modified system. Dieldrin slightly exceeded the PQL only once in one of the six downgradient performance wells during the FYR period, indicating minimal impact to groundwater.

**Comment 21. Page 50, Table 4.1-7 - Off-Post Groundwater Intercept and Treatment System (OGTIS) CSRG Analytes**

**SSAB comments:** The Table does not include NDMA as an OGITS CSRG analyte.

- a. This chemical should be part of the OGITS CSRG analyses.
- b. The Table also identifies the inclusion of NDPA in 2020.
- c. What is the source of NDPA and what is the extent of the off-site plume?

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** Table 4.1-7 does include NDMA with the PQL of 0.009 µg/L and plant effluent is monitored regularly for this contaminant. As noted in the comment, NDPA was added in April 2020. NDPA is a contaminant associated with some dinitroaniline-based herbicides. The herbicide Planavin, a dinitroaniline-based herbicide, was produced in South Plants and associated wastes were disposed on site. The most recent off-post plume mapping was completed based on FY19 groundwater data, and results are shown in the FYRR on Figure 6.3-66.

**Comment 22. Page 56, Section 4.2 Ecological Protection** The 2020 FYR states, “Ensure that biota are not exposed to COCs in surface water, due to migration from soil and sediments at concentrations capable of causing acute or chronic toxicity via direct exposure or bioaccumulation.”

**SSAB comment:**

- a. The 2020 FYR should expand “ecological protection” to include biota’s consumption of contaminated wildlife and plant life. Previous biota sampling identified acute concentrations of RMA contaminants in lower trophic level biota. Due to bioaccumulation, consumption of these can result in toxic effects on upper trophic biota.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** Section 4.2 merely provides the RAOs for ecological protection as presented in the On-Post ROD. They are presented to provide the framework for which the FYR is performed. The surface water and biota sampling programs, including evaluating pathways related to consumption of wildlife and plant life, have been reviewed and approved by the regulatory agencies.

**Comment 23. Page 57, Section 4.2.1 Shell Disposal Trenches RCRA-Equivalent Cover Interim Operations and Maintenance**

**SSAB comments:**

- a. The 2020 FYR should provide a timeframe when the Operational and Functional (O&F) determination will be made, i.e., when will there be enough performance data and percolation exceedance measures to make the O&F determination?
- b. Were the percolation exceedance measures of 2019 and 2020 effective?
- c. In addition, the 2020 FYR should describe requirements of the mandatory compliance period.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** There is no specified time period for data collection to support the O&F determination. The O&F determination is provided by EPA and is based upon field inspection and monitoring data demonstrating conformance with cover performance

goals. A Construction Completion Report (CCR) providing data demonstrating compliance with the performance goals and supporting an O&F determination was provided for regulatory agency review in April 2021, after the FYR period. The report is awaiting EPA review.

Percolation data collected since completion of corrective measures at the Shell Disposal Trenches Cover System indicate that the measures were successful. However, most of this data has been collected after the FYR period and is not discussed in the FYRR but is included in the draft CCR issued for regulatory agency review. The Army will continue to collect monthly percolation data from the SDT RCRA-Equivalent Cover through December of 2025 to monitor the effectiveness of the corrective measures.

Compliance requirements are presented in Section 4.2.1.2.

With successful completion of the corrective measures, there is no indication of remedy problems for the Shell Disposal Trenches RCRA-Equivalent Cover.

**Comment 24. Page 63, Section 4.3.1.1 Site-Wide Biota Monitoring** The 2020 FYR states, “Although the starling evaluation was completed as planned, the kestrel portion of the BMP could not be completed as outlined in the BMP due to lack of nest box occupancy. As a result, sampling requirements for program completion were revised to focus on soil sampling rather than collection of kestrel samples.”

**SSAB comments:**

- a. The conclusions of the startling (sic) study portion of the BMP should be included in the report.
- b. The Army should have considered similar RMA biota to the kestrel in evaluating the effects of RMA soil contamination on biota that reside on the site.
- c. The locations of soil sampling are not referenced in the report and should be included.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** The starling study was completed in 2013 and results were discussed in the previous FYRR. Discussions with the regulatory agencies and USFWS concerning completion of the monitoring program included exploring other species for potential sampling. Cooperatively, the decision was made to implement a soil sampling strategy to determine residual risk rather than continue to sacrifice kestrels or similar valuable species to obtain tissue samples. The areas included for soil sampling are shown on Figure 6.3-78. This effort was completed in November 2017.

**Comment 25. Page 64, Section 4.3.1.2 – Land Use Controls** The 2020 FYR states, “Areas of RMA where property and management authority have been transferred to the USFWS are governed by the *National Wildlife Refuge System* regulations... “These regulations close all

areas of RMA included in the National Wildlife Refuge System to the public unless these areas are opened by regulation, individual permit, or public notice.”

**SSAB comments:**

- a. The 2020 FYR should describe what is entailed for the public to access closed areas of the refuge, i.e., what specific regulations, individual permits, and/or public notices are acceptable. The 2020 FYR should include:
  - i. Where are these requirements published specifically for RMA,
  - ii. Are they published by signage at the RMA Wildlife Refuge lakes and other areas where people engage in fishing and other contact with wildlife?
    - a. If not, why not?
  - iii. To date, have these requirements been met by the public and what areas were opened and for what purpose?
  - iv. How often do the USFWS law enforcement monitor the public participation at the RMA Wildlife Refuge?
  - v. What areas of the refuge are designated for public use?
  - vi. How does the Army monitor LUCs at the RMA Wildlife Refuge and/or control and enforce LUCs?

**Response:** Information regarding public access and Refuge activities is published on the USFWS website located at [https://www.fws.gov/refuge/rocky\\_mountain\\_arsenal/](https://www.fws.gov/refuge/rocky_mountain_arsenal/). In general, most of the Refuge is considered closed unless otherwise identified by the USFWS as being open. In addition, signs throughout the Refuge designate areas that are closed for public access and locking gates are also maintained in many road entrance locations to prevent public access to closed portions of the refuge.

- b. This Section also states, “Project specific health and safety training continued (emphasis added) to be conducted...”

**SSAB comment:** Does this training continue to be part of land use controls? Who is trained and how often?

**Response:** The sentence regarding training for entry to the Central Remediation Area is outdated and has been removed.

- c. This Section also 2020 FYR states, “The USFWS provides information at the Visitor Center to help visitors understand which areas of RMA are accessible.”

**SSAB comments:**

- i. Have these members of the public been issued access via the requirements identified above?
- ii. Have there been instances where violations of LUCs or activities inconsistent with LUCs occurred?

1. What were these activities and when?
2. How were these violations corrected?
3. Are activities, violations, and enforcement actions reported to the Army, EPA, and CDPHE?
  - a. If not, how are LUCs enforced and the public protected?

**Response:** Visitor access is consistent with the information provided at the Visitor Center. Activities inconsistent with the LUCs are reported to the regulatory agencies in accordance with the Land Use Control Plan. Significant violations that result in exposure to contamination or damage to remedy components are reported as they occur. There was one trespassing incident during the FYR period that resulted in minor damage to the NWBCS, as discussed in Section 6.3.7 of the FYRR. Less significant issues are reported in the annual LUC Monitoring Reports.

- iii. The 2020 FYR identifies a “formal process” initiated by USFWS to remove and/or modify the game consumption restriction with respect to bison on RMA. What is this formal process? It should include public comment.

**Response:** The process referred to is the CERCLA process for implementing changes to a Record of Decision as detailed in the NCP and EPA guidance. Public comment is required for fundamental changes to the remedy that require a ROD Amendment.

- iv. Why were the bison introduced to RMA, knowing it would eventually require removal of bison from the RMA Wildlife Refuge?

**Response:** Bison are a priority species for short- and mixed-grass prairie lands and were reintroduced consistent with the Department of Interior’s Bison Conservation Initiative and the USFWS’ 1996 Comprehensive Management Plan which was subject to public review. Bison grazing improves the richness of plant species on prairie grasslands, aiding in the overall prairie restoration efforts.

- v. Is there a Memorandum of Understanding or other legal document evidencing the agreement between the Army and USFWS regarding the enforcement of LUCs and other regulations necessary to maintain the integrity of the remedy and to protect human health and the environment? Please provide a copy of the document(s) and include this issue in the future Five-Year Reviews.

**Response:** There is no Memorandum of Understanding or other specific legal document describing an agreement between the Army and USFWS regarding the enforcement of LUCs. USFWS implements the required LUCs on Refuge property, as stated in the Land Use Control Plan. The Army continues to monitor the effectiveness of the LUCs and reports findings in the annual LUC Monitoring Reports. Any issues noted are

discussed with the USFWS to determine actions needed to maintain the LUC effectiveness, as appropriate.

- vi. The 2020 FYR states, “when appropriate and consistent with the Department of Interior Bison Conservation Initiative 2020 animals may be transferred to other Department of Interior lands.” Does the initiative allow such transfers when it violates federal requirements such as the LUCs identified in the FFA, the On-Post ROD, and the legislation that established the Rocky Mountain Arsenal Wildlife Refuge?

**Response:** While there is a restriction for consumption of fish and game taken on RMA, neither the FFA, ROD, or Rocky Mountain Arsenal National Wildlife Refuge Act prohibit the transfer of bison from the RMA NWR to other Department of Interior units. Any such bison are transferred with the understanding that there is a consumption restriction for these animals.

- vii. Does the initiative include “other conservation partners, including tribes, states, or other intertribal organizations” as these may not be “other Department of Interior lands”?

**Response:** For details related to the Department of Interior’s Bison Conservation Initiative, please see <https://www.nps.gov/articles/000/bison-conservation-initiative.htm>.

- viii. There is no reference to the “Tissue Contaminant Study” which will evaluate risks associated with human consumption of RMA bison.

1. What is the expected date of the draft study and how will it be published for public comment?
2. This should include the EPA-approved risk assessment identified in this report.

**Response:** Two reports were issued by the USFWS in May 2021 that discuss the completion of the USFWS bison tissue sampling program and evaluation of potential risk due to consumption of muscle tissue. Although these reports were issued after the FYR period and do not impact the Army’s LUCs, the FYRR has been revised to update the discussion for clarity.

- ix. The 2020 FYR states, “If risks are determined to be acceptable, the ROD and LUCP may (emphasis added) be modified. Such changes to the RMA’s LUCs will require a ROD modification at a minimum, with public comment included.

**Response:** Any changes to the ROD will be coordinated with the regulatory agencies and will follow the CERCLA process. Changes that require modification of the ROD will include public participation as required by the NCP.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** Overall, evaluation of LUCs indicates that the controls are being implemented on the Refuge as required and remain effective. There have been no instances of exposure due to a failure in the LUCs and the remedy remains protective.

## **Section 5**

### **Comment 26. Status of Recommendation and Follow-Up Actions from 2015 FYR**

The 2020 FYR states, “unresolved concerns from EPA, CDPHE or TCHD identified in the 2015 FYR were addressed as part of ongoing consultation with the regulatory agencies with operational adjustments as appropriate.”

#### **SSAB comment:**

- a. What were these concerns?
- b. Were these concerns identified in regulatory comments?
- c. The SSAB should have equal opportunity to discuss its FY 2015 comments and unresolved concerns with the Army (see Background and General Comment 1 above).

**Response:** Please see the 2015 FYRR for discussion of these regulatory agency concerns. These concerns were all addressed during the FYR period and did not result in issues for this FYR. See also response to General Comment 1.

**Comment 27. Section 5.2** The 2020 FYR states, “Two issues from the 2015 FYRR dealt with emerging contaminants.” “Groundwater monitoring during the FYR period confirmed the presence of NDPA above the CBSG upgradient of the NBCS, NWBCS, FCS and NPS.”

#### **SSAB comment:**

- a. The 2020 FYR should identify the source(s) location and history of NDPA use on RMA.

**Response:** NDPA is an emerging contaminant associated with some dinitroaniline-based herbicides, including Planavin. Planavin was produced in South Plants and associated wastes were disposed on site. This information has been added to the FYRR.

- b. Including NDPA in the long-term performance and water quality tracking does not resolve NDMA from protecting human health and the environment. What corrective actions are planned to eliminate NDPA groundwater above CBSGs?

**“As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** Evaluation of NDPA presence in RMA groundwater included review of the existing treatment plant influent and effluent to determine effectiveness in treating this emerging contaminant. Effluent monitoring has demonstrated that the existing systems effectively remove NDPA from groundwater. The ROD was modified in April 2020 to include the NDPA Colorado groundwater standard as an ARAR and require treatment (which was already

occurring), as discussed in Section 7.2.5. The LTMP was revised to include effluent and groundwater monitoring necessary to evaluate the effectiveness of treatment.

**Comment 28. Section 5.2** The 2020 FYR states a feasibility study was performed regarding remedial actions for 1,4-dioxane.

**SSAB comment:** The 2020 FYR does not include a reference or the results of the study. This should be included in the 2020 FYR.

**Response:** Results of the Feasibility Study are discussed in Section 7.2.5 and the document is included in the reference list in Section 12. A citation for the reference has been added to Section 5.2.

**Comment 29. Section 5.2** The 2020 FYR states, “In addition, per- and polyfluoroalkyl substances (PAFS)(sic) were identified as emerging contaminants during this FYR period.” The results of the investigation indicated detected detectable levels of POFA and PFOS in RMA groundwater, although only a location near the South Plants spill area was above the EPA health advisory level. Treatment plant and off-Post data indicated that RMA is not a significant source of PAF contamination in groundwater.”

**SSAB comment:**

- a. What is meant by “significant source of PAF contamination,” if it exceeds EPA health advisory levels On-Post? The 2020 FYR should describe the risk, the concentrations found throughout RMA, and explain how the conclusion was reached that RMA is not a significant source.

**Response:** The Army has an extensive historical record for RMA that indicates there is only one documented use of PFAS-containing products at RMA. PFAS was detected above the health advisory level in a small group of wells within and immediately downgradient of South Plants where the single documented use occurred. Concentrations of PFAS above the health advisory level do not persist downgradient and are not present at the treatment systems or in the off-post OU. Figure 6.3-78 shows the results for all samples collected.

- b. Was the chemical not investigated and identified during the analyses of NDPA?

**Response:** Analysis for PFAS requires a different analytical method than that for NDPA. Both emerging contaminants were investigated in accordance with the Emerging Contaminants Sampling and Analysis Plan, implemented in 2017, with follow-up sampling in 2019.

- c. The SSAB was unable to identify the Department of Defense guidance referenced, it should be included in the report.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** The DoD guidance is included in the reference list in Section 12.

**Comment 30. Section 5.2** The 2020 FYR provides only one location near the South Plants spill area with PAFS (sic) above the EPA health advisory level.

**SSAB comment:**

- a. The 2020 FYR should include maps showing the South Plants spill area, as there were many concentrations detected. Were there adjacent locations sampled? These results should be included in the 2020 FYR.

**Response:** Figure 6.3-73 presents the results of the PFAS monitoring. Well 01525, located in South Plants, is located in the area of the single documented use of PFAS-containing products on RMA. Reference to the well location has been added to Sections 5.2 and 6.3.3.9.

- b. Which select wells will be monitored for PAFS (sic)? How were these locations selected?

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** Wells within and immediately downgradient of the South Plants area, where PFAS concentrations have been observed above the health advisory level, were selected for continued monitoring. In addition, treatment plant influent and effluent will continue to be monitored to provide additional data on PFAS occurrence on site. It should be noted that, even if PFAS did migrate from the source areas, it would be effectively removed by the activated carbon treatment present at all RMA treatment plants. There is no evidence of remedy problems attributable to PFAS detections.

**Comment 31. Table 5.2.1 Status of Follow-up Actions to Address 2015 Issues**

**SSAB comment:** The 2020 FYR should include a map of and schedules of the long-term monitoring network for dieldrin.

**Response:** There is an extensive network of wells being regularly sampled for dieldrin. Table 6.3-21 in the FYRR provides a list of the wells currently in the off-post, long-term sampling network and indicates the contaminants analyzed for at each well. As stated on Table 5.2-1, the off-post long-term monitoring network has been identified as an issue in the FYRR and is currently being evaluated to determine if it should be optimized to better assess the contaminant plumes. The Army and regulatory agencies are working cooperatively to determine appropriate well locations in the off-post OU for this purpose.

**Comment 32. Table 5.2.1**

**SSAB comments:** The Table describes the 2017 NDAA provisions for Commerce City to modify or remove the restriction that prohibits the use of the PUD property for residential and industrial use. It states Commerce City can modify or remove the restriction if a determination is

made that the property will be protective of human health and the environment for the proposed use.

- a. Will Commerce City make the required determination or will the land use be limited to compliance with current LUCs?

**Response:** Per the 2017 NDAA, Commerce City is required to perform a risk assessment to demonstrate that any change in land use will be protective of human health and the environment. The risk assessment must be completed pursuant to CERCLA requirements and any response actions necessary must also be completed before the proposed use can be allowed.

- b. One visual inspection in 2018 was listed as the method of enforcement of LUCs; it should not be the basis to conclude that the PUD land use is consistent with the existing land use controls or objectives.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** The table indicates that the monitoring requirement was revised in 2018; however, inspection of transferred properties, including the Prairie Gateway, is conducted annually and reported in the annual Land Use Control Monitoring Reports.

**Comment 33. Table 5.2.1**

**SSAB Comment:** Well 359D exceeds the DIMP CBSG. As the exceedance was identified two years ago, why is the projected date regarding the evaluation of the new well and potential alternate solutions to be finalized in 2022?

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** The Army has been working continuously with the regulatory agencies to collect additional monitoring data for the well and develop a suitable approach for a more detailed investigation. Final evaluation of the field investigation results should be completed in 2022.

**Comment 34. Table 5.2.1**

**SSAB Comment:** NDPA was detected above CBSG in RMA groundwater. The 2020 FYR should provide the sources of NDPA on RMA.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** See response to comment 27.

**Comment 35. Table 5.2.1** For the BMP, the Table states, “Results indicated no concentrations of dieldrin above the screening criteria indicating that the remedy effectively eliminated significant exposure pathways in the area sampled.”

- a. What was the screening level and how was it determined?

**Response:** The screening level used is the EPA Ecological Soil Screening Level (Eco-SSL) developed for an avian carnivore, which is representative for the American Kestrel. Eco-SSLs are soil screening concentrations derived to represent levels that are protective of ecological receptors that consume biota that live in or on the soil. The Eco-SSL includes both soil and food ingestion and accounts for biomagnification of contaminants in the food source.

- b. Where was the area sampled?

**Response:** Soil sample areas are depicted on Figure 6.3-78.

- c. Were the soil samples composited?

**Response:** The soil samples were collected using Incremental Sampling Methodology, which is a soil compositing methodology developed by the Interstate Technology Regulatory Council and endorsed by EPA as an alternate compositing approach for investigation of potentially contaminated soil areas. This sampling methodology reduces data variability, or the potential effects of soil heterogeneity on sample accuracy, and increases sample representativeness, providing an unbiased estimate of the mean contaminant concentration for the area being sampled. Incremental sampling involves the collection of many soil samples systematically within a grid over the study area of interest. These samples are then combined into one large representative sample, homogenized, and sub-sampled for analysis. This methodology has been proven to provide consistent results within a study area.

- d. The 2020 FYR should include the sampling methodology, the sample locations, and soil sample results.

**Response:** Sample locations and results are shown on Figure 6.3-78. There were no concentrations found above the Eco-SSL.

## **Section 6**

### **Comment 36. Section 6.2 Community Involvement and Public Notices**

**SSAB Comment:** See General Comment #1.

**Response:** See response to General Comment 1.

**Comment 37. Section 6.3.3.1 Northwest Boundary Contaminant System** The 2020 FYR states, “Effluent concentrations for all contaminants were below their respective CSRGs except dieldrin in FY15...” Dieldrin was also detected in FY18. The review also states detections of NDMA were detected above their PQLs in the second quarters of FY17 and isodrin above its CSRG in FY19.”

**SSAB comments:**

- a. The 2020 FYRR also states “In FY2015, several analytes in addition to dieldrin were detected...” The 2020 FYRR should identify these contaminants and the reason they were detected. Why do none of these additional analytes or contaminants exist in the 2020 FYR?

**Response:** The comment seems to be confusing detections in plant effluent with detections in downgradient wells. During the FYR period, dieldrin was detected in plant effluent above the PQL once (in FY15). Dieldrin was not detected in plant effluent in FY18. Similarly, NDMA was detected above the PQL once (in FY17). However, the reason for the detections in the effluent was not apparent because both the influent and upgradient well concentrations have been non-detect since 2014. Compliance was maintained during the entire FYR period since the four-quarter moving average remained below the PQL.

Isodrin has not been detected in the plant effluent. Isodrin was detected above the CSRG in two downgradient wells during the FYR period, as shown on Table 6.3-2. These occurrences have not been repeated. NDMA was not detected in downgradient wells during the FYR period.

- b. The 2020 FYRR discusses an evaluation to determine where there is a potential for flow around the northern terminus of the Northeast Extension slurry wall requiring additional extraction in the area. The 2020 FYR should describe the initial exploratory investigation, the results, and conclusions. When will the evaluation be complete?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** New monitoring wells were installed at the Northeast Extension in July 2020 after this FYR period to collect additional data on groundwater flow and groundwater quality. Additional groundwater data collection for both new and existing wells is planned through the second quarter of FY23. Monitoring data will be reviewed with the regulatory agencies to determine appropriate actions.

**Comment 38. Section 6.3.1.2 North Boundary Containment System** The 2020 FYR states, “Effluent concentrations for all contaminants were below their respective CSRGs except for NDMA.”

**SSAB comments:**

- a. Why does this section omit all data regarding 1,4 dioxane? The compound is not included in Table 6.3-4 Five-Year Summary of CSRG Analyte Sampling from NBCS Downgradient Performance Wells. In several Sections of the 2020 FYR 1,4-dioxane is described as a substantial failure of the NBCS and Off-Post of RMA. This Section should be modified to provide a complete description of the ineffectiveness of the NBCS to adequately capture all contaminants migrating into the system.

**Response:** Effluent requirements for 1,4-dioxane were not adopted until April 2020, which is after the FYR period. Performance well monitoring for this emerging contaminant was conducted during the FYR period, and the results are discussed in several places in Section 6.3.3. Although the current North Boundary Containment System was not specifically designed to treat 1,4-dioxane (as it is an emerging contaminant), some reduction of 1,4-dioxane appears to be occurring based on comparison of influent and effluent concentrations. As discussed in the response to comment 19, a new treatment plant (the Consolidated Water Treatment Plant) has been designed to accommodate treatment for 1,4-dioxane for the North Boundary flow. Construction of the new treatment facility is tentatively scheduled to begin in FY23, pending funding and regulatory agency approval of the design.

- b. The 2020 FYRR is confusing as to the PQL for NDMA. At times the PQL is 0.009 ug/L while Table 7.2-1 identifies the 2020 CBSG for NDMA as 0.00069 ug/L. The 2020 FYRR should better explain the differing values.

**Response:** Table 7.2-1 provides a review of the Colorado groundwater standards to determine if there were any changes during the FYR period. For NDMA, the CSRG is unchanged and represents the CBSG, which is 0.00069 µg/L. However, analytical methods are not capable of detecting NDMA at that level in groundwater. In accordance with the RODs, when the CSRG is lower than the achievable analytical reporting limit, the PQL is used as the compliance point. For NDMA, the current PQL is 0.009 µg/L.

- c. Is the range of years for chloride and sulfate to achieve CBSGs 2026-2031? The 2020 FYRR needs correction.

**Response:** The projected dates provided in the FYRR are correct. Chloride is expected to reach the CSRG by 2026 and sulfate is expected to reach the CSRG by 2021. As noted in the FYRR, both anions were below their respective CSRGs in the NBCS effluent throughout the FYR period.

- d. Why does the 2020 FYR use “five-year concentrations of effluent contaminant discharge” to determine treatment effectiveness for fluoride?

**Response:** The NBCS does not treat for anions, including fluoride. Although influent and effluent monitoring are conducted to evaluate fluoride concentrations as compared to the CSRG, concentrations above the CSRG are not indicative of system performance. The average fluoride effluent concentration is provided to illustrate the magnitude of the one CSRG exceedance compared to typical effluent concentrations. The exceedance from FY18 is a statistical outlier when evaluated with the distribution of effluent concentrations over the FYR period.

- e. The 2020 FYR describes “primary performance criteria” and “secondary performance criteria” in evaluating NBCS system optimization. The 2020 FYRR should describe what is meant by both criteria.

**Response:** The primary and secondary performance criteria are described in detail in the report on pages 43-44. Secondary performance criteria are applicable for performance evaluation if the primary criteria are not met.

- f. The 2020 FYR consistently relies on the Mann-Kendall test for evaluating contaminant trends. It does not, however, explain what the test is, what data it relies on, and how/why the test is used.

**Response:** The Mann-Kendall test is a statistical tool used to determine whether a data series illustrates an upward or downward trend over time. It is a nonparametric test, meaning it does not require the data to be normally distributed, making it well-suited for evaluation of environmental data. The Mann-Kendall test provides the trend analysis necessary to determine whether contaminant concentrations are stable or decreasing, which is a performance goal for many of the treatment systems. The Mann-Kendall test is widely accepted by EPA and the State of Colorado for evaluating trends in environmental data.

- g. The 2020 FYR identifies placement of alternate wells north of the NBCS to provide “continuity in system performance monitoring” This modification was due to concerns related to monitoring continuity and lack of complete information regarding water quality downgradient of the system and the mechanisms causing contaminant concentrations to be above the CSRG. Where are locations of the five alternate wells along with the locations of existing wells being replaced. How does incorporating new wells north of the NBCS alleviate contaminant discharges that are not protective of the environment?

**Response:** The current performance well numbers and the alternate well numbers are listed on Table 4.1-1 and well locations are provided on Figure 6.3-7. The proposed wells are being evaluated based on the recommendation in the 2015 FYRR as part of the overall evaluation of hydrogeology north of the NBCS. The proposed alternate monitoring wells are expected to be more representative of system performance, allowing better system evaluation for protectiveness determinations.

- h. Figure 6.3-13 states that NDMA detections in downgradient performance wells were identified as “Laboratory contamination resulting in method blank detections.”
  - i. As these appear to be critical data points, where there duplicate samples?
  - ii. Were the wells resampled?
  - iii. How were these results considered in NDMA contamination in the performance wells?

**Response:** There were no duplicate samples collected from these wells during the FY15 sample event. Because NDMA is typically not detected in these wells and the source was determined to be laboratory contamination, the wells were not resampled in FY15. Results in FY16, as expected, were all non-detect. Due to contamination in the method blank, the FY15 data were qualified and not used for evaluation of system performance in FY15. The remaining downgradient performance wells did not show detections of NDMA and were used to demonstrate system performance.

- i. Table 6.3-4 provides sample concentrations for numerous RMA groundwater contaminants, however, seven contaminants were identified as N/A. Assuming this is not applicable, the 2020 FYRR should explain why they are labeled N/A and whether additional sampling will be performed in these contaminants. Why wasn't 1,4-dioxane included in these analyses?

**Response:** Analysis for the compounds designated not applicable is not required under the LTMP for the NBCS performance wells. The table has been revised to include a footnote providing this information. Performance well monitoring requirements for 1,4-dioxane were not adopted until May 2020, which is after the FYR period. Therefore, results are not provided on Table 6.3-4.

- j. The 2020 FYR should describe in detail why the Army believes “downgradient detections are most likely (emphasis added) caused by residual contamination and not representative of system effectiveness.” Terms like “most likely” regarding downgradient detections of dieldrin are not definitive, and additional monitoring and evaluations are necessary to confirm this conclusion.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** The conclusion is based on evaluation of all available data associated with the system. Primarily, the system effluent continues to meet the compliance criteria with four-quarter moving averages consistently below the dieldrin PQL. Potential bypass is controlled by maintaining reverse gradient through recharge of treated groundwater downgradient of the system. Concentrations in monitoring wells upgradient of the extraction wells are significantly higher than the concentrations in downgradient monitoring wells. In addition, recent investigative efforts have not identified a flow path with significant volume to contribute to downgradient exceedances. Monitoring and evaluation are ongoing to confirm these conclusions.

#### **Comment 39. Section 6.3.1.4 Basin A Neck System**

##### **SSAB comment:**

- a. The 2020 FYRR indicated a “compliance requirement” for the system’s reverse hydraulic gradient. Are there compliance requirements for each groundwater system, both internal and at the boundaries? These need to be included in each section of the 2020 FYR.

**Response:** As indicated in Section 6.3.1.4, reverse hydraulic gradient is not a compliance requirement for the BANS. Groundwater gradients across the system slurry wall are monitored as an operational consideration to evaluate system capture. The compliance requirement for the BANS is treatment plant effluent concentrations below the CSRGs. Each section discussing groundwater treatment systems has similar text describing the compliance requirement for the system.

- b. The 2020 FYRR also indicates a “performance requirement.” Is this similar to the compliance requirement provided above? As with the compliance requirement, all performance requirements should be included in each section of the 2020 FYR.

**Response:** Each section of the FYRR includes a description of both the compliance requirements and performance requirements. For groundwater treatment systems, the compliance requirements represent measurable elements that must meet ARARs (i.e., effluent concentrations). Performance requirements are criteria developed in the Long-Term Monitoring Plan for Groundwater and Surface Water that are designed to evaluate the system performance (e.g., decreasing or stable concentrations in downgradient wells). Annual monitoring reports provide a detailed evaluation of all compliance and performance evaluations for each system.

- c. The 2020 FYR states that during the five-year reporting period for the BANS, only 1,2 DCLE, CPMSO<sub>2</sub>, dieldrin and PPDDT occurred in downgradient performance at concentrations exceeding CSRGS/PQLs. The Section includes no discussion as to why these exceedances exist and what corrective actions will be implemented to rectify this remedy failure. Does this failure violate the compliance or performance requirements?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** For BANS, the performance criteria include stable or decreasing concentrations in downgradient performance wells. Although concentrations of several contaminants were detected above their respective CSRGs, none showed increasing concentrations. The performance requirements were met and the detections do not represent a failure of the BANS system.

**Comment 40. Section 6.3.1.5 Bedrock Ridge Extraction System** The 2020 FYR describes numerous RMA contaminants detected in downgradient performance wells identifying plume capture and remedy failure at the Bedrock Ridge Extraction System.

**SSAB comments:**

- a. As commented above, do these exceedances violate compliance and/or performance requirements?

**Response:** Because groundwater extracted from the BRES is treated at BANS, the compliance requirements apply for the BANS treatment plant effluent and

are being met there. Performance criteria for the BRES include contaminant concentrations below CSRGs in downgradient performance wells or stable or decreasing trends. In this case, concentrations of several contaminants exhibit increasing trends, which does not meet the performance goal. Evaluation of BRES performance is underway to identify potential improvements that could be implemented to optimize system performance.

- b. These contaminant exceedances date back to the 2015 FYR: why does it take the Army greater than five years to evaluate data, improve monitoring of the downgradient performance wells, and ultimately optimize plume capture?

**Response:** The Army, in consultation with the regulatory agencies, implemented a phased approach to evaluation of system performance, which included a detailed evaluation of existing data, supplemental monitoring of existing wells, evaluation of the existing monitoring network, and installation of new monitoring wells to provide additional data necessary for a competent evaluation. Groundwater flow in this area is very slow, requiring multiple sample events to generate a data set that provides adequate information for appropriate decision making.

- c. What is the estimated date to complete a corrective action on this system?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** Additional groundwater data collection for both new and existing wells is planned through the end of FY21. Monitoring data will be reviewed with the regulatory agencies to determine appropriate actions and determine an implementation schedule for any system adjustments determined to be required.

#### **Comment 41. Section 6.3.1.6 Off-Post Groundwater Intercept and Treatment System**

##### **SSAB comments:**

- a. This Section includes the need to demonstrate “compliance with remediation goals.” Are these similar to compliance and/or performance requirements? Where are the remediation goals for the system identified in the 2020 FYR?
- i. There are exceedances of NDMA identified in both FY16 and FY17.
  - ii. The review should describe what is meant as “The effluent met the four-quarter moving average throughout the five-year period...” Is the four- quarter moving average used as a remediation goal?
  - iii. As the NBCS does not treat NDMA, what corrective actions are planned to alleviate NDMA exceedances of CSRGs?

**Response:** For the groundwater treatment systems, compliance with remediation goals is synonymous with compliance requirements. Both refer to the requirement for the treatment plant effluent to meet the ARARs, or CSRGs, identified for the system. The FYRR includes a table for each treatment system listing the CSRGs for each contaminant. These tables are located in Section 4.1.1 with the system and remedy descriptions.

As noted in the comment, the concentration of NDMA in the NBCS effluent exceeded the current PQL of 0.009 µg/L on two occasions during the FYR period. However, the concentration in FY16 was below the effective PQL at the time (0.018 µg/L). Figure 6.3-34 has been revised to reflect this. For effluent monitoring, compliance is based on the four-quarter moving average in accordance with the LTMP. The four-quarter moving average for NDMA remained below the PQL throughout the FYR period, as shown on Figure 6.3-35.

The NBCS has been successfully treating for NDMA since installation of the ultraviolet treatment unit in 1997, as required by the RODs.

- b. What is meant by the “mass removal criterion” and how was the “performance goal” of removing 75% of the contaminant developed?

**Response:** The mass removal goal of 75% was developed in consultation with the regulatory agencies as a performance goal to evaluate system performance against the ROD remedial action objective.

- c. Table 6.3-13 identifies dieldrin exceedances downgradient of the system. The 2020 FYR states “It is expected that the dieldrin levels within the FCS (First Creek System) will generally continue (emphasis added) to decrease over time.” The 2020 FYR should provide data that supports this conclusion.

**Response:** As discussed in the text, the dieldrin concentration trend for the downgradient wells is shown on Figure 6.3-36. Dieldrin concentrations in these wells has been decreasing since FY16.

- d. The 2020 FYR states, “It is unlikely that the dieldrin detected downgradient is caused by bypass of the system, but rather dieldrin in soil was mobilized in groundwater due to fluctuating water levels in the vicinity of First Creek.” Do the assumptions provided fully support this conclusion?

**Response:** The discussion included in the text provides adequate support for the conclusion. If the dieldrin concentrations downgradient of the system were due to system bypass, the other contaminants present upgradient would also be expected to be present in the downgradient wells, but this is not the case.

- e. It is evident from this section that the inability of the NBCS to treat NDMA and NDPA (and 1,4-dioxane) has resulted in groundwater plumes Off-Post exceeding CSRGs, and therefore, the remedy does not protect the environment. Is it the Army’s intention to

allow continued environmental degradation of groundwater by these compounds, or will the NBCS be optimized to capture and discharge all RMA contaminants below CSRGs?

**Response:** The NBCS provides effective treatment for both NDMA and NDPA, as evidenced by the effluent monitoring results. Plumes downgradient of the NBCS existed prior to construction of the system and are not indicative of system performance.

Although the current NBCS was not specifically designed to treat 1,4-dioxane (as it is an emerging contaminant), some reduction of 1,4-dioxane appears to be occurring based on comparison of influent and effluent concentrations. A new treatment plant (the Consolidated Water Treatment Plant) has been designed to treat the flow from the NWBCS and the NBCS, replacing the existing two treatment systems. The North Boundary treatment train within the new treatment plant has been designed to accommodate treatment for 1,4-dioxane for the North Boundary flow. Construction of the new treatment facility is tentatively scheduled to begin in FY23, pending funding and regulatory agency approval of the design.

- f. There is a significant plume of dieldrin approaching, within, and downgradient of the Off-Post groundwater “gap.” The 2020 FYR indicates a system modification to capture groundwater flowing through the gap.
  - i. When is this modification expected to be completed?
  - ii. How much dieldrin will have passed through the gap and at what concentrations?
  - iii. How far Off-Post is it estimated this dieldrin plume will migrate?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** Construction on the Northern Pathway System modification started in May 2021 and is expected to be completed by November 2021. Although dieldrin was identified in the area between two of the modified system extraction wells, the plume has been captured by the downgradient original system wells. The addition of the new extraction wells will improve capture along the alignment of the modified system. Dieldrin exceeded the PQL only once in one of the six downgradient performance wells during the FYR period, indicating minimal impact to groundwater.

**Comment 42. Section 6.3.3.1 Water Level Tracking** The 2020 FYR states, “Overall, based on a year-to-year water level comparison for 2015 through 2019, groundwater flow directions and associated migration of contaminant plumes have not changed significantly.”

**SSAB comments:**

- a. The 2020 FYR should include plume maps from these years identifying changes in flow directions and migration of RMA contaminants.

**Response:** During this reporting period, Off-post plume maps were developed in FY17 and FY19 based on comprehensive sampling rounds. These maps were coordinated with the regulatory agencies and submitted to the State Engineers Office. Generally, the off-post plumes have been decreasing in size over time. This frequency (twice in five years) is in accordance with the Long-Term Monitoring Plan for Groundwater and Surface Water (LTMP). Also, per the LTMP, on-post plume mapping is conducted every 20 years to evaluate long-term effectiveness of the remedy (last completed in 2014). Where monitoring changes in the plumes is important, such as at the groundwater treatment systems, operational and performance monitoring is conducted and evaluated as needed.

- b. Do these changes require modifications to On-Post and/or Off-Post monitoring well locations?

**“As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** Based on evaluation of water level maps developed since the completion of the remedy, the Army does not anticipate a need to modify on-post or off-post water-level monitoring networks.

**Comment 43. Table 6.3-16 - Water Quality Tracking Wells and Analyses Demonstrating Increasing Statistical Trends**

- a. There are numerous increases in dieldrin and/or chloroform downgradient of South Plants source, Basin F source, and the Sand Creek Lateral source migrating towards the NWBCS. Why are these compounds increasing with the current remedy in place?

**Response:** While groundwater contamination exists within the on-post area of RMA, and the concentrations of some analytes may be increasing upgradient of the boundary containment treatment systems (NBCS and NWBCS), the groundwater remedy addresses containment and treatment at the RMA boundary. The migration of contaminants emanating from source areas in the former South Plants, Basin F, and Sand Creek Lateral is monitored under the LTMP on a continuing basis to ensure that the boundary systems continue to capture these plumes.

- b. In addition, there are increases in chloride migrating towards the NBCS along with arsenic and trichloroethylene groundwater concentrations increasing downgradient of Basin A and migrating towards the Basin A Neck. The 2020 FYR should explain definitively why are these compounds continue to increase in groundwater with the current remedy in place?

**SSAB Comments: As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** As previously stated, groundwater contamination exists within the on-post area of RMA, and while the concentrations of some analytes may be increasing, the groundwater remedy addresses containment and treatment at the RMA boundary via the NBCS and the NWBCS. The water quality tracking network includes wells in and downgradient of source areas to provide data for evaluating long-term trends between the source areas and the boundary treatment systems. There are no remedy performance criteria associated with the water quality tracking wells. The network provides additional data beyond the treatment system well networks to evaluate concentration trends and future shut-off determinations. Although some wells currently show increasing trends for limited contaminants, the overall trend is decreasing or stable.

**Comment 44. Table 6.3-17 – Summary of FY19 Water Quality Tracking Data for Emerging Contaminants**

**SSAB comments:**

- a. Has the Army identified the sources of these RMA contaminants?

**Response:** Potential sources were investigated as part of the characterization efforts for these emerging contaminants. 1,4-Dioxane was used as a stabilizer for various chlorinated solvents that were used on RMA. NDPA is a contaminant associated with some dinitroaniline-based herbicides. The herbicide Planavin, a dinitroaniline-based herbicide, was produced in South Plants and associated wastes were disposed on site. Groundwater data indicates the same source areas and flow paths for these contaminants as was identified in the RI for other RMA contaminants.

- b. What is the rate of groundwater migration for these compounds i.e., when will they reach the RMA boundaries?

**Response:** Based on information in Appendix A of the LTMP, Groundwater Travel Times and Aquifer Test and Property Data, the following provides approximate travel times from source areas to the NWBCS and NBCS for the flow paths presented in Table 6.3-17.

- South Plants to NWBCS via Basin A Neck – 59 years
- South Plants to NWBCS via Lakes and Western Tier – 13 years
- Basin F to NBCS – 5 years

- c. Why is there no groundwater data regarding the NBCS and these compounds?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** The NBCS water quality tracking wells were inadvertently combined with the NWBCS data. This table has been corrected to separate wells associated with the two systems.

**Comment 45. Confined Flow System Monitoring**

**SSAB Comments:** Dieldrin detections in the confined flow system beneath Basin F were identified for the first time in 2017 and again in FY2019. Have these wells been sampled yearly since 1994 and 2002?

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** These wells were sampled extensively during the Remedial Investigation from 1988 through 1994. Beginning in 1999, monitoring of the CFS wells was included in the long-term monitoring network and they have been sampled on a twice-in-5-year frequency.

**Comment 46. Section 6.3.3.4 Off-Post Exceedance Monitoring** The 2020 FYR states, “Exceedance monitoring is also conducted in support of the institutional control component of the off-post remedy. The purpose of the institutional control is to restrict the use of contaminated groundwater – in particular by restricting the installation of new wells – within identified plume areas.”

- a. The exceedance monitoring should not be limited to human health consumption of contaminated groundwater, but to protect the environment as required by the RODs and CERCLA.

**Response:** As discussed in the ROD, the potential for exposure to contaminated groundwater is limited to human and livestock receptors. The off-post monitoring network provides the information necessary to determine the extent of contamination remaining in the off-post OU and to implement the off-post institutional controls as required by the Off-Post ROD. After the off-post monitoring is conducted (twice in five years), an off-post plume map is developed and submitted to the State Engineer’s Office.

- b. The 2020 FYR should describe how exceedance monitoring is designed to ensure the environment is not continually damaged by RMA contaminants discharged into Off-Post groundwater.

**Response:** The off-post exceedance monitoring network is designed to monitor long-term contaminant trends to assess contaminant levels and remedy performance. Monitoring to date has shown significant reductions in both the concentration and extent of contamination, especially off post. The OGITS treatment plant effluent consistently meets the compliance requirements and is not discharging groundwater with contaminants exceeding the remediation goals.

- c. The list of RMA Off-Post groundwater contaminants identified on the two pages of Table 6.3-21 is extensive.

**Response:** Comment noted. The OGITS has an extensive list of contaminants with corresponding remediation goals that the system effectively treats.

- d. The 2020 FYR should clearly describe the reasons for the considerable amount of contaminated groundwater that remains Off-Post of RMA, i.e., is this a boundary treatment system(s) failure?

**Response:** Concentrations have decreased significantly since implementation of the remedy, indicating the remedy is functioning as designed. Concentrations of contaminants are significantly higher in wells upgradient of the treatment systems than wells downgradient of the treatment systems, further confirming the effectiveness of the systems.

- e. Will all these contaminants be treated by Off-Post systems?

**Response:** The OGITS has an extensive list of contaminant remediation goals. The treatment plant effluent at the OGITS is consistently below the remediation goals for all contaminants the system is designed to treat.

- f. What is the corrective action to remove arsenic, carbon tetrachloride, dieldrin, 1,4-dioxane, and NDPA, which appear downgradient, or possibly not captured by the Off-Post treatment systems?

**SSAB Comments: As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** The OGITS successfully treats groundwater for carbon tetrachloride, dieldrin, and NDPA. Although the plant was not designed for treatment of 1,4-dioxane, concentrations in the plant influent and effluent are consistently below the CBSG. There is no defined 1,4-dioxane plume downgradient of the system. Although there is an isolated area of arsenic exceeding the CSRG in wells downgradient of the Northern Pathway System, this has been present since the system was constructed in 1992. Concentrations are decreasing and no longer exceed the CBSG in the OGITS effluent.

#### **Comment 47. Section 6.3.3.5 Private Well Network**

**SSAB comments:** The 2020 FYR does not identify a corrective action regarding the DIMP exceedance in the Off-Post private well. What is the Army’s proposed future action to resolve this, and possibly other neighboring private wells contaminated with DIMP above the CBSG?

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** The presence of DIMP above the CBSG in one private well is identified as an issue in the FYR with a recommendation to perform additional evaluation and determine the most appropriate action for providing a permanent water source, as required by the Off-Post ROD. This evaluation is ongoing. This appears to be an isolated well, as no other private wells sampled exhibited DIMP concentrations exceeding the CBSG, as shown on Table 6.3-22.

**Comment 48. Section 6.3.3.6 Hazardous Waste Landfill Post Closure Groundwater Monitoring**

- a. The 2020 FYR should describe how the upper prediction limit (UPL) is derived and its relevance to concentration exceedances.

**Response:** The methodology for the derivation of UPLs is presented in the Post-Closure Groundwater Monitoring Plan for the HWL with details provided in the EPA's Unified Guidance (2009). The text has been revised to clarify the derivation and use of UPLs relative to compliance monitoring for the HWL. UPLs provide a means to test statistical differences between compliance (downgradient) and background (upgradient) water quality data to determine whether the HWL, or similar landfills/surface impoundments, have impacted water quality.

- b. The 2020 FYR should describe what additional investigations are proposed to conclude that elevated dieldrin in well 25194 "is likely sources of pre-existing soil contamination in the vicinity of the HWL."

**Response:** As presented in section 6.3.3.6, dieldrin in well 25194 was investigated with the results presented in the *Hazardous Waste Landfill Groundwater Monitoring Wells 25194 and 25184 Subsurface Soil and Landfill Stormwater Runoff Data Summary Report* (2019). No further investigation is anticipated based on the review of previous investigations, hydrogeologic information, statistical evaluations, and trend analysis, that indicate water quality in the vicinity of the HWL has not been affected by the post-closure O&M of the landfill.

- c. The 2020 FYR should include the locations of subsurface dieldrin sampling collected during the program.

**Response:** As summarized in Section 6.3.3.6, and as originally presented in the *Hazardous Waste Landfill Groundwater Monitoring Wells 25194 and 25184 Subsurface Soil and Landfill Stormwater Runoff Data Summary Report* (2019), two soil borings were completed and sampled for dieldrin. The first boring was located east of well 25194 near the centerline of the former Sand Creek Lateral. The second boring was located at the site of new well 25184, to the north of the northwest corner of the landfill berm. A total of 14 samples were collected from the two borings and dieldrin was not detected in any of the samples.

- d. Was dieldrin detected in previous groundwater sampling events or during the soil RI?

**Response:** Dieldrin was detected in groundwater and soil prior to the remedy in the western portion of Section 25 and eastern portion of Section 26 likely associated with the chemical sewer and Sand Creek Lateral. The dieldrin

plume, as mapped in 2014, flows northwest from the vicinity of the HWL and ELF where there have been isolated detections of dieldrin in well 25194.

- e. What is CUSUM an abbreviation for?

**SSAB Comments:** As per EPA Guidance this remedy is an “early indicator of remedy problems.”

**Response:** As defined by the EPA’s Unified Guidance (EPA 2009), CUSUM stands for cumulative sum, which “sequentially analyzes each new measurement with prior compliance data.” Together with the Shewhart portion of a control chart, detection monitoring is evaluated through comparisons between downgradient compliance data and upgradient background data.

**Comment 49. Section 6.3.3.8 Basin F Post-Closure Groundwater Monitoring**

**SSAB Comments:**

- a. The 2020 FYR should better describe the date, location, and length of time the breach in the Basin F liner. How was the breach repaired?

**Response:** The requested information is contained in the *Final Phase I Contamination Assessment Report for Site 26-6: Basin F*, which provides a history of Basin F prior to the RI. According to the report, deterioration of the liner was discovered and repaired on two occasions in 1957 and 1969. Subsequent work in the basin in 1976 did not indicate a breach in the liner.

- b. The 2020 FYR indirectly concludes that arsenic and chloroform are leaking from the Basin F Wastepile liner as identified in increases in wells 26015 and 26017, which are the only wells monitoring groundwater downgradient of the site.

- i. The current groundwater monitoring program is insufficient to characterize contaminants migrating from the Wastepile and should be modified to better characterize the extent of the remedy failure.
- ii. What were the sampling results of well 26016 located between wells 26015 and 26017?

**Response:** Well 26016 is only monitored for water levels under the post-closure groundwater monitoring program. Well 26016 was sampled for water quality prior to the RI from 1978 through 1980, although contaminant analysis was limited and did not include arsenic or chloroform. No analytical data exist for well 26016 since 1980.

- c. Table 6.3.25 identifies the increase of chloroform in wells 26015 and 26017 as “likely caused by higher water levels mobilizing residual chloroform.”

- i. What data was used as a basis of this conclusion?

**Response:** Evaluation of groundwater levels and water quality data for wells 26015 and 26017, suggest that pre-existing residual soil contamination beneath the former Basin F may have been remobilized as the local water table has risen as a result of elevated precipitation that affected the regional water table.

- ii. What soils samples during the remedial investigation were taken beneath the Basin F Wastepile prior to construction of the liner?

**Response:** During the remedial investigation, and prior to the construction of the wastepile during the interim response action (IRA) from June 1988 through January 1989, a total of 185 samples were collected at 47 locations across Basin F. Of this total, 23 samples were collected at 7 locations in the footprint of the IRA wastepile, with sample depths ranging from the surface to a maximum depth of 39.5 ft.

- iii. The 2020 FYSR concludes “Groundwater quality downgradient of the Basin F WP area has potentially been affected in the vicinity of wells 26015 and 26017.” This indicates remedy failure at the Basin F Wastepile; what corrective actions are in place, or being considered, to alleviate the continued migration of contamination from the wastepile?

**Response:** There are no data to indicate remedy failure in the Basin F WP area. The remedy, as required by the ROD, was selected and implemented to meet remedial action objectives (RAOs) by removing contaminated waste and soils, then constructing and maintaining an engineered soil cover across the footprint of the former disposal basin. To address the presence of increasing concentrations of specific indicator compounds in wells downgradient of the WP area, recommended action includes additional evaluation of Basin F groundwater data, the monitoring network, and statistical data evaluation process.

- d. The 2020 FYR states for the Basin F Principal Threat area, “Several indicator compounds – including chloroform, DIMP, sulfate, and tetrachloroethylene – appear to be increasing in more than one downgradient well. The exceedances likely (emphasis added) are caused by residual contamination and are consistent with pre-existing contamination that was present before the Basin F Post-closure period.”

- i. What additional RMA contaminants were identified in addition to these four?

**Response:** Historical RMA contaminants identified as indicator compounds (ICs) for Basin F post-closure monitoring were initially considered for post-closure monitoring. In accordance with the PCGMP, 11 ICs selected to represent the contaminants of concern related to historical disposal within Basin F. ICs were selected based on chemical and physical properties, widespread occurrence in plumes, and the potential for migration in groundwater. Besides the 11 ICs, 62

additional constituents are analyzed based review of former Basin F wastes, the groundwater contaminant history in the vicinity, and RCRA regulations.

- ii. What data was used as a basis of this conclusion?

**Response:** See the response to the previous comment.

- iii. The 2020 FYR concludes that the downgradient groundwater quality has potentially been affected in all four Basin F Principle Threat monitoring wells. This indicates remedy failure at the Basin F PT area; what corrective actions are in place, or being considered, to alleviate the continued migration of contamination from the Basin F PT area?

**Response:** Although downgradient water quality has potentially been affected, there are no data to indicate remedy failure in the Basin F Principle Threat area. The ROD remedy was implemented to meet RAOs by removing contaminated waste and soils, then constructing and maintaining an engineered soil cover across the footprint of the former disposal basin. To address the presence of increasing concentrations of specific ICs in wells downgradient of the PT area, actions recommended in the FYRR include performing additional evaluations of Basin F groundwater data, the monitoring network, and statistical data evaluation process.

- iv. Do groundwater level data confirm that the contamination is from “rising water levels and mobilization of pre-existing residual contamination from the Former Basin F”?

**Response:** Evaluation of groundwater levels and water quality data suggest that pre-existing residual soil contamination, beneath the former Basin F, has been remobilized as the local water table has risen. The rise in the local water table is the result of elevated precipitation events that affected regional groundwater elevations. Higher-than-normal precipitation in late 2013 and during the spring in 2014 and 2015 caused water levels to rise in the unconfined flow system upgradient and beneath Basin F. As the water table has declined during subsequent years, the remobilized contamination has remained in groundwater, eventually flowing downgradient of Basin F.

