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Beltsville Agricultural Research Center

Beltsville, Maryland
CERCLIS #MD0120508940

Site Exposure Potential

The Beltsville Agricultural Research Center (BARC) comprises about 2,830 hectares in Beltsville, Maryland, in the northern tip of Prince George's County (Figure 1). The site drains to Paint Branch, Little Paint Branch, Indian Creek, and Beaverdam Creek. All flow south, eventually feeding into the Northeast Branch about 5 km downstream from the boundaries of the site (Figure 2). The Northeast Branch then flows about 4 km before discharging to the Anacostia River, which subsequently discharges to the Potomac River approximately 13 km farther downstream. The site is approximately 200 km from Chesapeake Bay.

Operations at BARC began in 1910 when the U.S. Department of Agriculture purchased a 190-hectare farm for research on animal husbandry, dairying, and animal diseases. The facility has since expanded with operations focused on research on commercially available herbicides, insecticides, and fungicides. The site has more than 600 buildings, including farm, office, and some residential buildings, and research laboratories. Because hazardous wastes are generated by the laboratories and associated research projects, BARC is a RCRA hazardous waste generator.

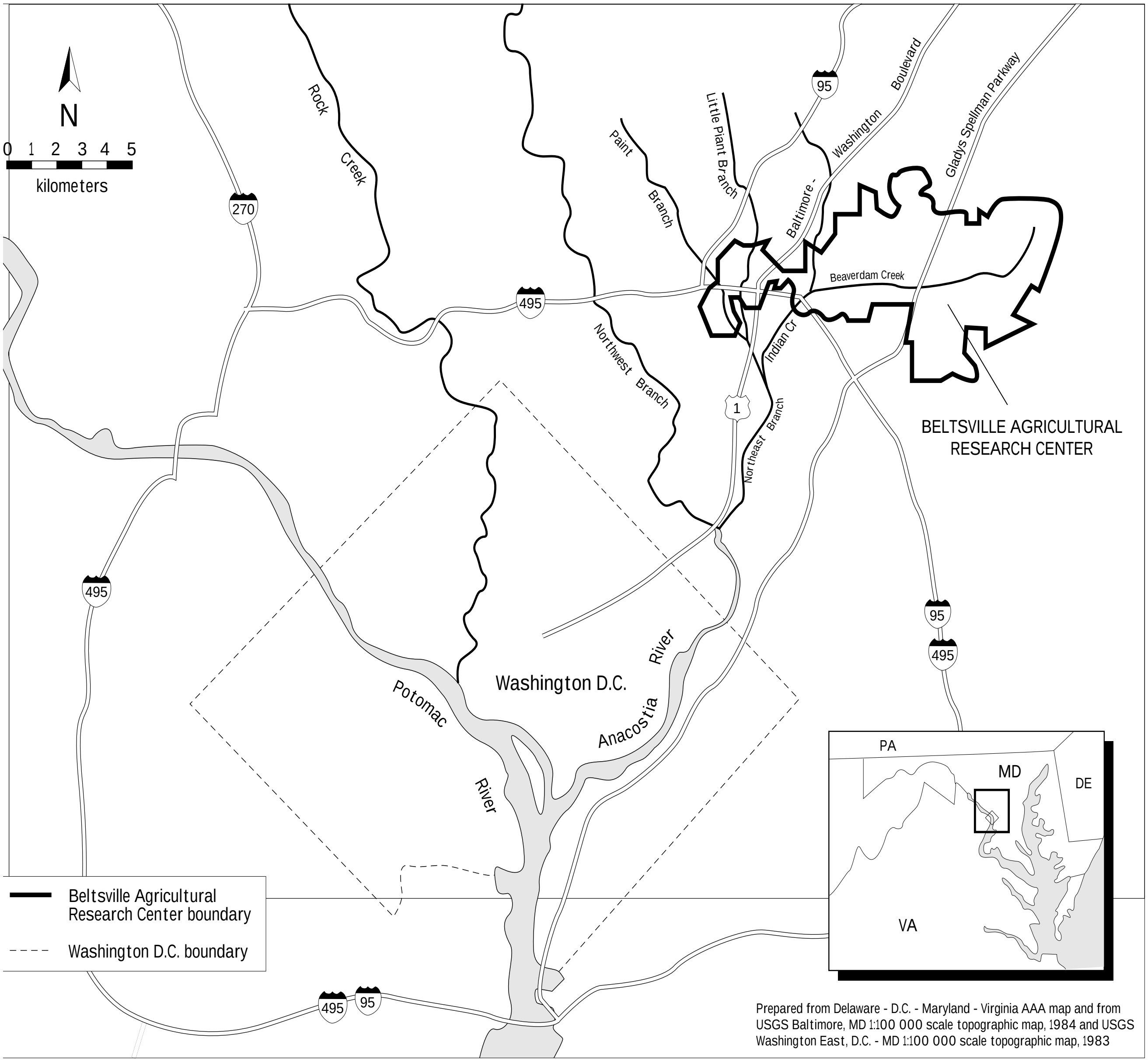

Figure 1. Location of the Beltsville Agricultural Research Center in Beltsville, Maryland.

Agricultural operations generate chemical and biological wastes (e.g., manure, animal carcasses, and waste bedding). Municipal-type waste is also generated as paper, wood, scrap metal, paints, cleaners, construction debris, and vegetative cuttings. A PA/SI identified 44 areas at the site with known or suspected disposal or release of wastes (Apex Environmental 1991). Apex identified 16 of these areas as potential receptors of

Table 1. Summary of sites at BARC where CERCLA hazardous substances may be present.

Site of Concern	Period of Operation	Size	Types of Waste Disposed or Spilled
1) Experimental Wood Treating Area	1946 to mid-1950s	<0.2 ha	Creosote, PCP, copper, naphthanate, and copper-chromated arsenate
