

ROCKY MOUNTAIN ARSENAL

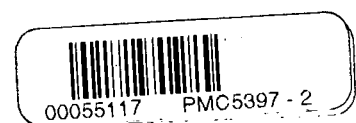
Land Use Control Plan

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Prepared for:
U.S. Department of the Army
Shell Oil Company

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ACRONYMS AND ABBREVIATIONS

CBSG	Colorado Basic Standards for Groundwater
CCR	Code of Colorado Regulations
CDPHE	Colorado Department of Public Health and Environment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COGCC	Colorado Oil and Gas Conservation Commission
C.R.S.	Colorado Revised Statutes
CSRG	Containment System Remediation Goal
EOD	Explosive Ordnance Disposal
EPA	U.S. Environmental Protection Agency
FFA	Federal Facility Agreement
HHE	Human Health Exceedance
IEA/RC	Integrated Endangerment Assessment/Risk Characterization
LTMP	Long-Term Monitoring Plan for Groundwater and Surface Water
LUC	Land Use Control
MOA	Memorandum of Agreement
MPPEH	Material Potentially Presenting an Explosive Hazard
NPL	National Priorities List
NWR	National Wildlife Refuge
O&M	Operations and Maintenance
OGITS	Off-Post Groundwater Intercept and Treatment System
OU	Operable Unit
P.L.	Public Law
RCRA	Resource Conservation Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
RMA	Rocky Mountain Arsenal
ROD	Record of Decision
RVO	Remediation Venture Office
SACWSD	South Adams County Water and Sanitation District
SAPC	Steering and Policy Committee
SEO	Office of the State Engineer
TCHD	Tri-County Health Department
USFWS	U.S. Fish and Wildlife Service

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1.0 INTRODUCTION

Land Use Controls (LUC)s are established to provide administrative, legal and/or physical controls to minimize the potential for human exposure to contamination and/or protect the integrity of the remedy whenever a site cannot support unlimited use and unrestricted exposure. As part of the long-term remedy at the Rocky Mountain Arsenal (RMA), LUCs, both institutional and engineering controls, are utilized to ensure protectiveness.

This LUC Plan for the RMA identifies LUC requirements in accordance with the Records of Decision (ROD)s for both the On-Post and Off-Post Operable Units (OU)s and provides the framework for minimizing potential exposure for workers and visitors at RMA and the RMA National Wildlife Refuge (NWR), ensuring that remedy facilities are protected and identifying monitoring and reporting requirements. This LUC Plan replaces the Interim RMA Institutional Control Plan (August 2008) and satisfies the agreement reached in the Basin A Dispute Resolution Agreement (PMRMA 1998), which requires a site-wide institutional control plan.

The United States Army (Army) is responsible for implementing, maintaining, reporting on, and enforcing all LUCs. Although the Army may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, the Army shall retain ultimate responsibility of assuring the effectiveness, reliability, monitoring, and reporting of the LUCs to support continued remedy protectiveness. The United States Fish and Wildlife Service (USFWS) will abide by the LUC requirements and provide implementation and enforcement of LUCs on refuge property.

Oversight for implementation of LUCs is provided by the U.S. Environmental Protection Agency (EPA), Colorado Department of Public Health and Environment (CDPHE), and Tri-County Health Department (TCHD), collectively referred to as the Regulatory Agencies. The Regulatory Agencies will be notified by telephone within 24 hours of ascertaining any violation of a LUC that results in a release of hazardous materials, results in an actual exposure of personnel to hazardous materials, or compromises the integrity of any remedy component. The telephone reports will be followed within 72 hours by a written report and may trigger consultation with the Regulatory Agencies as described in Section 6.

2.0 BACKGROUND

The Army established RMA in 1942 to produce chemical warfare agents and incendiary munitions in support of World War II. Following the war and through the early 1980s, the Army continued to use these facilities. Beginning in 1946, some RMA facilities were leased to private companies to manufacture industrial and agricultural chemicals. Shell Oil Company (Shell), the principal lessee, manufactured primarily pesticides at RMA from 1952 to 1982. Common industrial and waste disposal practices during those years resulted in significant levels of contamination. The principal contaminants include organochlorine pesticides, heavy metals, agent-degradation products and manufacturing by-products, and chlorinated and aromatic solvents.

For purposes of conducting CERCLA investigations and remedial actions, the RMA was divided into the On-Post OU and Off-Post OU. On-Post sites that posed potential immediate risks to human health and the environment were addressed through Interim Response Actions. A

Remedial Investigation/Feasibility Study (RI/FS) was conducted for the On-Post OU leading to the actions required by the On-Post ROD (FWENC 1996), as amended (TtEC 2005).

Groundwater contamination migrated north and northwest of RMA prior to installation of groundwater pump-and-treat systems at the boundaries. This necessitated creation of the Off-Post OU followed by preparation of an RI/FS and the Off-Post ROD (HLA 1995).

Surrounded by development, the On-Post OU provides a refuge for an abundant diversity of flora and fauna. For this reason the site was designated as a future National Wildlife Refuge in the Rocky Mountain Arsenal National Wildlife Refuge Act (Refuge Act) of 1992 (Public Law 1992). The RMA Federal Facility Agreement (FFA) and the On-Post ROD restrict future land use and prohibit certain activities such as agriculture, use of on-post groundwater as a drinking source, and consumption of fish and game taken at RMA. Current and future land use of the Off-Post OU surface area has not been restricted; however, institutional controls identified in the Off-Post ROD have been implemented to reduce the potential for exposure to groundwater exceeding remediation goals.

2.1 On-Post Operable Unit

The RMA On-Post OU is a federally owned facility located in southern Adams County, Colorado, approximately 10 miles northeast of downtown Denver, directly north of the former Stapleton International Airport and west of Denver International Airport. Location of the On-Post OU (and Off-Post OU) is shown on Figure 2.1-1. The original extent of the On-Post OU included all of the property located within the fenced boundary of RMA, approximately 26.5 square miles.

Manufacturing and disposal activities by the Army and Shell resulted in contamination of soil, sediments, structures and groundwater. The remedy selected in the On-Post ROD consisted primarily of on-site containment and groundwater treatment. Contaminated soils and sediments were excavated to a maximum depth of 10 feet and disposed in the on-site hazardous waste landfills or consolidated beneath soil covers. Contaminated structures were demolished and disposed in the landfills or Basin A. The groundwater remedy includes extraction of contaminated groundwater before it flows off post, treatment at on-site facilities, and reinjection of treated groundwater.

As components of the On-Post OU remedy have been completed, administrative jurisdiction has been transferred to the USFWS or other parties. These transfers are completed after the EPA has certified, with concurrence from the State of Colorado, that all required response actions are complete and the areas have been deleted from the National Priorities List (NPL). The EPA certification for partial deletions from the NPL (and the subsequent transfer of land) are based on an evaluation that concludes that there are no known hazardous substances remaining in the deleted areas above health-based levels with respect to the anticipated uses of and access to the site. As a result of these partial deletions, the Rocky Mountain Arsenal National Wildlife Refuge was officially established on April 21, 2004. As of September 2010, approximately 94 percent of the surface media at RMA had been deleted from the National Priorities List, and most of the property had been transferred to the USFWS. Groundwater has also been deleted in the eastern and southern perimeter areas of the RMA. However, groundwater underlying the central and

northwestern portions of the site, as shown on Figure 2.1-2, has not met remediation goals and remains on the NPL.

Other parties receiving transfers of property include Commerce City, South Adams County Water and Sanitation District (SACWSD) and other units of local government. Commerce City purchased acreage at the south west corner and west side of RMA now known as "Prairie Gateway." The SACWSD received the property upon which the Klein Water Treatment Facility (Klein Property) is located. The Colorado Department of Transportation, Commerce City and the City and County of Denver received 100-foot wide strips of property for public road construction, hereinafter referred to as "100-Foot Highway Setbacks". The Colorado Department of Transportation received a setback to the northwest along Colorado Highway 2, Commerce City received a setback to the north of RMA along 96th Avenue, and the City and County of Denver received a setback to the south of RMA along 56th Avenue. In 2007, the USFWS reacquired approximately 148 acres of the Prairie Gateway for incorporation into the Refuge. In return, approximately 28 acres of land in Section 33 and approximately 14 acres in the northeast (NE) corner of Section 20 (Section 20 NE Parcel) were deeded to Commerce City. Figure 2.1-2 shows the On-Post OU and illustrates Army-retained areas, RMA NWR, and areas transferred to other parties.

For the remainder of this report, the combination of USFWS refuge property and property retained by the Army is referred to as the RMA. As such, the On-Post OU is comprised of the RMA, Prairie Gateway, Klein Property, 100-Foot Highway Setbacks, and Section 20 NE Parcel.

2.2 Off-Post Operable Unit

The Off-Post OU is defined by the RMA FFA as that portion of the Off-Post Study Area where hazardous substances, pollutants, or contaminants from RMA are found and are subject to remediation. The Off-Post ROD further defined the Off-Post OU as depicted on Figure 2.1-2. The location of the Off-Post Groundwater Intercept and Treatment System (OGITS) is also shown.

The Off-Post OU addresses contamination north and northwest of RMA. Contamination migrated to the Off-Post Study Area primarily by shallow groundwater and airborne pathways. Contaminant transport in the shallow or unconfined groundwater has been controlled by construction of the boundary containment systems and improvements to these systems. Off-Post Study Area surface water was contaminated primarily by the natural interaction with off-post groundwater. Off-Post Study Area surface soil was contaminated by the deposition of airborne contaminants, non-RMA-related agricultural application of pesticides, and irrigation practices. Although the area with groundwater contaminants present is revised periodically based on post-ROD monitoring, no off-post groundwater has been deleted from the NPL.

