

7. SCREENING-LEVEL ECOLOGICAL RISK ASSESSMENT

A screening-level ecological risk assessment (SERA) was conducted to determine the potential for adverse effects associated with exposure to chemicals present at the RI sites under investigation at Fort McClellan. The SERA was conducted in accordance with national and regional U.S. Environmental Protection Agency (EPA) guidance for evaluating ecological risks at hazardous waste sites (EPA 1989c,d; 1991e, 1992e,f; 1995c; 1997b; 1998e) and in accordance with relevant Army (Wentsel et al. 1994) and military (Wentsel et al. 1996) guidance. These documents do not provide a detailed step-by-step approach to ecological risk assessments (ERAs). Instead, they discuss an overall approach to considering ecological effects and identifying sources of information necessary to perform ERAs. Thus, professional knowledge and experience are important in ERAs to compensate for this lack of specific guidance and established methods.

SERAs are simplified risk assessments that can be conducted with limited data by assuming values for parameters for which data are lacking. Assumptions for exposure and toxicity values are biased toward overestimating risk in a SERA. The objective of a SERA is to identify on a preliminary basis any chemicals having the potential to cause risks. Conservative assumptions are important to ensure that sites are not dismissed from further evaluation in a baseline or full ERA when an unacceptable risk actually exists at a site. If the results of the SERA indicate that additional evaluation is necessary, the ERA may continue with a baseline ecological risk assessment (BERA). The objective of this SERA is to identify preliminarily any chemicals having the potential to cause risks, and not to identify definitively if adverse effects are occurring. More specifically, the results of this SERA will be used to determine whether a site-specific BERA should be conducted to reduce uncertainty and/or develop site-specific cleanup goals or whether little or no ecological risk exists and further study is not warranted (EPA 1995c).

This SERA is the third iteration of an ERA that has been submitted for the 12 sites under investigation. The two previous versions were submitted in 1995 and 1999. During this timeframe, new ecological risk guidance has been published and a facility-wide work plan has been developed for Fort McClellan (IT 1998). In addition, the Army and EPA Region IV agreed to a revised SERA outline at a meeting in October 1999 that differs from the proposed approach in the facility-wide work plan (IT 1998). Although the SERA incorporates aspects of the previous ERA iterations and selected aspects of the installation-wide work plan, as well as addresses some of the regulatory comments on the most recent version, the SERA primarily follows the outline agreed to at the October 1999 meeting. The outline agreed to by the Army and regulators includes the following five sections:

- Environmental Setting
- Abiotic Toxicity Screen
- Background Screen
- Lines of Evidence
- Summary and Conclusions.

7.1 ENVIRONMENTAL SETTING

Section 7.1 presents the environmental setting for the 12 sites under investigation in the SERA by providing a historical site description and discussing potential constituents associated with the sites, ecotoxicity of those constituents, potential exposure pathways, and site habitats.

7.1.1 Historical Site Description

Fort McClellan is located in northeastern Calhoun County, Alabama, approximately 60 miles northeast of Birmingham; approximately 75 miles northwest of Auburn; and approximately 90 miles west of Atlanta, Georgia. The city of Anniston adjoins the main installation on the south and west. The city of Weaver is located approximately 1 mile northwest of the Main Post and the city of Oxford is approximately 5 miles south of Anniston. Fort McClellan consists of 45,679 acres of government-owned and leased land situated in the foothills of the Appalachian mountains of northwest Alabama. The Morrisville Maneuver Area, or Pelham Range (22,245 acres), is located approximately 5 miles due west of the Main Post (18,946 acres) and adjoins the Anniston Army Depot along its northern boundary.

The objectives of the Remedial Investigation (RI) were to investigate the presence, nature, and extent of mission-related constituents resulting from previous controlled Army chemical warfare agent (CWM) training activities and uncontrolled munitions and municipal waste disposal. The RI sites include seven former CWM training areas (T-4, T-5, T-24A, T-38, Range J, Range K, and Detection and Identification [D&I] Area), two reported munitions disposal sites (Old Water Hole and Range L [Lima Pond]), and three former municipal or demolition debris landfills (Landfills #1, #2, and #3). Site-specific maps and photographs also are presented in Section 1.

7.1.2 Constituents Associated with the Site

The chemical and biological agent training sites under investigation during the RI were used for controlled training of military personnel in various facets of chemical and biological warfare agent decontamination, detection, and munitions/agent disposal. Outdoor training at these sites occurred between the early 1950's and 1973, with activities involving various dilute chemical agents, including HD (mustard), sarin (GB), and O-ethyl-S-(diisopropylaminoethyl)methylphosphonothiolate (VX). Limited, controlled application or sampling of fixed quantities of dilute CWM was typical during the training exercises. Evidence of widespread dispersal or usage of CWM or biological materials at the sites of concern has not been identified based on a review of records at the U.S. Army Chemical Museum at Fort McClellan, installation literature, and discussions with site personnel who were present during training exercises.

Documented evidence of munitions disposal activities at two sites on Pelham Range (Range L and Old Water Hole) is lacking. Unsubstantiated, anecdotal information indicates that Range L was used for the disposal (in drums) of captured World War II munitions, including chemical munitions, and for the detonation of unexploded ordnance (UXO) (ESE 1984). The Old Water Hole site reportedly was used to dispose of a variety of munitions, including chemical munitions (USATHAMA 1977). The disposal of municipal waste and demolition debris on Fort McClellan between 1945 and 1967 was conducted at three primary former landfill sites (Landfills #1, #2, and #3). Constituents associated with uncontrolled burial of chemical or conventional munitions may include the previously detailed chemical agents and decontaminants, in addition to explosive compounds and their breakdown products and leachable metals. The widest possible spectrum of potential constituents may result from uncontrolled landfill areas where a variety of municipal wastes, construction/demolition debris, possible training materials and byproducts, and uncontrolled mission-related wastes may have been buried. The RI samples and analytical suites are summarized in Table 7-1. Section 1.5 of the RI report provides details for site-specific waste related activities that were used to select the analytical suites at each site.

7.1.3 Ecotoxicity of Constituents Associated with the Site

Chronic (long-term) toxicity resulting from chemical exposures is the primary concern at Fort McClellan. Toxic effects on individual organisms can adversely affect receptor populations by decreasing reproduction rates, reducing the viability of offspring, causing alterations in behavior patterns, or increasing susceptibility to disease. Constituents also may decrease the ability of a population to persist without individual adult organisms suffering any direct lethal effects from exposure to the chemical. These indirect effects are difficult to predict and are not evaluated in the SERA for Fort McClellan.

Based on historical information, a number of different groups of constituents are potentially occurring at the 12 sites. However, based on the selection of ecological constituents of potential concern (ecoCOPCs) in Sections 7.2 and 7.3, the main group of constituents is metals, followed by polycyclic aromatic hydrocarbons (PAHs), pesticides, and volatile organic compounds (VOCs). Thus, ecotoxicological discussion has been limited to these groups of constituents.

Metals produce a diversity of adverse physiological and behavioral effects on receptors exposed under natural conditions. The diverse effects of metals on animals usually result from either impairment of kidney function or poisoning of the nervous system. Most inorganic salts of metals (e.g., mercuric sulfide) are toxic to the kidneys; most organometallic forms (e.g., methyl mercury) are neurotoxic (Cockerham and Shane 1994). Moreover, the dose-response relationship for a given metal often differs among receptors because of the different abilities of organisms to detoxify the metal or eliminate from their bodies, as well as differences in how the receptor interacts with its environment. For example, those organisms with complex mating or foraging behaviors may be affected adversely by a neurotoxic metal at a lower exposure than organisms with less complex behaviors. For example, the egg-laying behavior of mallards is impaired at exposure concentrations of methyl mercury that are lower than those that apparently cause no ecological effect on earthworms (Eisler 1987a).

Plants grown in soil containing metals can accumulate higher-than-background levels of some metals, resulting in chronic toxicity. Bioaccumulation is generally most significant in the roots of plants; however, several metals can be translocated to parts of the plant above the ground. Some metals (e.g., selenium) accumulate in animal tissues and can have subtle deleterious effects on animals over long exposure times.

Many organic compounds are reported to cause a wide variety of adverse biological effects under laboratory conditions, including tumors, disruption of metabolism, and reduction of growth and survival. PAHs have been reported to cause increased liver weights and blood flow to the liver in adults and increased mortality, reduced growth, and increased skeletal and morphological defects in juvenile mallards (Eisler 1987b). PAHs cause genetic, immunopathic, and teratogenic effects in mice. Many organic contaminants (e.g., pesticides) are extremely lipophilic and can biomagnify in organisms.

7.1.4 Site-specific Exposure Pathway Information

Exposure is defined as contact between a receptor species and ecoCOPCs in an environmental medium. For exposure to occur, a chemical release must occur to an environmental medium with which a receptor species must have contact. Potential exposure pathways for ecological receptors were identified based on the consideration of: (1) the source/mechanism of chemical release; (2) the medium (or media) of chemical transport; (3) the point of potential contact by the receptor organism; and (4) the route of exposure at the contact point. An exposure pathway was considered complete if the criteria

mentioned above were met. The SERA evaluates the potential exposures of receptor species to ecoCOPCs in surface soil, surface water, sediment, and plants and animals.

Potentially complete exposure pathways were identified for evaluation in the SERA based on consideration of the available habitat, and the type, extent, magnitude, and location of potential chemical contamination. Only the pathways predicted to result in the highest exposure to ecological receptors at Fort McClellan sites were evaluated in the SERA.

Aquatic life potentially could be exposed to chemicals at Fort McClellan sites by direct contact with contaminated surface water and sediment, respiration of chemicals in surface water and sediment, and ingestion of contaminated sediments and food. Aquatic life also could be exposed to chemicals via the ingestion of chemicals that have accumulated in the food web.

Terrestrial wildlife occurring at Fort McClellan sites may be exposed to ecoCOPCs by several pathways: (1) ingestion of contaminated soil, sediment, surface water, or food while foraging or grooming; (2) dermal absorption of chemicals from soil, sediment, or surface water via direct contact while foraging, resting, grooming, and during other typical daily activities; and (3) inhalation of chemicals that have been wind-eroded and entrained from soil. Among these potential exposure pathways, the greatest potential for exposure to chemicals is likely to result from the ingestion of chemicals that have accumulated in food. This conclusion is based on both the potential for some chemicals to accumulate to higher concentrations in food than abiotic media from which they originate and on the relatively high ingestion rate of food as compared to surface soil/sediment. The incidental ingestion of contaminated soil or sediment (while foraging or burrowing), although an important exposure route, is likely to result in lesser exposure. The quantification of receptor-specific exposures via inhalation or dermal absorption was not selected for evaluation because of a lack of appropriate exposure and toxicity data. The exposure of animals to contaminants in soil by dermal contact is likely to be small due to barriers of fur, feathers, and epidermis. Exposure through inhalation of constituents also is likely to be negligible as VOC contamination in surface soil already would have dissipated. Thus, exposures from dermal absorption and inhalation are expected to be insignificant in comparison to other potential exposure pathways.

Because of the multiple potential exposure routes, all chemicals identified as ecoCOPCs in surface soil, surface water, and sediment were evaluated conservatively for their potential to adversely affect terrestrial wildlife via ingestion. It should be recognized, however, that the relative importance of the route by which a chemical is ingested will depend to a large extent on the chemical being evaluated. For chemicals having the potential to bioaccumulate, such as hydrophobic organic compounds (e.g., DDT), the greatest exposure to wildlife is likely to be from the ingestion of prey. For chemicals having a limited potential to bioaccumulate, the exposure of wildlife to chemicals is likely to be greatest through the direct ingestion of abiotic media, such as soil. This distinction is important when initially identifying pathways and receptors for evaluation in the SERA and when making risk management decisions. The pathways selected for evaluation are presented in the conceptual site model (CSM) (Figure 7-1). The SERA consists of two exposure evaluations. The first evaluation is an abiotic toxicity screen (Section 7.2) that focuses more on direct toxicity. The second evaluation is food chain modeling for those chemicals with the potential to bioaccumulate. Appendix I presents the methodology and results of the food chain modeling. Table 7-2 lists the exposure units and associated exposure evaluations conducted for each unit.

7.1.5 Site Habitats

Four distinct terrestrial habitats occur at Fort McClellan: forest, old field (combination of shrubs, grasses, and small trees), riparian, and grassy areas. Forests and grasslands dominate the vegetative communities. Forests cover approximately 14,000 acres on the Main Post and approximately 17,140 acres on Pelham Range (USATHAMA 1977). Grasslands, both natural and manmade, cover approximately 4,732 acres on the Main Post and 4,864 acres on Pelham Range. The sites also include unpaved roads, which are not treated here as habitats. There are two aquatic habitats among the sites, Lima Pond at Range L, and small streams draining several of the other sites. The facility-wide work plan provides additional details concerning habitat types and wildlife at Fort McClellan (IT 1998). Habitat characteristics of the individual sites are presented below.

7.1.5.1 Site 1 – Area T-4, Biological Stimulant Test Area

Area T-4 is a site of approximately 0.2 ha (0.5 acres) on the Main Post. The site is mostly cleared, with bare ground covered with chert and small cobbles (Science Applications International Corporation [SAIC] site reconnaissance, August 29 through 31, 1994). A few small blackjack oak, southern red oak, smaller pines, and black cherry trees are located in the center of the turnaround of the road. The site is surrounded by small blackjack oak, black oak, and black cherry trees, with a very high stem count per acre. A few trees are up to 8 inches in diameter at breast height (DBH) and most trees are 30 to 40 feet tall. There is some sourwood, as well as Virginia and loblolly pine. This site provides appropriate habitat for terrestrial receptors.

7.1.5.2 Site 2 – Area T-5, Toxic Hazards Detection and Decontamination Training Area

Area T-5 is a site of approximately 4.6 ha (11.4 acres) on the Main Post. The site is wooded with mixed pine and hardwoods, including loblolly pine, yellow poplar, sassafras, dogwood, blackgum, red maple, blackjack oak, chestnut oak, some sweetgum and hickory, and Virginia pine. The stand becomes younger to the south along the road at the western side of the site, where the hardwoods are mostly saplings. The area to the east of the lower road is level, with an older stand of mostly hardwoods with some pines. There are white oaks, pines to 16 inches DBH, sweetgum, some hickory, and black cherry. There is a fairly open understory of dogwood, hardwood seedlings, and saplings. A small wet-weather conveyance runs along the eastern perimeter and off of the area. Flicker, deer, Carolina chickadee, and nuthatch were observed on the site, as well as deer trails, during the SAIC site reconnaissance on August 29 through 31, 1994. This site provides habitat for terrestrial, aquatic, and sediment-exposed receptors.

7.1.5.3 Site 3 – Area T-24A, Chemical Munitions Disposal Training Area

Area T-24A is a site of approximately 0.6 ha (1.5 acres) on the Main Post. The site is enclosed by a 6-foot chain-link fence topped with barbed wire. The site was disturbed during the growing season by drilling and sampling activities.

The site is surrounded by pine stands on the north and east sides, and by mixed pine and hardwoods on the south and west. Nearly 100 percent of the site itself has a ground cover of honeysuckle, lespedeza, small sumacs, and blackberry, with scattered 20- to 25-foot tall pines. Queen Anne's lace and goldenrod cover approximately 50 feet of the west end of the site. To the east, the site grades into a fairly closed-canopy pine stand, perhaps 20 to 25 years old (DBH 3 to 6 inches). Blueberry is found in the understory, in this part of the site, along with grasses in nearly 90 percent ground cover. There is a small spring/seep approximately 110 feet from the east corner of the fence on the north side. Mixed woods along the south side of the site include sweetgum, yellow poplar, sourwood, dogwood, and

persimmon. An approximately 15-foot-wide graded perimeter is located around most of the site. Deer tracks and a squirrel nest were observed during the SAIC site reconnaissance conducted on August 29 through 31, 1994. This site provides habitat for terrestrial, aquatic, and sediment-exposed receptors.

7.1.5.4 Site 4 – Area T-38, Technical Escort Reaction Area

Area T-38 is a site of approximately 2.4 ha (6 acres) on the Main Post. This former training site has several buildings (concrete block, frame), a gravel road network, several open storage sheds, and several small training/work pavilions. Scattered clumps of pine (longleaf, shortleaf, loblolly) from landscaping occur with younger clumps and individuals of pine and hardwoods (sweetgum and oak) that have seeded in. There are also a few specimen hardwoods from earlier landscaping (sweetgums to 12 inches DBH), as well as black cherry and hickories as scattered individuals. Some areas of the site are still grassed, while other areas are in hardwood seedlings and saplings, mostly sweetgum. The site is in the midst of a mixed pine hardwood forest.

The southern third of the site is thickly wooded. The southeast corner of the site is a densely wooded thicket of pines and sweetgum. The southwest corner is more open under scattered larger hardwoods and pines. The middle third of the site around Building 4450 appears to be mowed once or twice a year, keeping it mostly in grass, with some lespedeza, goldenrod, and Queen Anne's lace. The northern sixth of the site is approximately half open and half young woods. Pines and sweetgum are heavy in the northeast sixth (an internally fenced area). Pines and sweetgum are coming in along the roadways in many areas. Honeysuckle, grape, and other vines occur on much of the fencing. Sumac is found in some areas. The site perimeter is bounded by a graded unpaved road. There is evidence of fire on trees in unmowed areas of the site.

The internal fence gates are open, allowing easy movement of wildlife within the site. This site provides habitat for terrestrial receptors. A fawn was flushed from a bed in high grass near Building 4450 when the reconnaissance team arrived at the site. A doe was flushed from the southeast corner of the site.

7.1.5.5 Site 5 – Range K Training Area

Range K is a site of approximately 0.8 ha (2 acres) at Pelham Range. The site contains a pine stand with a fairly well-developed hardwood understory. The site itself has been cleared of much of its understory for RI work, allowing an herbaceous ground cover of approximately 60 percent to develop (lespedeza, ragweed, grasses, forbs) along with a low shrub layer of hardwood seedlings (sweetgum, white oak, water oak). The age of the pine stand is approximately 20 to 30 years; the area was thinned/harvested by approximately 50 percent (stem count) 5 to 10 years ago, as evidenced by stumps. Lush stands of panic grass were observed in some areas. A pine stand in the southeast part of the site is older, with trees up to 20 inches DBH and a well-developed hardwood understory (sweetgum, oaks, and some black cherry). This site provides habitat for terrestrial receptors.

7.1.5.6 Site 6 – Range J Training Area

Range J is a site of approximately 0.04 ha (0.1 acres) at Pelham Range. This site is fenced, and inside the fence there are clumps of young pines, 3 to 8 years old, scattered small wild plums, some small sumacs, and an herbaceous ground cover similar to that of the border. A few small areas of soil have been disturbed by drilling and sampling activities.

The site is bordered on all sides by pine stands that appear to be 20 to 25 years old. An area (approximately 1 to 2 acres) south of the site appears to have been cleared more recently, reverting to pines that are approximately 10 years old. The perimeter of the fenced area has been graded recently, approximately 20 to 30 feet wide. The site has approximately 75 percent ground cover of herbaceous and young woody plants: Johnson grass, lespedeza, sumac, honeysuckle, blackberry, ragweed, Queen Anne's lace, blackgum, and smilax. During the SAIC site reconnaissance (August 29 through 31, 1994), a very small wet area (holding water) was observed at the southwest corner of the site, just outside the fenced area. Pine stands show evidence of fire and have a somewhat clear understory.

This site provides habitat for terrestrial receptors. Deer tracks were observed in the perimeter band, along with two dust bathing areas used by turkey. A deer was observed just beyond the perimeter area; turkeys were heard in the distance. Several towhees, cardinals, and Carolina wrens were seen and heard.

7.1.5.7 Site 7 – Detection and Identification Area

The D&I Area is a site of approximately 0.44 ha (1.1 acres) on the Main Post. The site contains a young stand of mixed pine and hardwoods, (maximum of 6 inch DBH pine) with black cherry. There is an understory with sumac, *Vitis* spp., honeysuckle, and Virginia creeper. A well-developed litter layer of mostly pine needles was observed. The site also includes sweetgum and red cedar. Snow damage to many small pines in the area was evident (i.e., trees were bent, broken, or uprooted) from a snowstorm in the spring of 1993. Herbaceous cover included passionflower and an unidentified tall feathery asparagus-like plant. Some herbaceous cover (approximately 25 percent) in areas of the site was disturbed by sampling and drilling activities. The site is surrounded on three sides by more mature pine stands. The surrounding stand has loblolly pines to about 18 inches DBH, with some dogwood and small privet. This site provides habitat for terrestrial receptors. Carolina chickadees were observed on the site. There was evidence of striped skunks (conical holes). Numerous deer tracks were observed at the site.

7.1.5.8 Site 8 – Range L (Lima Pond) Chemical Munitions Disposal Area

Range L is a site of approximately 0.2 ha (0.5 acres) at Pelham Range. Located just to one side of the crest of a rise, it is a conical depression a maximum of 20 to 25 feet deep on the side of the crest. It is in the midst of a pine stand with well-developed hardwood mid- and understory, with fairly heavy ground cover. At the time of the reconnaissance, a bulldozer had ringed and bermed the site. The site itself is a small pond surrounded by a steep bank of bermed material with shrubby old field cover consisting of scattered pine and hardwood saplings, mostly sweetgum. Woody vegetation includes blackberry, dogwood, sumac, and hardwood seedlings (mostly sweetgum and oaks). Much of the small tree cover has been pushed over in the last year or two for RI work, leaving scattered slash. This site provides habitat for terrestrial, aquatic, and sediment-exposed receptors.

7.1.5.9 Site 9 – Landfill #1

Landfill #1 is a site of approximately 0.8 ha (2 acres) on the Main Post. Part of the area is in residential lawn and has two residential buildings. The other two-thirds of the site are nearly 100 percent pine with an understory of privet and dogwood. There is ground cover of honeysuckle and poison ivy. The understory also includes small blackgums, cedars, sweetgums, and black cherry. Along 16th Avenue, the forest grades to somewhat larger-diameter loblolly pine and more privet. One large black willow (approximately 12 inches DBH) along the edge of the site indicates a possible seep (searched for, but not seen). A 30- to 40-foot powerline right-of-way is located near the eastern end of the site with a mostly herbaceous cover of goldenrod with some privet and hardwood seedlings. A stream borders the

downgradient (southeast) side of the landfill. This site provides habitat for terrestrial, aquatic, and sediment-exposed receptors. Towhees, bluejays, cottontail, Carolina wren, and deer were observed on the residential portion of the site.

7.1.5.10 Site 10 – Landfill #2

Landfill #2 is a site of approximately 1.6 ha (4 acres) on the Main Post. The central area of this site is a very dense old field with sumac, blackberry, scattered pines, some hardwood saplings, and heavy herbaceous cover. Along the edge near the creek are large sycamores and elm, with an understory including river cane, small oaks, black cherry, and redbud. The adjacent area to the north is a young pine stand. The area immediately around Well #2 is a small stand approximately 0.2 acre in size with 12- to 16-inch pines and an open understory. Herbaceous cover included lespedeza, passionflower, mint, pokeweed, white clover, Carex, grasses, and mullein. Hardwood seedlings and saplings (sweetgum, oaks, black cherry, and black willow) also were present. A very thin soil cover had been used for closure. Grading for an access road for the drill rig had exposed refuse near the soil surface.

This site provides habitat for terrestrial receptors. Deer tracks were observed on the site, and deer were seen by the SAIC reconnaissance team on their entry to the site (August 29 through 31, 1994). Contaminants present in Landfill #2 potentially could leach into surface runoff and be transported to nearby Cave Creek. Therefore, it is appropriate to evaluate the potential for risk to aquatic and sediment-exposed biota in Cave Creek to contaminants that might originate at Landfill #2.

7.1.5.11 Site 11 – Landfill #3

Landfill #3 is a site of approximately 8.9 ha (22 acres) on the Main Post. The site is covered by a mixed pine and hardwood stand (loblolly and shortleaf pine, sweetgum) approximately 40 to 50 years old with a well-developed understory (dogwood and black cherry) and ground cover of honeysuckle and blackberry. Though generally level, the surface is a series of shallow trenches and low ridges, northwest-southeast trending, with an average elevation difference of approximately 5 feet, with ridge-to-ridge distances of approximately 20 to 30 feet. On the south side of the road entering the site from the east, privet becomes prevalent in the understory. On this side, the trenches and ridges become less distinguishable, with an elevation difference of 1 to 2 feet, making a softly undulating forest floor with honeysuckle and poison ivy. Approaching the west side, the forest grades into an area with more hardwoods. Nearing the drain along the perimeter, there are more hardwoods in general, including water oak. This site provides habitat for terrestrial receptors. Because chemicals might leach from surface or subsurface soil to nearby Cave Creek, it is appropriate to evaluate exposures to aquatic and sediment-exposed biota in Cave Creek adjacent to Landfill #3.

7.1.5.12 Site 12 – Old Water Hole

The Old Water Hole is a site of approximately 0.03 ha (0.07 acres) on Pelham Range. The site includes a mixed pine and hardwood stand: hickory, Virginia pine, loblolly, sweetgum, white oak, and some blackjack oak. The age of the stand is uneven, approximately 40 to 50 years. There is a fairly open understory, with a well-developed litter layer as well as a low shrub layer of mostly hardwood seedlings and poison oak and poison ivy. The pond area is highly disturbed by clearing and road-building for sampling and drilling activities. This disturbance effectively surrounds the pond, making it more permanent but disconnected from the rest of the wet area that surrounds it. The area around the pond grades into more hardwoods—red maple, elm, blackgum, and water oak—than surrounding woods. A wet area extends well beyond the pond (50 to 100 feet), as evidenced by the condition of the forest floor. The pond supports a high population of frogs and mosquitoes. This site provides habitat for terrestrial receptors.

7.2 ABIOTIC TOXICITY SCREEN

The abiotic toxicity screen is the primary decisionmaking tool used in this SERA to determine if a site is no further action (NFA) or requires additional sampling, in accordance with EPA Region IV guidance. Once the sampling data of the substances detected were grouped and summarized, maximum detected concentrations of a chemical in each medium (surface soil [0 to 1 ft], surface water, and sediment) at each site were compared to the corresponding EPA Region IV screening values (EPA 1999) or other appropriate screening values (Tables 7-3, 7-4, and 7-5). If the maximum concentration was not above the screening value, the chemical passed the abiotic toxicity screen and was not considered further in the SERA. If the maximum concentration was above the screening value, the chemical was screened against background (for inorganics) in Section 7.3. If the maximum concentration was above both the screening value and background, the chemical was identified as an ecoCOPC. In instances where only background concentrations were available, the chemical was selected as an ecoCOPC if the site concentration was determined to be above background. If neither a screening value nor background concentration was available, the chemical was selected as an ecoCOPC.

The ecological screening values (ESVs) are based on contaminant concentrations associated with a low probability of unacceptable risks to ecological receptors that are considered to be protective of the most sensitive species in a medium. These values are based on conservative endpoints and represent a preliminary screening of the contaminant concentrations to determine if further investigation needs to be conducted at the site. Preference was given to the EPA Region IV screening values for surface water, sediment, and surface soil. In the absence of these values, other sources were used according to agreements between the Army and regulators (IT 2000a). The ESVs used are presented in Tables 7-3, 7-4, and 7-5. These are the standard ESVs that will be used at all Fort McClellan sites. In addition, these tables note which ESVs were not recommended by EPA Region IV. For sediment, if the EPA Contract Laboratory Program (CLP) practical quantitation limit (PQL) was above the effect level, the sediment screening value defaulted to the PQL. In addition, the sediment screening values were derived predominantly based on marine data, but should be within a factor of three for freshwater sites based on values currently being developed for freshwater. For further details on the derivation of the Region IV ESVs, see EPA (1999).

The results of the abiotic toxicity screen are presented in conjunction with the results of the background screen (Section 7.3) for each site in Section 7.4. However, the results are discussed separately within each site to distinguish which chemicals passed or failed each screen.

7.3 BACKGROUND SCREEN

Following the abiotic toxicity screen, a background screen was conducted to determine if reported concentrations were site-related or indistinguishable from background. The background comparison was conducted only for inorganic substances. If an inorganic constituent was not detected in background samples or background data were not available, a background comparison was not conducted, and the analyte was considered mission-related. For this SERA, it is assumed that all concentrations of organic compounds are mission-related, so no background screening for organics was conducted at the sites under investigation. However, some organic constituents might not be mission-related, as is often the case with constituents of anthropogenic origin such as PAHs. The Army, IT and the Alabama Department of Environmental Management (ADEM) have agreed that it is appropriate to screen out anthropogenic levels of PAHs for ecoCOPC selection and risk estimation. Considerable resources have been invested to identify a reasonable anthropogenic background data set for PAHs (IT 2000a). However, the regulators are reviewing the data set at this time so no values were available

for comparison. The background samples used in the comparison and their corresponding locations are presented in Section 4.3.

The background comparison used in the selection of ecoCOPCs was conducted for inorganic analytes in accordance with the facility-wide work plan (IT 1998). The background criterion for a given analyte was equal to two times ($2\times$) the mean background concentration of that analyte. If the maximum detected value in an exposure unit exceeded the background criterion, the analyte was designated as mission-related for that exposure unit. Analytes with maximum detected concentrations below the background criterion were screened out.

Data from the Fort McClellan *Background Metals Survey Report* (SAIC 1998) were used to determine the average background concentrations. The *Background Metals Survey Report* objective was to provide statistically robust background concentrations for target analyte list (TAL) metals in surface water, sediment, surface soil, subsurface soil, and groundwater for Base Realignment and Closure (BRAC) activities. The surface water samples ($n=56-67$) were collected from the headwater portions of the mapped streams upgradient from the developed Post areas and from major water bodies on the Post. Sediment samples ($n=55-65$) were collected from areas of deposition within the Post streams. Surface soil ($n=54-70$) samples were collected at 0 to 1 foot below land surface (BLS). These samples were collected from the areas of the Main Post and Pelham Range as well as some off-Post sites.

In addition to the Fort McClellan *Background Metals Survey Report* (SAIC 1998), Section 4.4 provides for further details on the background sampling. The facility-wide work plan (IT 1998) suggests that the $2\times$ background screen may be followed with a nonparametric analysis of variance (ANOVA) using the Wilcoxon Rank Sum test (EPA 1992c). For the SERA, this additional analysis is conducted after calculating risks and presented in Section 7.4.3.

The discussion presented above summarizes the methods used to conduct the background comparison for the selection of ecoCOPCs. A more detailed discussion, including pertinent equations and references, is presented in Appendix H, Section H.1. All chemicals not eliminated by the above screens were identified as ecoCOPCs. The selection of a chemical as an ecoCOPC does not necessarily mean it poses a risk to ecological receptors, rather, the selection of a chemical indicates there is a need to evaluate that chemical further in the SERA to determine if exposures to ecological receptors could result in potential risk to those receptors.

7.4 LINES OF EVIDENCE

This section presents the lines of evidence concerning screening-level ecological risks at the 12 Fort McClellan sites evaluated in this SERA. Table 7-1 summarizes the RI samples and analytical suites collected at the 12 sites. In some instances, there were a limited number of samples and limited analytical suite. This is a source of uncertainty in the SERA, as the representativeness of the samples collected is unknown. However, the majority of samples were collected in areas most likely to have contamination. Although appropriate to achieving the goals of the RI, such biased sampling is likely to overestimate the potential for exposure and adverse effects to ecological receptors. After the analytical program discussion for each site, the results of the abiotic toxicity screen and background screen are presented in Tables 7-6 through 7-37. All of the even-numbered tables contain the abiotic toxicity screen results, while the odd-numbered tables contain the results of the $2\times$ background screen. Table 7-38 presents an overview of ecoCOPCs selected at each site in each medium. The ecoCOPCs are predominantly metals. Samples consisting of only nondetects were not included in the number of samples used to determine the mean or frequency of detection in Tables 7-6 through 7-37.

After the comparison between the maximum detected site concentration and $2\times$ the background mean, a more rigorous statistical analysis (i.e., ANOVA) was performed on media with at least four samples as suggested in the facility-wide work plan (IT 1998). In a similar manner to the human health risk assessment, this second background comparison was conducted after risks were estimated and used as another tool with which to evaluate the sites.

The ANOVA background comparison was conducted for inorganics detected in surface water and sediment at Range L and surface water and surface soil at Landfill #3 (Tables I-36 through I-39). In accordance with the guidance, the central tendencies of the site and background data sets were compared to determine if they differed statistically from each other.

Once the ecoCOPCs have been selected for each site, a lines of evidence evaluation is presented based on the following factors:

- Magnitude of exceedance with respect to ESVs
- Frequency of detection
- Status as an essential nutrient
- Food chain modeling results.

7.4.1 Abiotic and Background Screening Results

The results of the abiotic and background screens are presented in Sections 7.4.1.1 through 7.4.1.12.

7.4.1.1 Area T-4

Four surface soil samples were collected at Area T-4. The samples were analyzed for CWM breakdown products only. Breakdown products that are potentially associated with degradation or decontamination of CWM were not detected in the surface soil at Area T-4. Thus, no data summary table was prepared for Area T-4 surface soil in the SERA and no food chain modeling was conducted. Surface water and sediment samples were not collected at Area T-4.

7.4.1.2 Area T-5

Three surface water samples were collected at Area T-5. Two samples were analyzed for the full suite of surface water analyses (VOCs, semivolatile organic compounds [SVOCs], pesticides/polychlorinated biphenyls [PCBs], metals, explosives, pentachlorophenol [PCP], benzene, toluene, ethylbenzene, and xylene [BTEX], and CWM breakdown products). One sample was analyzed for CWM breakdown products only. Three sediment samples and one duplicate sample were collected at Area T-5. Two samples were analyzed for the full suite of sediment analyses (VOCs, SVOCs, pesticides/PCBs, metals, explosives, and CWM breakdown products). One sample and one duplicate sample were analyzed for CWM breakdown products only. Four surface soil samples were collected at Area T-5. The samples were analyzed for CWM breakdown products only. Breakdown products that are potentially associated with degradation or decontamination of CWM were not detected in the surface water, sediment, or soil samples collected at Area T-5. Thus, no data summary table was prepared for Area T-5 surface soil in the SERA.