- v. Later in this Section the 2020 FYR it states, “Groundwater elevations have generally decreased in all downgradient and upgradient wells since 2015.” The 2020 FYR should explain this discrepancy.

**Response:** See the response to the previous comment.

e. The 2020 FYR states "...there are no chemical-specific standards that apply to Basin F groundwater since the RMA remedy addresses contaminated groundwater downgradient at the NBCS and NWBCS, where it is extracted and treated."

i. The Army must explain if this is the intention/direction of the overall remedy on RMA.

**Response:** The Basin F remedy, including post-closure care and monitoring, is consistent with the requirements of the ROD and meets RAOs, thus supporting the overall remedy for RMA.

ii. If so, why were Basin F, and all other internal hazardous waste source areas within RMA, capped and/or covered?

**Response:** As required under the ROD, specific areas on RMA were remediated by leaving contamination in place and constructing engineered soil cover systems over these areas to limit infiltration, thus restricting the transport of contaminants into groundwater and eliminating potential on-site exposure to contaminated soils by human and ecological receptors.

iii. Why are there internal treatment systems if RMA contaminated groundwater is and will be addressed at the NBCS and NWBCS?

**Response:** The only internal treatment system within the on-post operable unit at RMA is the Basin A Neck System (BANS). The BANS operates as a mass removal system designed to extract highly contaminated groundwater in the central part of the site and, through treatment and reinjection, decrease the contaminant load to be captured by the boundary containment systems.

iv. Why is the Army monitoring internal groundwater?

**Response:** Groundwater within the on-post area, and specifically within the vicinity of Basin F, is monitored as a requirement of the ROD and the Basin F Post-Closure Plan. Groundwater plumes are depicted every 20 years per the LTMP.

v. The statement above, which is a repeated assertion that the Army (sic) doesn't need to address failures in On-Post remedies since the contaminants will be picked up by the boundary groundwater treatment systems, violates the FFA, the On-Post ROD, regulations, and defies reason.

**Response:** The Basin F remedy is consistent with the requirements of the ROD and meets RAOs, thus supporting the overall remedy for RMA. There are no failures identified for the Basin F remedy. Groundwater extraction at the boundary treatment systems is consistent with the

ROD requirements and is protective. There are no exposures for human or wildlife receptors to groundwater on site.

- f. The 2020 FYR acknowledges that contaminants increasing downgradient of the Former Basin F are not limited to chloroform, DIMP, sulfate, and tetrachloroethylene. In addition to these RMA contaminants, arsenic, chloride, copper, DCPD, and NDMA are also increasing.

**Response:** Comment noted. As presented in Section 6.3.3.8 and summarized in Table 6.3-27, the contaminants noted in the comment indicated apparent and/or statistical increasing trends for water quality data both upgradient and downgradient of Basin F.

- g. The 2020 FYR states, "...it appears that the PT groundwater flow path is having a greater impact on water quality downgradient of the former Basin F compared to the WP flow path."
  - i. Does this statement consider that the monitoring wells for the WP are half (2) the number as the PT area (4)?

**Response:** To infer the relative water quality for the WP and PT, the number of wells was not taken into account. The statement is based on the observed flow paths indicated by the potentiometric surface in the vicinity of Basin F and the levels of indicator compounds detected downgradient in wells along the WP and PT flow paths.

- ii. It is evident that all groundwater monitoring wells, from both WP and PT areas, are showing increases in RMA groundwater contamination. What corrective actions beside additional groundwater monitoring are proposed to alleviate this remedy failure?

**“As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** In accordance with the requirements of the ROD, the remedy is operating as intended. Actions recommended for Basin F groundwater include performing additional evaluation of water quality data, the monitoring network, and the statistical data evaluation process as presented in Section 9.1.

#### **Comment 50. Section 6.3.3.9 Emerging Contaminants**

##### **SSAB comments:**

- a. The 2020 FYR provides the Army’s definition of emerging contaminants; it should also provide EPA’s definition.

- i. Does the Army consider 1,4 dioxane an “emerging contaminant”? The Army has been monitoring the compound on RMA since 2011; it is no longer an emerging contaminant.

**Response:** The definition provided is substantively consistent with EPA’s definition. For this FYR period, 1,4-dioxane was considered an emerging contaminant since characterization and a risk assessment had not yet been completed. With completion of the Feasibility Study and revision to the ROD, 1,4-dioxane has been incorporated into the remedy consistent with other RMA contaminants.

- b. The 2020 FYR should provide a reference to the 2016 Army guidance regarding PFOA/PFOS.

**Response:** The guidance document is included in the reference list in Section 12. Citation for this reference has been added to Section 6.3.3.9.

- c. The 2020 FYR should include a plume map, instead of monitoring results, for NDPA.

**Response:** The off-post plume map is provided on Figure 6.3-66. Consistent with the LTMP, on-post plume maps are only developed every 20 years. Monitoring well data collected were sufficient to determine that the NDPA is being captured and treated at the boundary systems and the OGITS.

- d. The 2020 FYR should include a plume map, instead of monitoring results, for PFAS.

- i. The 2020 FYR identifies one location where PFAS was above the EPA health advisory.
- ii. Figure 6.3-73 identifies four locations in the South Plants where PAFS (sic) exceeded the health advisory.
- iii. The 2020 FYR states, “All of the wells were located in the vicinity of the South Plants source area associated with documented use.” However, Figure 6.3-73 identifies PFAS detections upgradient of South Plants, and downgradient of Basin A, north and east of the Army Complex Trenches, west of Basin F, Off-Post, and in Sections 27 and 33.
- iv. As these are individual well results, additional groundwater monitoring is necessary to better define PFAS on and off RMA.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** The statement quoted in bullet iii above has been revised to clarify that all the wells that exceeded the health advisory level are located in the

vicinity of the South Plants source area. The other wells with detections of PFAS, both on and off post, have concentrations significantly below the health advisory level.

**Comment 51. Section 6.3.4 Surface Water Monitoring**

**SSAB comments:** Was the contamination detected in surface water evaluated to determine impacts on biota other, than aquatic, as part of the BMP? Exposures to biota from surface water would include dermal absorption and ingestion. While likely not a primary route of exposure, these pathways should be included in the BMP and overall protectiveness of RMA wildlife.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** Previous assessment by the Biological Advisory Subcommittee evaluated aquatic pathways including a food web with dietary pathways for both aquatic and terrestrial organisms. This assessment did not identify an unacceptable risk for any species due to exposure to surface water (*Assessment of Residual Ecological Risk and Risk Management Recommendations Part 2: Aquatic Pathways and Receptors*, BAS 2003). Therefore, the BMP focused on risk from exposure to contaminated soil. For the surface water monitoring requirements, the assessment relied on water quality criteria for aquatic life.

**Comment 52. Section 6.3.5 Site Wide Biota Monitoring** The 2020 FYR states, “Although the majority of the dieldrin concentrations in the eggs collected were below detection, there was insufficient data to evaluate the decision rule described in the BMP for all nest box decisions. Dieldrin residues above the No Observable Adverse Effect Concentration (NOAEC) were detected once in each of seven different kestrel nest boxes during the four seasons that the kestrel nest boxes were monitored.”

**SSAB comments:**

- a. The 2020 FYR should include the percentage of total eggs sampled that contained dieldrin above the NOAEC and the locations and concentrations of the eggs.

**Response:** Tissue sampling was completed during the previous FYR period and the results were discussed in the 2015 FYRR. Eleven of the 89 eggs collected had dieldrin concentrations above the NOAEC (approximately 12%). The nest boxes producing eggs that exceeded the NOAEC were located in the central and northwest portions of the site. Detailed discussion of the tissue sampling results is provided in the *Data Summary Report Long-Term Biomonitoring Program*, November 2016.

- b. The 2020 FYR states, “The Army conducted a series of meetings with Regulatory Agencies to determine requirements for completion of the program.” The 2020 FYR also states, “... sampling requirements for program completion were revised to focus on soil sampling rather than collection of kestrel samples.”

- i. How were soil sample results compared to actual kestrel eggs that were analyzed? This evaluation is critical as soil samples are a single pathway whereas

kestrel egg sampling would include other pathways such as inhalation of contaminated dust, ingestion of contaminated biota, and consumption of contaminated surface water.

**Response:** The soil screening level used to evaluate the soil sample results accounts for ingestion of soil and prey and bioaccumulation in the prey. Soil sample results and kestrel egg results were not directly compared as there are no criteria to do so. Dermal contact with contaminated soil is not a significant pathway. Although surface water was not included as a pathway in the Phase II soil sampling, surface water sampling conducted since remedy implementation has not detected dieldrin above aquatic life standards. In addition, as mentioned in the response to comment 51, a previous assessment by the Biological Advisory Subcommittee evaluated aquatic pathways and did not identify an unacceptable risk for any species due to exposure to surface water.

c. Were all soil samples collected within the entire range of the kestrels?

**Response:** Soil samples were collected over the portions of RMA where kestrel egg sample results indicated potential exposure to RMA contaminants.

d. Were the sample locations from areas undisturbed by the remediation?

**Response:** The incremental sample strategy involves collection of soil increments systematically over the entire sample area, so both disturbed and undisturbed areas were included in the composite sample.

e. Why weren't other RMA biota similar to kestrel eggs considered as a contingent sampling collection? This could include the Rock Dove, pheasant, quail and/or mallards which historically had acute concentrations of dieldrin that resulted in mortality.

**Response:** Discussions with the regulatory agencies and USFWS concerning completion of the biomonitoring program included exploring other species for potential sampling. Overall, the decision was to implement a soil sampling strategy to determine residual risk rather than continue to sacrifice kestrels or similar valuable species to obtain tissue samples. This effort was completed in 2017.

f. Why weren't substrates other than eggs considered including kestrel brains or liver?

**Response:** Analysis of kestrel brain tissue was planned for Phase II of the program if egg concentrations warranted further evaluation. However, only one bird was collected for brain tissue sampling due to lack of nest box residency. This was one of the factors that led to the revision in approach for Phase II and the shift to soil sampling.

g. The 2020 FYR states, "The Army completed the Data Summary Report for tissue sampling in November 2016 (Navarro 2016c) and prepared a sampling and analysis plan

for the soil sampling event. An incremental sample methodology was selected to provide an estimate of mean surface soil concentrations across the entire sample area.” Why incremental sampling?

**Response:** Because the wildlife range over a foraging area and are exposed to potential contamination over the entire range, a methodology that represents the entire foraging area conditions was warranted. An incremental sampling strategy was developed in consultation with the regulatory agencies and the sampling was implemented consistent with the approved sampling and analysis plan. The incremental sampling methodology reduces data variability and increases sample representativeness, providing an estimate of the mean contaminant concentration for the area being sampled.

h. Without the ability to review the above referenced report, what tissue sampling is the 2020 FYR referring to?

**Response:** Tissue sample collection included starling brains and kestrel eggs.

i. Did the USF&WS prepare the sampling and analysis plan? If not, did it review and concur?

**Response:** The sampling and analysis plan was developed cooperatively between representatives of the Army, USFWS, and the regulatory agencies.

j. The 2020 FYR should include a detailed description of the “incremental sample methodology” used to evaluate dieldrin concentrations.

i. Does incremental sampling imply composite sampling?

ii. What were the greatest concentrations of dieldrin identified in the soil sampling program?

iii. Where were the locations?

iv. How did the incremental sampling adjust its findings due to the potential of substantial dilution of contamination concentrations due to combining numerous samples into one?

**Response:** Incremental sampling methodology is a soil compositing methodology developed by the Interstate Technology Regulatory Council and endorsed by EPA as an alternate compositing approach for investigation of potentially contaminated soil areas. Incremental sampling involves the collection of many soil samples systematically within a grid over the study area of interest. These samples are then combined into one large representative sample, homogenized, and sub-sampled for analysis. This sample methodology reduces data variability, or the potential effects of soil heterogeneity on sample accuracy, and increases sample representativeness, providing an unbiased estimate of the mean contaminant concentration for the area being

sampled. Although this is a form of composite sampling, it differs significantly from traditional composite sampling, which is often skewed by biased selection of sample locations.

Sample locations and results are shown on Figure 6.3-78. The highest concentration was located near Upper Derby Lake; however, the concentration was well below the soil screening level selected in consultation with the regulatory agencies (see response to bullet o below). Because incremental sampling is designed to provide unbiased estimates of the mean soil concentration, there are no adjustments necessary for evaluation of sample results.

- k. What is meant by “The nest boxes that required additional investigation...”?

**Response:** This statement refers to nest boxes that had kestrel egg concentrations above the Phase I criteria.

- l. Figure 6.3.78 does not identify the “59 soil sample decision units.” The figure needs to be revised to include these decision units.

**Response:** The 59 decision units are shown on Figure 6.3-78 and are labeled in bold numbers 1-59.

- m. The 2020 FYR should include a discussion why decision unit 35NW, located in a highly contaminated area of RMA, was identified as “No Additional Monitoring Needed.”

**Response:** Decision unit 35NW was included within the soil sampling area due to its central location within the overall sample area, even though kestrel eggs collected from 35NW had a mean dieldrin concentration of 0.044 µg/g, which is below the 0.05 µg/g no observable effect level identified in the BMP.

- n. Was there consideration to include other RMA contaminants to the revised BMP? These should include contaminants such as DDT, DDE, and/or endrin.

**Response:** Based on the risk assessment completed by the Biological Advisory Subcommittee, dieldrin was identified as the primary risk driver and the most prevalent of all of the pesticides historically present at RMA. The other pesticides listed in this comment are not detected as frequently and they present lower risks than dieldrin.

- o. The 2020 FYR should include how the selected screening criteria of 110 ug/g was calculated.

**Response:** The screening level used is the EPA Ecological Soil Screening Level (Eco-SSL) developed for an avian carnivore, which is representative for the American Kestrel. Eco-SSLs are soil screening concentrations derived to

represent levels that are protective of ecological receptors that consume biota that live in or on the soil. The Eco-SSL includes both soil and food ingestion and accounts for biomagnification of contaminants in the food source.

- p. The 2020 FYR should identify where decision units are located.

**Response:** The decision units are shown on Figure 6.3-78 and are labeled in bold numbers 1-59.

- q. The 2020 FYR should identify which agencies and/or regulators determined the results to be acceptable.

**Response:** EPA, CDPHE and TCHD all reviewed and concurred with the Data Summary Report, which presented the results in comparison to the sampling and analysis plan and data quality objectives and determined the sampling results to be acceptable.

- r. The 2020 FYR should explain why the Data Summary Report is still awaiting EPA review three years after completion.

The 2015 FYRR stated that there is a ROD requirement “Ensure that biota are not exposed to COCs in surface water, due to migration from soil or sediment, at concentrations capable of causing acute or chronic toxicity via direct exposure or bioaccumulation.” In addition, the 2015 FYRR stated, “Although the ROD requirement will continue to be evaluated as part of annual land use control monitoring, the ecosystem has no bearing on remedy effectiveness and will not be evaluated in future five-year reviews.”

- i. The SSAB disagrees that this evaluation be terminated. Ensuring that all biota are not exposed to COC’s capable of causing acute or chronic toxicity via direct exposure or bioaccumulation has a definitive bearing on remedy effectiveness.
- ii. This is particularly important since there appears to be meager enforcement of the “catch and release” fishing program at the RMA Wildlife Refuge. This issue was not addressed in the 2020 FYR. Monitoring of aquatic biota needs to be evaluated in this and future FYRRs.

**“As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future**

**Response:** As a point of clarification, there have been two Data Summary Reports issued for the BMP, one for tissue sampling and one for soil sampling. Both reports have been reviewed and approved by the EPA. Following completion of the soil sampling Data Summary Report, a draft Monitoring Completion Report (MCR) was provided to document completion of the ROD requirement for long-term biomonitoring as described in the *Long-Term Contaminant Biomonitoring Program for Terrestrial Ecological*

*Receptors at Rocky Mountain Arsenal.* The long-term biomonitoring requirement identified in the On-Post ROD has been completed and the MCR is awaiting final EPA review.

A previous assessment by the Biological Advisory Subcommittee evaluated aquatic pathways and did not identify an unacceptable risk for any species due to exposure to surface water (*Assessment of Residual Ecological Risk and Risk Management Recommendations Part 2: Aquatic Pathways and Receptors*, BAS 2003).

**Comment 53. Section 6.3.6 Hazardous Waste Landfill Monitoring** The 2020 FYR states, “The integrity of the HWL Cap will be maintained by the U.S. Army for the duration of the post-closure period.”

**SSAB Comments:**

- a. The 2020 FYR should make it clear that the post-closure groundwater monitoring and maintenance of the HWL will be the responsibility of the U.S Army in perpetuity.

**Response:** The referenced language is consistent with that used in the HWL Post-Closure Plan Section 1.1.

- b. The 2020 FYR discusses issues with adequate vegetation on the HWL cover. As required by regulation, vegetation is required to reduce erosion. The 2020 FYR failed to provide the current status of vegetation on the cap’s cover, especially as erosion continues to be an issue with cap integrity.

**Response:** Section 6.3.6.1 of the 2020 FYRR states: “Vegetation establishment continues to improve from year to year and the population of broadleaf weedy species continues to decline.” Likewise, erosion of the HWL cap is also not a concern. Section 6.3.6.1 of the 2020 FYRR states: “No erosion rills were observed on the side slopes of the HWL itself.” While the general condition of the vegetation on the HWL is routinely monitored, there are no quantitative requirements for vegetation on the HWL cap. The implication made by the comment that vegetation on the HWL is inadequate is misleading and incorrect.

- c. The 2020 FYR identifies the LS/LF Building and shipments of LCS/LDS wastewater being shipped off site for treatment and disposal.
  - i. The 2020 FYR should identify the locations of the treatment/disposal facility.
  - ii. What are the transportation routes for these shipments?
  - iii. Are these “wastewaters” being regulated as hazardous wastes?

**Response:** Wastewater generated by the HWL is characterized as hazardous waste and is managed and disposed in accordance with all RCRA and DOT requirements. All treatment and disposal is accomplished at RCRA-permitted facilities with

EPA approval to receive waste from a CERCLA site. For the HWL and ELF, leachate is shipped to the Clean Harbors incineration facility in Kimball, Nebraska. The regulatory agencies oversee the management and disposal of all hazardous waste generated at RMA. The location of the treatment facility and transportation routes are not necessary to evaluate the protectiveness of the remedy and are therefore not included in the FYRR.

- d. The 2020 FYR states, “the HWL LCS liner system appear (emphasis added) to be intact.” The 2020 FYR also states “Typically, the detections are attributed to contaminants in the LCS clay liner material rather than indications of leaks in the liner system.”
  - i. The 2020 FYR should include what analytes (and concentrations) were detected in the clay liner prior to installation.
  - ii. It should make definitive conclusions why contaminants were detected in the LDS.

**“As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** RMA contaminants were not detected in the clay liner material prior to landfill construction. Section 6.3.6.1 of the FYRR states “The soil used to construct the compacted clay liners of the HWL contained low levels of RMA contaminants that only became detectable after they were mobilized in water and analyzed using a method that had a much lower MRL than what can be achieved in soil analyses.” The LDS data are reviewed in conjunction with the groundwater monitoring data and the calculated Action Leakage Rate to determine whether the landfill is leaking. None of the LDS analytical results or evaluations have indicated potential leaks in the landfill liner systems and low-level contamination within the clay liner material is the most likely source of the extremely low detections of contaminants in the LDS leachate.

#### **Comment 54. Section 6.3.6.2 Enhanced Hazardous Waste Landfill Monitoring**

##### **SSAB comments:**

- a. Many of the vegetation and erosion concerns on the ELF are similar to the HWL (see SSAB comments above).

**Response:** There are presently no concerns regarding the vegetation and erosion on the ELF cap. Routine inspections and prudent maintenance activities have preserved the integrity of the soil cap and improved the quality of the vegetation on the ELF cap.

- b. Table 6.3-37 should identify the locations of the sumps beneath the ELF. Including the statement that “detections are attributed to contaminants in the LCS clay liner material rather than indications of leaks in the liner system.”

**Response:** A description of the ELF sump arrangement is provided under the Wastewater Management heading in Section 6.3.6.2. The requested statement regarding the potential source of contaminants is provided in the paragraph immediately following Table 6.3-37.

- c. The 2020 FYR should provide the locations of lysimeters 04 and 014. It should include the “recommended path forward” for the excess percolation in these lysimeters.

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** Lysimeters 004 and 014 are associated with the Integrated Cover System, not the ELF, and assessment of these lysimeters is discussed in Section 6.3.6.3 as part of the Integrated Cover System evaluation. The lysimeter assessments did not find any evidence that the areas over the lysimeters require additional maintenance or further investigation, or that the cover in general is not performing as designed. The recommended paths forward for Lysimeter 004 and Lysimeter 014 have been added to Section 6.3.6.3.

**Comment 55. Section 6.3.6.4 Basin F RCRA-Equivalent Cover Monitoring** The 2020 FYR provides three conditions which are not being met: percolation, cover thickness, and vegetation. It states that each of these conditions has been resolved. These conclusions are based on additional measurements provided after these conditions were identified.

**SSAB comments:**

- a. The 2020 FYR should provide a list of the improvements that were done to make these conditions acceptable to regulatory agencies, including the dates of completion.

**Response:** The Basin F RCRA-Equivalent Cover has been in compliance with the performance standards since the initial post-closure compliance determination was made in April of 2016. Improvements have not been necessary. The third paragraph of Section 6.3.6.4 will be revised to clarify that cover performance is evaluated against the three standards (e.g., percolation, cover thickness, and vegetation) to determine the compliance status.

- b. The 2020 FYR should identify how the burrowing owls and black-footed ferrets were “eliminated” and the dates of such eliminations.

**“As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** The text has been revised to clarify that the prairie dogs were eliminated, not the burrowing owls and black-footed ferrets. The means by which the prairie dog population was controlled on the Basin F RCRA-Equivalent Cover are not germane to the question of remedy protectiveness. The Army has a responsibility to remove burrowing animals that create holes in the cover soil greater than three inches in diameter. Several methods have been used to remove prairie dogs from the cover depending on the circumstances surrounding the cover damage. As stated in Section 6.3.6.4 of the 2020

FYRR, the Army coordinated with the USFWS to minimize impacts to other species that share habitat with the prairie dogs, including burrowing owls and black-footed ferrets. Most of the prairie dog control activities were performed after the burrowing owls migrated away from the site, and the USFWS was given time to trap and relocate black-footed ferrets before control measures were implemented.

## **Section 7**

**Comment 56. Section 7.1.1 On Post Soil Remedies Under Construction** The 2020 FYR states routine percolation monitoring, vegetation assessments, and cover maintenance activities are “expected to be protective and performance standards will likely be met.”

### **SSAB comments:**

- a. It appears these ongoing projects may not be protective and/or capable of meeting performance standards. When and how will the results of these critical requirements be published for public comment?

**Response:** Monitoring data during the interim O&M period for the covers demonstrates that all performance standards are being met. The statement about future expected protectiveness is not appropriate for this section of the FYR and has been removed. The protectiveness statements are included in Section 10. Future Five-Year Reviews, which will continue to be provided for public comment, will continue to provide assessment of cover performance.

- b. Does CDPHE have overall RCRA regulatory authority at RMA, including when the O&M period moves into Operational and Functional (O&F)?

**Response:** Operational and Functional is a CERCLA designation and will be determined by EPA with concurrence from CDPHE.

- c. Approximately when will the draft CCR – Part 2 be available for public review?
  - i. What performance data will be included in this report?
  - ii. Why has it been a year for EPA to support the O&F determination?

**“As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** Public review of Construction Completion Reports (CCRs) is not required prior to approval by the EPA. The CCR includes a summarization of all cover performance data from the interim O&M period. Although the Army coordinates closely with EPA for submittal of these documents, the Army does not have control over the EPA’s document review schedule. The Army and the EPA are working through funding issues associated with RMA project oversight. Once those funding issues have been resolved, the review

and approval of certain documents, including the CCRs and Biomonitoring Report, will resume

**Comment 57. Section 7.1.1.2 Shell Disposal Trenches RCRA-Equivalent Cover Interim Operations and Maintenance** The 2020 FYR states, “Once enough performance data are collected and corrective measures performed on the cover is validated...”

**SSAB comments:**

- a. What corrective measures are ongoing at the Shell Trenches?
- b. Approximately when will the draft CCR – Part 2 for the Shell Trenches be available for public review?

**Response:** Corrective measures at the Shell Disposal Trenches RCRA-Equivalent Cover were completed in August of 2020. The corrective measures are summarized in Table 5.2-1 of the 2020 FYRR. Public review of Construction Completion Reports is not required prior to approval by the EPA.

**Comment 58. Section 7.1.2.1 – Shell Disposal Trenches Slurry Walls** The 2020 FYR states, “The report concluded that Bore 3453 may not be an appropriate location to evaluate groundwater/disposal trench interaction as it is uncertain that disposal trenches extended to the area of Bore 3453.”

**SSAB comments:**

- a. It’s unclear why there’s uncertainty as to locations of Shell’s trenches.
- b. Was the RI insufficient to define all trench locations?
- c. Does it remain questionable where additional, unidentified Shell trenches extend?
- d. Did the Army’s investigation of the SW portion look for the boundaries of other Shell Trench boundaries?

**“As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** Locations of the disposal trenches were mapped during the RI using a combination of historical information, geophysical survey and soil sampling results. In general, there is relatively low uncertainty in the location of the disposal trenches, but depth information, which cannot be discerned from the geophysical data, has more uncertainty. Detailed evaluation of the site information revealed that the performance goal selected at Bore 3453 was likely not appropriate as there was no evidence of a trench present in that location. However, rather than eliminate the goal outright, an investigation was conducted to determine the bottom elevation of a known trench in that area of the disposal site. The quality of the existing information was substantiated when the targeted trench was identified in the location depicted in the RI information. The investigation was focused on identifying the trench bottom elevation in the SW portion of the Shell Trenches to replace borehole 3453 as a performance goal. Additional investigation to look for boundaries of other Shell

trenches was unnecessary and would have resulted in additional disturbance of the cover.

**Comment 59. Section 7.1.2.3 Bedrock Ridge Extraction System** The 2020 FYR states, “Analytes 1,2 DCLE and trichloroethylene in downgradient performance well 36566 show increasing concentration trends.”

- a. The remedy at the Bedrock Ridge Extraction System cannot be considered “protective” when the report clearly identifies CRSG exceedances of RMA wastes in a downgradient performance well.
- b. The definition of protectiveness includes the environment, not just human health. Why does 2020 FYR omit the evaluation of the protectiveness of the environment?
- c. Depending on capture of contamination at the NBCS should not be the goal of a protective remedy. It calls into question why there are any on-post treatment systems if capture of contamination and “protectiveness” are reliant upon extraction and treatment at the RMA’s boundary.
- e. When will there be a corrective action that is available for public comment on how the Army plans to remedy this violation of the On-Post ROD?

**SSAB Comments: As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** The FYRR evaluates overall protectiveness of human health and the environment. The selected remedies presented in the On-Post and Off-Post RODs, determined to be protective of human health and the environment in accordance with CERCLA, were designed to eliminate exposure pathways for human and wildlife receptors and minimize further migration of contaminants to groundwater. The presence of contamination in groundwater does not itself render the remedy unprotective, as continued extraction and treatment of contaminated groundwater is a significant component of the selected remedy and there is no completed exposure pathway to groundwater.

For on-post groundwater treatment systems, including BRES, the RAO outlined in the ROD requires groundwater extraction and treatment that establishes hydrologic conditions consistent with the soil remedy and provides long-term improvement in the performance of the boundary treatment systems. The BRES continues to meet the ROD RAO as evidenced by significantly lower concentrations of contaminants in groundwater downgradient of the system compared to upgradient.

Nevertheless, system evaluations are conducted when remedy components do not meet performance criteria detailed in O&M plans. In this case, concentrations of several contaminants exhibit increasing trends, which does not meet the performance goal of a stable or decreasing trend. Evaluation of BRES performance is in progress, including the installation of two new groundwater monitoring wells.

Additional groundwater data collection for both new and existing wells is planned through the end of FY21. Monitoring data will be reviewed with the regulatory agencies to determine appropriate actions.

**Comment 60. Section 7.1.2.5 – Section 36 Lime Basins Slurry/Barrier Wall** The 2020 FYR states, “The Lime Basins dewatering system is functioning as intended...” Then states, “...the inward gradient goal will not be achieved by this date the date (sic) for meeting the inward gradient performance goal cannot be reliably projected” However, a new goal of September 2024 was established to track progress towards meeting the goal.”

**SSAB comments:** The 2020 FYR identifies a problem with the Lime Basins dewatering system. Explain how the Army considers this to be “functioning as intended.”

**As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** The Lime Basins dewatering system continues to function as designed and groundwater levels inside the slurry wall show a consistent decline due to operation of the system. Although the inward gradient goal has not yet been achieved on the northern side, there is continued progress toward meeting the goal. The projected time frame is dependent not only on the dewatering inside the slurry wall but also on the groundwater levels outside the slurry wall, which are subject to regional groundwater level fluctuations. As long as the dewatering system continues to result in decreasing groundwater levels inside the slurry wall, and the groundwater elevation continues to be below the bottom of the waste elevation, the remedy is functioning as intended.

**Comment 61. Section 7.1.2.8 Basin A Neck System** The 2020 FYR states, “The BANS met the 75 percent mass removal criterion throughout the FYR period.”

**SSAB comments:**

- a. Was the 75% mass removal criteria for the Basin A Neck System identified in the On-Post ROD?

**Response:** The mass removal goal of 75% was developed in consultation with the regulatory agencies as a performance goal to evaluate system performance against the ROD remedial action objective.

- b. The 2020 FYR states, “The BANS is operating as intended...” The 2020 FYR previously stated, “Concentrations of most analytes (except dieldrin, PPDDT, 12 DCLE and CPMSO2), are below CSGG/PQL in the downgradient performance wells.”
  - a. Were these exceedances intended in the in the On-Post ROD?
  - b. What are the dimensions of these plumes?
  - c. What corrective action will be implemented to resolve these exceedances?

**“As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** For BANS, the performance criteria include stable or decreasing concentrations in downgradient performance wells. Although concentrations of several contaminants were detected above their respective CSRGs, none showed increasing concentrations. The performance requirements were met, and the detections do not represent a failure of the BANS system.

**Comment 62. Section 7.1.2.9 – Northwest Boundary Containment System** The 2020 FYR states, “...the NWBCS is functioning as intended...” It also states that effluent concentrations for all contaminants were below their respective CSRGs except dieldrin and NDMA. The Army then relied on the effluent meeting the “four-quarter moving averages.” The 2020 FYR also states, “Although dieldrin was detected above the PQL in Original System and Northeast Extension downgradient performance wells, the performance criteria were met because the long-term trend is not increasing in downgradient performance wells.” The 2020 FYR also states, “...dieldrin concentrations above the PQL in downgradient performance wells is an early indicator of potential remedy failure...” The 2020 FYR then states the exceedances “appear to be unrelated to system performance.”

**SSAB comments:** Does the Army consider the NWBCS to be functioning “as intended” with RMA contaminants exceeding CSRGs downgradient and off-post, and based on trends of dieldrin not increasing?

**“As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** Based on the ROD RAOs and performance criteria developed in the LTMP, the NWBCS is functioning as intended. Effluent concentrations met the four-quarter moving averages for compliance throughout the five-year review period for all CSRG analytes, including dieldrin. System performance criteria were also met throughout the FYR period. A reverse hydraulic gradient was maintained within the system and plume capture was evident based on review of groundwater level data. Concentrations of contaminants in downgradient performance wells did not exhibit increasing trends. Although the system compliance and performance evaluation criteria were met, the Army identified the continued downgradient concentrations of dieldrin above the PQL as a potential problem requiring further evaluation; however, the comment misquotes the FYRR as there is no indication of remedy failure.

**Comment 63. 7.1.5.1 Site-Wide Biomonitoring**

**SSAB comments:**

- a. The 2020 FYR should include a location map along with the results of the starling collection. This data needs to be included by the Army’s BMP in defining RMA impacts on biota. How were the starling results used in defining soil sample locations?

**Response:** Tissue sampling was completed during the previous FYR period and the results were presented in the 2015 FYRR and the *Data Summary Report Long-Term Biomonitoring Program*, November 2016. Tissue data for

both the kestrels and starlings were reviewed to determine the areas required for soil sampling. However, the sample results for the starlings were overwhelmingly below the maximum allowable tissue concentration (MATC) (only one sample out of 888 starling samples exceeded the MATC). Therefore, the soil sample area was defined by the kestrel nest box locations where dieldrin concentration in eggs exceeded the NOAEC.

- b. The 2020 FYR states soil samples were conducted in the area where limited kestrel results indicated potential exposure. The 2020 FYR should provide the locations and concentrations of the limited kestrel results.

**Response:** Locations of the kestrel nest boxes are shown on Figure 6.3-78 with an indication of those locations requiring additional monitoring due to dieldrin detections in eggs. Details related to the egg sampling were provided in the 2015 FYRR since all tissue sampling was completed during that FYR period.

- c. What toxicology studies were used to develop the “selected screening criteria of 110 ug/g” for sampled soil? Was this agreed to by all regulators? This information should be included in the 2020 FYR.

**“As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** The screening level used is the EPA Ecological Soil Screening Level (Eco-SSL) developed for an avian carnivore, which is representative for the American Kestrel. Eco-SSLs are soil screening concentrations derived to represent levels that are protective of ecological receptors that consume biota that live in or on the soil. The Eco-SSL includes both soil and food ingestion and accounts for biomagnification of contaminants in the food source. Selection of the Eco-SSL for the BMP was discussed with and approved by the regulatory agencies.

**Comment 64. Site-Wide Surface Monitoring** The 2020 FYR states that exposed surface soil from the Shell Plants cover and landfill caps did not impact biota at Lake Ladora and Borrow Area 5.

**SSAB comments:**

- a. It was assumed that soils used for RMA covers and caps were clean fill material.
  - i. What sampling has been performed to define contamination on Shell Plant’s cover and caps?
  - ii. Were contaminated soils used on all RMA caps and covers?

**Response:** Uncontaminated soil was used to construct the Shell (South) Plants cover, and no concerns have been identified in soil or surface water sampling results to warrant additional sampling of the soil cover. The statement in the FYRR

refers to exposed soil underlying the cover that could have impacted surface water quality prior to completion of the cover.

- b. The 2020 FYR should explain the statement “Based on local topography, contaminants at this location (North Plants) do not have the potential to migrate to downstream receptors off-post and exceed the remediation goals in off-post surface water.”

**Response:** The text has been revised to provide clarification on the nature of the topography in the North Plants area as not allowing surface water to flow from the site to downstream receptors. At the time of sampling, the North Plants sample location was a localized surface depression and point of surface water accumulation during high precipitation events where the topography restricted surface water flow outside of the area.

- i. FYR 2020 should describe why surface water in the North Plants that exceeds aquatic life standards remains on RMA.

**Response:** As previously stated, the surface water at the North plants area is ephemeral in nature and is not continuously present under normal precipitation conditions.

- ii. Are these surface water concentrations harmful to other RMA biota through absorption and/or consumption?

**Response:** As required under the approved Sampling and Analysis Plan, surface water sample results were only compared to aquatic life criteria, and the effects on terrestrial biota were not assessed under this monitoring program. A previous assessment by the Biological Advisory Subcommittee evaluated aquatic pathways including a food web with dietary pathways for both aquatic and terrestrial organisms. This assessment did not identify an unacceptable risk for any species due to exposure to surface water (*Assessment of Residual Ecological Risk and Risk Management Recommendations Part 2: Aquatic Pathways and Receptors*, BAS 2003).

- c. The 2020 FYR should explain what is meant by off-post surface water being “consistent with the historical trend in arsenic within First Creek.”

- i. When did this historical trend begin?

**Response:** Historical data for arsenic in First Creek covers the time period of June 1988, when initial First Creek samples were collected, up to the most recent sampling. Historical trend analysis is conducted using all sample results to evaluate how current data compare to the trend of all data.

- ii. Did this historical trend first appear prior to RMA contamination migrating into First Creek?

**Response:** There currently is no operational evidence or analytical data indicating that First Creek was contaminated with arsenic from an RMA source. Based on statistical trend analysis of all surface water samples collected from First Creek as it enters RMA (SW08003) and again as it exits RMA (SW24004), arsenic concentrations have decreased since monitoring began in 1988. The highest concentrations of arsenic have been detected outside of RMA in First Creek at Highway 2, the furthest location downgradient from the site. Concentrations of arsenic in surface water samples upgradient of this location (and closer to RMA boundary) are consistently lower than this surface water location.

- iii. What background data and analysis were used to reach the conclusion that arsenic in First Creek is naturally occurring?

**Response:** The lack of variability in arsenic concentrations as demonstrated by statistically decreasing trends in data for SW08003 (background) and SW24004 implies there is little, or no, contribution of anthropogenic arsenic into First Creek surface water as it flows through RMA. The highest concentrations of arsenic in First Creek occur off post and further downgradient, where contributions to surface water cannot solely be attributed to RMA.

- d. The 2020 FYR states, “With the continuing removal of organic contamination from the groundwater in the area, concentrations of the suite of organic constituents in surface water at off-post station SW37001 are expected to decrease.” What organic contaminants exist in off-post SW37001?
  - i. What data/calculations and analysis were used to conclude these organic constituents “are expected to decrease”?
  - ii. Are they currently decreasing? If so, based on what data?
  - iii. When are they estimated to completely dissipate?

**“As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** Organic contaminants—including organochlorine pesticides, dicyclopentadiene, and diisopropyl methylphosphonate—have been detected more frequently and at higher concentrations in the samples collected at SW37001 downgradient of RMA, compared to SW24004, which is located at the RMA boundary. Over the past several years the flow in First Creek has increased and ponding of surface water has occurred across the First Creek System area where data indicate surface water is in contact with

contaminated groundwater based on the similarity in water quality and presence of organic contaminants in both.

Based on review of analytical data for surface water and groundwater, the number of organic analytes detected and their concentrations have decreased significantly over the past 10 years. Review of treatment system effectiveness for the First Creek System shows the performance criterion for contaminant mass removal (75%) continues to be met while groundwater concentrations (and associated mass) have been decreasing.

The time frame for when RMA contaminant concentrations will no longer exceed CSRGs cannot be accurately forecast due to the complexity of the hydrogeologic system and the dynamic interaction between groundwater and surface water. Also complicating this evaluation is the retention of specific contaminants (e.g., organochlorine pesticides like dieldrin) in groundwater.

The text has been revised to provide clarity regarding the presence of organic contaminants in surface water at location SW37001 relative to groundwater within the First Creek System area.

**Comment 65. Section 7.1.5.3 Site Wide Groundwater Monitoring** The 2020 FYR describes increasing statistical trends of numerous groundwater contaminants at numerous RMA sites including Basin F and Basin A.

**SSAB comments: “As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

- a. Why do each of these increases exist?

**Response:** Some contaminants exhibit an increasing concentration trend because of additional contributions from the unsaturated zone when groundwater elevations rise, resulting in mobilization of pre-existing contamination.

- b. Why do you conclude that these increases do not represent changes in site conditions that affect remedy performance and/or remedy failure?

**Response:** There is no indication that remedy failure has occurred as a result of increasing concentrations of groundwater contaminants. As described in the response to the previous comment, increasing concentrations correlate with fluctuations in the water table. Performance monitoring of the systems comprising the groundwater remedy have demonstrated that the boundary containment systems are functioning as intended. Relative to the performance of soil caps and covers, operational monitoring shows that these components of the remedy are functioning as intended, maintaining structural integrity and limiting infiltration as observed during required inspections.

- c. These increases could be due to remedy failure of Basin F and Basin A caps and/or covers. What have you done to determine if there is remedy failure of the caps and covers at Basin F, Basin A?

**Response:** There is no indication that remedy failure has occurred related to the soil caps and covers constructed over former Basins A and F. Relative to the performance of soil caps and covers, operational monitoring shows that these components of the remedy are functioning as intended, maintaining structural integrity and limiting infiltration as observed during regularly-scheduled inspections.

- d. What contingencies and/or corrective actions are being considered if these increasing trends continue?

**Response:** In the event increasing trends continue that cannot be attributed to the current understanding of groundwater mechanisms, the Army will engage the regulatory agencies in the consultative process as prescribed by governing plans (e.g., LTMP, post-closure plans, treatment plant O&M plans). As demonstrated by recent efforts following the consultative process, the Army will propose a path forward to investigate and will resolve the issue in cooperation with the regulatory agencies.

- e. What groundwater modeling or other hydrogeologic considerations have been evaluated to better understand why dieldrin has been detected for the first time (or in 25 years) in the confined flow system (CFS) beneath basin F?

**Response:** Dieldrin has only recently been detected in the CFS as observed during the FY19 CFS monitoring program. As required by the LTMP, the Army followed the consultative process and notified the regulatory agencies. As presented in Section 9.1 of the report, recommended actions include downhole camera inspection of the CFS wells to evaluate for potential damage that might allow migration from the UFS to the CFS, water quality sampling for paired UFS wells, increased monitoring frequency, and evaluation of the existing well network to determine if additional monitoring points are necessary. At this time, a formal investigation plan to evaluate dieldrin in the CFS is in the development stage, and the Army anticipates investigative work will take place in FY22.

- f. The 2020 FYR states the four wells “should” be evaluated to determine the source of CFS contamination.

- i. How long has the Army known or believed that the four wells should be evaluated?
- ii. Why haven't the four wells been evaluated at this point?
- iii. What is the estimated date for evaluation of these four wells?

- iv. What is the process, groundwater modeling, or other hydraulic considerations that will be used in this evaluation?
- v. This evaluation should be an Army priority since it may be due to remedy failure of the Basin F liner.

**Response:** As described in Section 7.1.5.3, in FY19 dieldrin was detected in three CFS wells, all downgradient of former Basin F, for the first time and in well 26153 for the first time in more than 25 years. The text has been revised to provide clarification on the timeframe in which dieldrin was detected in the CFS.

Since the dieldrin contamination detected in these CFS wells is a relatively recent observation, the Army is in the initial stages of planning an evaluation of these wells with a focused effort to begin in FY22.

With planning in the initial stage, a specific technical approach has not been developed for the investigation of dieldrin the CFS wells. Communications between the Army and the regulatory agencies will continue as the investigative approach is developed and a plan is provided for regulatory review and approval. To support planning, all available data will be utilized to understand current conditions and identify data needs for the investigation.

There is no indication of remedy failure related to the Basin F liner because a liner was not installed as part of the remedy for the site. The Basin F remedy included the construction of an engineered soil cover designed to minimize infiltration downward toward the water table. Since the remedy was implemented, required maintenance—including detailed inspections of the cover—has been conducted, and there is no indication of a lack of integrity in the soil cover that could cause remedy failure.

**Comment 66. Section 7.1.5.4 Land Use Controls (LUCs)** The 2020 FYE states, “...the LUCP incorporates controls for other specific areas, including additional ICs for the previously excavated lake sediments.”

**SSAB comments:**

- a. There is little or no discussion in the 2020 FYR regarding the excavated lake sediments.
  - i. Please describe the locations these sediments and concentrations of RMA contaminants in the sediments.
  - ii. Describe what actions will be done to remove the contaminates of protect human health and the environment from any threat by this contamination.

**Response:** The buried lake sediments site (SSA-3b) was remediated in accordance with the ROD. Remedy included excavation of soil with concentrations of contaminants exceeding the ROD remedy criteria and backfill of the site with clean soil. However, because soil with lower levels of contamination was left

in place, the LUCP includes controls to prevent inadvertent exposure to the buried contamination. There is no complete exposure pathway to the remaining soil and no further action is planned.

- b. The 2020 FYR states that LUCs have effectively protected individuals from exposure to unacceptable levels of risk.
  - i. Are these individuals members of the public, RMA contractors or both?
  - ii. Do RMA contractors continue to receive hazardous waste training at the site?

**Response:** The existing LUCs have effectively prevented exposure for all potential receptors including on-site workers and visitors. All Army and Army contractor personnel receive annual hazardous waste training.

- c. Does the Department of Interior support USFWS's attempt to change RMA's LUCs regarding consumption of RMA bison?
  - i. Are the USFWS and DOI prepared to re-open the On-Post ROD to make the LUC modification?
  - ii. Will all aspects of the process of re-opening the ROD be opened to public comment?

**Response:** USFWS conducts bison herd management on the Refuge, consistent with the Department of Interior Bison Conservation Initiative. For more detail about the 2020 initiative please refer to <https://www.nps.gov/articles/000/bison-conservation-initiative.htm>. Any change requested by the USFWS to the LUCs currently required by the ROD will be coordinated with the regulatory agencies and will follow the required CERCLA process.

- d. The 2020 FYR should include the bison sampling program report.
  - i. Was/is this report available for public comment?
  - ii. What is the status to the reporting requirements and risk evaluation needs?
  - iii. The SSAB requests public review and comment on all aspects of these critical issues regarding the proposed consumption of RMA bison and attempts to re-open the ROD.

**Response:** The USFWS completed two reports in May 2021 that discuss the completion of the bison tissue sampling program and evaluation of potential risk based on the potential consumption of muscle tissue. All tissue samples were non-detect for organochlorine pesticides. Although these reports were issued after the FYR period, the FYRR has been revised to update the discussion for clarity. Current USFWS policy does not include a management option that would provide bison for human consumption. However, if a ROD change were proposed, the USFWS and Army would coordinate with the regulatory agencies to determine those requirements. Changes that require modification of the RODs will include public participation as required by the NCP.

The EPA has declined to review the USFWS Data Summary Reports on bison and deer sampling (April 2021 and July 2021) due to pending funding issues and consistent with EPA Regional Administrator's Decision Document dated March 29, 2019. Further EPA has not approved the final Sampling and Analysis Plan for the bison tissue sampling

- e. The 2020 FYR is vague regarding Commerce City's proposal to violate and/or change LUCs.
  - i. Why hasn't this issue been resolved since it was addressed in the 2015 RMA FYR?
  - ii. Is Commerce City prepared to perform a risk assessment to justify and prove that a change to LUCs remains protective to human health and environment? This risk assessment must be available to public review and comment.

**Response:** There is no proposal from Commerce City that would violate the LUCs. Although the current PUD includes potential land uses that appear inconsistent with the existing restrictions, their planning documents recognize the existing restriction on residential use and clearly state that the restriction would need to be modified before residential construction could be accomplished. Although the Army maintains open communication with Commerce City, there is no known timetable for revision of the PUD or completion of a risk assessment. Completion of the risk assessment is required to follow the CERCLA process outlined in the NCP.

- f. Why would a modification to the LUCP resolve a violation of the FFA and ROD regarding past transfers of land outside federal control? How was this violation resolved?

**“As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** Documentation associated with the transfer was provided to the regulatory agencies and was determined to be sufficient, resolving the issue. There were no modifications to the LUCP related to this issue.

**Comment 67. Section 7.1.6.2 Secondary Basins Remediation Part 3, Basin C Supplemental Soil Excavation Project** The 2020 FYE states, “...the Basin C Supplemental Excavation Project has been completed.

**SSAB comments:**

- a. The 2020 FYR cannot, as was done previously throughout the 2020 FYR, simply reference a Navarro document instead of describing actual details of an issue.
- b. The 2020 FYR should describe in detail the investigation and remediation of Basin C soils.

**Response:** Section 7.1.6.2 references the project completion report; however, a more detailed project description is provided earlier in the FYRR in Section 4.2.3.2. A cross-reference to this section has been added to this section.

**Comment 68. Section 7.1.7 Cost**

**SSAB comment:** Has the Army estimated the overall cost, including the yearly costs, to maintain groundwater treatment systems, caps, covers, groundwater monitoring etc. in perpetuity?

**Response:** As discussed in Section 7.1.7, the current cost estimate for remedy operations and maintenance over the next 30 years is \$275 million. Annual reports provide details on annual operating costs for each system.

**Comment 69. Section 7.2.1.1 Changes to Water Standards** The 2020 FYR provides that the 2020 CSRG for chloroform is 6.0 ug/L while the new or revised standard (CBSG) is 3.5 ug/L.

**SSAB comment:** Are the boundary systems meeting the chloroform ARAR of 3.5 ug/L?

**Response:** The change in the chloroform standard was first identified in the 2010 FYRR. Analysis of this revised standard revealed that there was no impact on protectiveness to maintain the original ROD ARAR of 6 µg/L. As shown on Table 7.2-1, the 2010 assessment of the revised standard remains valid. Although the revised standard has not been adopted as an ARAR, the NBCS, NWBCS and OGITS all show effluent concentrations below the current CBSG.

**Comment 70. Section 7.2.1.3 PQLs, Certified Reporting Limits and MRLs** - The 2020 FYR states that there was agreement with CDPHE in 2012 for an interim PQL for NDMA as twice the calculated PQL. In 2015 the PQL was replaced to 0.009 ug/L. The 2020 FYR states reporting limits have not changed significantly during the review period while Table 7.2.1 identifies the 2020 NDMA CSRG as 0.00069 ug/L.

**SSAB comment:** What is the CSRG value for NDMA treatment at the boundary systems and at all internal treatment systems?

**Response:** Table 7.2-1 presents the CSRGs and any changes based on new or revised standards identified during the FYR. For NDMA, the CSRG is set at the Colorado groundwater standard, which is unchanged at 0.00069 µg/L. However, analytical methods are not capable of detecting NDMA at that level in groundwater. In accordance with the RODs, when the CSRG is lower than the achievable analytical reporting limit, the Practical Quantitation Limit (PQL) is used as the compliance point. For NDMA, the current PQL is 0.009 µg/L.

**Comment 71. Section 7.2.5 Changes in Exposure Assessment Variables; Vapor Intrusion**

**SSAB comment:** 1,4-dioxane, NDMA, and NDPA exist in both On-Post and Off-Post groundwater, they should be included in the risk screening evaluation in regards to vapor intrusion.

**“As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** Emerging contaminants were reviewed to determine if contaminant properties or groundwater concentrations were sufficient to warrant re-evaluation of the previous assessment, completed in 2004. NDMA was not evaluated in the 2004 assessment and was also reviewed. Concentrations of 1,4-dioxane and NDMA in off-post wells are significantly below EPA screening levels, and NDPA is not considered volatile. As a result, no re-evaluation of the vapor intrusion pathway is necessary as it is not a viable exposure pathway for these contaminants at the levels detected. This information has been added to Section 7.2.5.

**Comment 72. Section 7.2.5 Changes in Exposure Assessment Variables; Emerging**

**Contaminants** The 2020 FYR states a feasibility study and risk assessment were performed for 1,4-dioxane, but were limited to “potential off-post exposure pathways.” The Army concluded that “remedial action for 1,4 dioxane in the off-post OU was not warranted.”

**SSAB comments:**

- a. The feasibility study should include groundwater treatment options for protection of the environment as required by CERCLA and the RMA RODs, and not merely risks to human health.

**Response:** Consistent with the RODs, remedial actions were evaluated to mitigate risk from completed exposure pathways to contaminated media. The only potentially complete exposure pathways for contaminated groundwater are for human exposure.

- b. The On-Post treatment systems should also meet CBSG for NDPA, not merely the boundary systems and the OGITS.

**Response:** The Remedial Action Objective for the on-post treatment systems requires remedial actions that provide long-term improvement in the performance of the boundary systems. As such, BANS is designed as a mass removal system to reduce the overall mass of contaminants moving downgradient to the boundary systems. Although the NDPA standard was not adopted for the BANS, influent and effluent monitoring demonstrates that the system is effective in removing NDPA from groundwater.

- c. The 2020 FYR states that Army and EPA guidance were used to determine whether PFOA/PFOS were present in RMA groundwater above the EPA health advisory level of 0.07 ug/L. There is no reference to either of these guidance documents and they should be included in the 2020 FYR.

**“As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** The guidance documents are included in the reference list in Section 12. Citations for these references have been added to Section 7.2.5.