In addition, the ROD identified approximately 160 acres of surface area owned by Shell Oil Company for revegetation. This is a portion of property referred to as the Shell Property and is included in the Off-Post OU. The property is located in Sections 13 and 14 as shown on Figure 2.1-2. Although contaminant concentrations indicated existing risk within EPA's acceptable risk range, the Army and Shell agreed to complete the revegetation as part of the remedy. Revegetation was completed in April 1996. In September 2009, EPA completed a Ready for

Reuse Determination for most of the Shell Property documenting that the property is ready for use for any purpose allowed under local land use and zoning laws. The property remains subject to restrictions specified in the Off-Post ROD as described in Section 4.4. In September 2010, all the off-post surface media, including the Shell Property, was deleted from the NPL.

As part of the State of Colorado Natural Resource Damages settlement, 100 acres of the Shell Property was deeded to Commerce City for open space and to use as a stormwater retention area. A conservation easement has been placed on the property as part of the agreement, and the easement is held by Adams County. The conservation easement preserves the property's conservation values in perpetuity and opens the area for limited recreational use.

3.0 ON-POST OPERABLE UNIT LAND USE CONTROLS

The selected remedy for the On-Post OU includes LUCs as a component of the remedy (FWENC 1996). These LUCs consist of Primary Institutional Controls as well as other LUCs including engineering controls (signs, fences) and access restrictions for specific areas of the On-Post OU.

3.1 Primary Land Use Controls

The FFA establishes LUCs that restrict the current and future use of real property and resources within the boundaries of RMA (EPA 1989). The LUCs set forth in the FFA are also required by the On-Post ROD (FWENC 1996). In addition, the Refuge Act incorporates similar LUCs as perpetual restrictions for property identified in the Refuge Act for disposal to parties other than USFWS, i.e., the Prairie Gateway and 100-Foot Highway Setbacks (Public Law 102-402). The land use controls along with the source and the applicability of each control are presented below in Table 3.1-1.

Table 3.1-1 Source and Applicability of the Primary On-Post OU Land Use Controls

Control	Source	Applicability
Prohibit residential development	FFA, On-Post ROD ¹	On-Post OU ²
Prohibit use of property for residential purposes	Refuge Act	Prairie Gateway and 100-Foot Highway Setbacks
Prohibit use of groundwater or surface water as a potable water source	FFA, Refuge Act ³ , On-Post ROD	On-Post OU
Prohibit consumption of fish and game taken at RMA,	FFA, On-Post ROD	On-Post OU
Prohibit hunting and fishing, except for non-consumptive use	Refuge Act	Prairie Gateway and 100-Foot Highway Setbacks
Prohibit non-remedy agricultural activities such as raising of livestock, crops or vegetables	FFA, Refuge Act ³ , On-Post ROD	On-Post OU
Preserve and manage wildlife habitats to protect endangered species, migratory birds, and bald eagles	FFA	RMA ⁴

Prohibit major non-remedy alteration of the geophysical characteristics of RMA if such alteration may likely have an adverse impact on the natural drainage of RMA for floodplain management, recharge of groundwater, operation of Response Action Structures, or protection of wildlife habitat(s)	FFA	RMA
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¹In addition, the National Wildlife Refuge System Administration Act of 1966 precludes residential development on refuge lands.

²On-Post OU consists of RMA, Prairie Gateway, Klein Property, 100-Foot Highway Setbacks, and Section 20 NE Parcel.

³Refuge Act applies only to the Prairie Gateway and 100-Foot Highway Setbacks.

⁴RMA consists of Army-retained property and RMA NWR.

Because these land uses were restricted for the On-Post OU, risks for such uses were not considered in the human health risk characterization portion of the Integrated Endangerment Assessment/Risk Characterization (IEA/RC) (Ebasco 1994). The portions of the On-Post OU transferred to other parties (e.g., Prairie Gateway, Klein Property, and 100-Foot Highway Setbacks) continue to be subject to these land use restrictions and are enforceable through deed restrictions placed on the transferred property.

The FFA includes a requirement to assure that future use of resources on and under the RMA is compliant with the primary land use restrictions included in the FFA. If the Army or USFWS decides to lease, grant a license, or otherwise provide for use of any portion of the RMA by any non-Federal party (e.g., access to mineral rights) for which a Report of Availability is required, the Army or USFWS will provide a Report of Availability detailing the specific location, uses, hazards, and restrictions associated with the anticipated use. The report shall be issued in accordance with Section XLIV, paragraphs 44.7 through 44.10 of the FFA.

The ROD also imposes a restriction on nonpotable uses of on-post groundwater. Because nonpotable uses of on-post groundwater were not anticipated, these risks were also not considered in the human health risk characterization portion of the Integrated Endangerment Assessment/Risk Characterization. Therefore, the ROD requires a risk evaluation prior to any future nonpotable use to ensure that such use would be protective of human health and the environment.

Additionally, in accordance with the February 3, 1993 letter from Lewis D. Walker (the Deputy Assistant Secretary of the Army for Installation, Logistics, and Environment) (Walker 1993) and the February 19, 1993 letter from John L. Spinks (the Deputy Regional Director for the USFWS) (USFWS 1993), the Army and the USFWS will not build, use, nor allow the use of any basements at RMA unless the Army or the USFWS prepares a feasibility study that addresses the impacts of the use of basements on human health and the environment, and documents that such impacts are minimal. This issue is discussed in detail in Section 3.1.2.

3.1.1 Overnight Occupational Use

Background: As discussed above, the FFA includes a restriction prohibiting residential development for the On-Post OU. Presently there is no residential development at RMA, and

residential use will not occur without residential development (SAPC 2013a). The USFWS has the capability to provide on-site housing for workers; however, overnight occupational use was not specifically described in the FFA or ROD. Discussions surrounding overnight uses by temporary/seasonal or short-term workers resulted in the following decision regarding short-term workers residing on site.

Land Use Control: If USFWS anticipates activities by short-term workers that are not included in the Biological Worker Risk Assessment from the IEA/RC, they will submit a description of the activities to the RMA Committee for review and approval prior to commencing said activities (SAPC 2013b).

The RMA Committee has developed a process to implement the requirements regarding short-term, overnight occupational use (RMA Committee 2013). This process ensures that if the USFWS has a need for workers to reside on site on a short-term basis, this use will be reviewed and approved by the RMA Committee on a case-by-case basis prior to such use. The USFWS will provide the following information to the RMA Committee 2-4 weeks in advance: (1) the reason for the stay; (2) the length of the stay; (3) a description of activities conducted by occupant during their stay; and (4) if the occupant is a RMA NWR employee (based on duty station). A bunkhouse-use-specific decision document will be completed and signed by all parties and placed in the Administrative Record to document the agreement.

Emergency use of the RMA NWR bunkhouses is authorized without prior approval. An emergency is defined by USFWS policy (090 FW 2.3) as either a catastrophic incident or an emergency incident that requires action to protect life or property. In these cases, the USFWS will provide the RMA Committee with details as soon as practicable for inclusion in the Administrative Record.

3.1.2 Restriction on Construction and/or Use of Basements

Background: Pursuant to Section 44.4 of the FFA, the Army added a restriction on construction or use of basements at RMA. The Army specified this additional restriction by letter in February 1993 (Walker 1993). The USFWS wrote a similar letter providing the same commitment for the Refuge (Spinks 1993). Specifically the letters state "... the Army and DOI (Department of Interior) will neither build, use, nor allow the use of any basements on RMA. This policy applies to current activities and to future uses of RMA when it becomes a National Wildlife Refuge." The policy letters from the Army and USFWS also state that if it becomes necessary to amend the policy (i.e., provide for use of a basement on RMA), a focused feasibility study will be prepared to address the impacts of basement use on human health and the environment.

Currently, there are two basements with occasional use for facility operations and maintenance, one at Building 112, Communications, and the second at Building 371, Lake Ladora Pump House. Both these locations have been in use since their construction in 1942.

Evaluation of the vapor intrusion pathway for buildings in the RMA administration area, including Building 112, was included in the 2010 Five-Year Review Report (FYRR). This evaluation was completed consistent with the *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance)* (EPA 2002). As noted in the FYRR evaluation, the only volatile organic compound

present in the vicinity of the administration area is chloroform. Historic chloroform concentrations in monitoring wells near the administration area have ranged from nondetect to a maximum of 5.89 µg/l, with the most recent concentration measured at 3.08 µg/l. These concentrations are well below the groundwater screening level of 80 µg/l provided in the Subsurface Vapor Intrusion Guidance, indicating that the vapor intrusion pathway does not pose an unacceptable risk to human health. For Building 371, there are no volatile contaminants present in groundwater beneath the building; therefore, the vapor intrusion pathway is incomplete. Based on the screening criteria provided in the Subsurface Vapor Intrusion Guidance, the vapor intrusion pathway is not a pathway of concern and continued use of these basements does not present an unacceptable risk to human health.

Land Use Control: For the two basements in use where the evaluation shows no unacceptable risk (Building 112 and Building 371), continued use for facility operations and maintenance purposes is acceptable and no additional monitoring is required. Prior to construction or use of any new basements, an evaluation of the potential risks will be completed in accordance with the agreement in the Army and USFWS policy letters.

3.2 Additional Controls

In addition to the Primary LUCs, the Army and in some cases the USFWS are responsible for maintaining and enforcing the following additional LUCs in all areas within the boundaries of RMA. Additional information on remedy sites where LUCs are required can be found in the Remedial Investigation Summary Report (Ebasco 1992) and in the RMA Environmental Database.

3.2.1 Site SSA-3b: Previously Excavated Lake Sediments

Background: This site consists of sediment that was dredged from Upper and Lower Derby Lakes and disposed in Section 12, South of 6th Avenue (64th Avenue). The sediment was contaminated with the pesticides aldrin and dieldrin. The dredged sediment that was characterized as human health exceedance (HHE) soil was removed, as required by the ROD, in 1999 as part of the Miscellaneous Southern Tier Soils Remediation Project (FWENC 2000). There is some remaining pesticide contamination at depths greater than 3 feet that exceeds the acute human health criteria (see Figure 3.2.1-1). This soil was not required to be excavated by the ROD and does not pose a human health risk if left undisturbed below the overlying soils.

