

5. CONCLUSIONS AND RECOMMENDATIONS

Site investigation (SI) activities have been conducted at 17 sites on the Fort McClellan Army Installation. The identified sites for investigation include 12 former chemical agent training areas located on the Main Post and Pelham Range, 2 former munitions disposal areas, and 3 former sanitary landfills. This section summarizes Science Applications International Corporation's (SAIC's) conclusions and recommendations based on the findings of the SI activities conducted by SAIC and the U.S. Army Technical Escort Unit (USATEU) at the Post.

5.1 SITE CONDITIONS

Existing conditions and supplemental investigation activities that may be necessary to further characterize unknown conditions at the investigated sites are summarized below. Existing conditions include geologic and hydrogeologic conditions, surficial site conditions, and environmental conditions.

5.1.1 *Geologic and Hydrogeologic Conditions*

Complete geologic and hydrogeologic characterization of the sites considered under the SI was not a primary goal of the field program. Information was obtained regarding the site soils at the agent training areas to describe the samples; however, characterization of available transport pathways was not a focus of the sampling at these sites. Similarly, investigations at the former munitions disposal areas (Range L and Old Water Hole) and Former Landfill #1 consisted solely of reconnaissance geophysical activities with no intrusive sampling. The most detailed geologic characterizations were completed at Former Landfills #2 and #3 and consisted of drilling and lithologic logging of 8 boreholes and geotechnical analysis of 13 soil samples. Hydrogeologic characterization at Former Landfills #1 and #2 consisted of measuring groundwater elevations in the site wells, and determining hydraulic gradients and groundwater flow directions. Hydrologic characterization has not been conducted at the remaining SI sites. Contamination resulting from former usage of chemical warfare agents or the degradation products of previously used agents at the training sites was not detected during the SI program. Therefore, detailed geologic or hydrogeologic characterization of these sites is not warranted at this time. Additional geologic and hydrogeologic characterization is warranted at Former

Landfills #1, #2, and #3, Range L, and the Old Water Hole, since these areas indicate a potential for release of contaminants to the environment or represent an environmental hazard. Additional characterization at these sites should include combinations of quantitative geophysics, drilling and monitoring well installations, soil sampling and analysis, water level measurements, and slug testing.

5.1.2 Site Boundaries

The locations of areas used as disposal or burn pits on several of the training sites and the locations of existing survey monuments with respect to the pit boundaries are unknown. Investigated sites that warrant additional quantitative geophysical surveys to delineate pit or site boundaries, landfilled areas, or buried munitions or drums include Sites T-24A and T-38, Range L, the Old Water Hole, and Former Landfill #1. Geophysical surveys consisting of combinations of electromagnetics, magnetics, and ground penetrating radar (GPR) should be obtained on grid patterns that extend beyond the expected targets of the surveys.

Identification of overall site boundaries is of concern at Range L, the Old Water Hole, and Landfill #1. Some of these areas were heavily overgrown during the site visits and field work, and other areas were not well-defined by previous investigators at the sites. Resolution of site boundaries at Former Landfill #3 can be effected through analysis of aerial photographs, field reconnaissance, and global positioning surveying (GPS) to provide quantitative location information. Determination of site boundaries at the Old Water Hole is recommended using electromagnetic terrain conductivity and magnetometer surveying. Additional GPR surveys should be obtained at the Old Water Hole to attempt to image the disposition of waste materials buried at the site. Geophysical surveys at Range L are recommended to quantitatively locate concentrations of buried munitions and attempt to determine the depth of the burial pit. Coordinated surveys, including EM, magnetometer, and GPR, are recommended for further investigations within the burial pit. Intrusive sampling within the pit area is not recommended for safety reasons.

Delineation of burial pit boundaries is recommended at sites T-24A and T-38. Quantitative magnetometer and EM surveying should be conducted on grid patterns to attempt

to accurately locate the former burial pits for comparison to recently sampled locations and for permanent location of the areas in the event future remediation is required. Additional geophysical surveys also are warranted at Landfill #1 to further investigate the geophysical anomalies identified during the SI study.

5.1.3 Environmental Conditions

Known environmental conditions at the SI sites are based on environmental sampling at locations determined to have a high probability for containing the materials known to have been used or disposed of at each site. Sampling at the 12 former chemical agent training areas did not indicate the presence of chemical agent or chemical agent breakdown products in the shallow soils, surface water, or sediments at these sites. The disposition of the remaining sites would be determined based on the other supplemental activities recommended at each site. Recommended geophysical surveys at these sites are discussed in Section 3. Monitoring well installations are recommended at the Old Water Hole and Range L.

Former training sites that are recommended for minimal or no additional investigative activities include Areas T-5, T-6, T-31, Old Toxic Training Area, Decontamination and Identification Area, Range I, Range J, and the HD Spill/Burial Sites. Area T-5 and Range J should be assessed for the presence of ordnance, and once cleared, should be removed from consideration under the SI program. Additional investigative activities to locate Area T-4 and to investigate CWA ordnance at Range K are recommended.