Maximum concentrations of aluminum, barium, iron, and manganese were greater than their respective screening values in surface water (Table 7-6). A number of the screening values (barium, calcium, magnesium, manganese, and sodium) were not from EPA Region IV and there is uncertainty

associated with their use. However, these four chemicals were within background concentrations and screened out (Table 7-7). As a result, no ecoCOPCs were selected in surface water at Area T-5.

Maximum concentrations of cadmium, copper, lead, and di-n-butyl phthalate (DNBP) were greater than their respective screening values in sediment (Table 7-8). The sediment screening value for DNBP was a non-Region IV value and there is uncertainty associated with its use. No sediment screening values were available for aluminum, barium, calcium, iron, magnesium, manganese, potassium, vanadium, and benzyl alcohol. Aluminum, barium, calcium, iron, magnesium, manganese, vanadium, and potassium were screened out due to the background comparison (Table 7-9). As a result, contaminants selected as ecoCOPCs in sediment at Area T-5 included cadmium, copper, lead, benzyl alcohol, and DNBP.

All of the ecoCOPCs with the exception of cadmium and potassium were detected in both sediment samples. Sample T5-D02 contained the majority of maximum detections at Area T-5. The maximum hazard quotients (HQs) for cadmium, copper, lead, and DNBP in sediment at Area T-5 are presented in Table 7-8 and ranged from 2.4 (cadmium) to 49 (DNBP). Thus, there is potential for adverse effects to benthic receptors at Area T-5 based on the results of the conservative abiotic screen.

7.4.1.3 Area T-24A

Two surface water samples were collected at Area T-24A. One sample was analyzed for the full suite of surface water analyses and one sample was analyzed for CWM breakdown products. Two sediment samples were collected at Area T-24A. One sample was analyzed for the full suite of sediment analyses and the other sample was analyzed for CWM breakdown products. Surface soil samples were not collected at Area T-24A. Breakdown products that are potentially associated with degradation or decontamination of CWM were not detected in the surface water or sediment at Area T-24A.

Maximum concentrations of aluminum, barium, and lead were greater than the respective screening values in surface water (Table 7-10). A number of the surface water screening values (barium, calcium, magnesium, manganese, potassium, and sodium) were non-Region IV values and there is uncertainty associated with their use. However, these chemicals were within background concentrations and screened out (Table 7-11). As a result, no ecoCOPCs were selected in surface water at Area T-24A.

Maximum concentrations of chemicals with screening values were all below the screening values in sediment at Area T-24A (Table 7-12). The sediment screening value for cobalt was a non-Region IV value and there is uncertainty associated with its use. No sediment screening values were available for aluminum, barium, calcium, iron, magnesium, manganese, potassium, vanadium, and benzyl alcohol. Manganese and vanadium were screened out due to the background comparison (Table 7-13). Contaminants selected as ecoCOPCs in sediment at Area T-24A included aluminum, barium, calcium, iron, magnesium, potassium, and benzyl alcohol.

None of the ecoCOPCs in sediment at Area T-24A has an ecological toxicity screening value. All of the ecoCOPCs were detected in the single sediment sample. Calcium, magnesium, and potassium, although selected as ecoCOPCs, are also essential nutrients for ecological receptors. Thus, there is uncertainty associated with the potential for the ecoCOPCs in sediment at Area T-24A to cause adverse effects to benthic receptors.

7.4.1.4 Area T-38

Surface water or sediment samples were not collected at Area T-38. Three surface soil samples were collected at Area T-38. The samples were analyzed for the full suite of soil analyses (VOCs, SVOCs, pesticides/PCBs, metals, explosives, and CWM breakdown products). Breakdown products that are potentially associated with degradation or decontamination of CWM were not detected in the surface soil at Area T-38.

Maximum concentrations of aluminum, chromium, iron, lead, manganese, and vanadium were greater than the respective screening values in surface soil (Table 7-14). The surface soil screening value for magnesium was a non-Region IV value and there is uncertainty associated with its use. No surface soil screening values were available for calcium and potassium. Calcium and manganese were the only contaminants screened out solely due to background (Table 7-15). Contaminants selected as ecoCOPCs in surface soil at Area T-38 included aluminum, chromium, iron, lead, potassium, and vanadium.

The ecoCOPCs were detected in every sample. Sample T38-S09 contained the majority of maximum detections at Area T-38. The maximum HQs for aluminum, chromium, iron, lead, and vanadium are presented in Table 7-14 and range from 1.7 (lead) to 900 (iron). Thus, there is potential for adverse effects to terrestrial receptors at Area T-38 based on the results of the conservative abiotic screen. The potential for adverse effects to terrestrial receptors may be greater from aluminum, chromium, iron, and vanadium than lead, as their HQs are all greater than 90. Calcium and potassium, although selected as ecoCOPCs, are also essential nutrients for ecological receptors.

7.4.1.5 Range K

Surface water and sediment samples were not collected at Range K. Two surface soil samples were collected at Range K. The samples were analyzed for CWM breakdown products. Breakdown products that are potentially associated with degradation or decontamination of CWM were not detected in the surface soil at Range K. Thus, no data summary table has been prepared for Range K surface soil in the SERA.

7.4.1.6 Range J

Surface water, sediment, and surface soil samples were not collected at Range J. Thus, no data summary tables have been prepared for Range J in the SERA.

7.4.1.7 D&I Area

Surface water, sediment, and surface soil samples were not collected at the D&I Area. Thus, no data summary tables have been prepared for the D&I Area in the SERA.

7.4.1.8 Range L

Four surface water samples were collected at Range L and analyzed for the full suite of surface water analyses. Four sediment samples and one duplicate sample were collected at Range L and analyzed for the full suite of sediment analyses. Two surface soil samples were collected at Range L and analyzed for the full suite of soil analyses. Breakdown products that are potentially associated with degradation or decontamination of CWM were not detected in the surface water, sediment, or soil at Range L.

Maximum concentrations of aluminum, barium, iron, and manganese were greater than the respective screening values in surface water (Table 7-16). The surface water screening values for a number of chemicals were non-Region IV values and there is uncertainty associated with their use. However, aluminum, barium, and iron were within background concentrations and screened out (Table 7-17). As a result, manganese was the only contaminant in surface water selected as an ecoCOPC. Manganese was detected in all four surface water samples. The maximum HQ for manganese in surface water is 12. Thus, there is potential for adverse effects to aquatic receptors at Range L based on the results of the conservative abiotic screen. However, ANOVA indicated that manganese is not site-related (Table I-36).

Maximum concentrations of chromium, cobalt, copper, lead, nickel, zinc, and dieldrin were greater than the respective screening values in sediment (Table 7-18). The sediment screening value for cobalt was a non-Region IV value and there is uncertainty associated with its use. No sediment screening values were available for aluminum, barium, calcium, iron, magnesium, manganese, potassium, sodium, selenium, and vanadium. Sodium was within background concentrations and screened out (Table 7-19). Contaminants selected as ecoCOPCs in sediment at Range L included aluminum, barium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, vanadium, zinc, and dieldrin. The same constituents identified as site-related by the ANOVA comparison also were identified as ecoCOPCs for sediment in Range L (Tables I-37 and 7-19).

HQs for chromium, cobalt, copper, lead, nickel, zinc, and dieldrin are presented in Table 7-18 and range from 1.1 to 11. All of the ecoCOPCs, with the exception of dieldrin (1 of 5) and selenium (3 of 5), were detected in all five sediment samples. Due to the low frequency of detection and low HQ (1.1), the potential for adverse effects to ecological receptors from dieldrin exposure would appear to be low. Calcium, magnesium, and potassium, although selected as ecoCOPCs, are also essential nutrients for ecological receptors. There is uncertainty associated with the potential for the ecoCOPCs in sediment at Range L to cause adverse effects to benthic receptors based on the low HQs, presence of essential nutrients, and lack of toxicity data.

Maximum concentrations of aluminum, chromium, cobalt, copper, iron, lead, manganese, nickel, selenium, vanadium, and zinc were greater than the respective screening values in surface soil (Table 7-20). The surface soil screening value for magnesium was a non-Region IV value and there is uncertainty associated with its use. No surface soil screening values were available for calcium, potassium, sodium, and benzyl alcohol. Calcium and sodium were within background concentrations and screened out (Table 7-21). Contaminants selected as ecoCOPCs in surface soil at Range L included aluminum, chromium, cobalt, copper, iron, lead, manganese, nickel, potassium, selenium, vanadium, zinc, and benzyl alcohol.

All of the ecoCOPCs with the exception of selenium and benzyl alcohol were detected in both surface soil samples. Maximum HQs are presented in Table 7-20 and ranged from 1 (selenium) to 842 (aluminum). Thus, there is potential for adverse effects to surface soil receptors at Range L based on the results of the conservative abiotic screen. The potential for adverse effects to terrestrial receptors may be greater from aluminum, chromium, and iron than the other ecoCOPCs, as their HQs are all greater than 100. Calcium, magnesium, and potassium, although selected as ecoCOPCs, are also essential nutrients for ecological receptors.

7.4.1.9 Landfill #1

Two surface water samples and one duplicate were collected at Landfill #1. The samples were analyzed for the full suite of surface water analyses. Two sediment samples and one duplicate were

collected at Landfill #1. One sample was analyzed for VOCs, SVOCs, pesticides/PCBs, metals, explosives, and HD. One sample and the duplicate were analyzed for VOCs, SVOCs, pesticides/PCBs, metals, and explosives. Breakdown products that are potentially associated with degradation or decontamination of CWM were not detected in the surface water or sediment at Landfill #1. Surface soil samples were not collected at Landfill #1.

Maximum concentrations of aluminum, barium, iron, lead, and manganese were greater than the respective screening values in surface water (Table 7-22). The surface water screening values for a number of chemicals were non-Region IV values and there is uncertainty associated with their use. Aluminum, iron, lead, and manganese were within background concentrations and screened out (Table 7-23). As a result, barium was the only contaminant in surface water selected as an ecoCOPC. Barium was detected in all three surface water samples. The maximum HQ for barium in surface water is 27. Thus, there is potential for adverse effects to aquatic receptors at Landfill #1 based on the results of the conservative abiotic screen.

The maximum concentration of nickel was greater than the respective screening value in sediment (Table 7-24). The sediment screening value for cobalt was a non-Region IV value and there is uncertainty associated with its use. No sediment screening values were available for aluminum, barium, calcium, iron, magnesium, manganese, potassium, vanadium and benzyl alcohol. Vanadium was the only contaminant screened out solely due to background (Table 7-25). Contaminants selected as ecoCOPCs in sediment at Landfill #1 included aluminum, barium, calcium, iron, magnesium, manganese, nickel, potassium, and benzyl alcohol.

The HQ for nickel (1.1) is presented in Table 7-24. All of the ecoCOPCs, with the exception of benzyl alcohol, which was detected in two samples, were detected in all three sediment samples. Due to the low HQ for nickel, the potential for adverse effects to benthic receptors from nickel exposure would appear to be low. Calcium, magnesium, and potassium, although selected as ecoCOPCs, are also essential nutrients for ecological receptors. There is uncertainty associated with the potential for the ecoCOPCs in sediment at Landfill #1 to cause adverse effects to benthic receptors based on the low HQs, presence of essential nutrients, and lack of toxicity data.

7.4.1.10 Landfill #2

Two surface water samples were collected at Landfill #2. Both samples were analyzed for the full suite of surface water analyses. Two sediment samples were collected at Landfill #2. One sample was analyzed for VOCs, SVOCs, pesticides/PCBs, metals, explosives, and HD. The remaining sample was analyzed for the same constituents, with the exception of HD. Surface soil samples were not collected at Landfill #2.

Maximum concentrations of aluminum and barium were greater than their respective screening values in surface water (Table 7-26). A number of the surface water screening values were non-Region IV values and there is uncertainty associated with their use. Both aluminum and barium were within background concentrations and screened out (Table 7-27). As a result, no ecoCOPCs were selected in surface water at Landfill #2.

Maximum concentrations were all below the respective screening values in sediment (Table 7-28). The sediment screening value for cobalt was a non-Region IV value and there is uncertainty associated with its use. No sediment screening values were available for aluminum, barium, calcium, iron, magnesium, manganese, potassium, selenium, vanadium, and benzyl alcohol. Aluminum, barium, calcium, magnesium, manganese, potassium, and vanadium were screened out solely due to

background (Table 7-29). Contaminants selected as ecoCOPCs in sediment at Landfill #2 included iron, selenium, and benzyl alcohol.

Iron and benzyl alcohol were detected in both sediment samples, and selenium was detected in one of two sediment samples. None of the ecoCOPCs in sediment at Landfill #2 has an ecological toxicity screening value. Thus, there is uncertainty associated with the potential for the ecoCOPCs in sediment at Landfill #2 to cause adverse effects to benthic receptors.

7.4.1.11 Landfill #3

Six surface water samples were collected at Landfill #3. Four samples were analyzed for the full suite of surface water analyses. One sample was analyzed for VOCs, SVOCs, pesticides/PCBs, metals, explosives, GB/VX, and BTEX. The remaining sample was analyzed for CWM breakdown products. Three sediment samples were collected at Landfill #3. Two samples were analyzed for VOCs, SVOCs, pesticides/PCBs, metals, and explosives. One sample was analyzed for the full suite of sediment analyses. Five surface soil samples and one duplicate were collected at Landfill #3. The samples were analyzed for VOCs, SVOCs, pesticides/PCBs, metals, and explosives. Breakdown products that are potentially associated with degradation or decontamination of CWM were not detected in the surface water or sediment at Landfill #3.

Maximum concentrations of aluminum, barium, iron, lead, and manganese were greater than their respective screening values in surface water (Table 7-30). A number of the surface water screening values were non-Region IV values and there is uncertainty associated with their use. Aluminum, barium, iron, and manganese were within background concentrations and screened out (Table 7-31). As a result, only lead was selected as an ecoCOPC in surface water at Landfill #3. Lead was detected in one of five surface water samples. The maximum HQ for lead in surface water is 54. Thus, there is potential for adverse effects to aquatic receptors at Landfill #3 based on the results of the conservative abiotic screen.

The ANOVA comparison identified lead, potassium, and sodium as site-related constituents (Table I-38), in a similar manner to the 2× background mean screen. Potassium and sodium were eliminated as ecoCOPCs because the maximum detected concentration was less than the ESV (Table 7-30).

Maximum concentrations of copper, nickel, DDE, benzo(a)anthracene, benzo(b)fluoranthene, chrysene, fluoranthene, and pyrene were greater than the respective screening values in sediment (Table 7-32). The sediment screening value for cobalt was a non-Region IV value and there is uncertainty associated with its use. No sediment screening values were available for aluminum, barium, calcium, iron, magnesium, manganese, potassium, sodium, and vanadium. Manganese and sodium were screened out solely due to background (Table 7-33). Contaminants selected as ecoCOPCs in sediment at Landfill #3 included aluminum, barium, calcium, copper, iron, magnesium, nickel, potassium, vanadium, DDE, benzo(a)anthracene, benzo(b)fluoranthene, chrysene, fluoranthene, and pyrene.

HQs for copper, nickel, DDE, benzo(a)anthracene, benzo(b)fluoranthene, chrysene, fluoranthene, and pyrene are presented in Table 7-32 and range from 1.1 (DDE) to 3.6 (pyrene). The inorganic ecoCOPCs were detected in three of three sediment samples. The organic ecoCOPCs were detected in one of three sediment samples. The maximum detected concentrations for all metals and organics occurred at samples OLF-D03 and OLF-D02, respectively. Calcium, magnesium, potassium, and sodium, although selected as ecoCOPCs, are also essential nutrients for ecological receptors. There is uncertainty associated with the potential for the ecoCOPCs in sediment at Landfill #3 to cause adverse

effects to benthic receptors based on the low HQs, presence of essential nutrients, and lack of toxicity data.

Maximum concentrations of aluminum, barium, chromium, cobalt, iron, manganese, mercury, nickel, vanadium, zinc, DDD, DDE, chlordane, fluoranthene, and pyrene were greater than the respective screening values in surface soil (Table 7-34). The surface soil screening values for magnesium, benzo(a)anthracene, and chrysene were non-Region IV values and there is uncertainty associated with their use. No surface soil screening values were available for calcium, potassium, and sodium. Sodium was the only contaminant in surface soil at Landfill #3 screened out solely due to background (Table 7-35). Contaminants selected as ecoCOPCs in surface soil at Landfill #3 included aluminum, barium, calcium, chromium, cobalt, iron, manganese, mercury, nickel, potassium, vanadium, zinc, DDD, DDE, chlordane, fluoranthene, and pyrene.

Manganese and mercury were identified as ecoCOPCs in surface soil based on the abiotic and background screens (Tables 7-34 and 7-35). However, the ANOVA comparison determined that these constituents are not site-related (Table I-39). Thus, there is uncertainty associated with their selection as ecoCOPCs.

HQs for aluminum, barium, chromium, cobalt, iron, manganese, mercury, nickel, vanadium, zinc, DDD, DDE, chlordane, fluoranthene, and pyrene are presented in Table 7-34 and range from 1.1 (cobalt) to 1,560 (aluminum). The potential for adverse effects to terrestrial receptors may be greater from aluminum, chromium, and iron than the other ecoCOPCs, as their HQs are all greater than 100. Thus, there is potential for adverse effects to surface soil receptors at Landfill #3 based on the results of the conservative abiotic screen. Mercury and fluoranthene were detected in two of six surface soil samples. The remaining inorganic ecoCOPCs were detected in all six surface soil samples. The organic ecoCOPCs were detected in two of six surface soil samples. Calcium and potassium, although selected as ecoCOPCs, are also essential nutrients for ecological receptors.

7.4.1.12 Old Water Hole

Surface water and sediment samples were not collected at the Old Water Hole. Three surface soil samples were collected at the Old Water Hole. One sample was analyzed for the full suite of soil analyses. One sample was analyzed for VOCs, SVOCs, pesticides/PCBs, metals, and explosives. The remaining sample was analyzed for CWM breakdown products. Breakdown products that are potentially associated with degradation or decontamination of CWM were not detected in the surface soil at the Old Water Hole.

Maximum concentrations of aluminum, chromium, iron, manganese, vanadium, and phenol were greater than the respective screening values in surface soil (Table 7-36). No surface soil screening values were available for calcium, potassium, and benzyl alcohol. Aluminum, chromium, iron, manganese, potassium, and vanadium were screened out due to background (Table 7-37). Contaminants selected as ecoCOPCs in surface soil at the Old Water Hole included benzyl alcohol and phenol.

The maximum HQ for phenol (34) is presented in Table 7-36. Thus, there is potential for adverse effects to surface soil receptors at the Old Water Hole based on the results of the conservative abiotic screen. Benzyl alcohol also is identified as an ecoCOPC in Table 7-37. However, benzyl alcohol does not have an ecological toxicity screening value. Benzyl alcohol was detected in one of two surface soil samples and phenol was detected in both surface soil samples.

7.4.2 Food Chain Modeling Results

The details concerning the food chain modeling are presented in Appendix I. Food chain models were conducted for Eastern cottontail, white-footed mouse, shrew, American robin, American woodcock, red fox, red-tailed hawk, and muskrat. Food chain risks were not estimated for all of the 12 sites, but only for sites and media with ecoCOPCs that have bioaccumulative properties. This approach excluded some chemicals with bioaccumulative properties that were not selected as ecoCOPCs (Appendix I lists these chemicals). In addition, food chain models were not run for media with limited sample sizes ($N \leq 2$) due to the additional uncertainty associated with these results.

Table 7-39 summarizes the food chain results for Sites 4 (Area T-38), 8 (Range L), 9 (Landfill #1), and 11 (Landfill #3). Each site had at least one HQ greater than 1. In addition, each receptor had at least one HQ greater than 1. Thus, the SERA results indicate potential for risk to wildlife receptors at Sites 4, 8, 9, and 11. Although the number of HQs greater than 1 was limited for each receptor, HQs ranged from 1 to more than 4,000. However, other than aluminum, no ecoCOPCs had HQs greater than 44. Aluminum also was the chemical with the greatest number of HQs greater than 1 and typically had the highest HQs for each receptor. Other chemicals with HQs greater than 1 included chromium, lead, manganese, zinc, and DDD. The muskrat was the only receptor with an HQ (aluminum) greater than 1 at Sites 8 and 9. The food chain risks were based on a number of conservative assumptions in accordance with SERA guidance. Based on the conservative nature of the food chain model, bioaccumulation does not appear to be a major concern at these four sites. The number and magnitude of HQs greater than 1 would decrease if a more realistic (less conservative) model was conducted. More realistic exposure factors that would be used include an average exposure point concentration, area use factor, and temporal use factor. Aluminum often is listed as a food chain risk, despite not being commonly thought of as one of the major bioaccumulators (e.g., PCBs, mercury). As noted in Appendix I, most of the risk associated with aluminum is not through consumption of plants or animals, but rather through incidental ingestion of surface soil and sediment. The incidental ingestion pathway is totally dependent on the media concentrations (no bioaccumulation factors are involved). For chemicals naturally abundant in the Earth's crust (e.g., aluminum) ecological risks can be overestimated. In a few instances, ANOVA indicated that constituents that had food chain HQs >1 were not site-related. For example, the short-tailed shrew had an HQ greater than 1 for total exposure to mercury at Landfill #3 (HQ = 4) (Table I-28), however, based on ANOVA, this constituent is not site-related.

7.4.3 Uncertainties

Uncertainty is inherent in every step of the risk assessment process. The general approach in this SERA has been to err on the side of conservatism. Therefore, the risks in this SERA are likely to be overestimated rather than underestimated.

The two most important types of uncertainty in the Fort McClellan SERA are those surrounding the estimates of the contaminant concentrations to which ecological receptors are actually exposed (exposure concentrations) and the concentrations that present an acceptable level of risk of harmful effects (toxicity thresholds). These uncertainties arise from multiple causes, especially from the lack of site-specific data on contaminant transport and transformation processes, organismal toxicity, animal behavior and diet, population dynamics, and the responses of plant and animal populations to chemical contaminants in central Alabama environments.

Concentrations of chemicals in soil, surface water, and sediment are based on varying numbers of samples. A degree of uncertainty exists about the actual spatial distribution of chemicals. Exposure concentrations could be overestimated or underestimated, depending on the differences between the

actual and measured data distributions. However, the majority of samples were collected in the areas most likely to have contamination. Although appropriate to achieving the goals of the RI, such biased sampling is likely to overestimate the potential for exposure and adverse effects to ecological receptors. In addition, limited data were collected at some sites with which to evaluate ecological risks. For example, food chain risks from surface soil exposures at Site T-38 are based on only three surface soil samples.

A number of potentially viable exposure pathways were not evaluated in the SERA because of a lack of applicable exposure or toxicity data in the scientific literature. For example, the SERA did not evaluate the potential for adverse effects to terrestrial wildlife via the inhalation or dermal absorption of chemicals. Although exposure via these potential pathways is likely to be less than those evaluated in this SERA, there is still some potential for exposure via these pathways.

Exposure assumptions (e.g., food ingestion rates and dietary composition) for each of the receptors of concern were based primarily on information in the *Wildlife Exposure Factors Handbook* (EPA 1993b). Conservative values were selected in accordance with the SERA guidance. For example, it was conservatively assumed that receptors receive 100 percent of their diet from the site. This likely overestimates exposure for species that may range over larger areas (e.g., red-tailed hawk) and for sites that may not be adequate in providing all of their dietary needs.

Bioavailability is a function of both compound-specific physical/chemical properties and the properties of the soil matrix itself. When soil is inadvertently ingested, not all of the contaminants in the ingested soil are available to be absorbed across the gut lining. However, to be conservative, a default gastric absorption factor (GAF) of 1 was used in the SERA. Use of a GAF of 1 for constituents in soil may result in an inaccurate estimate of dose if there are differences in the uptake levels under the laboratory study conditions versus environmental exposure conditions.

The calculated risks to ecological receptors at Fort McClellan are the risks of individual and groups of chemicals. The risks from exposure to multiple chemicals depend on chemical interactions; effects could be greater or less than those from a single chemical. The evaluation of chemical mixtures made the simplistic assumption that the mode of action or mechanism of toxicity for each chemical was the same. Although this is true for some chemicals, it would not be true for all of the ecoCOPCs evaluated at in this SERA. A true evaluation of risks for chemical mixtures cannot be conducted without additional data and evaluation of alternative models of chemical interaction.

7.5 SUMMARY AND CONCLUSIONS

A SERA was performed for ecological exposures to surface soil, surface water, and sediment at 12 sites on the Fort McClellan Main Post and Pelham Range. The SERA was performed by screening maximum detected concentrations at each site in each medium against ecological screening values and background concentrations. Food chain modeling also was conducted for ecoCOPCs that are of bioaccumulative concern. Based on the results, each site is recommended for one of the four following options: no further action (NFA), additional sampling, refined SERA or BERA.

It is important in the SERA process to avoid overstating conclusions, especially considering the conservative assumptions used in the SERA and the limited sampling data available for evaluation. EcoCOPCs were selected at each site where chemicals were detected. The selection of a chemical as an ecoCOPC indicates potential for adverse effects to ecological receptors. However, the results are based on maximum comparisons to ecological screening values and, in many instances, limited sampling data. Food chain HQs were above 1 at the four sites evaluated (Sites 4, 8, 9, and 11), also suggesting the

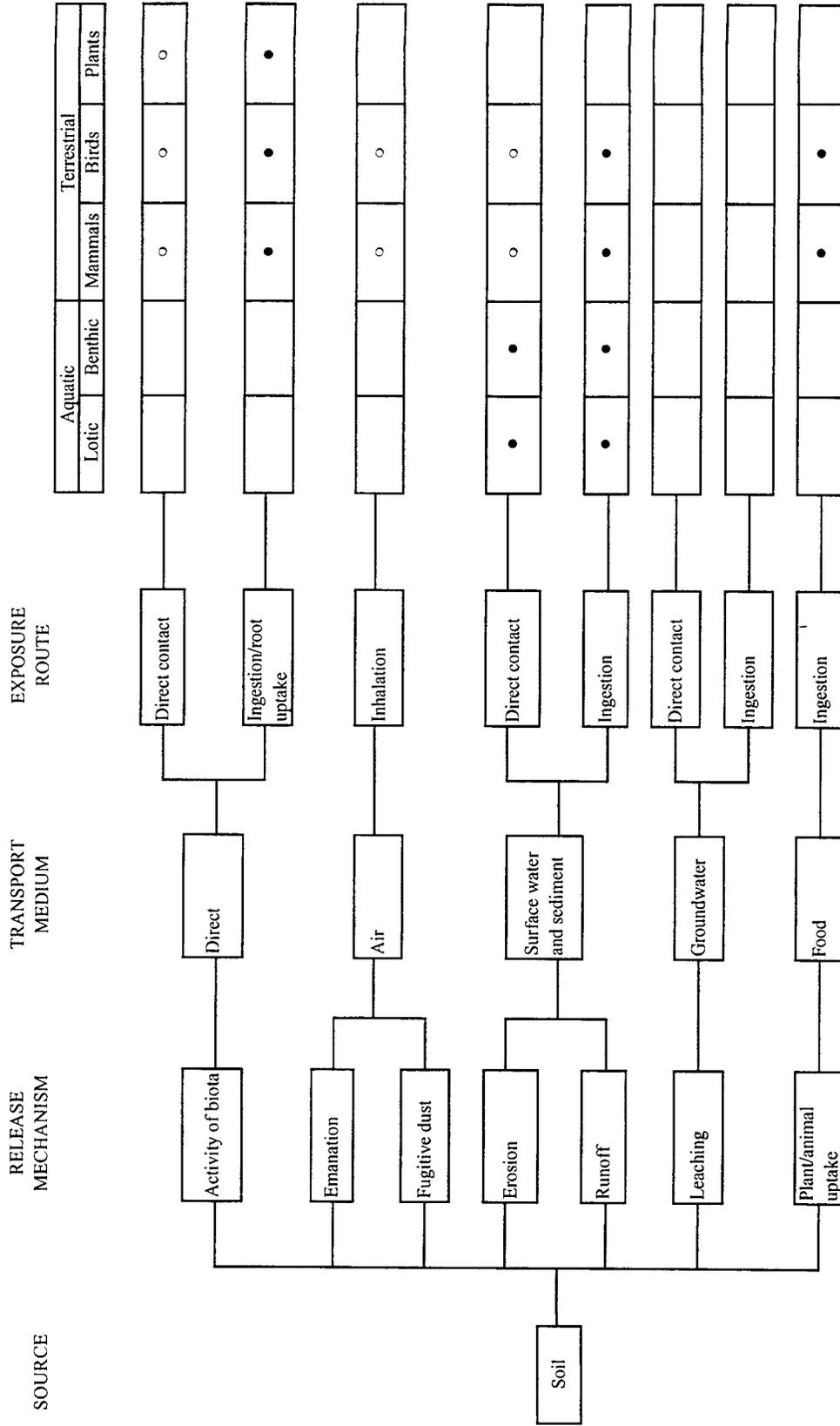
potential for adverse effects. Again, the risks were based on maximum detected concentrations and limited sample sizes.

The surface soil HQs resulting from the abiotic screen were typically highest for aluminum, chromium, iron, and vanadium. In relation to the surface soil risks, surface water and sediment HQs were low. The primary risk driver for the food chain was aluminum. However, this risk was more from incidental ingestion than bioaccumulation in plants and animals. The food chain modeling did not evaluate chemicals that could bioaccumulate, but were not selected as ecoCOPCs. The BRAC Cleanup Team (BCT) must decide if all chemicals that could potentially bioaccumulate should be evaluated in future SERAs.

Calcium, magnesium, and potassium were selected as ecoCOPCs in a number of media at a number of sites. However, these chemicals are essential nutrients for ecological receptors and would be metabolically regulated to some extent. In addition, these chemicals are not associated with mission-related activities at Fort McClellan. As a result, these ecoCOPCs are not considered a concern at any of the 12 sites.

Very limited, if any, chemical data were available for four sites (Area T-4, Range K Training Area, Range J Training Area, and D&I Area). These sites are recommended for additional chemical sampling and subsequent evaluation in a SERA. The RI recommendations in Section 8 specify the types of additional sampling proposed. Surface water is recommended as NFA because so few ecoCOPCs were selected (three total).

The data do not suggest the need to conduct a BERA with associated biological sampling for those sites with available chemical data. Rather, a more refined evaluation of surface soil and/or sediment ecoCOPCs at Areas T-5, T-24A, T-38, Range L, Landfills #1, #2, #3, and the Old Water Hole is recommended in the form of a refined SERA. This refined evaluation would include components of a BERA (more realistic exposure assumptions) without the collection of biological data. Additional chemical sampling may also occur at Area T-5, Area T-24A, Area T-38, Range L, Landfill #2, and Landfill #3. The revised SERA also would incorporate any additional data. From this refinement, the need for biological sampling would be determined.



● = major complete pathway
 ○ = minor complete pathway, not evaluated
 No symbol = no complete pathway

Figure 7-1. Conceptual Site Model of Ecological Exposure Pathways

Table 7-1. Summary of RI Samples and Analytical Suites in the SERA
Fort McClellan RI, Anniston, Alabama

Location	No. samples	Detections?	VOC	SVOC	Pesticides	PCBs	Metals	Explosives	GB/VX	HD	BOD	PCP	BTEX
<i>Soil</i>													
T-4	4	No							X	X			
T-5	4	No							X	X			
T-24A	No surface soil												
T-38	3	Yes	X	X	X	X	X	X	X	X			
Range K	2	No							X	X			
Range J	No surface soil												
D&I	No surface soil												
Range L	2	Yes	X	X	X	X	X	X	X	X			
LF 1	No surface soil												
LF2	No surface soil												
LF3	6	Yes	X	X	X	X	X	X	X	X			
Old Water Hole	1	Yes	X	X	X	X	X	X	X	X			
	1	Yes	X	X	X	X	X	X	X	X			
	1	No							X	X			
<i>Sediment</i>													
T-5	2	Yes	X	X	X	X	X	X	X	X			
	2	No	X	X					X	X			
T-24A	1	Yes	X	X	X	X	X	X	X	X			
	1	No							X	X			
Range L	5	Yes	X	X	X	X	X	X	X	X			
LF 1	2	Yes	X	X	X	X	X	X	X	X			
	1	Yes	X	X	X	X	X	X	X	X			
LF 2	1	Yes	X	X	X	X	X	X	X	X			
	1	Yes	X	X	X	X	X	X	X	X			
LF 3	2	Yes	X	X	X	X	X	X	X	X			
	1	Yes	X	X	X	X	X	X	X	X			
<i>Surface Water</i>													
T-5	2	Yes	X	X	X	X	X	X	X	X	X	X	X
	1	No							X	X			
T-24A	1	Yes	X	X	X	X	X	X	X	X	X	X	X
	1	No							X	X			
Range L	4	Yes	X	X	X	X	X	X	X	X	X	X	X
LF 1	3	Yes	X	X	X	X	X	X	X	X	X	X	X
LF 2	2	Yes	X	X	X	X	X	X	X	X	X	X	X
LF 3	4	Yes	X	X	X	X	X	X	X	X	X	X	X
	1	Yes	X	X	X	X	X	X	X	X	X	X	X
	1	No							X	X			

**Table 7-2. SERA Exposure/Receptor Matrix for Screening and Food Chains
Fort McClellan RL, Anniston, Alabama**

Exposure Unit	Abiotic and Background Screens				Food Chain Receptors									
	Surface Soil Receptors	Surface Water Receptors	Sediment Receptors	Cottontail	White-footed Mouse	Robin	Woodcock	Shrew	Red Fox	Red-Tailed Hawk	Muskrat			
Site 1 - Area T-4	No detects	NA	NA											
Site 2 - Area T-5	No detects	X	X								X			
Site 3 - Area T-24A	NA	X	X								X			
Site 4 - Area T-38	X	NA	NA	X	X	X	X	X	X	X				
Site 5 - Range K Training Area	No detects	NA	NA											
Site 6 - Range J Training Area	NA	NA	NA											
Site 7 - Detection and Identification Area	NA	NA	NA											
Site 8 - Range L	X	X	X	X	X	X	X	X	X	X	X			
Site 9 - Landfill #1	NA	X	X								X			
Site 10 - Landfill #2	NA	X	X								X			
Site 11 - Landfill #3	X	X	X	X	X	X	X	X	X	X	X	X		
Site 12 - Old Water Hole	X	NA	NA	X	X	X	X	X	X	X	X			

Notes: Bold indicates that sample size is N=2 or less for similar analytical suites. In these instances, foodchains were **NOT** run in Appendix I.
NA = Not applicable because no sample was collected.