2) South Farm Dump	1950s through present	0.8 ha	Municipal-type waste; some chemicals including malathion, parathion; empty 208-liter barrels
3) North Farm Dump	1950s through present	Pit 6 m by 4.5 m	Waste chemical containers, metal, transformers, considerable unspecified dumping activity
4) B033 Washdown Area	1950s through present	No data available	Mixing, loading, washing of chemical sprayers and other farm equipment
5) Herbicide Washdown Area	Early 1980s through present	No data available	Trash burning, disposal of currency (low levels of metals, PCBs), herbicide rinse water
6) Biodegradable Site	1946-1975	1.2-1.6 ha	General refuse, chemical containers
7) South Dairy Road Spill	Spill occurred in 1982 or 1983	$<9.3\ m^2$	About 1,135 l spilled from sprayer believed to contain herbicides altrazine or alachlor
8) APU Burial Area	Early 1980s through 1988	No data available	Waste pesticides; used test tubes, vials, needles; chemicals; incinerator ash; municipal trash
9) Dump Site	No dates given	About 3.2 ha	Wood and metal scrap, empty drums, glass
10) B301 Washdown Area	Since early in history of site	No data available	All chemicals used in fertilizing and spraying fields handled here; wash water dumped in pit
11) B409 Dump Site	No dates given	No data available	General refuse, waste pesticides, and herbicides
12) Chemical Disposal Pits	Approx. 1965-1980	2 to 3 pits, about 36 m^3	Substantial quantities of unknown hazardous chemicals; site of sewage sludge testing project
13) Hayden Farm Spill	Spill occurred in 1976	6 m by 18 m	About 1,500 l of an insecticide/herbicide mixture were spilled; another spill of pesticides
14) Airport Mixing Pad	Pad closed in 1980	3 m by 6 m	Mostly agricultural chemicals including pesticide mixtures used in aerial spraying applications.
15) Airport Test Droplet Area	Prior to 1963 through 1980	No data available	Same as Airport Mixing Pad
16) Chemical Burial at the airport	1983 or 1984	Small clearing	A 4.5-6.8 kg box of unidentified chemicals buried here

CERCLA hazardous substances. Table 1 summarizes these 16 areas, with locations shown on Figure 2.