Environmental contamination has not been assessed at Former Landfill #1. The results of reconnaissance geophysical surveying indicate a potential for subsurface disturbance in the southern portion of the inferred former landfill area. Additional geophysical surveying (EM and magnetometer) is recommended at Former Landfill #1 with the installation of groundwater monitoring wells in the event that the surveys delineate anomalous areas of concern. Soil sampling and analysis is warranted during well installation. A second round of groundwater sampling is recommended at Former Landfills #2 and #3 to confirm the results of the initial sampling rounds. Soil sampling and analysis is recommended at each of these sites. Additional well or piezometer placements are warranted at Former Landfill #3 to investigate groundwater

quality around the landfill and to provide additional data locations to further delineate groundwater flow directions.

Extensive additional investigation activities are recommended for Range L and the Old Water Hole sites to determine the extent of munitions burial and the potential environmental impacts of disposal at these locations. Integrated, multi-component geophysical surveys and monitoring well drilling, installation, and sampling is recommended for these sites. Additional investigations also are recommended for Areas T-24A and T-38 to delineate pit boundaries and to complete additional soil sampling and analysis. The conclusions determined from the SI study and recommendations for additional investigations at the SI sites are provided in Table 5-1.

**Table 5-1. Summary of Site Investigation Findings and Recommendations
Fort McClellan, Alabama**

Site No.	Site Name	Field and Laboratory Results	Recommended Activities
1	Area T-4	<ul style="list-style-type: none"> Unable to locate site 	Research site location and perform additional field reconnaissance of site. Collect soil samples for analysis.
2	Area T-5	<ul style="list-style-type: none"> HD, GB, VX chemical agent, agent breakdown products not detected at 5 locations 	Assess site for ordnance. If negative, no further investigation is warranted for present land use
3	Area T-6	<ul style="list-style-type: none"> HD chemical agent, agent breakdown products not detected at 3 locations 	No further investigation is warranted for present land use
4	Area T-24A	<ul style="list-style-type: none"> HD, GB chemical agent, agent breakdown products not detected at 3 locations 	Delineate pit boundaries and possible ordnance geophysically; possible additional soil sampling
5	Area T-31	<ul style="list-style-type: none"> HD, GB chemical agent, agent breakdown products not detected at 5 locations 	No further investigation is warranted for present land use
6	Area T-38	<ul style="list-style-type: none"> HD, GB VX chemical agent, agent breakdown products not detected at 4 locations 	Delineate pit boundaries and locate possible buried drums; assess site area for possible chemical agent using MINICAMS field screening; drill soil boring in pit area.
7	Old Toxic Training Area	<ul style="list-style-type: none"> HD chemical agent, agent breakdown products not detected at 2 locations 	No further investigation is warranted for present land use.
8	Range K	<ul style="list-style-type: none"> HD, GB, VX chemical agent, agent breakdown products not detected at 1 location 	Additional site reconnaissance reported CWA ordnance at site; additional soil sampling; if CWA is not detected, then no further investigation is warranted for present land use.
9	Range I	<ul style="list-style-type: none"> HD, GB chemical agent, agent breakdown products not detected at 2 locations 	Remove site from SI
10	Range J	<ul style="list-style-type: none"> HD chemical agent, agent breakdown products not detected at 4 locations 	Assess site geophysically for possible burials, potentially remove from SI.

**Table 5-1. Summary of Site Investigation Findings and Recommendations
Fort McClellan, Alabama (continued)**

Site No.	Site Name	Field and Laboratory Results	Recommended Activities
11	Range L	<ul style="list-style-type: none"> • Samples not collected; metal detection indicates possible munitions burials at site 	Install 6 monitoring wells; investigate pond area geophysically
12	Detection and Identification Area	<ul style="list-style-type: none"> • HD, GB chemical agent, agent breakdown products not detected at 2 locations 	No further investigation is warranted for present land use
13	Former Landfill 1	<ul style="list-style-type: none"> • Magnetometer survey indicates potential ground disturbance 	Additional geophysical surveying in southern portion of site; possible monitoring well installations
14	Former Landfill 2 (LF2)	<ul style="list-style-type: none"> • Organics, inorganics, agent breakdown products not detected in groundwater 	Confirmatory groundwater and surface water/sediment sampling
15	Former Landfill 3 (OLF)	<ul style="list-style-type: none"> • Organic and inorganic contamination detected in groundwater at site; explosive compounds detected in groundwater 	Delineate extent of groundwater contamination; hydrogeology; confirmatory groundwater and surface water/sediment sampling.
16	HD Spill/Burial Sites	<ul style="list-style-type: none"> • No sampling activities 	In absence of verifiable information, the sites should be removed from the SI
17	Old Water Hole	<ul style="list-style-type: none"> • Magnetometer survey indicates substantial quantities of buried material 	Investigate site using quantitative geophysics; install three perimeter groundwater monitoring wells; assess soil contamination

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SITE INVESTIGATION REPORT

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APPENDICES

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Installation Restoration Division
Aberdeen Proving Ground,
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**SITE INVESTIGATION REPORT
FOR
FORT McCLELLAN, ALABAMA**

APPENDICES

Submitted to:

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