### **Comment 73. Section 7.4 Technical Assessment Summary**

**SSAB comment:** The Section contradicts itself, the remedy is not “generally functioning as intended.” As stated throughout Section 7, groundwater contaminants continue to exceed state and/or federal standards with no clear corrective actions identified. These remedy failures have been identified for years with no resolution as to remediation of the violations of ARARs, the RODs, and CERCLA. The 2020 FYR states that emerging contaminants have been assessed and remediation goals and monitoring requirements have been incorporated where appropriate. The 2020 FYR does not include how remediation goals and monitoring requirements protect the environment, but instead merely human health. In conclusion, the current remedy is not protective in the short-term and long-term of human health and the environment.

**“As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** As discussed in the FYRR and responses preceding this comment, the review included evaluation of remedy components against ROD requirements and RAOs, remedial designs, and performance goals identified in long-term management plans. Although there were several issues identified that could affect future protectiveness and other findings not affecting protectiveness that warrant attention, the remedy is generally functioning as intended. Corrective measures have been developed and implemented in response to issues identified in the previous five-year reviews. Fourteen issues identified in the 2015 FYRR have been closed based on work performed over the past five years. For the other issues identified, additional evaluation is underway to provide information needed to determine if further actions are necessary.

## **Section 8**

### **Comment 74: Section 8 Issues**

**SSAB comment:** The Army references a portion of 2001 EPA to justify its determination of “Issues Identified and Effects on Current or Future Protectiveness” at RMA (Table 8.0.1). In the ten years since this guidance, numerous additional EPA guidance documents have been published to better characterize remedy protectiveness determinations.

It is evident in this Section that the Army misinterprets the 2001 guidance. The table merely identifies issues that currently prevent the response action from being protective; it fails to identify issues that may affect protectiveness in the future and/or early indicators of potential remedy failure.

Instead, the 2020 FYR inappropriately lists these future protectiveness issues in Section 9 “Recommendations and Follow-Up Actions” of the Review. Each of the SSAB’s comments in Section 9 are in response to remedial issues should be included in Section 8 because they clearly meet the 2001 EPA FYR guidance as they relate to future issues of protectiveness and/or early indicators of potential remedy failure.

**Response:** Although the EPA 2001 FYR guidance remains the primary guidance document for preparing FYRs, the Army does consider all EPA FYR guidance documents while performing each five-year review. One such update, the revised FYRR template issued in 2016, includes a separate section for Other Findings that are not tracked as FYR issues that affect current or future protectiveness. Issues identified in Section 8 include all issues that the Army has determined could affect future protectiveness, as indicated in the last column on Table 8.0-1.

## **Section 9**

### **Comment 75: Recommendations and Follow-Up Actions**

#### **SSAB comments:**

- a. Section 9.1 states the recommendations identified during the 2020 FYR “may improve remedy operations, management of O&M or completeness of the site file, but do not affect current and/or future protectiveness.” These “recommendations” are instead follow-up actions to resolve issues that may affect protectiveness in the future and/or early indicators of potential remedy failure.

**Response:** Consistent with the most recent EPA FYR guidance, Section 9.1, Other Findings, includes recommendations for concerns identified that do not affect protectiveness. Table 9.0-1 lists the recommendations for issue that could affect future protectiveness.

- b. Without EPA concurrence, the Biota Monitoring Program (BMP) remains an issue that may affect protectiveness in the future. Without EPA concurrence, the BMP may reveal that remaining RMA surface soils adversely impact RMA biota now and in the future.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** All efforts associated with the ROD-required BMP were coordinated with and approved by the EPA. Although the final monitoring report is awaiting EPA review, EPA has reviewed all data associated with the program and concurs that the sampling was completed as required with no exceedances of the appropriate evaluation criteria.

- c. The Bedrock Ridge Extraction System has identified three RMA organic contaminants downgradient of the system, an evident indication of potential remedy failure.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** The Army is working with the regulatory agencies to conduct an evaluation of the Bedrock Ridge Extraction System. The evaluation is currently ongoing, with data from existing wells and two new wells being collected on a semi-annual basis to gather sufficient data to make an informed decision regarding further response actions. See also response to comments 40 and 59.

- d. Basin F groundwater monitoring has identified a minimum of four increasing RMA contaminants downgradient of the basin. This issue has resulted in the Army evaluating Basin F groundwater data, the Basin F monitoring network, and statistical data evaluation. It is evident these studies are being done due to indicators of potential remedy problems, not to improve remedy operations, manage the O&M and/or completeness of the site. The Army needs to acknowledge this is a remedy failure and initiate corrective actions to remedy the failed response action.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** Evaluation of the Basin F groundwater monitoring data is ongoing. See also responses to comments 49 and 65.

- e. The identification of dieldrin in the confined flow system below Basin F has become a possible remedy failure.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** Evaluation of the confined flow system network and monitoring data is ongoing. See also responses to comments 45 and 65.

- f. Increasing chloride concentrations in Well 35083 (location unidentified) indicates potential remedy problems. The Army recommendation of further evaluation of chlorine in the vicinity would be evidence of a remedy protectiveness concern.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** Elevated chloride in this well is a localized occurrence and there is no indication of downgradient migration in other CFS wells. Although further evaluation is recommended, there is no impact to protectiveness.

- g. The USFWS’s desire to allow consumption of bison (or other animals from RMA, for that matter) is a clear violation of RMA’s LUCs.

**As per EPA Guidance, this remedy “currently prevents the response action from being protective or may do so in the future.”**

**Response:** There has been no violation of the restriction on game consumption at RMA. The USFWS is performing tissue studies and related risk assessments to determine if this restriction could be changed; however, current USFWS policy does not include a management option that would provide bison for human consumption. Any change to the ROD for this LUC will follow the required CERCLA process. See also responses to comments 25 and 66.

- h. The 2020 FYR identifies many issues concerning inadequate community involvement. While this may not directly impact remedy protectiveness, the SSAB agrees that without meaningful public input on remedial issues on RMA, there will be significant delays on implementation of important remedy decisions, an early indicator of remedy problems. Any updates, improvements, and/or communications with the community must be in coordination with the public and the RMA SSAB.

**“As per EPA Guidance this remedy is an “early indicator of remedy problems.”**

**Response:** As noted in the response to General Comment 1, the Army will evaluate its current community involvement plan to identify opportunities to expand ongoing community outreach and education. Any community involvement activities required under the CERCLA process as outlined in the NCP are included in remedy project plans and schedules.

#### **SSAB Conclusion:**

It is important for everyone to remember that the “clean-up” at RMA is designed to be minimally protective. The remedy is designed to protect the public to a level of 10 (-4). This means that after the RMA “clean-up” is complete, exposure to the contamination left at RMA will provide additional cancer risk to one in ten thousand people (this is in addition to the current cancer rates in the United States: one-in-two men will have cancer and one-in-three women will have cancer during their lifetimes). This is the minimum level of “clean-up” allowed by law and, at the time this remedy was selected, the standard level of “clean-up” was 10 (-6) or a one-in-one-million increase in the cancer risk.

The SSAB objected to a minimal “clean-up” at RMA, and has tried to be diligent in its oversight of the RMA “clean-up” precisely because a minimum “clean-up” demands that the assumptions underlying the remedies are valid, that the “clean-up” is designed and performed at the highest possible level, and that long-term monitoring is effective and the long-term remedy is protective of human health and the environment. If every step taken at RMA is as minimalized and compromised as the choice of the RMA remedies, the community surrounding and visiting the RMA will be harmed and the State of Colorado will pay a huge price to try to correct the problems.

Given the fact that the public has had to accept the presence of thousands of tons of contaminated soil being left at the RMA, and that over one-square mile of contaminated land has become a sacrifice zone, and that there is no quantification or cataloguing of the remaining contamination in throughout RMA, , the institutional controls that are used and will be used to

control contamination and protect the public must be absolute and fool-proof. That is nowhere near the case at RMA.

In our limited survey, we have been able to identify hundreds of land transfers in the Off-Post area that have NOT included the required notice of below-surface contamination emanating from the RMA. Deed restrictions are one of the only institutional controls used Off-Post and have been discussed many times with the public. The fact that there are no groundwater or CERCLA easements contained in thousands of sales documents shows that that the deed restrictions put in place by the Polluters are inadequate and not functioning as intended by the public.

All Off-Post contamination pathways have not been closed and the public has not been protected. We are aware of homeowner/developer struggles to acquire the so-called replacement water, provided in the ROD, at properties where existing wells continue to analyze “positive” for military contamination. In addition, we are aware of a landowner in the contaminated Off-Post area of RMA who was able to obtain a permit to drill a well, contrary to the “advertised” institutional controls required by the ROD.

This issue also raises the concerns about the inadequate number of sampling and monitoring wells, which are necessary to provide data to insure long-term protection. In order to protect the community and to ensure that there are no open pathways to the tons of contamination that have been left in place, the amount of information and data should be increasing over time, rather than decreasing. For all these reasons, the public cannot consider the assurances of protectiveness as adequate, let alone fool-proof.

**Response:** As stated in the responses to these SSAB comments on the 2005, 2010 and 2015 FYRRs, while the risk assessments and remediation strategies made use of  $10^{-4}$  and  $10^{-6}$  risk levels for decision-making, the remedy has been implemented in ways that have significantly lowered potential health risks even lower than ROD requirements.

The decision to contain waste on site was made in consultation with the community and regulatory agencies during numerous public meetings about the overall design of the remedy. During those meetings, the public reviewed several alternatives and preferred on-site containment over transporting waste through the community to another location.

As detailed in the Off-Post ROD, the remedial design includes two principal components to prevent human consumption of contaminated groundwater: alternative water supply for well owners located in the DIMP plume footprint, and off-post institutional controls. The primary institutional control is a notification placed in well permit applications in the vicinity of contaminated groundwater. The ROD did not require that notices be included for all land transfers in the off-post areas that overlie groundwater contamination.

The 2005 FYRR identified improvement of the notification process as an issue with specific recommendations for review of permits and the associated RMA-related notifications. These recommendations have been implemented successfully and were adopted in the final Land Use Control Plan. Monitoring of well permits issued in the

off-post area continues and is reported on an annual basis as part of land use control monitoring. There were 15 permits issued for new wells during this FYR period, and all permits carried the required notification language. The Army also worked with the State Engineer's Office to ensure that appropriate notification language was included on permits for replacement wells and permits for use of existing wells. The well notification program continues to function as intended.



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## **Colorado Chapter of Sierra Club Comments on 2020 Five Year Review of Rocky Mountain Arsenal**

Submitted by [REDACTED]

July 20, 2021

Please address all correspondence to: [REDACTED]  
[REDACTED]

Thank you for the opportunity for Sierra Club (SC) to submit comments on the 2020 RMA 5-year review (5YR). We have been active participants in RMA oversight since the early 90's with participation in the community engagement, Record of Decision (ROD), Medical Monitoring Plans and previous 5YR processes.

In preparation of this review, the 2016 5YR was examined and referred to in several places within this document. What was readily apparent from 5 years ago, as well as now, was persistent issues with the boundary containment system and the lack of protection to communities neighboring RMA. The premise of land use control (LUC) was then, as now, intended as a source of protection for RMA communities that local governments in conjunction with the RMA staff have begun to whittle away.

*Major issues raised in 2016 5YR comments:*

1. Dieldrin at Northwest Boundary Containment System;
2. Land Use Controls (LUC)

3. Metals in Surface Water;
4. 1,1,2,2Tetrachloroethane (TCLEA) at BANS;
5. Dieldrin Exceedance in Basin C;
6. Bedrock Ridge Extraction System (BRES) Performance; and
7. Incomplete Biomonitoring Program

While there have been many tasks completed over the course of the closure of RMA, the most difficult tasks remain. A review of the RMA Remedial Stat Project shows the completion of 4 projections over the last 5 years and 20 remaining projects. These 20 projects are the most onerous. Issues raised 5 years ago have not been resolved and in some cases have worsened (groundwater exceedances).

The protection of the communities surrounding RMA and the resident wildlife has always been the primary purpose of the oversight of the cleanup from regulatory and community groups. While it is notable that many projects are now closed, the ongoing remedies for the 20 remaining projects have not been adequate for the following items:

### 2020 5YR Issues Raised

- A) Community education/engagement
- B) Off-post monitoring of groundwater that has bypassed the containment systems
- C) Basin F Contamination
- D) LUCs
- E) Incomplete Biomonitoring Program (BMP)/Animal welfare

We will focus on these 5 items for comments. **We also would like to raise the possibility that additional funds may be available through the American Rescue Act of 2021 to expedite and supplement existing funds for remediation as a component of infrastructure improvements to the community. We would like to see this topic explored by the US Army.**

### **A. Community Engagement/Education**

During our decades of involvement in oversight of the “clean up at RMA”, local citizens were promised that documents regarding the remedy at RMA, regarding the monitoring of the remedy for protectiveness, and regarding all aspects of the long-term operations and maintenance would be available on the RMA website. It is necessary that everyone in the Denver-metro area (especially Commerce City, Denver, Aurora, and Brighton that

surround the RMA) ensure this remedy remains protective. Therefore, this process MUST be transparent and accessible to all. **Documents should be readily available online.**

Also new residents, including members of the Spanish-speaking community, and newly elected officials may be unaware of the historical significance of RMA and the legacy of pollution at the site as a former manufacturing and hazardous waste facility. Community members living north and northwest of the site have indicated they would like to better understand the groundwater remediation program and the progress being made toward achieving groundwater remediation goals. **Materials should be available in English and Spanish languages. Can you confirm if dual language materials are available?**

Lastly, at a recent Commerce City Council meeting, and a follow-up meeting with the RMA SSAB, information was presented by the Army indicating the current systems in place are maintaining protectiveness. The SC would counter that ongoing and new safety issues suggest the current remedies may not be maintaining protectiveness. We would like to see the method used to make this determination. **We ask for clarity of the methods used and accountability in how this determination was made.**

## **B) Off-post monitoring of groundwater that has bypassed the containment system**

In the 2016 5YR document we noted “Northwest Boundary system has exceedances of dieldrin. Allowing Dieldrin to by-pass the Northwest Boundary System and migrate contamination into the offpost groundwater, is not a protective remedy.

During this 5YR there is evidence of greater off-post contamination. Monitoring wells do not provide a thorough assessment of where the plumes reside. Groundwater mitigation is ineffective and additional remedies must be evaluated. From the provided maps, Figure 6.3-60 demonstrates the off-post groundwater plume of chloride, Figure 6.3-62 shows dieldrin, and Figure 6.3-63 showing fluoride exceedances and the flow of groundwater in perspective with the map of 2014. The plumes have moved slightly but still have maintained the width and breadth of contamination. At the Bedrock Ridge Extraction System rising concentrations of three contaminants (1,2-dichloroethane, tetrachloroethylene and trichloroethylene) have been observed in one downgradient performance monitoring well. The Army’s recommendation is to conduct additional

monitoring and evaluation of system performance. This has been the plan for over 10 years and it is ineffective. **The responsible parties must add wells to better characterize the contamination.**

The notes from the 6/24/20 site visit provide useful information as to the state of RMA. Several inspection reports indicate wells visited were unlocked and there was confusion as to the risk of dieldrin from confined or unconfined aquifers. Additional notes mentioned vandalism and shut-off of the NWB treatment system. **A review of safety measures should be conducted annually to prevent the system from being accessed and vandalized.**

Additionally a private drinking water monitored well (359A) detected diisopropylmethyl phosphonate (DIMP). While new well 359D was installed in November 2016, there are still DIMP detections in this well with concentrations exceeding the Colorado Basic Standards for Groundwater (CBSG). **Is this water used for irrigation? What supplemental water is provided to this property?**

The addition of the First Creek Treatment System indicates current methods are not adequate. A photograph of this system suggests it is a “Tough Shed” in design. There is not 4-sided security around the plant-this needs to be addressed as RMA opens up to visitors. Also it appears there are concerns with security of monitoring wells- locks/caps and bolts- **must be clearly marked and access restricted. Treatment Facility Manuals on inspection were 10 years old. Update and revise as needed.**

**Can the Army provide more information as to the integrity of the First Creek Treatment building to withstand high winds and security measures to protect the site? Besides monitoring these off-post exceedances, what is being done to capture them?**

### **C) Basin F Contamination**

The increasing concentrations in downgradient Basin F wells in both the Confined and Unconfined aquifers, and the lack of a comprehensive monitoring network, are an issue that 5YR documents must address and should resolve. Exceedances seen in the concentrations of contaminants in downgradient Basin F wells indicate ongoing groundwater contamination downgradient of the Basin F Principle Threat and Wastepile areas has potentially been affected.

This post-closure monitoring data are erratic with numerous exceedances for multiple contaminants. In response to the repeated Upper Prediction Limit (UPL) exceedances, and the continued presence of elevated/increasing concentrations of contaminants in downgradient wells, a change to the Basin F groundwater monitoring network is necessary to remain protective.

As noted by CDPHE: “Sampling of the current downgradient Basin F groundwater monitoring network has shown contamination in excess of background concentrations and, in some instances, at levels greater than pre-remedy concentrations.” It is not clear if these exceedances are responsible, in part, for the boundary exceedances at the NW Containment location. No improvements to the current system have been provided for review. The ongoing remediation efforts are not adequate and warrant new methodologies to reduce contamination of groundwater on the off-post unit. The need for a revision of the Basin F groundwater monitoring network is an issue that has the potential to affect current protectiveness and should be evaluated in further detail in this 5YR.

#### **D) Land Use Controls (LUCs)/Deed Restrictions**

The SC reaffirms the benefit of LUCs for the RMA off-post sites in neighboring communities and any future developments. New information from the Army with respect to the exceedances in groundwater Dieldrin north of the containment systems (Item D has more detail) highlights the ongoing and continued risk the neighborhoods. Inappropriate use of land must be controlled. Primary health hazards are related to vapor intrusion from groundwater into homes from basements and the consumption of produce home-grown in soil. Access to the locations with elevated COCs add an increased risk to children and young adults. **A thorough review of the acceptable uses of land must be conducted with local city governments on an annual basis.**

The Commerce City Prairie Gateway Planned Unit Development (PUD) appears to have the most communication with this entity. Although representatives from the U.S. Army coordinate regularly with representatives from Commerce City, the Prairie Gateway Planned Unit Development (PUD) still has allowable uses that conflict with the LUCs. Individual homeowners must be made aware of property/soil restrictions. While there are usually notifications for new build construction of land use restrictions, it is unknown with resales what the process is. **Is there a document that outlines these guidances?**

**RMA staff must work with the local governments to educate them of the land use restrictions and reaffirm the deed restrictions to protect the communities.**

### **E) Incomplete Biomonitoring Program (BMP)**

The 5YR states, “The purpose of the BMP is to help evaluate the efficacy of the remedy in accordance with the requirements of Section 9.7 of the ROD, i.e., that “monitoring activities for biota will continue by USFWS in support of evaluating the effectiveness of the selected remedy.” It also states, “Because kestrels are a valuable species and it was not desirable to continue to sacrifice birds, the kestrel study was suspended in February 2014.” The SC requests that to confirm the effectiveness of the remedy, the BMP not be abandoned and the final report be made available to the public. The On-Post ROD requires long-term biomonitoring as a component of the remedy. Soil sampling was conducted, and data summary reports were finalized, however, the Biomonitoring Completion Report, prepared by the Biological Advisory Subcommittee (BAS) is not complete. **When will this report be finalized and made available to the public?**

Map 6.3-78 shows the location of soil sampling in lieu of wildlife monitoring. This approach used a grid pattern evenly distributed across RMA. This in no way is representative of the hazardous waste areas where animals may receive the greatest exposure to pesticides and COCs. Because soil does not bioconcentrate chemicals as fatty tissue does in predator/apex species, it is an imperfect source for biomonitoring. We request that other RMA species with direct exposure to soils such as earthworms and/or or prairie dogs be tested if the kestrel collection is not possible. Since halting the BMP, new species have been added to the Arsenal including the Blackfooted ferret. **Has any fortuitous sampling been done with these ferrets? Has USFWS conducted an assessment of the health of this species?**

In the 5YR, the issue of consumption of bison has again been raised. The SC is on record opposing the introduction of bison to RMA. Part of our opposition was mismanagement risk of herd size. That now appears to be reality with a request for sale of bison meat to cull the herd. This is unacceptable to potential human health risks from a superfund site and goes against the original agreement for reintroduction of bison. **Any culling of the herd must not be at the expense of human health. What is the current USFW plan for bison on RMA?**

**We agree with EPA on the following noted comment: In Section 9.1, Page 144.** This section explains that the USFWS is pursuing a change to the restriction to allow consumption of bison from RMA, that the USFWS is in the process of collection of bison tissue, but that this is not a FYR issue because the existing restriction has not been violated. However, this was identified by the EPA as an issue in the 2015 FYR and it should continue to be identified as an issue because there is new information that requires the sampling, analysis, and risk assessment approach to be reevaluated. This new information includes the identification of receptors that are different than originally considered (e.g., children through a tribal school lunch program) and new information on the accumulation of methyl mercury in muscle tissue. **The bison sampling, analysis, and risk assessment program must be updated to effectively evaluate risk of consumption. We also would like to see agreement across all agencies and parties that bison will not be sold for consumption of meat by humans.**

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**U.S. Army Responses to  
Colorado Chapter of Sierra Club Comments on the  
Fifth Five-Year Review Report for  
Rocky Mountain Arsenal, Revision E, May 6, 2021**

Submitted by [REDACTED]

Thank you for the opportunity for Sierra Club (SC) to submit comments on the 2020 RMA 5-year review (5YR). We have been active participants in RMA oversight since the early 90's with participation in the community engagement, Record of Decision (ROD), Medical Monitoring Plans and previous 5YR processes.

In preparation of this review, the 2016 5YR was examined and referred to in several places within this document. What was readily apparent from 5 years ago, as well as now, was persistent issues with the boundary containment system and the lack of protection to communities neighboring RMA. The premise of land use control (LUC) was then, as now, intended as a source of protection for RMA communities that local governments in conjunction with the RMA staff have begun to whittle away.

*Major issues raised in 2016 5YR comments:*

1. Dieldrin at Northwest Boundary Containment System;
2. Land Use Controls (LUC)
3. Metals in Surface Water;
4. 1,1,2,2Tetrachloroethane (TCLEA) at BANS;
5. Dieldrin Exceedance in Basin C;
6. Bedrock Ridge Extraction System (BRES) Performance; and
7. Incomplete Biomonitoring Program

While there have been many tasks completed over the course of the closure of RMA, the most difficult tasks remain. A review of the RMA Remedial Stat Project shows the completion of 4 projections over the last 5 years and 20 remaining projects. These 20 projects are the most onerous. Issues raised 5 years ago have not been resolved and in some cases have worsened (groundwater exceedances).

The protection of the communities surrounding RMA and the resident wildlife has always been the primary purpose of the oversight of the cleanup from regulatory and community groups. While it is notable that many projects are now closed, the ongoing remedies for the 20 remaining projects have not been adequate for the following items:

2020 5YR Issues Raised

- A) Community education/engagement
- B) Off-post monitoring of groundwater that has bypassed the containment systems
- C) Basin F Contamination

D) LUCs

E) Incomplete Biomonitoring Program (BMP)/Animal welfare

**Comment:** We will focus on these 5 items for comments. **We also would like to raise the possibility that additional funds may be available through the American Rescue Act of 2021 to expedite and supplement existing funds for remediation as a component of infrastructure improvements to the community. We would like to see this topic explored by the US Army.**

**Response:** The Army recognizes the Sierra Club’s sustained commitment to providing input on the Rocky Mountain Arsenal remediation program. Responses to the list of issues described in the introduction are provided for the specific comments that follow. The Army receives sufficient funding for the operations and maintenance of the RMA remedy from Defense Environmental Restoration Program appropriations. The American Rescue Act of 2021 is not an authorized source of funding for Department of Defense remediation.

#### **A. Community Engagement/Education**

**Comment:** During our decades of involvement in oversight of the “clean up at RMA”, local citizens were promised that documents regarding the remedy at RMA, regarding the monitoring of the remedy for protectiveness, and regarding all aspects of the long-term operations and maintenance would be available on the RMA website. It is necessary that everyone in the Denver-metro area (especially Commerce City, Denver, Aurora, and Brighton that surround the RMA) ensure this remedy remains protective. Therefore, this process **MUST** be transparent and accessible to all. Documents should be readily available online.

Also new residents, including members of the Spanish-speaking community, and newly elected officials may be unaware of the historical significance of RMA and the legacy of pollution at the site as a former manufacturing and hazardous waste facility. Community members living north and northwest of the site have indicated they would like to better understand the groundwater remediation program and the progress being made toward achieving groundwater remediation goals. **Materials should be available in English and Spanish languages. Can you confirm if dual language materials are available?**

**Response:** The Army has expanded the online library of documents since the 2015 Five-Year Review (published September 2016). The website currently includes most of the primary governing documents, site-wide remedy design and completion reports, operational and maintenance plans, Five-Year Review reports and annual monitoring reports. It also includes announcements and fact sheets about projects or issues of particular interest to the community. Based on the community interviews conducted during the 2020 Five-Year Review, we are evaluating our site navigation and organization to determine if those can be improved to make it easier for community members to find the documents they seek. We will also continue to expand and update the online library as needed.

The Army agrees with your comments regarding additional community involvement opportunities in the surrounding communities and will assess future outreach strategies as part of its evaluation of its community involvement program. Most community members who were interviewed during the Five-Year Review process indicated they knew about the history and cleanup of RMA and had confidence in the operation and maintenance of the site. They reported that they appreciated the information they received and had opportunities to obtain updates or ask questions. They indicated, however, that newly elected officials and newly relocated residents would benefit from additional outreach.

During the 2020 Five-Year Review, the Army, in partnership with the regulatory agencies, included more interviews with representatives of the Spanish-speaking community in the community interview process. Currently, the Army provides periodic remedy updates to the Commerce City Council, which can be viewed with Spanish-language translation, and has had bilingual staff contact local residents prior to the start of projects in their area. The Army has also translated an overview of the history, Superfund designation, environmental cleanup and transition of the site for Spanish-speaking residents, as well as fact sheets about the Five-Year Review and perfluorinated compounds. The Army is assessing additional translation needs as part of its evaluation of its community involvement program.

**Comment:** Lastly, at a recent Commerce City Council meeting, and a follow-up meeting with the RMA SSAB, information was presented by the Army indicating the current systems in place are maintaining protectiveness. The SC would counter that ongoing and new safety issues suggest the current remedies may not be maintaining protectiveness. We would like to see the method used to make this determination. **We ask for clarity of the method used and accountability in how this determination was made.**

**Response:** Evaluation of the remedy and protectiveness determinations were made consistent with EPA FYR guidance. The process is described in detail in Section 7 of the FYRR and seeks to answer three questions:

- Is the remedy functioning as intended by the decision documents?
- Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy selection still valid?
- Has any other information come to light that could call into question the protectiveness of the remedy?

Throughout the FYR period, monitoring data and other information is collected to support the five-year review. This information, provided in Section 6 of the FYRR, is used to evaluate remedy performance with respect to cleanup levels and assess operation of the remedy components against ROD requirements and RAOs, remedial designs, and performance goals identified in long-term management plans.

Both EPA and CDPHE continue to provide a high level of oversight for the remedy, and the Army continues to consult with the regulatory agencies to identify remedy issues and necessary actions to maintain protectiveness. The Army remains

committed to maintaining the integrity of all remedy components to ensure continued protection of human health and the environment.

## **B. Off-post monitoring of groundwater that has bypassed the containment system**

**Comment:** In the 2016 5YR document we noted “Northwest Boundary system has exceedances of dieldrin. Allowing Dieldrin to by-pass the Northwest Boundary System and migrate contamination into the offpost groundwater, is not a protective remedy.

During this 5YR there is evidence of greater off-post contamination. Monitoring wells do not provide a thorough assessment of where the plumes reside. Groundwater mitigation is ineffective and additional remedies must be evaluated. From the provided maps, Figure 6.3-60 demonstrates the off-post groundwater plume of chloride, Figure 6.3-62 shows dieldrin, and Figure 6.3-63 showing fluoride exceedances and the flow of groundwater in perspective with the map of 2014. The plumes have moved slightly but still have maintained the width and breadth of contamination. At the Bedrock Ridge Extraction System rising concentrations of three contaminants (1,2-dichloroethane, tetrachloroethylene and trichloroethylene) have been observed in one downgradient performance monitoring well. The Army’s recommendation is to conduct additional monitoring and evaluation of system performance. This has been the plan for over 10 years and it is ineffective. **The responsible parties must add wells to better characterize the contamination.**

**Response:** The figures noted provide comparison of contaminant plumes between 2014 and 2019, the time frame for this five-year review. Although there appears to be limited change in extent during this review period for some contaminants, overall average concentrations have decreased. It should be noted that both the extent and concentration of the off-post plumes have decreased significantly for many contaminants since implementation of the remedy.

For the dieldrin plume downgradient of the Northwest Boundary Containment System, the Army has determined that additional wells are needed to improve plume monitoring in this area. This is identified as a five-year review issue, and evaluation of well locations to upgrade the network is already underway. Dieldrin is a very persistent contaminant in the environment, so reduction below a low standard will take time. It is important to note that the dieldrin plume is stable, ie, it is not expanding. Given additional time, the plume will continue to reduce. The additional monitoring wells that will be installed will help to better assess the plume extent reduction over time.

For on-post groundwater treatment systems, including BRES, the RAO established in the ROD requires groundwater extraction and treatment that establishes hydrologic conditions consistent with the soil remedy and provides long-term improvement in the performance of the boundary treatment systems. The BRES continues to meet the ROD RAO as evidenced by significantly lower concentrations downgradient of the system compared to upgradient.

Nevertheless, system evaluations are conducted when remedy components do not meet performance criteria detailed in O&M plans. In this case, concentrations of several contaminants exhibit increasing trends, which does not meet the performance goal of stable or decreasing trend. Evaluation of BRES performance is underway, including the installation of two additional monitoring wells. Additional groundwater data collection for both new and existing wells is planned through the end of FY21. Monitoring data will be reviewed with the regulatory agencies to determine appropriate actions once all the data have been collected.

**Comment:** The notes from the 6/24/20 site visit provide useful information as to the state of RMA. Several inspection reports indicate wells visited were unlocked and there was confusion as to the risk of dieldrin from confined or unconfined aquifers. Additional notes mentioned vandalism and shut-off of the NWB treatment system. **A review of safety measures should be conducted annually to prevent the system from being accessed and vandalized.**

**Response:** Safety measures are constantly evaluated by the Army for protection of workers and visitors and to ensure that unplanned events do not have the potential to result in contaminant exposure or damage to remedy components. Well locks were replaced when they were noted as missing. Appropriate measures are implemented as needed to prevent recurrence of trespass or vandalism events. During this FYR period, the vandalism noted at the NWBCS was addressed with changes to well switch configurations and the addition of security cameras at the treatment building.

**Comment:** Additionally, a private drinking water monitored well (359A) detected diisopropylmethyl phosphonate (DIMP). While new well 359D was installed in November 2016, there are still DIMP detections in this well with concentrations exceeding the Colorado Basic Standards for Groundwater (CBSG). **Is this water used for irrigation? What supplemental water is provided to this property?**

**Response:** Due to concentrations of DIMP above the groundwater standard, bottled water is being provided to the residents to prevent exposure. The well can be used for nonpotable purposes, such as irrigation. The Army has been working with the regulatory agencies to complete additional monitoring and an evaluation into a more permanent solution for providing safe drinking water to this residence. A final report for this work is expected to be completed in 2022.

**Comment:** The addition of the First Creek Treatment System indicates current methods are not adequate. A photograph of this system suggests it is a “Tough Shed” in design. There is not 4-sided security around the plant-this needs to be addressed as RMA opens up to visitors. Also, it appears there are concerns with security of monitoring wells- locks/caps and bolts- **must be clearly marked and access restricted. Treatment Facility Manuals on inspection were 10 years old. Update and revise as needed.**

**Can the Army provide more information as to the integrity of the First Creek Treatment building to withstand high winds and security measures to protect the site? Besides monitoring these off-post exceedances, what is being done to capture them?**

**Response:** The First Creek Treatment System was constructed to provide treatment of groundwater in the First Creek pathway instead of treatment at the Off-Post Groundwater Intercept and Treatment System (OGITS). Contrary to the statement made in the comment, the system was not required to address inadequate treatment at the OGITS. The First Creek system will allow removal of the aging OGITS plant and provide continued compliant groundwater treatment. The new treatment building is an engineered structure designed and built by American Standard Steel Building Systems, which is an industry accepted building used for small water treatment systems. The building has metal sides and a concrete foundation. The building is located within the First Creek system area, which is completely enclosed by a fence for security.

Overall, well security remains an area of focus for the Army. All off-post wells are locked and well locks are replaced when they were noted as missing. There have been no instances of tampering noted with any of the off-post monitoring wells. Treatment plant operations manuals are updated as needed. Although some versions are several years old, there have been no changes to operational requirements that necessitate revision. In some cases, changes were made to the manuals without updating the revision date on the cover page. As a result of the review, the Army will evaluate the process for maintaining properly dated O&M manuals.

### **C) Basin F Contamination**

**Comment:** The increasing concentrations in downgradient Basin F wells in both the Confined and Unconfined aquifers, and the lack of a comprehensive monitoring network, are an issue that 5YR documents must address and should resolve. Exceedances seen in the concentrations of contaminants in downgradient Basin F wells indicate ongoing groundwater contamination downgradient of the Basin F Principle Threat and Wastepile areas has potentially been affected.

This post-closure monitoring data are erratic with numerous exceedances for multiple contaminants. In response to the repeated Upper Prediction Limit (UPL) exceedances, and the continued presence of elevated/increasing concentrations of contaminants in downgradient wells, a change to the Basin F groundwater monitoring network is necessary to remain protective.

As noted by CDPHE: “Sampling of the current downgradient Basin F groundwater monitoring network has shown contamination in excess of background concentrations and, in some instances, at levels greater than pre-remedy concentrations.” It is not clear if these exceedances are responsible, in part, for the boundary exceedances at the NW Containment location. No improvements to the current system have been provided for review. The ongoing remediation efforts are not adequate and warrant new methodologies to reduce contamination of groundwater on the off-post unit. The need for a revision of the Basin F groundwater monitoring network is an issue that has the potential to affect current protectiveness and should be evaluated in further detail in this 5YR.

**Response:** Evaluation of groundwater levels and water quality data, suggest that pre-existing residual soil contamination beneath the former Basin F has been remobilized as the local water table has risen. The rise in groundwater elevations is the result of higher

than average precipitation that affected the regional water table. To address the presence of increasing concentrations of specific contaminants in wells downgradient of the Wastepile area, the Army is reviewing the Basin F monitoring network and conducting additional evaluation of groundwater data, including statistical analysis. These evaluations are in progress. The Army will continue to coordinate with the regulatory agencies to review the results of the evaluations and determine next steps in FY22.

#### **D. Land Use Controls (LUCs)/Deed Restrictions**

**Comment:** The SC reaffirms the benefit of LUCs for the RMA off-post sites in neighboring communities and any future developments. New information from the Army with respect to the exceedances in groundwater Dieldrin north of the containment systems (Item D has more detail) highlights the ongoing and continued risk the neighborhoods. Inappropriate use of land must be controlled. Primary health hazards are related to vapor intrusion from groundwater into homes from basements and the consumption of produce home-grown in soil. Access to the locations with elevated COCs add an increased risk to children and young adults. **A thorough review of the acceptable uses of land must be conducted with local city governments on an annual basis.**

**Response:** The Land Use Controls are very effective in eliminating potential exposures in neighboring communities, and the boundaries of the notification areas associated with the LUC requirements have been adjusted to account for the current location of the plume. Although recent improvements in analytical methods have resulted in changes to the extent of the identified dieldrin plume, the exposure pathways evaluated in the Off-Post Exposure Assessment remain unchanged. Vapor intrusion into basements is not a viable exposure pathway as dieldrin has very low volatility. The Army routinely meets with Commerce City officials, local developers, and environmental consultants conducting Environmental Assessments in the area north and northwest of RMA to ensure that these entities are aware of the details regarding RMA's groundwater contaminant plumes and other land use control issues.

**Comment:** The Commerce City Prairie Gateway Planned Unit Development (PUD) appears to have the most communication with this entity. Although representatives from the U.S. Army coordinate regularly with representatives from Commerce City, the Prairie Gateway Planned Unit Development (PUD) still has allowable uses that conflict with the LUCs. Individual homeowners must be made aware of property/soil restrictions. While there are usually notifications for new build construction of land use restrictions, it is unknown with resales what the process is. **Is there a document that outlines these guidances?**

**RMA staff must work with the local governments to educate them of the local governments to educate them of the land use restriction and reaffirm the deed restriction to protect the communities.**

**Response:** Although the current PUD includes potential land uses that appear inconsistent with the existing restrictions, Commerce City planning documents recognize the existing restriction on residential use and clearly state that the restriction would need to be

modified before residential construction could be accomplished. In addition, per the 2017 National Defense Authorization Act, Commerce City is required to perform a risk assessment to demonstrate that the change in use will be protective of human health and the environment. The risk assessment must be completed pursuant to CERCLA requirements and any response actions necessary must also be completed before the proposed use can be allowed.

#### **E. Incomplete Biomonitoring Program (BMP)**

**Comment:** The 5YR states, “The purpose of the BMP is to help evaluate the efficacy of the remedy in accordance with the requirements of Section 9.7 of the ROD, i.e., that “monitoring activities for biota will continue by USFWS in support of evaluating the effectiveness of the selected remedy.” It also states, “Because kestrels are a valuable species and it was not desirable to continue to sacrifice birds, the kestrel study was suspended in February 2014.” The SC requests that to confirm the effectiveness of the remedy, the BMP not be abandoned and the final report be made available to the public. The On-Post ROD requires long-term biomonitoring as a component of the remedy. Soil sampling was conducted, and data summary reports were finalized, however, the Biomonitoring Completion Report, prepared by the Biological Advisory Subcommittee (BAS) is not complete. **When will this report be finalized and made available to the public?**

**Response:** A draft Monitoring Completion Report (MCR) was provided to the regulatory agencies to document completion of the ROD requirement for long-term biomonitoring as described in the *Long-Term Contaminant Biomonitoring Program for Terrestrial Ecological Receptors at Rocky Mountain Arsenal*. The EPA reviewed the initial draft of the MCR; however, the report is awaiting final EPA review. Once final, the report will be made available to the public.

**Comment:** Map 6.3-78 shows the location of soil sampling in lieu of wildlife monitoring. This approach used a grid pattern evenly distributed across RMA. This in no way is representative of the hazardous waste areas where animals may receive the greatest exposure to pesticides and COCs. Because soil does not bioconcentrate chemicals as fatty tissue does in predator/apex species, it is an imperfect source for biomonitoring. We request that other RMA species with direct exposure to soils such as earthworms and/or or prairie dogs be tested if the kestrel collection is not possible. Since halting the BMP, new species have been added to the Arsenal including the Blackfooted ferret. **Has any fortuitous sampling been done with these ferrets? Has USFWS conducted an assessment of the health of this species?**

**Response:** The soil sampling strategy approved by the regulatory agencies, multi-increment sampling, provides for collection of many soil samples across a sample area to serve as a representative sample. This sampling methodology reduces data variability, or the potential effects of soil heterogeneity on sample accuracy, and increases sample representativeness, providing an unbiased estimate of the mean contaminant concentration for the area being sampled. This sample approach is appropriate since there are no hazardous waste areas remaining open where biased sampling would be required to evaluate elevated concentrations and risk. The mean concentration over any given foraging area is most representative of the expected exposure.

Soil sample results were compared to the EPA Ecological Soil Screening Level (Eco-SSL) developed for an avian carnivore, which is representative of the American Kestrel. Eco-SSLs are soil screening concentrations derived to represent levels that are protective of ecological receptors that consume biota that live in or on the soil. The Eco-SSL includes both soil and food ingestion and accounts for biomagnification of contaminants in the food source. The Eco-SSL selected for the BMP was developed in consultation with the regulatory agencies.

The Biomonitoring Program was designed to evaluate risk to sentinel species that are likely to have the highest exposure and are toxicologically sensitive. As a result, the Biological Advisory Subcommittee selected the European Starling and American Kestrel for the long-term monitoring program. This approach allows efficient data collection without the need to sample every species present. By evaluating risk to the sentinel species, overall risk for all receptors is considered.

The USFWS has not conducted any tissue sampling for black-footed ferrets and no fortuitous samples have been found on the Refuge. There is no indication of any health issue with the black-footed ferret population on the Refuge.

**Comment:** In the 5YR, the issue of consumption of bison has again been raised. The SC is on record opposing the introduction of bison to RMA. Part of our opposition was mismanagement risk of herd size. That now appears to be reality with a request for sale of bison meat to cull the herd. This is unacceptable to potential human health risks from a superfund site and goes against the original agreement for reintroduction of bison. **Any culling of the herd must not be at the expense of human health. What is the current USFW plan for bison on RMA?**

**Response:** Bison grazing improves the richness of plant species on prairie grasslands, aiding in the overall prairie restoration efforts. Consistent with the USFWS RMANWR Habitat Management Plan, active management of the bison population is required to achieve a balance that provides the resources necessary for all grassland-dependent species identified as resources of concern. USFWS' management of the bison herd will remain consistent with the Department of Interior's Bison Conservation Initiative.

**Comment: We agree with EPA on the following noted comment: In Section 9.1, Page 144.** This section explains that the USFWS is pursuing a change to the restriction to allow consumption of bison from RMA, that the USFWS is in the process of collection of bison tissue, but that this is not a FYR issue because the existing restriction has not been violated. However, this was identified by the EPA as an issue in the 2015 FYR and it should continue to be identified as an issue because there is new information that requires the sampling, analysis, and risk assessment approach to be reevaluated. This new information includes the identification of receptors that are different than originally considered (e.g., children through a tribal school lunch program) and new information on the accumulation of methyl mercury in muscle tissue. **The bison sampling, analysis, and risk assessment program must be updated to effectively evaluate risk of consumption. We also would like to see agreement across all agencies and parties that bison will not be sold for consumption of meat by humans.**

**Response:** As noted in the response to the EPA comment, the Army does not agree that this is a FYR issue because, as stated in the report, there is no effect on protectiveness while the current restriction on consumption is being enforced. Two reports were issued by the USFWS in May 2021 that discuss the completion of the bison tissue sampling program and evaluation of potential risk due to consumption of muscle tissue. Although these reports were issued after the FYR period, the FYRR has been revised to update the discussion for clarity. At this time, the game consumption restriction remains in force for RMA NWR bison. Any changes to the ROD will be coordinated with the regulatory agencies and will follow the CERCLA process. Changes that require modification of the ROD will include public participation as required by the NCP.

**From:**  
**To:**  
**Cc:**

[Redacted]  
[Redacted]  
[To:](#) [Redacted]  
[Redacted]  
[Redacted]

**Subject:** Re: Comments; 5th Five Year Review Period: April 1, 2015-March 31, 2020\_ Rocky Mountain Arsenal, Colorado  
**Date:** Thursday, July 22, 2021 12:33:29 PM

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My name is [Redacted],

I am or was a long time resident of commerce city, and have been involved with the RAB and then the SSAB for many years, and am still today.

You talked about monitoring., and have stated there are a few issues.

Basin F is leaking. Are you monitoring that ? What remedies are in place to stop the leakage?

The dimp plume you say has gotten smaller, but according to the map that doesn't show it smaller. Are the maps updated?

Is the groundwater going into the platte river?

If so and even if it is under the bed rock what are the chances that it may leak into the surface water downstream? Are you monitoring for that? How far down the Platte river are you monitoring or testing the water?

What about flooding? The homes at 92nd Ave had issues with basements being flooded. How would they know if that water was contaminated? Is that being looked into?

Some of my concerns are, in talking to friends who live in the area have no idea of what is going on at the Rocky Mountain Arsenal. They have the belief that it is all cleaned up and is now a wildlife refuge. There is no communication with the residence. What are you doing to inform the surrounding residents?

I also see that Realtors have listed homes for sale with statements such as very close to the National wildlife refuge and a beautiful park. This is very concerning to me.

Any other questions, about the 5 year review, I have, have already been posted.

Thank you for your time in reading my comments/questions

[Redacted]

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**U.S. Army Response to  
[REDACTED] Comments on the  
Fifth Five-Year Review Report for  
Rocky Mountain Arsenal, Revision E, May 6, 2021**

**Comment:** My name is [REDACTED],

I am or was a long time resident of commerce city, and have been involved with the RAB and then the SSAB for many years, and am still today.

You talked about monitoring, and have stated there are a few issues.

Basin F is leaking. Are you monitoring that? What remedies are in place to stop the leakage?

**Response:** Monitoring at Basin F consists of cover performance monitoring and groundwater monitoring. The Basin F remedy included construction of a RCRA-equivalent soil cover to minimize percolation of water through the waste and leaching of contaminants to groundwater. Cover performance monitoring demonstrates there is little to no percolation of water through the soil cover, thereby eliminating further migration of contaminants to groundwater. Groundwater monitoring continues to show concentrations of contaminants present in groundwater downgradient of Basin F. However, these contaminants were present in groundwater before the Basin F soil cover was constructed. Evaluation of the overall remedy, soil cover performance and groundwater data, do not indicate that the waste contained in place is leaking to groundwater.

**Comment:** The dimp plume you say has gotten smaller, but according to the map that doesn't show it smaller. Are the maps updated?

Is the groundwater going into the platte river?

If so and even if it is under the bed rock what are the chances that it may leak into the surface water downstream? Are you monitoring for that? How far down the Platte river are you monitoring or testing the water?

**Response:** Since construction of the boundary containment systems in 1982, the extent of the DIMP plume has decreased dramatically. The maps provided in the FYRR show the change in the DIMP plume over the last five years. During that time, there has been a modest reduction in the extent of the plume, particularly downgradient of the First Creek System. This area of the plume historically extended several miles downgradient but is now completely below the Colorado groundwater standard. Although flow of groundwater moves in a general northwest direction from the RMA toward the South Platte River, there are no RMA contaminant plumes reaching the South Platte River. As such, the Army does not monitor surface water in the river. There is no impact on surface water quality for downstream users.

**Comment:** What about flooding? The homes at 92nd Ave had issues with basements being flooded. How would they know if that water was contaminated? Is that being looked into?

**Response:** The Army is not aware of any flooding associated with contaminated groundwater intrusion into homes. Flooding from surface water due to excess precipitation or

drainage problems does not represent an issue for exposure to RMA contaminants since contamination is in groundwater, not surface water.

**Comment:** Some of my concerns are, in talking to friends who live in the area have no idea of what is going on at the Rocky Mountain Arsenal. They have the belief that it is all cleaned up and is now a wildlife refuge. There is no communication with the residence. What are you doing to inform the surrounding residents?

I also see that Realtors have listed homes for sale with statements such as very close to the National wildlife refuge and a beautiful park. This is very concerning to me.

Any other questions about the 5 year review, I have, have already been posted.

Thank you for your time in reading my comments/questions.



**Response:** Among the steps in the Five-Year Review process is the community interview process. During this phase, the Army, in partnership with the regulatory agencies, contacted community members representing a wide range of community groups and perspectives. In addition to identifying any questions residents might have, this process is intended to assess community information needs and preferences.

Based on those interviews, the Army agrees that it would be beneficial to conduct additional outreach to educate newer residents, as well as Spanish-speaking residents, about the site. Accordingly, the Army will evaluate its current community involvement program and identify the most effective ways to expand its outreach. Currently, the outreach program includes meeting regularly with leaders and staff from local government and community organizations, providing periodic briefings to the Commerce City Council, publishing remedy updates and monitoring reports on the RMA website, staffing a community information line and offering additional presentations or tours to community groups as needed.

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**From:** [REDACTED]

**Sent:** Wednesday, July 21, 2021 1:07 PM

**To:** [REDACTED]

**Subject:** [Non-DoD Source] Comments 5th Five Year Review of Rocky Mountain Arsenal

All active links contained in this email were disabled. Please verify the identity of the sender, and confirm the authenticity of all links contained within the message prior to copying and pasting the address to a Web browser.

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July 21, 2021

I am a long time resident, forty five years, of Commerce City. I have been a member of the Site Specific Advisory Board since 1996, twenty five years. I am very concerned that there are failures to the remedy every five year review period since the Rocky Mountain Arsenal closing. I have not seen any flyers, mailings, or any other attempts to contact or educate the residents. Even the Rocky Mountain Arsenal WEB site was not working right. Upon speaking with my neighbors, they did not know anything about the RMA being a past superfund site and is now designated a wild life refuge. Even more concerning is the representatives of the army say the remedy is working, More accurately, it is only partially working. There is a note in 2020 that vandals had been in restricted areas. Do these vandals have any idea what they are messing with? I think not. That is even more reason for educating the public. The monitoring information shows many exceedances for a number of contaminates. In some cases at higher levels than pre-remedy. That would indicate the remedy at the very best is only partially working. An additional concern is Commerce City Officials are not following the land use controls. I know the representatives of the army can not control Commerce City and the US Fish and Wildlife, even though the issues are related to the Rocky Mountain Arsenal.

These issues have been going on for many years. I fear they will never be resolved.

[REDACTED]

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**U.S. Army Responses to  
[REDACTED] Comments on the  
Fifth Five-Year Review Report for  
Rocky Mountain Arsenal, Revision E, May 6, 2021**

**Comment:** I am a long time resident, forty five years, of Commerce City. I have been a member of the Site Specific Advisory Board since 1996, twenty five years. I am very concerned that there are failures to the remedy every five year review period since the Rocky Mountain Arsenal closing. I have not seen any flyers, mailings, or any other attempts to contact or educate the residents. Even the Rocky Mountain Arsenal WEB site was not working right. Upon speaking with my neighbors, they did not know anything about the RMA being a past superfund site and is now designated a wild life refuge. Even more concerning is the representatives (sic) of the army say the remedy is working, More accurately, it is only partially working. There is a note in 2020 that vandals had been in restricted areas. Do these vandals have any idea what they are messing with? I think not. That is even more reason for educating the public.

**Response:** One purpose of the Five-Year Review is to assess community needs around what information community members would like to receive and how they prefer to receive it. Currently, RMA representatives meet regularly with leaders and staff from local government and community organizations, provide periodic briefings to the Commerce City Council, publish remedy updates and monitoring reports on the RMA website, staff a community information line and offer presentations or tours to community groups as needed. The Army also consulted with the U.S. Fish and Wildlife Service in developing an exhibit area within the Rocky Mountain Arsenal National Wildlife Refuge Visitor Center that provides an overview of the history of the site, including past manufacturing activities, Superfund designation, environmental cleanup and transition to a national wildlife refuge.

Regarding the RMA website, we are aware of a broken link to one section of the draft final 2020 Five-Year Review Report, which was published on the RMA website and placed in local libraries. We were notified of the issue on July 16, 2021, and the link was fixed that day. Otherwise, we are not aware of any ongoing issues with the RMA website.

As indicated in the Five-Year Review Report, we will be evaluating additional opportunities to inform and educate the public about the history and environmental cleanup of the site.

**Comment:** The monitoring information shows many exceedances for a number of contaminants. In some cases at higher levels than pre-remedy. That would indicate the remedy at the very best is only partially working.

**Response:** Overall, monitoring data demonstrate that the remedy is functioning as expected. Treatment plant effluent is consistently in compliance with the remediation goals identified in the RODs. Groundwater monitoring data generally indicate that contaminant concentrations are decreasing. In a few cases where increasing trends

have been identified, those occurrences are identified as Five-Year Review issues or Other Findings requiring investigation to determine appropriate remedy adjustments.

**Comment:** An additional concern is Commerce City Officials are not following the land use controls. I know the representatives (sic) of the Army cannot control Commerce City and the US Fish And Wildlife, even though the issues are related to the Rocky Mountain Arsenal. These issues have been going on for many years. I fear they will never be resolved.



