

## ATTACHMENT 5 SWMU AND AOC DESCRIPTIONS

*SWMU 9. 1000 Area.* The 1000 Area is located in the northwestern portion of the D&Z facility south of Area 900. It was originally used as a load and pack (LAP) facility for the 105 mm shell. In 1952, three facilities (Buildings 1064, 165, and 1066) were added and the line was converted to a facility for loading the 105 millimeter (mm) artillery round with Composition B. Building 1008 was being used to treat wastewater from another area prior to discharge. The line was then used in the production of 60 mm mortar and M795 projectiles (TechLaw 2006). Prior to construction of the industrial wastewater treatment system in the 1000 Area, wastewater was discharged into the unlined ditches and oxidation ponds.

An RFA was completed in 1989. The Phase I RCRA Facility Investigation (RFI) was completed in August 1994 and the Phase II RFI was completed in June 1998. Metals and explosives were detected in the soil in the 1000 Area during these investigations. Groundwater investigations completed in the 1000 Area include the Phase I RFI in 1992, the Phase II RFI in 1996, the 2011 Data Gap Study and a 2004 Data Gap Study. Analytical data indicated that groundwater in the 1000 Area had not been impacted by explosives.

In 1991-1992 petroleum underground storage tanks (UST's) #16 and #17, both with 17,111 gallon capacity were removed under the direction of the Kansas Department of Health and Environment's Bureau of Environment (Facility ID #24006). They were replaced by Aboveground Storage Tanks (AST's) #32 (5,000 gallon Diesel Fuel), #33 (15,000 gallon No. 5 Fuel Oil) and #47 (2,000 gallon No. 2 Fuel Oil)

Contaminated soil was removed from the 1000 Area in the spring of 2003. During that removal, trinitrotoluene (TNT) and cyclotrimethylenetrinitramine (RDX) contaminated soils were removed to industrial clean-up standards of 21 milligrams per kilogram (mg/kg) and 6 mg/kg, respectively. The closure report for this removal shows unrestricted use levels were attained in all excavated areas. There are four locations outside the limits of excavation where arsenic remains above unrestricted use levels; however these concentrations are below the site-specific background levels (5-year report).

In the Corrective Measures Decision (CMD) prepared by the EPA in April 2006 the corrective measures selected from the 1000 Area included contaminated soil removal, long-term monitoring (LTM), and land use controls (LUC) of industrial land use and a restriction against the use of groundwater.

There are currently nine monitoring wells that are used to assess the groundwater at this site - MW 2-3, MW 3-3, MW 4-3, MW 16-5, MW 17-5, MW 18-5, MW 47S, MW 5-7D, and MW 1-14. The general direction of groundwater flow was south across the central part of the 1000 Area, southeast in the southeastern portion of the area, and southwest in the southwest portion of the 1000 Area during the spring 2012 and fall 2012 sampling events. The 1000 Area monitoring wells are located on the south slope of a low, broad topographic rise. The hydraulic gradient was approximately 0.007 ft/ft (37 ft/mi) in spring 2012 and approximately

0.011 ft/ft (58 ft/mi) in fall 2012. (USACE 2013) The groundwater in the 1000 Area has been impacted with several explosives; however, the contaminate levels in the groundwater have decreased between 1992 and 2012. The fall 2012 sampling event showed only two analytes at concentrations exceeding their respective cleanup goals. The detections from Monitoring Well MW 18-5, 2012 spring and fall events - 3.1 µg/L and 2.7 µg/L, respectively, exceeded the RDX CMD Cleanup Goal of 0.61 µg/L. Cadmium was the only metal detected above the CMD action level (5 µg/L) in the fall 2012 event, at a concentration of 19 µg/L in MW 2-3. No VOCs were detected in any of the wells during the 2012 sampling events. Land Use Controls (LUCs) for groundwater are required. A minimum of five more years of LTM is expected for the 1000 Area. Once LTM is completed, the wells will be abandoned.