Apex determined that the remaining 28 areas were ineligible under CERCLA authority or EPA policy. However, EPA and the Maryland Department of the Environment do not agree, and are reviewing the 28 areas to determine which sites need further investigation. Of these 28 sites, the site that probably poses the most serious threat to NOAA resources is the Radiological Burial Site in

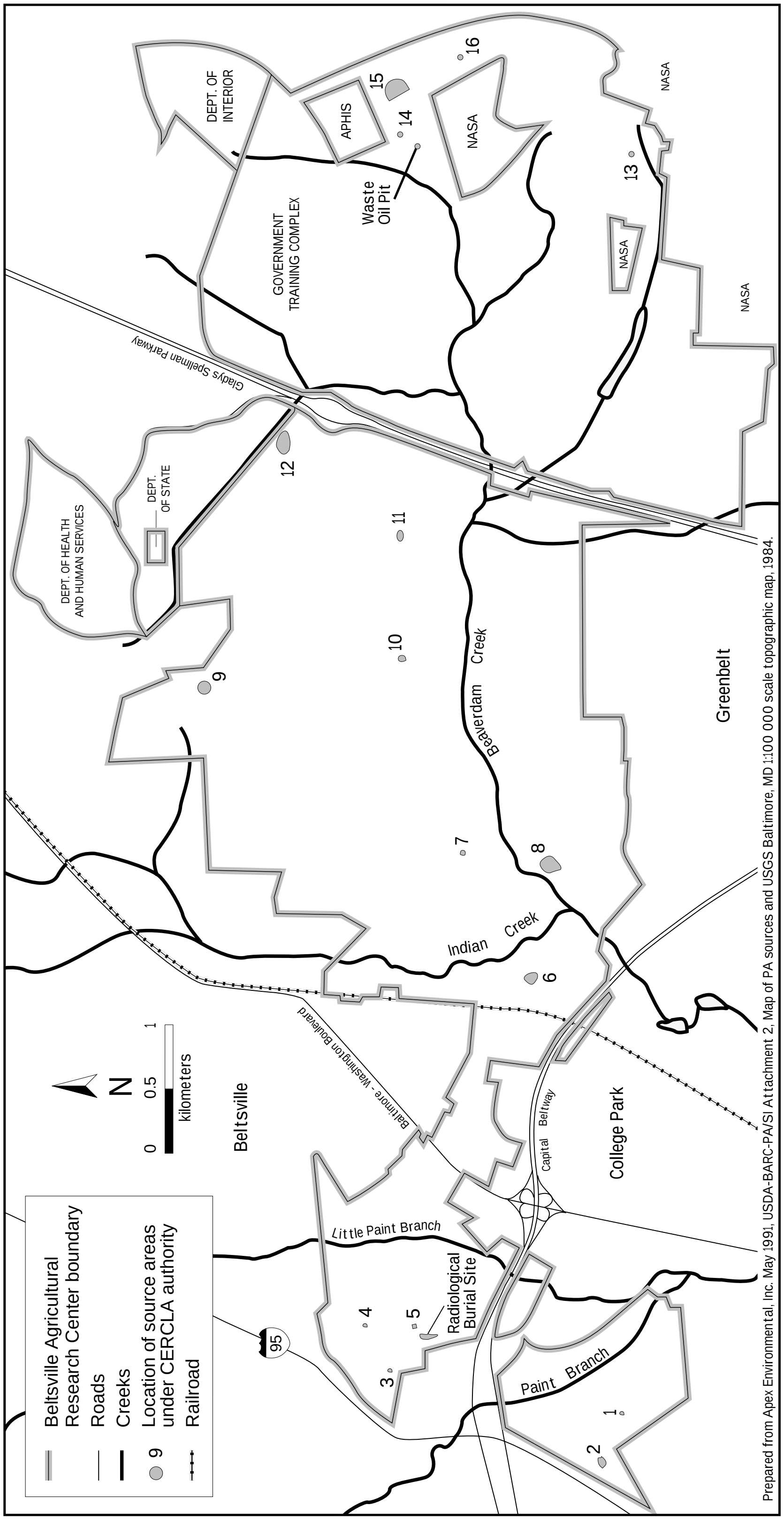

Figure 2. Detail of Beltsville Agricultural Research Center.

the western portion of BARC. This site was established in 1949 and is an inactive landfill that was used for the disposal of low-level radioactive waste from the late 1940s until the early 1980s. Examples of the material disposed at the site include laboratory glassware, metal and plastic products, animal carcasses, and scintillation vials and fluids. The Waste Oil Pit near the airport could also pose a substantial threat to NOAA resources because of its likely contamination with trace elements and petroleum products and its nearness to a wetland area. The rest of the 28 sites are primarily landfills, small dumping areas, fill areas, storage areas, and minor spill areas that were determined not to pose more than a low potential for release of CERCLA hazardous wastes. However, because of the long history of undocumented dumping at the BARC facility at a variety of locations, NOAA resources could be at some risk from each of these sites.