Land Use Controls: Unless part of a planned remedy, the USFWS and the Army will prevent excavation into the portion of SSA-3b where subsurface soil concentrations exceed the acute human health criteria. The USFWS will also maintain signs around the restricted area. In the unlikely event that excavation becomes necessary, the USFWS or the Army will notify the Regulatory Agencies 14 days in advance of any excavation.

3.2.2 Access Restrictions for Caps and Covers

Background: The On-Post ROD requires construction of covers to meet the Remedial Action Objectives described in Section 7.4.2 of the ROD. As stated in Section 8.3.1 of the ROD, "The covers provide for protection of human health primarily through containment of human health exceedances, which interrupts exposure pathways and reduces the migration of contaminants to

groundwater and the atmosphere.” The following is a list of cover types and the project areas that have covers (also shown on Figure 2.1-2).

RCRA-Subtitle C caps over landfills in the Corrective Action Management Unit

- Hazardous Waste Landfill
- Enhanced Hazardous Waste Landfill

Former Basin F RCRA-Equivalent Cover

Integrated Cover System RCRA-Equivalent Covers

- Basin A Consolidation Area
- Complex (Army) Trenches
- Section 36 Lime Basins
- Shell Disposal Trenches
- South Plants Central Processing Area

Soil Covers

- South Plants Balance of Areas 3-foot cover
- Shell Trenches 2-foot cover

Land Use Controls: The ROD requires access restrictions to ensure the integrity of the covers. To prevent exposure to the waste left under the covers and to protect the cover remedy and any other remedial system components (e.g., vertical groundwater barriers, fences, signs, obelisks, and monitoring equipment) activities that may damage or impair the proper functioning of any covers are prohibited. Prohibited activities include, but are not limited to, excavation, drilling, tilling, grading, or construction of any sort (including construction of any structures, paths, trails, or roads). This restriction does not apply to response actions authorized pursuant to the FFA or ROD, including but not limited to, monitoring and maintenance activities (including tilling or other agricultural work necessary to maintain or repair the vegetative layer of the cover system and prescribed burning to maintain grassland covers). However, prohibited activities require notification and a Non-Routine Action Plan or Corrective Measures Plan prior to performing these activities.

Protection of the covers and operations and maintenance (O&M) associated with covers are the responsibility of the Army. Access restrictions are maintained through engineering controls, including perimeter fences and warning signs, which are monitored pursuant to the *RCRA-Equivalent, 2-, and 3-Foot Covers Long-Term Care Plan* (TtEC 2011b), *Hazardous Waste Landfill Post-Closure Plan* (TtEC 2011c), *Enhanced Hazardous Waste Landfill Post-Closure Plan* (TtEC 2010a) and *Basin F Post-Closure Plan* (TtEC 2011a).

3.2.3 Sanitary Sewers

Background: The sanitary sewer system was constructed by the Army to convey sanitary wastewater from the railyard, administration, South Plants and North Plants areas to the on-site sewage treatment plant in Section 24. The sanitary sewer system was one of three sewer systems constructed and was separate from the chemical sewer and process water sewer systems. Contamination was discovered in the sanitary sewer system both prior to and during the Remedial Investigation. As part of the remedy for sanitary sewers, the On-Post ROD required concrete plugging of the void space under abandoned sanitary sewer manholes and placement of aboveground warning signs every 1,000 feet along remaining abandoned sanitary sewer lines to indicate their location underground.

Land Use Control: Maintenance of the aboveground markers is required. As part of construction, an engraved brass plate sign was placed on each plugged manhole and at additional locations where the distance between manholes exceeded 1,000 feet. The brass plates will be inspected and maintained once every five years to ensure that the location of the abandoned sanitary sewer is adequately marked. The location of the abandoned sewer along with coordinates of manhole/marker locations is shown on Figure 3.2.3-1. In addition, due to the potential for residual contamination in the sewers, the Army or USFWS will conduct utility locates to identify abandoned sewer locations prior to intrusive activities and will notify the Regulatory Agencies 14 days in advance of any excavation of the abandoned sanitary sewer line.

3.2.4 Groundwater Remedy Structures (Treatment, Extraction/Recharge Systems, Wells, and Related Infrastructure)

Background: The groundwater remedy at RMA consists of groundwater treatment facilities, extraction/recharge systems, and a network of groundwater monitoring wells that are located in and near groundwater contamination. The wells are part of the long-term groundwater monitoring program (RVO 2010b). The RMA treatment facilities include the North Boundary Containment System, the Northwest Boundary Containment System, the Railyard System, the Basin A Neck System, and the OGITS. These treatment systems were installed in the 1980s and 1990s, prior to the ROD. Additional groundwater extraction systems include the Bedrock Ridge and Complex Trenches Extraction systems, and the Lime Basins Dewatering System. The most current information on the operational status and locations of groundwater wells is available in the Rocky Mountain Arsenal Environmental Database.

Land Use Control: Protection of the groundwater remedial action structures including the treatment facilities, extraction/recharge systems, wells, and related infrastructure (e.g., electrical systems, instrumentation, access vaults) is the responsibility of the Army. The Army is responsible for ongoing O&M associated with groundwater wells and treatment systems at RMA.

Institutional Controls for the groundwater remedy consist of access control and control of activities that may damage these systems. Access to the treatment systems is limited to authorized personnel and is controlled by locking doors to the facilities during non-business hours. Groundwater monitoring wells are protected using secure well caps, with locking caps, in the on-post public use areas and off-post OU.

CERCLA and Public Law 102-402 (Refuge Act) require the Army to retain remedial action structures as long as they are required for remediation purposes. The Refuge Act guarantees Army access to USFWS lands for all response actions. Activities (e.g., remediation, revegetation, other construction, or maintenance) associated with or located near the treatment systems and the long-term groundwater monitoring well network must be conducted so that the treatment structures, extraction/recharge systems, monitoring well network, and associated equipment are not disturbed or damaged.

Monitoring wells in the on-post public use area will be inspected annually. Additional inspection requirements and the process to be used when damaged system components are identified are presented in the *Long-Term Monitoring Plan for Groundwater and Surface Water (LTMP)* (RVO 2010b). Damaged system components and corrective actions performed will be documented in the Annual Summary Reports. Monitoring activities discussed in the Annual Summary Reports, including groundwater remedy structures engineering controls/O&M activities, are not evaluated as part of land use control monitoring.

3.2.5 Notification Requirements for Lower Derby Lake

Historical analytical data from Lower Derby Lake sediments indicated potential human health risks were present in one portion of the lake bed. A sediment sampling program was conducted in Lower Derby Lake in 2006 to determine what, if any, residual human health risks exist in these sediments. The results of the 2006 sampling effort indicated that concentrations are below human health screening criteria. Based on this information, institutional controls are unnecessary (RVO 2008). However, due to the potential for residual contamination in the sediments, the USFWS will notify the Regulatory Agencies 14 days in advance of dredging in Lower Derby Lake in the unlikely event it would ever do so.

3.3 Access Controls

3.3.1 General Access to RMA

Physical access to RMA is and will continue to be restricted. Although the USFWS maintains a public access gate at the southwest corner of the site near the USFWS Visitor Center, access is permitted only to the areas of the refuge designated for public use by the USFWS. The remainder of RMA operates as a closed facility with access available only to authorized workers and visitors. The perimeter fence with limited access points (West, South, North and Northwest Gates) limits site access to those people who have legitimate activities at RMA. The west and south gates are automated gates requiring access codes for entry. The USFWS is responsible for issuing and maintaining access codes and security associated with the gates. The north and northwest gates are manual gates intended for use by treatment system personnel and are locked when not in use. The north gate is also intended for use by heavy delivery trucks.

The USFWS provides information at the Visitor Center and at the kiosks outside the Visitor Center to help visitors understand which areas of RMA are accessible. In addition, the USFWS maintains signs on the refuge to control access to areas that are not opened to the public. Additional information related to RMA access controls is provided in the Rocky Mountain Arsenal Access Policy (RVO 2012c). The Army maintains access control to Army-retained areas. As discussed in Section 3.2.2, access restrictions in the form of engineering controls

(fences, signs and obelisks) are maintained for containment areas in accordance with the *RCRA-Equivalent, 2-, and 3-Foot Covers Long-Term Care Plan* (TtEC 2011b), *Hazardous Waste Landfill Post-Closure Plan* (TtEC 2011c), *Enhanced Hazardous Waste Landfill Post-Closure Plan* (TtEC 2010a) and *Basin F Post-Closure Plan* (TtEC 2011a). The engineering controls associated with the landfills also satisfy the requirements of 40 Code of Federal Regulations (CFR) §264.14 and 6 Code of Colorado Regulations (CCR) 1007-3 §264.14 for security.

Access control to the RMA NWR is maintained by the USFWS and is controlled by regulations governing the National Wildlife Refuge System (50 CFR Parts 25-29). One of the most significant aspects of the above regulations is the fact that “No person shall trespass, including but not limited to entering, occupying, using, or being upon, any national wildlife refuge, except as specifically authorized in this subchapter C or in other applicable Federal regulations.” (50 CFR §25.21(a)). This statement and the other provisions of Subchapter C provide the USFWS with a full range of authorities and capabilities to manage RMA NWR lands. Access to areas of the RMA NWR that are not opened to the public is controlled using signs, regulations, and periodic monitoring by USFWS Law Enforcement.

3.3.2 Access for CERCLA Response Actions

The Refuge Act provides for Army access to refuge property after transfer of jurisdiction for any CERCLA response actions. This includes groundwater treatment facilities and groundwater monitoring wells. The deeds for the Prairie Gateway, Klein Property and the 100-Foot Highway Setbacks include a covenant providing access for response actions or corrective actions.

3.3.3 Activities Management

A critical part of activities management at RMA is providing adequate information and training to help people understand access restrictions and their responsibilities. Activity coordination responsibility varies depending on the location within RMA. The Army coordinates all activities within remedy O&M areas. The USFWS coordinates activities on the RMA NWR compliant with 50 CFR Parts 25 through 29.

