SECTION 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

5.1.1 The purpose of this RI was to characterize the presence/absence of contamination, or additionally, to characterize the nature and extent of contamination at the AOCs which have been identified at the former SADVA in the Town of Guilderland, New York.

5.1.2 USACE, NYSDEC, NYSDOH, ACHD and the public will continue working together to identify the primary human health and environmental concerns using the characterization data from this RI. Where appropriate, USACE has, and will continue, conducting FSs for various AOCs as necessary to evaluate various site clean-up options. USACE will consult with the NYSDEC, NYSDOH, ACHD and the public in deciding appropriate site clean up remedies. Once the clean-up remedy is established for a particular AOC, a decision document will be issued that describes the remedy. The USACE then prepares a remedial design for the clean-up action, if necessary, and completes the clean-up. This is the process that has been followed at AOCs 2 and 3, and will be followed at other AOCs, where warranted by the human health risks present. A RAB has been active in the RI and will continue to participate in this process through to the final decision for each AOC.

5.1.3 The following subsections present conclusions and recommendations based on key results as they relate to the objectives for each AOC RI.

5.2 AOC 1 – U.S. ARMY SOUTHERN LANDFILL

5.2.1 Summary and Conclusions

5.2.1.1 AOC 1 is the former U.S. Army Southern Landfill. Surface water and sediment characterization data were considered data gaps in previous investigations. The objective of characterizing the surface water and sediment in the pond and wetlands adjacent to the U.S. Army Southern Landfill was met during the RI. Surface water and sediment samples were collected from a pond and seasonally-wet areas. Aquatic life in the pond and surrounding area were also assessed. BEHP was detected above NYSDEC criteria and upstream ranges in pond water. PAHs, pesticides, PCBs, and up to ten metals were present above NYSDEC criteria and background in sediments from the pond. An assessment of the diversity and aquatic life in the pond found the macroinvertebrate community was slightly impaired. The finding is related to the fact that the water body is man-made with a monotonous structure, and an aquatic plant community that is dominated by a single species - bladderwort. A visual survey of potential drainage structures along the railroad tracks was conducted on June 29, 2000 and did not identify any drainage structures that would be offsite migration pathways to the east.

5.2.1.2 The abandonment of well AMW-11 and its replacement with well GW-11R was completed as planned. However, a bedrock aquifer capable of producing suitable quantities of

water for sampling and hydraulic testing was not encountered. The hydraulic communication between the shallow water bearing zone and bedrock was not evaluated by the planned pump test because insufficient water was encountered. Three shallow wells were installed along the eastern property boundary at AOC 1. Results for those wells indicated the VOC contaminants detected elsewhere in the landfill are not migrating offsite to the east. The groundwater plume containing VOCs remains in the landfill area, but concentrations have decreased over the past 10 years.

5.2.1.3 A quantitative HHRA for AOCs 1/7 combined was completed and found that an unacceptable human health cancer risk is posed by groundwater and surface water in the pond at AOC 1, if they are to be used as a drinking water source. The soils and sediment at AOCs 1/7 do not pose an unacceptable human health risk.

5.2.2 Recommendations

A feasibility study is recommended to be completed at AOC 1 to provide information about mitigating the risks posed by the site, and to assess whether remedial actions at AOC 1 are necessary.

5.3 AOC 2 – FORMER BIVOUAC AREA/BASE COMMANDER'S LANDFILL

5.3.1 Summary and Conclusions

5.3.1.1 AOC 2 is the former Bivouac Area/Post Commander's Landfill located west of County Route 201. This 40.6-acre parcel was part of the SADVA from its inception until its sale to a private owner who has lived at the property since 1963. The RI objective was to assess the presence, nature, and extent of contamination at AOC 2. Specific objectives included locating and characterizing the extent of fill, and sampling the fill, soil, groundwater, surface water, and sediment to assess potential exposure pathways to humans and fauna. The scope of work also included sampling former domestic wells at the site and abandoning a former groundwater monitoring well. The objectives were met through the sampling of the various media as planned.