**Table 7-3. Ecological Benchmark Screening Values for Soil
Fort McClellan RI, Anniston, Alabama**

Constituents Analyzed For In Soil	EPA Region IV Eco. Screening Values ^a (mg/kg)	Supplemental Eco. Screening Values (mg/kg)	Ref.	Notes
<u>Inorganics</u>				
Aluminum	5.00E+01	--		
Antimony	3.50E+00	--		
Arsenic	1.00E+01	--		
Barium	1.65E+02	--		
Beryllium	1.10E+00	--		
Cadmium	1.60E+00	--		
Calcium	no data	no data		
Chromium	4.00E-01	--		
Cobalt	2.00E+01	--		
Copper	4.00E+01	--		
Iron	2.00E+02	--		
Lead	5.00E+01	--		
Magnesium	no data	4.40E+05	b	based on protection of flora & fauna
Manganese	1.00E+02	--		
Mercury (inorganic)	1.00E-01	--		
Methyl mercury	6.70E-01	--		
Molybdenum	2.00E+00	--		
Nickel	3.00E+01	--		
Potassium	no data	no data		
Selenium	8.10E-01	--		
Silver	2.00E+00	--		
Sodium	no data	no data		
Thallium	1.00E+00	--		
Vanadium	2.00E+00	--		
Zinc	5.00E+01	--		
Cyanide	5.00E+00	--		
<u>Volatile Organic Compounds (VOCs)</u>				
1,1,1,2-Tetrachloroethane	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
1,1,1-Trichloroethane	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
1,1,2,2-Tetrachloroethane	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
1,1,2-Trichloroethane	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
1,1-Dichloroethane	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
1,1-Dichloropropene	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
1,2,3-Trichlorobenzene	1.00E-02	--		
1,2,3-Trichloropropane	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
1,2,3-Trimethylbenzene	1.00E-01	--		value for monocyclic aromatic hydrocarbon
1,2,4-Trichlorobenzene	1.00E-02	--		
1,2,4-Trimethylbenzene	1.00E-01	--		value for monocyclic aromatic hydrocarbon
1,2-Dibromo-3-chloroprop	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
1,2-Dibromoethane	no data	1.23E+00	e	
1,2-Dichlorobenzene	1.00E-02	--		

**Table 7-3. Ecological Benchmark Screening Values for Soil
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed For In Soil	EPA Region IV Eco. Screening Values ^a (mg/kg)	Supplemental Eco. Screening Values (mg/kg)	Ref.	Notes
1,2-Dichloroethane	4.00E-01	--		
1,2-Dichloroethene (Total)	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
1,2-Dichloropropane	7.00E+02	--		
1,3,5-Trichlorobenzene	1.00E-02	--		
1,3,5-Trimethylbenzene	1.00E-01	--		value for monocyclic aromatic hydrocarbon
1,3-Dichlorobenzene	1.00E-02	--		
1,3-Dichloropropane	no data	7.00E+02		use 1,2-dichloropropane as surrogate
1,4-Dichlorobenzene	1.00E-02	--		
2,2-Dichloropropane	no data	7.00E+02		use 1,2-dichloropropane as surrogate
2-Butanone	no data	8.96E+01	e	
2-Chlorotoluene	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
2-Hexanone	no data	1.26E+01	e	
3-Chlorotoluene	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
4-Chlorotoluene	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
4-methyl-2-Pentanone (MI)	no data	4.43E+02	e	
Acetone	no data	2.50E+00	e	
Benzene	5.00E-02	--		
Bromobenzene	1.00E-01	--		value for monocyclic aromatic hydrocarbon
Bromochloromethane	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
Bromodichloromethane	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
Bromoform	no data	1.59E+01	e	
Bromomethane	no data	no data		
Carbon disulfide	no data	9.40E-02	e	
Carbon tetrachloride	1.00E+03	--		
Chlorobenzene	5.00E-02	--		
Chloroethane	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
Chloroform	1.00E-03	--		
Chloromethane (methyl cl)	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
cis-1,2-Dichloroethene	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
cis-1,3-Dichloropropene	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
Dibromochloromethane	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
Dibromomethane	no data	1.23E+00	e	
Dichlorodifluoromethane	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
Ethyl benzene	5.00E-02	--		
Hexachlorobutadiene	no data	3.98E-02	e	
Isopropylbenzene (cumen)	no data	no data		
m,p-Xylene	5.00E-02	--		
Methylene chloride	2.00E+00	--		
Naphthalene	1.00E-01	--		
n-Butylbenzene	no data	no data		
n-Propylbenzene	no data	no data		
o-Xylene	5.00E-02	--		
p-Isopropyltoluene (p-cym)	no data	no data		

**Table 7-3. Ecological Benchmark Screening Values for Soil
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed For In Soil	EPA Region IV Eco. Screening Values ^a (mg/kg)	Supplemental Eco. Screening Values (mg/kg)	Ref.	Notes
sec-Butylbenzene	no data	no data		
Styrene	1.00E-01	--		
tert-Butylbenzene	no data	no data		
Tetrachloroethene	1.00E-02	--		
Toluene	5.00E-02	--		
trans-1,2-Dichloroethene	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
trans-1,3-Dichloropropene	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
Trichloroethene	1.00E-03	--		
Trichlorofluoromethane	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
Vinyl chloride	1.00E-02	--		
Xylenes (total)	5.00E-02	--		
1,1-Dichloroethene	1.00E-01	--		value for chlorinated aliphatic hydrocarbon
Semivolatile Organic Compounds (SVOCs)				
1,2,4-Trichlorobenzene	1.00E-02	--		
1,2-Dichlorobenzene	1.00E-02	--		
1,3-Dichlorobenzene	1.00E-02	--		
1,4-Dichlorobenzene	1.00E-02	--		
2,4,5-Trichlorophenol	4.00E+00	--		
2,4,6-Trichlorophenol	1.00E+01	--		
2,4-Dichlorophenol	no data	2.00E+01		use 3,4-dichlorophenol as surrogate
2,4-Dimethylphenol	no data	1.00E-02	e	
2,4-Dinitrophenol	2.00E+01	--		
2,4-Dinitrotoluene	no data	1.28E+00	e	
2,6-Dichlorophenol	no data	2.00E+01		use 3,4-dichlorophenol as surrogate
2,6-Dinitrotoluene	no data	3.28E-02	e	
2-Chloronaphthalene	1.00E+00	--		
2-Chlorophenol	no data	7.00E+00		use 3-chlorophenol as surrogate
2-Methylnaphthalene	no data	--		
2-Methylphenol (o-cresol)	5.00E-01	--		
2-Nitroaniline	no data	3.16E+00	e	
2-Nitrophenol	no data	7.00E+00		use 4-nitrophenol as surrogate
3,3'-Dichlorobenzidine	no data	6.46E-01	e	
3-Nitroaniline	no data	2.19E+01	e	
4,6-Dinitro-2-methylpheno	no data	no data		
4-Bromophenyl-phenyleth	no data	no data		
4-Chloro-3-methylphenol	no data	no data		
4-Chloroaniline	no data	2.00E+01		use 3-chloroaniline as surrogate
4-Chlorophenyl-phenyleth	no data	no data		
4-Methylphenol (p-cresol)	5.00E-01	--		
4-Nitroaniline	no data	3.16E+00	e	use m-nitroaniline as surrogate
4-Nitrophenol	7.00E+00	--		
Acenaphthene	2.00E+01	--		

**Table 7-3. Ecological Benchmark Screening Values for Soil
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed For In Soil	EPA Region IV Eco. Screening Values^a (mg/kg)	Supplemental Eco. Screening Values (mg/kg)	Ref.	Notes
Acenaphthylene	no data	6.82E+02	e	
Anthracene	1.00E-01	--		
Benzo(a)anthracene	no data	5.21E+00	e	
Benzo(a)pyrene	1.00E-01	--		
Benzo(b)fluoranthene	no data	5.98E+01	e	
Benzo(g,h,i)perylene	no data	1.19E+02	e	
Benzo(k)fluoranthene	no data	1.48E+02	e	
Benzoic acid	no data	no data		
bis(2-Chloroethoxy)metha	no data	no data		
bis(2-Chloroethyl)ether	no data	2.37E+01	e	
bis(2-Chloroisopropyl)ethe	no data	no data		
bis(2-Ethylhexyl)phthalate	no data	9.26E-01	e	
Butyl benzyl phthalate	no data	2.39E-01	e	
Carbazole	no data	no data		
Chrysene	no data	4.73E+00	e	
Dibenzo(a,h)anthracene	no data	1.84E+01	e	
Dibenzofuran	no data	no data		
Diethyl phthalate	1.00E+02	--		
Dimethylphthalate	2.00E+02	--		
Di-n-butylphthalate	2.00E+02	--		
Di-n-octylphthalate	no data	7.09E+02	e	
Fluoranthene	1.00E-01	--		
Fluorene	no data	1.22E+02	e	
Hexachlorobenzene	2.50E-03	--		
Hexachlorobutadiene	no data	3.98E-02	e	
Hexachlorocyclopentadier	1.00E+01	--		
Hexachloroethane	no data	5.96E-01	e	
Indeno(1,2,3-cd)pyrene	no data	1.09E+02	e	
Isophorone	no data	1.39E+02	e	
Naphthalene	1.00E-01	--		
Nitrobenzene	4.00E+01	--		
n-Nitroso-di-n-propylamine	no data	no data		
n-Nitrosodiphenylamine	2.00E+01	--		
Pentachlorophenol	2.00E-03	--		
Phenanthrene	1.00E-01	--		
Phenol	5.00E-02	--		
Pyrene	1.00E-01	--		
Diisopropylmethylphosphic	no data	no data		
Dimethylmethylphosphoni	no data	no data		
Ethylmethylphosphonic Acid	no data	no data		
Isopropylmethylphosphoni	no data	no data		
Methylphosphonic Acid	no data	no data		
Thiodiglycol	no data	no data		

**Table 7-3. Ecological Benchmark Screening Values for Soil
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed For In Soil	EPA Region IV Eco. Screening Values ^a (mg/kg)	Supplemental Eco. Screening Values (mg/kg)	Ref.	Notes
1,4-Dithiane	no data	no data		
1,4-Oxathiane	no data	no data		
p-Chlorophenylmethylsulfc	no data	no data		
p-Chlorophenylmethylsulfc	no data	no data		
Propane, 2,2'-Oxybis[1-Cl	no data	no data		
<u>Dioxins and Furans ^c</u>				
2,3,7,8-TCDD	no data	1.00E-02	b	based on protection of fauna
Total TCDD	no data	1.00E-02		use 2,3,7,8-TCDD as surrogate
2,3,7,8-TCDF	no data	1.00E-02		protective of birds and mammals
Total TCDF	no data	1.00E-02		protective of birds and mammals
1,2,3,7,8-PeCDD	no data	1.00E-02		protective of birds and mammals
Total PeCDD	no data	1.00E-02		protective of birds and mammals
1,2,3,7,8-PeCDF	no data	1.00E-01		protective of birds and mammals
2,3,4,7,8-PeCDF	no data	1.00E-02		protective of birds and mammals
Total PeCDF	no data	1.00E-02		protective of birds and mammals
1,2,3,4,7,8-HxCDD	no data	1.00E-01		protective of birds and mammals
1,2,3,6,7,8-HxCDD	no data	1.00E-01		protective of birds and mammals
1,2,3,7,8,9-HxCDD	no data	1.00E-01		protective of birds and mammals
Total HxCDD	no data	1.00E-01		protective of birds and mammals
1,2,3,4,7,8-HxCDF	no data	1.00E-01		protective of birds and mammals
1,2,3,6,7,8-HxCDF	no data	1.00E-01		protective of birds and mammals
1,2,3,7,8,9-HxCDF	no data	1.00E-01		protective of birds and mammals
2,3,4,6,7,8-HxCDF	no data	1.00E-01		protective of birds and mammals
Total HxCDF	no data	1.00E-01		protective of birds and mammals
1,2,3,4,6,7,8-HpCDD	no data	1.00E+00		protective of birds and mammals
Total HpCDD	no data	1.00E+00		protective of birds and mammals
1,2,3,4,6,7,8-HpCDF	no data	1.00E+00		protective of birds and mammals
1,2,3,4,7,8,9-HpCDF	no data	1.00E+00		protective of birds and mammals
Total HpCDF	no data	1.00E+00		protective of birds and mammals
Total OCDD	no data	1.00E+02		protective of birds and mammals
Total OCDF	no data	1.00E+02		protective of birds and mammals
<u>PCBs/Nitroexplosives/Pesticides/Herbicides</u>				
Aroclor 1016	2.00E-02	--		value for total PCBs
Aroclor 1221	2.00E-02	--		value for total PCBs
Aroclor 1232	2.00E-02	--		value for total PCBs
Aroclor 1242	2.00E-02	--		value for total PCBs
Aroclor 1248	2.00E-02	--		value for total PCBs
Aroclor 1254	2.00E-02	--		value for total PCBs
Aroclor 1260	2.00E-02	--		value for total PCBs
PCBs (total)	2.00E-02	--		
2,4,5-T	1.00E-01	--		value for organochlorinated pesticides

**Table 7-3. Ecological Benchmark Screening Values for Soil
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed For In Soil	EPA Region IV Eco. Screening Values ^a (mg/kg)	Supplemental Eco. Screening Values (mg/kg)	Ref.	Notes
2,4,5-TP (Silvex)	1.00E-01	--		value for organochlorinated pesticides
2-Nitrotoluene	no data	no data		
3-Nitrotoluene	no data	no data		
4,4'-DDD	2.50E-03	--		
4,4'-DDE	2.50E-03	--		
4,4'-DDT	2.50E-03	--		
Aldrin	2.50E-03	--		
alpha-BHC	2.50E-03	--		
beta-BHC	1.00E-03	--		
Chlordane (technical)	1.00E-01	--		value for organochlorinated pesticides
delta-BHC	no data	9.94E+00	e	
Dieldrin	5.00E-04	--		
Endosulfan I	no data	1.19E-01	e	
Endosulfan II	no data	1.19E-01	e	
Endosulfan sulfate	no data	3.58E-02	e	
Endrin	1.00E-03	--		
Endrin aldehyde	no data	1.05E-02	e	
Endrin ketone	no data	1.05E-02	e	use endrin aldehyde as surrogate
gamma-BHC (Lindane)	5.00E-05	--		
Heptachlor	1.00E-01	--		value for organochlorinated pesticides
Heptachlor epoxide	no data	1.52E-01	e	
Methoxychlor	no data	1.99E-02	e	
Toxaphene	no data	1.19E-01	e	
Dalapon	1.00E-01	--		value for organochlorinated pesticides
2,4-D	1.00E-01	--		value for organochlorinated pesticides
2,4-DB	1.00E-01	--		value for organochlorinated pesticides
Dicamba	1.00E-01	--		value for organochlorinated pesticides
Dichloroprop	1.00E-01	--		value for organochlorinated pesticides
Dinoseb	1.00E-01	--		value for organochlorinated pesticides
MCPA	1.00E-01	--		value for organochlorinated pesticides
MCPP	1.00E-01	--		value for organochlorinated pesticides
1,3,5-Trinitrobenzene	no data	3.76E-01	e	
1,3-Dinitrobenzene	no data	6.55E-01	e	
2,4,6-Trinitrotoluene	no data	no data		
2,4-Dinitrotoluene	no data	1.28E+00	e	
2,6-Dinitrotoluene	no data	3.28E-02	e	
2-Amino-4,6-dinitrotoluene	no data	no data		
4-Amino-2,6-Dinitrotoluen	no data	no data		
HMX	no data	no data		
Nitrobenzene	no data	1.31E+00	e	
RDX	no data	no data		
Tetryl	no data	no data		
p-Nitrotoluene	no data	no data		

**Table 7-3. Ecological Benchmark Screening Values for Soil
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed For In Soil	EPA Region IV Eco. Screening Values ^a (mg/kg)	Supplemental Eco. Screening Values (mg/kg)	Ref.	Notes
Azinphosmethyl	1.00E-01	--		value for organochlorinated pesticides
Bolstar	1.00E-01	--		value for organochlorinated pesticides
Chlorpyrifos	1.00E-01	--		value for organochlorinated pesticides
Coumaphos	1.00E-01	--		value for organochlorinated pesticides
Demeton	1.00E-01	--		value for organochlorinated pesticides
Diazinon	1.00E-01	--		value for organochlorinated pesticides
Dichlorvos	1.00E-01	--		value for organochlorinated pesticides
Dimethoate	1.00E-01	--		value for organochlorinated pesticides
Disulfoton	1.00E-01	--		value for organochlorinated pesticides
Ethoprop	1.00E-01	--		value for organochlorinated pesticides
Famphur	1.00E-01	--		value for organochlorinated pesticides
Fensulfothion	1.00E-01	--		value for organochlorinated pesticides
Fenthion	1.00E-01	--		value for organochlorinated pesticides
Malathion	1.00E-01	--		value for organochlorinated pesticides
Merphos	1.00E-01	--		value for organochlorinated pesticides
Methyl Parathion	1.00E-01	--		value for organochlorinated pesticides
Mevinphos	1.00E-01	--		value for organochlorinated pesticides
Naled	1.00E-01	--		value for organochlorinated pesticides
O,O,O-Triethyl Phosphoro	1.00E-01	--		value for organochlorinated pesticides
Parathion	1.00E-01	--		value for organochlorinated pesticides
Phorate	1.00E-01	--		value for organochlorinated pesticides
Ronnel	1.00E-01	--		value for organochlorinated pesticides
Stirophos	1.00E-01	--		value for organochlorinated pesticides
Sulfotep	1.00E-01	--		value for organochlorinated pesticides
Thionazin	1.00E-01	--		value for organochlorinated pesticides
Tokuthion	1.00E-01	--		value for organochlorinated pesticides
Trichloronate	1.00E-01	--		value for organochlorinated pesticides

Notes:

^a EPA 1999. Region IV Waste Management Division Soil Screening Values for Hazardous Waste Sites. Online

^b EPA 1995. BTAG Screening Levels.

^c Screening values for PCDD/PCDFs were calculated using the TEF methodology presented in:

Van den Berg et al. 1998. Toxic Equivalency Factors for PCBs, PCDDs, PCDFs for Humans and Wildlife. Environ. Health Perspect. 106: 775-792.

^d Talmage et al. 1999. Nitroaromatic Munition Compounds: Environmental Effects and Screening Values.

Rev Environ Contam Toxicol 161:1-156.

^e EPA 1999. Region V Ecological Data Quality Levels (EDQL). Online. Based on the most conservative NOAELs for plants, earthworms, voles, and shrews.

**Table 7-4. Ecological Benchmark Screening Values for Surface Water
Fort McClellan RI, Anniston, Alabama**

Constituents Analyzed For In Surface Water	EPA Region IV Eco. Screening Values ^a (mg/L)	Supplemental Eco. Screening Values (mg/L)	Ref.	Notes
<u>Inorganics</u>				
Aluminum	8.70E-02	--		
Antimony	1.60E-01	--		
Arsenic	1.90E-01	--		
Barium	no data	3.90E-03	c	Tier II value
Beryllium	5.30E-04	--		
Cadmium (water)	6.60E-04	--		
Calcium	no data	1.16E+02	d	
Chromium VI	1.10E-02	--		
Cobalt	no data	3.00E-03	c	Tier II value
Copper	6.54E-03	--		
Iron	1.00E+00	--		
Lead	1.32E-03	--		
Magnesium	no data	8.20E+01	d	
Manganese	no data	8.00E-02	c	Tier II value
Mercury	1.20E-05	--		
Methyl mercury	no data	3.00E-06	c	Tier II value
Molybdenum	no data	2.40E-01	c	Tier II value
Nickel	8.77E-02	--		
Potassium	no data	5.30E+01	d	
Selenium	5.00E-03	--		
Silver	1.20E-05	--		
Sodium	no data	6.80E+02	d	
Thallium	4.00E-03	--		
Vanadium	no data	1.90E-02	c	Tier II value
Zinc	5.89E-02	--		
Cyanide	5.20E-03	--		
<u>Volatile Organic Compounds (VOCs)</u>				
1,1,1,2-Tetrachloroethane	no data	2.40E+00	b	lowest observable chronic effect level
1,1,1-Trichloroethane	5.28E-01	--		
1,1,2,2-Tetrachloroethane	2.40E-01	--		
1,1,2-Trichloroethane	9.40E-01	--		
1,1-Dichloroethene	3.03E-01	--		
1,1-Dichloroethane	no data	4.70E-02	c	Tier II value
1,1-Dichloropropene	no data	2.44E-01	f	based on protection of flora & fauna
1,2,3-Trichlorobenzene	no data	6.92E-02	h	
1,2,3-Trichloropropane	no data	1.21E-02	h	
1,2,3-Trimethylbenzene	no data	no data		
1,2,4-Trichlorobenzene	4.49E-02	--		
1,2,4-Trimethylbenzene	no data	no data		
1,2-Dibromo-3-chloroprop	no data	1.12E-01	h	
1,2-Dibromoethane	no data	2.25E-02	h	

**Table 7-4. Ecological Benchmark Screening Values for Surface Water
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed For In Surface Water	EPA Region IV Eco. Screening Values ^a (mg/L)	Supplemental Eco. Screening Values (mg/L)	Ref.	Notes
1,2-Dichlorobenzene	1.58E-02	--		
1,2-Dichloroethane	2.00E+00	--		
1,2-Dichloroethene (Total)	no data	3.10E-01	h	
1,2-Dichloropropane	5.25E-01	--		
1,3,5-Trichlorobenzene	no data	5.00E-02	f	based on protection of flora & fauna
1,3,5-Trimethylbenzene	no data	no data		
1,3-Dichlorobenzene	5.02E-02	--		
1,3-Dichloropropane	no data	5.21E-01		use 1,2-dichloropropane as surrogate
1,4-Dichlorobenzene	1.12E-02	--		
2,2-Dichloropropane	no data	5.21E-01		use 1,2-dichloropropane as surrogate
2-Butanone (MEK)	no data	7.10E+00	h	
2-Chlorotoluene	no data	no data		
2-Hexanone (MBK)	no data	1.71E+00	h	
3-Chlorotoluene	no data	no data		
4-Chlorotoluene	no data	no data		
4-Methyl-2-pentanone (MI)	no data	3.68E+00	h	
Acetone	no data	7.80E+01	h	
Benzene	5.30E-02	--		
Bromobenzene	no data	no data		
Bromochloromethane	no data	1.10E+01	f	based on protection of fauna
Bromodichloromethane	no data	1.10E+01	f	based on protection of fauna
Bromoform	2.93E-01	--		
Bromomethane	no data	no data		
Carbon disulfide	no data	8.40E-02	h	
Carbon tetrachloide	3.52E-01	--		
Chlorobenzene	1.95E-01	--		
Chloroethane	no data	2.30E+02	h	
Chloroform	2.89E-01	--		
Chloromethane (methyl cl)	5.50E+00	--		
cis-1,2-Dichloroethene	no data	1.16E+01	f	based on protection of flora & fauna
cis-1,3-Dichloropropene	2.44E-02	--		
Dibromochloromethane	no data	6.40E+00	h	
Dibromomethane	no data	2.25E-02	h	
Dichlorodifluoromethane	no data	1.10E+01	f	based on protection of flora & fauna
Ethyl benzene	4.53E-01	--		
Hexachlorobutadiene	9.30E-04	--		
Isopropylbenzene (cumen)	no data	no data		
m,p-Xylene	no data	1.17E-01	h	value for total xylenes
Methylene chloride	1.93E+00	--		
Naphthalene	6.20E-02	--		
n-Butylbenzene	no data	no data		
n-Propylbenzene	no data	no data		
o-Xylene	no data	1.17E-01	h	value for total xylenes

**Table 7-4. Ecological Benchmark Screening Values for Surface Water
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed For In Surface Water	EPA Region IV Eco. Screening Values ^a (mg/L)	Supplemental Eco. Screening Values (mg/L)	Ref.	Notes
p-Isopropyltoluene (p-cym)	no data	no data		
sec-Butylbenzene	no data	no data		
Styrene	no data	5.60E-02	h	
tert-Butylbenzene	no data	no data		
Tetrachloroethene	8.40E-02	--		
Toluene	1.75E-01	--		
trans-1,2-Dichloroethene	1.35E+00	--		
trans-1,3-Dichloropropene	2.44E-02	--		
Trichloroethene	no data	2.19E+01	b	lowest observable chronic effect level
Trichlorofluoromethane	no data	1.10E+01	f	based on protection of flora & fauna
Vinyl chloride	no data	9.20E-03	h	
Xylenes (total)	no data	1.17E-01	h	value for total xylenes
Semivolatile Organic Compounds (SVOCs)				
1,2,4-Trichlorobenzene	4.49E-02	--		
1,2-Dichlorobenzene	1.58E-02	--		
1,3-Dichlorobenzene	5.02E-02	--		
1,4-Dichlorobenzene	1.12E-02	--		
2,4,5-Trichlorophenol	no data	6.30E-02	b	proposed chronic effect criterion
2,4,6-Trichlorophenol	3.20E-03	--		
2,4-Dichlorophenol	3.65E-02	--		
2,4-Dimethylphenol	2.12E-02	--		
2,4-Dinitrophenol	6.20E-03	--		
2,4-Dinitrotoluene	3.10E-01	--		
2,6-Dichlorophenol	no data	3.65E-02		use 2,4-dichlorophenol as surrogate
2,6-Dinitrotoluene	no data	4.20E-02	h	
2-Chloronaphthalene	no data	3.96E-04	h	
2-Chlorophenol	4.38E-02	--		
2-Methylnaphthalene	no data	3.30E-01	h	
2-Methylphenol (o-cresol)	no data	4.89E-01	d	
2-Nitroaniline	no data	no data		
2-Nitrophenol	3.50E+00	--		
3,3'-Dichlorobenzidine	no data	9.98E-02	h	
3-Nitroaniline	no data	no data		
4,6-Dinitro-2-methylpheno	no data	no data		
4-Bromophenyl-phenyleth	no data	1.50E-03	h	
4-Chloro-3-methylphenol	3.00E-04	--		
4-Chloroaniline	no data	5.00E-02	b	lowest observable chronic effect level
4-Chlorophenyl-phenyleth	no data	no data		
4-Methylphenol (p-cresol)	no data	4.89E-01		use 2-methylphenol as surrogate
4-Nitroaniline	no data	no data		
4-Nitrophenol	8.28E-02	--		
Acenaphthene	1.70E-02	--		

**Table 7-4. Ecological Benchmark Screening Values for Surface Water
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed For In Surface Water	EPA Region IV Eco. Screening Values ^a (mg/L)	Supplemental Eco. Screening Values (mg/L)	Ref.	Notes
Acenaphthylene	no data	4.84E+00	h	
Anthracene	no data	2.90E-05	h	
Benzo(a)anthracene	no data	8.39E-04	h	
Benzo(a)pyrene	no data	1.40E-05	h	
Benzo(b)fluoranthene	no data	9.07E-03	h	
Benzo(g,h,i)perylene	no data	7.64E-03	h	
Benzo(k)fluoranthene	no data	5.60E-06	h	
bis(2-Chloroethoxy)metha	no data	1.10E+01	f	based on protection of flora & fauna
bis(2-Chloroethyl)ether	2.38E+00	--		
bis(2-Chloroisopropyl)ethe	no data	no data		
bis(2-Ethylhexyl)phthalate	3.00E-04	--		
Butyl benzyl phthalate	2.20E-02	--		
Carbazole	no data	no data		
Chrysene	no data	3.30E-05	h	
Dibenzo(a,h)anthracene	no data	1.60E-06	h	
Dibenzofuran	no data	2.00E-02	h	
Diethyl phthalate	5.21E-01	--		
Dimethylphthalate	3.30E-01	--		
Di-n-butyl phthalate	9.40E-03	--		
Di-n-octyl phthalate	no data	3.00E-02	h	
Fluoranthene	3.98E-02	--		
Fluorene	no data	3.90E-03	h	
Hexachlorobenzene	no data	3.68E-03	b	proposed chronic effect criterion
Hexachlorobutadiene	9.30E-04	--		
Hexachlorocyclopentadier	7.00E-05	--		
Hexachloroethane	9.80E-03	--		
Indeno(1,2,3-cd)pyrene	no data	4.31E-03	h	
Isophorone	1.17E+00	--		
Naphthalene	6.20E-02	--		
Nitrobenzene	2.70E-01	--		
N-Nitroso-di-n-propylamin	no data	no data		
N-Nitrosodiphenylamine	5.85E-02	--		
Pentachlorophenol	1.30E-02	--		
Phenanthrene	no data	6.30E-03	b	proposed chronic effect criterion
Phenol	2.56E-01	--		
Pyrene	no data	3.00E-04	h	
Propane, 2,2'-Oxybis[1-Cl	no data	no data		
Dioxins and Furans ^e				
2,3,7,8-TCDD	1.00E-08	--		
Total TCDD	1.00E-08	--		
2,3,7,8-TCDF	1.00E-08	--		protective of fish, birds, and mammals
Total TCDF	1.00E-08	--		protective of fish, birds, and mammals

**Table 7-4. Ecological Benchmark Screening Values for Surface Water
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed For In Surface Water	EPA Region IV Eco. Screening Values ^a (mg/L)	Supplemental Eco. Screening Values (mg/L)	Ref.	Notes
1,2,3,7,8-PeCDD	1.00E-08	--		protective of fish, birds, and mammals
Total PeCDD	1.00E-08	--		protective of fish, birds, and mammals
1,2,3,7,8-PeCDF	1.00E-07	--		protective of fish, birds, and mammals
2,3,4,7,8-PeCDF	1.00E-08	--		protective of fish, birds, and mammals
Total PeCDF	1.00E-08	--		protective of fish, birds, and mammals
1,2,3,4,7,8-HxCDD	2.00E-08	--		protective of fish, birds, and mammals
1,2,3,6,7,8-HxCDD	1.00E-07	--		protective of fish, birds, and mammals
1,2,3,7,8,9-HxCDD	1.00E-07	--		protective of fish, birds, and mammals
Total HxCDD	2.00E-08	--		protective of fish, birds, and mammals
1,2,3,4,7,8-HxCDF	1.00E-07	--		protective of fish, birds, and mammals
1,2,3,6,7,8-HxCDF	1.00E-07	--		protective of fish, birds, and mammals
1,2,3,7,8,9-HxCDF	1.00E-07	--		protective of fish, birds, and mammals
2,3,4,6,7,8-HxCDF	1.00E-07	--		protective of fish, birds, and mammals
Total HxCDF	1.00E-07	--		protective of fish, birds, and mammals
1,2,3,4,6,7,8-HpCDD	1.00E-06	--		protective of fish, birds, and mammals
Total HpCDD	1.00E-06	--		protective of fish, birds, and mammals
1,2,3,4,6,7,8-HpCDF	1.00E-06	--		protective of fish, birds, and mammals
1,2,3,4,7,8,9-HpCDF	1.00E-06	--		protective of fish, birds, and mammals
Total HpCDF	1.00E-06	--		protective of fish, birds, and mammals
Total OCDD	1.00E-04	--		protective of fish, birds, and mammals
Total OCDF	1.00E-04	--		protective of fish, birds, and mammals
PCBs/Nitroexplosives/Pesticides/Herbicides				
Aroclor 1016	1.40E-05	--		
Aroclor 1221	1.40E-05	--		
Aroclor 1232	1.40E-05	--		
Aroclor 1242	1.40E-05	--		
Aroclor 1248	1.40E-05	--		
Aroclor 1254	1.40E-05	--		
Aroclor 1260	1.40E-05	--		
PCBs (water)	1.40E-05	--		
2,4,5-T	no data	no data		
2,4,5-TP (Silvex)	no data	3.27E-01	h	
2-Nitrotoluene	no data	no data		
4,4'-DDD	6.40E-06	--		
4,4'-DDE	1.05E-02	--		
4,4'-DDT	1.00E-06	--		
Aldrin	3.00E-04	--		
alpha-BHC	5.00E+00	--		
beta-BHC	5.00E+01	--		
Chlordane	4.30E-06	--		
delta-BHC	no data	6.67E-01	h	
Dieldrin	1.90E-06	--		

**Table 7-4. Ecological Benchmark Screening Values for Surface Water
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed For In Surface Water	EPA Region IV Eco. Screening Values ^a (mg/L)	Supplemental Eco. Screening Values (mg/L)	Ref.	Notes
Endosulfan I	5.60E-05	--		
Endosulfan II	5.60E-05	--		
Endosulfan sulfate	no data	2.22E-03	h	
Endrin	2.30E-06	--		
Endrin aldehyde	no data	1.50E-04	h	
Endrin ketone	no data	1.50E-04	h	use endrin aldehyde as surrogate
gamma-BHC (Lindane)	8.00E-05	--		
Heptachlor	3.80E-06	--		
Heptachlor Epoxide	3.80E-06	--		
Methoxychlor	3.00E-05	--		
Toxaphene	2.00E-07	--		
Dalapon	no data	no data		
2,4-D	no data	no data		
2,4-DB	no data	no data		
Dicamba	no data	no data		
Dichloroprop	no data	no data		
Dinoseb	no data	3.90E-04	h	
MCPA	no data	no data		
MCPP	no data	no data		
1,3,5-Trinitrobenzene	no data	1.10E-02	g	secondary chronic value
1,3-Dinitrobenzene	no data	2.00E-02	g	secondary chronic value
2,4,6-Trinitrotoluene	no data	9.00E-02	g	
2,4-Dinitrotoluene	no data	2.30E-01	h	
2,6-Dinitrotoluene	no data	4.20E-02	h	
2-Amino-4,6-dinitrotoluene	no data	2.00E-02	g	secondary chronic value
3-Nitrotoluene	no data	no data		
4-Amino-2,6-Dinitrotoluene	no data	no data		
HMX	no data	3.30E-01	g	secondary chronic value
Nitrobenzene	no data	7.40E-01	h	
RDX	no data	1.90E-01	g	secondary chronic value
Tetryl	no data	no data		
p-Nitrotoluene	no data	no data		
Azinphosmethyl	no data	no data		
Bolstar	no data	no data		
Chlorpyrifos	4.10E-05	--		
Coumaphos	no data	no data		
Demeton	1.00E-04	--		
Diazinon	no data	4.30E-05	c	final chronic value
Dichlorvos	no data	no data		
Dimethoate	no data	4.12E-02	h	
Disulfoton	no data	4.02E-05	h	
Ethoprop	no data	no data		
Famphur	no data	no data		

**Table 7-4. Ecological Benchmark Screening Values for Surface Water
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed For In Surface Water	EPA Region IV Eco. Screening Values ^a (mg/L)	Supplemental Eco. Screening Values (mg/L)	Ref.	Notes
Fensulfothion	no data	no data		
Fenthion	no data	no data		
Malathion	1.00E-04	- -		
Merphos	no data	no data		
Methyl Parathion	1.30E-05	- -		value for parathion mixture
Mevinphos	no data	no data		
Naled	no data	no data		
O,O,O-Triethyl Phosphorc	no data	no data		
Parathion	1.30E-05	- -		
Phorate	no data	3.62E-03	h	
Ronnel	no data	no data		
Stirophos	no data	no data		
Sulfotep	no data	no data		
Thionazin	no data	no data		
Tokuthion	no data	no data		
Trichloronate	no data	no data		

Notes:

- ^a EPA 1999. Region IV Waste Management Division Freshwater Surface Water Chronic Screening Values for Hazardous Waste Sites. Online
- ^b NOAA 1999. Screening Quick Reference Tables. Freshwater chronic ambient water quality criteria.
- ^c OSWER 1996. Ecotox Thresholds. Presented in: ECO Update, January, 1996. EPA 540/F-95/038.
- ^d Lowest chronic value for all species tested. Referenced from:
Suter and Tsao 1996. Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Aquatic Biota: 1996 Revision.
- ^e Screening values for PCDD/PCDFs were calculated using the TEF methodology presented in:
Van den Berg et al. 1998. Toxic Equivalency Factors for PCBs, PCDDs, PCDFs for Humans and Wildlife. Environ. Health Perspect. 106: 775-792.
- ^f EPA 1995. Region III BTAG Ecological Screening Value
- ^g Talmage et al. 1999. Nitroaromatic Munition Compounds: Environmental Effects and Screening Values.
Rev Environ Contam Toxicol 161:1-156.
- ^h EPA 1999. Region V Ecological Data Quality Levels (EDQL). Online. Based on the most conservative NOAELs for mink and kingfishers.