Intrusive activities within the Army-retained areas require completion of an Intrusive Activity Permit in accordance with RVO SOP ES&H.210 (RVO 2007). The permit process outlines requirements for determining potential hazards associated with intrusive activities and includes information where controls exist to limit or prevent excavation. Completion and approval of an intrusive activity permit is required prior to performing the activity to ensure that areas with excavation restrictions are not inadvertently disturbed.

In addition, the appropriate entity, either the Army or the USFWS, will maintain signs required by existing regulations, plans, and procedures. These signs provide visitors with information and assist with managing visitor and worker safety. The Army maintains signs that provide information related to waste containment areas or remedy O&M areas, while the USFWS maintains access control signs on the refuge.

4.0 OFF-POST OU CONTROLS

Land Use Controls, in the form of Institutional Controls, were established as part of the selected remedy for the Off-Post OU (HLA 1995). The Off-Post ROD identifies the objective of the

Institutional Controls as “prevent the future use of groundwater exceeding remediation goals” and provides the following specific requirements:

- The Army will provide the Office of the State Engineer (SEO), State of Colorado, with a map identifying those areas in the Off-Post Study Area where groundwater could potentially exceed containment system remediation goals (CSRG)s. This map will be updated based on each sampling round.
- The Army will establish procedures to ensure that the well notification program is operating effectively. The Army will inspect, or oversee inspection, of all well construction activity to monitor conformance with the State Board of Examiners well drilling regulations (the Army does not provide inspection of individual well construction).
- The Army will fund analytical sampling of any future domestic well constructed in the area of contamination, if requested.
- The Army will provide Commerce City, the City of Brighton, and Adams County officials with the same map provided to the SEO (as described in first bullet above). The Army will make arrangements with these governmental agencies to ensure that the map is used in the most effective manner possible to reduce exposure to potentially contaminated groundwater.
- For new domestic wells with DIMP levels of 8 parts per billion or greater (or other relevant CBSG at the time), the U.S. Army and Shell Oil Company will pay for hook-up to the SACWSD distribution system or provide a deep well or other permanent solution.

In conjunction with the above, the Off-Post ROD identifies the following:

- The SEO will include a distinctive notice on each well permit application correspondence, each well permit, and each drilling permit. The area included in this requirement is any part of the Off-Post Study Area where groundwater could potentially exceed groundwater containment system remediation goals. This notice will advise the applicant to contact the TCHD and the EPA for information regarding groundwater quality and the options provided by the Army to avoid use of potentially contaminated groundwater.

In addition, the Off-Post ROD included exposure control and provision of alternate water supply for domestic well owners in the Off-Post OU as follows:

- As of the date of the On-Post ROD, and based on a 0.392 parts per billion detection limit, the U.S. Army will use the last available quarterly monitoring results to determine the DIMP plume footprint.
- As part of the On-Post ROD, the U.S. Army and Shell Oil Company will pay for the extension of, and hook-up to, the current distribution system for all existing well owners within the DIMP plume footprint referenced above.
- Existing domestic well owners outside of the DIMP plume footprint as of the date of the On-Post ROD where it is later determined that levels of DIMP are eight parts per billion or greater (or relevant CBSG at the time) will be hooked up at the U.S. Army and Shell

Oil Company's expense to the SACWSD distribution system or provided a deep well or other permanent solution.

- For new domestic wells with levels of eight parts per billion or greater (or other relevant CBSG at the time), the Off-Post ROD institutional controls will provide that the U.S. Army and Shell Oil Company will pay for hook-up to the distribution system or provide a deep well or other permanent solution.
- Any user of a domestic well within the Off-Post OU that contains groundwater contaminants derived from RMA at concentrations that exceed the greater of the remediation goals in Tables 7.1 through 7.3 or the ARARs in Table 10.1 of the Off-Post ROD will be provided an alternate water supply. Bottled water will be provided for cooking and drinking until a permanent alternate water supply is provided. Permanent alternate water supplies could include installation of a deep uncontaminated well or connection to a municipal potable water-supply system. This commitment applies to both users of existing domestic wells and users of wells that are lawfully drilled in the future.

The Off-Post ROD also provides a discussion of state and local regulations applicable to groundwater use, well construction, building permits and zoning requirements that limit or prevent the use of groundwater from the alluvial aquifer. These regulations, in conjunction with the ROD-required Institutional Controls and exposure control provisions, provide restrictions or processes that reduce the potential for exposure to groundwater exceeding remediation goals.

4.1 Well Notification Program

The primary mechanism for implementing the institutional controls is a well permit notification program developed in conjunction with the SEO, TCHD and the Army. Beginning in 1996, the Army has provided maps to the SEO to identify the off-post area where groundwater could potentially exceed groundwater CSRGs. The map is generally referred to as the well permit notification area map, or notification area map, and satisfies the Army requirement described in the ROD. The Army also provides the SEO with groundwater CSRG exceedance maps for information purposes. The SEO uses the notification area map to notify well applicants that their wells are in the off-post RMA area where contaminated groundwater might be encountered.

Groundwater monitoring is conducted for the off-post exceedance monitoring network on a twice-in-five-year frequency as detailed in the *Long-Term Monitoring Plan for Groundwater and Surface Water* (RVO 2010b). Following each sampling round, a revised CSRG exceedance map is prepared. Data from TCHD's private well monitoring program is used to help delineate the CSRG exceedance area. Historically the notification area map has been modified as appropriate based on the updated CSRG exceedance map to reflect the potential exceedance area. The updated maps were then provided to the SEO for use in the well permit notification program.

In 2011, the well notification program was modified to include both the potential CSRG exceedance area and the historic area of contamination (PMRMA 2011). The historic area of contamination is defined as the area of DIMP contamination based on the 0.392 parts per billion detection limit identified in the Off-Post ROD. The notification areas are shown on Figure 4.1-1.

These notification areas will be used until groundwater is deleted from the NPL, unless there is agreement to change the notification area.

The Off-Post ROD states that a notice should be included on each well permit application correspondence, each well permit, and each drilling permit. However, discussions with the SEO to facilitate implementation of the notification program resulted in agreement for the SEO to provide the required notification only on each approved well permit. The process followed by the SEO includes review of each well permit application and determination as to whether the well is located in one of the notification areas. If the well is identified to be within the notification areas and the application is approved, the SEO attaches a notice to the permit that is sent to the well owner. For wells within the potential exceedance area the notice states the following:

“This proposed well is in the Rocky Mountain Arsenal off-post area where groundwater contamination may exceed groundwater quality standards. Contact the Tri-County Health Department @ 303-288-6816 for details prior to drilling this well.”

For wells within the historic area of contamination the notice states the following:

“This proposed well is in the Rocky Mountain Arsenal off-post area where groundwater contamination may be encountered. Contact the Tri-County Health Department @ 303-288-6816 for details prior to drilling this well.”

The SEO also provides a copy of each approved permit to EPA, CDPHE and TCHD.

Requests for groundwater information are handled by TCHD consistent with its internal work plans and procedures. Typically this includes providing RMA-related off-post groundwater contamination history, researching the well location, construction information and property history, providing recommendations for sampling, as appropriate, and completing a resident survey for documentation in the property folder.

4.2 Change of Well Ownership

In addition, Colorado law requires a buyer of a property to complete a change in ownership form when the transaction includes transfer of ownership of certain wells (C.R.S. § 38-30-102(3)(b) (CRS 2008). The SEO has agreed to provide TCHD with an annual summary of all change of ownership forms when wells are located within the notification area. When warranted, TCHD will contact the new owner and discuss any owner concerns.

4.3 Tri-County Health Department Coordination

The off-post private well groundwater monitoring is implemented under a Memorandum of Agreement (MOA) between the Army and TCHD. The MOA defines responsibilities for TCHD to support the objectives of the RMA remediation program and includes private well sampling, public education, data management and reporting to the Army. . TCHD also coordinates with the SEO to ensure that the well notification program is operating properly. This process includes:

- Four times per year (once per quarter), TCHD makes a formal request to the SEO office for copies of well permits issued in the notification area.

- TCHD reviews each permit to determine if the appropriate notification has been placed on the well permit and evaluate if the well user is, or may in the future be, extracting and using groundwater that exceeds CSRGs. If notifications are not being placed on well permits issued in the notification area, TCHD in conjunction with the Army will work with the SEO to improve the notification process.
- TCHD notifies the RVO, EPA, and CDPHE if a well permit is issued within a notification area. If so, the well will be included in the next round of sampling, and Army will provide notification to the EPA, CDPHE and TCHD if the sample result exceeds CSRGs.
- When warranted, TCHD will make individual contact with the permit recipient/new owner to provide a detailed explanation of the nature and extent of groundwater contamination in the off-post area.

Although review of the well permits and change of ownership forms issued in the notification area is conducted by TCHD, the Army retains responsibility for implementation of the well permit notification program.

In addition, TCHD educates property owners, residents, drillers, and contractors that call as needed on past and present history of the site and provides sampling and analysis for both notification areas as necessary. When warranted, TCHD will make individual contact with a well permit recipient or new well owner to provide a detailed explanation of the nature and extent of groundwater contamination in the off-post area, and inform the well owner of the private well monitoring program, which TCHD conducts for the RVO. The RVO will pay for TCHD's education, and sampling and analysis program in both the exceedance and historic notification areas.

4.4 Oil and Gas Well Notification

A public concern was identified with oil and gas wells near RMA potentially encountering RMA contamination. These concerns are related to two separate issues: past subsurface waste disposal at RMA associated with the former hazardous waste injection well, and contaminated alluvial groundwater. The former hazardous waste injection well, located in Section 26, served as a disposal well to injected liquid waste 12,000 ft below ground. Approximately 165 million gallons of liquid wastes were disposed from March 1962 to February 1966. This disposal was discontinued in February 1966 and the well was subsequently closed and plugged. The second issue is associated with contaminated groundwater north and northwest of RMA. Alluvial groundwater was contaminated after contaminants migrated from RMA.

The CDPHE, in conjunction with the Colorado Oil and Gas Conservation Commission (COGCC), is developing notification language intended to provide information about RMA historical operations and points of contact for more information. The intent is that the COGCC will provide the notification if a permit application is submitted for a well within 5 miles of the former deep well injection site or within the areas of alluvial groundwater concern. The COGCC is responsible for implementation of these requirements and the Army will not monitor COGCC implementation of these notifications.