5.3.1.2 The extent of fill was determined using soil borings and test pits. In two large areas, the fill consisted primarily of small glass pill bottles containing salt tablets and iodine tablets. In several other areas, fill consisting of pint-sized solvent-filled bottles, 55-gallon drums of solvent, 5-gallon pails of a tar-like material, and paint residue were identified and delineated. The fill materials contained hazardous substances and were classified as flammable and toxic, and were considered hazardous waste. Pesticides were detected above NYSDEC surface water and sediment quality criteria. SVOCs were detected above surface water criteria in two samples. Metals were detected above the NYSDEC soil quality criteria in all of the media sampled. Benzene, BEHP and phenol were detected above the Class GA groundwater standards. Up to six metals were also above the Class GA groundwater standards and upgradient concentrations. No VOCs, SVOC, pesticides, or PCBs were detected above Class GA groundwater standards in either of the former domestic wells. No metals were detected above Class GA criteria in the domestic well located at the site. Three metals were detected above Class GA criteria in the former domestic supply well at the neighboring property.

5.3.1.3 On the basis of the contamination found during the RI, USACE requested that a quantitative HHRA be completed for AOC 2. The HHRA found that unacceptable human health risks were present for soil and groundwater at AOC 2. USACE requested that an EECA be completed, and based on the HHRA and EECA findings, a non-time critical removal action was recommended and completed. All wastes and impacted soils were removed from the site and properly disposed offsite. A post-remediation soil HHRA was subsequently performed, using the confirmatory soil sample data that were collected as part of the remedial action. The HHRA found that the remedial action at AOC 2 was effective in mitigating the unacceptable human health risks. Surface water, sediment and soil at AOC 2 no longer pose an unacceptable risk to human health.

5.3.2 Recommendations

A post-remediation HHRA for the groundwater pathway will be completed and issued as a supplement to this RI Report during 2008. No other actions are recommended.

5.4 AOC 3 – FORMER BURN PIT AREA

5.4.1 Summary and Conclusions

5.4.1.1 AOC 3 is the former Burn Pit Area located at the north end of the SADVA. This area is less than 10 acres in size. Historical aerial photographs suggest this area has been the site of dump areas, pits, or scarred areas. The RI objectives were to assess the nature and extent of contamination at AOC 3, including defining the presence and extent of surface and subsurface soil contamination in geophysical anomalies, and the characterization of shallow groundwater quality. The soil characterization objectives were met through the drilling and sampling of 10 soil borings and 22 supplemental soil borings. The groundwater characterization objectives were met through the installation and sampling of eight groundwater monitoring wells and five temporary wells. The new monitoring wells and the one existing well were sampled several times to further characterize groundwater quality at AOC 3.

5.4.1.2 Surface soils containing CPAHs, pesticides, and PCBs were identified; however, all but one of those areas are under the footprint of the new warehouse or paved parking and roadway areas, so the exposure risk is mitigated. Subsurface soil contamination by VOCs, CPAHs, NPAHs, pesticides, and metals was detected and delineated. The former burn pit area near SB-06 was heavily contaminated. The vertical extent of contamination at SB06 and SB14 was identified by the additional soil boring completed in this area. Results from the SB32 boring indicate the onsite contamination extended eight feet into the water table to a depth of 25 feet bgs.

5.4.1.3 VOC and SVOC concentrations above the groundwater standard were present at the site in SB06R and at the western property line in HP02 and during each sampling of MW-2. Results from wells installed later during the RI at AOC 3 and on the adjacent school property also indicated the presence of VOCs and SVOCs above the groundwater criteria in MW-5, 7, 8, and 9. While the concentrations at the fence line were low, the groundwater plume appeared to extend onto the school grounds for a short distance. The MW-6 well, which is located further west near the running track, did not contain any VOCs or SVOCs above the regulatory criteria in

the groundwater or in the soils. A plume appeared to be moving offsite in a north-northwesterly direction.

5.4.1.4 The RI results at AOC 3 defined the vertical extent of contamination in soils and groundwater. USACE requested that an FS be completed to identify and evaluate remedial action options to mitigate the human health risks posed by contamination at AOC 3. The FS recommended that Remedial Alternative 3 (Containment, Soil Removal, and Offsite Disposal) be implemented to remediate this AOC. An Interim Action Plan incorporating the FS recommendation was subsequently prepared by Parsons (Parsons, 2002). AOC 3 was remediated based on the FS and Interim Action Plan in 2002 and 2003. Post-remediation groundwater sampling has been completed to assess the post-remediation groundwater quality.