LUCs for the 1000 Area include the following: industrial use of the land only, no use of the groundwater, enrollment in the “Kansas Environmental Use Control Program,” and deed restrictions and access provisions.

*SWMU 10. 1100 Area* The 1100 Area is located in the south central portion of the D&Z facility, north of Road 4. This area occupies approximately 124 acres of land and is currently used for the production of Sensor Fuzed Weapons (SFW). The 1100 Area was originally used as a bomb line. In 1968, it was converted to a LAP facility for loading the cluster bomb unit with Composition B. In 1984, the line underwent conversion to produce combined effects munition (CEM) for the United States Air Force and several buildings were demolished (TechLaw 2006).

An RFA was completed in 1989. The Phase I RFI was completed in August 1994 and the Phase II RFI was completed in June 1998. Metals and explosives were detected in the soil in the 1100 Area during these investigations. Groundwater investigations completed in the 1100 Area include the Phase I RFI in 1992, the Phase II RFI in 1996, the 2011 Data Gap Study and a 2003 Supplemental Groundwater Investigation. Analytical data indicated that groundwater in the 1100 Area had been impacted by explosives, including RDX and related volatile organic compounds (VOC) in excess of the action levels for groundwater.

In 1991-1992 petroleum underground storage tanks (UST's) #18 and #19, both with 17,111 gallon capacity were removed under the direction of the Kansas Department of Health and Environment's Bureau of Environment (Facility ID #24006). They were replaced by Aboveground Storage Tanks (AST's) #34 (15,000 gallon No. 5 Fuel Oil), #35 (15,000 gallon No. 5 Fuel Oil), #36 (5,000 gallon Diesel Fuel) and #46 (1,000 gallon No. 2 Fuel Oil).

Contaminated soil was removed from the 1100 Area in May of 2003. At that time approximately 1,200 cubic yards (cy) of metals-contaminated soil and 1,000 cy of explosive contaminated soil was removed. During that removal, arsenic, TNT and RDX contaminated soils were removed to industrial clean-up standards of 23 mg/kg, 21 mg/kg, and 6 mg/kg, respectively. The closure report for this removal shows unrestricted use levels were attained in all excavated areas. There are six locations outside the limits of excavation where arsenic (two sites) or RDX (four sites) remain above unrestricted use levels.

In the CMD prepared by the EPA in April 2006 the corrective measures selected from the 1100 Area included contaminated soil removal, LTM for explosives-contaminated groundwater, and LUCs of industrial land use and a restriction against the use of groundwater.

There are currently 23 monitoring wells that are used to assess the groundwater at this area - MW 7-3, MW 9-3, MW 10-3, MW 19-5, MW 20-5, MW 215, MW 6-7, MW 7-7, MW 1-9, MW 2-9, MW 4-9, MW 5-9, MW 7-12, MW 8-12, MW 9-12, MW 10-12, MW 11-12, MW 12-12, MW 1-13, MW 4-13, MW 5-13, MW 8-13, and MW 12-13. The general direction of groundwater flow was to the south- southwest during the spring 2012 and fall 2012 sampling events. The 1100 Area is located on the south flank of a low topographic rise that trends from southwest to northeast. The ground surface over most of the 1100 Area slopes to the south, and this topography influences groundwater flow at the site (USACE 2013). A PCE plume was discovered during the installation of additional monitoring wells delineating the explosive plume during 2009. Additional investigations have not identified a specific source for this plume. The most current monitoring results detected 1, 1-Dichloroethene in Monitoring Well MW 12-12 at 10 µg/L (Spring 2012) and 29 µg/L (Fall 2012) above the CMD Cleanup Goal of 7.0 µg/L. Tetrachloroethylene was detected in Monitoring Well MW 12-12 at 420 µg/L (Spring) and 630 µg/L (Fall) above the CMD Cleanup Goal of 5.0 µg/L. The RDX detections in all 1100 Area monitoring wells except for MW 12-12 (spring and fall) exceeded the CMD Cleanup Goal of 0.61 µg/L. No other constituents were identified in the groundwater water above either background or the CMD Cleanup goal (USACE 2013).