**Response:** Regarding land use controls, there is no indication that Commerce City is violating the land use controls. Although the current Prairie Gateway PUD includes potential land uses that appear inconsistent with the existing restrictions, Commerce City planning documents recognize the existing restriction on residential use and clearly state that the restriction would need to be modified before residential construction could be accomplished. In addition, per the 2017 National Defense Authorization Act, Commerce City is required to perform a risk assessment to demonstrate that the change in use will be protective of human health and the environment. The risk assessment must be completed pursuant to CERCLA requirements and any response actions necessary must also be completed before the proposed use can be allowed.

Similarly, the USFWS is not in violation of any land use controls. Annual monitoring of RMA property, both Army-retained and Refuge property, has not identified any activities inconsistent with the existing land use controls.

**From:** [REDACTED]  
**Sent:** Monday, July 26, 2021 5:45 PM  
**To:** [REDACTED]  
**Cc:** [REDACTED]  
**Subject:** [Non-DoD Source] late RMA 2021 comment

All active links contained in this email were disabled. Please verify the identity of the sender, and confirm the authenticity of all links contained within the message prior to copying and pasting the address to a Web browser.

It looks like the EPA may soon be reevaluating the 1,2-dioxane safety risk factors in yellow below..

[REDACTED]  
Caution-<https://cen.acs.org/policy/chemical-regulation/Big-changes-afoot-US-chemical/99/i25> < Caution-<https://cen.acs.org/policy/chemical-regulation/Big-changes-afoot-US-chemical/99/i25> >

**Big changes afoot for US chemical risk evaluations**

**EPA seeks to restore trust and protect vulnerable populations from chemical exposures**

by *Britt E. Erickson* < Caution-[https://cen.acs.org/static/about/staff\\_landing/biobee.html](https://cen.acs.org/static/about/staff_landing/biobee.html) >

## Big changes afoot for US chemical risk evaluations

EPA seeks to restore trust and protect vulnerable populations from chemical exposures

by *Britt E. Erickson* < Caution-[https://cen.acs.org/static/about/staff\\_landing/biobee.html](https://cen.acs.org/static/about/staff_landing/biobee.html) >

July 8, 2021 | A version of this story appeared in [Volume 99, Issue 25](#) < Caution-<https://cen.acs.org/magazine/99/09925.html> >

Credit: Shutterstock

The US Environmental Protection Agency is developing a screening approach to determine whether chemicals in air and water surrounding industrial facilities pose a risk to nearby communities.

Facing lawsuits and criticism from scientists, environmental groups, and the chemical industry, the US Environmental Protection Agency is overhauling its approach for evaluating risks associated with high-priority chemicals that are already on the market. According to Michal Freedhoff, head of the EPA's chemicals office, the changes will impact the [first 10 assessments](#) < Caution-<https://cen.acs.org/articles/94/i48/EPA-flexes-muscle-under-new.html> > completed by the Trump administration under the amended Toxic Substances Control Act (TSCA). They will also affect the next 24 assessments, which the EPA has already begun, and those that the agency conducts in the future.

The changes include assessing exposure to chemicals from air and water, as well as from land disposal. During the Trump administration, the EPA disregarded such pathways, claiming that they were already regulated by other statutes, such as the Clean Air Act and Clean Water Act. For 6 of the first 10 chemicals, the EPA will develop a screening approach that uses existing ambient air and surface-water data to evaluate risks to fence-line communities that border industrial facilities.

The EPA also plans to reopen its assessment of the solvent [1,4-dioxane](#) < Caution-<https://cen.acs.org/policy/chemical-regulation/US-EPA-disregards-risk-1-4-dioxane-in-drinking-water/99/web/2021/01> >, a widespread [drinking-water contaminant](#) < Caution-<https://cen.acs.org/environment/pollution/14-Dioxane-Another-forever-chemical/98/i43> >, to determine whether drinking water and air exposure pose unreasonable risks to the general population. The agency will also evaluate occupational exposures to 1,4-dioxane generated a manufacturing by-product that were not considered in its previous assessments.

One change that will affect all the first 10 chemical evaluations is a plan to abandon a use-by-use approach for determining risks. The EPA will continue analyzing risks for each specific use but will make only one unreasonable risk determination for chemicals that have significant risks across multiple uses.

**None of the first 10 risk evaluations satisfied EPA's statutory obligations or provided a complete and accurate picture of the chemicals' true risks.**

*Jonathan Kalmuss-Katz, senior supervising attorney, Earthjustice*

The EPA also will not assume that workers have access to personal protective equipment (PPE) or that they wear PPE properly. The Trump administration generally made such assumptions for the first 10 chemicals, so some findings of no unreasonable risks could change, the agency says.

Freedhoff announced the changes during an [event](#) < Caution-<https://www.eli.org/events/tsca-reform-five-years-later> > commemorating the fifth anniversary of TSCA reform hosted by the Environmental Law Institute on June 30. Congress amended the law in 2016, giving the EPA new authorities to ensure that chemicals in the marketplace do not pose unreasonable risks to human health and the environment.

"Many actions taken in the last administration left EPA with an internal and external trust deficit, which affected our ability to carry out our core duties and function to protect health and the environment," Freedhoff said. "It's also clear that some of EPA's actions during this time were inappropriately driven by the previous political leadership rather than sound science."

"None of the first 10 risk evaluations satisfied EPA's statutory obligations or provided a complete and accurate picture of the chemicals' true risks," Jonathan Kalmuss-Katz, a senior supervising attorney with the environmental law group Earthjustice, said during the meeting. The EPA now faces the difficult task of evaluating the risks of 24 additional chemicals, "while at the same time having to go back and fix the mess left by the last administration," he said.

Lawyers who work closely with the chemical industry commend the EPA for making changes to address increasing litigation related to the first 10 risk assessments, but they question how the agency will meet its deadlines for risk management as it revisits them. "EPA's between a rock and a hard place," Lynn Bergeson, managing partner at the law firm Bergeson & Campbell, commented at the meeting. "I applaud EPA for making some very courageous decisions that may themselves invite further litigation."

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**U.S. Army Responses to  
[REDACTED] Comments on the  
Fifth Five-Year Review Report for  
Rocky Mountain Arsenal, Revision E, May 6, 2021**

**Comment:** It looks like the EPA may soon be reevaluating the 1,2-dioxane (sic) safety risk factors in yellow below.

**Big changes afoot for US chemical risk evaluations**

**EPA seeks to restore trust and protect vulnerable populations from chemical exposures**

*by Britt E. Erickson < Caution-[https://cen.acs.org/static/about/staff\\_landing/biobee.html](https://cen.acs.org/static/about/staff_landing/biobee.html) >*

## **Big changes afoot for US chemical risk evaluations**

**EPA seeks to restore trust and protect vulnerable populations from chemical exposures**

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July 8, 2021 | A version of this story appeared in Volume 99, Issue 25 < Caution-<https://cen.acs.org/magazine/99/09925.html> >

Credit: Shutterstock

The US Environmental Protection Agency is developing a screening approach to determine whether chemicals in air and water surrounding industrial facilities pose a risk to nearby communities.

Facing lawsuits and criticism from scientists, environmental groups, and the chemical industry, the US Environmental Protection Agency is overhauling its approach for evaluating risks associated with high-priority chemicals that are already on the market. According to Michal Freedhoff, head of the EPA's chemicals office, the changes will impact the first 10 assessments < Caution-<https://cen.acs.org/articles/94/i48/EPA-flexes-muscle-under-new.html> > completed by the Trump administration under the amended Toxic Substances Control Act (TSCA). They will also affect the next 24 assessments, which the EPA has already begun, and those that the agency conducts in the future.

The changes include assessing exposure to chemicals from air and water, as well as from land disposal. During the Trump administration, the EPA disregarded such pathways, claiming that they were already regulated by other statutes, such as the Clean Air Act and Clean Water Act. For 6 of the first 10 chemicals, the EPA will develop a screening approach that uses existing ambient air and surface-water data to evaluate risks to fence-line communities that border industrial facilities.

The EPA also plans to reopen its assessment of the solvent 1,4-dioxane < Caution-<https://cen.acs.org/policy/chemical-regulation/US-EPA-disregards-risk-1-4-dioxane-in-drinking-water/99/web/2021/01> >, a widespread drinking-water contaminant < Caution-<https://cen.acs.org/environment/pollution/14-Dioxane-Another-forever-chemical/98/i43> >, to determine whether drinking water and air exposure pose unreasonable risks to the general population. The agency will also evaluate occupational exposures to 1,4-dioxane generated as a manufacturing by-product that were not considered in its previous assessments.

One change that will affect all the first 10 chemical evaluations is a plan to abandon a use-by-use approach for determining risks. The EPA will continue analyzing risks for each specific use but

will make only one unreasonable risk determination for chemicals that have significant risks across multiple uses.

**None of the first 10 risk evaluations satisfied EPA's statutory obligations or provided a complete and accurate picture of the chemicals' true risks.**

*Jonathan Kalmuss-Katz, senior supervising attorney, Earthjustice*

The EPA also will not assume that workers have access to personal protective equipment (PPE) or that they wear PPE properly. The Trump administration generally made such assumptions for the first 10 chemicals, so some findings of no unreasonable risks could change, the agency says. Freedhoff announced the changes during an event < Caution-<https://www.eli.org/events/tsca-reform-five-years-later> > commemorating the fifth anniversary of TSCA reform hosted by the Environmental Law Institute on June 30. Congress amended the law in 2016, giving the EPA new authorities to ensure that chemicals in the marketplace do not pose unreasonable risks to human health and the environment.

“Many actions taken in the last administration left EPA with an internal and external trust deficit, which affected our ability to carry out our core duties and function to protect health and the environment,” Freedhoff said. “It’s also clear that some of EPA’s actions during this time were inappropriately driven by the previous political leadership rather than sound science.”

“None of the first 10 risk evaluations satisfied EPA’s statutory obligations or provided a complete and accurate picture of the chemicals’ true risks,” Jonathan Kalmuss-Katz, a senior supervising attorney with the environmental law group Earthjustice, said during the meeting. The EPA now faces the difficult task of evaluating the risks of 24 additional chemicals, “while at the same time having to go back and fix the mess left by the last administration,” he said.

Lawyers who work closely with the chemical industry commend the EPA for making changes to address increasing litigation related to the first 10 risk assessments, but they question how the agency will meet its deadlines for risk management as it revisits them. “EPA’s between a rock and a hard place,” Lynn Bergeson, managing partner at the law firm Bergeson & Campbell, commented at the meeting. “I applaud EPA for making some very courageous decisions that may themselves invite further litigation.”

Chemical & Engineering News

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**Response:** Consistent with EPA five-year review guidance, the Army evaluates any changes to exposure assessment information as part of each five-year review, including changes in promulgated standards, exposure assumptions, or toxicity information. Results of EPA assessments related to 1,4-dioxane will be considered as they are made available.

July 19, 2021

[REDACTED]  
Rocky Mountain Arsenal  
6550 Gateway Road  
Commerce City, CO. 80022  
[REDACTED]  
[REDACTED]

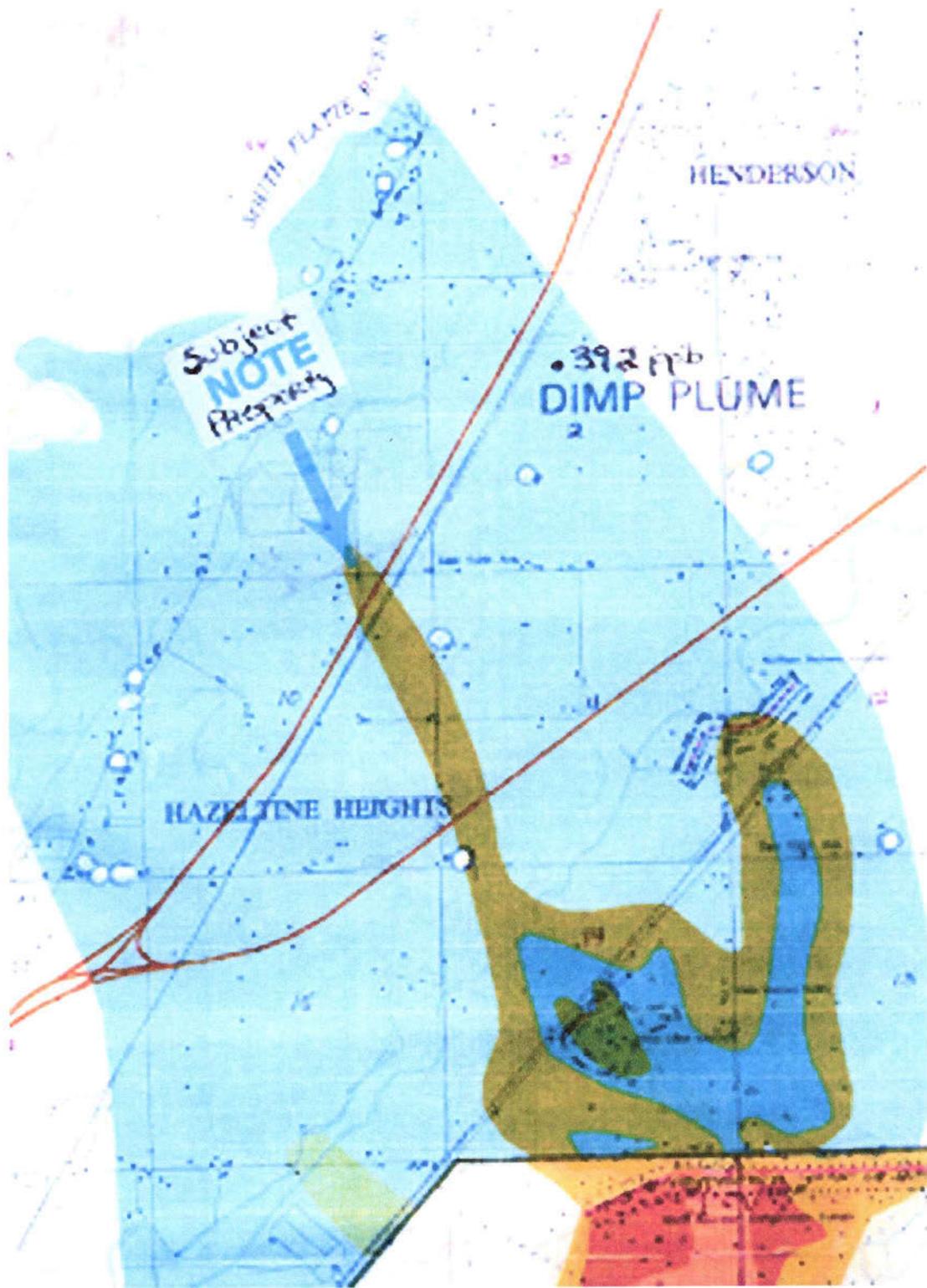
Re: Comments; 5<sup>th</sup> Five Year Review Period: April 1, 2015 – March 31, 2020

The Environmental Protection Agency (EPA) “considers the Five-Year Review (FYR) effort to be a critical element of the CERCLA process...to ensure that the Report adequately address the three fundamental questions posed by the Review. These questions are:

1. Is the remedy functioning as intended by the decision documents?
2. Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?
3. Has any other information come to light that could call into question the protectiveness of any of the remedies?”

Current and future land use of the Off-Post OU surface area has not been restricted, although groundwater use has been restricted in the Off-Post Record of Decision (ROD). Land use controls, in the form of institutional controls, were established as part of the selected remedy for the Off-Post ROD to prevent the future use of groundwater exceeding remediation goals.

“In 2011, the Off-Post Well Notification Program was modified to include both the potential Containment System Remediation Goals (CSRGs) exceedance area and the historic area of contamination as defined as the area of diisopropylmethyl phosphonate (DIMP) contamination based on the 0.392 parts per billion detection limits identified in the Off-Post ROD. These notification areas will be used until off-post groundwater is deleted from the NPL....



Any user of a domestic well within the Off-Post OU that contains groundwater contaminants derived from RMA at concentrations that exceed the

remediation goal or Applicable or Relevant and Appropriate Requirement (ARARs) will be provided an alternate water supply. This commitment applies to both users of existing domestic wells and users of wells that are lawfully drilled in the future." [2 (redacted)].

SACWSD was provided 4,000-acre feet of water valued (1995) at \$16 Million Dollars (ROD), and hook-ups to facilitate water- tap-connections to properties within the DIMP detection footprint – valued (1995) at \$28 Million Dollars. Pursuant to the *June 11, 1996 SACSWD*, the U.S. Army, and the Shell Oil Company signed *Memorandum of Agreement Regarding a Supplemental Water Supply for SACWSD*: ...water tap recipients were to receive 2,000 gallons per month for \$7.00, with usage greater than 2,000 gallons charged at a rate of \$1.85 per additional 1,000 gallons. SACWSD failed to meet this obligation and assessed tap holders for water, in amounts greater than this commitment.

### **Request to Implement: Monitoring Sampling Accessibility**

#### **Monitoring Well**

1 message

Fri, Jan 10, 2020 at 4:35 PM

To: [REDACTED]  
Cc: [REDACTED]

Hi [REDACTED]

Thanks for the call earlier this week. We are still evaluating our off-post wells to determine which ones are necessary for us to retain in the program. My understanding is that the monitoring well on your property (37353) is currently only used for evaluating water elevations. Please clarify if that is the well that you are concerned about establishing an easement/access agreement for. The other well on your property (494c) is sampled by Tri-County Health Department (TCHD). My understanding is that well was not installed by the Army. We would need to coordinate with TCHD to determine if they would like to retain sampling capability for that well. I am out of the office for most of next week, but will touch base again later this month.

Thanks

[REDACTED]  
Environmental Engineer  
Rocky Mountain Arsenal  
[REDACTED]

### **Commerce City, Colorado ROD violations**

The ROD, the FFA, and the Refuge Act prohibit transfers of land outside the federal government other than the five land transfers specifically provided for in the Refuge Act. On August 20, 2007, the Federal government allowed to be transferred ownership of a portion of land in the northeast corner of the RMA (Section 20 Lands, 14.388 acres adjacent to 96<sup>th</sup> Avenue and Buckley Road) to Commerce City. The Federal government and Commerce City government failed to comply with the provisions of CERCLA 120(h), the Colorado Executive Order D-013-98 dated June 18, 1998, and the incorporated Colorado Statewide Defense Initiatives/CDPHE Joint Policy dated June 19, 1998, in transferring ownership without notifying the State of Colorado of the transfer, and without ensuring the appropriate remedial covenants appear on title.

Land use controls are applicable to property transferred from the Army to Commerce City (referencing its Prairie Gateway development) where the Army incorporated deed restrictions required by the Federal Facilities Agreement (FFA) and the ROD Land Use Controls. However, the Prairie Gateway Planned Unit Development (PUD) and Amendment #1 included development uses inconsistent with the residential/gardening deed restriction [3].

On March 31, 2016, the U.S. Army notified Commerce City of Land Use Control Violations of the "Refuge Act". On Sept. 14, 2017, the Colorado Dept. of Public Health and Environment files Civil Action No. 17CV2223 reading sale to Commerce City in violation of Rocky Mountain Arsenal Institutional Controls.

### **City of Commerce City, Colorado REISBECK SUBDIVISION violations**

Reisbeck Subdivision (Reisbeck) was subdivided in Adams County in 1966 and zoned Industrial-1 in 1968 {Pursuant to C.R.S. 24-68-103 creating a vested property right} [4]. On November 10, 1982, the SACWSD District agreed to serve the Reisbeck property. On August 20, 1985, Reisbeck was included in the service area of the South Adams County Water and Sanitation District (SACWSD) recorded August 29, 1985, in Adams County Book 3042 at Page 529.

Notwithstanding C.R.S. 31-12-105, Commerce City illegally annexed the Reisbeck Subdivision rail-spur to facilitate a Commerce City 'residential' development north of Reisbeck upon the RMA Off-Post groundwater Superfund site. Commerce City alleges Reisbeck petitioned for annexation in Book 3412 Page 880 which was not true [5].

On November 15, 1996, the "Riverdale Dunes Metropolitan District No. 2", was created in conformance with the Service Plan and Resolution Approval of the City Council of the City of Commerce City, Colorado to be known as the "City of Commerce City Northern Infrastructure General Improvement District" [6]. This District PETITION incorporated the "District Improvements" of "Water improvements, including but not limited to transmission and distribution lines, reservoirs, hydrants, meters, pumping stations, water taps, and all necessary, incidental and appurtenant properties and facilities" which were provided by the Army under the Off-Post ROD dated December 19, 1995 [7].

On August 18, 1997, the City of Commerce City Northern Infrastructure General Improvement District incorporates Reisbeck under the false pretext of the Enterprise Corridor Land association ownership (Quit Claim Deed) of the Reisbeck "rail spur" [8].

On December 23, 1997, Reisbeck Subdivision was included in the service boundaries of the South Adams County Water and Sanitation District [9].

On February 19, 1998, the *ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS* confirms (document ODG/0114/98) that DIMP is a Scheduled 2 B chemical pursuant to the *Chemical Weapons Convention (CWC)* prohibiting release into the environment {Note: On December 22, 2003, Laura Williams, USEPA Region 8 Team Leader for RMA confirmed (Ref: 8EPR-F) that "... The Army did not identify the CDC as a consideration for development of the groundwater treatment requirements....".

On April 27, 1998, the Northern Infrastructure General Improvement District and South Adams County Water and Sanitation District agreed to a mandate of Commerce City Annexation for SACWSD service.

On May 22, 1998, Reisbeck applied (application 000241) for an Off-post ROD water connection with SACWSD as provided in the RMA Off-post ROD which was granted December 31, 1998 [10].

On July 19, 1999, "Dunes Development" petitions for residential development in Commerce City, utilizing the Northern Infrastructure General Improvement District for its improvements, 'abandoning' the use of the Reisbeck rail spur [11].

Upon the Commerce City municipal steps, post-election evening of April 3, 2001, where Scott Jaquith (Past RAB Chairwoman Sandy's Jaquith's brother) ousts Rene Bullock from the Commerce City Council, Larry Ford and Mayor Busby tells the undersigned that they will never let me develop Reisbeck Subdivision in Adams County – only in Commerce City. I asked if that was a threat and Larry responded: "No, a promise – your Title is already sullied".

On December 4, 2001, Reisbeck gives its "Notice of Intent to Preserve an (its) Interest in the aforementioned rail spur [12]. On October 9, 2002, SACWSD dedicated 54 "Equivalent Residential Units" (ERU's) to the Reisbeck property; 1.5 ERU's per each of Reisbeck's 36 "Industrial" acres.

On March 4, 2004, the City of Commerce City acknowledged that the Commerce City road construction supervision of June 23, 1997, and September 25, 2001 on 112<sup>th</sup> avenue, changed the 112<sup>th</sup> historical road grade – removing two (2) lanes of asphalt, without restoration, and thereafter negligently buried SACWSD installed fire hydrants (June-July 2004) creating major property drainage problems for Reisbeck.

On April 28, 2004, SACWSD and the City of Commerce City crafted an *Intergovernmental Agreement*, paragraph 13, wherein SACWSD agreed that: "City Approval of Development. South Adams hereby agrees that it shall only issue water and sewer taps to property within the GSA or the RMA Lands with prior City approval of development of those lands...."

On June 14, 2004, Reisbeck received its *"No Action Determination Approval for Property at 9940-9982 East 112<sup>th</sup> Avenue, Henderson, CO"* (VCUP) **requiring** "...this approval applies only for the land use specified in the application, which is Adams County Industrial-1...."[13]. On November 4, 2004, USEPA gives Notice to Reisbeck that EPA retains its "Statutory right of access" (3<sup>rd</sup> Party Access Easement) over Reisbeck.

Notwithstanding Reisbeck's VCUP requirements, on February 7, 2005, the City of Commerce City attorney Timothy J. Beaton advised Reisbeck that "... in any event, annexation of the property (Reisbeck) into Commerce City is required under the 2004 IGA between the District and the City" {Note: Mr. Beaton reaffirmed the City's position in its December 8, 2010, SACWSD Board meeting}.

Beginning January 11, 2006, SACWSD refers all Reisbeck development plans for any Adams County project(s) to Commerce City {See: Adams County Development Review Planner-i Abel M. Montoya letter dated October 6, 2004 regarding Reisbeck PRE2004-00091; and, SACWSD Minutes, Pg. 1 lines 29-31 and Pg 2 lines 1-2 and, City of Commerce City Regional Projects Manager Tom Acre letter dated May 10, 2006}.

Notwithstanding C.R.S. 31-12-115, on November 21, 2007, Commerce City Planner Brian Garner confirms that although the Reisbeck rail-spur was annexed, Commerce City refuses to apply its' city zoning designation to the Reisbeck parcel.

On March 24, 2008, Colorado Senate Bill 08-037 (SB08-037) passes, legalizing the application of "Notice of Environmental Use restrictions" in Colorado. During 2010 and 2011, ignoring SB08-037 and Reisbeck's VCUP , Commerce City revises its Comprehensive Land Development Plan identifying Reisbeck (Adams County I-1) as a "Residential-High" USE in Commerce City. On April 26, 2011, Commerce City Engineer Daren A. Sterling attempted to close 2 of the 3 Reisbeck property access points predicated upon the Commerce City annexation.

The City of Commerce City tortiously interfered (asserting jurisdictional USE control over Adams County) with Reisbeck negotiations regarding its real estate sales transactions, dismissing the Reisbeck VCUP requirement of Adams County I-1 zoning development, on the following occasions:

December 10, 2002	<i>KINGDOM HOMES</i> Adams Co. Permit BDP03-1798
April 20, 2018	SITE RECON
April 21, 2018	<i>MAVERIK</i>
July 10, 2018	<i>STINKER OIL</i>
June 6, 2019	<i>QUIK TRIP</i>

Generally, from Dec. 2002 through May 2021, over 3,681 real estate transactions valued at more than \$1,340,154,890, have occurred upon the RMA Off-post Superfund site, as annexed by Commerce City (Henderson). No disclosure was given to Grantee's (Buyers) regarding the RMA Off-post USEPA statutory right of access; undermining the transaction *Deeds* which covenant full-disclosure of any third-party access easement upon the Off-Post ROD properties; resulting in transaction fraud.

Specifically, the *Quik Trip* tortious interference by Commerce City, attempted to undermine Reisbeck's 54 ERU alternate water supply dedication as provided by the ROD; undermining the protections of Reisbeck by the State's VCUP; and costing Reisbeck \$150,000.00 in minimum damages.



**FW: File #NCS-965375-CO; 112th and Hwy 85, Henderson CP**

1 message

Mon, Sep 14, 2020 at 10:44 AM

To: [REDACTED]

Fyi.

**From:** [REDACTED]  
**Sent:** Saturday, September 12, 2020 10:51 AM  
**To:** [REDACTED]  
**Cc:** [REDACTED]  
**Subject:** FW: File #NCS-965375-CO; 112th and Hwy 85, Henderson CP

[REDACTED]

See below. I advised [REDACTED] of this yesterday.

The 3<sup>rd</sup> contract amendment is attached. It contains a \$150,000 price reduction. QuikTrip learned that they needed to do a PUD for the back part of the property that might take another six months. QuikTrip offered to close without PUD approval for a \$480,000 price reduction. Ultimately, after negotiation, a \$150,000 price reduction was arrived at.

Let me know if you have any questions.

Sincerely,

[REDACTED]

[REDACTED]

[REDACTED]

Commerce City's June 2021 establishment of its *Environmental Policy Advisory Committee* [Res 2021-38] in tandem with its *Comprehensive Plan Update* [Pres 21-302] is suspect at best – given Commerce City's decades-long mis- behaviors of self-interest, and irresponsible decision-making, concerning the Rocky Mountain Arsenal Off-Post contamination pathways.

I seek a written response addressing the City of Commerce City's continual and willful violations of RMA Off-Post Institutional Controls which were implemented pursuant to Colorado Statutes and the RMA Off-post ROD.

Regards,



Office Address:



- [1] Greg Hargreaves letter to Bruce Huenefeld dated September 26, 2005, EPA Ref: 8EPR-F;
- [2] Land Use Control Monitoring Report for Fiscal Year 2020, Revision1 dated February 11, 2021, U.S. Department of the Army/Shell Oil Company as prepared by Navarro Research and Engineering, Inc.
- [3] U.S. District Court for the District of Colorado, Civil Action 19CV1105 and U.S. Army RMA Program Manager C. Scharmann to Commerce City Manager B. McBroom dated March 31, 2016, Re: Prairie Gateway Planned Unit Development (PUD) Zone Document;
- [4] Reisbeck Subdivision Dedication per Adams County File 12 Map 37 and Zoning Map 19.
- [5] Commerce City Ordinance #827 as recorded in Book 3388 Page 109 [Section 2 "That the owners of 100% of the property described on attached Exhibit A have petitioned for annexation"], Annexation Map recorded November 12, 1987 at reception #B781151 (File 16 Map 679 Pgs. 5 & 6) and Ordinance 827 (AN-82-87) recorded February 2, 1988 in Book 3412 Page 880 [Section 2 "That the owners of 100% of the property described on attached Exhibit A have petitioned for annexation"];
- [6] Adams County District Court, Civil Action No. 96 CV 1413A, recorded in Book 4897 Pg. 0188-0193 dated 12/10/96 and Commerce City Resolution No. 96-25 dated August 19, 1996; and, Ordinance No. 1212, Series 1997 recorded in Book 5100 Page 0285-0315;
- [7] Commerce City Ordinance August 18, 1997 transmitted to Adams County for filing on August 29, 1997;
- [8] Adams County reception #C0316487;
- [9] Adams County reception #C0350418; as parcel 28 in District Court Civil Action No. 5750; recorded December 31, 1997;
- [10] Adams County reception #C0486762;
- [11] Commerce City case # Z-698-99;
- [12] Adams County reception #C0895212. {See: March 10, 2014 U.S. Supreme Court: The General Railroad R.O.W. Act gives railroads only a temporary right of easement with abandonment reversionary interest transferring to Landowner}. December 4, 2014, Colorado Court of Appeals 2014COA167 affirms Reisbeck ownership of the rail-spur;
- [13] EPA Registry Id. 110022512912.

**Summary of Annexation Requirements under Existing IGAs  
Between Commerce City and South Adams County Water and Sanitation District**

Updated: April 8, 2016

---

The following is a summary of the circumstances under which properties are required to annex into Commerce City to receive water and wastewater services from the South Adams County Water and Sanitation District ("South Adams") under the provisions of existing Intergovernmental Agreements ("IGAs") between South Adams and Commerce City or a General Improvement District of Commerce City.

The requirements are different for specific geographical areas within the South Adams service area, depending in part on whether Commerce City or a General Improvement District of Commerce City helped finance infrastructure needed to provide the water and/or wastewater service. The geographical areas include:

- 1) General Service Area ("GSA") of South Adams
  - Generally areas north of Sand Creek to 112<sup>th</sup> Avenue and east of the South Platte River to that portion of Quebec Street extending north to 78<sup>th</sup> Avenue and then northerly along Highway 2 to 112<sup>th</sup> Avenue.
- 2) Rocky Mountain Arsenal property ("RMA Lands")
  - Approximately 917 acres located on the western tier of the Rocky Mountain Arsenal.
- 3) The Northern Range Area, also known as the inclusion area for the Northern Infrastructure General Improvement District ("NIGID").
- 4) The inclusion area for the E-470 Commercial Area General Improvement District ("ECAGID") or the E-470 Residential Area General Improvement District.

**ANNEXATION REQUIREMENTS**

**1) Properties within General Service Area of South Adams or the RMA Lands**

- *Annexation Requirements under the April 28, 2004 IGA between Commerce City and South Adams, as Amended by April 7, 2014 IGA for Implementation of 2004 IGA:*
  - All properties in the GSA and RMA Lands to be served with water or wastewater services by South Adams must be annexed into Commerce City, to the extent allowed by law.

• *Exceptions:*

- As to properties included into South Adams prior to April 28, 2004, but not annexed into Commerce City, application of the annexation requirement to such properties might "result in some cases which must be individually reviewed and determined by South Adams and Commerce City."
- Commerce City retains authority to make the final determination as to whether any particular property for which annexation is sought will be annexed.
- Properties shall not be required to annex into Commerce City in order to receive water and wastewater services from South Adams if the proposed development is less than one acre in size or the new use, or expanded portion of the existing use, proposed would utilize four equivalent residential units ("ERUs") or fewer, provided that:
  - South Adams shall not provide ERUs in excess of the City's standard allocation to such properties without the City's prior written consent regardless of annexation status.
  - If, in order to serve such properties, the use by South Adams of facilities financed by any General Improvement District ("GID Facilities") is required, the owner of such property enters into a reimbursement agreement with the applicable GID for use of the GID Facilities.

**2) Properties within the Northern Range Area, also known as the inclusion area for the Northern Infrastructure General Improvement District.**

- *Annexation requirements under the April 27, 1998 Agreement between NIGID and South Adams and its Enterprise for the Purpose of Construction, Installation and Maintenance of Water Lines, Wastewater Lines, Accessories and Appurtenances Thereof, including the June 12, 2013 Second Amendment*
  - No land may receive water or wastewater services from or through any facilities or capacity constructed as part of the Project (as defined in the Agreement) without approval by NIGID or the ECAGID and South Adams. The landowner must agree to be bound by the "Agreement Regarding Annexation and Rebate of Costs Expended for Water and Wastewater Main Extension Lines" between Commerce City and South Adams, dated January 10, 1996 (the "1996 Agreement").

- The 1996 Agreement provides that if Commerce City provides any financial consideration or credit enhancement for construction or installation of water or wastewater main extension lines to any property located within the boundaries of South Adams and within the Growth Area (as defined in the 1996 Agreement), and South Adams has agreed to serve that property with potable water and sanitary wastewater treatment, South Adams shall require annexation as a condition of the property receiving any water or wastewater service.

- *Exceptions:*

- Annexation is not required upon written notification from Commerce City to the landowner that Commerce City waives its right to require annexation under the 1996 Agreement.

**3) Properties within the inclusion area for the E-470 Commercial Area General Improvement District or the E-470 Residential Area General Improvement District**

- *Annexation Requirements under 2013 IGA among South Adams and its Enterprise, Commerce City, the ECAGID, and DIATC Metropolitan District*

- a. No land may receive water or wastewater services from or through any facilities or capacity constructed as part of the Project (as defined in the Agreement) without approval by ECAGID and South Adams.
- b. To receive approval, the landowner must agree to be bound by “[t]he terms and conditions required by the ECAGID and [South Adams] for such services, which may include, but not be limited to, payment of rebate and recapture costs to the ECAGID for construction and installation of the Project.” Annexation is not expressly required, but the ECAGID require annexation as a term and condition.

**U.S. Army Responses to  
[REDACTED] Comments on the  
Fifth Five-Year Review Report for  
Rocky Mountain Arsenal, Revision E, May 6, 2021**

July 19, 2021

[REDACTED]  
Rocky Mountain Arsenal  
6550 Gateway Road  
Commerce City, CO 80022  
[REDACTED]

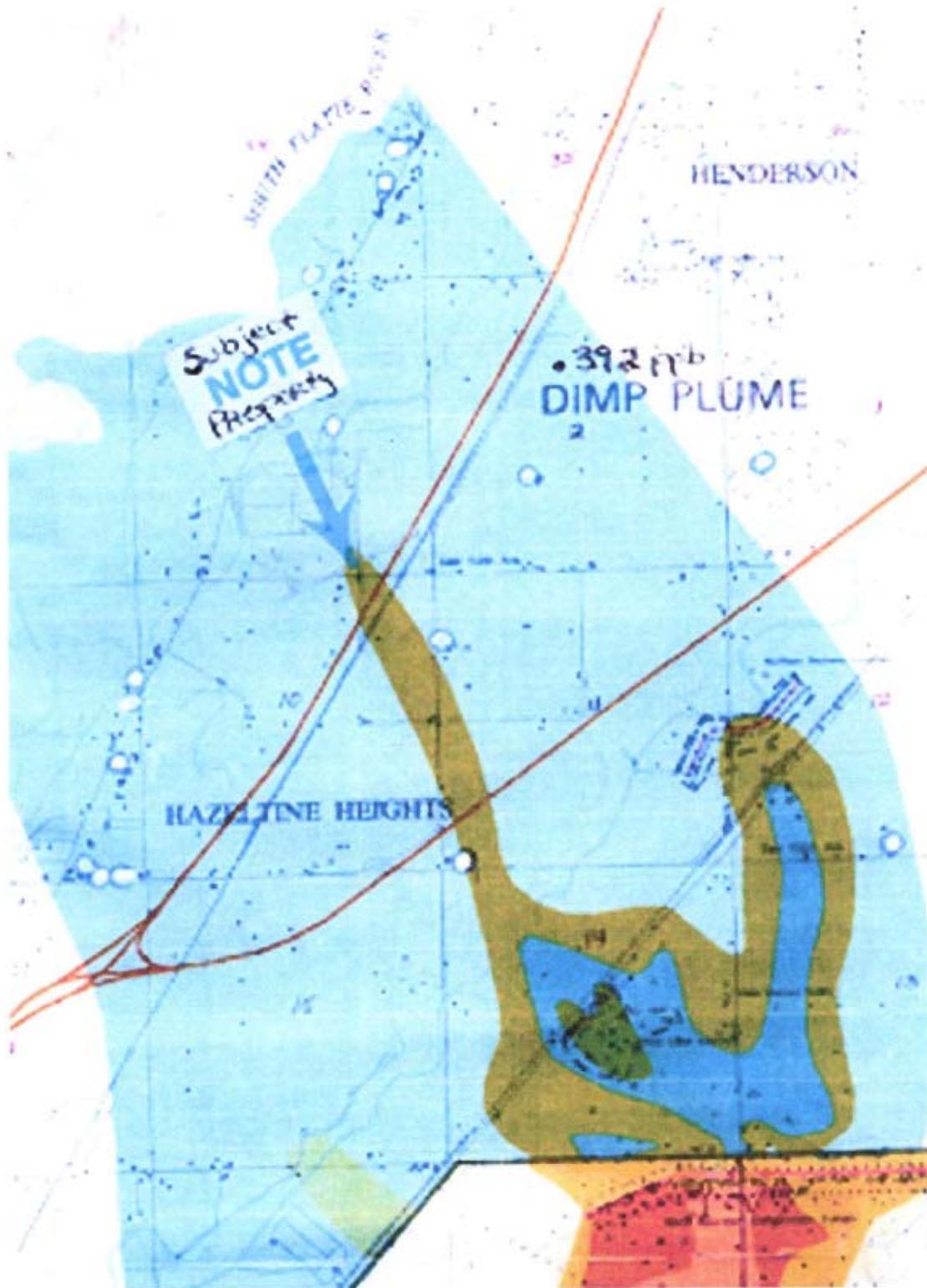
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Thanks

[REDACTED]  
Environmental Engineer  
Rocky Mountain Arsenal  
[REDACTED]

### **Commerce City, Colorado ROD Violations**

**Comment:** The ROD, the FFA, and the Refuge Act prohibit transfers of land outside the federal government other than the five land transfers specifically provided for in the Refuge Act. On August 20, 2007, the Federal government allowed to be transferred ownership of a portion of land in the northeast corner of the RMA (Section 20 Lands, 14.388 acres adjacent to 96th Avenue and Buckley Road) to Commerce City. The Federal government and Commerce City government failed to comply with the provisions of CERCLA 120(h), the Colorado Executive Order D- 013-98 dated June 18, 1998, and the incorporated Colorado Statewide Defense Initiatives/CDPHE Joint Policy dated June 19, 1998, in transferring ownership without notifying the State of Colorado of the transfer, and without ensuring the appropriate remedial covenants appear on title.

Land use controls are applicable to property transferred from the Army to Commerce City (referencing its Prairie Gateway development) where the Army incorporated deed restrictions required by the Federal Facilities Agreement (FFA) and the ROD Land Use Controls. However, the Prairie Gateway Planned Unit Development (PUD) and Amendment #1 included development uses inconsistent with the residential/gardening deed restriction [3].

On March 31, 2016, the U.S. Army notified Commerce City of Land Use Control Violations of the "Refuge Act". On Sept. 14, 2017, the Colorado Dept. of Public Health and Environment files Civil Action No. 17CV2223 reading sale to Commerce City in violation of Rocky Mountain Arsenal Institutional Controls.

**Response:** The Army recognizes [REDACTED] sustained commitment to providing input on the Rocky Mountain Arsenal remediation program. As pointed out in the comments, the Records of Decision, Federal Facility Agreement, and Rocky Mountain Arsenal National Wildlife Refuge Act of 1992 (Refuge Act) include land use restrictions or controls applicable to the on-post and off-post Operable Units. The Army performs at least annual inspections of all land use controls to ensure they are effectively implemented to help maintain protectiveness of human health and the environment. Results of the inspections are documented in annual Land Use Control Monitoring Reports.

The comment notes a transfer of land from the Federal government (USFWS) to Commerce City that occurred August 20, 2007, and identifies a concern over compliance with the controlling documents, CERCLA, and other State of Colorado provisions. The Army and USFWS worked cooperatively with CDPHE to provide the documentation related to assessment of the property completed prior to the transfer. The documentation associated with the transfer was determined to be sufficient, resolving the issue. In addition, the deed for the transferred property does include the required CERCLA restrictions and maintains the land use controls for the property in perpetuity.

The comment notes an Army communication with Commerce City on March 31, 2016, regarding existing land use controls. The comment incorrectly alleges that the Army notified Commerce City of violations of the land use controls included in the Rocky Mountain Arsenal National Wildlife Refuge Act. Instead, the letter identified land uses included in the Prairie Gateway Planned Unit Development (PUD) that could conflict with the Refuge Act, if implemented. Although the Army and Commerce City had previously discussed the PUD issues, the communication was designed to provide documentation of the understanding of the existing requirements. Commerce City provided a response to the Army on April 1, 2016, confirming their understanding of the existing restrictions and commitment to coordinate with the Army regarding revision of the PUD. In addition, per the 2017 National Defense Authorization Act, Commerce City is required to perform a risk assessment to demonstrate that a change in land use will be protective of human health and the environment. The risk assessment must be completed pursuant to CERCLA requirements and any response actions necessary must also be completed before the proposed use can be allowed.

## City of Commerce City, Colorado REISBECK SUBDIVISION violations

Reisbeck Subdivision (Reisbeck) was subdivided in Adams County in 1966 and zoned Industrial-1 in 1968 {Pursuant to C.R.S. 24-68-103 creating a vested property right} [4]. On November 10, 1982, the SACWSD District agreed to serve the Reisbeck property. On August 20, 1985, Reisbeck was included in the service area of the South Adams County Water and Sanitation District (SACWSD) recorded August 29, 1985, in Adams County Book 3042 at Page 529.

Notwithstanding C.R.S. 31-12-105, Commerce City illegally annexed the Reisbeck Subdivision rail-spur to facilitate a Commerce City 'residential' development north of Reisbeck upon the RMA Off-Post groundwater Superfund site. Commerce City alleges Reisbeck petitioned for annexation in Book 3412 Page 880 *which was not true* [5].

On November 15, 1996, the "Riverdale Dunes Metropolitan District No. 2", was created in conformance with the Service Plan and Resolution Approval of the City Council of the City of Commerce City, Colorado to be known as the "City of Commerce City Northern Infrastructure General Improvement District" [6]. This District PETITION incorporated the "District Improvements" of "Water improvements, including but not limited to transmission and distribution lines, reservoirs, hydrants, meters, pumping stations, water taps, and all necessary, incidental and appurtenant properties and facilities" which were provided by the Army under the Off-Post ROD dated December 19, 1995 [7].

On August 18, 1997, the City of Commerce City Northern Infrastructure General Improvement District incorporates Reisbeck under the false pretext of the Enterprise Corridor Land association ownership (Quit Claim Deed) of the Reisbeck "rail spur" [8].

On December 23, 1997, Reisbeck Subdivision was included in the service boundaries of the South Adams County Water and Sanitation District [9].

On February 19, 1998, the *ORGANISATION FOR THE PROHIBITION OF CHEMICAL WEAPONS* confirms (document ODG/0114/98) that DIMP is a Scheduled 2 B chemical pursuant to the *Chemical Weapons Convention (CWC)* prohibiting release into the environment {Note: On December 22, 2003, Laura Williams, USEPA Region 8 Team Leader for RMA confirmed (Ref: 8EPR-F) that "... The Army did not identify the CDC as a consideration for development of the groundwater treatment requirements...."}.

On April 27, 1998, the Northern Infrastructure General Improvement District and South Adams County Water and Sanitation District agreed to a mandate of Commerce City Annexation for SACWSD service.

On May 22, 1998, Reisbeck applied (application 000241) for an Off-post ROD water connection with SACWSD as provided in the RMA Off-post ROD which was granted December 31, 1998 [10].

On July 19, 1999, "Dunes Development" petitions for residential development in Commerce City, utilizing the Northern Infrastructure General Improvement District for its improvements, 'abandoning' the use of the Reisbeck rail spur [11].

Upon the Commerce City municipal steps, post-election evening of April 3, 2001, where [REDACTED] (Past RAB Chairwoman [REDACTED]) ousts [REDACTED] from the Commerce City Council, [REDACTED] tells the undersigned that they will never let me develop Reisbeck Subdivision in Adams County – only Commerce City. I asked if that was a threat and Larry responded: “No, a promise – your Title is already sullied”.

On December 4, 2001, Reisbeck gives its “Notice of Intent to Preserve an (its) Interest in the aforementioned rail spur [12]. On October 9, 2002, SACWSD dedicated 54 “Equivalent Residential Units (ERU’s) to the Reisbeck property; 1.5 ERU’s per each of Reisbeck’s “Industrial” acres.

On March 4, 2004, the City of Commerce City acknowledged that the Commerce City road construction supervision of June 23, 1997, and September 25, 2001 on 112<sup>th</sup> avenue, changed the 112<sup>th</sup> historical road grade – removing two (2) lanes of asphalt, without restoration, and thereafter negligently buried SACWSD installed fire hydrants (June-July 2004) creating major property drainage problems for Reisbeck.

On April 28, 2004, SACWSD and the City of Commerce City crafted an *Intergovernmental Agreement*, paragraph 13, wherein SACWSD agreed that: “City Approval of Development. South Adams hereby agrees that it shall only issue water and sewer taps to property within the GSA or the RMA Lands with prior City approval of development of those lands....”

On June 14, 2004, Reisbeck received its “*No Action Determination Approval for Property at 9940-9982 East 112<sup>th</sup> Avenue, Henderson, CO*” **requiring** “...this approval applies only for the land use specified in the application, which is Adams County Industrial-1....” [13]. On November 4, 2004, USEPA gives Notice to Reisbeck that EPA retains its “Statutory right of access” (3<sup>rd</sup> Party Access Easement) over Reisbeck.

Notwithstanding Reisbeck’s VCUP requirements, on February 7, 2005, the City of Commerce City attorney Timothy J. Beaton advised Reisbeck that “... in any event, annexation of the property (Reisbeck) into Commerce City is required under the 2004 IGA between the District and the City” {Note: Mr. Beaton reaffirmed the City’s position in its December 8, 2010, SACWSD Board meeting}.

Beginning January 11, 2006, SACWSD refers all Reisbeck development plans for any Adams County project(s) to Commerce City {See: Adams County Development Review Planner-1 Abel M. Montoya letter dated October 6, 2004 regarding Reisbeck PRE2004-00091; and, SACWSD Minutes, Pg. 1 lines 29-31 and Pg 2 lines 1-2 and, City of Commerce City Regional Projects Manager Tom Acre letter dated May 10, 2006}.

Notwithstanding C.R.S. 31-12-115, on November 21, 2007, Commerce City Planner Brian Garner confirms that although the Reisbeck rail-spur was annexed, Commerce City refuses to apply its’ city zoning designation to the Reisbeck parcel.

On March 24, 2008, Colorado Senate Bill 08-037 (SB08-037) passes, legalizing the application of “Notice of Environmental Use restriction” in Colorado. During 2010 and 2011, ignoring SB08-037 and Reisbeck’s VCUP, Commerce City revises its Comprehensive Land Development Plan identifying Reisbeck (Adams County I-1) as a “Residential-High” USE in

Commerce City. On April 26, 2011, Commerce City Engineer Daren A. Sterling attempted to close 2 of the 3 Reisbeck property access points predicated upon the Commerce City annexation.

The City of Commerce City tortiously interfered (asserting jurisdictional USE control over Adams County) with Reisbeck negotiations regarding its real estate sales transactions, dismissing the Reisbeck VCUP requirements of Adams County I-1 zoning development, on the following occasions:

December 10, 2002	<i>KINGDOM HOMES</i> Adams Co. Permit BDP03-1798
April 20, 2018	<i>SITE RECON</i>
April 21, 2018	<i>MAVERIK</i>
July 10, 2018	<i>STINKER OIL</i>
June 6, 2019	<i>QUIK TRIP</i>

Generally, from Dec. 2002 through May 2021, over 3,631 real estate transactions valued at more than \$1,340,154,890, have occurred upon the RMA Off-post Superfund site, as annexed by Commerce City (Henderson). No disclosure was given to Grantee's (Buyers) regarding the RMA Off-post USEPA statutory right of access; undermining the transaction *Deeds* which covenant full-disclosure of any third-party access easement upon the Off-Post ROD properties; resulting in transaction fraud.

Specifically, the Quik Trip tortious interference by Commerce City, attempted to undermine Reisbeck's 54 ERU alternate water supply dedication as provided by the ROD; undermining the protections of Reisbeck by the State's VCUP; and costing Reisbeck \$150,000.00 in minimum damages.

Commerce City's June 2021 establishment of its *Environmental Policy Advisory Committee* [Res 2021-38] in tandem with its *Comprehensive Plan Update* [Pres 21-302] is suspect at best – given Commerce City's decades-long mis-behaviors of self-interest, and irresponsible decision-making, concerning the Rocky Mountain Arsenal Off-Post contamination pathways.

I seek a written response addressing the City of Commerce City's continual and willful violations of RMA Off-Post Institutional Controls which were implemented pursuant to Colorado Statutes and the RMA Off-post ROD.

Regards,

[REDACTED]

Property Owner

[REDACTED]

**Comment:** In closing, I ask that the *Five Year Review* address the extent to which these failures to comply with the RMA Off\_Post Institutional Controls, if true, could materially and adversely impact the intended longterm protectiveness of the Rocky Mountain Arsenal Off-Post remedy.



**Response:** Much of the narrative included in these comments involve actions taken by Commerce City or Adams County related to the Reisbeck Subdivision. Although the Army recognizes the apparent frustration with the long history portrayed by these communications, there is no violation of ROD-required land use controls evident.

To the extent of the Army's knowledge, both Commerce City and the South Adams County Water and Sanitation District have complied with the requirements of the institutional controls identified in the Off-Post ROD. As such, there has been no negative impact to protectiveness of the remedy due to failure of institutional controls in the off-post Operable Unit, and there are no issues identified as a result of the five-year review.

## **APPENDIX C**

### **Operable Units Associated with the RMA Site**

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### **Operable Units Associated with the RMA Site**

The RMA Site consists of 30 EPA-identified Operable Units (OUs), numbered 0 through 29. The OUs include 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 on-post IRAs (OUs 6 through 29) either contributed to or were incorporated into the final remedy for OU 3 (On-Post OU). The four off-post IRAs (OUs 00, 01, 02, and 05) contributed to the final remedy for the OU 4 (Off-Post OU). One IRA (OU 5) was incorporated into the final remedy for OU 4.

Two IRAs (OUs 01 and 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.

Table C-1, provided by EPA, presents the EPA OU number that correlates with each FYRR project and identifies any IRAs associated with each project.