5.4.1.5 A post-remediation quantitative HHRA was completed and demonstrated that the remedial action was effective and that no unacceptable carcinogenic risks are present for soil and groundwater at AOC 3. For the non-carcinogenic chemicals detected in mixed soils, there was no unacceptable risk for potential industrial receptors. The calculated risks for groundwater were evaluated for individual wells. No unacceptable carcinogenic risks were calculated for any wells. Unacceptable non-carginogenic hazards were calculated in monitoring well MW-2. The risk was driven almost entirely by the presence of 1,3,5-trimethylbenzene during one sampling event in September 2004, at a concentration far below the NYSDEC Class GA groundwater quality criterion. In addition, a hazard associated with lead exists in wells MW-1, MW-2, MW-4-2, MW-5, and the Supply Well. However, since at least March 2005 the lead concentrations in all of these wells have been below the NYSDEC Class GA criterion for lead.

5.4.1.6 The HHRA included screening criteria to evaluate vapor intrusion of VOCs from shallow groundwater into buildings, based on USEPA (2002) target groundwater concentrations. The target groundwater concentrations are calculated to correspond to target indoor air concentrations that are protective of human health if vapor intrusion occurs. In the vapor intrusion analysis, two VOCs were found to be above the target screening value. These chemicals were hexachlorobutadiene in one sample collected from MW-2 in September 2004, and trichloroethene from two samples collected at the Supply Well in March 2005 and July 2005. It is worth noting that the VOC screening criteria were met in 9 of the 10 sampling events for MW-2, and in 8 of 10 sampling events for the Supply Well. MW-2 is located in an open area between the warehouses at AOC 3 and the Guilderland High School. The Supply Well is an irrigation supply well located in the Guilderland School District maintenance garage. Note that the target screening concentrations are derived to ensure protection of a residential receptor, and thus provide an overly conservative evaluation for the current and/or future worker exposure scenarios expected for the site.

5.4.2 Recommendations

No further investigation or remediation actions are recommended for AOC 3.

5.5 AOC 4 – C&D LANDFILL

5.5.1 AOC 4 is the C&D Landfill located at the southern end of the NEIP, west of AOC 1 (the US Army Southern Landfill) and AOC 7 (the Triangular Disposal Area). Waste disposal

activities were not ongoing at AOC 4 during the period of time the SADVA was operated by the DoD. Therefore, this AOC was not initially included in the RI. To address requests by the RAB to investigate the potential that abandoned Army materials had been moved from the warehouses and disposed at AOC 4, USACE agreed to undertake a limited characterization at AOC 4. Surface and subsurface soil, groundwater, surface water and sediment samples were collected and analyzed. CPAHs were detected above NYSDEC soil criteria in two surface soil samples. One pesticide and zinc exceeded Class C criteria in a surface water sample from the sump. Zinc exceeded the NYSDEC sediment criteria. These results do not indicate the presence of high levels of contamination, or a direct connection to former SADVA activities.

5.5.2 No further action is recommended at AOC 4.

5.6 AOC 5 – VOORHEESVILLE DEPOT

5.6.1 Summary and Conclusions

5.6.1.1 AOC 5, known as the Voorheesville Depot, is currently owned by the GSA and is operated by the DLA/DNSC under the National Stockpile Program. Metallurgical ores and metals necessary for manufacturing defense materials, or materials used in national defense, have been stored at the site since the SADVA was active. The RI objective was to assess whether the stored materials are leaching or have leached metals into the soil, groundwater, and surface water/sediments. ` The soil sample data suggest that most areas of the site have metals concentrations that exceed background and NYSDEC soil quality criteria. The RI data set is adequate to provide a general characterization of the soil quality impacts from DNSC's and its predecessor's operations.

5.6.1.2 Groundwater samples were collected from four temporary well borings and one supply well located at the site. The concentrations of the primary metals stored at the site (aluminum, copper, chromium, lead, and zinc) were below NYSDEC Class GA groundwater criteria. Iron and sodium were detected above groundwater standards in all four groundwater samples, including the most upgradient sample, indicating these metals may have elevated naturally-occurring concentrations in groundwater at the site. The highest concentrations of sodium were detected in the two samples collected near Route 201. The sodium could be attributable to road salting. Four other metals were detected above groundwater standards in at least one sample. There is no consistent pattern to the distribution of these metals, and they are not known to be associated with the metals/ore storage operations at AOC 5.