LTM and LUCs for no groundwater use and industrial land use are required for this SWMU group. LTM is currently planned for an additional 25 years unless concentrations attenuate to levels below groundwater remediation goals (prior to that time. Once LTM is completed, the wells will be abandoned.

LUCs for the 1100 Area include the following: industrial use of the land only, no use of the groundwater, enrollment in the “Kansas Environmental Use Control Program,” and deed restrictions and access provisions.

*SWMU 17. Open Detonation Field* is approximately 20 acres in size and is located in the central part of the D&Z facility in the 2700 Area. The Demolition grounds have been used since 1942 and are currently being operated under interim status. An RFA was completed in 1989. An RFI Phase I was completed in August 1994, and the RFI Phase II was completed in June 1998. Groundwater Monitoring began in March 1999.

In August of 2009, approximately 160 soil samples were collected from 60 borings locations within the OD Grounds. The soil samples were analyzed for explosives, total metals, and perchlorates. According to the analytical results, levels of 2,4,6-Trinitrotoluene (TNT) and RDX were found in seven samples at concentrations exceeding the CMD Cleanup Goals. The concentrations of TNT above the CMD cleanup goal of 16 milligrams per kilogram (mg/kg) ranged from 19 mg/kg to 300 mg/kg. The concentrations of RDX above the CMD cleanup goal of 4.4 mg/kg ranged from 5 mg/kg to 260 mg/kg. Cadmium was detected in two of the

soil samples at concentrations exceeding the CMD cleanup goal of 37 mg/kg. The cadmium concentrations above the cleanup goal were reported at 38.8 mg/kg and 78.9 mg/kg. Perchlorate was not detected above the EPA regional screening level (RSL) for industrial soil (Open Detonation Grounds Baseline Survey Report, ARA for USACE, January 2010). Currently seven monitoring wells are used to assess the groundwater at this site - MW 10-1, MW 17-3, MW 18-3, MW 19-3, MW 20-3, MW 15-7, and MW 16-7. The most recent groundwater monitoring results from the OD Grounds reported the general direction of groundwater flow was from the northwest to the southeast across the site during the spring 2012 and fall 2012 sampling events. The hydraulic gradient was approximately 0.02 ft/ft (105 ft/mi) in spring 2012 and approximately 0.019 ft/ft (101 ft/mi) in fall 2012. No VOCs or explosives were detected at SWMU 17 during the spring or fall 2012 sampling events. Although several metals were detected in the groundwater samples, none of the metals detections were above their respective CMD Cleanup Goals for metals (USACE).

In a separate investigation, perchlorate was detected in groundwater but at levels well below the Kansas Department of Health and Environment (KDHE) Risk-Based Standard for Kansas (RSK) value of 11 parts per billion (ppb).

In the fall sampling event of 2013, RDX was detected in MW 20-3 at 0.639 ug/L which was exceeded the CMD Cleanup Goal of 0.61ug/L.

*SWMU 21. Container Storage Area's 2707, 2708 and 2709:* Container Storage Areas 2707, 2708, and 2709 store hazardous wastes that are to be thermally treated at the OD grounds. All three igloos are of identical construction. These storage igloos are constructed of poured reinforced concrete. The reinforced concrete slab walls are six-inches thick and rest on an eight-inch reinforced concrete slab floor poured on fill on grade. The floor dimensions of each igloo are 6-foot by 6-foot, for a total floor space of 36 square feet. Ceiling height within the igloos is seven feet. Each igloo is earth-covered to a minimum depth of two feet with 1:1 grass-covered side slopes. The igloos are used to store containers with no free liquids; although, each igloo has a secondary containment consisting of a 2.5-inch concrete sill at the entrance. These igloos are small in size and provide only limited storage space. Due to the limited space in each igloo, a 2-foot wide aisle is maintained for inspection purposes and to allow for moving containers in and out of the igloos. These igloos were permitted in 1989 and will continue to be permitted under this new permit.