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**Table C-1. Correlation of Rocky Mountain Arsenal Five-Year Review Report (FYRR) Project #s and EPA’s Operable Units (OU) Designation**

<b>FYRR Project #</b>	<b>Project Name</b>	<b>EPA Operable Unit (OU) Number</b>	<b>Associated Interim Response Action (IRA) OU, if any, (and FYRR Project #)</b>
1	Corrective Action Management Unit (CAMU)/Basin A Well Abandonment	3 – On-post, Phase 24	
2	CAMU Soil Remediation		
	CAMU Soils Remediation Completion and Support	3 – On-post, Phase 26	
3	Construction of Hazardous Waste Landfill (HWL) Wastewater Treatment Unit	3 – On-post, Phase 23	
4	Construct Hazardous Waste Landfill Cell 1	3 – On-post, Phase 9	
5	Section 26 Human Health Exceedance and Biota Exceedance Soils Removal	3 – On-post, Phase 42	
6	Construct Hazardous Waste Landfill Cell 2	3 – On-post, Phase 44	
7	Operation of Hazardous Waste Landfill Cells 1 and 2	3 – On-post, Phase 73	
8	Hazardous Waste Landfill Cap Construction	3 – On-post, Phase 74	
	Hazardous Waste Landfill Post-Closure O&M	3 – On-post, Phase 74 O&M	
9	Landfill Wastewater Treatment Addition of Ion Exchange	3 – On-post, Phase 66	
10	Operation of Hazardous Waste Landfill Wastewater Treatment System	3 – On-post, Phases: 73 (HWL Ops), 76 (ELF Ops), and 90 (LWTS Closure)	
11	Construct Enhanced Hazardous Waste Landfill (ELF) O&M	3 – On-post, Phase 36	
12	Operation of Enhanced Landfill	3 – On-post, Phase 76	
13	Enhanced Hazardous Waste Landfill Cap Construction	3 – On-post, Phase 77	
	Enhanced Hazardous Waste Landfill Post-Closure O&M	3 – On-post, Phase 77 O&M	

**Table C-1. Correlation of Rocky Mountain Arsenal Five-Year Review Report (FYRR) Project #s and EPA’s Operable Units (OU) Designation (Continued)**

<b>FYRR Project #</b>	<b>Project Name</b>	<b>EPA Operable Unit (OU) Number</b>	<b>Associated Interim Response Action (IRA) OU, if any, (and FYRR Project #)</b>
14	Basin A Consolidation and Remediation Area Operations/Subgrade	3 – On-post, Phase 10	13: Fugitive Dust Control (FYRR #77)
15	Integrated Cover System, Basin A Consolidation and Remediation Area	3 – On-post, Phases: 72 (Basin A Cover) 810 (ICSD)	
	Integrated Cover System Interim O&M, Basin A Consolidation and Remediation Area	3 – On-post, Phase 810 O&M	
16	Sanitary and Chemical Sewer Manhole Plugging Phase I	3 – On-post, Phase 11	14: Sanitary Sewers Remediation (FYRR #78)
17	Shell Disposal Trenches Slurry Walls (Construction)	3 – On-post, Phase 13	23: Remediation of Other Contamination Sources – Shell
	Shell Disposal Trenches Slurry Walls (Dewatering)	3 – On-post, Phase 52	Section 36 Trenches (FYRR #86)
	Complex (Army) Disposal Trenches Slurry Walls (Construction)	3 – On-post, Phase 12	22: Remediation of Other Contamination Sources – Army
	Complex (Army) Disposal Trenches Slurry Walls (Dewatering)	3 – On-post, Phase 51	(Complex) Disposal Trenches (FYRR #85)
18	Post-ROD Removal Actions for Structures – Administrative Areas Asbestos Remediation Projects	3 – On-post, Phase 7	15: Asbestos Remediation (FYRR #79)
	Post-ROD Removal Actions for Structures – Exterior Piping Chemical Related Activities	3 - On-post, Phase 8	26: Chemical Process-Related Activities (FYRR #92)
	Post-ROD Removal Actions for Structures – Interior Building Chemical Related Activities for South Plants	3 – On-post, Phase 27	26: Chemical Process-Related Activities (FYRR #92)
19	Toxic Storage Yards Soil Remediation	3 – On-post, Phase 22	27: Chemical Process-Related Activities / Underground Storage Tank (FYRR #92)
20	Existing (Sanitary) Landfills Remediation Section 1	3 – On-post, Phases: 18 (design) and 57 (construction)	

**Table C-1. Correlation of Rocky Mountain Arsenal Five-Year Review Report (FYRR) Project #s and EPA’s Operable Units (OU) Designation (Continued)**

<b>FYRR Project #</b>	<b>Project Name</b>	<b>EPA Operable Unit (OU) Number</b>	<b>Associated Interim Response Action (IRA) OU, if any, (and FYRR Project #)</b>
21	Existing (Sanitary) Landfills Remediation Section 4	3 – On-post, Phases: 18 (design) and 56 (construction)	
22	Existing (Sanitary) Landfills Remediation Section 36	3 – On-post, Phases: 18 (design) and 59 (construction)	
	Existing (Sanitary) Landfills Remediation Section 30	3 – On-post, Phases: 18 (design) and 58 (construction)	
23	Lake Sediments Remediation	3 – On-post, Phases: 19 (design) and 30 (construction)	
24	Burial Trenches Soil Remediation Part I	3 – On-post, Phases: 14 (design) and 68 (construction)	
	Burial Trenches Soil Remediation Part II	3 – On-post, Phases: 14 (design) and 64 (construction)	
25	Munitions (Testing) Soil Remediation Part I	3 – On-post, Phases: 14 (design) and 65 (construction)	
	Munitions (Testing) Soil Remediation Part II	3 – On-post, Phases: 14 (design) and 71 (construction)	
	Munitions (Testing) Soil Remediation Part III	3 – On-post, Phases: 14 (design) and 81 (construction)	
	Munitions (Testing) Soil Remediation Part IV	3 – On-post, Phases: 14 (design) and 82 (construction)	

**Table C-1. Correlation of Rocky Mountain Arsenal Five-Year Review Report (FYRR) Project #s and EPA’s Operable Units (OU) Designation (Continued)**

<b>FYRR Project #</b>	<b>Project Name</b>	<b>EPA Operable Unit (OU) Number</b>	<b>Associated Interim Response Action (IRA) OU, if any, (and FYRR Project #)</b>
26	Miscellaneous Northern Tier Soil Remediation	3 – On-post, Phases: 19 (design) and 29 (construction)	
27	Miscellaneous Southern Tier Soil Remediation	3 – On-post, Phases: 19 (design) and 28 (construction)	
	Miscellaneous Southern Tier Soil Remediation, Sand Creek Lateral	3 – On-post, Phase 83	
28	Bedrock Ridge Extraction System	3 – On-post, Phase 17	
29	South Plants Structures Demolition and Removal Phase 1	3 – On-post, Phase 20	12: Closure of the Hydrazine Facility (FYRR #76) 26: Chemical Process-Related Activities (FYRR #92) and 27: Underground Storage Tank/Chemical Process-Related
	South Plants Structures Demolition and Removal Phase 2	3 – On-post, Phase 35	Activities (FYRR #92) 29: Pretreatment of CERCLA Liquid Wastes (IRA) – Element Two, Polychlorinated Biphenyls (PCBs) (FYRR #90)
30	Miscellaneous RMA Structures Demolition and Removal Phase I	3 – On-post, Phases: 31 (design) and 61 (demolition)	26: Chemical Process-Related Activities (FYRR #92) 27: Chemical Process-Related Activities / Underground Storage Tank (FYRR #92) 28: Pretreatment of CERCLA Liquid Wastes (IRA) – Element One, Waste Management and Element Three, Waste Storage 29: Pretreatment of CERCLA Liquid Wastes (IRA) – Element Two, Polychlorinated Biphenyls (PCBs) (FYRR #90)
	Miscellaneous RMA Structures Demolition and Removal Phase II	3 – On-post, Phases: 31 (design) and 62 (demolition)	

**Table C-1. Correlation of Rocky Mountain Arsenal Five-Year Review Report (FYRR) Project #s and EPA’s Operable Units (OU) Designation (Continued)**

<b>FYRR Project #</b>	<b>Project Name</b>	<b>EPA Operable Unit (OU) Number</b>	<b>Associated Interim Response Action (IRA) OU, if any, (and FYRR Project #)</b>
	Miscellaneous RMA Structures Demolition and Removal Phase III	3 – On-post, Phases: 31 (design) and 63 (demolition)	
	Miscellaneous RMA Structures Demolition and Removal Phase IV	3 – On-post, Phases: 31 (design) and 89 (demolition)	
31	Buried M-1 Pits Soil Remediation	3 – On-post, Phase 32	16: Remediation of Other Contamination Sources – M-1 Settling Basins (FYRR #87)
32	Hex Pit Soil Remediation	3 – On-post, Phases: 33 (In-situ Thermal Desorption) 91 (Soil Excavation)	
33	South Plants Balance of Areas and Central Processing Area Soil Remediation Phase 1	3 – On-post, Phase 34	
34	South Plants Balance of Areas and Central Processing Area Soil Remediation Phase 2, Parts 1 and 2	3 – On-post, Phase 45	
	Integrated Cover System, South Plants Balance of Areas and Central Processing Area	3 – On-post, Phases: 69 (S Plants Cover) and 810 (ICSD)	
	Integrated Cover System Interim O&M, South Plants Balance of Areas and Central Processing Area	3 – On-post, Phase 810 O&M	
35	Sanitary Sewer Manhole Plugging Project Phase II	3 – On-post, Phase 37	14: Sanitary Sewers Remediation (FYRR #78)
36	Section 36 Balance of Areas Soil Remediation Parts 1 and 2	3 – On-post, Phases: 49 (Part 1) and 87 (Part 2)	
37	Secondary Basins Soil Remediation, Phase I and II	3 – On-post, Phases: 46 (Phase I) 50 (Phase II)	
	Secondary Basins Soil Remediation, NCSA-2d (Basin B Drainage Ditch) Contingent Soil Volume	3 – On-post, Phase 88	

**Table C-1. Correlation of Rocky Mountain Arsenal Five-Year Review Report (FYRR) Project #s and EPA’s Operable Units (OU) Designation (Continued)**

<b>FYRR Project #</b>	<b>Project Name</b>	<b>EPA Operable Unit (OU) Number</b>	<b>Associated Interim Response Action (IRA) OU, if any, (and FYRR Project #)</b>
38	Complex (Army) Disposal Trenches Remediation Subgrade Construction	3 – On-post, Phases: 75 (Army Subgrade) and 810 (ICSD)	
	Integrated Cover System, Complex (Army) Disposal Trenches Remediation Cover	3 – On-post, Phases: 51 (Army Cover) and 810 (ICSD)	
	Integrated Cover System O&M, Complex (Army) Disposal Trenches Remediation Cover	3 – On-post, Phase 810 O&M	
39	Shell Disposal Trenches RCRA-Equivalent Cover Construction	3 – On-post, Phases: 52 (Shell Cover) and 810 (ICSD)	
	Shell Disposal Trenches RCRA-Equivalent Cover Interim O&M	3 – On-post, Phase 810 O&M	
	Integrated Cover System, Shell Disposal Trenches 2-ft Soil Covers	3 – On-post, Phases: 52 (Shell Cover) and 810 (ICSD)	
	Integrated Cover System O&M, Shell Disposal Trenches 2-ft Soil Covers	3 – On-post, Phase 810 O&M	
40	North Plants Soil Remediation Free Product Removal - Pilot	3 – On-post, Phase 53	
41	Section 35 Soil Remediation	3 – On-post, Phase 40	
	Section 35 Soil Remediation, Sand Creek Lateral	3 – On-post, Phase 83	
42	North Plants Structure Demolition and Removal	3 – On-post, Phase 38	11: Building 1727 Sump Liquid (FYRR #75) 26: Chemical Process-Related Activities (FYRR #92) 27: Chemical Process-Related Activities / Underground Storage Tank (FYRR #92) and 29: Pretreatment of CERCLA Liquid Wastes (IRA) – Element Two, Polychlorinated Biphenyls (PCBs) (FYRR #90)

**Table C-1. Correlation of Rocky Mountain Arsenal Five-Year Review Report (FYRR) Project #s and EPA’s Operable Units (OU) Designation (Continued)**

<b>FYRR Project #</b>	<b>Project Name</b>	<b>EPA Operable Unit (OU) Number</b>	<b>Associated Interim Response Action (IRA) OU, if any, (and FYRR Project #)</b>
43	Basin F Wastepile Remediation	3 – On-post, Phase 41	10: Basin F Liquid, Sludge, and Soil Remediation Element One, Basin F Wastepile (FYRR #73) and Deep Disposal Well Closure (FYRR #93) and 25: Basin F Liquid, Sludge, and Soil Remediation Element Two, Basin F Liquid (FYRR #74)
44	Former Basin F Principal Threat Soil Remediation (formerly known as Former Basin F Solidification)	3 – On-post, Phase 54	
45	Basin F/Basin F Exterior Remediation Part I/Phase I	3 – On-post, Phase 47	10: Basin F Liquid, Sludge, and Soil Remediation Element One, Basin F Wastepile (FYRR #73) and Deep Disposal Well Closure (FYRR #93)
	Basin F/Basin F Exterior Remediation Part I/Phase II – Remaining Biota Soil	3 – On-post, Phase 48	
46	Basin F/Basin F Exterior RCRA-Equivalent Cover Construction (Basin F Cover)	3 – On-post, Phase 48	
	Basin F/Basin F Exterior RCRA-Equivalent Cover Post-Closure O&M (Basin F Cover)	3 – On-post, Phase 48 O&M	
47	Section 36 Lime Basins Soil Remediation Slurry/Barrier Wall, (Construction) including Lime Basins Dewatering Wells	3 – On-post, Phase 43	20: Remediation of Other Contamination Sources – Lime Settling Basins (FYRR #83)
	Section 36 Lime Basins Slurry/Barrier Wall (Dewatering)	3 – On-post, Phase 84	
	Section 36 Lime Basins DNAPL Remediation	3 – On-post, Phase 92	
	Integrated Cover System Construction, Section 36 Lime Basins Cover	3 – On-post, Phases: 84 (Lime Basins Cover) and 810 (ICSD)	
	Integrated Cover System Interim O&M, Section 36 Lime Basins Cover	3 – On-post, Phase 810 O&M	

**Table C-1. Correlation of Rocky Mountain Arsenal Five-Year Review Report (FYRR) Project #s and EPA’s Operable Units (OU) Designation (Continued)**

<b>FYRR Project #</b>	<b>Project Name</b>	<b>EPA Operable Unit (OU) Number</b>	<b>Associated Interim Response Action (IRA) OU, if any, (and FYRR Project #)</b>
47a	Borrow Areas Operations	3 – On-post, Phase 350	
	Residual Ecological Risk Soil Remediation	3 – On-post, Phases: 78 (design) 79 (Part 1 implementation) 80 (Part 2 implementation)	
48	Site-Wide Biota Monitoring	3 – On-post	
49	Site-Wide Air Monitoring	3 – On-post, Phase 500	
50	Site-Wide Groundwater Monitoring	3 – On-post	
50a	On-Post Surface Water Quality Monitoring	3 – On-post	
50b	On-Post Surface Water Management	3 – On-post	
50c	Off-Post Surface Water Monitoring	4 - Offpost	
51	Unexploded Ordnance (UXO) Management	3 – On-post, Phases: 61 (Misc. Structures I) 64 (Burial Trenches II) 81 (Munitions Testing III)	
52	Medical Monitoring Program	3 – On-post	
53	Western Tier Parcel (deletion)	3 – On-post	
54	Trust Fund	3 – On-post	
55	South Adams County Water Supply	3 – On-post	
56	Henderson Distribution	3 – On-post, Phase 15	
57	Confined Flow System Well Closure	3 – On-post, Phase 25	8: Closure of Abandoned Wells at RMA (FYRR #71)

**Table C-1. Correlation of Rocky Mountain Arsenal Five-Year Review Report (FYRR) Project #s and EPA’s Operable Units (OU) Designation (Continued)**

<b>FYRR Project #</b>	<b>Project Name</b>	<b>EPA Operable Unit (OU) Number</b>	<b>Associated Interim Response Action (IRA) OU, if any, (and FYRR Project #)</b>
58	Irondale Containment System Main Well Field Treatment Shutdown	3 – On-post, Phase 6 4 – Offpost, Phase 6	6: Improvement of North Boundary Containment System and Evaluation of All Existing Boundary Systems – Irondale Containment System (FYRR #68)
	Motor Pool Area Extraction System	3 – On-post, Phase 6 4 – Offpost, Phase 6	18: Remediation of Other Contamination Sources – Motor Pool Area, Soil Vapor Extraction (FYRR #80) and Groundwater Remediation (FYRR #81)
	Railyard Containment System	3 – On-post, Phase 6 4 – Offpost, Phase 6	19: Remediation of Other Contamination Sources – Rail Classification Yard (FYRR #82) and 27: Chemical Process-Related Activities / Underground Storage Tank (FYRR #92)
59	North of Basin F Groundwater Plume Remediation System	3 – On-post, Phase 3	7: Groundwater Intercept and Treatment North of Basin F (FYRR #70)
	Basin A Neck System	3 – On-post, Phase 4	9: Basin A Neck Containment System (FYRR #72)
	Basin A Neck System – Lime Basin Groundwater Treatment Relocation and Basin A Neck Expansion	3 – On-post, Phases: 4 (Basin A Neck) and 84 (Lime Basins Dewatering)	
60	Operation of CERCLA Wastewater Treatment Facility	3 – On-post, Phases: 5 (Wastewater Treatment) 31 and 89 (Misc. Structures IV)	17: Pretreatment of CERCLA Liquid Wastes – Wastewater Treatment System (FYRR #88)
60a	South Plants and Lime Basins Mass Removal Project	3 – On-post, Phase 86	20: Remediation of Other Contamination Sources – Lime Settling Basins (FYRR #83) 21: Remediation of Other Contamination Sources – South Tank Farm Plume (FYRR #84)
61	Northwest Boundary Containment System	3 – On-post, Phase 1 4 – Offpost, Phase 5	24: Improvement of North Boundary Containment System and Evaluation of All Existing Boundary Systems – Northwest Boundary Containment System (FYRR #69)
62	North Boundary Containment System	3 – On-post, Phase 2 4 – Offpost, Phase 4	6: Improvement of North Boundary Containment System and Evaluation of All Existing Boundary Systems – North Boundary Containment System Improvements (FYRR #67)

**Table C-1. Correlation of Rocky Mountain Arsenal Five-Year Review Report (FYRR) Project #s and EPA’s Operable Units (OU) Designation (Continued)**

<b>FYRR Project #</b>	<b>Project Name</b>	<b>EPA Operable Unit (OU) Number</b>	<b>Associated Interim Response Action (IRA) OU, if any, (and FYRR Project #)</b>
63	n-Nitrosodimethylamine (NDMA) Monitoring and Assessment	3 – On-post, Phase 21	
64	South Lakes Plume Management	3 – On-post	21: Remediation of Other Contamination Sources – South Tank Farm Plume (FYRR #84)
65	Basin F Wastepile Operations and Management	3 – On-post	10: Basin F Liquid, Sludge, and Soil Remediation Element One, Basin F Wastepile (FYRR #73) and Deep Disposal Well Closure (FYRR #93)
66	Off-Post Groundwater Intercept and Treatment System (IRA) – see #94	4 – Offpost, Phase 3	5: Off-Post Groundwater Intercept and Treatment System (FYRR #66)
67	Improvement of North Boundary Containment System and Evaluation of All Existing Boundary Systems (IRA) – North Boundary Containment System Improvements – see #62	3 – On-post, Phase 2 4 – Offpost, Phase 4	6: Improvement of North Boundary Containment System and Evaluation of All Existing Boundary Systems – North Boundary Containment System Improvements (FYRR #67)
68	Improvement of North Boundary Containment System and Evaluation of All Existing Boundary Systems (IRA) – Irondale Containment System – see #58	3 – On-post, Phase 6 4 – Offpost, Phase 6	6: Improvement of North Boundary Containment System and Evaluation of All Existing Boundary Systems – Irondale Containment System (FYRR #68)
69	Improvement of North Boundary Containment System and Evaluation of All Existing Boundary Systems (IRA) – Northwest Boundary Containment System – see #61	3 – On-post, Phase 1 4 – Offpost, Phase 5	24: Improvement of North Boundary Containment System and Evaluation of All Existing Boundary Systems – Northwest Boundary Containment System (FYRR #69)
70	Groundwater Intercept and Treatment North of Basin F (IRA) – see #59	3 – On-post, Phase 3	7: Groundwater Intercept and Treatment North of Basin F (FYRR #70)
71	Closure of Abandoned Wells at RMA (IRA) – see #57	3 – On-post, Phase 25	8: Closure of Abandoned Wells at RMA (FYRR #71)
72	Basin A Neck Containment System (IRA) – see #59	3 – On-post, Phase 4	9: Basin A Neck Containment System (FYRR #72)

**Table C-1. Correlation of Rocky Mountain Arsenal Five-Year Review Report (FYRR) Project #s and EPA’s Operable Units (OU) Designation (Continued)**

<b>FYRR Project #</b>	<b>Project Name</b>	<b>EPA Operable Unit (OU) Number</b>	<b>Associated Interim Response Action (IRA) OU, if any, (and FYRR Project #)</b>
73	Basin F Liquid, Sludge, and Soil Remediation (IRA) Element One, Basin F Wastepile – see #43, 44, 45, and 93	3 – On-post, Phases: 41 (Wastepile Excavation), 47 (Basin F/Exterior Part 1), 48 (Basin F/Exterior Part 2), 54 (Principal Threat Soils)	10: Basin F Liquid, Sludge, and Soil Remediation Element One, Basin F Wastepile (FYRR #73) and Deep Disposal Well Closure (FYRR #93)
74	Basin F Liquid, Sludge, and Soil Remediation (IRA) Element Two, Basin F Liquid	3 – On-post	25: Basin F Liquid, Sludge, and Soil Remediation (IRA) Element Two, Basin F Liquid (SQI) (FYRR #74)
75	Building 1727 Sump Liquid (IRA) – see #42	3 – On-post, Phase 38	11: Building 1727 Sump Liquid (FYRR #75)
76	Closure of the Hydrazine Facility (IRA) – see #29	3 – On-post, Phases: 20 (S Plants Demolition 1) 35 (S Plants Demolition 2)	12: Closure of the Hydrazine Facility (FYRR #76)
77	Fugitive Dust Control (IRA) – see #14	3 – On-post, Phase 10	13: Fugitive Dust Control (FYRR #77)
78	Sanitary Sewers Remediation (IRA) – see #16 and 35	3 – On-post, Phases: 11 (Manhole Plugging I) and 37 (Manhole Plugging II)	14: Sanitary Sewers Remediation (FYRR #78)
79	Asbestos Remediation (IRA) – see #18	3 – On-post, Phase 7	15: Asbestos Remediation (FYRR #79)
80	Remediation of Other Contamination Sources (IRA) – Motor Pool Area, Soil Vapor Extraction – see #58	3 – On-post, Phase 6 4 – Offpost, Phase 6	18: Remediation of Other Contamination Sources – Motor Pool Area, Soil Vapor Extraction (FYRR 80)
81	Remediation of Other Contamination Sources (IRA) – Motor Pool Area, Groundwater Remediation – see #58	3 – On-post, Phase 6 4 – Offpost, Phase 6	18: Remediation of Other Contamination Sources – Motor Pool Area, Groundwater Remediation (FYRR #81)
82	Remediation of Other Contamination Sources (IRA) – Rail Classification Yard – see #58 and 92	3 – On-post, Phase 6 4 – Offpost, Phase 6	19: Remediation of Other Contamination Sources – Rail Classification Yard (FYRR #82) and 27: Chemical Process-Related Activities / Underground Storage Tank (FYRR #92)
83	Remediation of Other Contamination Sources (IRA) – Lime Settling Basins – see #47	3 – On-post, Phase 43	20: Remediation of Other Contamination Sources – Lime Settling Basins (FYRR #83)

**Table C-1. Correlation of Rocky Mountain Arsenal Five-Year Review Report (FYRR) Project #s and EPA’s Operable Units (OU) Designation (Continued)**

<b>FYRR Project #</b>	<b>Project Name</b>	<b>EPA Operable Unit (OU) Number</b>	<b>Associated Interim Response Action (IRA) OU, if any, (and FYRR Project #)</b>
84	Remediation of Other Contamination Sources (IRA) – South Tank Farm Plume – see #60a and 64	3 – On-post, Phases: 86 (Mass Removal) and S Lakes Plume Management	21: Remediation of Other Contamination Sources – South Tank Farm Plume (FYRR #84)
85	Remediation of Other Contamination Sources (IRA) – Army (Complex) Disposal Trenches – see #17	3 – On-post, Phases: 12 (Slurry Wall) 51 (Dewatering)	22: Remediation of Other Contamination Sources – Army (Complex) Disposal Trenches (FYRR #85)
86	Remediation of Other Contamination Sources (IRA) – Shell Section 36 Trenches – see #17	3 – On-post, Phases: 13 (Slurry Wall) and 52 (Dewatering)	23: Remediation of Other Contamination Sources – Shell Section 36 Trenches (FYRR #86)
87	Remediation of Other Contamination Sources (IRA) – M-1 Settling Basins – see #31	3 – On-post, Phase 32	16: Remediation of Other Contamination Sources – M-1 Settling Basins (FYRR #87)
88	Pretreatment of CERCLA Liquid Wastes (IRA) – Wastewater Treatment System – see #30 and 60	3 – On-post, Phases: 5 (Wastewater Treatment) and 31 and 89 (Misc. Structures IV)	17: Pretreatment of CERCLA Liquid Wastes – Wastewater Treatment System (FYRR #88)
89	Pretreatment of CERCLA Liquid Wastes (IRA) – Element One, Waste Management - see #30 and 91	3 – On-post and 31 and 61 (Misc Structures I)	28: Pretreatment of CERCLA Liquid Wastes (IRA) – Element One, Waste Management (FYRR #89) and Element Three, Waste Storage (FYRR #91)
90	Pretreatment of CERCLA Liquid Wastes (IRA) – Element Two, Polychlorinated Biphenyls (PCBs) – see #29, 30, and 42	3 – On-post, Phases: 20 (S Plants Structures 1) 31 and 61 (Misc Structures I) 35 (S Plants Structures 2) 38 (N Plants Structures)	29: Pretreatment of CERCLA Liquid Wastes (IRA) – Element Two, Polychlorinated Biphenyls (PCBs) (FYRR #90)

**Table C-1. Correlation of Rocky Mountain Arsenal Five-Year Review Report (FYRR) Project #s and EPA’s Operable Units (OU) Designation (Concluded)**

<b>FYRR Project #</b>	<b>Project Name</b>	<b>EPA Operable Unit (OU) Number</b>	<b>Associated Interim Response Action (IRA) OU, if any, (and FYRR Project #)</b>
91	Pretreatment of CERCLA Liquid Wastes (IRA) – Element Three, Waste Storage – see #30 and 89	3 – On-post and 31 and 61 (Misc Structures I)	28: Pretreatment of CERCLA Liquid Wastes (IRA) – Element One, Waste Management (FYRR #89) and Element Three, Waste Storage (FYRR #91)
92	Chemical Process-Related Activities (IRA) – see #18, 29, 30, and 42	3 – On-post, Phases: 20 (S Plants Structures 1) 31 and 61 (Misc Structures I) 35 (S Plants Structures 2) 38 (N Plants Structures)	26: Chemical Process-Related Activities (FYRR #92)
	Chemical Process-Related Activities (IRA) / Underground Storage Tank – see #19, 29, 30, 42, 58, and 82	3 – On-post, Phases: 6 (Railyard) 20 (S Plants Structures 1) 22 (Toxic Storage Yards) 31 and 61 (Misc Structures I) 35 (S Plants Structures 2) 38 (N Plants Structures) 4 – Offpost, Phase 6 (Railyard)	27: Chemical Process-Related Activities / Underground Storage Tank (FYRR #92)
93	Deep Disposal Well Closure (IRA) – see #45 and 73	3 – On-post, Phases: 47 (Basin F/Exterior Part 1)	10: Basin F Liquid, Sludge, and Soil Remediation Element One, Basin F Wastepile (FYRR #73) and Deep Disposal Well Closure (FYRR #93)
94	Off-Post Groundwater Intercept and Treatment System – see #66	4 – Offpost, Phase 3	5: Off-Post Groundwater Intercept and Treatment System (FYRR #66)
95	Off-Post Well Abandonment	4 – Offpost, Phase 2	
96	Private Well Network	4 - Offpost	
97	Off-Post Tillage Task	4 – Offpost, Phase 1	
98	Off-Post Institutional Controls	4 – Offpost, Phase 7	
99	On-Post Institutional Controls	3 – On-post	

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## **APPENDIX D**

### **Five-Year Review Site Inspections and Interview Checklists**

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## **Appendix D Five-Year Review Site Inspection and Interview Checklists**

TAB A	Section 7 Public Access Groundwater Well Protection Inspection Checklist
TAB B	Section 20 Northeast Parcel Inspection Checklist
TAB C	Basin F Groundwater Wells Inspection Checklist
TAB D	HWL and ELF Leachate Storage and Loadout Facility Inspection Checklist
TAB E	Basin A Neck System Inspection Checklist
TAB F	North Boundary Containment System Inspection Checklist
TAB G	Northwest Boundary Containment System Inspection Checklist
TAB H	Off-Post Groundwater Intercept and Treatment System Inspection Checklist
TAB I	Railyard Containment System Inspection Checklist

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## **Five-Year Review Site Inspections**

Site inspections were conducted JJune 23 through June 25, 2020, by representatives from the Army, EPA, CDPHE, and TCHD. The purpose of the inspections was to visually assess the protectiveness of selected features and components of the On-Post and Off-Post RMA remedy. The status of these remedy components are captured in the attached inspection reports.

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**TAB A**  
**Public Access**  
**Groundwater Well Protection -**  
**Section 7**

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## Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION													
<b>Site name:</b> Public Access Well Protection, Section 7	<b>Date of inspection:</b> 6/25/2020												
<b>Location and Region:</b> Rocky Mountain Arsenal, Region 8	<b>EPA ID:</b> CO5210020769												
<b>Agency, office, or company leading the five-year review:</b> US Army	<b>Weather/temperature:</b> Sunny, Warm 85*												
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Landfill cover/containment</td> <td><input type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input type="checkbox"/> Access controls</td> <td><input type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input checked="" type="checkbox"/> Institutional controls</td> <td><input type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td><input checked="" type="checkbox"/> Other <u>Groundwater monitoring</u></td> <td></td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation	<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment	<input checked="" type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls	<input type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input checked="" type="checkbox"/> Other <u>Groundwater monitoring</u>	
<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation												
<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment												
<input checked="" type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls												
<input type="checkbox"/> Groundwater pump and treatment													
<input type="checkbox"/> Surface water collection and treatment													
<input checked="" type="checkbox"/> Other <u>Groundwater monitoring</u>													
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached													

II. INTERVIEWS (Check all that apply)	
<b>1. O&amp;M site manager</b> _____                      _____                      _____ <div style="display: flex; justify-content: space-between; width: 100%;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	
<b>2. O&amp;M staff</b> _____                      _____                      _____ <div style="display: flex; justify-content: space-between; width: 100%;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	



<b>III. ON-SITE DOCUMENTS &amp; RECORDS VERIFIED</b> (Check all that apply)				
1.	<b>O&amp;M Documents</b> <input type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input type="checkbox"/> Maintenance logs Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
4.	<b>Permits and Service Agreements</b> <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits _____ Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
5.	<b>Gas Generation Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
6.	<b>Settlement Monument Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
7.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
8.	<b>Leachate Extraction Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
9.	<b>Discharge Compliance Records</b> <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
10.	<b>Daily Access/Security Logs</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A

<b>IV. O&amp;M COSTS</b>																																																	
1.	<p><b>O&amp;M Organization</b></p> <p> <input type="checkbox"/> State in-house                      <input type="checkbox"/> Contractor for State  <input type="checkbox"/> PRP in-house                              <input type="checkbox"/> Contractor for PRP  <input type="checkbox"/> Federal Facility in-house              <input checked="" type="checkbox"/> Contractor for Federal Facility  <input type="checkbox"/> Other _____                 </p>																																																
2.	<p><b>O&amp;M Cost Records</b></p> <p> <input type="checkbox"/> Readily available              <input type="checkbox"/> Up to date  <input type="checkbox"/> Funding mechanism/agreement in place                      Original O&amp;M cost estimate _____ <input type="checkbox"/> Breakdown attached                 </p> <p style="text-align: center;">Total annual cost by year for review period if available</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">From _____</td> <td style="width: 15%;">To _____</td> <td style="width: 30%;"></td> <td style="width: 15%;"></td> <td style="width: 25%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> </table>	From _____	To _____					Date	Date	Total cost			<input type="checkbox"/> Breakdown attached	From _____	To _____		Total cost		<input type="checkbox"/> Breakdown attached	Date	Date		Total cost		<input type="checkbox"/> Breakdown attached	From _____	To _____		Total cost		<input type="checkbox"/> Breakdown attached	Date	Date		Total cost		<input type="checkbox"/> Breakdown attached	From _____	To _____		Total cost		<input type="checkbox"/> Breakdown attached	Date	Date		Total cost		<input type="checkbox"/> Breakdown attached
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Date	Date		Total cost		<input type="checkbox"/> Breakdown attached																																												
3.	<p><b>Unanticipated or Unusually High O&amp;M Costs During Review Period</b></p> <p>Describe costs and reasons: _____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>																																																

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<p><b>Fencing damaged</b>              <input type="checkbox"/> Location shown on site map    <input type="checkbox"/> Gates secured    <input type="checkbox"/> N/A</p> <p>Remarks _____</p> <p>_____</p>
<b>B. Other Access Restrictions</b>	
1.	<p><b>Signs and other security measures</b>              <input type="checkbox"/> Location shown on site map    <input type="checkbox"/> N/A</p> <p>Remarks _____</p> <p>_____</p>

<b>C. Institutional Controls (ICs)</b>			
1.	<b>Implementation and enforcement</b>		
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) _____		
	Frequency _____		
	Responsible party/agency _____		
	Contact _____		
	Name	Title	Date
	Phone no.		
	Reporting is up-to-date	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Reports are verified by the lead agency	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Violations have been reported	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached		
	_____		
	_____		
	_____		
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		
	_____		
<b>D. General</b>			
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident
	Remarks Well 07001 is located near a new public access trail and does not have a locking cap. Well does not have an outer casing, and will require a locking cap to protect it from future vandalism.		
	_____		
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A	
	Remarks A new public use trail is being built near this well location.		
	_____		
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A	
	Remarks _____		
	_____		

<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b>	<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A	
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
--

<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
1. <b>Settlement</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____ _____
2. <b>Performance Monitoring</b> Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____ _____

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ _____
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____
3. <b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____		
<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive ( <i>e.g.</i> , chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		

5.	<b>Treatment Building(s)</b>	<input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____
6.	<b>Monitoring Wells</b> (pump and treatment remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells located <input checked="" type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks Requires locking cap _____ _____
<b>D. Monitoring Data</b>		
1.	Monitoring Data	<input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality
2.	Monitoring data suggests:	<input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b>		
1.	<b>Monitoring Wells</b> (natural attenuation remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>X. OTHER REMEDIES</b>		
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.		

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>  Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).  _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

<b>B. Adequacy of O&amp;M</b>
<p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <hr/>
<b>C. Early Indicators of Potential Remedy Problems</b>
<p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <hr/>
<b>D. Opportunities for Optimization</b>
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <hr/>

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**TAB B**  
**Section 20 - Northeast Parcel**

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## Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION													
<b>Site name:</b> Section 20 NE Parcel	<b>Date of inspection:</b> 6/24/2020												
<b>Location and Region:</b> Rocky Mountain Arsenal, Region 8	<b>EPA ID:</b> CO5210020769												
<b>Agency, office, or company leading the five-year review:</b> US Army	<b>Weather/temperature:</b> Sunny, Warm 75*												
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Landfill cover/containment</td> <td><input type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input type="checkbox"/> Access controls</td> <td><input type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input checked="" type="checkbox"/> Institutional controls</td> <td><input type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> <td></td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation	<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment	<input checked="" type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls	<input type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input type="checkbox"/> Other _____	
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<input type="checkbox"/> Groundwater pump and treatment													
<input type="checkbox"/> Surface water collection and treatment													
<input type="checkbox"/> Other _____													
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached													

II. INTERVIEWS (Check all that apply)	
<b>1. O&amp;M site manager</b> _____                      _____                      _____ <div style="display: flex; justify-content: space-between; width: 100%;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	
<b>2. O&amp;M staff</b> _____                      _____                      _____ <div style="display: flex; justify-content: space-between; width: 100%;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	



<b>III. ON-SITE DOCUMENTS &amp; RECORDS VERIFIED</b> (Check all that apply)				
1.	<b>O&amp;M Documents</b> <input type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input type="checkbox"/> Maintenance logs Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
4.	<b>Permits and Service Agreements</b> <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits _____ Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
5.	<b>Gas Generation Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
6.	<b>Settlement Monument Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
7.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
8.	<b>Leachate Extraction Records</b> Remarks <u>Housing has been built to the North and East of the ie</u>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
9.	<b>Discharge Compliance Records</b> <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
10.	<b>Daily Access/Security Logs</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A

<b>IV. O&amp;M COSTS</b>																																																													
1.	<p><b>O&amp;M Organization</b></p> <p> <input type="checkbox"/> State in-house                      <input type="checkbox"/> Contractor for State  <input type="checkbox"/> PRP in-house                              <input type="checkbox"/> Contractor for PRP  <input type="checkbox"/> Federal Facility in-house              <input type="checkbox"/> Contractor for Federal Facility  <input type="checkbox"/> Other _____                 </p>																																																												
2.	<p><b>O&amp;M Cost Records</b></p> <p> <input type="checkbox"/> Readily available              <input type="checkbox"/> Up to date  <input type="checkbox"/> Funding mechanism/agreement in place                      Original O&amp;M cost estimate _____ <input type="checkbox"/> Breakdown attached                 </p> <p style="text-align: center;">Total annual cost by year for review period if available</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">From _____</td> <td style="width: 15%;">To _____</td> <td style="width: 30%;"></td> <td style="width: 15%;"></td> <td style="width: 25%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> </table>	From _____	To _____					Date	Date	Total cost			<input type="checkbox"/> Breakdown attached	From _____	To _____					Date	Date	Total cost			<input type="checkbox"/> Breakdown attached	From _____	To _____					Date	Date	Total cost			<input type="checkbox"/> Breakdown attached	From _____	To _____					Date	Date	Total cost			<input type="checkbox"/> Breakdown attached	From _____	To _____					Date	Date	Total cost			<input type="checkbox"/> Breakdown attached
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From _____	To _____																																																												
Date	Date	Total cost			<input type="checkbox"/> Breakdown attached																																																								
3.	<p><b>Unanticipated or Unusually High O&amp;M Costs During Review Period</b></p> <p>Describe costs and reasons: _____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>																																																												

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<p><b>Fencing damaged</b>              <input type="checkbox"/> Location shown on site map      <input type="checkbox"/> Gates secured      <input checked="" type="checkbox"/> N/A</p> <p>Remarks _____</p> <p>_____</p>
<b>B. Other Access Restrictions</b>	
1.	<p><b>Signs and other security measures</b>              <input type="checkbox"/> Location shown on site map      <input checked="" type="checkbox"/> N/A</p> <p>Remarks _____</p> <p>_____</p>

<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Type of monitoring (e.g., self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Reports are verified by the lead agency	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Specific requirements in deed or decision documents have been met	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Violations have been reported	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A		
	Remarks <u>A bridge, road and public trail construction has occurred on the site. Public access is now present along Second Creek.</u>			
	_____			
	_____			
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A		
	Remarks <u>Housing has been built to the North and East of the Site</u>			
	_____			
	_____			

<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b>				
	<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A		
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
--

<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
1. <b>Settlement</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                            Depth _____ Remarks _____
2. <b>Performance Monitoring</b> Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____
3. <b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____		
<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive ( <i>e.g.</i> , chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		

5.	<b>Treatment Building(s)</b>	<input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____
6.	<b>Monitoring Wells</b> (pump and treatment remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>D. Monitoring Data</b>		
1.	Monitoring Data	<input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality
2.	Monitoring data suggests:	<input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b>		
1.	<b>Monitoring Wells</b> (natural attenuation remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>X. OTHER REMEDIES</b>		
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.		

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).  _____ _____ _____ _____ _____ _____ _____ _____ _____ _____	

<b>B. Adequacy of O&amp;M</b>
<p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <hr/>
<b>C. Early Indicators of Potential Remedy Problems</b>
<p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p>This parcel of land was transferred outside of federal ownership in conflict with the requirements found in the Refuge Act. There was no confirmatory sampling at this site, but land use restrictions were included as restrictions with the deed of the property.</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
<b>D. Opportunities for Optimization</b>
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <hr/>

## Five-Year Review Site Inspection Checklist (RMA 2020)

I. SITE INFORMATION													
Site name: Section 20 NE Parcel	Date of inspection: 06-24-2020												
Location and Region:	EPA ID: C05210020769												
Agency, office, or company leading the five-year review: US Army	Weather/temperature:												
Remedy Includes: (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Landfill cover/containment</td> <td><input type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input type="checkbox"/> Access controls</td> <td><input type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input checked="" type="checkbox"/> Institutional controls</td> <td><input type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> <td></td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation	<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment	<input checked="" type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls	<input type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input type="checkbox"/> Other _____	
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<input type="checkbox"/> Groundwater pump and treatment													
<input type="checkbox"/> Surface water collection and treatment													
<input type="checkbox"/> Other _____													
Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached													

II. INTERVIEWS (Check all that apply)													
<b>1. O&amp;M site manager</b> _____ <table style="width: 100%; border: none; margin-top: 5px;"> <tr> <td style="width: 40%; text-align: center;">Name</td> <td style="width: 20%; text-align: center;">Title</td> <td style="width: 40%; text-align: center;">Date</td> </tr> <tr> <td colspan="3">               Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____             </td> </tr> <tr> <td colspan="3">               Problems, suggestions; <input type="checkbox"/> Report attached _____             </td> </tr> <tr> <td colspan="3">               _____             </td> </tr> </table>		Name	Title	Date	Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____			Problems, suggestions; <input type="checkbox"/> Report attached _____			_____		
Name	Title	Date											
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Problems, suggestions; <input type="checkbox"/> Report attached _____													
_____													
<b>2. O&amp;M staff</b> _____ <table style="width: 100%; border: none; margin-top: 5px;"> <tr> <td style="width: 40%; text-align: center;">Name</td> <td style="width: 20%; text-align: center;">Title</td> <td style="width: 40%; text-align: center;">Date</td> </tr> <tr> <td colspan="3">               Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____             </td> </tr> <tr> <td colspan="3">               Problems, suggestions; <input type="checkbox"/> Report attached _____             </td> </tr> <tr> <td colspan="3">               _____             </td> </tr> </table>		Name	Title	Date	Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____			Problems, suggestions; <input type="checkbox"/> Report attached _____			_____		
Name	Title	Date											
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____													
Problems, suggestions; <input type="checkbox"/> Report attached _____													
_____													



III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1.	<b>O&amp;M Documents</b> <input type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input type="checkbox"/> Maintenance logs Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A
4.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A

IV. O&M COSTS	
1.	<b>O&amp;M Organization</b> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Other _____
	<input type="checkbox"/> Contractor for State <input type="checkbox"/> Contractor for PRP <input type="checkbox"/> Contractor for Federal Facility
2.	<b>O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date

V. ACCESS AND INSTITUTIONAL CONTROLS <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks _____
<b>B. Other Access Restrictions</b>	
1.	<b>Signs and other security measures</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A Remarks _____

<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
	Reports are verified by the lead agency <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
	Specific requirements in deed or decision documents have been met <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
	Violations have been reported <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
	_____			
	_____			

VI. GENERAL SITE CONDITIONS				
<b>A. Roads</b>	<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A		
1. <b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A	
Remarks _____ _____				
B. Other Site Conditions				
Remarks _____ _____ _____ _____				

<b>VII. LANDFILL CAPS OR RCRA-EQUIVALENT COVERS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
--

<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
--

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
--

X. OTHER REMEDIES
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS
<b>A. Implementation of the Remedy</b>
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
<p style="margin-left: 20px;"><i>Site was outside Rmt Area initially</i></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>



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**TAB C**  
**Basin F Groundwater Wells**

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## Five-Year Review Site Inspection Checklist (RMA 2020)

I. SITE INFORMATION			
Site name: Basin F Groundwater Monitoring Wells	Date of inspection: 6/24/2020		
Location and Region:	EPA ID: CO 5210020769		
Agency, office, or company leading the five-year review: US Army	Weather/temperature: ~ 80-85°F		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input checked="" type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____                 </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls                 </td> </tr> </table>		<input checked="" type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls
<input checked="" type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls		
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			

II. INTERVIEWS (Check all that apply)			
1. O&M site manager	Scott Ache	OMC	6/24/2020
	Name	Title	Date
Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____			
2. O&M staff	_____	_____	_____
	Name	Title	Date
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____			

*Informal D. Log Notes*

23185 - shallow - not sampled recently  
 26147 - deep - hits of lead pipe  
 26140 - shallow } pair  
 26017 - shallow - ← (alternate)  
 26147 - potentially paired  
 26015 - shallow } pair  
 26153 - deep } twin in 5 years

D-1

23194 - shallow } pair  
 23191 - deep }



III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1.	<b>O&amp;M Documents</b> <input type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input type="checkbox"/> Maintenance logs Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
4.	<b>Groundwater Monitoring Records</b> Remarks <i>Included in the Basin F Annual Reports and/or other RMA annual reporting.</i>	<input checked="" type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A

IV. O&M COSTS	
1.	<b>O&amp;M Organization</b> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Other _____
	<input type="checkbox"/> Contractor for State <input type="checkbox"/> Contractor for PRP <input type="checkbox"/> Contractor for Federal Facility
2.	<b>O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date

V. ACCESS AND INSTITUTIONAL CONTROLS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<b>Fencing damaged</b> Remarks _____
	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input checked="" type="checkbox"/> N/A
<b>B. Other Access Restrictions</b>	
1.	<b>Signs and other security measures</b> Remarks <i>The wells visited north of Basin F are not locked.</i>
	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A

<b>C. Institutional Controls (ICs)</b>			
1.	<b>Implementation and enforcement</b>		
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) _____		
	Frequency _____		
	Responsible party/agency _____		
	Contact _____		
	Name	Title	Date
	Reporting is up-to-date <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
	Reports are verified by the lead agency <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
	Specific requirements in deed or decision documents have been met <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A		
	Violations have been reported <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A		
	Other problems or suggestions: <input type="checkbox"/> Report attached		
	_____		
	_____		
	_____		
2.	<b>Adequacy</b>	<input checked="" type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		
	_____		
<b>D. General</b>			
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident
	Remarks _____		
	_____		
2.	<b>Land use changes on site</b> <input checked="" type="checkbox"/> N/A		
	Remarks _____		
	_____		
3.	<b>Land use changes off site</b> <input checked="" type="checkbox"/> N/A		
	Remarks _____		
	_____		

<b>VI. GENERAL SITE CONDITIONS</b>			
	<b>A. Roads</b>	<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL CAPS OR RCRA-EQUIVALENT COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
---

<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1. <b>Settlement</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____	
2. <b>Performance Monitoring</b> Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____	

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____	
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____	
3. <b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____	

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____		
<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____		

5.	<b>Treatment Building(s)</b>	<input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways)	<input type="checkbox"/> Needs repair
		<input type="checkbox"/> Chemicals and equipment properly stored	
	Remarks _____		
6.	<b>Monitoring Wells (pump and treatment remedy)</b>	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition	
		<input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A	
	Remarks _____		
<b>D. Monitoring Data</b>			
1.	Monitoring Data	<input checked="" type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality	
2.	Monitoring data suggests:	<input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining	
<b>E. Monitored Natural Attenuation</b>			
1.	<b>Monitoring Wells (natural attenuation remedy)</b>	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition	
		<input type="checkbox"/> All required wells located <input checked="" type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A	
	Remarks <i>Wells in former Borrow Area 4 (Section 23) need maintenance to repair well pads that were undermined.</i>		
<b>X. OTHER REMEDIES</b>			
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.			

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>
	<p>Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).</p> <p><i>Water Team is tracking detections of dielidrin in caprock flow system North of Basin F and which wells should be monitored in this area in additional both the unconfined and confined aquifer to evaluate the issue.</i></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>



## Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION			
<b>Site name:</b> Basin F Groundwater Monitoring Wells	<b>Date of inspection:</b> 6/24/2020		
<b>Location and Region:</b> Rocky Mountain Arsenal, Region 8	<b>EPA ID:</b> CO5210020769		
<b>Agency, office, or company leading the five-year review:</b> US Army	<b>Weather/temperature:</b> Sunny, Warm 85*		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____            _____         </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls         </td> </tr> </table>		<input checked="" type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls
<input checked="" type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls		
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			

II. INTERVIEWS (Check all that apply)	
<b>1. O&amp;M site manager</b> _____                      _____                      _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	
<b>2. O&amp;M staff</b> _____                      _____                      _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	



<b>III. ON-SITE DOCUMENTS &amp; RECORDS VERIFIED</b> (Check all that apply)			
1.	<b>O&amp;M Documents</b> <input type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input type="checkbox"/> Maintenance logs Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A
4.	<b>Permits and Service Agreements</b> <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits _____ Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
5.	<b>Gas Generation Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A
6.	<b>Settlement Monument Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A
7.	<b>Groundwater Monitoring Records</b> Remarks _____	<input checked="" type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A
8.	<b>Leachate Extraction Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A
9.	<b>Discharge Compliance Records</b> <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A
10.	<b>Daily Access/Security Logs</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A

<b>IV. O&amp;M COSTS</b>																																																	
1.	<p><b>O&amp;M Organization</b></p> <p> <input type="checkbox"/> State in-house                      <input type="checkbox"/> Contractor for State  <input type="checkbox"/> PRP in-house                              <input type="checkbox"/> Contractor for PRP  <input type="checkbox"/> Federal Facility in-house              <input checked="" type="checkbox"/> Contractor for Federal Facility  <input type="checkbox"/> Other _____                 </p>																																																
2.	<p><b>O&amp;M Cost Records</b></p> <p> <input type="checkbox"/> Readily available              <input type="checkbox"/> Up to date  <input type="checkbox"/> Funding mechanism/agreement in place                      Original O&amp;M cost estimate _____ <input type="checkbox"/> Breakdown attached                 </p> <p style="text-align: center;">Total annual cost by year for review period if available</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">From _____</td> <td style="width: 15%;">To _____</td> <td style="width: 30%;"></td> <td style="width: 15%;"></td> <td style="width: 25%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> </table>	From _____	To _____					Date	Date	Total cost			<input type="checkbox"/> Breakdown attached	From _____	To _____		Total cost		<input type="checkbox"/> Breakdown attached	Date	Date		Total cost		<input type="checkbox"/> Breakdown attached	From _____	To _____		Total cost		<input type="checkbox"/> Breakdown attached	Date	Date		Total cost		<input type="checkbox"/> Breakdown attached	From _____	To _____		Total cost		<input type="checkbox"/> Breakdown attached	Date	Date		Total cost		<input type="checkbox"/> Breakdown attached
From _____	To _____																																																
Date	Date	Total cost			<input type="checkbox"/> Breakdown attached																																												
From _____	To _____		Total cost		<input type="checkbox"/> Breakdown attached																																												
Date	Date		Total cost		<input type="checkbox"/> Breakdown attached																																												
From _____	To _____		Total cost		<input type="checkbox"/> Breakdown attached																																												
Date	Date		Total cost		<input type="checkbox"/> Breakdown attached																																												
From _____	To _____		Total cost		<input type="checkbox"/> Breakdown attached																																												
Date	Date		Total cost		<input type="checkbox"/> Breakdown attached																																												
3.	<p><b>Unanticipated or Unusually High O&amp;M Costs During Review Period</b></p> <p>Describe costs and reasons: _____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>																																																

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<p><b>Fencing damaged</b>              <input type="checkbox"/> Location shown on site map    <input type="checkbox"/> Gates secured    <input type="checkbox"/> N/A</p> <p>Remarks _____</p> <p>_____</p>
<b>B. Other Access Restrictions</b>	
1.	<p><b>Signs and other security measures</b>              <input type="checkbox"/> Location shown on site map    <input type="checkbox"/> N/A</p> <p>Remarks _____</p> <p>_____</p>

<b>C. Institutional Controls (ICs)</b>			
1.	<b>Implementation and enforcement</b>		
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) _____		
	Frequency _____		
	Responsible party/agency _____		
	Contact _____		
	Name	Title	Date
	Phone no.		
	Reporting is up-to-date	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Reports are verified by the lead agency	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Violations have been reported	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached		
	_____		
	_____		
	_____		
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		
	_____		
<b>D. General</b>			
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No vandalism evident
	Remarks _____		
	_____		
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A	
	Remarks _____		
	_____		
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A	
	Remarks _____		
	_____		

<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b>	<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A	
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL COVERS</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
---

<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
1. <b>Settlement</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                            Depth _____ Remarks _____
2. <b>Performance Monitoring</b> Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____
3. <b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive ( <i>e.g.</i> , chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5.	<b>Treatment Building(s)</b>	<input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____
6.	<b>Monitoring Wells</b> (pump and treatment remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks <u>Some wells inspected showed signs of wear. Particularly, well pads were non-existent or damaged in the former Barrow Area north of Basin F.</u> _____
<b>D. Monitoring Data</b>		
1.	Monitoring Data	<input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality
2.	Monitoring data suggests:	<input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b>		
1.	<b>Monitoring Wells</b> (natural attenuation remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>X. OTHER REMEDIES</b>		
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.		