5.6.1.3 Surface water and sediment samples were collected from the perimeter ditches, site retention ponds, storm sewer infalls, and ditches adjacent to the former open storage area. All metals concentrations in onsite and downstream surface water samples were below the NYSDEC Class C surface water standards and background ranges. The highest concentrations of most metals were detected in the infall samples. There are no site-related impacts to surface water at the site or immediately downstream of AOC 5. These results suggest the detention ponds are effective at improving surface water quality before it leaves the site.

5.6.1.4 Four of the metals stored at the site (copper, chromium, lead, and zinc) were detected above NYSDEC sediment criteria and background ranges in at least one sediment

sample at concentrations above the NYSDEC sediment criteria. These results suggest that soils and sediments with metals concentrations above sediment criteria have accumulated in the onsite ditches, and have migrated into offsite ditches, probably during periods of surface water overflow from the site prior to construction of the retention ponds. The primary transport mechanism is sediment suspended in storm water runoff. The DNSC has completed a reconstruction and expansion of the onsite storm water retention ponds to reduce the potential for offsite migration of contaminated soil, surface water and sediment. Implementation of this expansion is expected to reduce surface water discharges from the Depot to Black Creek.

5.6.2 Recommendations

With the conclusion of its operations at the site, DNSC has decided to return the property to GSA in its current condition. DNSC has concluded that the site is acceptable for continued industrial use. DNSC prepared a separate remedial investigation report for the property, and has submitted that report to NYSDEC, NYSDOH and ACHD for review. No other actions are recommended.

5.7 AOC 6 – FORMER WASTE WATER TREATMENT PLANT AREA

5.7.1 Summary and Conclusions

5.7.1.1 AOC 6 is the area near the former SADVA WWTP. Based upon the Final Archival Search Report and the ACEMC historical aerial photograph review, an area up to two acres in size located in the northeast corner of the WWTP was identified as a possible dumping ground. The objective of the AOC 6 investigation was to investigate the presence or absence of contamination in suspected former fill areas outside the footprint of the current WWTP. The objectives were met through the excavation of six test pits and the collection of six soil samples.

5.7.1.2 Other than a thin, charred soil layer, no visual evidence of a fill/waste source was observed in the test pits. Up to seven metals were detected above the NYSDEC soil criteria and background ranges. These metals concentrations were only slightly above the background ranges. The characterization data for AOC 6, which includes no obvious signs of waste sources, indicate that no further investigation is necessary.

5.7.2 Recommendations

No further action is recommended at AOC 6.

5.8 AOC 7 – TRIANGULAR DISPOSAL AREA

5.8.1 Summary and Conclusions

5.8.1.1 AOC 7 is a triangular-shaped area located near the southeastern end of the former SADVA and west of AOC 1. This area was formerly bounded by railroad tracks on three sides. Aerial photographs from the early 1940s indicate the presence of a possible dump in this triangular area, as do geophysical anomalies from previous investigations. The objective of this RI was to assess the presence or absence of fill materials and to characterize surface soils, subsurface soils, and groundwater. The objectives were met through the sampling of soils in

four test pit excavations, and the sampling of groundwater in three temporary well borings and five permanent monitoring wells.

5.8.1.2 A small amount of fill was encountered in the test pits. The fill consisted of railroad ties, charred wood, angular gravel, and glass bottles. Metals concentrations slightly above background were widespread in surface soil and subsurface soil. BEHP was detected above the NYSDEC Class GA groundwater standard in all five groundwater samples in July/August 2000 and in four of five samples collected in 2004. The source(s) of BEHP detected in AOC 7 and elsewhere at the site are unknown, but the groundwater samples from wells and the groundwater flow pattern suggest the source(s) are upgradient (east-northeast) of AOC 7. BEHP was detected upstream in Black Creek and during a previous RI in AOC 1; both of these areas are upgradient of AOC 7. Metals concentrations in the groundwater samples from temporary wells collected in 2000 may have been affected by high turbidity. Permanent wells were installed in 2004 to improve the integrity of groundwater samples. With the exception of iron in GW02, the 2004 metals concentrations were below the upgradient and Class GA concentrations.