4.5 Shell Property

One additional institutional control identified in the Off-Post ROD is relevant for the Shell Property located in Sections 13 and 14 north of RMA. The ROD requires a deed restriction that prohibits drilling new alluvial wells and use of deeper groundwater underlying the Shell Property until such groundwater no longer contains contamination in exceedance of groundwater CSRGs established in the ROD (HLA 1995). The deed restriction is defined in the *Declaration of Covenants among Shell, the United States, and the State of Colorado* dated February 2, 1996. The covenants were recorded by the Adams County Clerk and Recorder on June 11, 1996. These covenants “run with, and burden the land ... and are enforceable by the United States, through the Army and EPA, and by the State.”

A network of existing monitoring wells is being retained within the Shell Property to provide capability for potential future monitoring to support lifting the deed restriction. The list of retained wells is provided in the *Well Networks Update for Retention and Closure, Water Year 2003* (FWENC 2003).

5.0 ORDNANCE AND EXPLOSIVES ISSUES

It is anticipated that RMA workers may encounter Material Potentially Presenting an Explosive Hazard (MPPEH) on RMA/RMA NWR during the execution of post-remedy activities. The term MPPEH includes the familiar terms Munitions and Explosives of Concern, Unexploded Ordnance, Discarded Military Munitions, and munitions debris. The discovery of MPPEH will require response from off-site entities qualified to assess and recover MPPEH. Procedures for managing people and facilities at RMA in relation to incidents (unplanned events) involving actual or suspected MPPEH are described in the RVO Munitions Response Plan, RVO SOP: ES&H.217 (RVO 2012a), which is included as part of the RMA Emergency Management/Contingency Plan, RVO Policy PM-A-102 (RVO 2012b). Activities described in the Munitions Response Plan are in compliance with the appropriate Colorado Hazardous Waste Regulations; 6 CCR 1007-3, §267.200 through 202, Subpart M Military Munitions.

Areas on RMA/RMA NWR with MPPEH potential are not open for general public access. Upon assignment to the RMA NWR, all new USFWS employees will receive training on how to recognize MPPEH items and the procedures to follow if suspected or MPPEH items are encountered. In addition, the USFWS will provide site-specific MPPEH training as part of site orientation for visitors that are issued permits for more general site access (e.g., commercial photographers). As the USFWS modifies refuge access, the Army will continue to evaluate access control requirements for potential MPPEH areas to ensure protectiveness of site workers and visitors.

6.0 ENFORCEMENT AND NOTIFICATIONS

Violations of LUCs will be handled through various Army and USFWS enforcement mechanisms that are proportional to the violation. Although the Army maintains overall responsibility for implementing, maintaining, reporting on, and enforcing LUCs, the USFWS not only adheres to but provides implementation and enforcement of LUCs on refuge property. Minor and inadvertent violations of laws, regulations, policies, and procedures governing access and activities at the site may be handled administratively through management actions by the

parent or sponsoring organization(s) at RMA and may include various forms of disciplinary action. As warranted, the response to these violations can escalate to include severe penalties such as termination of a contract, barring of future entry to RMA, or termination of employment. More serious or repeat violations of federal laws or regulations may result in civil or criminal prosecution.

Notification to the Regulatory Agencies of violations of land use controls or activities inconsistent with land use restrictions is critical to keep the agencies informed and involved in the long-term effectiveness of the remedy. Notifications will be made to the RMA Committee members and specific requirements are determined dependent on the severity of the land use control violation. A summary of notification requirements is included on Table 6.0-1.

The EPA, CDPHE, and TCHD will be notified by telephone within 24 hours of ascertaining any violation of a LUC that results in a release of hazardous materials, results in an actual exposure of personnel to hazardous materials, or compromises the integrity of any remedy component. The telephone reports will be followed within 72 hours by a written report.

The Army shall provide notice to EPA and the State within 10 days of discovery of any activity that is inconsistent with the land use control requirements or objectives, or any action that may interfere with the effectiveness of the land use controls, or any activity that might result in a potential exposure of personnel to hazardous materials. The Army shall include in such notice a list of corrective actions taken or planned to address such deficiency or failure.

Violations requiring notification also require a consultative process to determine the appropriate remedy for the condition. Consultation may be initiated by the Army, USFWS, or any of the Regulatory Agencies. One of the purposes of the consultative process is to ensure that the parties are aware of detrimental or potentially detrimental conditions and agree upon the actions required. The consultation may be an exchange of e-mail, written notification, or a meeting that may include a site inspection, followed up with written documentation for the record. The parties will come to consensus regarding the appropriate action for the condition. If consensus is not reached, the parties will proceed as outlined in the FFA, or other equivalent document if superseded. Corrective actions, if necessary, will be performed after the parties agree on the action.

7.0 MONITORING AND REPORTING

Monitoring of the land use controls will be conducted annually by the Army. Monitoring generally consists of site inspections and inquiries of the Army and USFWS managers to assess whether land use controls are being implemented, are effective, and remain in place. Table 7.0-1 provides a summary of monitoring requirements for each LUC and Attachment 2 provides a checklist to assist in completing the monitoring activities. The monitoring results will be issued in a separate report or included as a section of another environmental report, if appropriate, and provided to EPA, CDPHE and TCHD. The annual monitoring report will evaluate the status of the land use controls and how any land use control deficiencies or inconsistent uses have been addressed. The annual monitoring reports will be issued in December of each year.

In addition, a discussion regarding the implementation and effectiveness of the LUCs will be included as part of subsequent Five-Year Reviews. The annual monitoring reports will be used in preparation of the Five Year Review to evaluate the effectiveness of the remedy.

8.0 CHANGES TO THE PLAN

The Army, with the concurrence of the Regulatory Agencies, will change the LUC Plan as necessary to continue to minimize human exposure and to protect the remedy. The Army shall notify EPA and the State 45 days in advance of any proposed land use changes that are inconsistent with the land use controls of the selected remedy. The Army shall not modify or terminate land use controls or implementation actions or modify land use without approval by EPA and the CDPHE. Changes in land use controls may also require preparation of an Explanation of Significant Differences or ROD Amendment depending on the extent of the change.

9.0 REFERENCES

CRS (Colorado Revised Statutes)

2008 (Mar. 26) *House Bill 08-1014. Colorado Revised Statutes 38-30-102.*

Ebasco (Ebasco Services Incorporated)

1994 (July) *Final Integrated Endangerment Assessment (IEA)/Risk Characterization (RC). Version 4.2.*

1992 (Jan.) *Final Remedial Investigation Summary Report. Version 3.2.*

EPA (U.S. Environmental Protection Agency)

2002 (Nov.) *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance) EPA530-D-02-004.*

1989 (Feb. 17) *Federal Facility Agreement, in the Matter of: Rocky Mountain Arsenal, Colorado, Department of the Army, Shell Oil Company, Pursuant to Section 120 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as Amended by Superfund Amendments and Reauthorization Act of 1986, 42 USC 9601-9675.*

FWENC (Foster Wheeler Environmental Corporation)

2003 (June) *Well Networks Update for Retention and Closure, Water Year 2003, Final.*

2000 (June) *Miscellaneous Southern Tier Soil Remediation Project, Construction Completion Report. Revision 1.*

1996 (June) *Record of Decision for the On-Post Operable Unit. Version 3.1.*

HLA (Harding Lawson Associates)

1995 (Dec. 19) *Rocky Mountain Arsenal Off-Post Operable Unit Final Record of Decision.*

PMRMA (Program Manager Rocky Mountain Arsenal)

- 2011 (Mar. 31) *Decision Document Off-Post Groundwater Notification Area.*
- 1998 (Mar. 20) *Basin A Dispute Resolution Agreement.*

Public Law

- 1992 (Oct.) *Rocky Mountain Arsenal National Wildlife Refuge Act of 1992 (Public Law 102-402)*

RMA Committee

- 2013 (Aug.) *Decision Document DD-29 Short-Term Use of Bunkhouses.*

RVO (Remediation Venture Office)

- 2012a (Sept. 10) *Munitions Response Plan. RVO SOP: ES&H.217.*
- 2012b (Sept. 19) *RMA Emergency Management/Contingency Plan. Policy PM-A-102.*
- 2012c (Jan. 13) *Rocky Mountain Arsenal Access Policy. Policy PM-A-101.*
- 2010a (Sept. 21) *RMA Incident and Emergency Management Policy and Contingency Plan. Revision 0.*
- 2010b (Mar. 3) *Long-Term Monitoring Plan for Groundwater and Surface Water. Final.*
- 2008 (Feb.) *Technical Justification Memorandum to Remove Institutional Controls for Lower Derby Lake Sediments (Final).*
- 2007 (Apr. 10) *Rocky Mountain Arsenal Intrusive Soil Activity. RVO SOP: ES&H.210.*

SAPC (Steering and Policy Committee)

- 2013a (July) *Decision Document Land Use Control Plan.*
- 2013b (July) *Decision Document Temporary/Seasonal Worker Risk Assessment.*

Spinks, John L., Jr. (Deputy Regional Director, U.S. Fish and Wildlife Service)

- 1993 (Feb. 19) *Letter to Jack McGraw Acting Regional Administrator of EPA Region VIII Regarding the Construction of Buildings with Basements at RMA.*

TtEC (Tetra Tech EC, Inc.)