An Environmental Photographic Interpretation Center historical analysis identified another 48 areas of potential concern that will need to be investigated to determine whether hazardous materials were stored, disposed, or released in these areas.

Surface water runoff and groundwater migration are the potential pathways of contaminant transport from the site to NOAA trust resources and associated habitats. Regional drainage is generally to the south with Paint Branch, Little Paint Branch, Indian Creek, and Beaverdam Creek collecting surface water from the site and discharging into the Anacostia River. The National Wetland Inventory maps show numerous isolated wetlands within the site boundaries and along surface water bodies at the site.

The Patuxent and Arundel formations underlie BARC, and the Patapsco formation may be present in the eastern portion of the site. The Patuxent and Patapsco formations are predominantly sand and gravel, while the intervening Arundel formation is predominantly clay. All three dip to the southeast. The Arundel clay tends to create a hydrologic barrier to flow beneath the Patuxent aquifer, which occurs at depths of approximately 50 m and greater in the areas at BARC that have been drilled for supply wells. Recharge of the aquifer is mostly in the western portion of the site where the aquifer outcrops.

NOAA Trust Habitats and Species

Habitats of concern to NOAA are surface water, bottom substrates, and riparian wetlands associated with Paint Branch, Little Paint Branch, Indian Creek, Beaverdam Creek, Northeast Branch, and the Anacostia River. Secondary habitats of concern to NOAA include surface water and associated bottom substrates of the Potomac River. While numerous anadromous species ascend the Potomac River tributaries, only alewife migrate upstream far enough to reach some of the on-site creeks.

Portions of Paint Branch, Little Paint Branch, Indian Creek, and Beaverdam Creek, which flow directly through the boundaries of the site, are representative of headwater streams commonly present in Maryland coastal floodplain drainages. On-site riparian areas are well-buffered, with varying degrees of scrub / shrub and forested canopies. In general, on-site creeks are relatively narrow and channelized, averaging approximately 9 m wide. Near the site, creek substrate is mostly sand and cobble, with isolated areas of silt (Cummins personal communication 1994). Bottom substrates of the Anacostia River are poorer,composed predominantly of silt and mud. Surface water of the Anacostia River is freshwater tidal upstream from its confluence with the Potomac River to Bladensburg, approximately 10 km downstream from the site. There are extensive submerged aquatic beds of hydrilla (*Hydrilla verticillata*) in substrates associated with central and lower reaches of the Anacostia River (Siemien personal communication 1994).

High volumes of urban runoff are discharged directly into the Anacostia River; this runoff contributes to sporadic flow rates and variable water quality. Lower portions of the river next to the metropolitan core of the District of Columbia are mostly bulkheaded, and surrounded by industrial and residential communities. Recreational water use is heavy near the site. During the summer months, surface water of the Anacostia River is frequently subjected to extended periods of low dissolved oxygen concentrations and warm water temperatures. Critically low dissolved oxygen concentrations (approximately 1.0 mg / l) have been recorded in the river during these periods (Siemien personal communication 1994).

There are runs of alewife, American shad, blueback herring, yellow perch, and white perch in the lower Anacostia River. Generally, anadromous alewife, blueback herring, and American shad enter the Potomac River drainage from March through May to spawn in suitable upstream environments. Juveniles generally return to the ocean and the lower Chesapeake Bay by the following fall. Resident species of the Anacostia River which occur in high densities include killifish, gizzard shad, and various warmwater fish (e.g., largemouth bass, sunfish, and bullhead). Juvenile striped bass typically use lower portions of the Anacostia River as a rearing habitat. The catadromous American eel is seen throughout the area (Siemien personal communication 1994).