**Table 7-5. Ecological Benchmark Screening Values for Sediment
Fort McClellan RI, Anniston, Alabama**

Constituents Analyzed for In Sediment	EPA Region IV Eco. Screening Values ^a (mg/kg)	Supplemental Eco. Screening Values (mg/kg)	Ref.	Notes
<u>Inorganics</u>				
Aluminum	no data	no data		
Antimony	1.20E+01	--		
Arsenic	7.24E+00	--		
Barium	no data	no data		
Beryllium	no data	no data		
Cadmium	1.00E+00	--		
Calcium	no data	no data		
Chromium	5.23E+01	--		
Cobalt	no data	5.00E+01	k	
Copper	1.87E+01	--		
Iron	no data	no data		
Lead	3.02E+01	--		
Magnesium	no data	no data		
Manganese	no data	no data		
Mercury	1.30E-01	--		
Methyl mercury	no data	2.45E-05	k	
Molybdenum	no data	no data		
Nickel	1.59E+01	--		
Potassium	no data	no data		
Selenium	no data	no data		
Silver	2.00E+00	--		
Sodium	no data	no data		
Thallium	no data	no data		
Vanadium	no data	no data		
Zinc	1.24E+02	--		
Cyanide	no data	no data		
<u>Volatile Organic Compounds (VOCs)</u>				
1,1,1,2-Tetrachloroethane	no data	1.09E-02	k	
1,1,1-Trichloroethane	no data	1.70E-01	d	
1,1,2,2-Tetrachloroethane	no data	9.40E-01	d	
1,1,2-Trichloroethane	no data	6.74E-01	k	
1,1-Dichloroethane	no data	5.75E-04	k	
1,1-Dichloropropene	no data	2.96E-03	k	value for cis-1,3-dichloropropene
1,2,3-Trichlorobenzene	no data	6.40E-02	e	use 1,2,4-trichlorobenzene as surrogate
1,2,3-Trichloropropane	no data	8.35E-03	k	
1,2,3-Trimethylbenzene	no data	no data		
1,2,4-Trichlorobenzene	no data	6.40E-02	e	
1,2,4-Trimethylbenzene	no data	no data		
1,2-Dibromo-3-chloropropane	no data	2.00E-02	k	
1,2-Dibromoethane	no data	1.24E-02	k	
1,2-Dichlorobenzene	no data	5.00E-02	e	

**Table 7-5. Ecological Benchmark Screening Values for Sediment
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed for In Sediment	EPA Region IV Eco. Screening Values ^a (mg/kg)	Supplemental Eco. Screening Values (mg/kg)	Ref.	Notes
1,2-Dichloroethane	no data	5.42E-02	k	
1,2-Dichloroethene (Total)	no data	2.09E-01	k	
1,2-Dichloropropane	no data	3.52E-01	k	
1,3,5-Trichlorobenzene	no data	6.40E-02	e	use 1,2,4-trichlorobenzene as surrogate
1,3,5-Trimethylbenzene	no data	no data		
1,3-Dichlorobenzene	no data	1.70E-01	e	
1,3-Dichloropropane	no data	3.52E-01	k	value for 1,2-dichloropropane
1,4-Dichlorobenzene	no data	1.20E-01	e	
2,2-Dichloropropane	no data	3.52E-01	k	value for 1,2-dichloropropane
2-Butanone	no data	1.37E-01	k	
2-Chlorotoluene	no data	no data		
2-Hexanone	no data	1.01E+00	k	
3-Chlorotoluene	no data	no data		
4-Chlorotoluene	no data	no data		
4-methyl-2-Pentanone (MIBK)	no data	5.44E-01	k	
Acetone	no data	4.53E-01	k	
Benzene	no data	5.70E-02	d	
Bromobenzene	no data	no data		
Bromochloromethane	no data	no data		
Bromodichloromethane	no data	1.13E-03	k	
Bromoform	no data	9.96E-01	k	
Bromomethane	no data	no data		
Carbon disulfide	no data	1.34E-01	k	
Carbon tetrachloride	no data	3.57E-02	k	
Chlorobenzene	no data	6.19E-02	k	
Chloroethane	no data	5.86E+01	k	
Chloroform	no data	2.70E-02	k	
Chloromethane (methyl chlorid	no data	7.85E-05	k	
cis-1,2-Dichloroethene	no data	2.09E-01	k	use trans-1,2-dichloroethene as surrogate
cis-1,3-Dichloropropene	no data	2.96E-03	k	
Dibromochloromethane	no data	2.68E-01	k	
Dibromomethane	no data	1.24E-02	k	
Dichlorodifluoromethane	no data	1.33E-03	k	
Ethyl benzene	no data	3.60E+00	d	
Hexachlorobutadiene	no data	1.38E+00	k	
Isopropylbenzene (cumene)	no data	no data		
m,p-Xylene	no data	2.50E-02	d	value for m-xylene
Methylene chloride	no data	1.26E+00	k	
Naphthalene	no data	3.46E-02	k	
n-Butylbenzene	no data	no data		
n-Propylbenzene	no data	no data		
o-Xylene	no data	1.88E+00	k	value for total xylenes
p-Isopropyltoluene (p-cymene	no data	no data		

**Table 7-5. Ecological Benchmark Screening Values for Sediment
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed for In Sediment	EPA Region IV Eco. Screening Values ^a (mg/kg)	Supplemental Eco. Screening Values (mg/kg)	Ref.	Notes
sec-Butylbenzene	no data	no data		
Styrene	no data	4.45E-01	k	
tert-Butylbenzene	no data	no data		
Tetrachloroethene	no data	1.96E-01	k	
Toluene	no data	6.70E-01	d	
trans-1,2-Dichloroethene	no data	2.09E-01	k	
trans-1,3-Dichloropropene	no data	2.96E-03	k	
Trichloroethene	no data	1.80E-01	k	
Trichlorofluoromethane	no data	3.07E-03	k	
Vinyl chloride	no data	2.00E-03	k	
Xylenes (total)	no data	1.88E+00	k	value for total xylenes
1,1-Dichloroethene	no data	2.33E-02	k	
Dibromochloromethane	no data	2.68E-01	k	
Semivolatile Organic Compounds (SVOCs)				
1,2,4-Trichlorobenzene	no data	6.40E-02	e	
1,2-Dichlorobenzene	no data	5.00E-02	e	
1,3-Dichlorobenzene	no data	1.70E-01	e	
1,4-Dichlorobenzene	no data	1.20E-01	e	
2,4,5-Trichlorophenol	no data	8.56E-02	k	
2,4,6-Trichlorophenol	no data	8.48E-02	k	
2,4-Dichlorophenol	no data	1.34E-01	k	
2,4-Dimethylphenol	no data	3.05E-01	k	
2,4-Dinitrophenol	no data	1.33E-03	k	
2,4-Dinitrotoluene	no data	7.51E-02	k	
2,6-Dichlorophenol	no data	3.94E-03	k	
2,6-Dinitrotoluene	no data	2.06E-02	k	
2-Chloronaphthalene	no data	4.17E-01	k	
2-Chlorophenol	no data	1.17E-02	k	
2-Methylnaphthalene	3.30E-01	--		
2-Methylphenol (o-cresol)	no data	6.30E-02	f	based on protection of flora & fauna
2-Nitroaniline	no data	2.00E-04	k	
2-Nitrophenol	no data	7.77E-03	k	
3,3'-Dichlorobenzidine	no data	2.82E-02	k	
3-Nitroaniline	no data	2.00E-04	k	
4,6-Dinitro-2-methylphenol	no data	no data		
4-Bromophenyl-phenylether	no data	1.55E+00	k	
4-Chloro-3-methylphenol	no data	no data		
4-Chloroaniline	no data	1.46E-01	k	
4-Chlorophenyl-phenylether	no data	6.56E-01	k	
4-Methylphenol (p-cresol)	no data	6.70E-01	f	based on protection of flora & fauna
4-Nitroaniline	no data	2.00E-04	k	
4-Nitrophenol	no data	7.78E-03	k	

**Table 7-5. Ecological Benchmark Screening Values for Sediment
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed for In Sediment	EPA Region IV Eco. Screening Values ^a (mg/kg)	Supplemental Eco. Screening Values (mg/kg)	Ref.	Notes
Acenaphthene	3.30E-01	--		
Acenaphthylene	3.30E-01	--		
Anthracene	3.30E-01	--		
Benzo(a)anthracene	3.30E-01	--		
Benzo(a)pyrene	3.30E-01	--		
Benzo(b)fluoranthene	6.55E-01	--		value for high molecular weight PAHs
Benzo(g,h,i)perylene	6.55E-01	--		value for high molecular weight PAHs
Benzo(k)fluoranthene	6.55E-01	--		value for high molecular weight PAHs
Benzoic acid	no data	6.50E-01	f	based on protection of flora & fauna
bis(2-Chloroethoxy)methane	no data	no data		
bis(2-Chloroethyl)ether	no data	2.12E-01	k	
bis(2-Chloroisopropyl)ether	no data	no data		
bis(2-Ethylhexyl)phthalate	1.82E-01	--		
Butyl benzyl phthalate	no data	4.19E+00	k	
Carbazole	no data	no data		
Chrysene	3.30E-01	--		
Dibenzo(a,h)anthracene	3.30E-01	--		
Dibenzofuran	no data	1.52E+00	k	
Diethyl phthalate	no data	8.04E-03	k	
Dimethylphthalate	no data	2.50E-02	k	
Di-n-butylphthalate	no data	1.11E-01	k	
Di-n-octylphthalate	no data	4.06E+01	k	
Fluoranthene	3.30E-01	--		
Fluorene	3.30E-01	--		
Hexachlorobenzene	no data	2.00E-02	k	
Hexachlorobutadiene	no data	1.38E+00	k	
Hexachlorocyclopentadiene	no data	9.01E-01	k	
Hexachloroethane	no data	2.23E+00	k	
Indeno(1,2,3-cd)pyrene	6.55E-01	--		value for high molecular weight PAHs
Isophorone	no data	4.22E-01	k	
Naphthalene	3.30E-01	--		
Nitrobenzene	no data	4.88E-01	k	
n-Nitroso-di-n-propylamine	no data	no data		
n-Nitrosodiphenylamine	no data	1.55E-01	k	
Pentachlorophenol	no data	6.90E-01	e	
Phenanthrene	3.30E-01	--		
Phenol	no data	2.73E-02	k	
Pyrene	3.30E-01	--		
Propane, 2,2'-Oxybis[1-Chloro	no data	no data		
Dioxins and Furans ⁹				
2,3,7,8-TCDD	2.50E-06	--		
Total TCDD	2.50E-06	--		use 2,3,7,8-TCDD as surrogate

**Table 7-5. Ecological Benchmark Screening Values for Sediment
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed for In Sediment	EPA Region IV Eco. Screening Values ^a (mg/kg)	Supplemental Eco. Screening Values (mg/kg)	Ref.	Notes
2,3,7,8-TCDF	2.50E-06	--		protective of fish, birds, mammals
Total TCDF	2.50E-06	--		protective of fish, birds, mammals
1,2,3,7,8-PeCDD	2.50E-06	--		protective of fish, birds, mammals
Total PeCDD	2.50E-06	--		protective of fish, birds, mammals
1,2,3,7,8-PeCDF	2.50E-05	--		protective of fish, birds, mammals
2,3,4,7,8-PeCDF	2.50E-06	--		protective of fish, birds, mammals
Total PeCDF	2.50E-06	--		protective of fish, birds, mammals
1,2,3,4,7,8-HxCDD	2.50E-05	--		protective of fish, birds, mammals
1,2,3,6,7,8-HxCDD	2.50E-05	--		protective of fish, birds, mammals
1,2,3,7,8,9-HxCDD	2.50E-05	--		protective of fish, birds, mammals
Total HxCDD	2.50E-05	--		protective of fish, birds, mammals
1,2,3,4,7,8-HxCDF	2.50E-05	--		protective of fish, birds, mammals
1,2,3,6,7,8-HxCDF	2.50E-05	--		protective of fish, birds, mammals
1,2,3,7,8,9-HxCDF	2.50E-05	--		protective of fish, birds, mammals
2,3,4,6,7,8-HxCDF	2.50E-05	--		protective of fish, birds, mammals
Total HxCDF	2.50E-05	--		protective of fish, birds, mammals
1,2,3,4,6,7,8-HpCDD	2.50E-04	--		protective of fish, birds, mammals
Total HpCDD	2.50E-04	--		protective of fish, birds, mammals
1,2,3,4,6,7,8-HpCDF	2.50E-04	--		protective of fish, birds, mammals
1,2,3,4,7,8,9-HpCDF	2.50E-04	--		protective of fish, birds, mammals
Total HpCDF	2.50E-04	--		protective of fish, birds, mammals
Total OCDD	2.50E-02	--		protective of fish, birds, mammals
Total OCDF	2.50E-02	--		protective of fish, birds, mammals
PCBs/Nitroexplosives/Pesticides/Herbicides				
Aroclor 1016	no data	3.30E-02		value for total PCBs
Aroclor 1221	6.70E-02	--		
Aroclor 1232	no data	3.30E-02		value for total PCBs
Aroclor 1242	no data	3.30E-02		value for total PCBs
Aroclor 1248	no data	3.30E-02		value for total PCBs
Aroclor 1254	no data	3.30E-02		value for total PCBs
Aroclor 1260	no data	3.30E-02		value for total PCBs
PCBs (solid media, food chair)	3.30E-02	--		
2,4,5-T	no data	no data		
2,4,5-TP (Silvex)	no data	7.35E+00	k	
2-Nitrotoluene	no data	no data		
3-Nitrotoluene	no data	no data		
4,4'-DDD	3.30E-03	--		
4,4'-DDE	3.30E-03	--		
4,4'-DDT	3.30E-03	--		
Aldrin	no data	2.00E-03	k	
alpha-BHC	no data	6.00E-03	k	
beta-BHC	no data	5.00E-03	k	

**Table 7-5. Ecological Benchmark Screening Values for Sediment
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed for In Sediment	EPA Region IV Eco. Screening Values ^a (mg/kg)	Supplemental Eco. Screening Values (mg/kg)	Ref.	Notes
Chlordane (technical)	1.70E-03	--		
delta-BHC	no data	7.15E+01	k	
Dieldrin	3.30E-03	--		
Endosulfan I	no data	1.75E-04	k	
Endosulfan II	no data	1.04E-04	k	
Endosulfan sulfate	no data	3.46E-02	k	
Endrin	3.30E-03	--		
Endrin aldehyde	no data	3.20E+00	k	
Endrin ketone	no data	3.20E+00	k	use endrin aldehyde as surrogate
gamma-BHC (Lindane)	3.30E-03	--		
Heptachlor	no data	6.00E-04	k	
Heptachlor epoxide	no data	6.00E-04	b	
Methoxychlor	no data	3.59E-03	k	
Toxaphene	no data	1.09E-04	k	
Dalapon	no data	no data		
2,4-D	no data	no data		
2,4-DB	no data	no data		
Dicamba	no data	no data		
Dichloroprop	no data	no data		
Dinoseb	no data	1.18E-02	k	
MCPA	no data	no data		
MCPP	no data	no data		
1,3,5-Trinitrobenzene	no data	2.40E-03	h	
1,3-Dinitrobenzene	no data	6.70E-03	h	
2,4,6-Trinitrotoluene	no data	9.20E-02	h	
2,4-Dinitrotoluene	no data	7.51E-02	k	
2,6-Dinitrotoluene	no data	2.06E-02	k	
2-Amino-4,6-dinitrotoluene	no data	no data		
4-Amino-2,6-Dinitrotoluene	no data	no data		
HMX	no data	4.70E-03	h	
Nitrobenzene	no data	4.88E-01	k	
RDX	no data	1.30E-02	h	
Tetryl	no data	no data		
p-Nitrotoluene	no data	no data		
Azinphosmethyl	no data	no data		
Bolstar	no data	no data		
Chlorpyrifos	no data	no data		
Coumaphos	no data	no data		
Demeton	no data	no data		
Diazinon	no data	1.90E-03	d	
Dichlorvos	no data	no data		
Dimethoate	no data	1.90E-01	k	
Disulfoton	no data	3.24E-01	k	

**Table 7-5. Ecological Benchmark Screening Values for Sediment
Fort McClellan RI, Anniston, Alabama (Continued)**

Constituents Analyzed for In Sediment	EPA Region IV Eco. Screening Values ^a (mg/kg)	Supplemental Eco. Screening Values (mg/kg)	Ref.	Notes
Ethoprop	no data	no data		
Famphur	no data	1.78E-03	k	
Fensulfothion	no data	no data		
Fenthion	no data	no data		
Malathion	no data	no data		
Merphos	no data	no data		
Methyl Parathion	no data	7.55E-04	k	
Mevinphos	no data	no data		
Naled	no data	no data		
Parathion	no data	3.40E-04	k	
Phorate	no data	8.61E-04	k	
Ronnel	no data	no data		
Stirophos	no data	no data		
Sulfotep	no data	no data		
Thionazin	no data	no data		
Tokuthion	no data	no data		
Trichloronate	no data	no data		

Notes:

- ^a EPA 1999. Region IV Waste Management Division Sediment Screening Values for Hazardous Waste Sites. Online
- ^b NOAA 1999. Screening Quick Reference Tables. Threshold Effects Level (TEL) for freshwater sediments.
- ^c Ontario Ministry of the Environment 1992. Guidelines for the Protection and Management of Aquatic Sediment Quality in Ontario. Lowest Effect Level.
- ^d OSWER 1996. Ecotox Thresholds. Presented in: ECO Update, January, 1996. EPA 540/F-95/038.
- ^e Barrick, R., S. Becker, L. Brown, H. Beller, and R. Pastorok 1988. Sediment Quality Values Refinement: 1988 Update and Evaluation of Puget Sound AET. Vol. 1. Prepared for the Puget Sound Estuary Program, Office of Puget Sound.
- ^f EPA Region III, 1995. BTAG Ecological Screening Value.
- ^g Screening values for PCDD/PCDFs were calculated using the TEF methodology presented in:
Van den Berg et al. 1998. Toxic Equivalency Factors for PCBs, PCDDs, PCDFs for Humans and Wildlife. Environ. Health Perspect. 106: 775-792.
- ^h Talmage et al. 1999. Nitroaromatic Munition Compounds: Environmental Effects and Screening Values.
Rev Environ Contam Toxicol 161:1-156.
- ^k EPA 1999. Region V Ecological Data Quality Levels (EDQL). Online. Based on the most conservative NOAELs for plants, earthworms, voles, and shrews.

**Table 7-6. Abiotic Toxicity Screen for Surface Water Area T5
Ft. McClellan RI, Anniston, Alabama**

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection		Range of Detected Concentrations		Units	Location of Maximum Concentration	Arithmetic Mean ³	Site EPC ^{3,3}	Concentration Used for Screening ⁴	ESV ⁵ Note ⁶	Max > ESV?	Maximum Hazard Quotient
				Limits	Concentrations	Concentrations	#								
Aluminum	7429-90-5	2 / 2	2	--	--	721	1,450	µg/L	T5-W03	1,086	1,450	87	Yes	17	
Barium	7440-39-3	2 / 2	2	--	--	24	26	µg/L	T5-W02	25	26	3.9	Yes	6.7	
Calcium	7440-70-2	2 / 2	2	--	--	2,060	5,000	µg/L	T5-W02	3,530	5,000	116,000	No	0.043	
Iron	7439-89-6	2 / 2	2	--	--	1,130	2,310	µg/L	T5-W03	1,720	2,310	1000	Yes	2.3	
Magnesium	7439-95-4	2 / 2	2	--	--	1,070	1,330	µg/L	T5-W02	1,200	1,330	82,000	No	0.016	
Manganese	7439-96-5	2 / 2	2	--	--	142	161	µg/L	T5-W02	152	161	80	Yes	2.0	
Sodium	7440-23-5	2 / 2	2	--	--	815	948	µg/L	T5-W02	882	948	680,000	No	0.0014	
Zinc	7440-66-6	2 / 2	2	--	--	27	29	µg/L	T5-W03	28	29	59	No	0.49	

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value. If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴ The maximum detected site concentration was used for the abiotic toxicity screen.

⁵ ESV = Ecological Screening Value from USEPA Region IV unless noted otherwise in the next column.

⁶ See Tables 7-3, 7-4, and 7-5 for further details concerning the ESVs. Non-Region IV ESVs are noted with an asterisk.

Table 7-7. Background Screen for Surface Water Area T5
 Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{2,3}	Concentration Used for Screening ⁴	2X Background Average ⁵	Max > Background?	ecoCOPC Flag ⁶
Aluminum	7429-90-5	2 / 2	2	--	721	1,450	T5-W03	1,086	1,450	1,450	5,689	No	No
Barium	7440-39-3	2 / 2	2	--	24	26	T5-W02	25	26	26	78	No	No
Calcium	7440-70-2	2 / 2	2	--	2,060	5,000	T5-W02	3,530	5,000	5,000	26,633	No	No
Iron	7439-89-6	2 / 2	2	--	1,130	2,310	T5-W03	1,720	2,310	2,310	21,130	No	No
Magnesium	7439-95-4	2 / 2	2	--	1,070	1,330	T5-W02	1,200	1,330	1,330	11,077	No	No
Manganese	7439-96-5	2 / 2	2	--	142	161	T5-W02	152	161	161	604	No	No
Sodium	7440-23-5	2 / 2	2	--	81.5	948	T5-W02	882	948	948	3,553	No	No
Zinc	7440-66-6	2 / 2	2	--	27	29	T5-W03	28	29	29	41	No	No

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "W" next to the EPC).

⁴ The maximum detected site concentration was used for the background screen.

⁵ Background threshold used in the background screen was two times the background average concentration.

⁶ If the maximum concentration was above the ESV and the background threshold, the chemical was identified as an ecoCOPC. If only one of the screening values was available (ESV or background) and the site maximum exceeded that value, the chemical was retained as an ecoCOPC. If neither an ESV nor background threshold was available, the chemical was selected as an ecoCOPC.

Table 7-8. Abiotic Toxicity Screen for Sediment Area T5
Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{2,3}	Concentration Used for Screening ⁴	ESV ⁵ Note ⁶	Max > ESV?	Maximum Hazard Quotient
Aluminum	7429-90-5	2 / 2	2	---	4,820 -	6,330	T5-D02	5,575	6,330	6,330	NA	Yes	NA
Barium	7440-39-3	2 / 2	2	---	25 -	28	T5-D02	26	28	28	NA	Yes	NA
Cadmium	7440-43-9	1 / 2	2	1.2 -	2.4 -	2.4	T5-D02	1.5	2.4	2.4	1.00	Yes	2.4
Calcium	7440-70-2	2 / 2	2	---	136 -	388	T5-D02	262	388	388	NA	Yes	NA
Chromium	7440-47-3	2 / 2	2	---	18 -	27	T5-D02	23	27	27	52	No	0.51
Copper	7440-50-8	2 / 2	2	---	16 -	59	T5-D02	37	59	59	19	Yes	3.1
Iron	7439-89-6	2 / 2	2	---	12,900 -	20,400	T5-D02	16,650	20,400	20,400	NA	Yes	NA
Lead	7439-92-1	2 / 2	2	---	16 -	260	T5-D02	138	260	260	30	Yes	8.6
Magnesium	7439-95-4	2 / 2	2	---	153 -	232	T5-D03	193	232	232	NA	Yes	NA
Manganese	7439-96-5	2 / 2	2	---	89 -	163	T5-D02	126	163	163	NA	Yes	NA
Potassium	7440-09-7	1 / 2	2	131 -	262 -	262	T5-D03	164	262	262	NA	Yes	NA
Vanadium	7440-62-2	2 / 2	2	---	16 -	26	T5-D02	21	26	26	NA	Yes	NA
Zinc	7440-66-6	2 / 2	2	---	34 -	111	T5-D02	72	111	111	124	No	0.90
Benzyl Alcohol	100-51-6	2 / 2	2	---	0.056 -	0.074	T5-D02	0.065	0.074	0.074	NA	Yes	NA
Di-n-butyl phthalate	84-74-2	2 / 2	2	---	1.8 -	5.4	T5-D02	3.6	5.4	5.4	0.11	Yes	49

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value. If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴ The maximum detected site concentration was used for the abiotic toxicity screen.

⁵ ESV = Ecological Screening Value from USEPA Region IV unless noted otherwise in the next column.

⁶ See Tables 7-3, 7-4, and 7-5 for further details concerning the ESVs. Non-Region IV ESVs are noted with an asterisk.

Table 7-9. Background Screen for Sediment Area T5
Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection		Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{3,4}	Concentration Used for Screening ⁴	2X Background Average ⁵	Max > Background?	ecoCOPC Flag ⁶
				Limits	Concentrations									
Aluminum	7429-90-5	2 / 2	2	--	--	4,820 - 6,330	mg/kg	T5-D02	5,575	6,330	#	8,859	No	No
Barium	7440-39-3	2 / 2	2	--	--	25 - 28	mg/kg	T5-D02	26	28	#	103	No	No
Cadmium	7440-43-9	1 / 2	2	1.2	1.2	2.4 - 2.4	mg/kg	T5-D02	1.5	2.4	#	0.47	Yes	Yes
Calcium	7440-70-2	2 / 2	2	--	--	136 - 388	mg/kg	T5-D02	262	388	#	1,139	No	No
Chromium	7440-47-3	2 / 2	2	--	--	18 - 27	mg/kg	T5-D02	23	27	#	32	No	No
Copper	7440-50-8	2 / 2	2	--	--	16 - 59	mg/kg	T5-D02	37	59	#	23	Yes	Yes
Iron	7439-89-6	2 / 2	2	--	--	12,900 - 20,400	mg/kg	T5-D02	16,650	20,400	#	35,480	No	No
Lead	7439-92-1	2 / 2	2	--	--	16 - 260	mg/kg	T5-D02	138	260	#	47	Yes	Yes
Magnesium	7439-95-4	2 / 2	2	--	--	153 - 232	mg/kg	T5-D03	193	232	#	970	No	No
Manganese	7439-96-5	2 / 2	2	--	--	89 - 163	mg/kg	T5-D02	126	163	#	1,071	No	No
Potassium	7440-09-7	1 / 2	2	131	131	262 - 262	mg/kg	T5-D03	164	262	#	1,076	No	No
Vanadium	7440-62-2	2 / 2	2	--	--	16 - 26	mg/kg	T5-D02	21	26	#	41	No	No
Zinc	7440-66-6	2 / 2	2	--	--	34 - 111	mg/kg	T5-D02	72	111	#	54	Yes	No
Benzyl Alcohol	100-51-6	2 / 2	2	--	--	0.056 - 0.074	mg/kg	T5-D02	0.065	0.074	#	--	Yes	Yes
Di-n-butyl phthalate	84-74-2	2 / 2	2	--	--	1.8 - 5.4	mg/kg	T5-D02	3.6	5.4	#	--	Yes	Yes

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

⁴ If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "w" next to the EPC).

⁵ The maximum detected site concentration was used for the background screen.

⁶ Background threshold used in the background screen was two times the background average concentration.

⁷ If the maximum concentration was above the ESV and the background threshold, the chemical was identified as an ecoCOPC. If only one of the screening values was available (ESV or background) and the site maximum exceeded that value, the chemical was retained as an ecoCOPC. If neither an ESV nor background threshold was available, the chemical was selected as an ecoCOPC.

Table 7-10. Abiotic Toxicity Screen for Surface Water Area T24A
 Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection		Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{3,4}	Concentration Used for Screening ⁴	ESV ⁵	ESV Note ⁶	Max > ESV?	Maximum Hazard Quotient
				Limits	Concentrations										
Aluminum	7429-90-5	1 / 1	1	--	--	209	µg/L	T24A-W02	209	209	209	87		Yes	2.4
Barium	7440-39-3	1 / 1	1	--	--	24	µg/L	T24A-W02	24	24	24	3.9		Yes	6.0
Calcium	7440-70-2	1 / 1	1	--	--	1,900	µg/L	T24A-W02	1,900	1,900	1,900	116,000		No	0.016
Iron	7439-89-6	1 / 1	1	--	--	409	µg/L	T24A-W02	409	409	409	1000		No	0.41
Lead	7439-92-1	1 / 1	1	--	--	8.8	µg/L	T24A-W02	8.8	8.8	8.8	1.3		Yes	6.7
Magnesium	7439-95-4	1 / 1	1	--	--	1,110	µg/L	T24A-W02	1,110	1,110	1,110	82,000		No	0.014
Manganese	7439-96-5	1 / 1	1	--	--	20	µg/L	T24A-W02	20	20	20	80		No	0.24
Potassium	7440-09-7	1 / 1	1	--	--	1,890	µg/L	T24A-W02	1,890	1,890	1,890	53,000		No	0.036
Sodium	7440-23-5	1 / 1	1	--	--	1,100	µg/L	T24A-W02	1,100	1,100	1,100	680,000		No	0.0016

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value. If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴ The maximum detected site concentration was used for the abiotic toxicity screen.

⁵ ESV = Ecological Screening Value from USEPA Region IV unless noted otherwise in the next column.

⁶ See Tables 7-3, 7-4, and 7-5 for further details concerning the ESVs. Non-Region IV ESVs are noted with an asterisk.

Table 7-11. Background Screen for Surface Water Area T24A
Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ³	Site EPC ^{2,3}	Concentration Used for Screening ⁴	2X Background Average ⁵	Max > Background?	ecocOPC Flag ⁶
Aluminum	7429-90-5	1 / 1	1	---	209	µg/L	T24A-W02	209	209	209	5,689	No	No
Barium	7440-39-3	1 / 1	1	---	24	µg/L	T24A-W02	24	24	24	78	No	No
Calcium	7440-70-2	1 / 1	1	---	1,900	µg/L	T24A-W02	1,900	1,900	1,900	26,633	No	No
Iron	7439-89-6	1 / 1	1	---	409	µg/L	T24A-W02	409	409	409	21,130	No	No
Lead	7439-92-1	1 / 1	1	---	8.8	µg/L	T24A-W02	8.8	8.8	8.8	9.6	No	No
Magnesium	7439-95-4	1 / 1	1	---	1,110	µg/L	T24A-W02	1,110	1,110	1,110	11,077	No	No
Manganese	7439-96-5	1 / 1	1	---	20	µg/L	T24A-W02	20	20	20	604	No	No
Potassium	7440-09-7	1 / 1	1	---	1,890	µg/L	T24A-W02	1,890	1,890	1,890	2,603	No	No
Sodium	7440-23-5	1 / 1	1	---	1,100	µg/L	T24A-W02	1,100	1,100	1,100	3,553	No	No

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analysis were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value. If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴ The maximum detected site concentration was used for the background screen.