- 2011a (Oct. 6) *Basin F Post-Closure Plan. Revision 0.*
- 2011b (Sept. 29) *RCRA-Equivalent, 2-, and 3-Foot Covers Long-Term Care Plan. Revision 2.*
- 2011c (Mar. 16) *Hazardous Waste Landfill Post-Closure Plan. Revision 3.*
- 2010a (May 20) *Enhanced Hazardous Waste Landfill Post-Closure Plan. Revision 0.*
- 2010b (Apr. 8) *Response Plan for Recovered Material Potentially Presenting an Explosive Hazard. Revision 0.*

- 2005 (Oct. 20) *Amendment to the Record of Decision for the On-Post Operable Unit, Rocky Mountain Arsenal Federal Facility Site, Section 36 Lime Basins Remediation, Basin F Principal Threat Soil Remediation. Revision 0.*

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

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

Table 6.0-1 Notification Requirements

Activity/Occurrence	Notification Requirement
Violation of a land use control that results in a release of hazardous materials	Telephone notification within 24 hours followed by written report within 72 hours
Violation of a land use control that results in actual exposure of personnel to hazardous materials	Telephone notification within 24 hours followed by written report within 72 hours
Violation of a land use control that compromises remedy integrity	Telephone notification within 24 hours followed by written report within 72 hours
Activity inconsistent with land use control requirements or objectives	Within 10 days of discovery
Actions that may interfere with the effectiveness of land use controls	Within 10 days of discovery
Emergency overnight use	Within 72 hours of occurrence
Excavation of SSA-3b	14 days in advance
Excavation of abandoned sanitary sewer line	14 days in advance
Dredging in Lower Derby Lake	14 days in advance
Changes to the Land Use Control Plan or proposed land use changes inconsistent with land use control objectives of the selected remedy	45 days in advance. If advance notice is not possible, notify within 72 hours of change followed by written confirmation.
Activity that might damage or impair the proper function of the caps/covers	Notifications made in accordance with the HWL Post-Closure Plan (TtEC2011c), ELF Post-Closure Plan (TtEC 2010a), Basin F Post-Closure Plan (TtEC 2011a) and Long-Term Care Plan (TtEC 2011b)
Discovery of UXO or repeated discovery of MDEH within same area	Notifications made in accordance with RMA Munitions Response Plan (RVO 2012a)

Note: Violation of a land use control that requires notification also requires a consultative process to determine the appropriate remedy for the condition.

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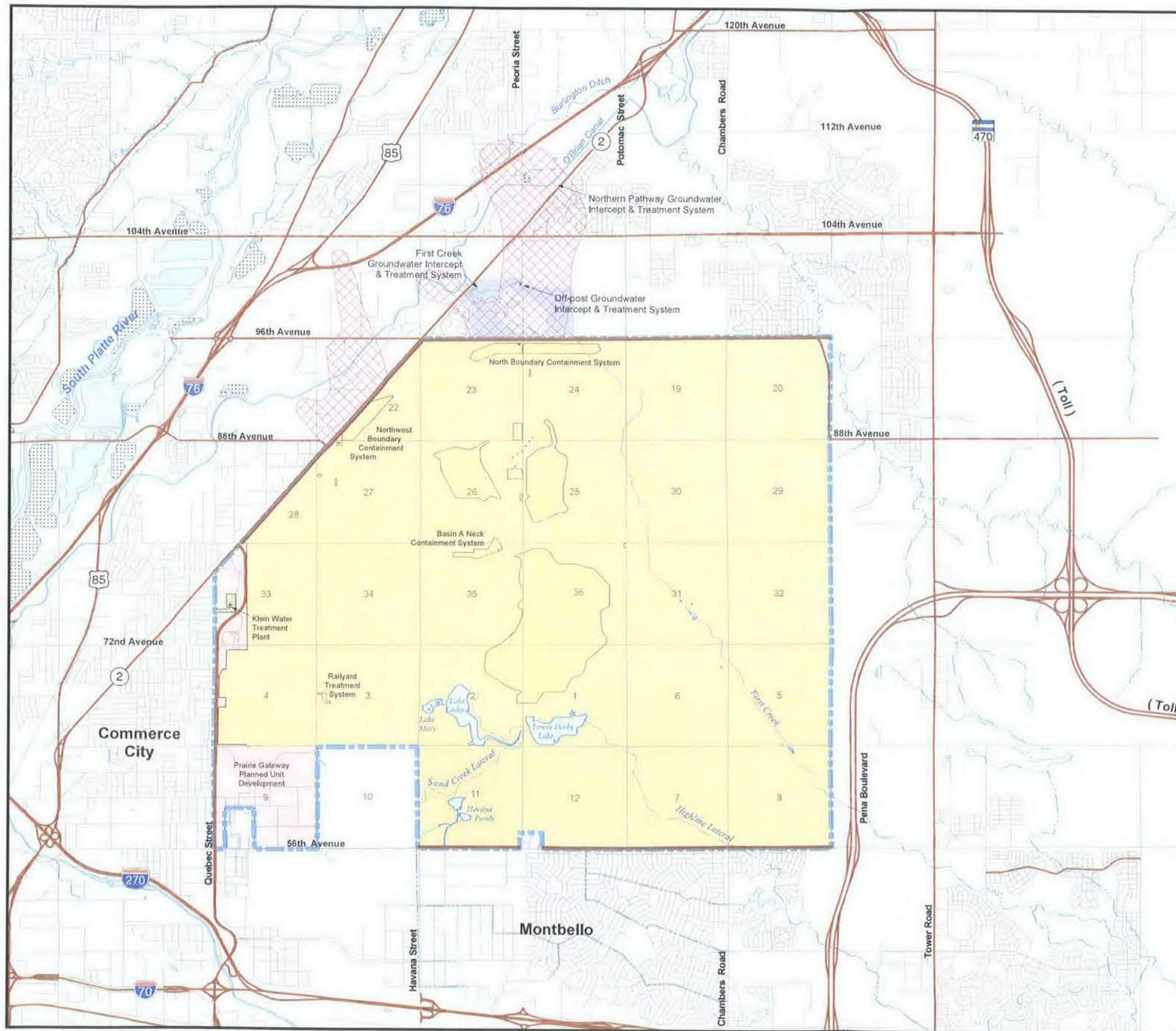
Table 7.0-1 Land Use Control Annual Monitoring Requirements

Land Use Control	Applicable Property	Monitoring Requirement
Prohibit residential development	RMA	Inquiry of Army and USFWS
	Klein Property, Section 20 NE Parcel	Deed restrictions are in place, no additional monitoring required
Prohibit use of property for residential purposes	Prairie Gateway	Inquiry of Commerce City Planning Division; review of Prairie Gateway Planned Unit Development documentation
	100-Foot Highway Setbacks	Deed restrictions are in place, no additional monitoring required
Prohibit use of groundwater or surface water as a potable source	RMA	Inquiry of Army and USFWS
	Prairie Gateway, Klein Property, 100-Foot Highway Setbacks	Deed restrictions are in place, no additional monitoring required
Prohibit consumption of fish and game taken on RMA	RMA	Inquiry of USFWS
	Klein Property, Section 20 NE Parcel	Deed restrictions are in place, no additional monitoring required
Prohibit hunting and fishing	Prairie Gateway, 100-Foot Highway Setbacks	Deed restrictions are in place, no additional monitoring required
Prohibit agricultural activities	RMA	Inquiry of Army and USFWS
	Prairie Gateway	Inquiry of Commerce City Planning Division; review of Prairie Gateway Planned Unit Development documentation
	Klein Property, 100-Foot Highway Setbacks, Section 20 NE Parcel	Deed restrictions are in place, no additional monitoring required
Preserve and manage wildlife habitats	RMA	Inquiry of USFWS
Prohibit major non-remedy alterations of RMA hydrogeologic characteristics	RMA	Inquiry of Army and USFWS regarding floodplain management, recharge of groundwater, operation of Response Action Structures, and protection of wildlife habitat
Perform risk evaluation prior to new nonpotable use of groundwater	RMA	Inquiry of Army and USFWS; Review documentation of risk evaluation if performed
Prohibition on use of basements on RMA	RMA	Inquiry of Army and USFWS
Overnight occupational use	RMA	Inquiry of USFWS; Review of Committee documentation
Prevent excavation of SSA-3b; maintain signs at site	SSA-3b	Inquiry of Army and USFWS; site inspection

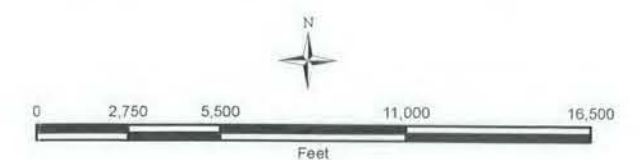
Table 7.0-1 Land Use Control Annual Monitoring Requirements (continued)

Land Use Control	Applicable Property	Monitoring Requirement
Access restrictions to ensure integrity of caps/covers; prohibit activities that might damage or impair the proper function of the covers	HWL, ELF, Basin F, Integrated Cover System (Basin A, Complex Army Trenches, South Plants, Lime Basins), Shell Disposal Trenches	Monitoring conducted pursuant to the HWL Post-Closure Plan (TtEC2011c), ELF Post-Closure Plan (TtEC 2010a), Basin F Post-Closure Plan (TtEC 2011a) and Long-Term Care Plan (TtEC 2011b)
Sanitary sewer markers	RMA	Site inspection (this inspection is required once every five years to coincide with the Five-Year Reviews)
Perform utility locate prior to intrusive activities to avoid abandoned sanitary sewers	RMA	Inquiry of Army and USFWS
Protection of groundwater remedial action structures	RMA, OGITS	Inquiry of Army and USFWS; Inspect monitoring wells in Refuge public use areas; Additional monitoring performed in accordance with the LTMP
Access controls preventing exposure and maintaining remedy integrity	RMA	Inquiry of Army and USFWS
Access controls restricting entry into areas with potential MPPEH	RMA	Inquiry of USFWS to identify new areas open for public access
Prohibit drilling new alluvial wells and use of deeper groundwater	Shell Property (Off-Post OU)	Deed restrictions are in place, no additional monitoring required
State Engineer's Office well notification	Off-Post OU Well Notification Areas	Review well permits issued and change of ownership forms filed for wells within the well notification areas
Provide alternate water supply for domestic wells that contain groundwater contaminants derived from RMA at concentrations that exceed the CBSGs	Off-Post OU	Review groundwater data from the private well sampling program