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>  Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).  _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

<b>B. Adequacy of O&amp;M</b>
<p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <hr/>
<b>C. Early Indicators of Potential Remedy Problems</b>
<p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <hr/>
<b>D. Opportunities for Optimization</b>
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <hr/>

## Five-Year Review Site Inspection Checklist (RMA 2020)

I. SITE INFORMATION			
Site name: Basin F Groundwater Monitoring Wells	Date of inspection: 06-24-2020		
Location and Region:	EPA ID: CO 521 00 20769		
Agency, office, or company leading the five-year review: US Army	Weather/temperature:		
Remedy Includes: (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____                             </td> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls                             </td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input checked="" type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls
<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input checked="" type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls		
Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			

II. INTERVIEWS (Check all that apply)	
1. O&M site manager _____	
	Name _____ Title _____ Date _____
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____	
Problems, suggestions; <input type="checkbox"/> Report attached _____	
2. O&M staff _____	
	Name _____ Title _____ Date _____
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____	
Problems, suggestions; <input type="checkbox"/> Report attached _____	

23 187 - Confined to  
 23 185 - shallow  
 26017 shallow (Furness Rd)  
 ( 26015 " "  
 26153 Confined  
 c/o 2X - 5yr

23193  
 23191

26147 - C  
 26146 - U  
 NOT Listed

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency TCMD  
 Contact Tom Boffe SREH Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions;  Report attached \_\_\_\_\_

4. **Other interviews (optional)**  Report attached.


III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1.	<b>O&amp;M Documents</b> <input type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input type="checkbox"/> Maintenance logs Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A
4.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A

IV. O&M COSTS	
1.	<b>O&amp;M Organization</b> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Other _____ <input type="checkbox"/> Contractor for State <input checked="" type="checkbox"/> Contractor for PRP <input type="checkbox"/> Contractor for Federal Facility
2.	<b>O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date

V. ACCESS AND INSTITUTIONAL CONTROLS <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks _____
<b>B. Other Access Restrictions</b>	
1.	<b>Signs and other security measures</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A Remarks _____

**C. Institutional Controls (ICs)**

1. **Implementation and enforcement**  
 Site conditions imply ICs not properly implemented  Yes  No  N/A  
 Site conditions imply ICs not being fully enforced  Yes  No  N/A

Type of monitoring (e.g., self-reporting, drive by) \_\_\_\_\_  
 Frequency \_\_\_\_\_  
 Responsible party/agency \_\_\_\_\_  
 Contact \_\_\_\_\_

Name	Title	Date	Phone no.

Reporting is up-to-date  Yes  No  N/A  
 Reports are verified by the lead agency  Yes  No  N/A

Specific requirements in deed or decision documents have been met  Yes  No  N/A  
 Violations have been reported  Yes  No  N/A  
 Other problems or suggestions:  Report attached

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. **Adequacy**  ICs are adequate  ICs are inadequate  N/A  
 Remarks \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**D. General**

1. **Vandalism/trespassing**  Location shown on site map  No vandalism evident  
 Remarks \_\_\_\_\_

\_\_\_\_\_

2. **Land use changes on site**  N/A  
 Remarks \_\_\_\_\_

\_\_\_\_\_

3. **Land use changes off site**  N/A  
 Remarks \_\_\_\_\_

\_\_\_\_\_

**VI. GENERAL SITE CONDITIONS**

A. **Roads**  Applicable  N/A

1. **Roads damaged**  Location shown on site map  Roads adequate  N/A  
 Remarks \_\_\_\_\_

\_\_\_\_\_

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL CAPS OR RCRA-EQUIVALENT COVERS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
--

<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1.	<b>Settlement</b> Areal extent _____ Remarks _____	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Depth _____
2.	<b>Performance Monitoring</b> <input type="checkbox"/> Performance not monitored Frequency _____ Head differential _____ Remarks _____	Type of monitoring _____ <input type="checkbox"/> Evidence of breaching

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A		
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1.	<b>Pumps, Wellhead Plumbing, and Electrical</b> <input type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____	
2.	<b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____	
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____	

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Treatment Train (Check components that apply)</b> <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____		
2.	<b>Electrical Enclosures and Panels (properly rated and functional)</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5.	<b>Treatment Building(s)</b>	<input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways)	<input type="checkbox"/> Needs repair
		<input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____	
6.	<b>Monitoring Wells (pump and treatment remedy)</b>	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____ _____		
<b>D. Monitoring Data</b>			
1.	<b>Monitoring Data</b>	<input checked="" type="checkbox"/> Is routinely submitted on time	<input checked="" type="checkbox"/> Is of acceptable quality
2.	<b>Monitoring data suggests:</b>	<input type="checkbox"/> Groundwater plume is effectively contained	<input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b>			
1.	<b>Monitoring Wells (natural attenuation remedy)</b>	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____ _____		
<b>X. OTHER REMEDIES</b>			
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.			

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>
	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).  _____ _____ _____ _____ _____ _____ _____ _____ _____ _____



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**TAB D**  
**HWL and ELF**  
**Leachate Storage and Loadout Facility**

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## Five-Year Review Site Inspection Checklist (RMA 2020)

I. SITE INFORMATION													
Site name: Leachate Loadout/Storage Facility	Date of inspection: 6/24/2020												
Location and Region:	EPA ID: CO 5210020769												
Agency, office, or company leading the five-year review: US Army	Weather/temperature: 80-85°												
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td><input checked="" type="checkbox"/> Landfill cover/containment</td> <td><input type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input type="checkbox"/> Access controls</td> <td><input type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input type="checkbox"/> Institutional controls</td> <td><input type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> <td></td> </tr> </table>		<input checked="" type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation	<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment	<input type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls	<input type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input type="checkbox"/> Other _____	
<input checked="" type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation												
<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment												
<input type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls												
<input type="checkbox"/> Groundwater pump and treatment													
<input type="checkbox"/> Surface water collection and treatment													
<input type="checkbox"/> Other _____													
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached													

II. INTERVIEWS (Check all that apply)			
1. O&M site manager	Scott Adie	OMC	6/24/2020
	Name	Title	Date
Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____			
Problems, suggestions; <input type="checkbox"/> Report attached _____			
2. O&M staff	_____	_____	_____
	Name	Title	Date
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____			
Problems, suggestions; <input type="checkbox"/> Report attached _____			

*Informal D. Hoyt Notes*

*V. clean*

*Well labeled*

*both leachate combined*

*landfills*

*100% covered with LORS  
so may segregate in future*

*FLR does not need LORS*

*Barbary is Inlay containment.*



III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)				
1.	<b>O&amp;M Documents</b>	<input checked="" type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	<input type="checkbox"/> O&M manual	<input checked="" type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	<input type="checkbox"/> As-built drawings	<input checked="" type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	<input type="checkbox"/> Maintenance logs	<input checked="" type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	Remarks <u>O&amp;M documents for the LS/LF are included in the HW and E&amp;F Post Closure Plans and Annual Reports</u>			
2.	<b>Site-Specific Health and Safety Plan</b>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	<input type="checkbox"/> Contingency plan/emergency response plan	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	Remarks _____			
3.	<b>O&amp;M and OSHA Training Records</b>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	Remarks _____			
4.	<b>Groundwater Monitoring Records</b>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	Remarks _____			

IV. O&M COSTS	
1.	<b>O&amp;M Organization</b>
	<input type="checkbox"/> State in-house <input type="checkbox"/> Contractor for State
	<input type="checkbox"/> PRP in-house <input type="checkbox"/> Contractor for PRP
	<input type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Contractor for Federal Facility
	<input type="checkbox"/> Other _____
2.	<b>O&amp;M Cost Records</b>
	<input type="checkbox"/> Readily available <input type="checkbox"/> Up to date

V. ACCESS AND INSTITUTIONAL CONTROLS <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input type="checkbox"/> N/A
	Remarks <u>No issues noted. LS/LF is within the HWOL/ELF fenced area</u>
<b>B. Other Access Restrictions</b>	
1.	<b>Signs and other security measures</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A
	Remarks <u>No issues. LS/LF Building is locked.</u>

C. Institutional Controls (ICs)			
1.	<b>Implementation and enforcement</b>		
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by)	<u>Inspections</u>	
	Frequency	<u>Monthly</u>	
	Responsible party/agency	<u>Army</u>	
	Contact	<u>Miki Jones</u>	<u>OMC Covers Manager</u>
	Name	Title	✓ Date Phone no.
	Reporting is up-to-date	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Reports are verified by the lead agency	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Violations have been reported	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input checked="" type="checkbox"/> N/A
	Other problems or suggestions:	<input type="checkbox"/> Report attached	
	<u>No issues.</u>		
2.	<b>Adequacy</b>	<input checked="" type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A
	Remarks		
<b>D. General</b>			
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident
	Remarks		
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A	
	Remarks	<u>None within the HWL/ELF Area</u>	
3.	<b>Land use changes off site</b>	<input checked="" type="checkbox"/> N/A	
	Remarks		

## VI. GENERAL SITE CONDITIONS

<b>A. Roads</b>	<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A	
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate <input type="checkbox"/> N/A
	Remarks		

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL CAPS OR RCRA-EQUIVALENT COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
---

<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1. <b>Settlement</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident	
Areal extent _____                      Depth _____	
Remarks _____ _____	
2. <b>Performance Monitoring</b> Type of monitoring _____	
<input type="checkbox"/> Performance not monitored	
Frequency _____ <input type="checkbox"/> Evidence of breaching	
Head differential _____	
Remarks _____ _____	

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1. <b>Pumps, Wellhead Plumbing, and Electrical</b>	
<input type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A	
Remarks _____ _____ _____	
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b>	
<input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance	
Remarks _____ _____	
3. <b>Spare Parts and Equipment</b>	
<input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided	
Remarks _____ _____	

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____
<b>C. Treatment System</b> <input checked="" type="checkbox"/> Applicable <del>*</del> <input type="checkbox"/> N/A <del>*</del> <i>The LS/LF only includes leachate storage</i>	
1.	<b>Treatment Train (Check components that apply)</b> <i>NA</i> <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____ _____
2.	<b>Electrical Enclosures and Panels (properly rated and functional)</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ _____
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____

5.	<b>Treatment Building(s)</b> <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____	
6.	<b>Monitoring Wells (pump and treatment remedy)</b> <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks _____ _____	
<b>D. Monitoring Data</b>		
1.	Monitoring Data <input checked="" type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality	
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input checked="" type="checkbox"/> <sup>Leachate volumes</sup> Contaminant concentrations are declining	
<b>E. Monitored Natural Attenuation</b>		
1.	<b>Monitoring Wells (natural attenuation remedy)</b> <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____	
<b>X. OTHER REMEDIES</b>		
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.		

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>  Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). <i>The LS/LE is well maintained, clean, + building secondary containment looked to be in good condition. HW6 / LEF sump levels are monitored electronically. Level alarms are present on the LS/LE tanks</i>
	_____ _____ _____ _____ _____ _____



## Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION			
<b>Site name:</b> Leachate Loadout/Storage Facility	<b>Date of inspection:</b> 6/24/2020		
<b>Location and Region:</b> Rocky Mountain Arsenal, Region 8	<b>EPA ID:</b> CO5210020769		
<b>Agency, office, or company leading the five-year review:</b> US Army	<b>Weather/temperature:</b> Sunny, Warm 85*		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input checked="" type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____            _____         </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls         </td> </tr> </table>		<input checked="" type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls
<input checked="" type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls		
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			

II. INTERVIEWS (Check all that apply)	
<b>1. O&amp;M site manager</b> _____                      _____                      _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	
<b>2. O&amp;M staff</b> _____                      _____                      _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	



<b>III. ON-SITE DOCUMENTS &amp; RECORDS VERIFIED</b> (Check all that apply)				
1.	<b>O&amp;M Documents</b> <input type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input type="checkbox"/> Maintenance logs Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
4.	<b>Permits and Service Agreements</b> <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits _____ Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
5.	<b>Gas Generation Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
6.	<b>Settlement Monument Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
7.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
8.	<b>Leachate Extraction Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
9.	<b>Discharge Compliance Records</b> <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
10.	<b>Daily Access/Security Logs</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A



<b>C. Institutional Controls (ICs)</b>			
1.	<b>Implementation and enforcement</b>		
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) _____		
	Frequency _____		
	Responsible party/agency _____		
	Contact _____		
	Name	Title	Date
	Phone no.		
	Reporting is up-to-date	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Reports are verified by the lead agency	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Violations have been reported	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached		
	_____		
	_____		
	_____		
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		
	_____		
<b>D. General</b>			
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No vandalism evident
	Remarks _____		
	_____		
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A	
	Remarks _____		
	_____		
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A	
	Remarks _____		
	_____		

<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b>	<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A	
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
--

<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
1. <b>Settlement</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____
2. <b>Performance Monitoring</b> Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____
3. <b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive ( <i>e.g.</i> , chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5.	<b>Treatment Building(s)</b>	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____
6.	<b>Monitoring Wells</b> (pump and treatment remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>D. Monitoring Data</b>		
1.	Monitoring Data	<input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality
2.	Monitoring data suggests:	<input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b>		
1.	<b>Monitoring Wells</b> (natural attenuation remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>X. OTHER REMEDIES</b>		
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.		

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).  _____ _____ _____ _____ _____ _____ _____ _____ _____ _____	

<b>B. Adequacy of O&amp;M</b>
<p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <hr/>
<b>C. Early Indicators of Potential Remedy Problems</b>
<p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <hr/>
<b>D. Opportunities for Optimization</b>
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <hr/>



3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency Town Butte 2  
Contact TCHD S. EA Caswell \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions;  Report attached \_\_\_\_\_

4. **Other interviews (optional)**  Report attached.


III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1.	<b>O&amp;M Documents</b> <input checked="" type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input checked="" type="checkbox"/> Maintenance logs Remarks _____	<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A
4.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A

IV. O&M COSTS	
1.	<b>O&amp;M Organization</b> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Other _____
	<input type="checkbox"/> Contractor for State <input checked="" type="checkbox"/> Contractor for PRP <input type="checkbox"/> Contractor for Federal Facility
2.	<b>O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date

V. ACCESS AND INSTITUTIONAL CONTROLS <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks _____
<b>B. Other Access Restrictions</b>	
1.	<b>Signs and other security measures</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A Remarks _____

<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
	Reports are verified by the lead agency <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
	Specific requirements in deed or decision documents have been met <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
	Violations have been reported <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b>				
	<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A		
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL CAPS OR RCRA-EQUIVALENT COVERS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
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<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1. <b>Settlement</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident	
Areal extent _____                      Depth _____	
Remarks _____	
2. <b>Performance Monitoring</b> Type of monitoring _____	
<input type="checkbox"/> Performance not monitored	
Frequency _____ <input type="checkbox"/> Evidence of breaching	
Head differential _____	
Remarks _____	

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1. <b>Pumps, Wellhead Plumbing, and Electrical</b>	
<input type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A	
Remarks _____	
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b>	
<input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance	
Remarks _____	
3. <b>Spare Parts and Equipment</b>	
<input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided	
Remarks _____	

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train (Check components that apply)</b> <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____		
2.	<b>Electrical Enclosures and Panels (properly rated and functional)</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5.	<b>Treatment Building(s)</b>	<input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways)	<input type="checkbox"/> Needs repair
		<input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____	
6.	<b>Monitoring Wells (pump and treatment remedy)</b>	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____ _____		
<b>D. Monitoring Data</b>			
1.	<b>Monitoring Data</b>	<input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality	
2.	<b>Monitoring data suggests:</b>	<input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining	
<b>E. Monitored Natural Attenuation</b>			
1.	<b>Monitoring Wells (natural attenuation remedy)</b>	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled	<input type="checkbox"/> Good condition
		<input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance	<input type="checkbox"/> N/A
	Remarks _____ _____		
<b>X. OTHER REMEDIES</b>			
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.			

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>
	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).  _____ _____ _____ _____ _____ _____ _____ _____ _____

<p><b>B. Adequacy of O&amp;M</b></p> <p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <hr/>
<p><b>C. Early Indicators of Potential Remedy Problems</b></p> <p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <hr/>
<p><b>D. Opportunities for Optimization</b></p> <p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <hr/>

ELF MWL  
x LDR 4  
6 Loads /yr

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**TAB E**  
**Basin A Neck System**

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## Five-Year Review Site Inspection Checklist (RMA 2020)

I. SITE INFORMATION			
<b>Site name: Basin A Neck System</b> (includes Bedrock Ridge Extraction System, Complex Trenches Dewatering System, Lime Basins Dewatering System)	<b>Date of inspection:</b> <span style="font-size: 1.2em; color: blue;">6/23/20</span>		
<b>Location and Region: Rocky Mountain Arsenal            Region 8</b>	<b>EPA ID: CO5210020769</b>		
<b>Agency, office, or company leading the five-year            review: US Army</b>	<b>Weather/temperature:</b> <span style="font-size: 1.2em; color: blue;">Hot / 85°</span>		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input checked="" type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____             </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input checked="" type="checkbox"/> Vertical barrier walls             </td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input checked="" type="checkbox"/> Vertical barrier walls
<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input checked="" type="checkbox"/> Vertical barrier walls		
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			

II. INTERVIEWS (Check all that apply)	
<b>1. O&amp;M site manager</b> <span style="font-size: 1.2em; color: blue;">Scott Ache</span> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Date <span style="font-size: 1.2em; color: blue;">6/23/20</span> Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	
<b>2. O&amp;M staff</b> <span style="font-size: 1.2em; color: blue;">Gayle Lammers</span> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Date <span style="font-size: 1.2em; color: blue;">6/23/20</span> Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	



III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1.	<b>O&amp;M Documents</b> <input checked="" type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input checked="" type="checkbox"/> Maintenance logs Remarks _____	<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks <u>MSDS sheets available and reviewed</u>	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
4.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A

IV. O&M COSTS	
1.	<b>O&amp;M Organization</b> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input checked="" type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Other _____
	<input type="checkbox"/> Contractor for State <input type="checkbox"/> Contractor for PRP <input type="checkbox"/> Contractor for Federal Facility
2.	<b>O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <u>N/A</u>

V. ACCESS AND INSTITUTIONAL CONTROLS <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks <u>specific fencing for BANS from main road,</u>
<b>B. Other Access Restrictions</b>	
1.	<b>Signs and other security measures</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A Remarks <u>Security cameras installed at building</u>

**C. Institutional Controls (ICs)**

1. **Implementation and enforcement**  
 Site conditions imply ICs not properly implemented  Yes  No  N/A  
 Site conditions imply ICs not being fully enforced  Yes  No  N/A

Type of monitoring (e.g., self-reporting, drive by) Annual Land Use Control Plan  
 Frequency \_\_\_\_\_  
 Responsible party/agency Army/Shell  
 Contact Scott Acker

	Name	Title	Date	Phone no.
--	------	-------	------	-----------

Reporting is up-to-date  Yes  No  N/A  
 Reports are verified by the lead agency  Yes  No  N/A

Specific requirements in deed or decision documents have been met  Yes  No  N/A  
 Violations have been reported  Yes  No  N/A  
 Other problems or suggestions:  Report attached

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2. **Adequacy**  ICs are adequate  ICs are inadequate  N/A  
 Remarks \_\_\_\_\_

**D. General**

1. **Vandalism/trespassing**  Location shown on site map  No vandalism evident  
 Remarks \_\_\_\_\_

2. **Land use changes on site**  N/A  
 Remarks \_\_\_\_\_

3. **Land use changes off site**  N/A  
 Remarks Public access to the site changing with time through the USFWS

**VI. GENERAL SITE CONDITIONS**

**A. Roads**  Applicable  N/A

1. **Roads damaged**  Location shown on site map  Roads adequate  N/A  
 Remarks \_\_\_\_\_

**B. Other Site Conditions**

Remarks \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**VII. LANDFILL CAPS OR RCRA-EQUIVALENT COVERS**  Applicable  N/A

**VIII. VERTICAL BARRIER WALLS**  Applicable  N/A

1. **Settlement**  Location shown on site map  Settlement not evident  
 Areal extent \_\_\_\_\_ Depth \_\_\_\_\_  
 Remarks \_\_\_\_\_

2. **Performance Monitoring** Type of monitoring Groundwater wells  
 Performance not monitored  
 Frequency Annual  Evidence of breaching  
 Head differential maintained  
 Remarks Did not inspect performance monitoring wells

**IX. GROUNDWATER/SURFACE WATER REMEDIES**  Applicable  N/A

**A. Groundwater Extraction Wells, Pumps, and Pipelines**  Applicable  N/A

1. **Pumps, Wellhead Plumbing, and Electrical**  
 Good condition  All required wells properly operating  Needs Maintenance  N/A  
 Remarks \_\_\_\_\_

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**  
 Good condition  Needs Maintenance  
 Remarks \_\_\_\_\_

3. **Spare Parts and Equipment**  
 Readily available  Good condition  Requires upgrade  Needs to be provided  
 Remarks \_\_\_\_\_

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input checked="" type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input checked="" type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input checked="" type="checkbox"/> Filters <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> Sampling ports properly marked and functional <input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date <input checked="" type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually <u>35 gpm</u> <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input checked="" type="checkbox"/> Chemicals and equipment properly stored Remarks _____
6.	<b>Monitoring Wells (pump and treatment remedy)</b> <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks <u>Did not inspect monitoring wells</u>
<b>D. Monitoring Data</b> <u>Not part of physical inspection</u>	
1.	Monitoring Data <input checked="" type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b>	
1.	<b>Monitoring Wells (natural attenuation remedy)</b> <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> N/A Remarks _____
<b>X. OTHER REMEDIES</b>	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.	

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A. Implementation of the Remedy</b>	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
	<u>BANS Remedy to reduce concentration of Contaminant Plume. Treatment Plant: tanks, valves, piping in good condition, labelled and no leaks observed. Building is in good condition with locked doors and security cameras and improved well casing security. Documentation reviewed included MSDS binder, Daily operation log book that was up to date and O&amp;M Manual. The O&amp;M manual had a 2008 cover date but had a 2020 text inside in RL/SO. JO not finalized. This should be corrected.</u>

<p><b>B. Adequacy of O&amp;M</b></p>	<p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <p>Did not inspect the Bedrock Ridge, Lime Basin or Complex Veneches Systems in this FYR Also did not inspect monitoring by Stern for BANS.</p>
<p><b>C. Early Indicators of Potential Remedy Problems</b></p>	<p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p>Though some security improvement are in place additional measures may be needed if Public access is increased near BANS</p>
<p><b>D. Opportunities for Optimization</b></p>	<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p>The BANS received a major upgrade in _____ and will not be replaced by the new treatment Plant. Optimization has involved no longer using Ferric hydroxide because not necessary</p>

## Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION			
<b>Site name:</b> Basin A Neck System	<b>Date of inspection:</b> 6/23/2020		
<b>Location and Region:</b> Rocky Mountain Arsenal, Region 8	<b>EPA ID:</b> CO5210020769		
<b>Agency, office, or company leading the five-year review:</b> US Army	<b>Weather/temperature:</b> Sunny, Warm 75*		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input checked="" type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____            _____         </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input checked="" type="checkbox"/> Vertical barrier walls         </td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input checked="" type="checkbox"/> Vertical barrier walls
<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input checked="" type="checkbox"/> Vertical barrier walls		
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			

II. INTERVIEWS (Check all that apply)	
<b>1. O&amp;M site manager</b> <u>Gayle Lammers</u> _____                      _____                      _____ <div style="display: flex; justify-content: space-between; width: 100%;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	
<b>2. O&amp;M staff</b> _____                      _____                      _____ <div style="display: flex; justify-content: space-between; width: 100%;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	



<b>III. ON-SITE DOCUMENTS &amp; RECORDS VERIFIED</b> (Check all that apply)				
1.	<b>O&amp;M Documents</b> <input checked="" type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input checked="" type="checkbox"/> Maintenance logs Remarks _____	<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
4.	<b>Permits and Service Agreements</b> <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits _____ Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
5.	<b>Gas Generation Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
6.	<b>Settlement Monument Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
7.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
8.	<b>Leachate Extraction Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
9.	<b>Discharge Compliance Records</b> <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
10.	<b>Daily Access/Security Logs</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A

<b>IV. O&amp;M COSTS</b>																																																	
1.	<p><b>O&amp;M Organization</b></p> <p> <input type="checkbox"/> State in-house                      <input type="checkbox"/> Contractor for State  <input type="checkbox"/> PRP in-house                              <input type="checkbox"/> Contractor for PRP  <input type="checkbox"/> Federal Facility in-house              <input checked="" type="checkbox"/> Contractor for Federal Facility  <input type="checkbox"/> Other _____                 </p>																																																
2.	<p><b>O&amp;M Cost Records</b></p> <p> <input type="checkbox"/> Readily available              <input type="checkbox"/> Up to date  <input type="checkbox"/> Funding mechanism/agreement in place                      Original O&amp;M cost estimate _____ <input type="checkbox"/> Breakdown attached                 </p> <p style="text-align: center;">Total annual cost by year for review period if available</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">From _____</td> <td style="width: 15%;">To _____</td> <td style="width: 30%;"></td> <td style="width: 15%;"></td> <td style="width: 25%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td></td> <td>Total cost</td> <td></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> </table>	From _____	To _____					Date	Date	Total cost			<input type="checkbox"/> Breakdown attached	From _____	To _____		Total cost		<input type="checkbox"/> Breakdown attached	Date	Date		Total cost		<input type="checkbox"/> Breakdown attached	From _____	To _____		Total cost		<input type="checkbox"/> Breakdown attached	Date	Date		Total cost		<input type="checkbox"/> Breakdown attached	From _____	To _____		Total cost		<input type="checkbox"/> Breakdown attached	Date	Date		Total cost		<input type="checkbox"/> Breakdown attached
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From _____	To _____		Total cost		<input type="checkbox"/> Breakdown attached																																												
Date	Date		Total cost		<input type="checkbox"/> Breakdown attached																																												
3.	<p><b>Unanticipated or Unusually High O&amp;M Costs During Review Period</b></p> <p>Describe costs and reasons: _____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>																																																

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<p><b>Fencing damaged</b>              <input type="checkbox"/> Location shown on site map    <input type="checkbox"/> Gates secured    <input type="checkbox"/> N/A</p> <p>Remarks _____</p> <p>_____</p>
<b>B. Other Access Restrictions</b>	
1.	<p><b>Signs and other security measures</b>              <input type="checkbox"/> Location shown on site map    <input type="checkbox"/> N/A</p> <p>Remarks _____</p> <p>_____</p>

<b>C. Institutional Controls (ICs)</b>			
1.	<b>Implementation and enforcement</b>		
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) _____		
	Frequency _____		
	Responsible party/agency _____		
	Contact _____		
	Name	Title	Date
	Phone no.		
	Reporting is up-to-date	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Reports are verified by the lead agency	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Violations have been reported	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached		
	_____		
	_____		
	_____		
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		
	_____		
<b>D. General</b>			
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No vandalism evident
	Remarks _____		
	_____		
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A	
	Remarks _____		
	_____		
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A	
	Remarks _____		
	_____		

<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b>	<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A	
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
--

<b>VIII. VERTICAL BARRIER WALLS</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
1. <b>Settlement</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____ _____
2. <b>Performance Monitoring</b> Type of monitoring Hydraulic Gradient _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____ _____

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____ _____
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____ _____
3. <b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____ _____

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input checked="" type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input checked="" type="checkbox"/> Air stripping <input checked="" type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive ( <i>e.g.</i> , chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5.	<b>Treatment Building(s)</b>	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____
6.	<b>Monitoring Wells</b> (pump and treatment remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>D. Monitoring Data</b>		
1.	Monitoring Data	<input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality
2.	Monitoring data suggests:	<input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b>		
1.	<b>Monitoring Wells</b> (natural attenuation remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>X. OTHER REMEDIES</b>		
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.		

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).  _____ _____ _____ _____ _____ _____ _____ _____ _____ _____	

<b>B. Adequacy of O&amp;M</b>
<p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <hr/>
<b>C. Early Indicators of Potential Remedy Problems</b>
<p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <hr/>
<b>D. Opportunities for Optimization</b>
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <hr/>

A neck  
**Five-Year Review Site Inspection Checklist (RMA 2020)**

I. SITE INFORMATION	
Site name: Basin A Neck System (includes Bedrock Ridge Extraction System, Complex Trenches Dewatering System, Lime Basins Dewatering System)	Date of inspection: <u>06-23-2020</u>
Location and Region: Rocky Mountain Arsenal Region 8	EPA ID: COS210020769
Agency, office, or company leading the five-year review: US Army	Weather/temperature:
Remedy Includes: (Check all that apply)	
<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	
<input type="checkbox"/> Monitored natural attenuation <input checked="" type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls	
Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached	

II. INTERVIEWS (Check all that apply)	
1. O&M site manager <u>Gagle Hannors</u> Name	<u>OMC Trench Op Mgr</u> Title
Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone	Phone no. _____ Date _____
Problems, suggestions; <input type="checkbox"/> Report attached _____	
_____	
2. O&M staff _____ Name	_____ Title _____ Date _____
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone	Phone no. _____
Problems, suggestions; <input type="checkbox"/> Report attached _____	
_____	

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency YCHO  
 Contact Tom Burt Sr Env Consultant \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
 Contact \_\_\_\_\_  
Name Title Date Phone no.

Problems; suggestions;  Report attached \_\_\_\_\_

4. **Other interviews (optional)**  Report attached.


III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1.	<b>O&amp;M Documents</b> <input checked="" type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input checked="" type="checkbox"/> Maintenance logs Remarks _____	<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A
4.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A

IV. O&M COSTS	
1.	<b>O&amp;M Organization</b> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Other _____ <input type="checkbox"/> Contractor for State <input checked="" type="checkbox"/> Contractor for PRP <input type="checkbox"/> Contractor for Federal Facility
2.	<b>O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date

V. ACCESS AND INSTITUTIONAL CONTROLS <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks _____
<b>B. Other Access Restrictions</b>	
1.	<b>Signs and other security measures</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A Remarks _____

**C. Institutional Controls (ICs)**

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented  Yes  No  N/A

Site conditions imply ICs not being fully enforced  Yes  No  N/A

Type of monitoring (e.g., self-reporting, drive by) \_\_\_\_\_

Frequency \_\_\_\_\_

Responsible party/agency \_\_\_\_\_

Contact \_\_\_\_\_

Name	Title	Date	Phone no.

Reporting is up-to-date  Yes  No  N/A

Reports are verified by the lead agency  Yes  No  N/A

Specific requirements in deed or decision documents have been met  Yes  No  N/A

Violations have been reported  Yes  No  N/A

Other problems or suggestions:  Report attached

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. **Adequacy**  ICs are adequate  ICs are inadequate  N/A

Remarks \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**D. General**

1. **Vandalism/trespassing**  Location shown on site map  No vandalism evident

Remarks \_\_\_\_\_

\_\_\_\_\_

2. **Land use changes on site**  N/A

Remarks \_\_\_\_\_

\_\_\_\_\_

3. **Land use changes off site**  N/A

Remarks \_\_\_\_\_

\_\_\_\_\_

**VI. GENERAL SITE CONDITIONS**

**A. Roads**  Applicable  N/A

1. **Roads damaged**  Location shown on site map  Roads adequate  N/A

Remarks \_\_\_\_\_

\_\_\_\_\_

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL CAPS OR RCRA-EQUIVALENT COVERS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
--

<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1. <b>Settlement</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____	
2. <b>Performance Monitoring</b> Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____	

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____	
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____	
3. <b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____	

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train (Check components that apply)</b> <input checked="" type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input checked="" type="checkbox"/> Air stripping <input checked="" type="checkbox"/> Carbon adsorbers <input checked="" type="checkbox"/> Filters <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____		
2.	<b>Electrical Enclosures and Panels (properly rated and functional)</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____		
4.	<b>Discharge Structure and Appurtenances</b> <input checked="" type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5. **Treatment Building(s)**  
 N/A       Good condition (esp. roof and doorways)       Needs repair  
 Chemicals and equipment properly stored  
 Remarks \_\_\_\_\_

6. **Monitoring Wells (pump and treatment remedy)**  
 Properly secured/locked       Functioning       Routinely sampled       Good condition  
 All required wells located       Needs Maintenance       N/A  
 Remarks \_\_\_\_\_

**D. Monitoring Data**

1. **Monitoring Data**  
 Is routinely submitted on time       Is of acceptable quality

2. **Monitoring data suggests:**  
 Groundwater plume is effectively contained       Contaminant concentrations are declining

**E. Monitored Natural Attenuation**

1. **Monitoring Wells (natural attenuation remedy)**  
 Properly secured/locked       Functioning       Routinely sampled       Good condition  
 All required wells located       Needs Maintenance       N/A  
 Remarks \_\_\_\_\_

**X. OTHER REMEDIES**

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

**XI. OVERALL OBSERVATIONS**

**A. Implementation of the Remedy**

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**B. Adequacy of O&M**

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O + m Functional  
Remediation waste properly labeled

**C. Early Indicators of Potential Remedy Problems**

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

**D. Opportunities for Optimization**

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

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**TAB F**  
**North Boundary Containment System**

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## Five-Year Review Site Inspection Checklist (RMA 2020)

I. SITE INFORMATION													
Site name: North Boundary Containment System	Date of inspection: 6/23/20												
Location and Region: Rocky Mountain Arsenal Region 8	EPA ID: CO5210020769												
Agency, office, or company leading the five-year review: US Army	Weather/temperature: Hot / 85°												
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Landfill cover/containment</td> <td><input type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input type="checkbox"/> Access controls</td> <td><input checked="" type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input type="checkbox"/> Institutional controls</td> <td><input checked="" type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input checked="" type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> <td></td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation	<input type="checkbox"/> Access controls	<input checked="" type="checkbox"/> Groundwater containment	<input type="checkbox"/> Institutional controls	<input checked="" type="checkbox"/> Vertical barrier walls	<input checked="" type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input type="checkbox"/> Other _____	
<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation												
<input type="checkbox"/> Access controls	<input checked="" type="checkbox"/> Groundwater containment												
<input type="checkbox"/> Institutional controls	<input checked="" type="checkbox"/> Vertical barrier walls												
<input checked="" type="checkbox"/> Groundwater pump and treatment													
<input type="checkbox"/> Surface water collection and treatment													
<input type="checkbox"/> Other _____													
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached													

II. INTERVIEWS (Check all that apply)	
1. O&M site manager <u>Scott Ache</u> _____ <div style="display: flex; justify-content: space-between; width: 100%;"> <span>Name</span> <span>Title</span> <span>6/23/20</span> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	
2. O&M staff <u>Gayle Lammers</u> _____ <div style="display: flex; justify-content: space-between; width: 100%;"> <span>Name</span> <span>Title</span> <span>6/23/20</span> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.  
Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.  
Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.  
Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.  
Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.  
Problems; suggestions;  Report attached \_\_\_\_\_

4. **Other interviews** (optional)  Report attached.


III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1.	<b>O&amp;M Documents</b> <input checked="" type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input checked="" type="checkbox"/> Maintenance logs Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks <u>MSDS sheets available and reviewed</u>	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
4.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A

IV. O&M COSTS	
1.	<b>O&amp;M Organization</b> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input checked="" type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Other <input type="checkbox"/> Contractor for State <input type="checkbox"/> Contractor for PRP <input type="checkbox"/> Contractor for Federal Facility
2.	<b>O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <u>N/A</u>

V. ACCESS AND INSTITUTIONAL CONTROLS <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks <u>Fencing at site perimeter treatment system not fenced</u>
<b>B. Other Access Restrictions</b>	
1.	<b>Signs and other security measures</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A Remarks <u>Sign prevents public access to NBCS area</u>

**C. Institutional Controls (ICs)**

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented  Yes  No  N/A  
 Site conditions imply ICs not being fully enforced  Yes  No  N/A

Type of monitoring (e.g., self-reporting, drive by) Annual Land use control Plan  
 Frequency \_\_\_\_\_  
 Responsible party/agency Army / Shell  
 Contact Scott Ache

Name	Title	Date	Phone no.

Reporting is up-to-date  Yes  No  N/A  
 Reports are verified by the lead agency  Yes  No  N/A

Specific requirements in deed or decision documents have been met  Yes  No  N/A  
 Violations have been reported  Yes  No  N/A

Other problems or suggestions:  Report attached

2. **Adequacy**  ICs are adequate  ICs are inadequate  N/A

Remarks \_\_\_\_\_

**D. General**

1. **Vandalism/trespassing**  Location shown on site map  No vandalism evident

Remarks \_\_\_\_\_

2. **Land use changes on site**  N/A

Remarks \_\_\_\_\_

3. **Land use changes off site**  N/A

Remarks Road enlargement and increased residential Development

**VI. GENERAL SITE CONDITIONS**

**A. Roads**  Applicable  N/A

1. **Roads damaged**  Location shown on site map  Roads adequate  N/A

Remarks \_\_\_\_\_

**B. Other Site Conditions**Remarks \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_**VII. LANDFILL CAPS OR RCRA-EQUIVALENT COVERS**  Applicable  N/A**VIII. VERTICAL BARRIER WALLS**  Applicable  N/A

1. **Settlement**  Location shown on site map  Settlement not evident  
Areal extent \_\_\_\_\_ Depth \_\_\_\_\_  
Remarks \_\_\_\_\_
2. **Performance Monitoring** Type of monitoring Groundwater Monitoring wells  
 Performance not monitored  
Frequency Annual  Evidence of breaching  
Head differential Maintained  
Remarks \_\_\_\_\_

**IX. GROUNDWATER/SURFACE WATER REMEDIES**  Applicable  N/A**A. Groundwater Extraction Wells, Pumps, and Pipelines**  Applicable  N/A

1. **Pumps, Wellhead Plumbing, and Electrical**  
 Good condition  All required wells properly operating  Needs Maintenance  N/A  
Remarks \_\_\_\_\_
2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**  
 Good condition  Needs Maintenance  
Remarks Did not inspect recharge system
3. **Spare Parts and Equipment**  
 Readily available  Good condition  Requires upgrade  Needs to be provided  
Remarks Spare quartz tubes for UV oxidation system no longer made. supply adequate for near future but may be a problem longer term

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input checked="" type="checkbox"/> Filters <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> Sampling ports properly marked and functional <input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date <input checked="" type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually <u>431 gpm</u> <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input checked="" type="checkbox"/> Chemicals and equipment properly stored Remarks _____
6.	<b>Monitoring Wells (pump and treatment remedy)</b> <input checked="" type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____
<b>D. Monitoring Data</b> <i>Not Part of physical inspection</i>	
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b> <i>N/A</i>	
1.	<b>Monitoring Wells (natural attenuation remedy)</b> <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____
<b>X. OTHER REMEDIES</b>	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.	

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A. Implementation of the Remedy</b>	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).  <i>NBCS Remedy goal: Contain Contaminant plumes  Treatment Plant: Tanks, valves, piping in good condition labelled and no leaks observed. Building is in good condition with locked doors and a new Security Camera System. Documentation reviewed included MSD binder Daily operations log and O&amp;M Manual. The operations log book was up to date, MSD binder readily available, operations manual dates to 2012 and not routinely updated so unclear if up to date. Overall, the Plant is in good condition and functional.</i>

<b>B.</b>	<b>Adequacy of O&amp;M</b>
	<p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <p><u>Extraction Wells: Visited wells 24310 and 24311 which are operating. Vault cover was locked and inside free of debris/animals. A new manual switch has been installed to keep someone from shutting off well. Looked at well wells 24309 and 24312 which are not operating. The vault cover has been removed and new manual switch installed. Well casings are not locked. Inspected downgradient monitoring wells and found them all locked. Water level well 23253 has a damaged pad and some wells have unreadable labelling. One east of north entrance road an unmarked PW well has no protective casing.</u></p>
<b>C.</b>	<b>Early Indicators of Potential Remedy Problems</b>
	<p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p><u>The UV Oxidation system at NBCS has quartz tubes that can no longer be purchased and is being operated with surplus tubes. Though not an immediate problem operation will be affected long term. The NBCS is restricted from access by the public by a sign but system only has restrictive fencing on the north side site boundary. Security of remedy system components will need to be addressed as District opens more of the site to public access.</u></p>
<b>D.</b>	<b>Opportunities for Optimization</b>
	<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p><u>The NBCS is to be replaced by an integrated treatment plant which should be optimized for more efficient operation</u></p>

## Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION			
<b>Site name:</b> North Boundary Containment system	<b>Date of inspection:</b> 6/23/2020		
<b>Location and Region:</b> Rocky Mountain Arsenal, Region 8	<b>EPA ID:</b> CO5210020769		
<b>Agency, office, or company leading the five-year review:</b> US Army	<b>Weather/temperature:</b> Sunny, Warm 75*		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input checked="" type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____            _____         </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input checked="" type="checkbox"/> Groundwater containment  <input checked="" type="checkbox"/> Vertical barrier walls         </td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input checked="" type="checkbox"/> Groundwater containment <input checked="" type="checkbox"/> Vertical barrier walls
<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____ _____	<input type="checkbox"/> Monitored natural attenuation <input checked="" type="checkbox"/> Groundwater containment <input checked="" type="checkbox"/> Vertical barrier walls		
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			

II. INTERVIEWS (Check all that apply)	
<b>1. O&amp;M site manager</b> <u>Gayle Lammers</u> _____                      _____                      _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	
<b>2. O&amp;M staff</b> _____                      _____                      _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	



<b>III. ON-SITE DOCUMENTS &amp; RECORDS VERIFIED</b> (Check all that apply)			
1.	<b>O&amp;M Documents</b> <input checked="" type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input checked="" type="checkbox"/> Maintenance logs Remarks _____	<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A
4.	<b>Permits and Service Agreements</b> <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits _____ Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
5.	<b>Gas Generation Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A
6.	<b>Settlement Monument Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A
7.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A
8.	<b>Leachate Extraction Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A
9.	<b>Discharge Compliance Records</b> <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A
10.	<b>Daily Access/Security Logs</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> N/A

<b>IV. O&amp;M COSTS</b>																																									
1.	<p><b>O&amp;M Organization</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <input type="checkbox"/> State in-house  <input type="checkbox"/> PRP in-house  <input type="checkbox"/> Federal Facility in-house  <input type="checkbox"/> Other _____                 </div> <div style="width: 45%;"> <input type="checkbox"/> Contractor for State  <input type="checkbox"/> Contractor for PRP  <input checked="" type="checkbox"/> Contractor for Federal Facility                 </div> </div>																																								
2.	<p><b>O&amp;M Cost Records</b></p> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <input type="checkbox"/> Funding mechanism/agreement in place Original O&M cost estimate _____ <input type="checkbox"/> Breakdown attached																																								
Total annual cost by year for review period if available																																									
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">From _____</td> <td style="width: 15%;">To _____</td> <td style="width: 30%;"></td> <td style="width: 15%;"></td> <td style="width: 25%;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> </tr> </table>		From _____	To _____			<input type="checkbox"/> Breakdown attached	Date	Date	Total cost			From _____	To _____			<input type="checkbox"/> Breakdown attached	Date	Date	Total cost			From _____	To _____			<input type="checkbox"/> Breakdown attached	Date	Date	Total cost			From _____	To _____			<input type="checkbox"/> Breakdown attached	Date	Date	Total cost		
From _____	To _____			<input type="checkbox"/> Breakdown attached																																					
Date	Date	Total cost																																							
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From _____	To _____			<input type="checkbox"/> Breakdown attached																																					
Date	Date	Total cost																																							
From _____	To _____			<input type="checkbox"/> Breakdown attached																																					
Date	Date	Total cost																																							
3.	<p><b>Unanticipated or Unusually High O&amp;M Costs During Review Period</b></p> Describe costs and reasons: _____ _____ _____ _____ _____																																								

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<p><b>Fencing damaged</b>      <input type="checkbox"/> Location shown on site map      <input checked="" type="checkbox"/> Gates secured      <input type="checkbox"/> N/A</p> Remarks _____ _____
<b>B. Other Access Restrictions</b>	
1.	<p><b>Signs and other security measures</b>      <input type="checkbox"/> Location shown on site map      <input type="checkbox"/> N/A</p> Remarks _____ _____

<b>C. Institutional Controls (ICs)</b>			
1.	<b>Implementation and enforcement</b>		
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) _____		
	Frequency _____		
	Responsible party/agency _____		
	Contact _____		
	Name	Title	Date
	Phone no.		
	Reporting is up-to-date	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Reports are verified by the lead agency	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Violations have been reported	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached		
	_____		
	_____		
	_____		
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		
	_____		
<b>D. General</b>			
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident
	Remarks _____		
	_____		
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A	
	Remarks _____		
	_____		
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A	
	Remarks _____		
	_____		

<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b>	<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A	
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
--

<b>VIII. VERTICAL BARRIER WALLS</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
1. <b>Settlement</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident Areal extent _____                            Depth _____ Remarks _____
2. <b>Performance Monitoring</b> Type of monitoring <u>Groundwater gradients/groundwater quality</u> <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks <u>To be determined in association with Five Year Summary Report review.</u>

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____
3. <b>Spare Parts and Equipment</b> <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks <u>Additional UV lamps</u>

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input checked="" type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive ( <i>e.g.</i> , chelation agent, flocculent) _____ <input checked="" type="checkbox"/> Others <u>UV treatment</u> _____ <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ Coatings and spill collection trenches, no secondary containment of wastewater and influent sumps		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5.	<b>Treatment Building(s)</b>	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____
6.	<b>Monitoring Wells</b> (pump and treatment remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks Well 24006 compression cap was not locked, numerous wells outside of the fenceline were missing ID tags, but most wells were identified with painted well numbers. _____ _____
<b>D. Monitoring Data</b>		
1.	Monitoring Data	<input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality
2.	Monitoring data suggests:	<input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b>		
1.	<b>Monitoring Wells</b> (natural attenuation remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>X. OTHER REMEDIES</b>		
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.		

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>  Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).  _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

<b>B. Adequacy of O&amp;M</b>
<p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <hr/>
<b>C. Early Indicators of Potential Remedy Problems</b>
<p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <hr/> <p><del>The continued development north of the Arsenal, and expanded public use will make the protection of remedy elements, primarily monitoring wells, an important part of continued operations. Permanent monitoring wells should be clearly labeled with locking protective casings.</del></p> <hr/> <hr/> <hr/> <hr/> <hr/>
<b>D. Opportunities for Optimization</b>
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <hr/>

## Five-Year Review Site Inspection Checklist (RMA 2020)

NBCS

I. SITE INFORMATION													
Site name: North Boundary Containment System	Date of inspection: 06-23-2020												
Location and Region: Rocky Mountain Arsenal Region 8	EPA ID: CO5210020769												
Agency, office, or company leading the five-year review: US Army	Weather/temperature: 282°F												
Remedy Includes: (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;"><input type="checkbox"/> Landfill cover/containment</td> <td style="width: 50%; border: none;"><input type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Access controls</td> <td style="border: none;"><input checked="" type="checkbox"/> Groundwater containment</td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Institutional controls</td> <td style="border: none;"><input checked="" type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td style="border: none;"><input checked="" type="checkbox"/> Groundwater pump and treatment</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Surface water collection and treatment</td> <td style="border: none;"></td> </tr> <tr> <td style="border: none;"><input type="checkbox"/> Other _____</td> <td style="border: none;"></td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation	<input type="checkbox"/> Access controls	<input checked="" type="checkbox"/> Groundwater containment	<input type="checkbox"/> Institutional controls	<input checked="" type="checkbox"/> Vertical barrier walls	<input checked="" type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input type="checkbox"/> Other _____	
<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation												
<input type="checkbox"/> Access controls	<input checked="" type="checkbox"/> Groundwater containment												
<input type="checkbox"/> Institutional controls	<input checked="" type="checkbox"/> Vertical barrier walls												
<input checked="" type="checkbox"/> Groundwater pump and treatment													
<input type="checkbox"/> Surface water collection and treatment													
<input type="checkbox"/> Other _____													
Attachments: <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached													

II. INTERVIEWS (Check all that apply)	
1. O&M site manager <u>Gayle Lannas</u> <small>Name</small>	<u>OMC Treaty Op Mgr.</u> <small>Title</small>
Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Date <u>1</u>	
Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	
2. O&M staff _____ <small>Name</small>	
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Title _____    Date _____	
Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	

NBCS

225 spm → 250 spm      Contam 15      WPK 2/1

Sumps cleared as needed - long turn  
except was sump from inside drains

24310    off  
24311    on



III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1.	<b>O&amp;M Documents</b> <input checked="" type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input checked="" type="checkbox"/> Maintenance logs Remarks _____	<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A
4.	<b>Groundwater Monitoring Records</b> Remarks _____	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A

IV. O&M COSTS	
1.	<b>O&amp;M Organization</b> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Other <input type="checkbox"/> Contractor for State <input checked="" type="checkbox"/> Contractor for PRP <input type="checkbox"/> Contractor for Federal Facility _____
2.	<b>O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date

V. ACCESS AND INSTITUTIONAL CONTROLS <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks _____
<b>B. Other Access Restrictions</b>	
1.	<b>Signs and other security measures</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A Remarks <u>CAMERAS</u>

<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
	Reports are verified by the lead agency <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
	Specific requirements in deed or decision documents have been met <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
	Violations have been reported <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			

<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b>	<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A		
1.	<b>Roads damaged</b>	<input checked="" type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL CAPS OR RCRA-EQUIVALENT COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
---

<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
--

1. <b>Settlement</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____
---

2. <b>Performance Monitoring</b> Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____
---

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
---

<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
--

1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____
--

2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____
---

3. <b>Spare Parts and Equipment</b> <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____
---

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train (Check components that apply)</b> <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input checked="" type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input checked="" type="checkbox"/> Others <u>UV</u> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____		
2.	<b>Electrical Enclosures and Panels (properly rated and functional)</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5.	<b>Treatment Building(s)</b>	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____
6.	<b>Monitoring Wells (pump and treatment remedy)</b>	<input type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>D. Monitoring Data</b>		
1.	<b>Monitoring Data</b>	<input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality
2.	<b>Monitoring data suggests:</b>	<input checked="" type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b>		
1.	<b>Monitoring Wells (natural attenuation remedy)</b>	<input type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>X. OTHER REMEDIES</b>		
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.		