⁵ Background threshold used in the background screen was two times the background average concentration.

⁶ If the maximum concentration was above the EPC and the background threshold, the chemical was identified as an ecocOPC. If only one of the screening values was available (ESV or background) and the site maximum exceeded that value, the chemical was retained as an ecocOPC. If neither an ESV nor background threshold was available, the chemical was selected as an ecocOPC.

**Table 7-12. Abiotic Toxicity Screen for Sediment Area T24A
Ft. McClellan RI, Anniston, Alabama**

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{2,3}	Concentration Used for Screening ⁴	ESV ⁵	ESV Note ⁶	Max > ESV?	Maximum Hazard Quotient
Aluminum	7429-90-5	1 / 1	1	--	9,810	mg/kg	T24A-D02	9,810	9,810	9,810	NA		Yes	NA
Barium	7440-39-3	1 / 1	1	--	130	mg/kg	T24A-D02	130	130	130	NA		Yes	NA
Calcium	7440-70-2	1 / 1	1	--	8,140	mg/kg	T24A-D02	8,140	8,140	8,140	NA		Yes	NA
Chromium	7440-47-3	1 / 1	1	--	27	mg/kg	T24A-D02	27	27	27	52		No	0.52
Cobalt	7440-48-4	1 / 1	1	--	3.8	mg/kg	T24A-D02	3.8	3.8	3.8	50		No	0.075
Copper	7440-50-8	1 / 1	1	--	12	mg/kg	T24A-D02	12	12	12	19		No	0.65
Iron	7439-89-6	1 / 1	1	--	50,400	mg/kg	T24A-D02	50,400	50,400	50,400	NA		Yes	NA
Lead	7439-92-1	1 / 1	1	--	12	mg/kg	T24A-D02	12	12	12	30		No	0.38
Magnesium	7439-95-4	1 / 1	1	--	4,950	mg/kg	T24A-D02	4,950	4,950	4,950	NA		Yes	NA
Manganese	7439-96-5	1 / 1	1	--	521	mg/kg	T24A-D02	521	521	521	NA		Yes	NA
Nickel	7440-02-0	1 / 1	1	--	6.3	mg/kg	T24A-D02	6.3	6.3	6.3	16		No	0.39
Potassium	7440-09-7	1 / 1	1	--	1,720	mg/kg	T24A-D02	1,720	1,720	1,720	NA		Yes	NA
Vanadium	7440-62-2	1 / 1	1	--	32	mg/kg	T24A-D02	32	32	32	NA		Yes	NA
Zinc	7440-66-6	1 / 1	1	--	20	mg/kg	T24A-D02	20	20	20	124		No	0.16
Benzyl Alcohol	100-51-6	1 / 1	1	--	0.062	mg/kg	T24A-D02	0.062	0.062	0.062	NA		Yes	NA

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value. If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴ The maximum detected site concentration was used for the abiotic toxicity screen.

⁵ ESV = Ecological Screening Value from USEPA Region IV unless noted otherwise in the next column.

⁶ See Tables 7-2, 7-3, and 7-4 for further details concerning the ESVs. Non-Region IV ESVs are noted with an asterisk.

Table 7-13. Background Screen for Sediment Area T24A
Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations		Units	Location of Maximum Concentration	Arithmetic Mean ³	Site EPC ^{3,1}	Concentration Used for Screening ⁴	2X Background Average ⁵	Max > Background?	ccCOPC Fig. 6
					Concentrations	Concentrations								
Aluminum	7429-90-5	/ /	1	--	9,810	9,810	mg/kg	T24A-D02	9,810	9,810	9,810	8,859	Yes	Yes
Barium	7440-39-3	/ /	1	--	130	130	mg/kg	T24A-D02	130	130	130	103	Yes	Yes
Calcium	7440-70-2	/ /	1	--	8,140	8,140	mg/kg	T24A-D02	8,140	8,140	8,140	1,139	Yes	Yes
Chromium	7440-47-3	/ /	1	--	27	27	mg/kg	T24A-D02	27	27	27	32	No	No
Cobalt	7440-48-4	/ /	1	--	3.8	3.8	mg/kg	T24A-D02	3.8	3.8	3.8	13	No	No
Copper	7440-50-8	/ /	1	--	12	12	mg/kg	T24A-D02	12	12	12	23	No	No
Iron	7439-89-6	/ /	1	--	50,400	50,400	mg/kg	T24A-D02	50,400	50,400	50,400	35,480	Yes	Yes
Lead	7439-92-1	/ /	1	--	12	12	mg/kg	T24A-D02	12	12	12	47	No	No
Magnesium	7439-95-4	/ /	1	--	4,950	4,950	mg/kg	T24A-D02	4,950	4,950	4,950	970	Yes	Yes
Manganese	7439-96-5	/ /	1	--	521	521	mg/kg	T24A-D02	521	521	521	1,071	No	No
Nickel	7440-02-0	/ /	1	--	6.3	6.3	mg/kg	T24A-D02	6.3	6.3	6.3	14	No	No
Potassium	7440-09-7	/ /	1	--	1,720	1,720	mg/kg	T24A-D02	1,720	1,720	1,720	1,076	Yes	Yes
Vanadium	7440-62-2	/ /	1	--	32	32	mg/kg	T24A-D02	32	32	32	41	No	No
Zinc	7440-66-6	/ /	1	--	20	20	mg/kg	T24A-D02	20	20	20	54	No	No
Benzyl Alcohol	100-51-6	/ /	1	--	0.062	0.062	mg/kg	T24A-D02	0.062	0.062	0.062	--	Yes	Yes

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴ The maximum detected site concentration was used for the background screen.

⁵ Background threshold used in the background screen was two times the background average concentration.

⁶ If the maximum concentration was above the ESV and the background threshold, the chemical was identified as an ccCOPC. If only one of the screening values was available (ESV or background) and the site maximum exceeded that value, the chemical was retained as an ccCOPC. If neither an ESV nor background threshold was available, the chemical was selected as an ccCOPC.

**Table 7-14. Abiotic Toxicity Screen for Surface Soils Area T-38
Ft. McClellan RI, Anniston, Alabama**

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ³	Site EPC ^{2,3}	Concentration Used for Screening ⁴	ESV ⁵ Note ⁶	Max > ESV?	Maximum Hazard Quotient
Aluminum	7429-90-5	3 / 3	3	0.0 - 1.00	18,500 - 38,700	mg/kg	T38-S09	29,100	38,700	38,700	50	Yes	774
Antimony	7440-36-0	1 / 3	3	1.00 - 1.00	1.4 - 1.4	mg/kg	T38-S09	0.78	1.4	1.4	3.5	No	0.39
Barium	7440-39-3	3 / 3	3	0.0 - 0.0	39 - 113	mg/kg	T38-S09	85	113	113	165	No	0.68
Calcium	7440-70-2	3 / 3	3	0.0 - 0.0	663 - 1,510	mg/kg	T38-S09	1,091	1,510	1,510	N/A	Yes	NA
Chromium	7440-47-3	3 / 3	3	0.0 - 0.0	17 - 150	mg/kg	T38-S09	69	150	150	0.40	Yes	375
Cobalt	7440-48-4	1 / 3	3	2.5 - 6.1	8.9 - 8.9	mg/kg	T38-S09	4.4	8.9	20	20	No	0.44
Copper	7440-50-8	2 / 3	3	23 - 23	15 - 23	mg/kg	T38-S09	17	23	23	40	No	0.58
Iron	7439-89-6	3 / 3	3	0.0 - 0.0	20,500 - 180,000	mg/kg	T38-S09	79,467	180,000	180,000	200	Yes	900
Lead	7439-92-1	3 / 3	3	0.0 - 0.0	16 - 84	mg/kg	T38-S10	39	84	84	50	Yes	1.7
Magnesium	7439-95-4	3 / 3	3	0.0 - 0.0	540 - 1,230	mg/kg	T38-S09	879	1,230	1,230	440,000	No	0.0028
Manganese	7439-96-5	3 / 3	3	0.0 - 0.0	310 - 666	mg/kg	T38-S10	479	666	666	100	Yes	6.7
Nickel	7440-02-0	3 / 3	3	0.0 - 0.0	7.7 - 13	mg/kg	T38-S09	11	13	13	30	No	0.42
Potassium	7440-09-7	3 / 3	3	0.0 - 0.0	558 - 850	mg/kg	T38-S09	708	850	850	N/A	Yes	NA
Vanadium	7440-62-2	3 / 3	3	0.0 - 0.0	28 - 186	mg/kg	T38-S09	92	186	186	2.0	Yes	93
Zinc	7440-66-6	3 / 3	3	0.0 - 0.0	26 - 39	mg/kg	T38-S09	32	39	39	50	No	0.78

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value. If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "M" next to the EPC).

⁴ The maximum detected site concentration was used for the abiotic toxicity screen.

⁵ ESV = Ecological Screening Value from USEPA Region IV unless noted otherwise in the next column.

⁶ See Tables 7-3, 7-4, and 7-5 for further details concerning the ESVs. Non-Region IV ESVs are noted with an asterisk.

Table 7-15. Background Screen for Surface Soils Area T-38
Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{2,3}	Concentration Used for Screening ⁴	2X Background Average ⁵	Max > Background?	ecoCOPC Fig. 6
Aluminum	7429-90-5	3 / 3	3	0.0 - 1.00	18,500 - 38,700	mg/kg	T38-S09	29,300	38,700	38,700	16,447	Yes	Yes
Antimony	7440-36-0	1 / 3	3	1.00 - 1.00	1.4 - 1.4	mg/kg	T38-S09	0.78	1.4	1.4	2.0	No	No
Barium	7440-39-3	3 / 3	3	0.0 - 0.0	39 - 113	mg/kg	T38-S09	85	113	113	123	No	No
Calcium	7440-70-2	3 / 3	3	0.0 - 0.0	663 - 1,510	mg/kg	T38-S09	1,091	1,510	1,510	1,700	No	No
Chromium	7440-47-3	3 / 3	3	0.0 - 0.0	17 - 150	mg/kg	T38-S09	69	150	150	37	Yes	Yes
Cobalt	7440-48-4	1 / 3	3	2.5 - 6.1	8.9 - 8.9	mg/kg	T38-S09	4.4	8.9	8.9	14	No	No
Copper	7440-50-8	2 / 3	3	23 - 23	15 - 23	mg/kg	T38-S09	17	23	23	13	Yes	No
Iron	7439-89-6	3 / 3	3	0.0 - 0.0	20,500 - 180,000	mg/kg	T38-S09	79,467	180,000	180,000	34,371	Yes	Yes
Lead	7439-92-1	3 / 3	3	0.0 - 0.0	16 - 84	mg/kg	T38-S10	39	84	84	39	Yes	Yes
Magnesium	7439-95-4	3 / 3	3	0.0 - 0.0	540 - 1,230	mg/kg	T38-S09	879	1,230	1,230	1,053	Yes	No
Manganese	7439-96-5	3 / 3	3	0.0 - 0.0	310 - 666	mg/kg	T38-S10	479	666	666	1,456	No	No
Nickel	7440-02-0	3 / 3	3	0.0 - 0.0	7.7 - 13	mg/kg	T38-S09	11	13	13	10	Yes	No
Potassium	7440-09-7	3 / 3	3	0.0 - 0.0	558 - 850	mg/kg	T38-S09	708	850	850	816	Yes	Yes
Vanadium	7440-62-2	3 / 3	3	0.0 - 0.0	28 - 186	mg/kg	T38-S09	92	186	186	59	Yes	Yes
Zinc	7440-66-6	3 / 3	3	0.0 - 0.0	26 - 39	mg/kg	T38-S09	32	39	39	40	No	No

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴ The maximum detected site concentration was used for the background screen.

⁵ Background threshold used in the background screen was two times the background average concentration.

⁶ If the maximum concentration was above the ESV and the background threshold, the chemical was identified as an ecoCOPC. If only one of the screening values was available (ESV or background) and the site maximum exceeded that value, the chemical was retained as an ecoCOPC. If neither an ESV nor background threshold was available, the chemical was selected as an ecoCOPC.

Table 7-16. Abiotic Toxicity Screen for Surface Water Range L
Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{2,3}	Concentration Used for Screening ⁴		ESV ⁵	Max > ESV? ⁶	Maximum Hazard Quotient
										ESV ⁵	ESV ⁵			
Aluminum	7429-90-5	4 / 4	4	--	137 - 1,440	µg/L	RL-W02	800	1,440	#	87	Yes	17	
Arsenic	7440-38-2	2 / 4	4	2.4 - 2.4	3.1 - 3.2	µg/L	RL-W03	2.2	3.2		190	No	0.017	
Barium	7440-39-3	4 / 4	4	--	11 - 32	µg/L	RL-W02	20	32	#	3.9	Yes	8.2	
Calcium	7440-70-2	4 / 4	4	--	798 - 6,140	µg/L	RL-W04	2,443	5,422	#	116,000	No	0.053	
Iron	7439-89-6	4 / 4	4	--	2,040 - 7,040	µg/L	RL-W01	4,788	7,040	#	1,000	Yes	7.0	
Magnesium	7439-95-4	4 / 4	4	--	301 - 1,050	µg/L	RL-W04	578	1,050	#	82,000	No	0.013	
Manganese	7439-96-5	4 / 4	4	--	44 - 975	µg/L	RL-W01	525	975	#	80	Yes	12	
Potassium	7440-09-7	3 / 4	4	1,240 - 1,240	1,460 - 1,870	µg/L	RL-W03	1,383	1,870	#	53,000	No	0.035	
Selenium	7782-49-2	1 / 4	4	2.5 - 2.5	3.4 - 3.4	µg/L	RL-W02	1.8	3.4		5.0	No	0.68	
Sodium	7440-23-5	4 / 4	4	--	416 - 1,760	µg/L	RL-W04	843	1,577	#	680,000	No	0.0026	
1,1,1-Trichloroethane	71-55-6	1 / 4	4	0.03 - 1.00	2.7 - 2.7	µg/L	RL-W02	1.1	2.7		528	No	0.0051	
2,4,6-Trinitrobenzene	118-96-7	2 / 4	4	0.43 - 0.43	0.92 - 2.2	µg/L	RL-W01	0.89	2.0		90	No	0.024	
2,4-Dinitrobenzene	121-14-2	2 / 4	4	0.40 - 0.40	1.6 - 5.4	µg/L	RL-W01	1.9	4.8		230	No	0.017	
2,6-Dinitrobenzene	606-20-2	2 / 4	4	0.60 - 0.60	0.82 - 2.3	µg/L	RL-W01	0.92	2.0		42	No	0.054	
alpha-BHC	319-84-6	2 / 4	4	0.0025 - 0.0025	0.0032 - 0.0033	µg/L	RL-W03	0.0023	0.0033	#	5,000	No	6.56E-07	
delta-BHC	319-86-8	2 / 4	4	0.0034 - 0.0034	0.0067 - 0.0073	µg/L	RL-W03	0.0043	0.0073	#	667	No	1.09E-05	

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

⁴ If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁵ The maximum detected site concentration was used for the abiotic toxicity screen.

⁶ ESV = Ecological Screening Value from USEPA Region IV unless noted otherwise in the next column.

⁷ See Tables 7-3, 7-4, and 7-5 for further details concerning the ESVs. Non-Region IV ESVs are noted with an asterisk.

Table 7-17. Background Screen for Surface Water Range I.
Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{2,3}	Concentration Used for Screening ⁴	2X Background Average ⁵	Max > Background?	ecoCOPC Flag ⁶
Aluminum	7429-90-5	4 / 4	4	--	137 - 1,440	µg/L	RL-W02	800	1,440	1,440	5,689	No	No
Arsenic	7440-38-2	2 / 4	4	2.4	3.1 - 3.2	µg/L	RL-W03	2.2	3.2	3.2	2.3	Yes	No
Barium	7440-39-3	4 / 4	4	--	11 - 32	µg/L	RL-W02	20	32	32	78	No	No
Calcium	7440-70-2	4 / 4	4	--	798 - 6,140	µg/L	RL-W04	2,443	5,422	6,140	26,633	No	No
Iron	7439-89-6	4 / 4	4	--	2,040 - 7,040	µg/L	RL-W01	4,788	7,040	7,040	21,130	No	No
Magnesium	7439-95-4	4 / 4	4	--	301 - 1,050	µg/L	RL-W04	578	1,050	1,050	11,077	No	No
Manganese	7439-96-5	4 / 4	4	--	44 - 975	µg/L	RL-W01	525	975	975	604	Yes	Yes
Potassium	7440-09-7	3 / 4	4	1,240	1,460 - 1,870	µg/L	RL-W03	1,383	1,870	1,870	2,603	No	No
Selenium	7782-49-2	1 / 4	4	2.5	3.4 - 3.4	µg/L	RL-W02	1.8	3.4	3.4	--	Yes	No
Sodium	7440-23-5	4 / 4	4	--	416 - 1,760	µg/L	RL-W04	843	1,577	1,760	3,553	No	No
1,1,1-Trichloroethane	71-55-6	1 / 4	4	1.00	2.7 - 2.7	µg/L	RL-W02	1.1	2.7	2.7	--	Yes	No
2,4,6-Trinitrotoluene	118-96-7	2 / 4	4	0.43	0.92 - 0.43	µg/L	RL-W01	0.89	2.0	2.2	--	Yes	No
2,4-Dinitrotoluene	121-14-2	2 / 4	4	0.40	1.6 - 5.4	µg/L	RL-W01	1.9	4.8	5.4	--	Yes	No
2,6-Dinitrotoluene	606-20-2	2 / 4	4	0.60	0.82 - 2.3	µg/L	RL-W01	0.92	2.0	2.3	--	Yes	No
alpha BHC	319-84-6	2 / 4	4	0.0025	0.0032 - 0.0033	µg/L	RL-W03	0.0023	0.0033	0.0033	--	Yes	No
delta-BHC	319-86-8	2 / 4	4	0.0034	0.0067 - 0.0073	µg/L	RL-W03	0.0043	0.0073	0.0073	--	Yes	No

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value. If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴ The maximum detected site concentration was used for the background screen.

⁵ Background threshold used in the background screen was two times the background average concentration.

⁶ If the maximum concentration was above the EPC and the background threshold, the chemical was identified as an ecoCOPC. If only one of the screening values was available (ESV or background) and the site maximum exceeded that value, the chemical was retained as an ecoCOPC. If neither an ESV nor background threshold was available, the chemical was selected as an ecoCOPC.

**Table 7-18. Abiotic Toxicity Screen for Sediment Range L
Ft. McClellan RI, Anniston, Alabama**

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection		Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{2,3}	Concentration Used for Screening ⁴		ESV ⁵	Max > ESV?	Maximum Hazard Quotient
				Limits	Concentrations						ESV ⁵	Note ⁶			
Aluminum	7429-90-5	5 / 5	5	0.0	-	12,900	mg/kg	RL-D01	30,720	51,198	61,500	NA	Yes	NA	
Barium	7440-39-3	5 / 5	5	0.0	-	56	mg/kg	RL-D01	107	165	165	NA	Yes	NA	
Calcium	7440-70-2	5 / 5	5	0.0	-	434	mg/kg	RL-D02	958	1,492	1,800	NA	Yes	NA	
Chromium	7440-47-3	5 / 5	5	0.0	-	30	mg/kg	RL-D04	57	80	80	52	Yes	1.5	
Cobalt	7440-48-4	5 / 5	5	0.0	-	6.7	mg/kg	RL-D03	41	92	92	50	Yes	1.8	
Copper	7440-50-8	5 / 5	5	0.0	-	18	mg/kg	RL-D03	31	45	51	19	Yes	2.7	
Iron	7439-89-6	5 / 5	5	0.0	-	20,100	mg/kg	RL-D04	32,860	42,906	49,200	NA	Yes	NA	
Lead	7439-92-1	5 / 5	5	0.0	-	19	mg/kg	RL-D03	39	58	64	30	Yes	2.1	
Magnesium	7439-95-4	5 / 5	5	0.0	-	574	mg/kg	RL-D01	1,501	2,571	3,290	NA	Yes	NA	
Manganese	7439-96-5	5 / 5	5	0.0	-	282	mg/kg	RL-D02	734	1,112	1,340	NA	Yes	NA	
Nickel	7440-02-0	5 / 5	5	0.0	-	13	mg/kg	RL-D01	76	176	176	16	Yes	11	
Potassium	7440-09-7	5 / 5	5	0.0	-	746	mg/kg	RL-D01	3,066	5,932	8,010	NA	Yes	NA	
Selenium	7782-49-2	3 / 5	5	0.45	-	0.78	mg/kg	RL-D04	0.78	1.5	1.5	NA	Yes	NA	
Sodium	7440-23-5	2 / 5	5	39	-	98	mg/kg	RL-D01	76	222	222	NA	Yes	NA	
Vanadium	7440-62-2	5 / 5	5	0.0	-	38	mg/kg	RL-D01	73	111	111	NA	Yes	NA	
Zinc	7440-66-6	5 / 5	5	0.0	-	57	mg/kg	RL-D03	139	247	247	124	Yes	2.0	
Dieldrin	60-57-1	1 / 5	5	0.0016	-	0.0036	mg/kg	RL-D04	0.0017	0.0029	0.0036	0.0033	Yes	1.1	

.. Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value. If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "H" next to the EPC).

⁴ The maximum detected site concentration was used for the abiotic toxicity screen.

⁵ ESV = Ecological Screening Value from USEPA Region IV unless noted otherwise in the next column.

⁶ See Tables 7-3, 7-4, and 7-5 for further details concerning the ESVs. Non-Region IV ESVs are noted with an asterisk.

Table 7-19. Background Screen for Sediment Range L
Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection		Range of Detected Concentrations		Location of Maximum Concentration		Arithmetic Mean ³	Site EPC ^{3,3}	Concentration Used for Screening ⁴	2X Background Average ⁵	Max > Background?	ecocCOPC Flag ⁶
				Limits	0.0	Concentrations	Units	Concentration	Units						
Aluminum	7429-90-5	5 / 5	5	0.0	0.0	12,500	61,500	RL-D01	30,720	51,198	61,500	8,859	Yes	Yes	
Barium	7440-39-3	5 / 5	5	0.0	0.0	56	165	RL-D01	107	165	165	103	Yes	Yes	
Calcium	7440-70-2	5 / 5	5	0.0	0.0	434	1,800	RL-D02	958	1,492	1,800	1,139	Yes	Yes	
Chromium	7440-47-3	5 / 5	5	0.0	0.0	30	80	RL-D04	57	80	80	32	Yes	Yes	
Cobalt	7440-48-4	5 / 5	5	0.0	0.0	6.7	92	RL-D03	41	92	92	13	Yes	Yes	
Copper	7440-50-8	5 / 5	5	0.0	0.0	18	51	RL-D03	31	45	51	23	Yes	Yes	
Iron	7439-89-6	5 / 5	5	0.0	0.0	20,100	49,200	RL-D04	32,860	42,906	49,200	35,480	Yes	Yes	
Lead	7439-92-1	5 / 5	5	0.0	0.0	19	64	RL-D03	39	58	64	47	Yes	Yes	
Magnesium	7439-95-4	5 / 5	5	0.0	0.0	574	3,290	RL-D01	1,501	2,571	3,290	970	Yes	Yes	
Manganese	7439-96-5	5 / 5	5	0.0	0.0	282	1,340	RL-D02	734	1,112	1,340	1,071	Yes	Yes	
Nickel	7440-02-0	5 / 5	5	0.0	0.0	13	76	RL-D01	76	176	176	14	Yes	Yes	
Potassium	7440-09-7	5 / 5	5	0.0	0.0	746	8,010	RL-D01	3,066	5,932	8,010	1,076	Yes	Yes	
Selenium	7782-49-2	3 / 5	5	0.45	0.45	0.78	1.5	RL-D04	0.78	1.5	1.5	0.59	Yes	Yes	
Sodium	7440-23-5	2 / 5	5	39	39	98	222	RL-D01	76	222	222	681	No	No	
Vanadium	7440-62-2	5 / 5	5	0.0	0.0	38	111	RL-D01	73	111	111	41	Yes	Yes	
Zinc	7440-66-6	5 / 5	5	0.0	0.0	57	247	RL-D03	139	247	247	54	Yes	Yes	
Dieldrin	60-57-1	1 / 5	5	0.0016	0.0048	0.0036	0.0036	RL-D04	0.0017	0.0029	0.0036	..	Yes	Yes	

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value. If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "m" next to the EPC).

⁴ The maximum detected site concentration was used for the background screen.

⁵ Background threshold used in the background screen was two times the background average concentration.

⁶ If the maximum concentration was above the ESV and the background threshold, the chemical was identified as an ecocCOPC. If only one of the screening values was available (ESV or background) and the site maximum exceeded that value, the chemical was retained as an ecocCOPC. If neither an ESV nor background threshold was available, the chemical was selected as an ecocCOPC.

Table 7-20. Abiotic Toxicity Screen for Surface Soils Range L
Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{2,3}	Concentration Used for Screening ⁴	ESV ⁵	ESV Note ⁶	Max > ESV?	Maximum Hazard Quotient
Aluminum	7429-90-5	2 / 2	2	--	8,690 - 42,100	mg/kg	RL-S08	25,395	42,100	42,100	50		Yes	842
Antimony	7440-36-0	1 / 2	2	1.00	2.3	mg/kg	RL-S02	1.4	2.3	2.3	3.5		No	0.64
Barium	7440-39-3	2 / 2	2	--	18	mg/kg	RL-S08	48	78	78	165		No	0.47
Calcium	7440-70-2	2 / 2	2	--	109	mg/kg	RL-S08	129	148	148	NA		Yes	NA
Chromium	7440-47-3	2 / 2	2	--	40	mg/kg	RL-S02	57	73	73	0.40		Yes	184
Cobalt	7440-48-4	2 / 2	2	--	15	mg/kg	RL-S08	54	94	94	20		Yes	4.7
Copper	7440-50-8	2 / 2	2	--	23	mg/kg	RL-S08	35	48	48	40		Yes	1.2
Iron	7439-89-6	2 / 2	2	--	43,800 - 80,000	mg/kg	RL-S02	61,500	80,000	80,000	200		Yes	400
Lead	7439-92-1	2 / 2	2	--	19	mg/kg	RL-S02	65	110	110	50		Yes	2.2
Magnesium	7439-95-4	2 / 2	2	--	185	mg/kg	RL-S08	968	1,750	1,750	440,000	*	No	0.0040
Manganese	7439-96-5	2 / 2	2	--	485	mg/kg	RL-S08	3,043	5,600	5,600	100		Yes	56
Nickel	7440-02-0	2 / 2	2	--	13	mg/kg	RL-S08	90	166	166	30		Yes	5.5
Potassium	7440-09-7	2 / 2	2	--	197	mg/kg	RL-S08	1,599	3,000	3,000	NA		Yes	NA
Selenium	7782-49-2	1 / 2	2	0.45	0.84	mg/kg	RL-S02	0.53	0.84	0.84	0.81		Yes	1.0
Sodium	7440-23-5	1 / 2	2	39	78	mg/kg	RL-S08	49	78	78	NA		Yes	NA
Vanadium	7440-62-2	2 / 2	2	--	51	mg/kg	RL-S08	63	76	76	2.0		Yes	3.8
Zinc	7440-66-6	2 / 2	2	--	26	mg/kg	RL-S08	93	160	160	50		Yes	3.2
Benzyl Alcohol	100-51-6	1 / 2	2	0.032	0.11	mg/kg	RL-S08	0.063	0.11	0.11	NA		Yes	NA

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

⁴ If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁵ The maximum detected site concentration was used for the abiotic toxicity screen.

⁶ ESV = Ecological Screening Value from USEPA Region IV unless noted otherwise in the next column.

* See Tables 7-3, 7-4, and 7-5 for further details concerning the ESVs. Non-Region IV ESVs are noted with an asterisk.

Table 7-21. Background Screen for Surface Soils Range L, Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection		Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{2,3}	Concentration Used for Screening ⁴	2X Background Average ⁵	Max > Background?	ecocOPC Flag ⁶
				Limits	Concentrations								
Aluminum	7429-90-5	2 / 2	2	--	8,690 - 42,100	mg/kg	RL-S08	25,395	42,100	42,100	Yes	Yes	
Antimony	7440-36-0	1 / 2	2	1.00	2.3	mg/kg	RL-S02	1.4	2.3	16,447	Yes	No	
Barium	7440-39-3	2 / 2	2	--	18	mg/kg	RL-S08	48	78	2.0	No	No	
Calcium	7440-70-2	2 / 2	2	--	109	mg/kg	RL-S08	129	148	123	No	No	
Chromium	7440-47-3	2 / 2	2	--	40	mg/kg	RL-S02	57	73	1,700	Yes	No	
Cobalt	7440-48-4	2 / 2	2	--	15	mg/kg	RL-S08	54	94	37	Yes	Yes	
Copper	7440-50-8	2 / 2	2	--	23	mg/kg	RL-S08	35	48	14	Yes	Yes	
Iron	7439-89-6	2 / 2	2	--	43,800	mg/kg	RL-S02	61,900	80,000	13	Yes	Yes	
Lead	7439-92-1	2 / 2	2	--	19	mg/kg	RL-S02	65	110	39	Yes	Yes	
Magnesium	7439-95-4	2 / 2	2	--	185	mg/kg	RL-S08	968	1,750	1,053	Yes	No	
Manganese	7439-96-5	2 / 2	2	--	485	mg/kg	RL-S08	3,043	5,600	1,456	Yes	No	
Nickel	7440-02-0	2 / 2	2	--	13	mg/kg	RL-S08	90	166	10	Yes	Yes	
Potassium	7782-49-2	2 / 2	2	0.45	197	mg/kg	RL-S08	1,599	3,000	816	Yes	Yes	
Selenium	7782-49-2	1 / 2	2	0.45	0.84	mg/kg	RL-S02	0.53	0.84	0.44	Yes	Yes	
Sodium	7440-23-5	1 / 2	2	39	78	mg/kg	RL-S08	49	78	630	No	No	
Vanadium	7440-62-2	2 / 2	2	--	51	mg/kg	RL-S08	63	76	59	Yes	Yes	
Zinc	7440-66-6	2 / 2	2	0.032	26	mg/kg	RL-S08	93	160	40	Yes	Yes	
Benzyl Alcohol	100-51-6	1 / 2	2	0.032	0.11	mg/kg	RL-S08	0.063	0.11	--	Yes	Yes	

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value. If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴ The maximum detected site concentration was used for the background screen.

⁵ Background threshold used in the background screen was two times the background average concentration.

⁶ If the maximum concentration was above the ESV and the background threshold, the chemical was identified as an ecocOPC. If only one of the screening values was available (ESV or background) and the site maximum exceeded that value, the chemical was retained as an ecocOPC. If neither an ESV nor background threshold was available, the chemical was selected as an ecocOPC.

Table 7-22. Abiotic Toxicity Screen for Surface Water Landfill #1
Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection		Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{3,3}	Concentration Used for Screening ⁴		ESV ⁵ Note ⁶	Max > ESV?	Maximum Hazard Quotient
				Limits	Concentrations						ESV ⁵	Screening ⁴			
Aluminum	7429-90-5	3 / 3	3	0.0	0.0	461	µg/L	LF1-W01	3,560	5,140	#	87	Yes	59	
Arsenic	7440-38-2	4 / 4	3	0.0	0.0	4.8	µg/L	LF1-W02	5.2	5.5	#	190	No	0.029	
Barium	7440-39-3	3 / 3	3	0.0	0.0	37	µg/L	LF1-W01	81	104	#	3.9	Yes	27	
Calcium	7440-70-2	3 / 3	3	0.0	0.0	9,190	µg/L	LF1-W02	13,837	23,100	#	116,000	No	0.20	
Iron	7439-89-6	3 / 3	3	0.0	0.0	910	µg/L	LF1-W01	7,303	10,700	#	1,000	Yes	11	
Lead	7439-92-1	4 / 4	3	0.0	0.0	7.8	µg/L	LF1-W01	8.0	8.2	#	1.3	Yes	6.2	
Magnesium	7439-95-4	3 / 3	3	0.0	0.0	3,720	µg/L	LF1-W02	5,953	10,400	#	82,000	No	0.13	
Manganese	7439-96-5	3 / 3	3	0.0	0.0	22	µg/L	LF1-W01	110	162	#	80	Yes	2.0	
Sodium	7440-23-5	3 / 3	3	0.0	0.0	1,490	µg/L	LF1-W02	2,783	5,340	#	680,000	No	0.0079	
Zinc	7440-66-6	2 / 3	3	18	18	41	µg/L	LF1-W01	31	42	#	59	No	0.70	
1,1,1-Trichloroethane	71-55-6	1 / 3	3	1.00	1.00	1.5	µg/L	LF1-W02	0.83	1.5	#	528	No	0.0028	
Chlorobenzene	108-90-7	1 / 3	3	1.00	1.00	1.9	µg/L	LF1-W02	0.97	1.9	#	195	No	0.0097	

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analysis were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴ The maximum detected site concentration was used for the abiotic toxicity screen.

⁵ ESV = Ecological Screening Value from USEPA Region IV unless noted otherwise in the next column.

⁶ See Tables 7-3, 7-4, and 7-5 for further details concerning the ESVs. Non-Region IV ESVs are noted with an asterisk.