RMA Regional Reference Figure 2.1-1



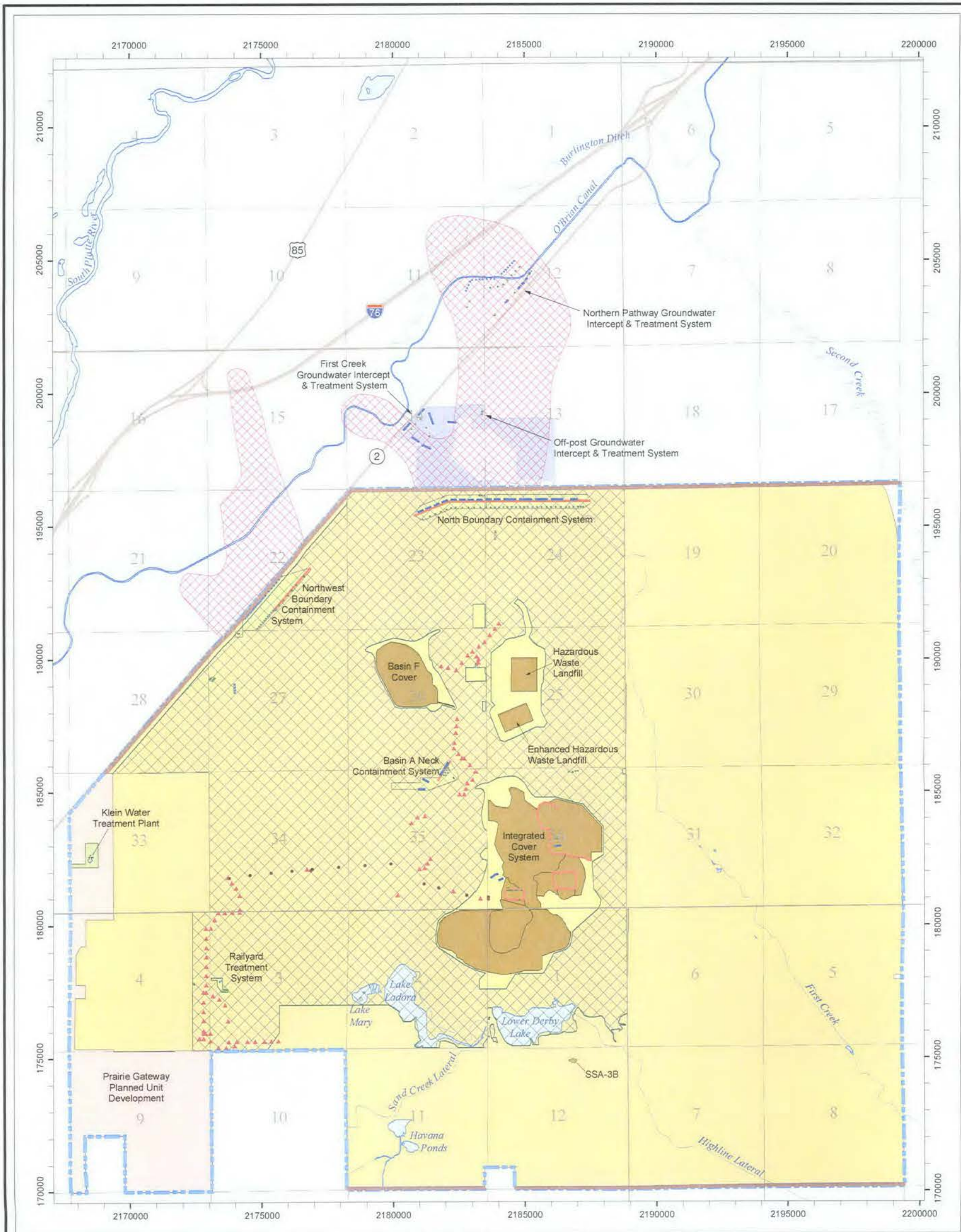
- Off-Post Operable Unit
- RMA On-Post Operable Unit
- U.S. Army Jurisdiction
- RMA National Wildlife Refuge
- South Adams County
- Prairie Gateway Planned Unit Development
- Shell Property
- Section Lines
- 100-Ft Highway Setbacks
- Lakes & Ponds
- Buildings
- Intermittent Streams
- Ditches, Canals



NAD27-NGVD29 Datum, US Survey Feet,
Colorado North Zone

Sources: U.S. Army, RMA GIS, PMC/OMC, Shell/URS Corp.

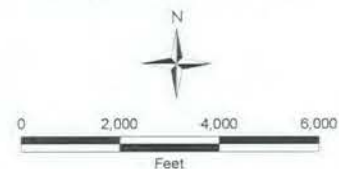
Rocky Mountain Arsenal GIS



RMA Operable Units

Figure 2.1-2

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|--|-------------------------|-----------------------------------|
| Off-Post Operable Unit | 100-Ft Highway Setbacks | Intermittent Streams |
| RMA On-Post Operable Unit | Shell Property | Ditches, Canals |
| U.S. Army Jurisdiction | SSA-3B Sediments | Township & Range Lines |
| RMA National Wildlife Refuge | Caps and Covers | Section Lines |
| Transferred RMA Property with Groundwater Remaining on NPL | Lakes and Ponds | Sanitary Sewer Location Markers |
| Prairie Gateway Planned Unit Development | Slurry Walls | Sanitary Sewer Manholes (Plugged) |
| | Recharge Trenches | Dewatering Wells |
| | | Recharge Wells |



NAD27-NGVD29 Datum, US Survey Feet, Colorado North Zone
Sources: U.S. Army, RMA GIS, PMC/OMC, Shell/URS Corp.

Rocky Mountain Arsenal GIS

Note: Monitoring wells not shown for clarity. Location of monitoring wells is provided in the Long-Term Monitoring Plan for Groundwater and Surface Water (RVO 2010a)

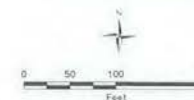
10/11/2013

P:\projects\long_term_landuse\mxds\rma_ous_fig2-1-2.mxd

Rocky Mountain Arsenal SSA-3b Excavation Restriction Area

Legend


- Site SSA-3b Boundary
- Remedy Excavation Area
- Culverts, Siphons, Sluices, and Weirs
- Ditches and Spillways
- Paved Roads
- Samples Exceeding Acute HHE Criteria
- Area Closed Signs



NAD27-NGVD29 Datum, US Survey Feet.
Colorado North Zone

Sources: U.S. Army, RMA GIS, PMCOMC, SheB/URS Corp.

Rocky Mountain Arsenal GIS

Figure 3.2,1-1	
GIS Analyst J. Thompson	
Date 10/2/2013	
Scale	
Prepared For S. Ashe	
Approved 	
File Location P:\projects\rad\remediation\mxd\coc_ssa_3b_arsenal_11x8.mxd	

2186000 2186500 2187000

64th Avenue

Sign Locations

Sign_id	STP_X	STP_Y
S-1	2186457.3	175224.5
S-2	2186707.2	175244.5
S-3	2186907.5	175266.3
S-4	2186964.8	175120.5
S-5	2186975.6	174972.9
S-6	2186975.4	174854.4
S-7	2186946.3	174794.1
S-8	2186890.4	174745.2
S-9	2186716.9	174807.7
S-10	2186620.2	174855.2
S-11	2186469.3	174906.3
S-12	2186409.3	175042.3

Acute Human Health Exceedance Samples Remaining at Site SSA-3b

Site_id	Depth (ft)	Acute HI
1212010004	4.5	4.0
1212010008	4.5	8.1
2012010013	9.5	1.1
2012010018	4.5	4.4
2012010020	4.5	1.3
BR120007	6.0	11.9
SSA-3B-01	2.6	5.4
SSA-3B-02	3.5	10.0
SSA-3B-03	2.8	5.9
SSA-3B-05	10.7	21.0
SSA-3B-06	8.5	10.0
SSA-3B-11	5.4	10.4
SSA-3B-12	6.0	1.1
SSA-3B-13	2.1	7.8
SSA-3B-14	1.5	2.6
SSA-3B-16	3.0	1.1
SSA-3B-17	7.0	3.6
SSA-3B-18	3.2	4.8
SSA-3B-19	7.7	5.8

2186000 2186500 2187000

175000

174500

175000

174500

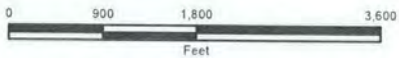
Abandoned Sanitary Sewer and Manhole Locations

Legend

- RMA (U.S. Army Retained Area)
- USFWS National Wildlife Refuge
- Section Lines
- Abandoned Sewer Pipe
- Sanitary Sewer Manholes (Plugged)
- Sanitary Sewer Location Markers