*SWMU 21. Container Storage Area 1813:* Magazine 1813 was permitted in 1989 for the storage of hazardous wastes. The unit is currently undergoing closure. The magazine is constructed of wood columns and pilasters with 8-inch thick tiled walls on a 6-inch reinforced concrete floor slab poured over fill on grade. The roof is a pitched roof, laid over a wood truss system spanning the width of the building (i.e., there are no interior columns). Roofing materials are asbestos shingles over 2-inch tongue and groove sheathing, laid on 2-foot by 8-foot joists and stringers. Twelve metal ventilators are installed along the peak of the roof. The dimensions of the magazine are 216-foot by 50-foot and 1-inch, for an approximate floor area of 10,800 square feet. The closure report for this unit was approved on July 10, 2015 and no further action will be necessary unless the property use changes from industrial to residential.

*SWMU 21. Container Storage Area 1816:* Magazine 1816 will be permitted for the storage of hazardous wastes upon issuance of this permit.

*SWMU 21. Container Storage Area Igloos 1914, 1915, 1916, 1917, 1958, 1961, 1974, and 1976:* Igloos 1914, 1915, 1916, 1917, 1958, 1961, 1974, and 1976 were permitted for the storage of hazardous wastes in 1989. Each of these igloos is constructed of poured concrete with arched ceilings. Each igloo's concrete walls vary in thickness from eight to 16 inches, and rest on a concrete foundation. Each six-inch thick floor slab is 60-feet and 8-inches long by 25-foot and 6-inches wide, for an approximate floor area of 1,547 square feet. Each igloo is earth-covered to a minimum depth of two feet with 2:1 side slopes. The concrete floors in the igloos are pitched one-half inch from the center line to the troughs on the side of the igloos for drainage. The drainage troughs are four-inches wide by two-inches deep and run the length of each igloo. Igloos 1914, 1915, 1916, 1917, 1958, and 1976 were utilized for storing containers with free liquids, and thus were constructed with a secondary spill containment system. Igloos 1961 and 1974 were utilized for storing containers with solids. The closure report for these units was approved on July 10, 2015 and no further action will be necessary unless the property use changes from industrial to residential.

*SWMU 21. Container Storage Area Igloos 1934, 1935, 1936, 1942, 1967, 1969 1970, and 1979:* Igloos 1934, 1935, 1936, 1942, 1967, 1969, 1970, and 1979 will be permitted for the storage of hazardous wastes upon issuance of this permit.

*SWMU 24. Burn Pad 6:* Burn Pad 6 is located in the north east edge of the D&Z facility adjacent to the permitted OD 2700 Area. It is located within a fenced perimeter that also contains Burn Pad 5 which is not part of the D&Z facility. Burn Pad 6 measured approximately 350 feet long by 200 feet wide. It was surrounded on the east, north, and west sides by earthen berms approximately 5 feet high and approximately 30 feet wide. It is underlain by native soil and limestone bedrock at an average depth of approximately 48 inches on the eastern edge of burn pad to a depth of approximately 12 feet on the western edge of burn pad.

Burn Pad 6 was used for remote burning of explosive hazardous wastes within metal burn pans. The burn pad was put into service in 1967, and was used to burn explosive contaminated materials and waste that was too large for the Contaminated Waste Processor. In 2006, the installation cleared the vegetation from the berms of Burn Pads 5 and 6 through a controlled burn. With the vegetation removed, they discovered a significant amount of waste debris from the burn pad operations. The explosives safety officer indicated the debris could consist of materials potentially presenting an explosive hazard (MPPEH); including but not limited to, ICM or sub-munitions, fuses, detonators, boosters, propellant, blasting caps, and grenade bodies. Personnel walked the berms and picked up the debris from the surface of the berms. The burn pad was deactivated in 2007.