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>  Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). <i>Remediation wells properly labeled</i> _____ _____ _____ _____ _____ _____ _____ _____

**B. Adequacy of O&M**

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O & M appears functional

**C. Early Indicators of Potential Remedy Problems**

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

No

**D. Opportunities for Optimization**

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

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**TAB G**  
**Northwest Boundary Containment System**

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## Five-Year Review Site Inspection Checklist (RMA 2020)

I. SITE INFORMATION			
Site name: Northwest Boundary Containment System	Date of inspection: 6/23/20		
Location and Region: Rocky Mountain Arsenal Region 8	EPA ID: CO5210020769		
Agency, office, or company leading the five-year review: US Army	Weather/temperature: Hot / 85°		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input checked="" type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____             </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input checked="" type="checkbox"/> Groundwater containment  <input checked="" type="checkbox"/> Vertical barrier walls             </td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input checked="" type="checkbox"/> Groundwater containment <input checked="" type="checkbox"/> Vertical barrier walls
<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input checked="" type="checkbox"/> Groundwater containment <input checked="" type="checkbox"/> Vertical barrier walls		
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			

II. INTERVIEWS (Check all that apply)	
1. O&M site manager <u>Scott Ache</u> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input checked="" type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	6/23/20
2. O&M staff <u>Gayle Lanmers</u> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	6/23/20

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.  
Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.  
Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.  
Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.  
Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.  
Problems; suggestions;  Report attached \_\_\_\_\_

4. **Other interviews** (optional)  Report attached.


III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)				
1.	<b>O&amp;M Documents</b>			
	<input checked="" type="checkbox"/> O&M manual	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	<input type="checkbox"/> As-built drawings	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	<input checked="" type="checkbox"/> Maintenance logs	<input type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	Remarks _____			
2.	<b>Site-Specific Health and Safety Plan</b>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	<input type="checkbox"/> Contingency plan/emergency response plan	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	Remarks <i>MSDS sheets available and reviewed</i>			
3.	<b>O&amp;M and OSHA Training Records</b>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	Remarks _____			
4.	<b>Groundwater Monitoring Records</b>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
	Remarks _____			

IV. O&M COSTS				
1.	<b>O&amp;M Organization</b>			
	<input type="checkbox"/> State in-house	<input type="checkbox"/> Contractor for State		
	<input type="checkbox"/> PRP in-house	<input type="checkbox"/> Contractor for PRP		
	<input checked="" type="checkbox"/> Federal Facility in-house	<input type="checkbox"/> Contractor for Federal Facility		
	<input type="checkbox"/> Other _____			
2.	<b>O&amp;M Cost Records</b>			
	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<i>N/A</i>	

V. ACCESS AND INSTITUTIONAL CONTROLS <input type="checkbox"/> Applicable <input type="checkbox"/> N/A				
<b>A. Fencing</b>				
1.	<b>Fencing damaged</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Gates secured	<input type="checkbox"/> N/A
	Remarks <i>Fencing at site perimeter with locked gate on access road to NWBCS but can access using other roads.</i>			
<b>B. Other Access Restrictions</b>				
1.	<b>Signs and other security measures</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A	
	Remarks <i>Sign prevents public access and security cameras installed at building</i>			

**C. Institutional Controls (ICs)**

1. **Implementation and enforcement**  
 Site conditions imply ICs not properly implemented  Yes  No  N/A  
 Site conditions imply ICs not being fully enforced  Yes  No  N/A

Type of monitoring (e.g., self-reporting, drive by) Annual Land Use control Plan  
 Frequency \_\_\_\_\_  
 Responsible party/agency Army / Shell  
 Contact Scott Ache

Name	Title	Date	Phone no.

Reporting is up-to-date  Yes  No  N/A  
 Reports are verified by the lead agency  Yes  No  N/A

Specific requirements in deed or decision documents have been met  Yes  No  N/A  
 Violations have been reported  Yes  No  N/A  
 Other problems or suggestions:  Report attached

---

2. **Adequacy**  ICs are adequate  ICs are inadequate  N/A  
 Remarks \_\_\_\_\_

---

**D. General**

1. **Vandalism/trespassing**  Location shown on site map  No vandalism evident  
 Remarks Vandalism occurred where an outside Plant Skatoff switches activated and extraction wells were turned off

2. **Land use changes on site**  N/A  
 Remarks Public access to areas of the site changing with time through USFWS

3. **Land use changes off site**  N/A  
 Remarks \_\_\_\_\_

**VI. GENERAL SITE CONDITIONS**

**A. Roads**  Applicable  N/A

1. **Roads damaged**  Location shown on site map  Roads adequate  N/A  
 Remarks \_\_\_\_\_

**B. Other Site Conditions**

Remarks \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**VII. LANDFILL CAPS OR RCRA-EQUIVALENT COVERS**  Applicable  N/A

**VIII. VERTICAL BARRIER WALLS**  Applicable  N/A

1. **Settlement**  Location shown on site map  Settlement not evident  
 Areal extent \_\_\_\_\_ Depth \_\_\_\_\_  
 Remarks \_\_\_\_\_

2. **Performance Monitoring** Type of monitoring Monitoring wells  
 Performance not monitored  
 Frequency Annual  Evidence of breaching  
 Head differential Maintained  
 Remarks \_\_\_\_\_

**IX. GROUNDWATER/SURFACE WATER REMEDIES**  Applicable  N/A

**A. Groundwater Extraction Wells, Pumps, and Pipelines**  Applicable  N/A

1. **Pumps, Wellhead Plumbing, and Electrical**  
 Good condition  All required wells properly operating  Needs Maintenance  N/A  
 Remarks Extraction well covers have screws to hold in place to prevent vandalism. Manual override switches on wells also upgraded to prevent manual shut off

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**  
 Good condition  Needs Maintenance  
 Remarks Did not inspect recharge wells

3. **Spare Parts and Equipment**  
 Readily available  Good condition  Requires upgrade  Needs to be provided  
 Remarks \_\_\_\_\_

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input checked="" type="checkbox"/> Filters <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) <input type="checkbox"/> Others <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> Sampling ports properly marked and functional <input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date <input checked="" type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually <u>1000 GPM</u> <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input checked="" type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input checked="" type="checkbox"/> Chemicals and equipment properly stored Remarks _____
6.	<b>Monitoring Wells (pump and treatment remedy)</b> <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks <u>Down gradient Performance wells inspected. Flush Mount bolts missing, pressure cap not tight and locks missing from some</u>
<b>D. Monitoring Data</b> <u>Not Part of physical inspection</u>	
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b> <u>N/A</u>	
1.	<b>Monitoring Wells (natural attenuation remedy)</b> <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____
<b>X. OTHER REMEDIES</b>	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.	

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A. Implementation of the Remedy</b>	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).
	<p><u>NWBCS: Contain Contaminant plumes.</u></p> <p><u>Remedy Treatment Plant: tanks, valves, piping in good condition labelled and no leaks observed. Building is in good condition with locked doors and a new security camera and improved auto-shutoff switch. Documentation reviewed included MSIS Binder Daily Operations logbook and O&amp;M Manual dated to 2012. O&amp;M Manual does not receive annual updates so hard to know if up to date. Overall the Plant is operational and functional.</u></p> <p><u>Extraction System: Visited NE wells 22317 and 22316 wells are in clean and neat condition and well covers</u></p>

<p><b>B. Adequacy of O&amp;M</b></p>	<p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <p>upgraded are secured and manual shut off has been upgraded                  Vault covers for both extraction and recharge wells are not locked and could endanger trespassers.                  Downgradient Performance Wells inspected with following observations                  37330 Flush mount not bolted and not locked                  37331 not bolted, not locked, pressure cap pulls off                  37333 not bolted, cap pulls off                  37600 not bolted, cap pulls off                  37332 not bolted, compression cap pulls off, not labelled</p>
<p><b>C. Early Indicators of Potential Remedy Problems</b></p>	<p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p>NWBCS was vandalized during the FYR period. the perpetrators were able to shut off the treatment plant, shut off extraction wells and leave the scene without identification                  Given that public access to the site is increasing and new areas will be opened up. Additional system security such as locking vaults should be considered as well as making sure external electrical boxes are tamper proof</p>
<p><b>D. Opportunities for Optimization</b></p>	<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p>The NWBCS is to be replaced by an integrated treatment system which should be optimized for more efficient operation.</p>

## Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION			
<b>Site name:</b> Northwest Boundary Containment System	<b>Date of inspection:</b> 6/23/2020		
<b>Location and Region:</b> Rocky Mountain Arsenal, Region 8	<b>EPA ID:</b> CO5210020769		
<b>Agency, office, or company leading the five-year review:</b> US Army	<b>Weather/temperature:</b> Sunny, Warm 75*		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input checked="" type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____             </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input checked="" type="checkbox"/> Groundwater containment  <input checked="" type="checkbox"/> Vertical barrier walls             </td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input checked="" type="checkbox"/> Groundwater containment <input checked="" type="checkbox"/> Vertical barrier walls
<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input checked="" type="checkbox"/> Groundwater containment <input checked="" type="checkbox"/> Vertical barrier walls		
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			

II. INTERVIEWS (Check all that apply)			
1. <b>O&amp;M site manager</b>	Gayle Lammers _____	_____	6/23/2020
	Name	Title	Date
	Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____		
	Problems, suggestions; <input type="checkbox"/> Report attached _____		
_____			
2. <b>O&amp;M staff</b>	_____	_____	_____
	Name	Title	Date
	Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____		
	Problems, suggestions; <input type="checkbox"/> Report attached _____		
_____			



<b>III. ON-SITE DOCUMENTS &amp; RECORDS VERIFIED</b> (Check all that apply)				
1.	<b>O&amp;M Documents</b> <input checked="" type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input checked="" type="checkbox"/> Maintenance logs Remarks _____	<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
4.	<b>Permits and Service Agreements</b> <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits _____ Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
5.	<b>Gas Generation Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
6.	<b>Settlement Monument Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
7.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
8.	<b>Leachate Extraction Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
9.	<b>Discharge Compliance Records</b> <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
10.	<b>Daily Access/Security Logs</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A

<b>IV. O&amp;M COSTS</b>																																																	
1.	<p><b>O&amp;M Organization</b></p> <p> <input type="checkbox"/> State in-house                      <input type="checkbox"/> Contractor for State  <input type="checkbox"/> PRP in-house                            <input type="checkbox"/> Contractor for PRP  <input type="checkbox"/> Federal Facility in-house            <input checked="" type="checkbox"/> Contractor for Federal Facility  <input type="checkbox"/> Other _____                 </p>																																																
2.	<p><b>O&amp;M Cost Records</b></p> <p> <input type="checkbox"/> Readily available            <input type="checkbox"/> Up to date  <input type="checkbox"/> Funding mechanism/agreement in place                      Original O&amp;M cost estimate _____ <input type="checkbox"/> Breakdown attached                 </p> <p style="text-align: center;">Total annual cost by year for review period if available</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">From _____</td> <td style="width: 10%;">To _____</td> <td style="width: 40%;"></td> <td style="width: 20%;"></td> <td style="width: 10%;"></td> <td style="width: 10%;"></td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td><input type="checkbox"/></td> <td>Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td><input type="checkbox"/></td> <td>Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td><input type="checkbox"/></td> <td>Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td><input type="checkbox"/></td> <td>Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td><input type="checkbox"/></td> <td>Breakdown attached</td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td><input type="checkbox"/></td> <td>Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td><input type="checkbox"/></td> <td>Breakdown attached</td> </tr> </table>	From _____	To _____					Date	Date	Total cost		<input type="checkbox"/>	Breakdown attached	From _____	To _____			<input type="checkbox"/>	Breakdown attached	Date	Date	Total cost		<input type="checkbox"/>	Breakdown attached	From _____	To _____			<input type="checkbox"/>	Breakdown attached	Date	Date	Total cost		<input type="checkbox"/>	Breakdown attached	From _____	To _____			<input type="checkbox"/>	Breakdown attached	Date	Date	Total cost		<input type="checkbox"/>	Breakdown attached
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Date	Date	Total cost		<input type="checkbox"/>	Breakdown attached																																												
3.	<p><b>Unanticipated or Unusually High O&amp;M Costs During Review Period</b></p> <p>Describe costs and reasons: _____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>																																																

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<p><b>Fencing damaged</b>            <input type="checkbox"/> Location shown on site map    <input checked="" type="checkbox"/> Gates secured    <input type="checkbox"/> N/A</p> <p>Remarks _____</p> <p>_____</p>
<b>B. Other Access Restrictions</b>	
1.	<p><b>Signs and other security measures</b>            <input type="checkbox"/> Location shown on site map    <input type="checkbox"/> N/A</p> <p>Remarks _____</p> <p>_____</p>

<b>C. Institutional Controls (ICs)</b>			
1.	<b>Implementation and enforcement</b>		
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) _____		
	Frequency _____		
	Responsible party/agency _____		
	Contact _____		
	Name	Title	Date
	Phone no.		
	Reporting is up-to-date	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Reports are verified by the lead agency	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Violations have been reported	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached		
	_____		
	_____		
	_____		
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		
	_____		
<b>D. General</b>			
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident
	Remarks _____		
	_____		
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A	
	Remarks _____		
	_____		
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A	
	Remarks _____		
	_____		

<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b>	<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A	
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
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<b>VIII. VERTICAL BARRIER WALLS</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
1. <b>Settlement</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Settlement not evident Areal extent _____                            Depth _____ Remarks _____
2. <b>Performance Monitoring</b> Type of monitoring <u>Groundwater gradients/groundwater quality</u> <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____
3. <b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input checked="" type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive ( <i>e.g.</i> , chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____ Coatings and spill collection trenches, no secondary containment of wastewater and influent sumps		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5.	<b>Treatment Building(s)</b>	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____
6.	<b>Monitoring Wells</b> (pump and treatment remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks <u>Performance monitoring wells 37330, 37600, 37333, 37332, 37331, 37386, and 22003 are flush mount wells with loose compression caps that are not secure</u> _____
<b>D. Monitoring Data</b>		
1.	Monitoring Data	<input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality
2.	Monitoring data suggests:	<input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b>		
1.	<b>Monitoring Wells</b> (natural attenuation remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>X. OTHER REMEDIES</b>		
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.		

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). _____ _____ _____ _____ _____ _____ _____ _____ _____ _____	

<b>B. Adequacy of O&amp;M</b>
<p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <hr/>
<b>C. Early Indicators of Potential Remedy Problems</b>
<p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p><u>The continued development around the Arsenal, and expanded public use will make the protection of remedy elements, primarily monitoring wells, an important part of continued operations. Permanent monitoring wells should be clearly labeled with locking caps or some other form of protection.</u></p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/>
<b>D. Opportunities for Optimization</b>
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <hr/>





III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)				
1.	<b>O&amp;M Documents</b>			
	<input checked="" type="checkbox"/> O&M manual	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	<input type="checkbox"/> As-built drawings	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	<input checked="" type="checkbox"/> Maintenance logs	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	Remarks _____			
2.	<b>Site-Specific Health and Safety Plan</b>	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	<input type="checkbox"/> Contingency plan/emergency response plan	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	Remarks _____			
3.	<b>O&amp;M and OSHA Training Records</b>	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	Remarks _____			
4.	<b>Groundwater Monitoring Records</b>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
	Remarks _____			

IV. O&M COSTS	
1.	<b>O&amp;M Organization</b>
	<input type="checkbox"/> State in-house <input type="checkbox"/> Contractor for State <input type="checkbox"/> PRP in-house <input checked="" type="checkbox"/> Contractor for PRP <input type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Contractor for Federal Facility <input type="checkbox"/> Other
2.	<b>O&amp;M Cost Records</b>
	<input type="checkbox"/> Readily available <input type="checkbox"/> Up to date

V. ACCESS AND INSTITUTIONAL CONTROLS <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input type="checkbox"/> N/A
	Remarks _____
<b>B. Other Access Restrictions</b>	
1.	<b>Signs and other security measures</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A
	Remarks <u>concern</u>

<b>C. Institutional Controls (ICs)</b>			
1.	<b>Implementation and enforcement</b>		
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No <input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) _____		
	Frequency _____		
	Responsible party/agency _____		
	Contact _____		
	Name	Title	Date
			Phone no.
	Reporting is up-to-date	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Reports are verified by the lead agency	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Violations have been reported	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached		
	_____		
	_____		
	_____		
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		
	_____		
<b>D. General</b>			
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident
	Remarks _____		
	_____		
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A	
	Remarks _____		
	_____		
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A	
	Remarks _____		
	_____		

<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b>	<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A	
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL CAPS OR RCRA-EQUIVALENT COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
---

<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1. <b>Settlement</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____	
2. <b>Performance Monitoring</b> Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____	

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____	
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks <u>Plan to add well (s) at NE end</u>	
3. <b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____	

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train (Check components that apply)</b> <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input checked="" type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____		
2.	<b>Electrical Enclosures and Panels (properly rated and functional)</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5.	<b>Treatment Building(s)</b>	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____
6.	<b>Monitoring Wells (pump and treatment remedy)</b>	<input type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>D. Monitoring Data</b>		
1.	<b>Monitoring Data</b>	<input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality
2.	<b>Monitoring data suggests:</b>	<input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b>		
1.	<b>Monitoring Wells (natural attenuation remedy)</b>	<input type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>X. OTHER REMEDIES</b>		
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.		

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>  Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). _____ <i>Remediation waste properly labeled</i> _____ _____ _____ _____ _____ _____ _____ _____



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**TAB H**  
**Off-Post Groundwater Intercept and Treatment System**

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## Five-Year Review Site Inspection Checklist (RMA 2020)

I. SITE INFORMATION			
<b>Site name: Off-post Groundwater Intercept and Treatment System</b>	<b>Date of inspection:</b> <u>6/23/20</u>		
<b>Location and Region: Rocky Mountain Arsenal Region 8</b>	<b>EPA ID: CO5210020769</b>		
<b>Agency, office, or company leading the five-year review: US Army</b>	<b>Weather/temperature:</b> <u>Hot / 85°</u>		
<b>Remedy Includes: (Check all that apply)</b> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input checked="" type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____ </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls </td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls
<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls		
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			

II. INTERVIEWS (Check all that apply)	
<b>1. O&amp;M site manager</b> <u>Scott Ache</u> <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span><u>6/23/20</u></span> </div> Date	
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	
<b>2. O&amp;M staff</b> <u>Gayle Lammers</u> <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span><u>6/23/20</u></span> </div> Date	
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.  
Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.  
Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.  
Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.  
Problems; suggestions;  Report attached \_\_\_\_\_

Agency \_\_\_\_\_  
Contact \_\_\_\_\_  
Name Title Date Phone no.  
Problems; suggestions;  Report attached \_\_\_\_\_

4. **Other interviews** (optional)  Report attached.


III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1.	<b>O&amp;M Documents</b> <input checked="" type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input checked="" type="checkbox"/> Maintenance logs Remarks <u>O&amp;M Manual dated 2011</u>	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks <u>MSDS sheets available and reviewed</u>	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
4.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A

IV. O&M COSTS	
1.	<b>O&amp;M Organization</b> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input checked="" type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Other <input type="checkbox"/> Contractor for State <input type="checkbox"/> Contractor for PRP <input type="checkbox"/> Contractor for Federal Facility
2.	<b>O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <u>N/A</u>

V. ACCESS AND INSTITUTIONAL CONTROLS <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<b>Fencing damaged</b> Remarks <u>Fencing encloses Extraction/recharge system and treatment plant</u>
<b>B. Other Access Restrictions</b>	
1.	<b>Signs and other security measures</b> Remarks <u>Security cameras installed</u>

<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by)	<u>Annual Land use control</u>		
	Frequency	<u>Plan updates</u>		
	Responsible party/agency	<u>Army/Shell</u>		
	Contact	<u>Scott Ache</u>		
	Name	Title	Date	Phone no.
	Reporting is up-to-date	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Reports are verified by the lead agency	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	<input type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
	Violations have been reported	<input type="checkbox"/> Yes	<input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
	Other problems or suggestions:	<input type="checkbox"/> Report attached		
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input checked="" type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks	_____		
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident	
	Remarks	_____		
	_____			
2.	<b>Land use changes on site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks	<u>Increased residential development nearby may require additional site security</u>		
	_____			
3.	<b>Land use changes off site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks	<u>Increased residential development nearby may require additional site security</u>		
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b>				
	<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A		
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks	_____		
	_____			

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL CAPS OR RCRA-EQUIVALENT COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
---

<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A	
1. <b>Settlement</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                      Depth _____ Remarks _____	
2. <b>Performance Monitoring</b> Type of monitoring <u>Groundwater Monitoring wells</u> <input type="checkbox"/> Performance not monitored Frequency <u>Annual</u> <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____	

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input type="checkbox"/> Good condition <input checked="" type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks <u>inspected wells/pavits 37802, 37809</u>	
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks <u>Did not inspect recharge system</u>	
3. <b>Spare Parts and Equipment</b> <input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____	

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train (Check components that apply)</b> <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input checked="" type="checkbox"/> Filters <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input checked="" type="checkbox"/> Sampling ports properly marked and functional <input checked="" type="checkbox"/> Sampling/maintenance log displayed and up to date <input checked="" type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually <u>350</u> <input type="checkbox"/> Quantity of surface water treated annually <u>23 + 9 PM</u> Remarks _____		
2.	<b>Electrical Enclosures and Panels (properly rated and functional)</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____
6.	<b>Monitoring Wells (pump and treatment remedy)</b> <input checked="" type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____
<b>D. Monitoring Data</b> <i>Not part of Physical inspection</i>	
1.	<b>Monitoring Data</b> <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality
2.	<b>Monitoring data suggests:</b> <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b> <i>N/A</i>	
1.	<b>Monitoring Wells (natural attenuation remedy)</b> <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____
<b>X. OTHER REMEDIES</b>	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.	

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A. Implementation of the Remedy</b>	Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.). <i>OGTS Remedy: Reduce concentrations in Contaminant Plumes</i> <i>Treatment Plant: Tanks, valves, piping in good condition labelled and no leaks observed. Building is in good condition with locked doors and security cameras</i> <i>Documentation reviewed includes MSDS binder, daily operations log book that is up to date and O&amp;M manual, which had a 2011 date.</i>

**B. Adequacy of O&M**

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Extraction wells (First Cr.) vaults are locked and show evidence of subsidence though are wells are operational, recharge trenches also have a locked vault and are operational. In NPS location only inspected the new extraction well field and found wells in good condition and locked. The metering building is in good condition

**C. Early Indicators of Potential Remedy Problems**

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

The NPS system is in the process of redesign for the extraction, recharge and treatment systems. A new stand alone treatment plant is planned as well as abandonment of ~~even~~ the original extraction/recharge system. It will be necessary to demonstrate that the revised system will provide the same level of plume capture and treatment.

**D. Opportunities for Optimization**

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

The OGITS treatment plant will be replaced by the integrated treatment plant (First Cr.) and a new stand alone system at NPS these systems will be optimized for current conditions

## Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION													
<b>Site name:</b> Off-Post Groundwater Intercept and Treatment System	<b>Date of inspection:</b> 6/23/2020												
<b>Location and Region:</b> Rocky Mountain Arsenal, Region 8	<b>EPA ID:</b> CO5210020769												
<b>Agency, office, or company leading the five-year review:</b> US Army	<b>Weather/temperature:</b> Sunny, Warm 75*												
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td><input type="checkbox"/> Landfill cover/containment</td> <td><input type="checkbox"/> Monitored natural attenuation</td> </tr> <tr> <td><input type="checkbox"/> Access controls</td> <td><input type="checkbox"/> Groundwater containment</td> </tr> <tr> <td><input type="checkbox"/> Institutional controls</td> <td><input type="checkbox"/> Vertical barrier walls</td> </tr> <tr> <td><input checked="" type="checkbox"/> Groundwater pump and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Surface water collection and treatment</td> <td></td> </tr> <tr> <td><input type="checkbox"/> Other _____</td> <td></td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation	<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment	<input type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls	<input checked="" type="checkbox"/> Groundwater pump and treatment		<input type="checkbox"/> Surface water collection and treatment		<input type="checkbox"/> Other _____	
<input type="checkbox"/> Landfill cover/containment	<input type="checkbox"/> Monitored natural attenuation												
<input type="checkbox"/> Access controls	<input type="checkbox"/> Groundwater containment												
<input type="checkbox"/> Institutional controls	<input type="checkbox"/> Vertical barrier walls												
<input checked="" type="checkbox"/> Groundwater pump and treatment													
<input type="checkbox"/> Surface water collection and treatment													
<input type="checkbox"/> Other _____													
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached													

II. INTERVIEWS (Check all that apply)	
<b>1. O&amp;M site manager</b> <u>Gayle Lammers</u> <div style="text-align: center; margin-left: 100px;">Name</div> <div style="text-align: center; margin-left: 200px;">Title</div> <div style="text-align: center; margin-left: 200px;">Date</div> Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	
<b>2. O&amp;M staff</b> _____ <div style="text-align: center; margin-left: 100px;">Name</div> <div style="text-align: center; margin-left: 200px;">Title</div> <div style="text-align: center; margin-left: 200px;">Date</div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	



<b>III. ON-SITE DOCUMENTS &amp; RECORDS VERIFIED</b> (Check all that apply)				
1.	<b>O&amp;M Documents</b> <input checked="" type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input checked="" type="checkbox"/> Maintenance logs Remarks _____	<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
4.	<b>Permits and Service Agreements</b> <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits _____ Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
5.	<b>Gas Generation Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
6.	<b>Settlement Monument Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
7.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
8.	<b>Leachate Extraction Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A
9.	<b>Discharge Compliance Records</b> <input type="checkbox"/> Air <input type="checkbox"/> Water (effluent) Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input type="checkbox"/> N/A <input type="checkbox"/> N/A
10.	<b>Daily Access/Security Logs</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input type="checkbox"/> N/A

<b>IV. O&amp;M COSTS</b>																																																			
1.	<p><b>O&amp;M Organization</b></p> <p> <input type="checkbox"/> State in-house                      <input type="checkbox"/> Contractor for State  <input type="checkbox"/> PRP in-house                              <input type="checkbox"/> Contractor for PRP  <input type="checkbox"/> Federal Facility in-house              <input checked="" type="checkbox"/> Contractor for Federal Facility  <input type="checkbox"/> Other _____                 </p>																																																		
2.	<p><b>O&amp;M Cost Records</b></p> <p> <input type="checkbox"/> Readily available              <input type="checkbox"/> Up to date  <input type="checkbox"/> Funding mechanism/agreement in place                      Original O&amp;M cost estimate _____ <input type="checkbox"/> Breakdown attached                 </p> <p style="text-align: center;">Total annual cost by year for review period if available</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">From _____</td> <td style="width: 15%;">To _____</td> <td style="width: 30%;"></td> <td style="width: 15%;"></td> <td style="width: 25%;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> </tr> <tr> <td>From _____</td> <td>To _____</td> <td></td> <td></td> <td><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td style="text-align: center;">Date</td> <td style="text-align: center;">Date</td> <td style="text-align: center;">Total cost</td> <td></td> <td></td> </tr> </table>	From _____	To _____			<input type="checkbox"/> Breakdown attached	Date	Date	Total cost			From _____	To _____			<input type="checkbox"/> Breakdown attached	Date	Date	Total cost			From _____	To _____			<input type="checkbox"/> Breakdown attached	Date	Date	Total cost			From _____	To _____			<input type="checkbox"/> Breakdown attached	Date	Date	Total cost			From _____	To _____			<input type="checkbox"/> Breakdown attached	Date	Date	Total cost		
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Date	Date	Total cost																																																	
3.	<p><b>Unanticipated or Unusually High O&amp;M Costs During Review Period</b></p> <p>Describe costs and reasons: _____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>																																																		

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<p><b>Fencing damaged</b>              <input type="checkbox"/> Location shown on site map    <input type="checkbox"/> Gates secured    <input type="checkbox"/> N/A</p> <p>Remarks _____</p> <p>_____</p>
<b>B. Other Access Restrictions</b>	
1.	<p><b>Signs and other security measures</b>              <input type="checkbox"/> Location shown on site map    <input type="checkbox"/> N/A</p> <p>Remarks _____</p> <p>_____</p>

<b>C. Institutional Controls (ICs)</b>			
1.	<b>Implementation and enforcement</b>		
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) _____		
	Frequency _____		
	Responsible party/agency _____		
	Contact _____		
	Name	Title	Date
	Phone no.		
	Reporting is up-to-date	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Reports are verified by the lead agency	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Specific requirements in deed or decision documents have been met	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Violations have been reported	<input type="checkbox"/> Yes	<input type="checkbox"/> No <input type="checkbox"/> N/A
	Other problems or suggestions: <input type="checkbox"/> Report attached		
	_____		
	_____		
	_____		
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		
	_____		
<b>D. General</b>			
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No vandalism evident
	Remarks _____		
	_____		
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A	
	Remarks _____		
	_____		
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A	
	Remarks _____		
	_____		

<b>VI. GENERAL SITE CONDITIONS</b>			
<b>A. Roads</b>	<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A	
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate <input type="checkbox"/> N/A
	Remarks _____		
	_____		

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL COVERS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
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<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A
1. <b>Settlement</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident Areal extent _____                            Depth _____ Remarks _____
2. <b>Performance Monitoring</b> Type of monitoring _____ <input type="checkbox"/> Performance not monitored Frequency _____ <input type="checkbox"/> Evidence of breaching Head differential _____ Remarks _____

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A
1. <b>Pumps, Wellhead Plumbing, and Electrical</b> <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks <u>Some of the well heads are located in box vaults that have shifted over time. There is currently a plan to replace these soon.</u>
2. <b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____
3. <b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply) <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input checked="" type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters <small>Pre and Post Filters</small> _____ <input type="checkbox"/> Additive ( <i>e.g.</i> , chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks <u>One Carbon adsorber showed signs of past leakage and staining on the outside of adsorber tank.</u> <u>Staff indicated that a leaking weld had caused the seepage and had since been repaired.</u>		
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional) <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5.	<b>Treatment Building(s)</b>	<input type="checkbox"/> N/A <input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____
6.	<b>Monitoring Wells</b> (pump and treatment remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ Not al wells inspected
<b>D. Monitoring Data</b>		
1.	Monitoring Data	<input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality
2.	Monitoring data suggests:	<input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b>		
1.	<b>Monitoring Wells</b> (natural attenuation remedy)	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>X. OTHER REMEDIES</b>		
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.		

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>
Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).  _____ _____ _____ _____ _____ _____ _____ _____ _____ _____	

<b>B. Adequacy of O&amp;M</b>
<p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <hr/>
<b>C. Early Indicators of Potential Remedy Problems</b>
<p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <hr/>
<b>D. Opportunities for Optimization</b>
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <hr/>

## Five-Year Review Site Inspection Checklist (RMA 2020)

00615

I. SITE INFORMATION	
<b>Site name: Off-post Groundwater Intercept and Treatment System</b>	<b>Date of inspection:</b> <u>06-23-2020</u>
<b>Location and Region: Rocky Mountain Arsenal Region 8</b>	<b>EPA ID: CO5210020769</b>
<b>Agency, office, or company leading the five-year review: US Army</b>	<b>Weather/temperature:</b>
<b>Remedy Includes: (Check all that apply)</b> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input checked="" type="checkbox"/> Institutional controls  <input checked="" type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____         </div> <div style="width: 45%;"> <input type="checkbox"/> Monitored natural attenuation  <input checked="" type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls         </div> </div>	
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached	

II. INTERVIEWS (Check all that apply)	
<b>1. O&amp;M site manager</b> <u>Gayle Lammers</u> <div style="text-align: center;">Name</div>	<u>one treated Ops Mo-</u> <div style="text-align: center;">Title</div>
Interviewed <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	
<b>2. O&amp;M staff</b> _____ <div style="text-align: center;">Name</div>	_____ <div style="text-align: center;">Title</div>
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	



III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1.	<b>O&amp;M Documents</b> <input checked="" type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input checked="" type="checkbox"/> Maintenance logs Remarks _____	<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A
4.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A

IV. O&M COSTS	
1.	<b>O&amp;M Organization</b> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Other <input type="checkbox"/> Contractor for State <input checked="" type="checkbox"/> Contractor for PRP <input type="checkbox"/> Contractor for Federal Facility _____
2.	<b>O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date

V. ACCESS AND INSTITUTIONAL CONTROLS <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<b>Fencing damaged</b> <input checked="" type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks _____
<b>B. Other Access Restrictions</b>	
1.	<b>Signs and other security measures</b> <input checked="" type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A Remarks _____ <i>renew</i>

<b>C. Institutional Controls (ICs)</b>				
<b>1.</b>	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	Site conditions imply ICs not being fully enforced		<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
	Type of monitoring (e.g., self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Reports are verified by the lead agency		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Specific requirements in deed or decision documents have been met		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Violations have been reported		<input type="checkbox"/> Yes	<input type="checkbox"/> No
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
<b>2.</b>	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks	_____		
	_____			
<b>D. General</b>				
<b>1.</b>	<b>Vandalism/trespassing</b>	<input checked="" type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> No vandalism evident	
	Remarks	_____		
	_____			
<b>2.</b>	<b>Land use changes on site</b>	<input type="checkbox"/> N/A		
	Remarks	_____		
	_____			
<b>3.</b>	<b>Land use changes off site</b>	<input checked="" type="checkbox"/> N/A		
	Remarks	_____		
	_____			

<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A.</b>	<b>Roads</b>	<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A	
<b>1.</b>	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks	_____		
	_____			

**B. Other Site Conditions**

Remarks \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**VII. LANDFILL CAPS OR RCRA-EQUIVALENT COVERS**     Applicable     N/A

**VIII. VERTICAL BARRIER WALLS**     Applicable     N/A

1.    **Settlement**                       Location shown on site map                       Settlement not evident  
 Areal extent \_\_\_\_\_                      Depth \_\_\_\_\_  
 Remarks \_\_\_\_\_

2.    **Performance Monitoring** Type of monitoring \_\_\_\_\_  
 Performance not monitored  
 Frequency \_\_\_\_\_                       Evidence of breaching  
 Head differential \_\_\_\_\_  
 Remarks \_\_\_\_\_

**IX. GROUNDWATER/SURFACE WATER REMEDIES**     Applicable     N/A

**A. Groundwater Extraction Wells, Pumps, and Pipelines**                       Applicable     N/A

1.    **Pumps, Wellhead Plumbing, and Electrical**  
 Good condition     All required wells properly operating     Needs Maintenance     N/A  
 Remarks changes to system pending

2.    **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**  
 Good condition     Needs Maintenance  
 Remarks \_\_\_\_\_

3.    **Spare Parts and Equipment**  
 Readily available     Good condition     Requires upgrade     Needs to be provided  
 Remarks \_\_\_\_\_

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train (Check components that apply)</b> <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input checked="" type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters _____ <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____		
2.	<b>Electrical Enclosures and Panels (properly rated and functional)</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5.	<b>Treatment Building(s)</b>	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____
6.	<b>Monitoring Wells (pump and treatment remedy)</b>	<input type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>D. Monitoring Data</b>		
1.	<b>Monitoring Data</b>	<input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality
2.	<b>Monitoring data suggests:</b>	<input checked="" type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b>		
1.	<b>Monitoring Wells (natural attenuation remedy)</b>	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>X. OTHER REMEDIES</b>		
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.		

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>  Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).  _____ _____ _____ _____ _____ _____ _____ _____ _____ _____

**B. Adequacy of O&M**

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

O&M Protocol  
Remediation waste properly labeled

**C. Early Indicators of Potential Remedy Problems**

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

**D. Opportunities for Optimization**

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

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**TAB I**  
**Railyard Containment System**

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## Five-Year Review Site Inspection Checklist (RMA 2020)

I. SITE INFORMATION			
Site name: Railyard Containment System	Date of inspection: 6/25/20		
Location and Region: Rocky Mountain Arsenal Region 8	EPA ID: CO5210020769		
Agency, office, or company leading the five-year review: US Army	Weather/temperature: Hot / 90°		
<b>Remedy Includes:</b> (Check all that apply) <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Landfill cover/containment  <input type="checkbox"/> Access controls  <input type="checkbox"/> Institutional controls  <input checked="" type="checkbox"/> Groundwater pump and treatment  <input type="checkbox"/> Surface water collection and treatment  <input type="checkbox"/> Other _____             </td> <td style="width: 50%; vertical-align: top;"> <input type="checkbox"/> Monitored natural attenuation  <input checked="" type="checkbox"/> Groundwater containment  <input type="checkbox"/> Vertical barrier walls             </td> </tr> </table>		<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input checked="" type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls
<input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Access controls <input type="checkbox"/> Institutional controls <input checked="" type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	<input type="checkbox"/> Monitored natural attenuation <input checked="" type="checkbox"/> Groundwater containment <input type="checkbox"/> Vertical barrier walls		
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached			

II. INTERVIEWS (Check all that apply)	
1. O&M site manager <u>Scott Ache</u> <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	6/25/20 Date
2. O&M staff <u>Gayle Lemms</u> <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div> Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	6/25/20 Date



<b>III. ON-SITE DOCUMENTS &amp; RECORDS VERIFIED</b> (Check all that apply)			
1.	<b>O&amp;M Documents</b> <input checked="" type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input type="checkbox"/> Maintenance logs Remarks <u>The RYTS system is shut off</u>	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A
4.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input checked="" type="checkbox"/> N/A

<b>IV. O&amp;M COSTS</b>	
1.	<b>O&amp;M Organization</b> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input checked="" type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Other _____ <input type="checkbox"/> Contractor for State <input type="checkbox"/> Contractor for PRP <input type="checkbox"/> Contractor for Federal Facility
2.	<b>O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date <u>N/A</u>

<b>V. ACCESS AND INSTITUTIONAL CONTROLS</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<b>Fencing damaged</b> <input type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks <u>Fence on both sides of system on north and south</u>
<b>B. Other Access Restrictions</b>	
1.	<b>Signs and other security measures</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A Remarks _____

**C. Institutional Controls (ICs)**

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented  Yes  No  N/A  
 Site conditions imply ICs not being fully enforced  Yes  No  N/A

Type of monitoring (e.g., self-reporting, drive by) \_\_\_\_\_  
 Frequency Annual Land Use Control Plan updates  
 Responsible party/agency Army/Shell  
 Contact Scott Arhe

Name	Title	Date	Phone no.

Reporting is up-to-date  Yes  No  N/A  
 Reports are verified by the lead agency  Yes  No  N/A

Specific requirements in deed or decision documents have been met  Yes  No  N/A  
 Violations have been reported  Yes  No  N/A

Other problems or suggestions:  Report attached

---

2. **Adequacy**  ICs are adequate  ICs are inadequate  N/A

Remarks \_\_\_\_\_

---

**D. General**

1. **Vandalism/trespassing**  Location shown on site map  No vandalism evident

Remarks \_\_\_\_\_

2. **Land use changes on site**  N/A

Remarks USFWS has built a visitor center nearby separated by a fence

3. **Land use changes off site**  N/A

Remarks Increased residential development nearby

**VI. GENERAL SITE CONDITIONS**

**A. Roads**  Applicable  N/A

1. **Roads damaged**  Location shown on site map  Roads adequate  N/A

Remarks \_\_\_\_\_

<b>B. Other Site Conditions</b>
Remarks _____ _____ _____ _____ _____

<b>VII. LANDFILL CAPS OR RCRA-EQUIVALENT COVERS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
---

<b>VIII. VERTICAL BARRIER WALLS</b> <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1.	<b>Settlement</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Settlement not evident	
	Areal extent _____                      Depth _____	
	Remarks _____ _____	
2.	<b>Performance Monitoring</b> Type of monitoring _____	
	<input type="checkbox"/> Performance not monitored	
	Frequency _____ <input type="checkbox"/> Evidence of breaching	
	Head differential _____	
	Remarks _____ _____	

<b>IX. GROUNDWATER/SURFACE WATER REMEDIES</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
<b>A. Groundwater Extraction Wells, Pumps, and Pipelines</b> <input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1.	<b>Pumps, Wellhead Plumbing, and Electrical</b>	
	<input type="checkbox"/> Good condition <input type="checkbox"/> All required wells properly operating <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A	
	Remarks <i>Not operating with electrical connections removed</i> <i>wells are in good condition</i>	
2.	<b>Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b>	
	<input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance	
	Remarks _____ _____	
3.	<b>Spare Parts and Equipment</b>	
	<input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided	
	Remarks <i>N/A</i>	

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b>	<input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance	
Remarks _____			
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b>	<input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance	
Remarks _____			
3.	<b>Spare Parts and Equipment</b>	<input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided	
Remarks _____			
<b>C. Treatment System</b>		<input type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train</b> (Check components that apply)	<input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation	
<input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers			
<input type="checkbox"/> Filters			
<input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____			
<input type="checkbox"/> Others _____			
<input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance			
<input checked="" type="checkbox"/> Sampling ports properly marked and functional			
<input type="checkbox"/> Sampling/maintenance log displayed and up to date			
<input checked="" type="checkbox"/> Equipment properly identified			
<input type="checkbox"/> Quantity of groundwater treated annually <u>Not operating</u>			
<input type="checkbox"/> Quantity of surface water treated annually _____			
Remarks _____			
2.	<b>Electrical Enclosures and Panels</b> (properly rated and functional)	<input type="checkbox"/> N/A <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance	
Remarks <u>most have been removed</u>			
3.	<b>Tanks, Vaults, Storage Vessels</b>	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance	
Remarks _____			
4.	<b>Discharge Structure and Appurtenances</b>	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance	
Remarks _____			

5.	<b>Treatment Building(s)</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____
6.	<b>Monitoring Wells (pump and treatment remedy)</b> <input checked="" type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input checked="" type="checkbox"/> Routinely sampled <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>D. Monitoring Data</b> <i>Not part of physical inspection</i>	
1.	Monitoring Data <input type="checkbox"/> Is routinely submitted on time <input type="checkbox"/> Is of acceptable quality
2.	Monitoring data suggests: <input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b> <i>N/A</i>	
1.	<b>Monitoring Wells (natural attenuation remedy)</b> <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>X. OTHER REMEDIES</b>	
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.	

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>  Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).  <i>Railroad Remedy: Contain Contaminant Plume</i> <i>Treatment Plant: Malfunctioned at present but well maintained and could be operational in two days</i> <i>Building is in good condition with locked doors</i> <i>Extraction wells: Inspected 03301, 03302, 03303, 03304</i> <i>all locked with electrical disconnected. Recovery wells RC-1, RC-2 locked and in good condition. Upgradient monitoring wells not all locked but behind fence</i>

<b>B. Adequacy of O&amp;M</b>
<p>Describe issues and observations related to the implementation and scope of O&amp;M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.</p> <p><i>System is in a state of readiness with Security Remedy. Given nearby Public Visitor Center, wells should be locked</i></p>
<b>C. Early Indicators of Potential Remedy Problems</b>
<p>Describe issues and observations such as unexpected changes in the cost or scope of O&amp;M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.</p> <p><i>None at this time</i></p>
<b>D. Opportunities for Optimization</b>
<p>Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.</p> <p><i>System probably not used in the future so no need for optimization</i></p>

## Five-Year Review Site Inspection Checklist (RMA 2020)

I. SITE INFORMATION	
Site name: <b>Railyard Containment System</b>	Date of inspection: <b>06-25-2020</b>
Location and Region: <b>Rocky Mountain Arsenal Region 8</b>	EPA ID: <b>CO5210020769</b>
Agency, office, or company leading the five-year review: <b>US Army</b>	Weather/temperature:
<b>Remedy Includes: (Check all that apply)</b> <input type="checkbox"/> Landfill cover/containment <input type="checkbox"/> Monitored natural attenuation <input type="checkbox"/> Access controls <input type="checkbox"/> Groundwater containment <input type="checkbox"/> Institutional controls <input type="checkbox"/> Vertical barrier walls <input checked="" type="checkbox"/> Groundwater pump and treatment * <input type="checkbox"/> Surface water collection and treatment <input type="checkbox"/> Other _____	
<b>Attachments:</b> <input type="checkbox"/> Inspection team roster attached <input type="checkbox"/> Site map attached	

II. INTERVIEWS (Check all that apply)	
<b>1. O&amp;M site manager</b> <u>Gayle Hansen</u> <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span><u>OMC Treatment Ops Mgr</u></span> <span>Date</span> </div>	
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	
<b>2. O&amp;M staff</b> _____ <div style="display: flex; justify-content: space-between; margin-left: 100px;"> <span>Name</span> <span>Title</span> <span>Date</span> </div>	
Interviewed <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone    Phone no. _____ Problems, suggestions; <input type="checkbox"/> Report attached _____ _____	

No 2018  
 RC-1 / KC-2  
 5 R wells  
 3 PM L  
 SPS -



III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1.	<b>O&amp;M Documents</b> <input checked="" type="checkbox"/> O&M manual <input type="checkbox"/> As-built drawings <input checked="" type="checkbox"/> Maintenance logs Remarks _____	<input checked="" type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A <input type="checkbox"/> N/A
2.	<b>Site-Specific Health and Safety Plan</b> <input type="checkbox"/> Contingency plan/emergency response plan Remarks _____	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> N/A <input type="checkbox"/> N/A
3.	<b>O&amp;M and OSHA Training Records</b> Remarks _____	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A
4.	<b>Groundwater Monitoring Records</b> Remarks _____	<input type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date <input type="checkbox"/> N/A

IV. O&M COSTS	
1.	<b>O&amp;M Organization</b> <input type="checkbox"/> State in-house <input type="checkbox"/> PRP in-house <input type="checkbox"/> Federal Facility in-house <input type="checkbox"/> Other _____ <input type="checkbox"/> Contractor for State <input checked="" type="checkbox"/> Contractor for PRP <input type="checkbox"/> Contractor for Federal Facility
2.	<b>O&amp;M Cost Records</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Up to date

V. ACCESS AND INSTITUTIONAL CONTROLS <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
<b>A. Fencing</b>	
1.	<b>Fencing damaged</b> <input checked="" type="checkbox"/> Location shown on site map <input type="checkbox"/> Gates secured <input type="checkbox"/> N/A Remarks _____
<b>B. Other Access Restrictions</b>	
1.	<b>Signs and other security measures</b> <input type="checkbox"/> Location shown on site map <input type="checkbox"/> N/A Remarks _____

<b>C. Institutional Controls (ICs)</b>				
1.	<b>Implementation and enforcement</b>			
	Site conditions imply ICs not properly implemented	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Site conditions imply ICs not being fully enforced	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
	Type of monitoring (e.g., self-reporting, drive by) _____			
	Frequency _____			
	Responsible party/agency _____			
	Contact _____			
	Name	Title	Date	Phone no.
	Reporting is up-to-date <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
	Reports are verified by the lead agency <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
	Specific requirements in deed or decision documents have been met <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
	Violations have been reported <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A			
	Other problems or suggestions: <input type="checkbox"/> Report attached			
	_____			
	_____			
	_____			
2.	<b>Adequacy</b>	<input type="checkbox"/> ICs are adequate	<input type="checkbox"/> ICs are inadequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			
	_____			
<b>D. General</b>				
1.	<b>Vandalism/trespassing</b>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No vandalism evident	
	Remarks _____			
	_____			
2.	<b>Land use changes on site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
3.	<b>Land use changes off site</b>	<input type="checkbox"/> N/A		
	Remarks _____			
	_____			
<b>VI. GENERAL SITE CONDITIONS</b>				
<b>A. Roads</b>	<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A		
1.	<b>Roads damaged</b>	<input type="checkbox"/> Location shown on site map	<input checked="" type="checkbox"/> Roads adequate	<input type="checkbox"/> N/A
	Remarks _____			
	_____			

**B. Other Site Conditions**

Remarks \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**VII. LANDFILL CAPS OR RCRA-EQUIVALENT COVERS**  Applicable  N/A**VIII. VERTICAL BARRIER WALLS**  Applicable  N/A

1. **Settlement**  Location shown on site map  Settlement not evident  
 Areal extent \_\_\_\_\_ Depth \_\_\_\_\_  
 Remarks \_\_\_\_\_
2. **Performance Monitoring** Type of monitoring \_\_\_\_\_  
 Performance not monitored  
 Frequency \_\_\_\_\_  Evidence of breaching  
 Head differential \_\_\_\_\_  
 Remarks \_\_\_\_\_

**IX. GROUNDWATER/SURFACE WATER REMEDIES**  Applicable  N/A

- A. Groundwater Extraction Wells, Pumps, and Pipelines**  Applicable  N/A
1. **Pumps, Wellhead Plumbing, and Electrical**  
 Good condition  All required wells properly operating  Needs Maintenance  N/A  
 Remarks \_\_\_\_\_
2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**  
 Good condition  Needs Maintenance  
 Remarks \_\_\_\_\_
3. **Spare Parts and Equipment**  
 Readily available  Good condition  Requires upgrade  Needs to be provided  
 Remarks \_\_\_\_\_ *Power*

<b>B. Surface Water Collection Structures, Pumps, and Pipelines</b>		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	<b>Collection Structures, Pumps, and Electrical</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
2.	<b>Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances</b> <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Spare Parts and Equipment</b> <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires upgrade <input type="checkbox"/> Needs to be provided Remarks _____		
<b>C. Treatment System</b>		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A
1.	<b>Treatment Train (Check components that apply)</b> <input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input checked="" type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters <input type="checkbox"/> Additive (e.g., chelation agent, flocculent) _____ <input type="checkbox"/> Others _____ <input type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually _____ <input type="checkbox"/> Quantity of surface water treated annually _____ Remarks _____		
2.	<b>Electrical Enclosures and Panels (properly rated and functional)</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		
3.	<b>Tanks, Vaults, Storage Vessels</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs Maintenance Remarks _____		
4.	<b>Discharge Structure and Appurtenances</b> <input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition <input type="checkbox"/> Needs Maintenance Remarks _____		

5.	<b>Treatment Building(s)</b>	<input type="checkbox"/> N/A <input checked="" type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs repair <input type="checkbox"/> Chemicals and equipment properly stored Remarks _____ _____
6.	<b>Monitoring Wells (pump and treatment remedy)</b>	<input type="checkbox"/> Properly secured/locked <input checked="" type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>D. Monitoring Data</b>		
1.	<b>Monitoring Data</b>	<input checked="" type="checkbox"/> Is routinely submitted on time <input checked="" type="checkbox"/> Is of acceptable quality
2.	<b>Monitoring data suggests:</b>	<input type="checkbox"/> Groundwater plume is effectively contained <input type="checkbox"/> Contaminant concentrations are declining
<b>E. Monitored Natural Attenuation</b>		
1.	<b>Monitoring Wells (natural attenuation remedy)</b>	<input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Functioning <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Good condition <input type="checkbox"/> All required wells located <input type="checkbox"/> Needs Maintenance <input type="checkbox"/> N/A Remarks _____ _____
<b>X. OTHER REMEDIES</b>		
If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.		

<b>XI. OVERALL OBSERVATIONS</b>	
<b>A.</b>	<b>Implementation of the Remedy</b>  Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).  _____ _____ _____ _____ _____ _____ _____ _____ _____ _____



## **APPENDIX E**

### Responses to Regulatory Agency Comments

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**U.S. Army and Shell Oil Company Responses to  
U.S. Environmental Protection Agency (EPA) January 14, 2021  
Comments on the Fifth Five-Year Review Report for Rocky Mountain Arsenal,  
Revision B, November 5, 2021**

**Comments for Incorporation**

**General Comments**

**Comment 1.** Protectiveness statements are provided in the Executive Summary. The following are comments on these statements:

- a. The overall protectiveness statement on Page ES-3 does not address the entire site. For example, the 2015 Five Year Review Report (FYRR) stated: “Because the remedial actions in both the On-Post and Off-Post OUs are expected to be protective of human health and the environment upon completion, the remedy for the entire site is expected to be protective of both human health and the environment.” For consistency, it is EPA recommends that a similar statement be provided to summarize the conclusion of the 2020 FYRR for both major operable units (OUs) at the Rocky Mountain Arsenal (RMA).
- b. The protectiveness statements do not clearly distinguish between short-term and long-term protectiveness. Please revise these statements for both the On-Post OU and the Offpost OU to first describe why the remedies are protective in the short term, and then to identify actions that need to be taken to ensure long-term protectiveness. Include statements that specifically address short-term and the long-term determinations.
- c. In a letter dated September 28, 2016, U.S. Environmental Protection Agency (EPA) issued an independent protectiveness determination for the On-Post OU, concluding that protectiveness was deferred because an ecorisk determination could not be made since the biomonitoring program was incomplete (EPA 2016). It is acknowledged that field sampling and data summary reports for the biomonitoring program are complete. However, the close-out documentation for this action identified in the Record of Decision (ROD) (i.e., a monitoring completion report) is still incomplete. Therefore, there is not a final record in place to provide a basis for changing the protectiveness deferred designation. Please change the protectiveness statement to “protectiveness deferred” for the On-Post OU. Once the monitoring completion report is finalized and approved by EPA, the protectiveness statement may be changed to “protective in the short term” through an addendum to the FYRR.