Alewife is the only anadromous species that migrates far enough upstream to inhabit surface water of some of the on-site creeks. In addition, alewife probably use surface water of the Indian Branch and Beaverdam Creek for spawning. A sheet-pile metal weir, situated in Paint Branch approximately 150 m upstream from its confluence with Indian Creek, blocks all upstream alewife migrations. Plans to breach the structure within two years would restore migratory access to both Paint and Little Paint branches (Cummins personal communication 1994).

Some recreational fishing occurs in the Anacostia River, where shoreline angling is popular year-round. Warmwater species attract the greatest sport effort throughout the watershed, while adult striped bass are heavily targeted in the Potomac River during their summer and fall residences. Striped bass are closely managed using size, take limit, and seasonal restrictions. No additional information was available regarding recreational fisheries in site-related streams. Commercial fishing is prohibited in the Anacostia River drainage (Siemien personal communication 1994). There are no health advisories or restrictions for the consumption of fish from surface water near the site (Murphy personal communication 1994).

Site-Related Contamination

Preliminary data indicate that trace elements and pesticides are contaminants of primary concern to NOAA at the BARC site. PA/SI data on concentrations of contaminants in soil at the site were limited to the 16 sites identified where CERCLA hazardous substances were potentially present (Apex Environmental 1991). Surface water and sediment sampling were limited to the Biodegradable Site and the B409 Dump Site. Groundwater sampling was limited to the Biodegradable Site and the Chemical Disposal Pits. A Phase II environmental investigation of the Biodegradable Site included additional sampling of soil, surface water, groundwater, and sediments (Apex Environmental 1992).

Trace elements were detected in on-site soil at the Biodegradable Site at concentrations that exceeded average U.S. soil concentrations (Table 2). Copper, lead, and zinc were detected in groundwater at the Biodegradable Site at concentrations that exceeded freshwater chronic AWQC by at least ten times. Mercury was detected in surface water upstream of the Biodegradable Site at a concentration of 0.4 µg/l, which exceeded freshwater chronic AWQC. Lead and silver were detected in surface water downstream of the Biodegradable Site at concentrations that exceeded freshwater chronic AWQC. Chromium and nickel were the only trace elements detected in sediments at concentrations that exceeded screening guidelines.

The pesticides DDD, DDE, DDT, dieldrin, and toxaphene were measured in on-site soil, but there are no screening guidelines for these contaminants in soil. DDD and DDE were detected in groundwater; there are no screening guidelines for these contaminants in groundwater. DDT was detected at a concentration that exceeded freshwater chronic AWQC by more than two orders of magnitude. None of these contaminants were detected in the limited surface water and sediment sampling completed at the site.

Although a number of PAHs, VOCs , and SVOCs were detected in on-site soil, there are no screening guidelines for these contaminants. Only 1,1,1-trichloroethane and trichloroethylene were detected in surface water, and only xylene and tetrachloroethene were detected in sediments. Although toluene, xylene, 1,1,1-trichloroethane,

Table 2. Maximum concentrations of selected contaminants detected at BARC.