It is believed that in the early days of facility operation these areas were used to open

burn the “*off-spec*” munitions, but were not surrounded by earthen berms. At some point it was decided that these areas should be surrounded by berms (it is assumed for safety reasons). It is thought that soil was dozed from either side of the burn pad(s) to form the existing berms. Based on finding the munitions debris (MD) on the berms in 2006, it is thought that previously burned munitions were not properly disposed of prior to constructing the berms. This may have resulted in the previously burned munitions debris to become incorporated throughout the berm soils (USACE, 2010).

The entire D&Z facility’s December 1989 RCRA permit issued to the Department of the Army after the Solid Waste Amendments (HWSA) of 1984 were enacted contained provisions for addressing releases of hazardous waste or hazardous constituents from Solid Waste Management Units (SWMUs). EPA completed a Resource Conservation and Recovery Act (RCRA) Facility Assessment in March 1989 that identified Burn Pad 6 as a SWMU requiring further investigation to determine the nature and extent of releases of hazardous waste or hazardous constituents. The Department of the Army completed all Phase I and Phase II RCRA Facility Investigations including Burn Pad 6 in May 1998.

In 2008 the Department of the Army ceased its operations at the D&Z facility as part the Base Realignment and Closure (BRAC) Committee recommendations. A large portion of the property determined by KDHE and EPA not to be impacted by hazardous waste operations or SWMUs was transferred to the Kansas Department of Wildlife and Parks in Parsons. The remaining land where permitted hazardous waste operations occurred began either clean closure activities for transfer to the GDPA or transferring the existing hazardous waste management permit will be to a private entity for these operations to continue. The US Army Corps of Engineers submitted a closure plan for Burn Pad 6 in April 2009.

The US Army Corps of Engineers submitted a final closure plan for Burn Pad 6 in April 2010 Which was approved on May 24, 2010 which included adjacent areas identified using digital geophysical mapping (DGM) during a survey conducted in 2010. Twelve various sized trenches were excavated to remove the same materials removed from Burn Pad 6. Trench numbers 2, 3, 4, and 5 were located to the east of Burn Pad 6; trench numbers 6, 7, 8, 9, and 10 were located to the south of Burn Pad 6; and trench numbers 11, 12, and 13 were located to the west of the burn pad.

Currently, the U.S. Army Corps of Engineers is responsible for collecting and analyzing samples from the groundwater monitoring wells associated with Burn Pad 6 quarterly for one year. After that time, the data will be reviewed and the U.S Army will make a recommendation on whether these wells should be included in the LTO/LTM for Burn Pad 6.

*AOC Water Tower. Water Tower #4.* : Water Tower #4 is one of four Water Towers that was built in 1941 and currently still used for water storage. The tower is enclosed within a secured fence. The ground surface at the base is covered with a 1- to 2-inch layer of gravel which was placed beneath the tower at the time of construction. As part of routine maintenance, the tower was periodically sandblasted and repainted. The tower reportedly was sandblasted in 1968 and 1982, with each sandblasting episode lasting approximately four weeks. As a result of the sandblasting operations, lead-based paint residue may have accumulated at the base of the towers.

Lead investigations and removal actions have been conducted at each of the water towers. The investigation of lead for the water towers is described in *Phase II, RFI Investigation Report* (LAW Engineering and Environmental Services, Inc. [LAW], 1998) and the interim removal action in the *Final Closure Report, Interim Soils Removal* (Environmental Chemical Corporation [ECC], 2004).