**Response:** a. In accordance with EPA FYR guidance, a site-wide protectiveness statement is not appropriate because the site has not achieved construction completion. The 2015 FYRR should not have included this statement.

- b. The protectiveness statements follow the recommended format from EPA FYR guidance and do provide descriptions of the remedy elements providing short-term protectiveness and the recommended actions to ensure long-term protectiveness.
- c. Although the final documentation associated with the biomonitoring program has yet to be reviewed and approved by EPA, the monitoring program was completed as specified in the *Long-Term Contaminant Biomonitoring Program Phase 2 Surface Soil Sampling and Analysis Plan*. The monitoring results, documented in the *Long-Term Contaminant Biomonitoring Program Phase 2 Surface Soil Sampling Data Summary Report*, clearly show all results below the applicable criterion. Protectiveness of the remedy is demonstrated based on completion of the sampling and data review.

**Comment 2.** EPA recommends the Army follow the new FYR report template that was issued in 2016. <https://semspub.epa.gov/work/HQ/100000001.pdf>.

**Response:** For this fifth FYR report, the Army continued to use the site-specific format approved for the previous reports with some revisions to follow the 2016 FYR report template. Although there may be some differences compared to the 2016 template, all information required by the 2001 comprehensive FYR guidance has been included. The Army will continue to evaluate use of the 2016 template and any updated guidance for the next FYR report.

**Comment 3.** Throughout Sections 6.0 and 7.0 of the Draft Fifth Five Year Review Report the text indicates that issues are identified in Section 8.0 of the report. However, Section 8.0 does not have all of the issues identified in Sections 6.0 and 7.0 and in some cases, issue identification is inconsistent between Sections 6.0 and 7.0. Please provide all the identified issues in Section 8.0 in keeping with the U.S. Environmental Protection Agency (EPA) *Comprehensive Five-Year Review Guidance* (EPA 2001). In addition, a summary of each issue should be provided in Section 8.0, as has been done in previous RMA five-year reviews.

**Response:** The document has been revised for consistency to ensure that all issues identified in Sections 6.0 and 7.0 are included on Table 8.0-1. In some cases, the information provided in these sections identifies a finding that does not affect protectiveness and the text has been revised to indicate that recommendations are included in Section 9.1 as Other Findings.

As part of the effort to streamline the five-year review, the detailed text sections included in Section 8.0 in previous five-year review reports have been eliminated. Consistent with EPA FYR guidance, all issues that affect current or future protectiveness are described on Table 8.0-1.

**Comment 4.** Issues identified in the 2015 Five Year Review (FYR) that are not closed out should be included in Section 8.0 of the FYRR, even if progress has been made on addressing these issues during the five-year review period. Based on EPAs issue

tracking, the following issues from the 2015 FYR should be added to the FYRR issues identified in Section 8.0:

- a. Land Use Controls (LUCs) – Commerce City Prairie Gateway Planned Unit Development (PUD). Although representatives from the U.S. Army coordinate regularly with representatives from Commerce City, the Prairie Gateway Planned Unit Development (PUD) still has allowable uses that conflict with the LUCs. This issue must be retained until the PUD is revised to adhere to the LUCs, and as required by the deed restrictions.
- b. Private drinking water well (359A) with diisopropylmethyl phosphonate (DIMP). While new well 359D was installed in November 2016, there are still DIMP detections in this well with concentrations exceeding the Colorado Basic Standards for Groundwater (CBSG).
- c. Bedrock Ridge Extraction System Performance. It is acknowledged that two new wells were installed. However, monitoring and evaluation of contaminant concentrations is ongoing to determine if there is an incomplete interception of contamination by the system.
- d. Incomplete Biomonitoring Program. The On-Post ROD requires long-term biomonitoring as a component of the remedy. Soil sampling was conducted, and data summary reports were finalized, however, the Biomonitoring Completion Report, prepared by the Biological Advisory Subcommittee (BAS) is not complete. Therefore, this ROD action and the 2015 FYR issue are open.
- e. Agricultural standards for surface water. Resolution of this issue was tied to the Bison Risk Assessment, which is still open.
- f. Northern Pathway System Monitoring Well Property Lease. Issues with the lease and configuration of the Northern Pathway System are still unresolved.
- g. Confined Flow System (CFS) well integrity. The monitoring system for the CFS has a damaged well, a well with a damaged seal, and several wells which are completed in semi-confined zones rather than confined zones.
- h. Consumption of Bison. Progress on the bison consumption risk assessment by the EPA and State was stopped because of funding issues. There are potentially new receptors identified and new information on risk of methyl mercury in muscle tissue. This new information requires an update to the existing sampling and analysis and risk assessment approach.

**Response:** a. Land Use Controls. The Army and Shell agree that this issue should be retained until the PUD is revised to be consistent with the existing land use restrictions and it has been added to Table 8.0-1. As stated, the Army continues to meet regularly with the Commerce City Planning Department to maintain open

communications regarding land use control issues. Planning Department personnel have consistently confirmed their awareness of the residential use exclusion for the Prairie Gateway and have confirmed that these uses would not be approved while the residential restriction is in force. The Army will continue to coordinate with the Planning Department to clarify allowable uses in the next amendment to the PUD.

- b. Private drinking water well (359A) with DIMP. Detection of DIMP above the CBSG in private well 359D is included as an issue on Table 8.0-1.
- c. Bedrock Ridge Extraction System Performance. The BRES potential bypass has been moved to Section 9.1 under Other Findings with recommendation for completing the system evaluation.
- d. Incomplete Biomonitoring Program. Although the final documentation associated with the biomonitoring program has yet to be reviewed and approved by EPA, the monitoring program was completed as specified. The recommendation for completion of the documentation is included in Section 9.1 under Other Findings.
- e. Agricultural standards for surface water. There is currently no use nor any planned use of surface water for agricultural purposes. The Army acknowledges that the Committee agreed to discuss potential applicability of agricultural surface water standards after the bison study is completed; however, because the existing agricultural use restriction is being enforced, there is no effect on protectiveness.
- f. Northern Pathway System Monitoring Well Property Lease. Plume capture for the NPS is included as an issue on Table 8.0-1.
- g. Confined Flow System (CFS) well integrity. A commitment to continue discussion on potential revision to the CFS monitoring program has been added to Other Findings.
- h. Consumption of Bison. The Army acknowledges the efforts by USFWS to continue toward completion of the bison tissue sampling program. Although additional coordination with the regulatory agencies is needed for completion of the risk assessment, there is no impact on protectiveness of the remedy, because the existing LUC on game consumption continues to be implemented while the study is being performed. As such, this is not a FYR issue but is acknowledged in Section 9.1 under Other Findings.

**Comment 5.** Numerous sections of the FYRR explain that the long-term biomonitoring program was completed during the FYR period and EPA review of the Monitoring Completion Report is pending (e.g., Table 5.2-1, Section 6.3.5, Page 91, Section 7.1.5.1, Page 128, Section 9.1, Page 143, and Section 10.1, Page 145). While the Army drafted a Monitoring Completion Report, this document is incomplete without key information regarding implementation of the program. The

biomonitoring program was developed and implemented by the multi-party subcommittee (i.e., the BAS). This missing information needs to be prepared and included by a key member of the BAS, the EPA-U.S. Fish and Wildlife Service (USFWS) liaison. However, completion of this work was discontinued because of funding issues. Please revise the FYRR to explain that while the field sampling approach is completed, the Monitoring Completion Report, a document that needs to be prepared by the BAS, is not complete.

**Response:** The FYRR currently states “Although all field work and data review have been completed, the Monitoring Completion Report (MCR) must be finalized and approved.” The Army and Shell are committed to coordinating with EPA to complete the MCR and recognize that EPA will provide additional detail for completion of the document when work resumes on the MCR review.

**Comment 6.** In EPA’s final approval of the 2015 FYRR on September 28, 2016, it was recommended that the 2016 Community Involvement Plan for the site be revisited to ensure effective communications with the public (EPA 2016). In addition, it is noted that Section 6.2 of the FYRR explains that some respondents interviewed as part of the FYR process also indicated they had concerns with inadequate ongoing community involvement. Please include a section in the FYRR that evaluates the current Community Involvement Plan and identifies any findings or issues necessary to update/improve community involvement.

**Response:** In 2016, after interviewing community stakeholders as part of the Five-Year Review process, Rocky Mountain Arsenal public affairs representatives reviewed and updated the existing Community Involvement Plan to address community needs as the site entered the Operation & Maintenance phase of the remedy. In alignment with the updated plan, the Arsenal expanded its website to provide more information about the environmental cleanup and offer easier access to annual monitoring reports, the 2015 Five-Year Review Report and other documents that detail remedy performance or address emerging topics of community interest. Also, in alignment with the plan, Rocky Mountain Arsenal staff meet regularly with local government leaders and staff to update them on the remedy, provide an annual briefing to the Commerce City Council, create and distribute fact sheets and other materials to highlight upcoming projects or address community questions, and respond to community and media questions received through the Community Information Line. In addition, Rocky Mountain Arsenal staff conducted three community presentations, developed background materials and answered community questions in advance of planned groundwater sampling and subsurface soil sampling to confirm the absence of chemical agent. Arsenal staff also provided a briefing and site tour to representatives from the Stapleton Denver development to inform them about the remedy and invite them to contact Arsenal representatives with any questions they may receive from new residents.

As part of the 2020 Five-Year Review process, the Arsenal expanded the number of community interviews conducted to include more representatives from the Spanish-speaking community and areas north of the site, where new residential

developments have brought significant population growth. Overall, those interviewed expressed a high level of confidence in the remedy and its management and satisfaction with the opportunities they had to ask questions or receive information about upcoming projects. They indicated, however, that new residents, members of the Spanish-speaking community and newly elected officials would benefit from additional information about the site's history as a former manufacturing and environmental clean-up site. Community members living north and northwest of the site also indicated they would like to better understand the groundwater remediation program and the progress being made toward achieving groundwater remediation goals. As part of the Five-Year Review process, Arsenal public affairs representatives are reviewing the site's current Community Involvement Plan to identify opportunities to update and improve communications to address the needs identified by community members during the community interview process.

Section 6.2 has been revised to discuss changes made to the Community Involvement Plan during the FYR period and suggested revisions needed. Section 9.1 has been revised to include these recommendations under Other Findings.

**Comment 7.** After reviewing numerous five-year reviews, EPA's Federal Facilities Restoration and Reuse Office has observed the following best practices in addressing pre- and polyfluoroal (sic) substances (PFAS) and other emerging contaminants of potential concern in FYRs:

- a. Progress Since Last Review: This is an appropriate location to summarize the status of the investigation into PFAS or other emerging contaminants, such as 1,4-dioxane.
- b. Data Review: This section is an appropriate location if there are data pertaining to emerging contaminants to review.

For the RMA FYRR, it appears that the best location for both of these topics would be in Section 6. Please verify that Section 6 of the FYRR addresses both (a) and (b) identified above. Note that in either (a) or (b), the description of PFAS should include a concise summary of the scope of the investigation to date, and screening of results as set forth in the latest EPA and Department of Defense (DOD) guidance (DOD 2019; EPA 2019; DOD 2020).

- c. Technical Assessment: In most cases, the section addressing FYR Question B is the most appropriate place to address PFAS and other emerging contaminants. Specifically, the EPA FYR Guidance asks to review exposure assumptions, including the detection or presence of new contaminants (EPA 2001). Please expand the discussion in Section 7.2.5 to address this.
- d. Issues/Recommendations: This section should include any issue(s) identified and proposed follow-on actions as needed. This section can also

be used to describe how emerging contaminants will be addressed going forward. If in fact no further action (e.g., no further sampling, investigation, risk assessment, etc.) is required for n-Nitrosodipropylamine (NDPA) or PFAS, then this would need to be stated more clearly to support no further issues or recommendations. Please provide sufficient support to demonstrate that NDPA, and PFAS do not affect long-term protectiveness. As presented, the lines of evidence suggest both NDPA and PFAS are present above existing screening values.

- e. **Protectiveness Determinations:** Facilities are selecting short-term protectiveness if they have at least a preliminary understanding of PFAS contamination and are confident that there are no current drinking water exposures. Because the PFAS investigation is complete at RMA, please include this information in the protectiveness determination. Other emerging contaminants should be addressed in a similar manner.

**Response:**

- a. A brief discussion of the emerging contaminant issues has been added to Section 5.0.
- b. Monitoring for emerging contaminants during the FYR period is discussed in Section 6.3.3.9.
- c. Section 7.2.5 has been revised to address potential exposure for emerging contaminants.
- d. There are no issues identified related to emerging contaminants and therefore none are included in Section 8. Future monitoring requirements have already been incorporated into the long-term plans and are discussed in Sections 6.3.3.9 and 7.2.5.
- e. The protectiveness determinations have been revised to include discussion of the determinations related to the emerging contaminants.

## Specific Comments

**Comment 8.** Five-Year Review Summary Form, Page ES-5. The review period shown on the form is March 30, 2020 – January 31, 2021. On previous FYR forms, the review period is identified as the 5-year period-of-time; in this case, April 1, 2015 - March 31, 2020. Please revise the form appropriately. In addition, the form should be revised to identify all the issues identified by the FYR.

**Response:** In accordance with EPA guidance, the review period listed corresponds to the period over which the review was performed and not the five-year period being assessed. For clarity, the FYR period has been added to the form to distinguish from the time frame for completing the review. The form was reviewed to ensure it includes all issues identified in Section 8.

**Comment 9.** Section 3.2, Page 7. This section provides background information about RMA. For consistency with previous FYRR's and numerous other documents, please include the statement: "Common industrial and waste disposal practices during these years resulted in the release of contamination."

**Response:** This statement appears in the Executive summary and has been added here for consistency.

**Comment 10.** Section 3.5, Page 9. The final paragraph of this section describes the risk assessment performed for the On-Post OU. However, the information is not clear. Please review and edit this paragraph.

**Response:** This section has been revised for clarity.

**Comment 11.** Section 4.0, Page 11. This section describes the On-Post remedial actions and explains there were four essential parts: groundwater, structures, soil, and "other." While the FYRR includes details of the remedy for groundwater, soil, and other actions, there is little mention of the structure remedy. For completeness in this section, please include a statement explaining that the structure remedy is complete, so it is not described in detail in this FYRR.

**Response:** Section 4.0 has been revised as suggested.

**Comment 12.** Section 4.1.1.1, Page 19. This section provides a discussion of the Bedrock Ridge Extraction System and indicates that the ROD remedy was modified by an Explanation of Significant Differences (ESD). However, the ROD modification is not discussed. Please summarize what was changed by the ESD.

**Response:** The ESD documented a cost change from the ROD estimate but did not revise the remedy approach. The text has been revised to clarify the change.

**Comment 13.** Section 4.1.1.2, Page 22. This section provides a discussion of the Section 36 Lime Basins dense nonaqueous phase liquid remediation. The last paragraph indicates

that eight new wells were installed but does not list these well numbers. The well numbers should be listed here and in Section 6.3.2.4 for clarity.

**Response:** The well numbers have been added to the Section 4.1.1.2 text. These wells are already listed in Section 6.3.2.4.

**Comment 14. Section 4.3.1.2, Page 33.** This section describes LUCs. However, standard language describing the origin of the LUCs has been revised. For consistency with the 2015 FYRR and the LUC Plan, please revise this section to explain that “The RMA FFA (EPA 1989a) established ICs [institutional controls] restricting the current and future use of real property and resources within the RMA boundaries. The ICs identified in the FFA are also required by the ROD for the On-Post OU.”

**Response:** The language was revised from previous reports to reflect the requirements of the ROD and selected remedy, which is the subject of the Five-Year Review. Although the LUCs were first described in the FFA, only the selected remedies in the RODs are being assessed, not the requirements of the FFA.

**Comment 15. Section 4.3.1.2, Page 34.** The last full paragraph describes the bison tissue contaminant study and states that if risks are determined to be acceptable, the ROD and LUCP will be modified accordingly. It is important to note that this determination is dependent on obtaining an EPA-approved risk assessment including public involvement process.

**Response:** The text has been revised as suggested.

**Comment 16. Section 4.3.1.3, Page 35.** The second paragraph discusses the modification to the off-Post notification areas to include both the potential containment system remediation goal (CSRG) exceedance area and the historic area of contamination identified in the ROD, and references Figure 3.0-1 for explanation. However, this figure does not identify the notification areas other than to identify the off-Post Operable Unit. The notification areas should be added to the figure.

**Response:** A new figure, 4.3-1, has been added to show the notification areas.

**Comment 17. Section 6.3.1.6, Page 53.** The last paragraph on Page 53 in the subsection titled Northern Pathway System Mass Flux Removal Estimates discusses the discrepancies between the plume mass flux and captured mass. However, the second paragraph on page 54 also appears to discuss discrepancies between the plume mass flux and captured mass and identifies a different position for the plume transect. Please correct the text, as necessary.

**Response:** The paragraph starting on page 53 has been removed as it was misplaced in the document.

**Comment 18. Section 6.3.1.6, Page 55.** In the subsection titled Northern Pathway System Modifications, the dieldrin in the data gap should be identified as an issue in this subsection as was done with other issues discussed in Section 6.0.

**Response:** Section 6.3.1.6 has been revised to identify the dieldrin presence in the gap area as an issue.

**Comment 19. Section 6.3.3.3, Page 69-70.** This section discusses CFS monitoring. In the subsections on Water Quality Monitoring Results for chloride at South Plants, the last sentence indicates that the chloride in the vicinity of Well 35083 is identified as an issue in Section 8.0. However, this issue is not included in Section 8.0 and should be added. In addition, these detections for chloride should be discussed in Section 7.1.5.3, regarding the Question A.

**Response:** Discussion of the chloride detections in Section 35 CFS is included in Section 9.1 under Other Findings. Section 6.3.3.3 has been revised accordingly.

**Comment 20. Section 6.3.3.3, Page 71.** This section discusses CFS monitoring. In the subsections on Water Quality Monitoring Results for dieldrin downgradient of Basin F, the text does not identify the dieldrin detections in downgradient CFS wells as an issue although it is identified as an issue in Section 7.0 page 131. As with other issues identified in Section 6.0, this issue should be identified and added to the issues in Section 8.0.

**Response:** Discussion of the dieldrin detections downgradient of Basin F is included in Section 9.1 under Other Findings. Section 6.3.3.3 has been revised accordingly.

**Comment 21. Section 6.3.3.8, Page 84.** This section discusses the Basin F post-closure monitoring and the subsection titled Basin F Post-Closure Monitoring Summary concludes that groundwater along the principal threat flow path has been impacted and that concentrations for some indicator compounds along the Wastepile flow path have increased. Tables 6.3-25 concludes that chloroform has affected water quality downgradient of the Basin F Wastepile and Table 6.3.26 indicates that tetrachloroethene and possibly copper have exceeded their historic ranges. These impacts to groundwater quality downgradient of Basin F are identified as “other findings” in Section 9.0. Because the monitoring results call into question whether the remedy is functioning as intended by the decision documents this should be identified as a FYR issue and should be identified in this section and Section 8.0.

**Response:** The presence of or increasing concentrations of contaminants downgradient of Basin F does not affect protectiveness due to containment of groundwater contamination at the boundary systems and groundwater use restrictions that are enforced. In addition, cover percolation monitoring provides strong evidence that the Basin F remedy is functioning as intended. Although further evaluation of the groundwater data is recommended in Section 9.1, it is not appropriate to include this as a FYR issue since it does not affect protectiveness.

**Comment 22. Section 7.2, Pages 135-138.** The Technical Assessment Question B addresses 1,4-dioxane, but not NDPA and PFAS. While it was good to see that 1,4-dioxane was assessed properly, it is not clear why NDPA and PFAS are not discussed. These

contaminants should be considered under Question B noting whether the detected concentrations raise potential risk concerns and/or require additional investigation.

**Response:** Section 7.2 has been revised to include additional information related to emerging contaminants NDPA and PFAS.

**Comment 23. Section 7.1.2.4, Page 118.** This section discusses the North Plants Fuel Release project and suggests that due to lack of LNAPL in North Plants Wells the monitoring program should be discontinued. Additional data and discussion of this topic should be presented at a Water Team Meeting before concurrence on this proposal can be made. This section should be revised to explain that future monitoring actions related to the North Plants Fuel Release are under discussion with the Regulatory Agencies. Final approval of the FYRR should not be considered approval of the proposed monitoring termination.

**Response:** The Five-Year Review provides a recommendation based on review of the monitoring data. The Army will continue consultation with the regulatory agencies regarding ongoing monitoring for the North Plants Fuel Release. The Army acknowledges that final approval of the FYRR does not constitute approval of the proposed monitoring termination.

**Comment 24. Section 7.1.3.1, Page 123.** This section describes operation of the Offpost Groundwater Intercept and Treatment System (OGITS). The fourth paragraph discusses optimization for OGITS but does not describe the proposed new treatment plant, improvements to the new extraction system, and elimination of the old system for the Norther (sic) Pathway System. Please consider adding these components to the optimization discussion.

**Response:** The text has been revised to incorporate the suggested optimization opportunities.

**Comment 25. Section 7.1.5.3, Page 131.** The last paragraph in the subsection titled Confined Flow System Monitoring, indicates that chloride in Well 35067 and dieldrin concentrations in CFS wells above CSRGs downgradient of Basin F are identified as issues in Section 8.0. However, these issues are not identified in Section 8.0 and should be added.

**Response:** Because these detections in the CFS have no effect on protectiveness, the text has been revised to indicate that these conditions, along with recommendations, are noted in Section 9.1 under Other Findings.

**Comment 26. Section 7.1.5.4, Page 132.** This section describes LUCs and concludes that there are no issues that prevent the response action from being protective. However, there are two outstanding issues with LUCs from the 2015 FYR that have not been fully resolved: inconsistencies with the Commerce city PUD and land use restrictions, and the goal of USFS to pursue consumption of bison. Either one of these issues, if not ultimately resolved appropriately, could place protectiveness at risk. Please revise this section, and Section 8.0, to identify these open issues.

**Response:** Section 7.1.5.4 has been revised to state that the Commerce City PUD issue has been added to Section 8.0. Efforts by USFWS for bison tissue sampling do not call into question the current or future protectiveness of the remedy because the existing LUC on game consumption continues to be implemented while the study is being performed. Discussion of the tissue sampling program is included in Section 4.3.1.2 and in Section 9.1 under Other Findings.

**Comment 27.** Section 7.1-6, Page 133. This section describes EPA approval letters for construction reports and states that the letters state the following:

- Remedial action activities have completed all construction items identified in the Scopes of Work and the Final Design Packages, as modified, for these projects.
- The Army has certified that the projects have been completed in accordance with the appropriate ROD.
- The State of Colorado has concurred with the CCRs.
- The EPA has approved the CCR and accepted the projects as complete.

However, EPA approval letters do not include the second bullet regarding the Army certification. Please revise this section accordingly.

**Response:** The text has been revised as suggested.

**Comment 28.** Section 7.2.5, Page 137-138. This section addresses Question B regarding changes in exposure assumptions and describes changes in exposure assessment variables. Two topics discussed are the vapor intrusion investigation conducted Offpost in 2005, and a risk evaluation of 1,4-dioxane in the On-Post Section 4 water supply wells. However, the discussion in Section 7.2.5 is confusing because it is not clear that these are two different investigations. Please add sub headers or separate introductions to provide enough background information and context to understand that these are two different exposure assessments.

**Response:** Subsection headers have been added for clarity.

**Comment 29.** Section 7.3, Page 139. This section addresses FYR Question C: “Has any other new information come to light that could call into question the protectiveness of the remedy?” and does not identify any new information. However, the response to this same question in 2015 identifies results from bison tissue sampling became available for 95 tissue samples collected in 2014 and 2015 with results of one fat sample from a 2-year-old bison having dieldrin concentrations of 21 ppb. Because Section 9.0 explains that USFWS is pursuing the change to the bison consumption restriction and work by the interagency tissue contaminant work group was discontinued, the significance of this dieldrin detection is still not known. Please revised (sic) this section to include the 2015 FYR unresolved concern.

**Response:** Although this was discussed as an unresolved concern in the 2015 FYRR, the efforts by USFWS for bison tissue sampling do not call into question the

protectiveness of the remedy because the existing LUC on game consumption continues to be implemented while the study is being performed.

**Comment 30. Section 8.0, Page 141.** This section is intended to identify issues that affective (sic) protectiveness, currently, or in the future. However, this section is incomplete. Please make the following revisions to this section for completeness and for consistency with the 2015 FYR Report format that was approved by EPA.

- a. Reference Table 8.0-1, which lists initial issues identified by this FYR that affect current or future protectiveness.
- b. Provide a written description of the issue in the text that provides additional detail summarizing the situation and how protectiveness is affected currently and in the future.
- c. Provide a subsection that compiles other findings or other unresolved concerns that were identified during the FYR process, similar to Section 8.16 of the 2015 FYR (Navarro 2016).
- d. The final statement in Section 8.0 states that no other unresolved concerns from EPA, CDPHE, or TCHD were identified. Please revise this statement appropriate based on the comments received on the draft FYRR.

**Response:**

- a. Reference to Table 8.0-1 has been added. In addition, the table has been relocated to immediately follow the Section 8.0 introductory text for clarity.
- b. Detailed descriptions of each issue do not need to be repeated in Section 8.0 in accordance with EPA FYR guidance. Detail is provided in Sections 6 and 7 of the report. The detail included in previous FYR reports was redundant and unnecessary and did not add to the understanding of the issues.
- c. Other Findings are discussed in Section 9.1 with recommendations, consistent with EPA FYR guidance.
- d. The statement has been deleted as it is not consistent with guidance.

**Comment 31. Section 9.0, Pages 143 to 144.** This section presents recommendations on how the issues in Section 8.0 will be addressed. Section 9.0 also identifies other findings. It is not appropriate to introduce other issues in Section 9.0. Instead, these should be identified in Section 8.0, consistent with the approach approved in the 2015 FYRR. Section 9.0 should then be revised to identify recommendation to address the findings.

**Response:** Inclusion of Other Findings that do not affect protectiveness with the recommendations is consistent with EPA FYR guidance. The format used in the 2015 report has been revised in this FYR to be more consistent with the guidance.

**Comment 32. Section 9.1, Page 144.** This section explains that the USFWS is pursuing a change to the restriction to allow consumption of bison from RMA, that the USFWS is in the process of collection bison tissue, but that this is not a FYR issue because the existing restriction has not been violated. However, this was identified by the EPA as an issue in the 2015 FYR and it should continue to be identified as an issue because there is new information that requires the sampling, analysis, and risk assessment approach to be reevaluated. This new information includes the identification of receptors that are different than originally considered (e.g., children through a tribal school lunch program) and new information on the accumulation of methyl mercury in muscle tissue. The bison sampling, analysis, and risk assessment program must be updated to effectively evaluate risk of consumption.

**Response:** The Army acknowledges that the program has undergone changes as the USFWS works with the regulatory agencies to complete the tissue sampling and risk assessment. However, the Army does not agree that this is a FYR issue because, as stated in the report, there is no effect on protectiveness while the current restriction on consumption is being enforced. Inclusion of this discussion under Other Findings is appropriate.

**Comment 33. Section 10.0, Page 145.** This section provides protectiveness statements for the on-post OU and the off-post OU. Statements regarding protectiveness in the long term for both OUs will need to be revised to reflect the final list of issues identified for the FYR.

**Response:** The text has been revised to ensure discussion of all issues that need to be addressed to provide long-term protectiveness.

**Comment 34. Figure 6.3-50.** This figure is a trend plot for tracking wells associated with the NWBCS and includes Well 23037. However, this well is not on the tracking well map (6.3-48), suggesting that Well 27037 may have been the intended well for this plot. Please revise, as necessary.

**Response:** Figure 6.3-50 has been revised to depict well 27037.

**Comment 35. Table 5.2-1, Pages 44-48.** This table provides a summary of the 2015 FYR issues and the current status. Please also add a column indicating whether the issue is complete, and the date completed. If not completed, please provide a project date.

**Response:** The table has been revised to include completion dates or projected completion dates.

**Comment 36. Table 7.4-2, Page 108.** This table summarizes a vapor intrusion screening evaluation. However, the table does not identify where this screening evaluation was conducted (e.g., Offpost, Section 4 water supply wells, or other). Please revise the table to identify where this vapor intrusion data was derived. In addition, please provide equivalent tables for the other vapor intrusion evaluations.

**Response:** The text has been revised to discuss the evaluation that was performed for structures in the RMA administration area. No other evaluations were performed.

**Comment 37. Table 8.0-1 and Table 9.0-1, Pages 109-110.** These tables list issues identified by the FYR, their effect on protectiveness, recommendations, and follow-up actions. Please expand these tables to include the issues identified in these comments.

**Response:** The tables have been revised to include all issues consistent with the responses provided to these comments.

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**U.S. Army and Shell Oil Company Responses to  
Colorado Department of Public Health and Environment (CDPHE) January 14, 2021  
Comments on the Fifth Five-Year Review Report for Rocky Mountain Arsenal,  
Revision B, November 5, 2020**

**Comments for Incorporation**

**General Comments**

**Comment 1.** The concentrations of contaminants in downgradient Basin F wells indicate groundwater quality downgradient of the Basin F Principle Threat (PT) and Wastepile (WP) areas has potentially been affected. This assessment is based on multiple years of post-closure monitoring along with the use of statistical indicators that provide a high level of confidence in these conclusions. In response to the repeated Upper Prediction Limit (UPL) exceedances, and the continued presence of elevated/increasing concentrations of contaminants in downgradient wells, a change to the Basin F groundwater monitoring network is necessary to fulfill the requirements of 6 Code of Colorado Regulations 1007-3, Section 265, Subpart F.

Sampling of the current downgradient Basin F groundwater monitoring network has shown contamination in excess of background concentrations and, in some instance, at levels greater than pre-remedy concentrations. CDPHE acknowledges that in previous meetings and documents, the Army has already committed to amending the Basin F groundwater monitoring program to account for these findings; but as of the current date, the groundwater monitoring program remains unchanged. The statistical analyses that are detailed in the Basin F Post-Closure Plan (used to calculate prediction limits and evaluate concentrations of indicator compounds in groundwater samples, collected upgradient and downgradient of the former Basin F Waste Pile and Principal Threat areas) no longer appear to meet the requirements of the regulation cited above. Migration of contaminated groundwater, whether currently or historically, has extended beyond the designated locations of the downgradient monitoring network. Currently, the groundwater monitoring network is insufficient to confirm that contaminated groundwater remains within the original “area of contamination”, beyond the boundary of Basin F. Furthermore, the existing groundwater monitoring network does not sufficiently provide an assessment of the effectiveness of the Basin F remedy by monitoring general long-term trends. As such, the need for the expansion and revision of the Basin F groundwater monitoring network is an issue that has the potential to affect current or future protectiveness and, therefore, should be evaluated in further detail in this Five-Year Review Report (FYRR).

**Response:** The Army acknowledges that contaminant concentrations have exceeded the prediction limits calculated in accordance with the Basin F Post-Closure Plan and that the condition warrants further evaluation. A recommendation to evaluate these groundwater impacts is included in the *2020 Basin F Cover and Groundwater Monitoring Report* as well as this FYRR in Section 9.1.

Although contaminant concentrations have exceeded the prediction limits, both the Basin F Post-Closure Plan and the Basin F Closure and Post-Closure Groundwater Monitoring Plan discuss the presence of contaminants in the aquifer beneath and downgradient of Basin F due to prior releases from Basin F and other sources. The post-closure monitoring network was selected for the Basin F Post-Closure Plan in 2011 with the understanding that contamination had already migrated beyond the Basin F downgradient wells. The 2020 Basin F monitoring report and previous annual reports discuss this condition and provides the conclusion that the increased concentrations are due to mobilization of residual contamination. However, additional evaluation was recommended to further investigate the source of the increased concentrations.

This evaluation is in progress. The Army will continue to coordinate with the regulatory agencies to review the results of the evaluation and determine whether revisions to the Basin F monitoring network and statistical analyses are necessary to comply with the requirements of 6 Code of Colorado Regulations 1007-3, Section 265, Subpart F, as outlined in the Basin F Post-Closure Plan.

However, the Army disagrees with the statement that the detections have the potential to affect current or future protectiveness. The presence or increasing concentrations of contaminants downgradient of Basin F does not affect protectiveness due to containment of groundwater contamination at the boundary systems and use restrictions that are enforced. Although further evaluation is recommended, it is not necessary for protectiveness, therefore the recommendation is included in Section 9.1 under Other Findings.

**Comment 2.** The Army has recently issued an administrative policy that requires documents be provided electronically whenever possible. Due to the size and complexity of this document coupled with the fact that it must be reviewed electronically, CDPHE requests that the Tables and Figures be incorporated into the next version of this main report, similar to the format of the 2015 Five Year Review Report.

**Response:** The report has been reformatted to include tables and charts in the text sections to improve readability.

**Comment 3.** Throughout this document, multiple remedy-related issues are identified, and the reader is referred to Section 8.0 for further information. However, no issues are actually carried forward or discussed in the referenced section. The issues identified within the text that should be discussed in Section 8.0 include:

- a. The Northwest Boundary Containment System (NWBCS) Northeast Extension (NEE) potential bypass (See Section 6.3.1.1, page 40)
- b. Increasing concentrations within the Bedrock Ridge Extraction System (BRES) performance well monitoring network (See Section 6.3.1.5, page 51)

- c. Elevated Chloride concentrations in well 35083 and other contaminant trends in Confined Flow System (CFS) wells (See Section 6.3.3.3, page 70)
- d. Necessary expansion of the Offpost Exceedance network downgradient of the NWBCS to characterize the dieldrin plume in the area (See Section 6.3.3.4, page 75)
- e. Evaluation of the dieldrin plume downgradient of North Boundary Containment System (NBCS)
- f. Contamination in Offpost private well 359D (See Section 6.3.3.5, page 76)
- g. The Northern Pathway System (NPS) capture zone “gap area” and proposed well field upgrades (See Section 7.1.3.1, page 123)
- h. Destruction and reduction in available Off-Post groundwater monitoring wells due to development and construction (See Section 7.1.5.3, page 131)

Additionally, as discussed above, CDPHE also considers the increasing concentrations and inadequacy of the Basin F monitoring network to be an issue in need of further evaluation. Please expand Section 8.0 to discuss these issues above and include the Basin F groundwater monitoring network as part of the on-going process to evaluate the protectiveness of the remedy at the Rocky Mountain Arsenal.

**Response:** Issues identified in Sections 6 and 7 are included on Table 8.0-1; however, the text of Section 8 inadvertently omitted the reference to the table. Issues described above in bullets a, b, d, f, g and h are already included on Table 8.0-1. Section 6.3.3.3 has been revised to indicate that the recommendation for further CFS evaluation (bullet c above) is provided in Section 9.1 under Other Findings. Similarly, further evaluation of dieldrin in the CFS downgradient of Basin F is recommended in Section 9.1. The dieldrin plumes downgradient of the NBCS (bullet e above) have been present since the off-post RI and are adequately monitored in accordance with the LTMP.

Consistent with EPA guidance, repeating discussion of the issues in Section 8 is not needed since the issues are fully discussed in the previous text sections. The Army recognizes this approach is different than what was presented in the last three Five-Year Review Reports but is striving to adhere to the published guidance and simplify the reports.

### **Specific Comments**

**Comment 4.** Executive Summary, On-Post Operable Unit, page ES-4 – The final sentence of this section states that further evaluation of the potential bypass at the Bedrock Ridge Extraction System (BRES) and the Northeast Extension (NEE) of the Northwest Boundary Containment System (NWBCS) are necessary to ensure long-term protectiveness, but does not include the equally necessary evaluation of the

Basin F groundwater monitoring network. Please expand this sentence to include the Basin F groundwater monitoring network.

**Response:** As discussed in the response to Comment 1, the presence or increasing concentrations of contaminants downgradient of Basin F does not affect protectiveness due to containment of groundwater contamination at the boundary systems and use restrictions that are enforced. Although further evaluation is recommended in Section 9.1, it is not necessary for protectiveness.

**Comment 5.** Executive Summary, Five-Year Review Summary Form – CDPHE has the following comments on this section.

- a. Page ES-6 – The Five-Year Review Summary Form classifies the “issues” identified in this Five-Year review report; however, this information appears to be in direct conflict with the statement in Section 8.0 that no findings meet the definition of “issues”. Please update Section 8.0 to include these, and other relevant, issues. (See general comment)
- b. Page ES-8 – The increasing concentrations in downgradient Basin F wells in both the Confined and Unconfined aquifers, and the lack of a comprehensive monitoring network, must be included as an issue on this form.
- c. Page ES-9 – The need for an evaluation into the increasing contaminant trends downgradient of Basin F must be included as part of the protectiveness statement for the On-Post OU. (See general comment)

**Response:**

- a. Contrary to the statement in the comment, Section 8.0 does not state that no findings meet the definition of issues. A list of the issues identified is provided on Table 8.0-1; however, reference to the table was omitted from the draft text. Section 8.0 has been revised for clarity and to include all issues identified in previous sections of the document. Also, see response to General Comment 3.
- b. Further evaluation of Basin F groundwater quality for both the confined and unconfined flow systems is identified under Other Findings in Section 9 because changes in groundwater quality on post do not affect current or future protectiveness due to use restrictions and containment of groundwater contamination at the boundary systems.
- c. As discussed in the response to Comment 1, the presence or increasing concentrations of contaminants downgradient of Basin F does not affect protectiveness due to containment of groundwater contamination at the boundary systems and groundwater use restrictions that are enforced. The recommendation for further evaluation is included under Other Findings but it is not necessary for protectiveness.

**Comment 6.** Section 4.1.1.1, OGITS, page 20, second paragraph, third sentence - This sentence appears to be out of place. Please revise as necessary.

**Response:** This statement appears in the previous paragraph and has been removed.

**Comment 7.** Section 4.3.1.2, page 34, penultimate paragraph, final sentence – The text should be revised to state that the “ROD and LUCP may be modified”, since removal of these restrictions are contingent upon an acceptable and robust sample collection and analysis plan that can demonstrate that the consumption of bison is acceptable.

**Response:** The text has been revised as requested.

**Comment 8.** Section 6.1, page 39, first full paragraph - As stated above, no issues have been summarized in Section 8.0 as stated in the text. The “ISSUES” section must be amended to include all issues identified throughout this document as well as any additional issues identified within these comments. (See general comment)

**Response:** Issues identified in Sections 6 and 7 are included on Table 8.0-1; however, the text of Section 8.0 inadvertently omitted the reference to the table. Consistent with EPA FYR guidance, repeating discussion of the issues in Section 8.0 is not needed since the issues are fully discussed in the previous sections. The Army recognizes this approach is different than what was presented in the last three Five-Year Review Reports but is striving to adhere to the published guidance and simplify the reports.

**Comment 9.** Section 6.3.1.2 – CDPHE has the following comments on this section:

- a. Page 46, third full paragraph, last sentence – The historical ranges of wells downgradient of the treatment systems do not appear appropriate for use in evaluating performance of the treatment systems. When discussing elevated concentrations of contaminants in treatment system performance wells, the discussion should be limited to long- and short-term trends rather than historical maximums or ranges. Also see page 55, discussion for well 37013.
- b. Page 47, first paragraph – It should be noted, within this section, that some of the original conformance wells (pre-performance wells) for the NBCS were replaced during development of the Long-Term Monitoring Plan for Surface Water and Groundwater (LTMP), but that both sets of wells were monitored for a period of time afterwards to ensure some level of continuity within the network. The approach detailed in the referenced document was developed to be consistent with this prior alteration, and this should be noted in the text.

**Response:**

- a. Discussion regarding historical range has been removed.
- b. The text has been revised to discuss consistency with the previous approach for implementing changes to the NBCS monitoring network.

**Comment 10.** Section 6.3.1.4, page 49, fourth paragraph – The proposed use of an alternative mass removal calculation should be further discussed and detailed in this section. Specifically, changes to the performance criteria will be implemented during the next five-year review period in order to reflect the use of this updated approach.

**Response:** At this time, a revised performance criterion has not been developed or proposed to evaluate the BANS mass removal. The Army will coordinate with the regulatory agencies to review the mass removal results and develop feasible mass removal goals for use in future evaluations. The text has been revised to include this information.

**Comment 11.** Section 6.3.1.6 – CDPHE has the following comments on this section:

- a. Page 53, First Creek System Mass Removal, second paragraph, last sentence – It is unclear what geochemical processes may cause contaminant concentrations to change in situ. This statement requires additional elaboration and specific examples of what contaminant and processes are being referenced in this statement.
- b. Page 54, Northern Pathway System Mass Flux and Mass Removal Estimates, first partial paragraph – This paragraph seems to be a duplicate in error. Please revise as necessary.
- c. Page 55, Northern Pathway System Modifications, first paragraph – The referenced figure, (Figure 6.3-62) does not appear to show the level of detail necessary to identify the "gap area" in question. Please provide a more detailed figure of this area, including the associated dieldrin plume. Also, the sentence "An addition to the NPS extraction system is being designed and the system is being evaluated due to expiration of the lease on which several extraction wells are currently located, leaving a gap in extraction well coverage" appears out of place and should be revised as necessary.

**Response:**

- a. The text has been revised to include examples of geochemical and physical processes that occur in situ that could account for the difference in contaminant concentrations over the course of the 800-ft to 1,200-ft flow path between the mass flux transect and system extraction wells. Some examples of these processes include biodegradation, attenuation, retardation, and dilution due to the mixing of surface water and shallow groundwater in the area.
- b. The duplicate paragraph has been deleted.
- c. Figure 6.3-62 has been revised to illustrate the NPS dieldrin plume and gap area discussed in the text.

**Comment 12.** Section 6.3.3.3, Page 71 &72, Dieldrin – The information presented in this subsection appears to support the need to fully expand CFS monitoring in the Basin F area. Given the increasing concentrations of contaminants in both UFS and CFS downgradient wells, the Basin F monitoring network should be expanded to better assess contaminant trends, investigate cross-aquifer transmission, identify potential sources of this contamination, and ensure there are no unacceptable releases at the RMA boundary (see general comment above).

**Response:** Detailed evaluations of both the UFS and CFS monitoring systems downgradient of Basin F are included in the recommendations of the FYRR in Section 9.1. Section 6.3.3.3 has been revised to be consistent with these recommendations. The Army will coordinate these evaluations with the regulatory agencies to determine if monitoring network changes are required.

**Comment 13.** Section 6.3.3.6, page 78, third full paragraph – The characterization of well 25194 in this section does not take into account the objections raised by the regulatory agencies regarding the interpretation of the water level and water quality data from this well. For example, the lack of water in new well 25184 does not support the theory of rising water levels from the perimeter ditch. While the increase in water levels in adjacent wells may indicate a changing hydrology of the area, this well is still used to monitor a suspected perched water table in the vicinity of the Hazardous Waste Landfill (HWL), and contaminant concentrations and trends continue to be monitored as part of the HWL downgradient water quality network. Please remove the speculative language found in this subsection regarding the “new hydrologic interpretation”.

**Response:** As discussed earlier in this section of the FYRR, the Army no longer believes that the elevated groundwater levels in the vicinity of the HWL are due to a potential perched water zone. Instead, the new hydrologic interpretation is that the higher groundwater levels could be the result of infiltration from the perimeter ditch located along the west side of the HWL. The potential presence of a perched water zone is no longer discussed in the annual HWL monitoring reports. Although well 25184 has been dry, other monitoring wells on the west side of the HWL do support the observation of elevated water levels since 2008 due to increased recharge from the perimeter ditch. To avoid confusion over the current status of this discussion, use of the terminology “new hydrologic interpretation” has been removed.

**Comment 14.** Section 6.3.3.8 – CDPHE has the following comments on this section:

- a. Page 82, Basin F Post-Closure Groundwater Quality, last sentence – While stormwater ponding in below-grade excavations during the remedy were identified as a potential cause of increased concentrations in downgradient wells during baseline monitoring, this temporary condition was expected to be ameliorated after cover construction. With nearly ten years of post-closure monitoring data collected since remedy completion, and concentrations in downgradient wells continuing to increase, the initial hypothesis of remedy-related impacts on groundwater is beginning to appear suspect. It is understood that the Basin F Post-Closure Groundwater Monitoring Plan is the source for this statement, however, this hypothesis should not be included within the Five-Year Review Report since it no longer appears relevant.
- b. Page 83, Statistical Evaluation of 2015-2019 Analytical Data, penultimate sentence – It is stated that Upper Prediction Limits (UPLs) were initially calculated using the baseline data from both up and downgradient wells, but that a sufficient number of upgradient samples now exist to calculate UPLs for

downgradient statistical comparisons. However, it is unclear when reviewing the accompanying figures (6.3-70a through 6.3-70k), as well as the prediction limit tables in the Basin F Post-Closure groundwater monitoring report, how this statement could be considered accurate. For example, there are no decreases of any prediction limits on the indicated figures, signifying that prediction limits are only adjusted upwards with each sample year, and that the baseline prediction limits continue to be used, regardless of upgradient concentrations. This section should be revised to better clarify the monitoring program currently in place, and a commitment to revise the program consistent with regulatory requirements should be made (see general comment).

- Response:**
- a. The text has been revised to delete statements about mobilization due to ponding during remedy.
  - b. UPLs were initially calculated using the baseline data, and currently upgradient data are used to annually calculate UPLs in accordance with the Basin F Post-Closure Groundwater Monitoring Plan. Each year the newly calculated prediction limits are compared to the historical maximum prediction limit, and the higher value is chosen to represent the new prediction limit. As discussed previously with the regulatory agencies, the statistical approach for evaluating data is being reassessed because sufficient data exist to provide for a more robust analysis of water quality at Basin F. The text has been revised accordingly.

**Comment 15.** Section 7.1.3, Off-Post Groundwater Intercept and Treatment System (#94), second paragraph, page 122: Please quantify “most” in the first sentence.

**Response:** The word most has been deleted since the OGITS functioned as intended throughout the FYR period.

**Comment 16.** Section 7.1.3, Off-Post Groundwater Intercept and Treatment System (#94) top of page 123: The mass removal goal using the new method for FY18 and FY19 is unclear. Can the text be expanded to clarify?

**Response:** The text has been revised to clarify the mass removal goal evaluated during the reporting period. At this time, a revised performance criterion has not been developed or proposed to evaluate FCS and NPS mass removal. The Army will coordinate with the regulatory agencies to review the mass removal results and develop feasible mass removal goals for use in future evaluations. The text has been revised to include this information.

**Comment 17.** Section 7.1.2.10 North Boundary Containment System (#62) page 121: The text states the downgradient performance well water quality data should be reported, but not considered in the NBCS performance evaluation. Why should it not be considered? Please clarify and also state if lowering the PQL would affect this?

**Response:** The statement has been removed to avoid confusion. As described in the text, and consistent with the LTMP performance evaluation criteria, the system is

functioning as intended when the primary performance criteria are met. Performance well water quality data are reviewed and reported to allow for trend analysis and evaluation of secondary criteria, if needed. Further lowering of the PQLs would not change the existing performance evaluation.

**Comment 18.** Section 7.1.2.9 Northwest Boundary Containment System (#61), paragraph 2, page 120 and 121: The text states that the NWBCS is functioning as intended in the Decision Documents. This statement does not appear to be accurate when paragraph three in the same section mentions possible system bypass and paragraph four mentions this is an early indicator of a potential remedy problem. Please review and clarify text.

**Response:** Although potential bypass is discussed for the Northeast Extension, all LTMP performance evaluation criteria for the system are being met and the system is functioning as intended. As noted, the potential bypass is identified as an early indicator of a potential remedy problem and additional evaluation is warranted. This is included as an issue on Table 8.0-1.

**Comment 19.** Section 7.4, page 139 – CDPHE agrees with the statement in this section that “There are several groundwater-related remedy components that are not functioning as intended”. However, as stated in previous comments, no actual issues are identified in Section 8.0 and this section must be amended to include those issues throughout the text as highlighted above.

**Response:** The text has been revised to ensure that Table 8.0-1 includes all issues identified in the previous sections of the report. Also see response to General Comment 3.

**Comment 20.** Section 8.0, page 141 – No issues have been identified in this section in direct contradiction to the information that was presented in the report up to this point. While all of the “issues” identified in this document are being addressed to some degree; without a complete resolution of each deficiency, CDPHE cannot support the interpretation provided in this paragraph. All of the issues identified in the comments above have the potential to affect protectiveness if they are not adequately addressed. This section will require extensive revision to provide a summary for each of the issues previously highlighted.

**Response:** Issues identified in Sections 6 and 7 that affect current or future protectiveness are included on Table 8.0-1; however, the text of Section 8.0 inadvertently omitted the reference to the table. Consistent with EPA guidance, repeating discussion of the issues in Section 8.0 is not needed since the issues are fully discussed in the previous sections. The Army recognizes this approach is different than what was presented in the last three Five-Year Review Reports but is striving to adhere to the published guidance and simplify the reports.

**Comment 21.** Section 9.1, page 143, Basin F Groundwater Impacts – As identified in the general comment above, a more extensive evaluation of the Basin F groundwater monitoring network is necessary given the increasing concentrations in

downgradient wells. While there have been some increases in upgradient wells, these increases do not explain the continued and elevated presence of contamination in downgradient wells. The review of current groundwater data, as stated in this subsection, is only a small part of much larger effort to expand the monitoring network to meet the requirements of 6 Code of Colorado Regulations 1007-3, Section 265, Subpart F. The stated recommendations under this sub section should be revised accordingly.

**Response:** As discussed in the response to General Comment 1, the presence or increasing concentrations of contaminants downgradient of Basin F does not affect protectiveness due to containment of groundwater contamination at the boundary systems, and groundwater use restrictions that are enforced. Although further evaluation is recommended, it is not necessary for protectiveness.

**Comment 22.** Figure 6.3-61 and Figure 6.3-65: These maps do not appear to show all the off-post wells. Please check.

**Response:** The maps were reviewed to ensure all CSRG network wells are shown and were revised as needed.

**Comment 23.** Table 5.2-1, page 45, first row, third column – In addition to the description on the current status of this issue, it should be noted that transfers of property outside of the United States remain restricted to those previously identified in the ROD, FFA or Refuge Act.

**Response:** The text has been revised to state that transfers are restricted by the ROD, which is the subject of the five-year review.

**U.S. Army and Shell Oil Company Responses to  
Tri-County Health Department (TCHD) January 14, 2021 Comments on the  
Draft Fifth Five-Year Review Report for Rocky Mountain Arsenal,  
Revision B, November 5, 2020**

**Comments for Incorporation**

**Specific Comments**

**Comment 1.** In Section 6.1, there is no notation that TCHD was involved in the 5-year review process. Tom Butts participated in this effort and should be listed in this section.

**Response:** The text has been revised as requested.

**Comment 2.** The well elevation for well 25144 on figure 6.3-1-47 appears to be in error and should be corrected.

**Response:** Note on figure has been revised to clarify that the water level for well 25144 could not be measured due to a damaged casing, as indicated by -888.88.

**Comment 3.** Overall, efforts to maintain effective monitoring and treatment systems to address issues identified in Tables 8.0-1 and 9.0-1 should be addressed in a timely manner. Attention to emerging issues identified by monitoring systems or at treatment systems should also remain priorities for the responsible parties and regulatory agencies.

**Response:** The Army and Shell remain committed to coordinating with the regulatory agencies to identify priorities for emerging issues and addressing issues as efficiently as possible.