**Table 7-23. Background Screen for Surface Water Landfill #1
Ft. McClellan RI, Anniston, Alabama**

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ³	Site EPC ^{2,3}	Concentration Used for Screening ⁴	2X Background Average ⁵	Max > Background?	ecoCOPC Flag ⁶
Aluminum	7429-90-5	3 / 3	3	0.0 - 0.0	461 - 5,140	µg/L	LF1-W01	3,560	5,140	#	5,140	No	No
Arsenic	7440-38-2	4 / 4	3	0.0 - 0.0	4.8 - 5.5	µg/L	LF1-W02	5.2	5.5	#	5.5	Yes	No
Barium	7440-39-3	3 / 3	3	0.0 - 0.0	37 - 104	µg/L	LF1-W01	81	104	#	104	Yes	Yes
Calcium	7440-70-2	3 / 3	3	0.0 - 0.0	9,190 - 23,100	µg/L	LF1-W02	13,837	23,100	#	23,100	No	No
Iron	7439-89-6	3 / 3	3	0.0 - 0.0	910 - 10,700	µg/L	LF1-W01	7,303	10,700	#	10,700	No	No
Lead	7439-92-1	4 / 4	3	0.0 - 0.0	7.8 - 8.2	µg/L	LF1-W01	8.0	8.2	#	8.2	No	No
Magnesium	7439-95-4	3 / 3	3	0.0 - 0.0	3,720 - 10,400	µg/L	LF1-W02	5,953	10,400	#	10,400	No	No
Manganese	7439-96-5	3 / 3	3	0.0 - 0.0	22 - 162	µg/L	LF1-W01	110	162	#	162	No	No
Sodium	7440-23-5	3 / 3	3	0.0 - 0.0	1,490 - 5,340	µg/L	LF1-W02	2,783	5,340	#	5,340	Yes	No
Zinc	7440-66-6	2 / 3	3	18 - 41	41 - 42	µg/L	LF1-W01	31	42	#	42	Yes	No
1,1,1-Trichloroethane	71-55-6	1 / 3	3	1.00 - 1.00	1.5 - 1.5	µg/L	LF1-W02	0.83	1.5	#	1.5	Yes	No
Chlorobenzene	108-90-7	1 / 3	3	1.00 - 1.00	1.9 - 1.9	µg/L	LF1-W02	0.97	1.9	#	1.9	Yes	No

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴ The maximum detected site concentration was used for the background screen.

⁵ Background threshold used in the background screen was two times the background average concentration.

⁶ If the maximum concentration was above the ESV and the background threshold, the chemical was identified as an ecoCOPC. If only one of the screening values was available (ESV or background) and the site maximum exceeded that value, the chemical was retained as an ecoCOPC. If neither an ESV nor background threshold was available, the chemical was selected as an ecoCOPC.

**Table 7-24. Abiotic Toxicity Screen for Sediment Landfill #1
Ft. McClellan RI, Anniston, Alabama**

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits		Range of Detected Concentrations		Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{2,3}	Concentration Used for Screening ⁴		ESV Note ⁶	Max > ESV? ⁵	Maximum Hazard Quotient
				0.0	0.032	6,620	17,400					#	#			
Aluminum	7429-90-5	3 / 3	3	0.0	0.0	6,620	17,400	mg/kg	LFI-D01	10,487	17,400	17,400	NA	Yes	NA	
Barium	7440-39-3	3 / 3	3	0.0	0.0	47	247	mg/kg	LFI-D02	139	247	247	NA	Yes	NA	
Calcium	7440-70-2	3 / 3	3	0.0	0.0	1,330	54,100	mg/kg	LFI-D02	28,377	54,100	54,100	NA	Yes	NA	
Chromium	7440-47-3	3 / 3	3	0.0	0.0	16	24	mg/kg	LFI-D02	20	24	24	52	No	0.45	
Cobalt	7440-48-4	3 / 3	3	0.0	0.0	6.3	9.7	mg/kg	LFI-D02	8.1	9.7	9.7	50	No	0.19	
Copper	7440-50-8	3 / 3	3	0.0	0.0	12	15	mg/kg	LFI-D01	13	15	15	19	No	0.80	
Iron	7439-89-6	3 / 3	3	0.0	0.0	24,300	38,600	mg/kg	LFI-D02	30,800	38,600	38,600	NA	Yes	NA	
Lead	7439-92-1	3 / 3	3	0.0	0.0	14	17	mg/kg	LFI-D02	15	17	17	30	No	0.56	
Magnesium	7439-95-4	3 / 3	3	0.0	0.0	2,440	30,500	mg/kg	LFI-D02	16,447	30,500	30,500	NA	Yes	NA	
Manganese	7439-96-5	3 / 3	3	0.0	0.0	103	1,600	mg/kg	LFI-D02	680	1,600	1,600	NA	Yes	NA	
Nickel	7440-02-0	3 / 3	3	0.0	0.0	9.5	18	mg/kg	LFI-D01	12	18	18	16	Yes	1.1	
Potassium	7440-09-7	3 / 3	3	0.0	0.0	294	1,510	mg/kg	LFI-D01	759	1,510	1,510	NA	Yes	NA	
Vanadium	7440-62-2	3 / 3	3	0.0	0.0	20	34	mg/kg	LFI-D02	27	34	34	NA	Yes	NA	
Zinc	7440-66-6	3 / 3	3	0.0	0.0	42	50	mg/kg	LFI-D02	46	50	50	124	No	0.40	
Benzyl Alcohol	100-51-6	2 / 3	3	0.032	0.032	0.059	0.064	mg/kg	LFI-D01	0.046	0.064	0.064	NA	Yes	NA	

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analysis were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴ The maximum detected site concentration was used for the abiotic toxicity screen.

⁵ ESV = Ecological Screening Value from USEPA Region IV unless noted otherwise in the next column.

⁶ See Tables 7-3, 7-4, and 7-5 for further details concerning the ESVs. Non-Region IV ESVs are noted with an asterisk.

Table 7-25. Background Screen for Sediment Landfill #1
 Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection		Range of Detected Concentrations		Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{3,4}	Concentration Used for Screening ⁴	2X Background Average ⁵	Max > Background?	ecocCPC Flag ⁶
				Limits	Concentrations	Units	Concentrations							
Aluminum	7429-90-5	3 / 3	3	0.0	0.0	6,620	17,400	LFI-D01	10,487	17,400	17,400	8,839	Yes	Yes
Barium	7440-39-3	3 / 3	3	0.0	0.0	47	247	LFI-D02	139	247	247	103	Yes	Yes
Calcium	7440-70-2	3 / 3	3	0.0	0.0	1,330	54,100	LFI-D02	28,377	54,100	54,100	1,139	Yes	Yes
Chromium	7440-47-3	3 / 3	3	0.0	0.0	16	24	LFI-D02	20	24	24	32	No	No
Cobalt	7440-48-4	3 / 3	3	0.0	0.0	6.3	9.7	LFI-D02	8.1	9.7	9.7	13	No	No
Copper	7440-50-8	3 / 3	3	0.0	0.0	12	15	LFI-D01	13	15	15	23	No	No
Iron	7439-89-6	3 / 3	3	0.0	0.0	24,300	38,600	LFI-D02	30,800	38,600	38,600	35,480	Yes	Yes
Lead	7439-92-1	3 / 3	3	0.0	0.0	14	17	LFI-D02	15	17	17	47	No	No
Magnesium	7439-95-4	3 / 3	3	0.0	0.0	2,440	30,500	LFI-D02	16,447	30,500	30,500	970	Yes	Yes
Manganese	7439-96-5	3 / 3	3	0.0	0.0	103	1,600	LFI-D02	680	1,600	1,600	1,071	Yes	Yes
Nickel	7440-02-0	3 / 3	3	0.0	0.0	9.5	18	LFI-D01	12	18	18	14	Yes	Yes
Potassium	7440-09-7	3 / 3	3	0.0	0.0	294	1,510	LFI-D01	759	1,510	1,510	1,076	Yes	Yes
Vanadium	7440-62-2	3 / 3	3	0.0	0.0	20	34	LFI-D02	27	34	34	41	No	No
Zinc	7440-66-6	3 / 3	3	0.0	0.0	42	50	LFI-D02	46	50	50	54	No	No
Benzyl Alcohol	100-51-6	2 / 3	3	0.032	0.032	0.059	0.064	LFI-D01	0.046	0.064	0.064	--	Yes	Yes

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value. If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "M" next to the EPC).

⁴ The maximum detected site concentration was used for the background screen.

⁵ Background threshold used in the background screen was two times the background average concentration.

⁶ If the maximum concentration was above the ESV and the background threshold, the chemical was identified as an ecocCPC. If only one of the screening values was available (ESV or background) and the site maximum exceeded that value, the chemical was retained as an ecocCPC. If neither an ESV nor background threshold was available, the chemical was selected as an ecocCPC.

**Table 7-26. Abiotic Toxicity Screen for Surface Water Landfill #2
Ft. McClellan RI, Anniston, Alabama**

Chemical	CAS Number	Frequency of Detection	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{2,3}	Concentration Used for Screening ⁴	ESV ⁵	ESV Note ⁶	Max > ESV?	Maximum Hazard Quotient
Aluminum	7429-90-5	2 / 2	2	--	157 - 201	µg/L	LF2-W01	179	201	201	87		Yes	2.3
Barium	7440-39-3	2 / 2	2	--	16	µg/L	LF2-W02	17	19	19	3.9	*	Yes	4.7
Calcium	7440-70-2	2 / 2	2	--	11,900	µg/L	LF2-W01	13,600	15,300	15,300	116,000	*	No	0.13
Iron	7439-89-6	2 / 2	2	--	255	µg/L	LF2-W01	292	329	329	1000	*	No	0.33
Magnesium	7439-95-4	2 / 2	2	--	6,730	µg/L	LF2-W01	7,690	8,650	8,650	82,000	*	No	0.11
Manganese	7439-96-5	2 / 2	2	--	14	µg/L	LF2-W01	19	23	23	80	*	No	0.29
Potassium	7440-09-7	1 / 2	2	1,240 - 1,240	1,330	µg/L	LF2-W02	975	1,330	1,330	53,000	*	No	0.025
Sodium	7440-23-5	2 / 2	2	--	902	µg/L	LF2-W02	1,016	1,130	1,130	680,000	*	No	0.0017

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "W" next to the EPC).

⁴ The maximum detected site concentration was used for the abiotic toxicity screen.

⁵ ESV = Ecological Screening Value from USEPA Region IV unless noted otherwise in the next column.

⁶ See Tables 7-3, 7-4, and 7-5 for further details concerning the ESVs. Non-Region IV ESVs are noted with an asterisk.

**Table 7-27. Background Screen for Surface Water Landfill #2
 Ft. McClellan RI, Anniston, Alabama**

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection		Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{3,4}	Concentration Used for Screening ⁴	2X Background Average ⁵	Max > Background?	ecoCOPC Flag ⁶
				Limits	Concentrations									
Aluminum	7429-90-5	2 / 2	2	--	--	157 - 201	µg/L	LF2-W01	179	201	201	5,689	No	No
Barium	7440-39-3	2 / 2	2	--	--	16 - 19	µg/L	LF2-W02	17	19	19	78	No	No
Calcium	7440-70-2	2 / 2	2	--	--	11,900 - 15,300	µg/L	LF2-W01	13,600	15,300	15,300	26,633	No	No
Iron	7439-89-6	2 / 2	2	--	--	255 - 329	µg/L	LF2-W01	292	329	329	21,130	No	No
Magnesium	7439-95-4	2 / 2	2	--	--	6,730 - 8,650	µg/L	LF2-W01	7,690	8,650	8,650	11,077	No	No
Manganese	7439-96-5	2 / 2	2	--	--	14 - 23	µg/L	LF2-W01	19	23	23	604	No	No
Potassium	7440-09-7	1 / 2	2	1,240	1,240	1,330 - 1,330	µg/L	LF2-W02	975	1,330	1,330	2,603	No	No
Sodium	7440-23-5	2 / 2	2	--	--	902 - 1,130	µg/L	LF2-W02	1,016	1,130	1,130	3,553	No	No

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "µ" next to the EPC).

⁴ The maximum detected site concentration was used for the background screen.

⁵ Background threshold used in the background screen was two times the background average concentration.

⁶ If the maximum concentration was above the ESV and the background threshold, the chemical was identified as an ecoCOPC. If only one of the screening values was available (ESV or background) and the site maximum exceeded that value, the chemical was retained as an ecoCOPC. If neither an ESV nor background threshold was available, the chemical was selected as an ecoCOPC.

**Table 7-28. Abiotic Toxicity Screen for Sediment Landfill #2
Ft. McClellan RI, Anniston, Alabama**

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{2,3}	Concentration Used for Screening ⁴	ESV ⁵	ESV Note ⁶	Max > ESV?	Maximum Hazard Quotient
Aluminum	7429-90-5	2 / 2	2	--	3,850 - 4,790	mg/kg	LF2-D01	4,320	4,790	4,790	NA	NA	Yes	NA
Barium	7440-39-3	2 / 2	2	--	11 - 25	mg/kg	LF2-D02	18	25	25	NA	NA	Yes	NA
Calcium	7440-70-2	2 / 2	2	--	478 - 567	mg/kg	LF2-D01	523	567	567	NA	NA	Yes	NA
Chromium	7440-47-3	2 / 2	2	--	15 - 51	mg/kg	LF2-D01	33	51	51	52	50	No	0.98
Cobalt	7440-48-4	1 / 2	2	2.5 - 2.5	3.6 - 3.6	mg/kg	LF2-D02	2.4	3.6	3.6	50	*	No	0.073
Copper	7440-50-8	2 / 2	2	--	7.6 - 10	mg/kg	LF2-D02	8.9	10	10	19	19	No	0.55
Iron	7439-89-6	2 / 2	2	--	20,100 - 45,700	mg/kg	LF2-D01	32,900	45,700	45,700	NA	NA	Yes	NA
Lead	7439-92-1	2 / 2	2	--	10 - 18	mg/kg	LF2-D02	14	18	18	30	30	No	0.60
Magnesium	7439-95-4	2 / 2	2	--	530 - 735	mg/kg	LF2-D02	633	735	735	NA	NA	Yes	NA
Manganese	7439-96-5	2 / 2	2	--	140 - 206	mg/kg	LF2-D02	173	206	206	NA	NA	Yes	NA
Nickel	7440-02-0	1 / 2	2	2.7 - 2.7	6.8 - 6.8	mg/kg	LF2-D02	4.1	6.8	6.8	16	16	No	0.43
Potassium	7440-09-7	2 / 2	2	--	289 - 482	mg/kg	LF2-D01	386	482	482	NA	NA	Yes	NA
Selenium	7782-49-2	1 / 2	2	0.45 - 0.45	0.72 - 0.72	mg/kg	LF2-D01	0.47	0.72	0.72	NA	NA	Yes	NA
Vanadium	7440-65-2	2 / 2	2	--	15 - 40	mg/kg	LF2-D01	27	40	40	NA	NA	Yes	NA
Zinc	7440-66-6	2 / 2	2	--	11 - 22	mg/kg	LF2-D02	17	22	22	124	124	No	0.18
Benzyl Alcohol	100-51-6	2 / 2	2	--	0.066 - 0.078	mg/kg	LF2-D01	0.072	0.078	0.078	NA	NA	Yes	NA

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "w" next to the EPC).

⁴ The maximum detected site concentration was used for the abiotic toxicity screen.

⁵ ESV = Ecological Screening Value from USEPA Region IV unless noted otherwise in the next column.

⁶ See Tables 7-3, 7-4, and 7-5 for further details concerning the ESVs. Non-Region IV ESVs are noted with an asterisk.

Table 7-29. Background Screen for Sediment Landfill #2
Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Location of Maximum Concentration		Aithmetic Mean ²	Site EPC ^{3,1}	Concentration Used for Screening ⁴	2X Background Average ⁵	Max > Background?	ccCOPC Fig. 6
						Units	Concentration						
Aluminum	7429-90-5	2 / 2	2	--	3,850 - 4,790	mg/kg	LF2-D01	4,320	4,790	4,790	8,859	No	No
Barium	7440-39-3	2 / 2	2	--	11 - 25	mg/kg	LF2-D02	18	25	25	103	No	No
Calcium	7440-70-2	2 / 2	2	--	478 - 567	mg/kg	LF2-D01	523	567	567	1,139	No	No
Chromium	7440-47-3	2 / 2	2	--	15 - 51	mg/kg	LF2-D01	33	51	51	32	Yes	No
Cobalt	7440-48-4	1 / 2	2	2.5 - 2.5	3.6 - 3.6	mg/kg	LF2-D02	2.4	3.6	3.6	13	No	No
Copper	7440-50-8	2 / 2	2	--	7.6 - 10	mg/kg	LF2-D01	8.9	10	10	23	No	No
Iron	7439-89-6	2 / 2	2	--	20,100 - 45,700	mg/kg	LF2-D01	32,900	45,700	45,700	35,480	Yes	Yes
Lead	7439-92-1	2 / 2	2	--	10 - 18	mg/kg	LF2-D02	14	18	18	47	No	No
Magnesium	7439-95-4	2 / 2	2	--	530 - 735	mg/kg	LF2-D02	633	735	735	970	No	No
Manganese	7439-96-5	2 / 2	2	--	140 - 206	mg/kg	LF2-D02	173	206	206	1,071	No	No
Nickel	7440-02-0	1 / 2	2	2.7 - 2.7	6.8 - 6.8	mg/kg	LF2-D02	4.1	6.8	6.8	14	No	No
Potassium	7440-09-7	2 / 2	2	--	289 - 482	mg/kg	LF2-D01	386	482	482	1,076	No	No
Selenium	7782-49-2	1 / 2	2	0.45 - 0.45	0.72 - 0.72	mg/kg	LF2-D01	0.47	0.72	0.72	0.59	Yes	Yes
Vanadium	7440-62-2	2 / 2	2	--	15 - 40	mg/kg	LF2-D01	27	40	40	41	No	No
Zinc	7440-66-6	2 / 2	2	--	11 - 22	mg/kg	LF2-D02	17	22	22	54	No	No
Benzyl Alcohol	100-51-6	2 / 2	2	--	0.066 - 0.078	mg/kg	LF2-D01	0.072	0.078	0.078	--	Yes	Yes

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value. If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "M" next to the EPC).

⁴ The maximum detected site concentration was used for the background screen.

⁵ Background threshold used in the background screen was two times the background average concentration.

⁶ If the maximum concentration was above the ESV and the background threshold, the chemical was identified as an ccCOPC. If only one of the screening values was available (ESV or background) and the site maximum exceeded that value, the chemical was retained as an ccCOPC. If neither an ESV nor background threshold was available, the chemical was selected as an ccCOPC.

**Table 7-30. Abiotic Toxicity Screen for Surface Water Landfill #3
Ft. McClellan RI, Anniston, Alabama**

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits		Range of Detected Concentrations		Units	Location of Maximum Concentration	Arithmetic Mean ³	Site EPC ^{3,3}	Concentration Used for Screening ⁴		ESV ⁵ Note ⁶	Max > ESV?	Maximum Hazard Quotient
				112	112	544	1,620					#	1,620			
Aluminum	7429-90-5	4 / 5	5	112	112	544	1,620	µg/L	OLF-W03	930	1,620	1,620	87	Yes	19	
Barium	7440-39-3	5 / 5	5	--	--	28	43	µg/L	OLF-W05	33	39	43	3.9	Yes	11	
Calcium	7440-70-2	5 / 5	5	--	--	6,970	19,300	µg/L	OLF-W01	12,870	19,300	19,300	116,000	No	0.17	
Iron	7439-89-6	5 / 5	5	--	--	426	7,930	µg/L	OLF-W05	3,359	6,063	7,930	1,000	Yes	7.9	
Lead	7439-92-1	1 / 5	5	4.5	43	71	71	µg/L	OLF-W05	20	71	71	1.3	Yes	54	
Magnesium	7439-95-4	5 / 5	5	--	--	2,450	8,760	µg/L	OLF-W02	4,862	7,654	8,760	82,000	No	0.11	
Manganese	7439-96-5	5 / 5	5	--	--	25	464	µg/L	OLF-W05	179	351	464	80	Yes	5.8	
Potassium	7440-09-7	4 / 5	5	1,240	1,240	2,080	3,710	µg/L	OLF-W05	2,586	3,710	3,710	53,000	No	0.070	
Sodium	7440-23-5	5 / 5	5	--	--	1,100	10,100	µg/L	OLF-W02	3,662	7,316	10,100	680,000	No	0.015	
Zinc	7440-66-6	2 / 5	5	18	18	19	22	µg/L	OLF-W04	14	22	22	59	No	0.37	
1,1,1-Trichloroethane	71-55-6	2 / 5	5	1.00	1.00	1.2	6.2	µg/L	OLF-W04	1.8	6.2	6.2	528	No	0.012	
Trichloroethene	79-01-6	1 / 5	5	1.00	1.00	1.3	1.3	µg/L	OLF-W04	0.66	1.3	1.3	21,900	No	5.94E-05	
alpha-BHC	319-84-6	1 / 5	5	0.0025	5.3	0.0035	0.0035	µg/L	OLF-W04	0.53	0.0035	0.0035	5,000	No	6.96E-07	
Lindane	58-89-9	1 / 5	5	0.0025	7.2	0.0041	0.0041	µg/L	OLF-W03	0.72	0.0041	0.0041	0.080	No	0.052	

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴ The maximum detected site concentration was used for the abiotic toxicity screen.

⁵ ESV = Ecological Screening Value from USEPA Region IV unless noted otherwise; in the next column.

⁶ See Tables 7-3, 7-4, and 7-5 for further details concerning the ESVs. Non-Region IV ESVs are noted with an asterisk.

**Table 7-31. Background Screen for Surface Water Landfill #3
Ft. McClellan RI, Anniston, Alabama**

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ³	Site EPC ^{2,3}	Concentration Used for Screening ⁴	2X Background Average ⁵	Max > Background?	ecoCOPC Flag ⁶
Aluminum	7429-90-5	4 / 5	5	112 -	544 -	µg/L	OLF-W03	930	1,620	1,620	5,689	No	No
Barium	7440-39-3	5 / 5	5	- -	28 -	µg/L	OLF-W05	33	39	43	78	No	No
Calcium	7440-70-2	5 / 5	5	- -	6,970 -	µg/L	OLF-W01	12,870	19,300	19,300	26,633	No	No
Iron	7439-89-6	5 / 5	5	- -	426 -	µg/L	OLF-W05	3,359	6,063	7,930	21,130	No	No
Lead	7439-92-1	1 / 5	5	4.5 -	71 -	µg/L	OLF-W05	20	71	71	9.6	Yes	Yes
Magnesium	7439-95-4	5 / 5	5	- -	2,450 -	µg/L	OLF-W02	4,862	7,654	8,760	11,077	No	No
Manganese	7439-96-5	5 / 5	5	- -	25 -	µg/L	OLF-W05	179	351	464	604	No	No
Potassium	7440-09-7	4 / 5	5	1,240 -	2,080 -	µg/L	OLF-W05	2,586	3,710	3,710	2,603	Yes	No
Sodium	7440-23-5	5 / 5	5	- -	1,100 -	µg/L	OLF-W02	3,662	7,316	10,100	3,553	Yes	No
Zinc	7440-66-6	2 / 5	5	18 -	19 -	µg/L	OLF-W04	14	22	22	41	No	No
1,1,1-Trichloroethane	71-55-6	2 / 5	5	1.00 -	1.2 -	µg/L	OLF-W04	1.8	6.2	6.2	--	Yes	No
Trichloroethene	79-01-6	1 / 5	5	1.00 -	1.3 -	µg/L	OLF-W04	0.66	1.3	1.3	--	Yes	No
alpha-BHC	319-84-6	1 / 5	5	0.0025 -	0.0035 -	µg/L	OLF-W04	0.53	0.0035	0.0035	--	Yes	No
Lindane	58-89-9	1 / 5	5	0.0025 -	0.0041 -	µg/L	OLF-W03	0.72	0.0041	0.0041	--	Yes	No

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴ The maximum detected site concentration was used for the background screen.

⁵ Background threshold used in the background screen was two times the background average concentration.

⁶ If the maximum concentration was above the ESV and the background threshold, the chemical was identified as an ecoCOPC. If only one of the screening values was available (ESV or background) and the site maximum exceeded that value, the chemical was retained as an ecoCOPC. If neither an ESV nor background threshold was available, the chemical was selected as an ecoCOPC.

**Table 7-32. Abiotic Toxicity Screen for Sediment Landfill #3
Ft. McClellan RI, Anniston, Alabama**

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits		Range of Detected Concentrations		Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{2,3}	Concentration Used for Screening ⁴	ESV ⁵	Max > ESV?	Maximum Hazard Quotient
				Lower	Upper	Lower	Upper								
Aluminum	7429-90-5	3 / 3	3	--	--	2,630	60,800	mg/kg	OLF-D03	23,457	60,800	60,800	NA	Yes	NA
Barium	7440-39-3	3 / 3	3	--	--	13	158	mg/kg	OLF-D03	69	158	158	NA	Yes	NA
Calcium	7440-70-2	3 / 3	3	--	--	473	7,860	mg/kg	OLF-D02	3,168	7,860	7,860	NA	Yes	NA
Chromium	7440-47-3	3 / 3	3	--	--	12	42	mg/kg	OLF-D03	22	42	42	52	No	0.81
Cobalt	7440-48-4	2 / 3	3	2.5	2.5	5.1	8.9	mg/kg	OLF-D03	5.1	8.9	8.9	50	No	0.18
Copper	7440-50-8	3 / 3	3	--	--	7.5	25	mg/kg	OLF-D03	14	25	25	19	Yes	1.3
Iron	7439-89-6	3 / 3	3	--	--	11,600	37,500	mg/kg	OLF-D03	23,600	37,500	37,500	NA	Yes	NA
Lead	7439-92-1	2 / 3	3	7.4	7.4	7.5	29	mg/kg	OLF-D03	13	29	29	30	No	0.96
Magnesium	7439-95-4	3 / 3	3	--	--	766	4,200	mg/kg	OLF-D03	2,449	4,200	4,200	NA	Yes	NA
Manganese	7439-96-5	3 / 3	3	--	--	73	361	mg/kg	OLF-D03	212	361	361	NA	Yes	NA
Nickel	7440-02-0	3 / 3	3	--	--	4.9	21	mg/kg	OLF-D03	10	21	21	16	Yes	1.3
Potassium	7440-09-7	2 / 3	3	131	131	996	8,180	mg/kg	OLF-D03	3,081	8,180	8,180	NA	Yes	NA
Sodium	7440-23-5	2 / 3	3	39	39	88	123	mg/kg	OLF-D03	77	123	123	NA	Yes	NA
Vanadium	7440-62-2	3 / 3	3	--	--	9.7	77	mg/kg	OLF-D03	35	77	77	NA	Yes	NA
Zinc	7440-66-6	3 / 3	3	--	--	26	74	mg/kg	OLF-D03	43	74	74	124	No	0.60
4,4'-DDE	72-55-9	1 / 3	3	0.0027	0.0027	0.0038	0.0038	mg/kg	OLF-D03	0.0022	0.0038	0.0038	0.0033	Yes	1.1
Acenaphthylene	208-96-8	1 / 3	3	0.033	0.033	0.080	0.080	mg/kg	OLF-D02	0.038	0.080	0.080	0.33	No	0.24
Benzo(a)anthracene	56-55-3	1 / 3	3	0.041	0.041	0.80	0.80	mg/kg	OLF-D02	0.28	0.80	0.80	0.33	Yes	2.4
Benzo(b)fluoranthene	205-99-2	1 / 3	3	0.31	0.31	0.92	0.92	mg/kg	OLF-D02	0.41	0.92	0.92	0.66	Yes	1.4
Benzo(k)fluoranthene	191-24-2	1 / 3	3	0.18	0.18	0.39	0.39	mg/kg	OLF-D02	0.19	0.39	0.39	0.66	No	0.60
Benzo(g)fluoranthene	207-08-9	1 / 3	3	0.13	0.13	0.48	0.48	mg/kg	OLF-D02	0.20	0.48	0.48	0.66	No	0.73
Chrysene	218-01-9	1 / 3	3	0.032	0.032	0.63	0.63	mg/kg	OLF-D02	0.22	0.63	0.63	0.33	No	1.9
Fluoranthene	206-44-0	1 / 3	3	0.032	0.032	0.89	0.89	mg/kg	OLF-D02	0.31	0.89	0.89	0.33	Yes	2.7
Phenanthrene	85-01-8	1 / 3	3	0.032	0.032	0.23	0.23	mg/kg	OLF-D02	0.087	0.23	0.23	0.33	No	0.70
Pyrene	129-00-0	1 / 3	3	0.083	0.083	1.2	1.2	mg/kg	OLF-D02	0.43	1.2	1.2	0.33	Yes	3.6

-- Not applicable

¹For the Frequency of Detection, counts were based on the averaged data set.

²Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴The maximum detected site concentration was used for the abiotic toxicity screen.

⁵ESV = Ecological Screening Value from USEPA Region IV unless noted otherwise in the next column.

⁶See Tables 7-3, 7-4, and 7-5 for further details concerning the ESVs. Non-Region IV ESVs are noted with an asterisk.

Table 7-33. Background Screen for Sediment Landfill #3
Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{2,3}	Concentration Used for Screening ⁴	2X Background Average ⁵	Max > Background?	ecoCOPC Flag ⁶
Aluminum	7429-90-5	3 / 3	3	--	2,630 - 60,800	mg/kg	OL-F-D03	23,457	60,800	60,800	8,859	Yes	Yes
Barium	7440-39-3	3 / 3	3	--	13 - 138	mg/kg	OL-F-D02	69	158	158	103	Yes	Yes
Calcium	7440-70-2	3 / 3	3	--	473 - 7,860	mg/kg	OL-F-D02	3,168	7,860	7,860	1,139	Yes	Yes
Chromium	7440-47-3	3 / 3	3	--	12 - 42	mg/kg	OL-F-D03	22	42	42	32	Yes	No
Cobalt	7440-48-4	2 / 3	3	2.5 - 2.5	5.1 - 8.9	mg/kg	OL-F-D03	5.1	8.9	8.9	13	No	No
Copper	7440-50-8	3 / 3	3	--	7.5 - 25	mg/kg	OL-F-D03	14	25	25	23	Yes	Yes
Iron	7439-89-6	3 / 3	3	--	11,600 - 37,500	mg/kg	OL-F-D03	23,600	37,500	37,500	35,480	Yes	Yes
Lead	7439-92-1	2 / 3	3	7.4 - 7.4	7.5 - 29	mg/kg	OL-F-D03	13	29	29	47	No	No
Magnesium	7439-95-4	3 / 3	3	--	766 - 4,200	mg/kg	OL-F-D03	2,449	4,200	4,200	970	Yes	Yes
Manganese	7439-96-5	3 / 3	3	--	73 - 361	mg/kg	OL-F-D03	212	361	361	1,071	No	No
Nickel	7440-02-0	3 / 3	3	--	4.9 - 21	mg/kg	OL-F-D03	10	21	21	14	Yes	Yes
Potassium	7440-09-7	2 / 3	3	131 - 131	996 - 8,180	mg/kg	OL-F-D03	3,081	8,180	8,180	1,076	Yes	Yes
Sodium	7440-23-5	2 / 3	3	39 - 39	88 - 123	mg/kg	OL-F-D03	77	123	123	681	No	No
Vanadium	7440-62-2	3 / 3	3	--	9.7 - 77	mg/kg	OL-F-D03	35	77	77	41	Yes	Yes
Zinc	7440-66-6	3 / 3	3	0.0027 - 0.0027	26 - 74	mg/kg	OL-F-D03	43	74	74	54	Yes	No
4,4'-DDE	72-55-9	1 / 3	3	0.0033 - 0.0033	0.0038 - 0.0038	mg/kg	OL-F-D03	0.0022	0.0038	0.0038	--	Yes	Yes
Acenaphthylene	208-96-8	1 / 3	3	0.041 - 0.041	0.80 - 0.80	mg/kg	OL-F-D02	0.038	0.080	0.080	--	Yes	No
Benzo(a)anthracene	56-55-3	1 / 3	3	0.31 - 0.31	0.80 - 0.80	mg/kg	OL-F-D02	0.28	0.80	0.80	--	Yes	Yes
Benzo(b)fluoranthene	205-99-2	1 / 3	3	0.18 - 0.18	0.92 - 0.92	mg/kg	OL-F-D02	0.41	0.92	0.92	--	Yes	Yes
Benzo(e)fluoranthene	191-24-2	1 / 3	3	0.13 - 0.13	0.39 - 0.39	mg/kg	OL-F-D02	0.19	0.39	0.39	--	Yes	No
Benzo(k)fluoranthene	207-08-9	1 / 3	3	0.032 - 0.032	0.48 - 0.48	mg/kg	OL-F-D02	0.20	0.48	0.48	--	Yes	No
Chrysene	218-01-9	1 / 3	3	0.032 - 0.032	0.63 - 0.63	mg/kg	OL-F-D02	0.22	0.63	0.63	--	Yes	No
Fluoranthene	206-44-0	1 / 3	3	0.032 - 0.032	0.89 - 0.89	mg/kg	OL-F-D02	0.31	0.89	0.89	--	Yes	Yes
Phenanthrene	85-01-8	1 / 3	3	0.032 - 0.032	0.23 - 0.23	mg/kg	OL-F-D02	0.087	0.23	0.23	--	Yes	No
Pyrene	129-00-0	1 / 3	3	0.083 - 0.083	1.2 - 1.2	mg/kg	OL-F-D02	0.43	1.2	1.2	--	Yes	Yes

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value. If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "w" next to the EPC).

⁴ The maximum detected site concentration was used for the background screen.

⁵ Background threshold used in the background screen was two times the background average concentration.