RMA Locator Map



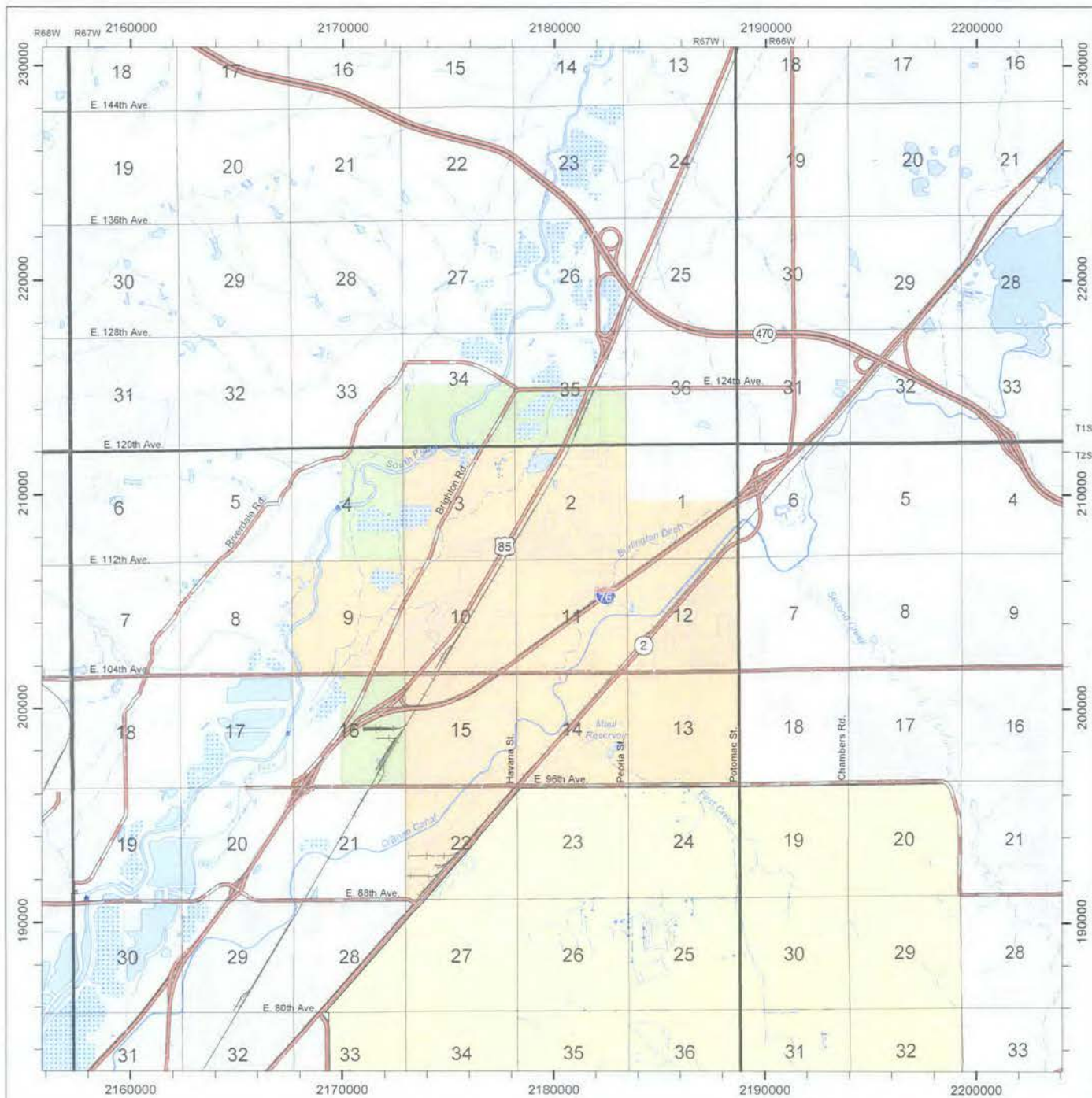
NAD27-NGVD29 Datum, US Survey Feet,
Colorado North Zone

Sources: U.S. Army, RVO GIS, PMC/OMC, Shell/URS Corp.

Rocky Mountain Arsenal GIS

GIS Analyst: J. Thompson	Figure 3.2.3-1
Date: 10/10/2013	
Scale:	
Prepared For: S. Ache	
Approved:	
File Location:	
P:\projects\long_term_landuse\mxds\sewer_mh_marker_fig3-2-3-1.mxd	

MANHOLE_ID	NORTHING	EASTING	MANHOLE_ID	NORTHING	EASTING	MANHOLE_ID	NORTHING	EASTING
1	181785.43	2173737.27	27 (Sec. 3)	175944.37	2173066.96	67C	182302.73	2181315.83
2	181579.29	2173889.00	27A	175944.82	2172896.66	67D	182473.36	2181421.31
2A	182097.35	2176734.86	28 (Sec. 26)	189718.86	2181838.75	73	181114.71	2180180.42
3	181388.26	2174044.07	28 (Sec. 3)	175644.37	2173067.04	CERCLA-1	180975.90	2183318.80
4	181115.59	2174171.91	30	175393.97	2173365.99	CERCLA-2	181249.40	2182294.00
5A	180591.98	2174174.97	31	175393.95	2173661.60	SQI18	191307.80	2184033.60
6	180486.53	2174175.53	32	175618.43	2173762.48	SQI19	191116.20	2183881.20
7	180484.81	2173899.56	32A	176412.86	2173737.52	SQI20	190877.30	2183691.70
8	180483.02	2173599.85	33	175621.86	2174070.38	SQI21	190620.70	2183489.00
9	180481.58	2173356.31	33A	175457.52	2173984.98	SQI22	190455.30	2183272.10
10	180204.70	2173224.65	34	175624.80	2174468.81	SQI23	190273.50	2183033.40
11	179887.31	2173074.99	35	175626.89	2174763.74	SQI23A	190083.10	2183182.90
12	179886.81	2172900.09	36 (Sec. 26)	187745.20	2182445.00	SQI23B	189994.10	2183258.50
13	179513.78	2172901.20	36 (Sec. 3)	175629.55	2175119.39	SQI23C	189849.40	2183259.50
14	179163.90	2172901.73	37 (Sec. 26)	187468.84	2182414.50	SQI23D	189850.10	2183219.90
15	178814.29	2172902.54	37 (Sec. 3)	175631.65	2175370.21			
16	178464.49	2172903.47	38 (Sec. 26)	187219.97	2182387.25			
17	178114.50	2172904.39	38 (Sec. 3)	175632.60	2175639.00	MARKER_ID	NORTHING	EASTING
18	177763.55	2172905.48	39	186849.83	2182346.00	318A	181038.70	2183631.30
19	177495.37	2172905.48	40	186635.16	2182322.25	318B	180962.50	2183631.30
19A	177360.22	2173159.28	41	186432.84	2182486.00	318C	181112.70	2182806.40
19B	177223.24	2173413.19	42	186258.81	2182627.50	318D	181397.10	2181745.70
19C	177001.45	2173632.22	43	186261.81	2182709.25	318E	181544.80	2181197.30
20	177494.48	2172806.13	44	185998.03	2182933.25	392-1	182053.20	2176888.00
21	177115.17	2172806.27	45	185755.19	2183140.50	392-2	182109.73	2176944.21
22	176764.42	2172806.38	46	185444.31	2183028.00	392-3	182171.73	2177942.29
23	176413.82	2172806.36	47	185306.33	2182833.75	392-4	182233.73	2178940.37
24 (Sec. 26)	190125.31	2182838.75	48	185102.44	2182773.25	392-5	182295.74	2179938.44
24 (Sec. 4)	176034.28	2172806.92	49	184886.82	2182709.27	393-1	181771.70	2173792.00
24A	175945.95	2172806.93	50	184894.67	2182537.25	393-2	181883.51	2174580.73
25 (Sec. 26)	189844.41	2182621.75	58	184081.14	2181221.00	393-3	181966.03	2175376.46
25 (Sec. 4)	175752.39	2172806.89	59	184053.23	2180941.25	393-4	182048.56	2176172.20
26 (Sec. 26)	189578.61	2182416.75	60	183827.22	2180707.25			
26 (Sec. 4)	175753.57	2172651.84	67A	182096.49	2181015.01			
27 (Sec. 26)	189652.75	2182110.50	67B	182131.95	2181211.09			



Well Permit Notification Areas

Figure 4.1-1

- | | | |
|---|------------------------|---------------------------------------|
| Rocky Mountain Arsenal | Lakes, Ponds, Rivers | Intermittent Streams |
| Potential CSRG Exceedance Notification Area | Wetlands | Ditches, Canals |
| Historical Contamination Notification Area | Dry Lakes | Culverts, Sluices, Siphons, and Weirs |
| Section Lines | Township & Range Lines | Primary Roads |
| Gravel Pits | Railroads | Secondary Roads |
| | | Paved Roads |



Rocky Mountain Arsenal GIS

Attachment 1

**Rocky Mountain Arsenal
Land Use Control Annual Inspection Checklist**

Evaluation Period:
Name of Inspector:

Land Use Control Requirement	Assessment	Corrective Action
Primary Land Use Controls		
Has there been any residential development on RMA?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Were there any overnight occupational uses on site? If so, were the required notifications provided to the RAs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
Is there any evidence of residential use on the Prairie Gateway?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Have there been any changes to the Prairie Gateway Planned Unit Development? If so, are the required land use restrictions still in place?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
Has there been any potable use of groundwater or surface water on RMA?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Is there any evidence of consumption of fish or wildlife taken on RMA?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Is there any evidence of hunting or fishing on the land transferred in accordance with the Refuge Act?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Have there been any agricultural activities on RMA?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Have there been any agricultural activities on the land transferred in accordance with the Refuge Act?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Has USFWS identified any issues preventing wildlife habitats from being maintained on RMA?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Have there been any major non-remedy alterations of RMA hydrogeologic characteristics?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Other Land Use Controls		
Has there been any new nonpotable use of groundwater on RMA? If so, was a risk assessment completed for such use?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
Have any basements been constructed? If so, was a risk assessment completed for such use?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	

Land Use Control Requirement	Assessment	Corrective Action
Has there been any excavation at site SSA-3b? If so, was the appropriate notification made to the RAs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
Are the signs at site SSA-3b present and readable?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Have there been any activities on the caps/covers that impact the integrity of the containment?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are abandoned sanitary sewer markers present and readable?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Was there any excavation of sanitary sewers? If so, was the appropriate notification made to the RAs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
Has there been any damage to groundwater remedy structures?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are groundwater monitoring wells in the Refuge Public Use Area locked?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Has there been any breach of access controls that resulted in exposure to hazardous materials or damage to remedy structures?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Have there been any changes to the Refuge Public Use Area that result in open access to areas with MPPEH potential?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Were there any requests for access to mineral rights on RMA? If so, was the appropriate notification made to the RAs?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
Were there any violations of land use controls resulting in release of hazardous materials, exposure to hazardous materials, or damage to remedy structures?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Are the water levels in Lower Derby Lake, Lake Ladora and Lake Mary maintained to support an aquatic ecosystem?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Has there been any dredging performed in Lower Derby Lake?	<input type="checkbox"/> Yes <input type="checkbox"/> No	
Off-Post Operable Unit		
Have any groundwater well permits been issued in the off-post notification areas? If so, do the permits include the required notifications?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	
Were any domestic wells within the Off-Post OU identified as containing groundwater contaminants derived from RMA at concentrations that exceed the limits specified in the ROD? If so, was an alternate water supply provided?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Yes <input type="checkbox"/> No	