Contaminants	Soil (mg/kg)		Water (µg/l)			Sediment (mg/kg)		
	On-Site	Avg. U.S.[1]	Surface Water	Ground-water[2]	AWQC[3]	Sediment	ERL[4]	ERM[5]
TRACE ELEMENTS								
Arsenic	450	5	1.2	82	NA	ND	8.2	70
Cadmium	3	0.06	ND	ND	1.1+	ND	1.2	9.6
Chromium	67	100	9	300	11[6]	99	81	370
Copper	330	30	8	310	12+	ND	34	270
Lead	1200	10	3.6	1500	3.2+	ND	46.7	218
Mercury	61	0.03	0.4	0.3	0.01	0.06	0.15	0.71
Nickel	230	40	ND	250	160+	33	20.9	51.6
Silver	26	0.05	26	ND	0.12	ND	1.0	3.7
Zinc	280	50	56	1100	110+	40	150	410
PESTICIDES/PCBs								
DDD	3.9	NA	ND	0.28	NA	ND	NA	NA
DDE	1.4	NA	ND	0.08	NA	ND	0.0022	0.027
DDT	120	NA	ND	0.35	0.001	ND	0.0016t	0.46t
Dieldrin	0.75	NA	ND	ND	25	ND	NA	NA
Toxaphene	12	NA	NA	ND	0.0002	ND	NA	NA
PCB-1260	0.079	NA	NA	ND	NA	ND	NA	NA
Aldrin	0.08	NA	ND	ND	NA	ND	NA	NA
Heptachlor Epoxide	0.02	NA	ND	ND	0	ND	NA	NA
PAHs/VOCs/SVOCs								
Acetone	0.61	NA	ND	ND	NA	ND	NA	NA
Methylene chloride	0.17	NA	ND	ND	NA	ND	NA	NA
1,2-Dichloroethene	11	NA	ND	ND	NA	ND	NA	NA
2-Butanone	0.14	NA	ND	ND	NA	ND	NA	NA
1,1,2-Trichloroethane	0.07	NA	ND	ND	9400*	ND	NA	NA
Tetrachloroethene	0.08	NA	ND	ND	NA	13	NA	NA
Chlorobenzene	0.06	NA	ND	ND	NA	ND	NA	NA
1,2-Dichlorobenzene	9.8	NA	ND	ND	763*§	ND	NA	NA
Naphthalene	3.9	NA	ND	ND	620*	ND	0.16	2.1
Anthracene	0.74	NA	ND	ND	NA	ND	0.085	1.1
Benzo(k)fluoranthene	1.4	NA	ND	ND	NA	ND	NA	NA
Toluene	0.04	NA	ND	9	NA	ND	NA	NA
Xylene	0.088	NA	ND	6	NA	0.088	NA	NA
Phenanthrene	5.1	NA	ND	ND	6.3p	ND	0.24	2.1
Fluoranthene	7.1	NA	ND	ND	NA	ND	0.60	5.1
Pyrene	7.3	NA	ND	ND	NA	ND	0.665	2.6
Benzo(a)anthracene	3.9	NA	ND	ND	NA	ND	0.26	1.6
Chrysene	3.2	NA	ND	ND	NA	ND	0.38	2.8
Benzo(b)fluoranthene	5.2	NA	ND	ND	NA	ND	NA	NA
Benzo(a)pyrene	2.9	NA	ND	ND	NA	ND	0.43	1.6
1,1,1 Trichloroethane	0.012	NA	17	27	NA	ND	NA	NA
Trichlorethene	0.41	NA	13	46	NA	ND	NA	NA
1,1,2,2-Tetrachloroethane	5.4	NA	ND	9	NA	ND	NA	NA

1: Lindsay (1979).
2: Only a few groundwater sites were sampled.
3: Freshwater chronic AWQC for the protection of aquatic organisms (U.S. EPA 1993).
4: Effects Range-Low (Long and MacDonald 1992).
5: Effects Range-Median(Long and MacDonald 1992).
6: Value for Cr^{+6}
NA: Not available.
ND: Not detected; detection limits not available.

+: Hardness-dependent criteria (100 mg/l $CaCO_3$ used).
*: Lowest Observed Effect Level (U.S. EPA 1993).
§: Value for the summation of all isomers.
e: Estimated value.
t: DDT total.
p: Proposed criteria.

trichloroethene, and 1,1,2,2-tetrachloroethane were detected in groundwater, there are no screening guidelines for these contaminants in groundwater.

Summary

Elevated concentrations of trace elements and pesticides have been detected in the soil, surface water, sediment, and groundwater at the Beltsville Agricultural Research Center. Several of the trace elements were detected in soil at the site at concentrations that far exceeded averages for U.S. soil. Though 16 separate areas at the site have been identified where CERCLA hazardous substances may be present, the data on the nature and extent of contamination at these sites is very limited. Most of the data available for this report pertain to the soils, surface water, sediments, and groundwater near one site, the Biodegradable Site, a formerly used landfill. Elevated concentrations of trace elements and pesticides detected at this site could pose a risk to alewife in on-site streams and other downstream anadromous species. More contaminant information is needed on the rest of the BARC facility to determine the overall risk posed by the facility to resources of concern to NOAA.

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