⁶ If the maximum concentration was above the ESV and the background threshold, the chemical was identified as an ecoCOPC. If only one of the screening values was available (ESV or background) and the site maximum exceeded that value, the chemical was retained as an ecoCOPC. If neither an ESV nor background threshold was available, the chemical was selected as an ecoCOPC.

**Table 7-34. Abiotic Toxicity Screen for Surface Soils Landfill #3
Ft. McClellan RI, Anniston, Alabama**

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{2,3}	Concentration Used for Screening ⁴		ESV ⁵	Max > ESV ⁶	Maximum Hazard Quotient
										ESV ⁵	78,000			
Aluminum	7429-90-5	6 / 6	6	0.0 - 0.0	24,400 - 78,000	mg/kg	OLF-S22	46,900	63,562	50	78,000	50	Yes	1,560
Barium	7440-39-3	6 / 6	6	0.0 - 0.0	65 - 198	mg/kg	OLF-S22	130	176	165	198	165	Yes	1.2
Calcium	7440-70-2	6 / 6	6	0.0 - 0.0	306 - 6,610	mg/kg	OLF-S23	2,624	6,610	NA	6,610	NA	Yes	NA
Chromium	7440-47-3	6 / 6	6	0.0 - 0.0	28 - 68	mg/kg	OLF-S11	40	53	0.40	68	0.40	Yes	170
Cobalt	7440-48-4	6 / 6	6	0.0 - 0.0	3.1 - 21	mg/kg	OLF-S22	12	18	20	21	20	Yes	1.1
Copper	7440-50-8	6 / 6	6	0.0 - 0.0	14 - 30	mg/kg	OLF-S21	23	30	40	30	40	No	0.74
Iron	7439-89-6	6 / 6	6	0.0 - 0.0	24,700 - 57,400	mg/kg	OLF-S22	39,850	50,286	50	57,400	50	Yes	287
Lead	7439-92-1	6 / 6	6	0.0 - 0.0	17 - 46	mg/kg	OLF-S22	32	46	50	46	50	No	0.92
Magnesium	7439-95-4	6 / 6	6	0.0 - 0.0	2,560 - 4,300	mg/kg	OLF-S21	3,195	3,720	440,000	4,300	440,000	No	0.0098
Manganese	7439-96-5	6 / 6	6	0.0 - 0.0	31 - 3,900	mg/kg	OLF-S22	1,491	3,900	100	3,900	100	Yes	39
Mercury	7439-97-6	2 / 6	6	0.050 - 0.050	0.093 - 0.11	mg/kg	OLF-S22	0.051	0.11	0.100	0.11	0.100	Yes	1.1
Nickel	7440-02-0	6 / 6	6	0.0 - 0.0	8.7 - 44	mg/kg	OLF-S22	23	44	30	44	30	Yes	1.5
Potassium	7440-09-7	6 / 6	6	0.0 - 0.0	3,210 - 5,550	mg/kg	OLF-S21	4,243	5,190	NA	5,550	NA	Yes	NA
Sodium	7440-23-5	6 / 6	6	0.0 - 0.0	60 - 127	mg/kg	OLF-S22	89	109	NA	127	NA	Yes	NA
Vanadium	7440-62-2	6 / 6	6	0.0 - 0.0	37 - 94	mg/kg	OLF-S22	62	80	2.0	94	2.0	Yes	47
Zinc	7440-66-6	6 / 6	6	0.0 - 0.0	21 - 128	mg/kg	OLF-S22	68	104	50	128	50	Yes	2.6
4,4'-DDD	72-54-8	1 / 6	6	0.0027 - 0.0027	0.0062 - 0.0062	mg/kg	OLF-S21	0.0022	0.0062	0.0025	0.0062	0.0025	Yes	2.5
4,4'-DDE	72-55-9	2 / 6	6	0.0027 - 0.0027	0.0041 - 0.014	mg/kg	OLF-S21	0.0039	0.014	0.0025	0.014	0.0025	Yes	5.6
Benzofluoranthene	56-55-3	2 / 6	6	0.041 - 0.041	0.12 - 0.16	mg/kg	OLF-S21	0.060	0.16	0.100	0.16	0.100	No	0.031
Chlordane	57-74-9	1 / 6	6	0.068 - 0.068	0.57 - 0.57	mg/kg	OLF-S21	0.12	0.57	0.100	0.57	0.100	Yes	5.7
Chrysene	218-01-9	2 / 6	6	0.032 - 0.032	0.083 - 0.091	mg/kg	OLF-S21	0.040	0.091	4.7	0.091	4.7	No	0.019
Fluoranthene	206-44-0	2 / 6	6	0.032 - 0.032	0.12 - 0.19	mg/kg	OLF-S21	0.062	0.19	0.100	0.19	0.100	Yes	1.9
Phenanthrene	85-01-8	1 / 6	6	0.032 - 0.032	0.087 - 0.087	mg/kg	OLF-S23	0.028	0.087	0.100	0.087	0.100	No	0.87
Pyrene	129-00-0	2 / 6	6	0.083 - 0.083	0.21 - 0.30	mg/kg	OLF-S21	0.11	0.30	0.100	0.30	0.100	Yes	3.0

--- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴ The maximum detected site concentration was used for the abiotic toxicity screen.

⁵ ESV = Ecological Screening Value from USEPA Region IV unless noted otherwise in the next column.

⁶ See Tables 7-3, 7-4, and 7-5 for further details concerning the ESVs. Non-Region IV ESVs are noted with an asterisk.

Table 7-35. Background Screen for Surface Soils Landfill #3
 Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits		Range of Detected Concentrations		Units	Location of Maximum Concentration	Arithmetic Mean ³	Site EPC ^{3,4}	Concentration Used for Screening ⁴	2X Background Average ⁵	Max > Background?	ecocCOPC Flag ⁶
				0.0	0.0	24,400	78,000								
Aluminum	7429-90-5	6 / 6	6	0.0	0.0	65	198	mg/kg	OLF-S22	46,900	63,562	78,000	16,447	Yes	Yes
Barium	7440-39-3	6 / 6	6	0.0	0.0	306	6,610	mg/kg	OLF-S23	130	176	198	123	Yes	Yes
Calcium	7440-70-2	6 / 6	6	0.0	0.0	28	68	mg/kg	OLF-S11	2,624	6,610	6,610	1,700	Yes	Yes
Chromium	7440-47-3	6 / 6	6	0.0	0.0	3.1	21	mg/kg	OLF-S22	40	53	68	37	Yes	Yes
Cobalt	7440-48-4	6 / 6	6	0.0	0.0	14	30	mg/kg	OLF-S21	12	18	21	14	Yes	Yes
Copper	7440-50-8	6 / 6	6	0.0	0.0	24,700	57,400	mg/kg	OLF-S22	23	30	30	13	Yes	No
Iron	7439-89-6	6 / 6	6	0.0	0.0	17	46	mg/kg	OLF-S22	39,850	50,286	57,400	34,371	Yes	Yes
Lead	7439-92-1	6 / 6	6	0.0	0.0	0.0	0.0	mg/kg	OLF-S22	32	46	46	39	Yes	No
Magnesium	7439-95-4	6 / 6	6	0.0	0.0	2,560	4,300	mg/kg	OLF-S21	3,195	3,720	4,300	1,053	Yes	No
Manganese	7439-96-5	6 / 6	6	0.0	0.0	31	3,900	mg/kg	OLF-S22	1,491	3,900	3,900	1,456	Yes	Yes
Mercury	7439-97-6	2 / 6	6	0.050	0.050	0.093	0.11	mg/kg	OLF-S22	0.051	0.11	0.11	0.080	Yes	Yes
Nickel	7440-02-0	6 / 6	6	0.0	0.0	8.7	44	mg/kg	OLF-S22	23	44	44	10	Yes	Yes
Potassium	7440-09-7	6 / 6	6	0.0	0.0	3.210	5,550	mg/kg	OLF-S21	4,243	5,190	5,550	816	Yes	Yes
Sodium	7440-23-5	6 / 6	6	0.0	0.0	60	127	mg/kg	OLF-S22	89	109	127	630	No	No
Vanadium	7440-62-2	6 / 6	6	0.0	0.0	37	94	mg/kg	OLF-S22	62	80	94	59	Yes	Yes
Zinc	7440-66-6	6 / 6	6	0.0	0.0	21	128	mg/kg	OLF-S22	68	104	128	40	Yes	Yes
4,4'-DDD	72-54-8	1 / 6	6	0.0027	0.0027	0.0062	0.0062	mg/kg	OLF-S21	0.0022	0.0062	0.0062	0.0062	Yes	Yes
4,4'-DDE	72-55-9	2 / 6	6	0.0027	0.0027	0.0041	0.014	mg/kg	OLF-S21	0.0039	0.014	0.014	0.014	Yes	Yes
Benz(a)anthracene	56-55-3	2 / 6	6	0.041	0.041	0.12	0.16	mg/kg	OLF-S21	0.060	0.16	0.16	0.16	Yes	No
Chlordane	57-74-9	1 / 6	6	0.068	0.068	0.57	0.57	mg/kg	OLF-S21	0.12	0.57	0.57	0.57	Yes	No
Chrysene	218-01-9	2 / 6	6	0.032	0.032	0.083	0.091	mg/kg	OLF-S21	0.040	0.091	0.091	0.091	Yes	No
Fluoranthene	206-44-0	2 / 6	6	0.032	0.032	0.12	0.19	mg/kg	OLF-S21	0.062	0.19	0.19	0.19	Yes	Yes
Phenanthrene	85-01-8	1 / 6	6	0.032	0.032	0.087	0.087	mg/kg	OLF-S23	0.028	0.087	0.087	0.087	Yes	No
Pyrene	129-00-0	2 / 6	6	0.083	0.083	0.21	0.30	mg/kg	OLF-S21	0.11	0.30	0.30	0.30	Yes	Yes

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value. If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "*" next to the EPC).

⁴ The maximum detected site concentration was used for the background screen.

⁵ Background threshold used in the background screen was two times the background average concentration.

⁶ If the maximum concentration was above the ESV and the background threshold, the chemical was identified as an ecocCOPC. If only one of the screening values was available (ESV or background) and the site maximum exceeded that value, the chemical was retained as an ecocCOPC. If neither an ESV nor background threshold was available, the chemical was selected as an ecocCOPC.

Table 7-36. Abiotic Toxicity Screen for Surface Soils Old Water Hole
Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection		Range of Detected Concentrations		Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{3,4}	Concentration		ESV ⁵ Note ⁶	Max > ESV?	Maximum Hazard Quotient
				Limits	Limits	Concentrations	Concentrations					Used for Screening ⁴	ESV ⁵			
Aluminum	7429-90-5	2 / 2	2	--	--	4,550	7,890	mg/kg	OWH-S01	6,220	7,890	#	7,890	50	Yes	158
Barium	7440-39-3	2 / 2	2	--	--	17	51	mg/kg	OWH-S01	34	51	#	165	165	No	0.31
Calcium	7440-70-2	2 / 2	2	--	--	87	852	mg/kg	OWH-S01	469	852	#	NA	NA	Yes	NA
Chromium	7440-47-3	2 / 2	2	--	--	12	15	mg/kg	OWH-S01	13	15	#	0.40	0.40	Yes	37
Copper	7440-50-8	1 / 2	2	2.8	2.8	7.4	7.4	mg/kg	OWH-S02	4.4	7.4	#	7.4	40	No	0.19
Iron	7439-89-6	2 / 2	2	--	--	15,900	19,200	mg/kg	OWH-S01	17,550	19,200	#	19,200	200	Yes	96
Lead	7439-92-1	2 / 2	2	--	--	13	22	mg/kg	OWH-S01	17	22	#	22	50	No	0.43
Magnesium	7439-95-4	2 / 2	2	--	--	165	338	mg/kg	OWH-S01	252	338	#	440,000	440,000	No	0.00077
Manganese	7439-96-5	2 / 2	2	--	--	152	401	mg/kg	OWH-S01	277	401	#	100	100	Yes	4.0
Nickel	7440-02-0	1 / 2	2	2.7	2.7	3.8	3.8	mg/kg	OWH-S01	2.6	3.8	#	3.8	30	No	0.13
Potassium	7440-09-7	2 / 2	2	--	--	189	189	mg/kg	OWH-S02	189	189	#	189	NA	Yes	NA
Vanadium	7440-62-2	2 / 2	2	--	--	27	39	mg/kg	OWH-S01	33	39	#	39	2.0	Yes	19
Zinc	7440-66-6	2 / 2	2	--	--	23	24	mg/kg	OWH-S01	23	24	#	24	50	No	0.49
Benzyl Alcohol	100-51-6	1 / 2	2	0.032	0.032	0.060	0.060	mg/kg	OWH-S01	0.038	0.060	#	0.060	NA	Yes	NA
Phenol	108-95-2	2 / 2	2	--	--	1.00	1.7	mg/kg	OWH-S01	1.4	1.7	#	1.7	0.050	Yes	34

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value. If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "M" next to the EPC).

⁴ The maximum detected site concentration was used for the abiotic toxicity screen.

⁵ ESV = Ecological Screening Value from USEPA Region IV unless noted otherwise in the next column.

⁶ See Tables 7-3, 7-4, and 7-5 for further details concerning the ESVs. Non-Region IV ESVs are noted with an asterisk.

Table 7-37. Background Screen for Surface Soils Old Water Hole
Ft. McClellan RI, Anniston, Alabama

Chemical	CAS Number	Frequency of Detection ¹	Number of Samples in Mean ²	Range of Detection Limits	Range of Detected Concentrations	Units	Location of Maximum Concentration	Arithmetic Mean ²	Site EPC ^{2,3}	Concentration Used for Screening ⁴	2X Background Average ⁵	Max > Background?	ecoCOPC Flag ⁶
Aluminum	7429-90-5	2 / 2	2	--	4,550 - 7,890	mg/kg	OWH-S01	6,220	7,890	7,890	16,447	No	No
Barium	7440-39-3	2 / 2	2	--	17 - 51	mg/kg	OWH-S01	34	51	51	123	No	No
Calcium	7440-70-2	2 / 2	2	--	87 - 852	mg/kg	OWH-S01	469	852	852	1,700	No	No
Chromium	7440-47-3	2 / 2	2	--	12 - 15	mg/kg	OWH-S01	13	15	15	37	No	No
Copper	7440-50-8	1 / 2	2	2.8	7.4 - 7.4	mg/kg	OWH-S02	4.4	7.4	7.4	13	No	No
Iron	7439-89-6	2 / 2	2	--	15,900 - 19,200	mg/kg	OWH-S01	17,550	19,200	19,200	34,371	No	No
Lead	7439-92-1	2 / 2	2	--	13 - 22	mg/kg	OWH-S01	17	22	22	39	No	No
Magnesium	7439-95-4	2 / 2	2	--	165 - 338	mg/kg	OWH-S01	252	338	338	1,053	No	No
Manganese	7439-96-5	2 / 2	2	--	152 - 401	mg/kg	OWH-S01	277	401	401	1,456	No	No
Nickel	7440-02-0	1 / 2	2	2.7	3.8 - 3.8	mg/kg	OWH-S01	2.6	3.8	3.8	10	No	No
Potassium	7440-09-7	2 / 2	2	--	189 - 189	mg/kg	OWH-S01	189	189	189	816	No	No
Vanadium	7440-62-2	2 / 2	2	--	27 - 39	mg/kg	OWH-S01	33	39	39	59	No	No
Zinc	7440-66-6	2 / 2	2	0.032	23 - 24	mg/kg	OWH-S01	23	24	24	40	No	No
Benzyl Alcohol	100-51-6	1 / 2	2	0.032	0.060 - 0.060	mg/kg	OWH-S01	0.038	0.060	0.060	--	Yes	Yes
Phenol	108-95-2	2 / 2	2	--	1.00 - 1.7	mg/kg	OWH-S01	1.4	1.7	1.7	--	Yes	Yes

-- Not applicable

¹ For the Frequency of Detection, counts were based on the averaged data set.

² Results of duplicate analyses were averaged and nondetects were treated as one-half the detection limit in the calculation of the arithmetic mean, standard deviation, and 95% UCL.

³ The exposure point concentration (EPC) is the 95% upper confidence (UCL) of the arithmetic mean, unless the 95% UCL exceeds the maximum detected value.

If the latter is true, the maximum detected value is substituted as the EPC (denoted by a "#" next to the EPC).

⁴ The maximum detected site concentration was used for the background screen.

⁵ Background threshold used in the background screen was two times the background average concentration.

⁶ If the maximum concentration was above the ESV and the background threshold, the chemical was identified as an ecoCOPC. If only one of the screening values was available (ESV or background) and the site maximum exceeded that value, the chemical was retained as an ecoCOPC. If neither an ESV nor background threshold was available, the chemical was selected as an ecoCOPC.

**Table 7-38. EcoCOPCs in Surface Soil, Surface Water, and Sediment
Fort McClellan RI, Anniston, Alabama**

RI Site*	EcoCOPCs in Surface Soil	EcoCOPCs in Surface Water	EcoCOPCs in Sediment
T-5			Cadmium, copper, lead, benzyl alcohol, and di-n-butylphthalate
T-24A			Aluminum, barium, calcium, iron, magnesium, potassium, and benzyl alcohol
T-38	Aluminum, chromium, iron, lead, potassium, and vanadium		
Range L	Aluminum, chromium, cobalt, copper, iron, lead, manganese, nickel, potassium, selenium, vanadium, zinc, and benzyl alcohol	Manganese	Aluminum, barium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, nickel, potassium, selenium, vanadium, zinc and dieldrin
Landfill 1		Barium	Aluminum, barium, calcium, iron, magnesium, manganese, nickel, potassium, and benzyl alcohol
Landfill 2			Iron, selenium, and benzyl alcohol
Landfill 3	Aluminum, barium, calcium, chromium, cobalt, iron, manganese, mercury, nickel, potassium, vanadium, zinc, DDD, DDE, chlordane, fluoranthene, and pyrene	Lead	Aluminum, barium, calcium, copper, iron, magnesium, nickel, potassium, vanadium, DDE, benzo(a)anthracene, benzo(b)fluoranthene, chrysene, fluoranthene, and pyrene
Old Water Hole	Benzyl alcohol and phenol		

*RI sites not listed did not have any ecoCOPCs.

**Table 7-39. Summary of HQs Greater than 1 for Food Chain Receptors
Fort McClellan RI, Anniston, Alabama**

Exposure Unit	Food Chain Receptors									
	Cottontail	White-footed Mouse	Robin	Woodcock	Shrew	Red Fox	Red-tailed Hawk	Muskrat		
Site 4- Area T-38	Al=262	Al=20	Al=28 Cr=22 Pb=25	Al=49 Cr=37 Pb=44	Al=2,194 Pb=4.15	Al=58	Cr=1.49			
Site 8 - Range L										Al=312
Site 9 - Landfill #1										Al = 88
Site 11 - Landfill #3	Al = 529 Mn = 1.03	Al = 41	Al=56 Cr=9.78 Zn = 5.8 DDD = 3.33	Al= 98 Cr=17 Zn= 8.86 DDD= 5.77	Al = 4,421 Mn=3.6	Al = 117	Al=1.15 Zn = 5.89 DDD= 2.11			Al = 308

8. SUMMARY AND CONCLUSIONS

The U.S. Army has conducted environmental investigations on 12 sites identified on the Main Post and Pelham Range at Fort McClellan, Alabama. The remedial investigation (RI) is the second study of the sites that has been conducted for the purpose of identifying and delineating environmental concerns in the former administrative, light industrial, historical training, and landfill areas on Fort McClellan. The results of the investigations are used in combination with historical site data and the results of a Site Investigation (SI) study completed at the sites in 1993.

The RI was conducted to document the extent of environmental concerns on the selected Fort McClellan properties that are the result of pre-closure military activities and to assess potential human health and ecological impacts. The objectives of the RI study were to investigate the presence, nature, and extent of environmental concerns resulting from previous controlled U.S. Army chemical warfare training activities and uncontrolled munitions and municipal waste disposal. The investigations included assessments of the sources of chemical constituents, delineation of the areal extent of detected constituents, detailed geologic/hydrogeologic characterization of several of the sites, and assessment of potential human health and ecological impacts. The RI sites include seven former chemical warfare training areas (T-4, T-5, T-24A, T-38, Range J, Range K, and Detection and Identification [D&I] Area), two reported chemical munitions disposal sites (Old Water Hole and Range L [Lima Pond]), and three former municipal or demolition debris landfills (Landfills #1, #2, and #3). Study areas T-6 (Agent Decontamination Area), T-31 (Technical Escort Reaction Area), and Range I (CWM Shell Tapping Area) were not included for additional study following the 1993 SI conducted under the IRP, however, these sites warrant future investigation to address BRAC issues associated with property transfer. Two additional SI study areas (Old Toxic Training Area [OTTA] and HD Spill/Burial Sites) were not included for further investigation under the RI study on the basis of limited areal extent and non-detection of CWM or CWM breakdown products (OTTA) or lack of substantive site information (HD sites).

The geologic and hydrogeologic conditions underlying the RI sites at Fort McClellan have been evaluated by investigative drilling and sampling, test pit excavations, groundwater elevation measurements, aquifer (slug) testing, and through available geologic mapping in the vicinity of Fort McClellan and Pelham Range. Geologic conditions in the investigated areas consist of variably weathered claystone and shale with minor sandstone on the Main Post and interlayered limestone, dolomite, and sandstone on Pelham Range. Soil derived from the weathered bedrock consists predominantly of clayey silt and silty clay with localized sand lenses and overlies the weathered rock in each of the study areas. Ledges, seams, and boulders of moderately to slightly weathered bedrock and chert were encountered at many of the investigated sites. The competent bedrock is overlain by silty and clayey residuum derived from weathering of the rock. The measured depth to groundwater on the Main Post ranged from 0 to 129.9 feet below ground surface and from 0.4 to 72.9 feet on Pelham Range.

The nature and extent of constituents attributable to the RI sites was assessed using field screening (MINICAMS[®]) analyses and soil, groundwater, surface water, and sediment sampling and analysis. MINICAMS[®] screening for chemical warfare agent (GB, VX, and HD) was conducted by USATEU on surface and subsurface soil at Areas T-4, T-5, T-24A, and T-38, Old Water Hole, D&I area, Range J, Range K, and Range L. Based on the results of the screening analyses, chemical warfare agent was not detected in any screened samples from the RI sites on the Main Post or Pelham Range. Surface and subsurface soils at Areas T-4, T-5, Detection and Identification Area, Range J, and Range K were solely evaluated for chemical agent (HD, GB, VX) and breakdown products. Soil sampling was conducted around the perimeter of Landfill #1 and Landfill #3. Soil sampling has not been conducted at Landfill #2. Additionally, soil sampling has not been conducted within the identified perimeter of the landfill sites.

A variety of geophysical investigation methods (EM-31, EM-61, STOLSTM, magnetometer) were applied to 10 of the RI sites. The geophysical surveys identified the presence of scattered debris (Area T-4, Area T-38, Range J, Range K, Range L, Landfill #1, and Old Water Hole) and subsurface burials (Area T-24A, Detection and Identification Area, and Landfill #2) at the sites. Ordnance was identified at Range K and Area T-24A.

Surface water and sediment samples were obtained near 6 of the RI sites from the Main Post and Pelham Range. Comparatively few organic constituents consisting of variably-detected concentrations of 1,1,1-trichloroethane, chlorobenzene, trichloroethene, α -BHC, δ -BHC, γ -BHC were identified in the surface water near the sites. Concentrations of the explosives compounds 2,4,6-trinitrotoluene, 2,4-dinitrotoluene, and 2,6-dinitrotoluene were detected in pond water at Range L. Background metals concentrations were detected in surface water at Area T-5, Area T-24A, and Landfill #2. Concentrations of arsenic, barium, lead, manganese, and zinc variably exceeded background concentrations at Range L, Landfill #1, and Landfill #3. Organic constituents that were detected in sediment samples adjacent to the sites consisted of isolated concentrations of benzyl alcohol, di-n-butyl phthalate, and dieldrin and concentrations of PAH compounds that were detected in a sample from the northeast corner of Landfill #3. Metals compounds in the sediment variably exceeded background concentrations at each site.

MINICAMS[®] screening of soil samples from nine former CW training sites did not detect the presence of residual HD, GB, or VX chemical agents. Laboratory soil analyses from Area T-4, T-5, Range J, Range K, and the Detection and Identification Area did not detect the presence of CWM breakdown products. Chemical constituents were detected in soil samples from excavated training pits within Area T-24A. Concentrations of PAH and pesticide compounds were variably detected in soil samples surrounding Landfill #1, Landfill #3, Area T-38 and the Old Water Hole site.

Groundwater underlying 8 of the sites at which monitoring was conducted is variably affected by concentrations of organic compounds that are related to previous use of the property for training or disposal activities. Groundwater at Range J (Pelham Range) and Area T-38 (Main Post) contains concentrations of acetone, carbon tetrachloride, 1,2-dichloroethene, chloroform, tetrachloroethene, 1,2-trichloroethane, 1,1,2,2 tetrachloroethane, and trichloroethene. These areas have previously been sites of extensive usage of decontamination solutions. Groundwater downgradient of Area T-24A (Main Post) contains concentrations of benzene, pentachlorophenol, phenol, PAH compounds, and pesticides. These constituents are consistent with open burning activities that used petroleum fuels as an ignition source. Groundwater quality at Range L and the Old Water Hole sites (Pelham Range) contains concentrations of PAH compounds and pesticides that may be unrelated to the previous site usage as suspected chemical weapons burial sites. Groundwater surrounding Landfill #1 and #2 on the Main Post contains concentrations of acetone, methylene chloride, toluene, 1,1,1-trichloroethane, and isolated concentrations of 1,3-dinitrobenzene, 4 methyl 2-pentanone, nitroglycerine, and pesticides. Groundwater surrounding Landfill #3 contains the largest variety of detected organic constituents including acetone, benzene, carbon disulfide, chlorobenzene, 1,1-dichloroethene, dichlorobenzene, methylene chloride, pentachlorophenol, trichloroethene, tetrachloroethene, 1,1,2,2-tetrachloroethane, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, xylenes, and vinyl chloride. Elevated concentrations of 1,1,2,2-tetrachloroethane and trichloroethene were detected in monitoring wells located west of the landfill.

Baseline Risk Assessments—The baseline risk assessment (BRA) assessed the potential for potential adverse human health effects that could result from contact with inorganic and organic constituents that were detected at the 12 sites under investigation. Because this RI study was conducted prior to the identification of Fort McClellan for closure under the Base Realignment and Closure (BRAC) program, several of the sites that were evaluated solely for chemical warfare agents (HD, B, VX) were not included in the risk assessment. These sites are Areas T-4, T-5 and Range K. Further,

sampling at several study areas did not include assessment of all of the pathways necessary for a complete risk evaluation of the property for the purpose of property transfer. These sites are Area T-4 (soil and groundwater), T-5 (soil and groundwater), T24-A (surface soil), Range K (soil and groundwater), Range J (soil), D&I (soil and groundwater), Landfill #1 (soil), Landfill #2 (soil), and Landfill #3 (soil). This information would be needed prior to assessments are recommended

Non-cancer and cancer risks to humans were estimated for both current and future land uses. Under current land use, occasional visits by trespassing children, adults, and military personnel were considered reasonably likely. Under future land use, higher levels of exposure to residents and construction workers were evaluated on a hypothetical basis. The human health risk estimates are attributable to exposures to both metal and organic substances. Exposure to constituents in groundwater was hypothetically assumed in the future industrial and residential scenario. Groundwater exposures at some sites accounts for the majority of the estimated hazard and risk.

There is no current or imminent hazard present at any of the sites evaluated. Under current land use, the combined non-cancer hazard indices (HI) are less than 1 and cancer risks are near the lower limit of the USEPA's target cancer risk range (1×10^{-4} to 1×10^{-6}) for the sites where sufficient characterization is available for the risk evaluation. The results of the human health risk assessment are primarily focused on the future land uses, which are summarized for each site evaluated as follows:

- **Area T-4**—Quantitative risk assessment was not conducted for Area T-4 because soil and groundwater pathways were not fully evaluated for non-CWM at this site. Soil from Area T-4 was analyzed specifically for chemical warfare agent breakdown products. The target analytes (CWM) were not detected in any samples. Soil and groundwater pathways were not fully evaluated and are identified as data gaps for this site.
- **Area T-5**—Comprehensive risk assessment was not conducted for Area T-5 because soil and groundwater pathways were not fully evaluated for non-CWM at this site. Soil from Area T-5 was analyzed specifically for chemical warfare agent breakdown products. The target analytes (CWM) were not detected in any samples. There were no COPCs for surface water and lead was identified as a COPC for sediment. The non-CWM evaluation of the soil and groundwater pathways at this site are identified as data gaps.
- **Area T-24A**—Surface soil samples collected from Area T-24A were analyzed only for agent breakdown products. Because agent breakdown products were not detected in any of the samples, risk assessment for surface soils was not conducted at Area T-24A. There were no COPCs for surface water or sediment at Area T-24A. However, there were COPCs in the subsurface soil and groundwater. Non-CWM evaluation of soil is identified as a data gap for this site.

All noncancer HIs and cancer risks are below EPA targets (i.e., $HI < 1$ and cancer risk $< 1 \times 10^{-6}$) at Area T-24A under current land use. Under future land use, noncancer HIs exceed 1 for resident child exposures to soil. Noncancer COCs for the subsurface soil are aluminum and antimony. HIs exceed 1 for groundwater ingestion by all receptors evaluated and for showering by the resident adult. Noncancer COCs in groundwater ($HQ > 1$) are manganese and benzene. Aluminum is a lesser noncarcinogenic COC for groundwater.

There were no carcinogenic COPCs in subsurface soil therefore risks were not calculated to evaluate soil exposures. Cancer risks for the resident exposed to groundwater reach 2×10^{-4} . The carcinogenic COCs for groundwater are benzene, benzo(b)fluoranthene, bis(2-ethylhexyl)phthalate (B2EHP), hexachlorobenzene, and pentachlorophenol (PCP) (except

benzene, all risk estimates for groundwater are within the EPA target range (1×10^{-6} to 1×10^{-4}).

- **Area T-38**—The noncancer HIs are below EPA targets for current and current/future land use. There are no carcinogenic COPCs under the current/future land use. Under future land use, HIs for surface soil (0 to <1 ft BLS) exceed 1 for the resident and construction worker. The HI for the resident exceeds 1 for subsurface soil (1 to 12 ft BLS). The non-cancer COC in soil is primarily iron (HQ >1). Lesser COCs in soil are aluminum, chromium, and vanadium (HQs < 1). Groundwater HIs exceed 1 for the resident adult and child, and the industrial worker. Non-cancer COCs in groundwater are primarily (HQs >1) iron, manganese, carbon tetrachloride, and trichloroethene. Lesser COCs (HQs <1) are aluminum, barium, nickel, and 1,2-dichloroethene.

Cancer risks are between 1×10^{-6} and 1×10^{-4} for soil exposures under future land use. Cancer risks exceed 1×10^{-4} for the groundwater exposures. Cancer-based COCs for the resident exposed to groundwater are primarily 1,1,2,2-tetrachloroethane and carbon tetrachloride. Lesser carcinogenic COCs are benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene, 1,1,2-TCE, tetrachloroethene, trichloroethene, chloroform, and bis(2-ethylhexyl)phthalate.

- **Range K**—Quantitative risk assessment was not conducted for Range K because soil and groundwater pathways were not fully evaluated for non-CWM at this site. Soil from Range K was analyzed specifically for chemical warfare agent breakdown products. The target analytes (CWM) were not detected in any samples. Soil and groundwater pathways not fully evaluated for this site.
- **Range J**—Quantitative risk assessment was not conducted for Range J because soil and groundwater pathways were not fully evaluated for non-CWM at this site. Soil from Range J was analyzed specifically for chemical warfare agent breakdown products. The target analytes (CWM) were not detected in any samples. Because agent breakdown products were not detected in any of the samples, risk assessment for soils was not conducted at Range J. RME risks were calculated for the groundwater pathway at Range J. Risks for current land use were not calculated at Range J because none of the target analytes was detected in soil and there is no current groundwater usage at the site.

Under future land use, noncancer HIs exceed 1 for the groundwater ingestion, dermal contact, and vapor inhalation pathways. The two COCs for noncancer effects are carbon tetrachloride and chloroform. Cancer risks reach 1×10^{-4} for the industrial worker. The cancer risks are above 1×10^{-4} for the residents. The COC for cancer effects is carbon tetrachloride, although chloroform, PCE, and 1,1,2,2-tetrachloroethane (1,1,2,2-PCA) are lesser COCs.

- **Detection and Identification Area**—There are no COPCs in any of the currently accessible media sampled at the D&I Area. All noncancer HIs and cancer risks are at or below the EPA targets (i.e., HI < 1 and cancer risk < 1×10^{-4}) for all receptors for future land use. Potential groundwater impacts have not been evaluated at this site.
- **Range L**—Under current land use and current/future land use all noncancer HIs and cancer risks are at or below EPA targets (i.e., HI < 1 and cancer risk < 1×10^{-6}). Under future land use, noncancer HIs for soil exposures to the industrial worker, the resident, and construction worker exceed 1. The HIs for groundwater exposures to the industrial worker and resident also exceed 1. The noncancer-based COCs in surface soil are primarily aluminum and manganese, and, to a lesser extent, chromium, nickel, and vanadium; whereas, in subsurface soil the COCs are aluminum, chromium, and vanadium. For groundwater, the primary

noncancer COC is manganese with aluminum, cadmium, nickel, heptachlor epoxide, nitrate, and B2EHP as lesser COCs (i.e., with HQs of less than 1). ANOVA indicates that the detected concentrations of manganese in the groundwater at Range L are indistinguishable from background. Based on the ANOVA and consideration of likely mission-related constituents, manganese is eliminated as a COC for groundwater at Range L.