5.8.1.3 A quantitative HHRA for AOCs 1/7 combined was completed and found that unacceptable human health cancer risk is posed by groundwater and surface water in the pond at AOC 1, if used for a drinking water source. The soils and sediment at AOCs 1/7 do not pose an unacceptable human health risk.

5.8.2 Recommendations

An FS is recommended to be completed for AOCs 1 and 7 combined to assess the need for remedial action.

5.9 AOC 8 – BLACK CREEK

5.9.1 Summary and Conclusions

5.9.1.1 Black Creek flows near many of the AOCs and receives surface water runoff from most of the AOCs through the perimeter ditches or by direct inflow. The objectives of the investigation were to determine background levels of surface water and sediment for Black Creek, to assess the nature and extent of contamination in Black Creek within the boundaries of the SADVA, and to assess constituents attributable to the various AOCs. The investigation objectives were met through the collection of background surface water and sediment samples, and the collection of surface water and sediment samples at the site or downstream of the site.

5.9.1.2 In general, the surface water sample results showed that the western ditch has degraded water quality, primarily for metals. However, the samples immediately downstream from the two points where the western ditch discharges to Black Creek (SW17 and SW09) show virtually no degraded water quality. Only SW17 had a concentration (of silver in the 2004 sample) above regulatory criteria and the upstream concentrations. The two samples collected downstream from all the AOCs (SW09 and SW25) had no concentrations above regulatory criteria and upstream concentrations.

5.9.1.3 At the south end of SADVA, near AOCs 4 and 5, shallow sediment concentrations for most metals tended to be higher than deeper concentrations, and were above the NYSDEC

sediment criteria. In the main channel of Black Creek adjacent to the SADVA (at SD17 and SD07) concentrations of most metals were generally below the sediment criteria. Downstream of SADVA, in the vicinity of School Road (at SD31 and SD32), metals concentrations tended to be higher in the deeper samples, and higher than the metals concentrations onsite at SD17 and SD07.

5.9.1.4 A quantitative HHRA was completed for AOC 8. The HHRA concluded that no unacceptable human health risks exist for the surface water and sediment pathways at AOC 8.

5.9.2 Recommendations

A feasibility study is recommended for AOC 8 to assess the risks posed to human health and the environment, to identify the potential remedial action alternatives, and to evaluate the need for remedial action.

5.10 AOC 9 – BUILDING 60 AREA

5.10.1 Summary and Conclusions

5.10.1.1 AOC 9 is located at the northeast corner of the SADVA in the area around Building 60. The potential source area for AOC 9 was an oil/water separator and a storm sewer pipeline leading from the oil/water separator to Black Creek. Both have been removed. The remaining potential source area was presumed to be residual contamination in the soil that may have originated from pipeline leaks. The objective of this RI was to assess the presence or absence of contamination at AOC 9. Soil along the former 12-inch clay sewer route was assessed to determine whether residual contamination exists. Groundwater in the vicinity of AOC 9 was also assessed to determine whether contaminants are present and whether they are migrating toward Black Creek.

5.10.1.2 To meet the objectives, a series of four soil borings were drilled along the former sewer pipe path. Eight soil samples were collected to characterize the soils. Groundwater samples were collected from four existing monitoring wells to characterize groundwater at AOC 9. Metals concentrations slightly above background were widespread in soils. None of the metals detected were anomalously higher than the soil criteria and background ranges. The groundwater results for AOC 9 are not indicative of impacts associated with the former USTs or oil/water separator. Lead, VOCs and SVOCs are the typical indicators associated with petroleum products and these analytes are not present at elevated concentrations in the AOC 9 wells. Surface water results showed no quality impacts. Five metals were present in one sediment sample at concentrations above NYSDEC criteria.

5.10.2 Recommendations

The elevated metals concentrations in MW09 are not known to be associated with the contamination problem that occurred in this area in 1998. Soil, surface water and sediment quality impacts are not severe in this area. The AOC 9 area has been adequately characterized. No further characterization is necessary. This area does not warrant a removal action, FS or other action for the soil, groundwater or surface water pathways. The sediment issues are considered to be addressed in concert with AOC 8.