In January 2012 a *Corrective Measures Implementation (CMI) Report* was submitted by Cape Environmental Management Inc. (CAPE) on behalf of the U.S. Army Corps of Engineers and approved by BER, Surface soils were removed if the composite grid sampling results exceeded the Industrial use standard of 1000 mg/kg for lead until a 400 mg/kg level off contamination was obtained. , Surface soils were not removed if the composite grid sampling results did not exceed the Industrial use standard of 1000 mg/kg for lead.

*AOC Mercury Fulminate Disposal Site. Mercury Fulminate Disposal Site.*: The Mercury Fulminate Disposal Site is a reported disposal area from interviews of former employees thought to be located just northwest of the OD range, between the OD 2700 Area and an old landfill adjacent to approximately the center of the north property boundary (between SWMUs 17 & 16). No evidence has been found to support the employee claims.

*AOC Old Ammunition Storage Area. Old Ammunition Storage Area.*: As described in the 2006 Historical Records Review (HRR), the Old Ammunition Storage Area [identified as parcel 48(7)X on the ECP map] was identified in the range inventory as comprising 3.02 acres of land located in the central portion of KSAAP; however, based on an Oct. 19, 2005 HRR site visit and review of aerial photography, the location and acreage of the Old Ammunition Storage Area appears to have been misrepresented during the range inventory. Although a road/track appears to lead into the location of the phase 3 identified site, storage activity does not appear to have occurred in that location due to the vegetation and the lack of visible access to the area. The actual location of the area appears to extend further to the west, is closer to the fence of the igloo area, and comprises approximately 26.76 acres.

This site was used as a storage area for munitions returned after World War II (WWII). According to the range inventory, this site was used as a storage area for munitions returned to the United States following WWII. Containers of munitions were placed in

open storage at the site. KSAAP began using the area in 1945, but how long the containers of munitions were stored there is not known. An installation assessment of KSAAP, dated August 1978, mentioned an area east of the 1900 Area as being used for open storage. The area was known as the ARO (ammunition returned from overseas). Based on the 1978 installation assessment, the area was used as a storage area for high explosive (HE) munitions returned after WWII. The munitions were reportedly stored on gravel pads. According to the 1978 installation assessment, the area was considered contaminated due to deterioration of the shipping containers and spreading of the munitions around the area, and soil cultivation was restricted due to suspected UXO.

The 1978 installation assessment referred to a photograph and a figure depicting the location of the storage area; however, these were not located during the research for the 2006 HRR. An aerial photograph, dated June 8, 1956, shows the area that was used as the Old Ammunition Storage Area. The area is crossed by what appear to be several dirt tracks that lead into three distinct areas. There appears to be U-shaped features within each of the three areas; however, there does not appear to be any items stored at the site by 1956.

Munitions were reportedly stored at the site long enough for the shipping and storage containers to decompose. The range inventory report stated that munitions were scattered throughout the site due to the decomposition of the containers; however, the types of munitions stored at the Old Ammunition Storage Area could not be identified by KSAAP personnel at the time of the range inventory.

The Old Ammunition Storage Area is still used for cattle grazing, but the area has been fenced. During the HRR site visit conducted in October 2005, the site appeared as undeveloped and access to the area was limited by a closed gate and fence. According to interviews conducted at KSAAP for the HRR, interviewees stated that they had driven through the site, but discarded military munitions (DMM) or scrap was not observed. In addition, personnel stated that no work had been conducted to address munitions issues at the site.

Based on the HRR findings, further SI activities, including geophysical surveys and soil sampling, were conducted in Y07. Results of the SI field effort confirmed buried metal anomalies, but soil sampling did not reveal the presence of explosives. In Y09 tests trenches were advanced in the area of the geophysical anomalies. These test trenches uncovered only cultural debris such as nails and high iron containing soils. No MEC was unearthed during this investigation. A no further action (NFA) report has been approved by EPA and BER.

*AOC Quarry Operation, Quarry Operation.:* This historical quarry operation will require further actions in accordance with Section VIE. of this Permit.