The greatest cancer risk is 2×10^{-5} for inhalation exposures to chromium in surface and subsurface soil. For groundwater exposures, the cancer risk reaches 4×10^{-4} , primarily attributable to an isolated concentration of polychlorinated biphenyl (PCB) 1248. Lesser carcinogenic COCs for the groundwater are isolated concentrations of benzo(a)anthracene, benzo(b)fluoranthene, heptachlor, heptachlor epoxide, indeno(1,2,3-cd)pyrene, Royal Demolition Explosive (RDX), and B2EHP.

- **Landfill #1**—Under current/future land use all noncancer HIs and cancer risks are below EPA targets (i.e., HI < 1 and cancer risk < 1×10^{-6}) at Landfill #1. Under future land use, noncancer HIs do not exceed 1 for any receptors exposed to subsurface soil. Noncancer HIs exceed 1 for the groundwater ingestion pathway for the resident. The primary COC for noncancer effects from exposure to groundwater is manganese. Lesser noncancer COCs for the groundwater are aluminum, barium, 1,3-dinitrobenzene, and nitrate. ANOVA indicates that the detected concentrations of manganese in the groundwater at Landfill #1 are indistinguishable from background.
- **Landfill #2**—Soil analyses were not conducted at Landfill #2 and is identified as a data gap for the site. COPCs are identified in sediment and groundwater. Under current/future land use all noncancer HIs are below the target HI of 1 and cancer risks are all below 1×10^{-6} . Under future land use, noncancer HIs exceed 1 for groundwater exposures to residents. The primary noncancer COC in groundwater is manganese, with aluminum, beryllium, and chromium as lesser COCs. The greatest cancer risk for exposure to groundwater is 8×10^{-6} , predominantly attributable to aldrin.
- **Landfill #3**—Under current and current/future land use all noncancer HIs and cancer risks are below EPA targets (i.e., HI < 1 and cancer risk < 1×10^{-6}) at Landfill #3. Under future land use, noncancer HIs exceed 1 for exposure to surface and subsurface soil. The primary COC for noncancer effects related to exposure to the surface soil is manganese (HQ > 1), and aluminum, chromium, and vanadium are lesser COCs (HQs < 1). Because the noncarcinogenic hazards are overwhelmingly related to manganese, these COCs are not combined or otherwise segregated according to similar noncancer effects. ANOVA indicates that the concentrations of manganese detected in the surface soil at Landfill #3 are indistinguishable from background. Based on the ANOVA manganese is eliminated as a COC for the surface soil at Landfill #3.

For groundwater, HIs exceed 1 for all receptors evaluated. Noncancer COCs are primarily aluminum, chromium, manganese, vanadium, and trichloroethylene. Lesser COCs (HQs < 1) are barium, beryllium, cadmium, cobalt, copper, mercury, nickel, 1,1,2,2-PCA, 1,2-DCE, acetone, aldrin, dieldrin, endrin, PCP, vinyl chloride, and B2EHP. The greatest summed cancer risk for soil exposures is for the industrial worker, and is below 1×10^{-4} . For exposures to the groundwater, the cancer risk reaches 3×10^{-3} for the resident. Carcinogenic COCs for groundwater are primarily (cancer risk > 1×10^{-4}) 1,1,2,2-TCA, dibenzo(a,h)anthracene, PCP, and vinyl chloride. Lesser carcinogenic COCs (cancer risk > 1×10^{-6}) for the groundwater are 1,1,2-TCA, 1,4-dichlorobenzene, aldrin, benzene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, dieldrin, heptachlor, heptachlor epoxide, indeno(1,2,3-cd)pyrene, PCB 1248, PCE, TCE, alpha-BHC,

beta-BHC, B2EHP, and lindane. Dieldrin and 4,4'-DDT were detected in the SI data but not in the RI data. In addition, alpha-BHC and endrin were detected at higher concentrations in the SI data than in the RI data.

- **Old Water Hole**—There were no COPCs in surface soil under current land use; thus, risks were not calculated for current land use at the Old Water Hole. Under future land use, noncancer HIs fall below 1 for the soil exposures to the resident. For groundwater exposures, HIs exceed 1 for the resident's exposures. The primary noncarcinogenic COC (HQ > 1) is manganese. Lesser noncarcinogenic COCs (HQs < 1) include aluminum, barium, and aldrin. By grouping the noncancer COCs according to similar toxic effect, manganese is identified as a COC for effect to the central nervous system. There were no carcinogenic COPCs to evaluate in soil. Cancer risks for exposure to the groundwater are greatest for the resident, reaching 3×10^{-4} . The cancer risk for groundwater exposures to the industrial worker reaches 1×10^{-4} . The primary carcinogenic COC for groundwater is dibenzo(a,h)anthracene. Aldrin, benzo(a)anthracene, benzo(b)fluoranthene, heptachlor, indeno(1,2,3-cd)pyrene, PCB 1248, RDX, alpha-BHC, and B2EHP are lesser carcinogenic COCs.

A screening-level ecological risk assessment (SERA) was conducted for ecological exposures to surface soil, surface water, and sediment at four of the 12 sites on the Fort McClellan Main Post and Pelham Range. Sampling was limited in scope at the remaining sites. The SERA was performed by screening maximum detected concentrations at each site in each medium against ecological screening values and background concentrations. Food chain modeling also was conducted for ecoCOPCs that are of bio-accumulative concern. Based on the results, a site is recommended for either no further action, additional sampling, refined SERA, or BERA.

It is important in the SERA process to avoid overstating conclusions, especially considering the conservative assumptions used in the SERA and the limited sampling data available for evaluation. EcoCOPCs were selected at each site where chemicals were detected. The selection of a chemical as an ecoCOPC indicates potential for adverse effects to ecological receptors. However, the results are based on maximum comparisons to ecological screening values and, in many instances, limited sampling data. Food chain HQs were above 1 at the four sites evaluated (Area T38, Range L, Landfill #1, and Landfill #3), also suggesting the potential for adverse effects. Again, the risks were based on maximum detected concentrations and limited sample sizes. Very limited, if any, chemical data were available for the remaining RI sites. These sites are recommended for additional chemical sampling and subsequent evaluation in a refined SERA. The surface soil HQs resulting from the abiotic screen were typically highest for aluminum, chromium, iron, and vanadium. In relation to the surface soil risks, surface water and sediment HQs were low. The primary risk driver for the food chain was aluminum. However, this risk was more from incidental ingestion than bioaccumulation in plants and animals. The food chain modeling did not evaluate chemicals that were not selected as ecoCOPCs but could bio-accumulate.

An evaluation of surface soil and/or sediment ecoCOPCs at Areas T-5, T-24A, T-38, Range L, Landfills #1, #2, #3, and the Old Water Hole is recommended in the form of a refined SERA. This refined evaluation would include components of a BERA (more realistic exposure assumptions) without the collection of biological data. Additional chemical sampling may also occur at Area T-4, Area T-5, Area T-24A, Area T-38, Range L, Landfill #2, and Landfill #3. The revised SERA also would incorporate any additional data. From this refinement, the need for biological sampling should be re-evaluated.

Areas Recommended for Additional Study—Additional information will be needed at several of the RI sites to assess exposure pathways that were not evaluated during the initial study and to further quantify the environmental chemistry in specific media. The following data are recommended for supplemental analyses:

- Because of the history of CWM and biological training activity at Area T-4 and the suspected use of decontamination solutions, groundwater sampling at the site is warranted based on the detection of organic constituents at similar sites on the Post. Surface and subsurface soil analyses for non-CWM constituents are needed to evaluate potential exposures associated with non-military land re-use. The analytical suite to minimally include VOCs, SVOCs, metals, explosives, pesticides/herbicides, and PCBs.
- Because of the history of CWM training activity at Area T-5 and the suspected use of decontamination solutions, groundwater sampling at the site is warranted based on the detection of organic constituents at similar sites on the Post. Surface and subsurface soil analyses for non-CWM constituents are needed to evaluate potential exposures associated with potential future non-military land re-use. The analytical suite to include VOCs, SVOCs, metals, explosives, pesticides/herbicides, and PCBs.
- Additional soil sampling may be warranted both within and outside the fenced enclosure at Area T-24A to analyze for non-CWM chemical constituents. Additional groundwater wells may be needed to assess the source of detected benzene concentrations downgradient of the site. The analytical suite to include VOCs, SVOCs, metals, explosives, pesticides/herbicides, and PCBs.
- Supplemental soil gas sampling at Area T-38 to potentially delineate a source for organic constituents that were detected in groundwater underlying the site. Verification surface and subsurface soil sampling in the potentially delineated source area. Surface water and sediment sampling to be conducted in the nearest downgradient stream. The analytical suite to include VOCs, SVOCs, metals, explosives, pesticides/herbicides/and PCB compounds.
- Because of the history of CWM disposal activity at Range J and the suspected use of decontamination solutions, surface and subsurface soil analyses for non-CWM constituents are warranted to allow the assessment of ecological and potential future human health exposures associated with non-military land re-use. The analytical suite to include VOCs, SVOCs, metals, explosives, pesticides/herbicides/PCBs.
- Because of the history of CWM and ordnance training activity and the suspected use of decontamination solutions at Range K and the Detection and Identification Area, surface and subsurface soil sampling for non-CWM constituents are warranted to evaluate potential exposures associated with future non-military land re-uses. Groundwater sampling at these sites is warranted based on the detection of organic constituents at similar sites on the Post. The analytical suite to minimally include VOCs, SVOCs, metals, explosives, pesticides/herbicides, and PCBs.
- Additional sampling of sediments and surface water within the fenced enclosure at Range L is needed to more completely evaluate potential residual chemical concentrations within the site area.
- Surface and subsurface soil sampling within the Landfill #1 perimeter are needed to complete the evaluation of the study area for the purposes of property transfer. The minimum analytical suite to include VOCs, SVOCs, metals, explosives, pesticides/herbicides/PCBs.

- Surface and subsurface soil sampling are warranted at Landfill #2 both inside and outside the site perimeter to evaluate potential exposures associated with non-military land re-use. The minimum analytical suite to include VOCs, SVOCs, metals, explosives, pesticides/herbicides/PCBs.
- Delineation of the off-Post component of detected groundwater constituents and the identification of potential non-landfill sources of the compounds is warranted at Landfill #3. Passive or active soil gas sampling on and off-Post may be warranted to assess the potential source area.
- Surface and subsurface soil sampling within the Old Water Hole study area are needed to support the ecological and human health risk evaluations complete the evaluation of the study area for the purposes of property transfer. The minimum analytical suite to include VOCs, SVOCs, metals, explosives, pesticides/herbicides/PCBs.

9. REFERENCES

- ADEM (Alabama Department of Environmental Management). 1993. Fort McClellan Sanitary Landfill SFL 08-02, Calhoun County, Alabama, letter report from R.E. Hicks, Hydrogeology Unit, to Russell Kelly, Chief, Solid Waste Branch, April 21.
- ANHP (Alabama Natural Heritage Program). 1994a. *Natural Heritage Inventory of Fort McClellan, Main Post: Federal Endangered, Threatened, Candidate Species and State-listed Species*. Alabama Department of Conservation and Natural Resources, Montgomery, Alabama.
- ANHP. 1994b. *Natural Heritage Inventory of Fort McClellan, Pelham Range: Federal Endangered, Threatened, Candidate Species and State-listed Species*. Alabama Department of Conservation and Natural Resources, Montgomery, Alabama.
- Auburn University. 1979. *Endangered, Threatened, and Special Concern Plants of Alabama*. Department Series No. 3, Auburn, Alabama.
- Baes, C.F. III, R.D. Sharp, A.L. Sjoreen, and R.W. Shor. 1984. *A Review and Analysis of Parameters for Assessing Transport of Environmentally Released Radionuclides through Agriculture*. ORNL-5786. Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- Bechtel Jacobs Company, LLC. 1998. Biota Sediment Accumulation Factors for Invertebrates: Review and Recommendation for the Oak Ridge National Laboratory, Oak Ridge, Tennessee. BJC/OR-112.
- Beyer, W.N., E. Conner, and S. Gerould. 1994. *Estimates of Soil Ingestion by Wildlife*. J. Wildl. Manage. 58: 375-382.
- Bunyan, J., A.T. Diplock, M.A. Cawthorne, and J. Green. 1968. *Vitamin E and stress. 8. Nutritional effects of dietary stress with silver in vitamin E-deficient chicks and rats*. Br. J. Nutr. 22: 165-182.
- Calhoun County Chamber of Commerce. 1993. Chamber of Commerce Member and Community Guide.
- CMS Research Corporation. 1993. Written communication. July.
- Cockerham, L.G., and B.S. Shane 1994. *Basic Environmental Toxicology*. CRC Press, Boca Raton, Florida.
- Cooper, H.H., J.D. Bredehoeft, S.S. Papadopoulos. 1973. *Response of a Finite-Diameter Well to an Instantaneous Charge of Water*, Water Resources Research, 1973, v.3, no. 1, pp 263-269.
- CRC. 1982. *Handbook of Chemistry and Physics*. 62nd Edition.
- Dragun, J. 1988. *The Soil Chemistry of Hazardous Materials*.
- Dynamac Corporation. 1993. VLEACH One-Dimensional Finite Difference Vadose Zone Leaching Model. Version 2.0.
- Eary, L.E. and D. Rai. 1989. *Kinetics of Chromate Reduction by Ferrous Ions Derived from Hematite and Biotite at 25°C*. Am. J. Sci. Vol. 289, pp. 180-213.

- ECG, Inc. 1994. *September Sanitary Landfill Sampling Results and Analysis of Variance*, quarterly data report prepared for Fort McClellan Environmental Management Office.
- Ecology and Environment, Inc. 1991. *Preliminary Investigation Report for Closure of Underground Storage Tanks, Fort McClellan, Anniston, Alabama*, March.
- EDAW, Inc. 1997. Fort McClellan Comprehensive Reuse Plan, Implementation Strategy, report prepared for the Fort McClellan Reuse and Redevelopment Authority of Alabama, November 1997.
- Eisler, R. 1987a. Mercury Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. U.S. Fish Wildlife Serv., Biol. Rep. 85 (1.10). Patuxent Wildlife Research. Laurel, Maryland.
- Eisler, R. 1987b. Aromatic Hydrocarbon Hazards to Fish, Wildlife, and Invertebrates: A Synoptic Review. U.S. Fish Wildlife Serv. Biol. Rep. 85 (1.11): 81 pp.
- ES&E (Environmental Science and Engineering, Inc.). 1981. Fort McClellan Military Reservation RCRA Studies, Final Engineering Report, May.
- ES&E. 1983. *Ground Water Contamination Assessment, Fort McClellan, Alabama*, May.
- ES&E. 1984. *Reassessment of Fort McClellan, Anniston, Alabama, Report No. 110A*, January.
- ES&E. 1995. Personal communication (fax and telephone) between J. Vondrick (ESE-Gainesville) and S. Maguire (SAIC), May 24.
- EPA (U.S. Environmental Protection Agency). 1982. Fort McClellan, Pelham Range-N.E., Alabama, aerial photography and interpretation prepared by Environmental Monitoring Systems Laboratory, TS-PIC-2001. April.
- EPA. 1983. Fort McClellan 24 Alpha, T38, Range J, Alabama, aerial photography and interpretation prepared by Environmental Monitoring Systems Laboratory, TS-PIC-83003. September.
- EPA. 1988. *Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA*, Office of Solid Waste and Emergency and Remedial Response, OSWER Directive 9335.3-01.
- EPA. 1989a. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual (Part A). Office of Solid Waste and Emergency and Remedial Response. OSWER Directive 9285.701A.
- EPA. 1989b. Exposure Factors Handbook. Office of Health and Environmental Assessment. EPA/600/8-89/043.
- EPA. 1989c. Risk Assessment Guidance for Superfund, Vol. II, Environmental Evaluation Manual, Interim Final. EPA/540/1-89/001. Office of Emergency and Remedial Response, Washington, DC.
- EPA. 1989d. Ecological Assessments of Hazardous Waste Sites: A Field and Laboratory Reference Document. EPA/600/3-89/0113. Washington, DC.
- EPA. 1990. Information and Data Requirements for Site Investigations, Federal Agencies. EPA Region IV, 16p. October.

- EPA. 1991a. Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors. Office of Emergency and Remedial Response, OSWER Directive 9285.6-03.
- EPA. 1991b. Risk Assessment Guidance for Superfund: Volume 1 – Human Health Evaluation Manual (Part B), Development of Risk-based Preliminary Remediation Goals. Office of Emergency and Remedial Response.
- EPA. 1991c. National Oil and Hazardous Substances Pollution Contingency Plan, Part 300, Subpart E.
- EPA. 1991d. Supplemental Region IV Risk Assessment Guidance. March 26, 1991. Region IV, Atlanta, Georgia.
- EPA. 1991e. "Ecological Assessment of Superfund Sites: an Overview." ECOupdates 1(2), Office of Solid Waste and Emergency Response, Publ. 9345.0-05I.
- EPA. 1991f. Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual.
- EPA. 1991g. Laboratory Data Validation Functional Guidelines Evaluating Organics and Inorganics Analyses. EPA Contract Laboratory Program. February.
- EPA. 1992a. Dermal Exposure Assessment: Principles and Applications. Office of Health and Environmental Assessment. EPA/600/8-91/001B.
- EPA. 1992b. Statistical Analysis of Ground-water Monitoring Data at RCRA Facilities. Addendum to Interim Final Guidance. Office of Solid Waste, Permits and State Programs Division.
- EPA. 1992c. Supplemental Guidance to RAGS: Calculating the Concentration Term. Office of Emergency and Remedial Response, Hazardous Site Evaluation Division, Washington, DC. Interim Bulletin, Vol.1, No.1, OSWER 9285.7-081.
- EPA. 1992d. Risk Assessment Issue Paper for: Provisional RfD for Trichloroethylene (CASRN 79-01-6). Draft. Environmental Criteria and Assessment Office.
- EPA. 1992e. Developing a Work Scope for Ecological Assessments. Office of Emergency and Remedial Response. ECOupdate 1(4):1-15.
- EPA. 1992f. Framework for Ecological Risk Assessment. Risk Assessment Forum, 630/R-92/001. Washington, DC.
- EPA. 1993a. Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure, Preliminary Review Draft, May 5.
- EPA. 1993b. *Wildlife Exposure Factors Handbook*, Volume I of II, Office of Health and Environmental Assessment, Office of Research and Development, U.S. Environmental Protection Agency, Washington, D.C., December. EPA/600/R-93/187a.
- EPA. 1993c. Provisional Guidance for Quantitative Risk Assessment of Polycyclic Aromatic Hydrocarbons. Office of Research and Development. EPA/600/R-93/089.

- EPA. 1994a. Development of Health Based Preliminary Remediation Goals, Remedial Goal Options, and Remediation Levels. Supplemental Guidance to RAGS: Region IV Bulletin. Vol. 1, No. 3, October 12, 1994, Atlanta, Georgia.
- EPA. 1994b. LEAD 0.99d. A PC Software Application of the Uptake/Biokinetic Model for Lead, Version 0.99d. March 8.
- EPA. 1994c. Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead, Version 0.99d. March 8.
- EPA. 1994d. Environmental Risk Assessment Guidelines. Draft. EPA Region III Superfund Technical Support Section.
- EPA. 1995a. Supplemental Guidance to RAGS: Region IV Bulletins, Human Health Risk Assessment.
- EPA. 1995b. *Supplemental Guidance to RAGS: Region IV Bulletins*, Guidance for evaluating carcinogenic PAHs. Office of Health Assessment, USEPA Region IV, Athens, Georgia.
- EPA. 1995c. *Supplemental Guidance to RAGS: Region IV Bulletins, Ecological Risk Assessment*, Ecological Screening Values, Ecological Risk Assessment Bulletin No. 2, November 1995, Office of Health Assessment, USEPA Region IV, Athens, Georgia.
- EPA. 1996a. Environmental Compliance Branch Standard Operating Procedures and Quality Assurance Manual, USEPA Region IV, Athens, Georgia.
- EPA. 1996b. *Drinking Water Regulations and Health Advisories*. Office of Water. February.
- EPA. 1996c. Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil. Technical Review Workgroup for Lead. December.
- EPA. 1996d. Exposure Factor Handbook, SAB review draft.
- EPA. 1997a. Health Effects Assessment Summary Tables, FY-94, Annual (March 1994) and Supplements No. 1 (July 1994) and 2 (November 1994), Office of Research and Development. EPA540/R-94/020.
- EPA. 1997b. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. Interim Final. Environmental Response Team. Edison, New Jersey. June.
- EPA. 1998a. Risk Assessment Guidance for Superfund: Human Health Evaluation Manual (Part D). Office of Solid Waste and Emergency and Remedial Response.
- EPA. 1998b. Risk Based Concentration Values, tabulation of values downloaded from USEPA Region III internet site.
- EPA. 1998c. Integrated Risk Information System (IRIS). U.S. Environmental Protection Agency On-line Database of Toxicity Values. Office of Research and Development, Environmental Criteria and Assessment Office, Cincinnati, Ohio. Electronic Mail Account Information via TOXNET, National Library of Medicine, Bethesda, Maryland.

- EPA. 1998d. Risk Review Comments, Human Health Aspects, Fort McClellan, Anniston, AL. Memorandum from Ted Simon, OTS to Bart Ready, FFB/BRAC, EPA Region IV, Atlanta, GA. August.
- EPA. 1998e. Final Guidelines for Ecological Risk Assessment. EPA/630/R-95/002B, Washington, DC.
- EPA. 1999. Region IV Waste Management Division Soil, Surface Water, and Sediment Screening Values for Hazardous Waste Sites. Online.
- Gaddy, L.L. 1984. Guide to the Wetland Plant Communities of Fort McClellan, Alabama. Prepared for National Wetlands Inventory, Fish and Wildlife Service, U.S. Department of the Interior; and U.S. Army Chemical and Military Police Centers, Fort McClellan, Alabama.
- Garten, C.T. 1980. Ingestion of soil by hispid cotton rats, white-footed mice, and eastern chipmunks. *Journal of Mammalogy* 61:136-137.
- Geo-Marine. 1993. Habitat Analysis and 10-year Management Plan for White-Tailed Deer and Eastern Turkey. Pelham Range Training Area, Fort McClellan, Alabama. Prepared for USACML&MPCEN&FM under contract No. DABT02-92-C-0036.
- Geraghty and Miller. 1989. AQTESOLV-Aquifer Test Design and Analysis Computer Software, version 1.1.
- Gilbert, R.O. 1987. *Statistical Methods for Environmental Pollution Monitoring*. Van Nostrand Reinhold Company, New York, New York.
- Golden Software. 1994. SURFER for Windows, Users Guide.
- Guthrie, G.M. 1993. Photo-Lineament Map of Landsat Imagery, Alabama Piedmont, Alabama Geological Survey of Alabama Special Map 239, 1 sheet.
- Harvey, G. 1991 and 1994. Personal communication during site visits to Area T-38 at Fort McClellan in 1991 and 1994.
- HAZWRAP, 1994. Loring Air Force Base Ecological Risk Methodology., Martin Marietta Energy Systems, Oak Ridge National Laboratory, Oak Ridge, TN.
- Hoffman, P. 1994. Written communications, unclassified Chemical Event Reports from Col. P. Hoffman (USA) to Mr. Gary Harvey (FTMC-CS), May and June.
- HSDB (Hazardous Substance Databaseline). 1998. Online.
- IT (IT Corporation). 1998. Comprehensive Work Plan for Environmental Investigations at Fort McClellan, Alabama, draft excerpts.
- IT. 2000a. Human Health and Ecological Screening Values and PAH Background Summary Report, Draft, 31 March.
- IT. 2000b. Conference Call between IT and SAIC, March 20, 2000.
- Kingery, A.F. and H.E. Allen. 1994. Environmental Fate of Alkyl Methylphosphonates Arising from Chemical Surety Material (CSM) and Potential Non-CSM Sources in Soil and Aqueous Media.

- Kirkland, G.L., T.N. Lane, eds. *Advances in the study of Peromyscus (rodentia)*. Lubbock, Texas: Texas Tech University Press.
- Law. 1993. Natural Areas Management Plan for Fort McClellan, Alabama. Prepared for U.S. Army Corps of Engineers, Mobile District, by Law Environmental, Kennesaw, Georgia, under contract No. DACA-01-02-D-0007.
- Lyman, W.J., W.E. Roehl, and D.H. Rosenblatt. 1982. *Handbook of Chemical Property Estimation Methods: Environmental Behavior of Organic Compounds*.
- MacMillen, R.E. and T.J. Garland. 1989. *Adaptive physiology*. In
- Menzie, C.A., D.E. Burmaster, J.S. Freshman, and C.A. Callahan. 1992. Assessment of Methods for Estimating Ecological Risk in Terrestrial Component: A Case Study at the Baird & McGuire Superfund Site in Holbrook, Massachusetts. *Environ. Toxicol. Chem.* 11:245-260.
- Mettee, M.F., and R.R. Haynes. 1979. A Study of the Endangered and Threatened Plants and Animals on Fort McClellan Military Installation and Pelham Range, Calhoun County, Alabama. Geological Survey of Alabama, Contract No. DACA01-79-0075.
- Montgomery and Welkom. 1991. *Groundwater Chemicals Desk Reference, Volumes I and II*.
- Moser, P.H. and S.S. DeJarnette. 1992. *Groundwater Availability in Calhoun County, Alabama, Geological Survey of Alabama Special Map 228*.
- Mount, R.H. 1986. *Vertebrate Animals of Alabama in Need of Special Attention*. Alabama Agricultural Experiment Station, Auburn, Alabama.
- OGE (O'Brien & Gere Engineers, Inc.). 1988. *Hazardous Waste Site Remediation*.
- Ogden Environmental, Inc. 1992. *Preliminary Wetland Survey: Fort McClellan and Pelham Range—Anniston, Alabama*. Unpublished report to U.S. Army Corps of Engineers, Mobile District, Knoxville, Tennessee.
- Osborne, W.E. and M.W. Szabo. 1984. *Stratigraphy and Structure of the Jacksonville Fault, Calhoun County, Alabama, Geological Survey of Alabama, circular 117*.
- Perry, T.R. 1992. Written communication, trip report for November 16, 1992 site visit to Fort McClellan, USAEC internal memorandum, November 25.
- PRI (Potomac Research Institute). 1995. *Installation Restoration Data Management Information System, Volume II Data Dictionary*.
- Rosenblatt, D.H., M.J. Small, T.A. Kimmell, and A.W. Anderson. 1995. *Agent Decontamination Chemistry Technical Report*.
- Sage, G.W. and P.H. Howard. 1989. *Environmental Fate Assessments of Chemical Agents HD and VX, Chemical Research, Development, and Engineering Center, U.S. Army Armament Munitions Chemical Command, CRDEC-CR-034, p. 33*. June.

- SAIC (Science Applications International Corporation). 1993. Final Site Investigation Report, submitted to USAEC August 31, 1993, USAEC Report ENAEC-IR-CR-93099, v. I, II.
- SAIC. 1994. Final, RI/FS Sampling and Analysis Plan, Volume I, submitted to USAEC April 6.
- SAIC. 1994. Final, RI/FS Sampling and Analysis Plan, Volume II Quality Assurance Project Plan, submitted to USAEC April 6.
- SAIC. 1994. RI/FS Project Work Plan, Fort McClellan, Alabama. Task Order 005. Contract Number DAAA15-91-D-0017.
- SAIC. 1995. Chemical Data Report No. 2 – Second Quarter, Anniston Army Depot, Off-Post Groundwater Monitoring and Emergency Response Plan, submitted to USAEC June.
- SAIC. 1995. Tooele Army Depot – North Area, Phase II RCRA Facility Investigation Report. April.
- SAIC. 1996. IRDMIS RI analytical data for Anniston Army Depot, Anniston, Alabama.
- SAIC. 1998. *Background Metals Survey Report*, report prepared for U.S. Army Corps of Engineers, Mobile District, July, 1998.
- Sample, B.E., Opresko, D.M., and Suter II, G.W., 1996. *Toxicological Benchmarks for Wildlife*, 1996 Revision. ES/ER/TM-86/R3, Lockheed Martin Energy Systems, Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- Sample, B.E., D.M. Opresko, G.W. Suter II, and T.L. Ashwood. 1998. Development and Validation of Bioaccumulation Models for Earthworms. Oak Ridge National Laboratory, Oak Ridge, Tennessee.
- Scott, J.C., Harris, Wiley F., Cobb, Riley H, 1987. *Geohydrology and Susceptibility of Coldwater Spring and Jacksonville Fault Areas to Surface Contamination in Calhoun County, Alabama*, U.S. Geological Water Resources Investigations Report 87-4031 prepared in cooperation with the Alabama Department of Environmental Management.
- Small, M.J. 1982. *Preliminary Pollutant Limit Value Analysis to Target Soil Detection Limits for Potential Residual Chemical Warfare Related Contaminants at Fort McClellan, Alabama*, Draft Technical Report 8208.
- Small, M.J. 1983. *Soil Detection Limits for Potential Chemical Warfare-Related Contaminants at Fort McClellan, Alabama*, U.S. Army Medical Research and Development Command, Technical Report 8208.
- Simon, T. 1998. Memorandum (May 28, 1998) from Ted W. Simon (USEPA Region IV) to Bart Reedy (USEPA Region IV) to provide calculated background screening levels for surface water and sediment at Fort McClellan, Alabama.
- Soil Conservation Service. 1961. *Soil Survey of Calhoun County, Alabama*.
- Stokinger, H.E. 1981. *The Metals* in G.D. Clayton and F.E. Clayton (eds), *Patty's Industrial Hygiene and Toxicology*, 3rd revised edition, John Wiley and Sons, New York.

- Summermour, B. 1992. *Results of Red-Cockaded Woodpecker Survey on Fort McClellan, Alabama*, unpublished report to Natural Resource Management Division, Fort McClellan, submitted by Jacksonville State University, Jacksonville, Alabama, 17 pp.
- Swartzbaugh, J., J. Sturgill, H.D. Williams, and B. Cormier. 1992. *Remediating Sites Contaminated with Heavy Metals*.
- Talmage, S.S. and B.T. Walton. 1993. Food Chain Transfer and Potential Renal Toxicity of Mercury to Small Mammals at a Contaminated Terrestrial Field Site. *Ecotoxicology* 2:243-256.
- Tucker, R.E. 1995. Personal communication between R. Tucker (USA) and C. Manikas (SAIC). June.
- URS Consultants, Inc. 1993. Operating Industries, Inc., Landfill Site Remedial Investigation Report.
- U.S. Army Chemical Research, Development, and Engineering Center. 1990. Material Safety Data Sheets. December 3.
- USAEC (U.S. Army Environmental Center). 1995. Users Guide to Installation Restoration Data Management Information System (IRDMIS). Prepared by Potomac Research, Inc. (Edition 1995.1).
- U.S. Army Corps of Engineers. 1992. *Fort McClellan: A Cultural Resources Overview*, report submitted by New South Associates and ERC Environmental and Energy Services, July 20.
- USAEHA (U.S. Army Environmental Hygiene Agency). 1975. *Solid Waste Special Study No. 99-056-73/76, Clearances of Toxic Agent Training Areas, Fort McClellan, Alabama*.
- USAEHA. 1976. *Landfill Study No. 26-0346-77*, Fort McClellan, November.
- USAEHA. 1986a. *Geohydrologic Study No. 38-26-0912-87*, U.S. Army Chemical and Military Police Centers and Fort McClellan, August.
- USAEHA. 1986b. Draft Hazardous Waste Consultation No. 37-26-1649-87, Fort McClellan, Alabama, December.
- USATHAMA (U.S. Army Toxic and Hazardous Materials Agency). 1977. *Installation Assessment of Fort McClellan, Report No. 110*, Volumes I and II, Fort McClellan, Alabama. April.
- USATHAMA. 1987. *Geotechnical Requirements for Drilling, Monitor Wells, Data Acquisition, and Reports*. March.
- USATHAMA. 1990. *Enhanced Preliminary Assessment Fort McClellan, Alabama* Volumes I and II (Appendices), Report No. CETHA-BC-CR-90181 prepared by Roy F. Weston, Inc., December.
- U.S. Geological Survey. 1972. *Topographic Quadrangle of Anniston, Alabama*, photorevised 1972.
- U.S. Geological Survey (USGS). 1995. *Rock and Soil Geochemical and Natural-Water Hydrogeochemical Surveys and Environmental Implications, Fort McClellan, Alabama*, Open-File Report 95-387
- Warman, J.C. and L.V. Causey. 1962. *Geologic Map of Calhoun County, Alabama*, U.S. Geological Survey of Alabama County Report 7, plate 2, 1962.

Watson, G. 1995. Personal communication between G. Watson (former CG Fort McClellan) and R. Levy (Chief-FTMC-EMO), February.

Wentzel, R.S., R.T. Checkai, T.W. LaPoint, M. Simini, D. Ludwig, and L. Brewer. 1994. Procedural Guidelines for Ecological Risk Assessments at U.S. Army Sites, Vol. 1. ERDEC-TR-221, Aberdeen Proving Ground, Maryland.

Wentzel, R.S., R.T. Checkai, T.W. LaPoint, M. Simini, D. Ludwig, and L. Brewer. 1996. Tri-Service Procedural Guidelines for Ecological Risk Assessment, Vol. 1. ERDEC-TR-221, Edgewood Development & Engineering Center, Aberdeen Proving Ground, Maryland.

Whitten, C. 1995. Personal communication between C. Whitten (CEWES), D. Hutchins (USAEC), L. Kingsbury (FTMC-EMO), and C. Manikas (SAIC), July 18.

Wolfe et al. 1985. Food habits of *Sympatric Peromyscus leucopus* and *peromyscus Maniculatus*, J.Mammal, 66:795-798.