Malone Service Company, Inc.

(Also Known as the Swan Lake Facility)

Texas City, Galveston County, Texas

EPA Facility ID: TXD980854789

Basin: West Galveston Bay

HUC: 12040204

Executive Summary

The Malone Service Company, Inc. (MSC) site is located in Texas City, Galveston County, Texas, in an industrial and petrochemical area built in marsh/wetlands on the shores of Swan Lake and Galveston Bay. Contaminants of concern at the MSC site include metals, SVOCs (primarily PAHs), pesticides, and PCBs. The NOAA habitats of concern are the surface waters of Swan Lake and Galveston Bay, as well as the surrounding wetlands. Several NOAA trust resources use these waters and wetlands, including invertebrates, fish, and sea turtles.

Site Background

The Malone Service Company, Inc. (MSC) site, also known as the Swan Lake Facility, is located in Texas City, Galveston County, Texas, in an industrial and petrochemical area built in marsh/wetlands on the shores of Swan Lake and Galveston Bay (Figure 1). The MSC site is bordered to the northeast by Galveston Bay and to the east by Swan Lake (shown on Figure 2), which is an embayment of Galveston Bay; marsh/wetlands border the southern portions of the site. The MSC site encompasses approximately 61 ha (150 acres) (TNRCC 1998; USEPA 2001).

The MSC site began operating in 1964 as a reclamation plant for waste oils and chemicals. Later, hazardous waste underground injection/disposal wells were added. Wastes generated from reclamation processes were injected into these wells. Operations ceased in January 1996, and the site has remained inactive since then. Waste materials, two American Petroleum Institute (API) separators, two underground injection wells, roll-off bins, a freshwater pond, and metal drums inside small buildings were left on the site after the plant was closed. The entire site is located within a flood control levee that ranges from 3 m (9 ft) above mean sea level (MSL) in undeveloped areas to 5.5 m (18 ft) above MSL around the waste management areas (TNRCC 1998; USEPA 2001).

The MSC site received a variety of waste products from surrounding industries, including acids and caustics; contaminated residues and solvents; gasoline and crude oil tank bottoms; contaminated earth and water from chemical spill cleanups; general industrial plant wastes; phenolic tars; and waste oils (USEPA 2001). Incoming wastes were placed into two earthen, unlined pits, which were formed by excavating into the sand of a paleostream that crosses from the southeast beneath the site (Figure 2). Wastes with high solids or high water content were placed in the larger pit, which was referred to as the settling pond. The oil fraction that rose to the top of the larger pit was skimmed off the surface and deposited into the smaller pit, known as the oil pit. This oil was then pumped to one of several tanks for treatment, after which it was resold as waste oil for energy recovery (USEPA 2001).

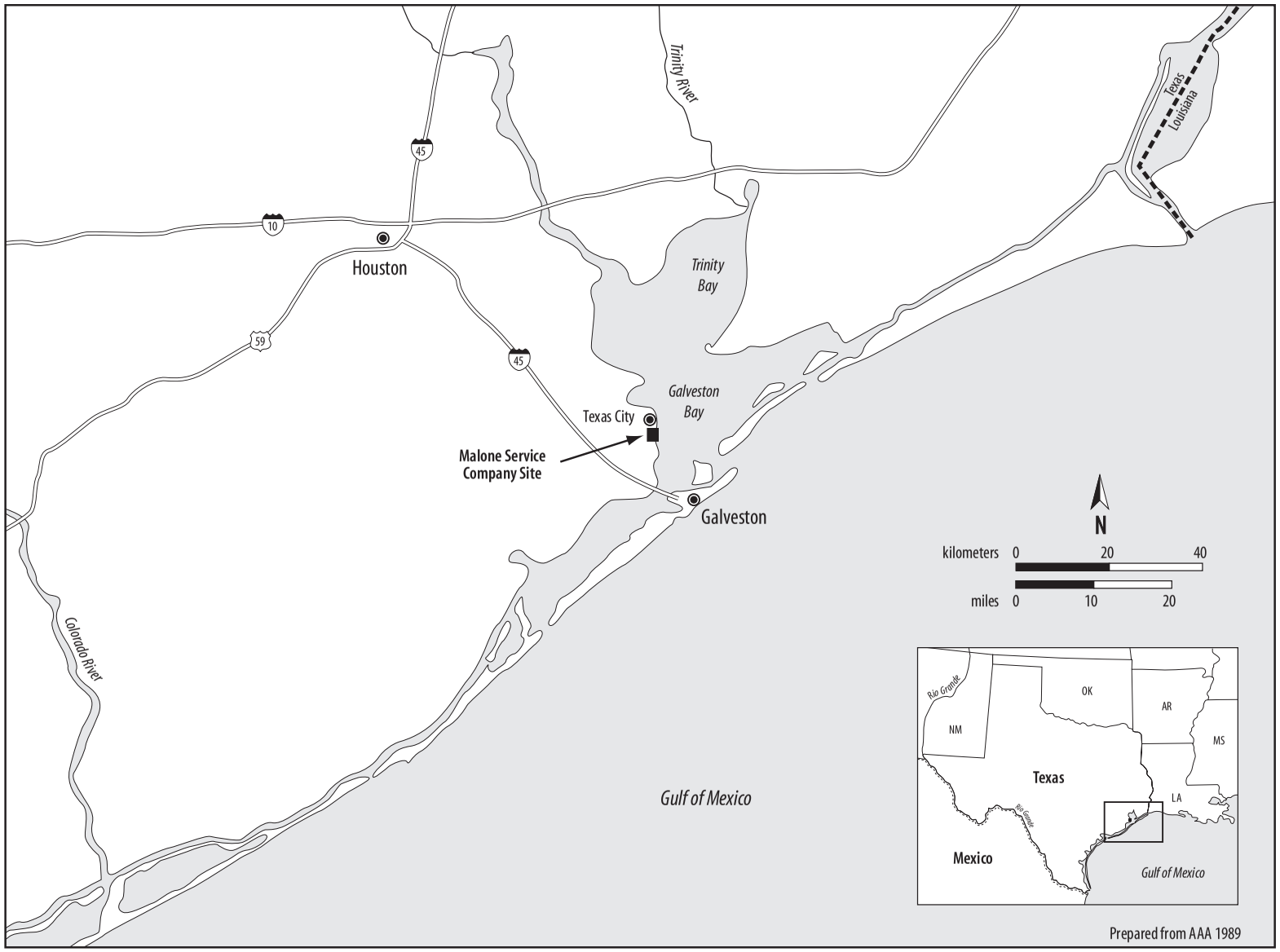

Figure 1. Location of Malone Service Company site, Texas City, Texas.

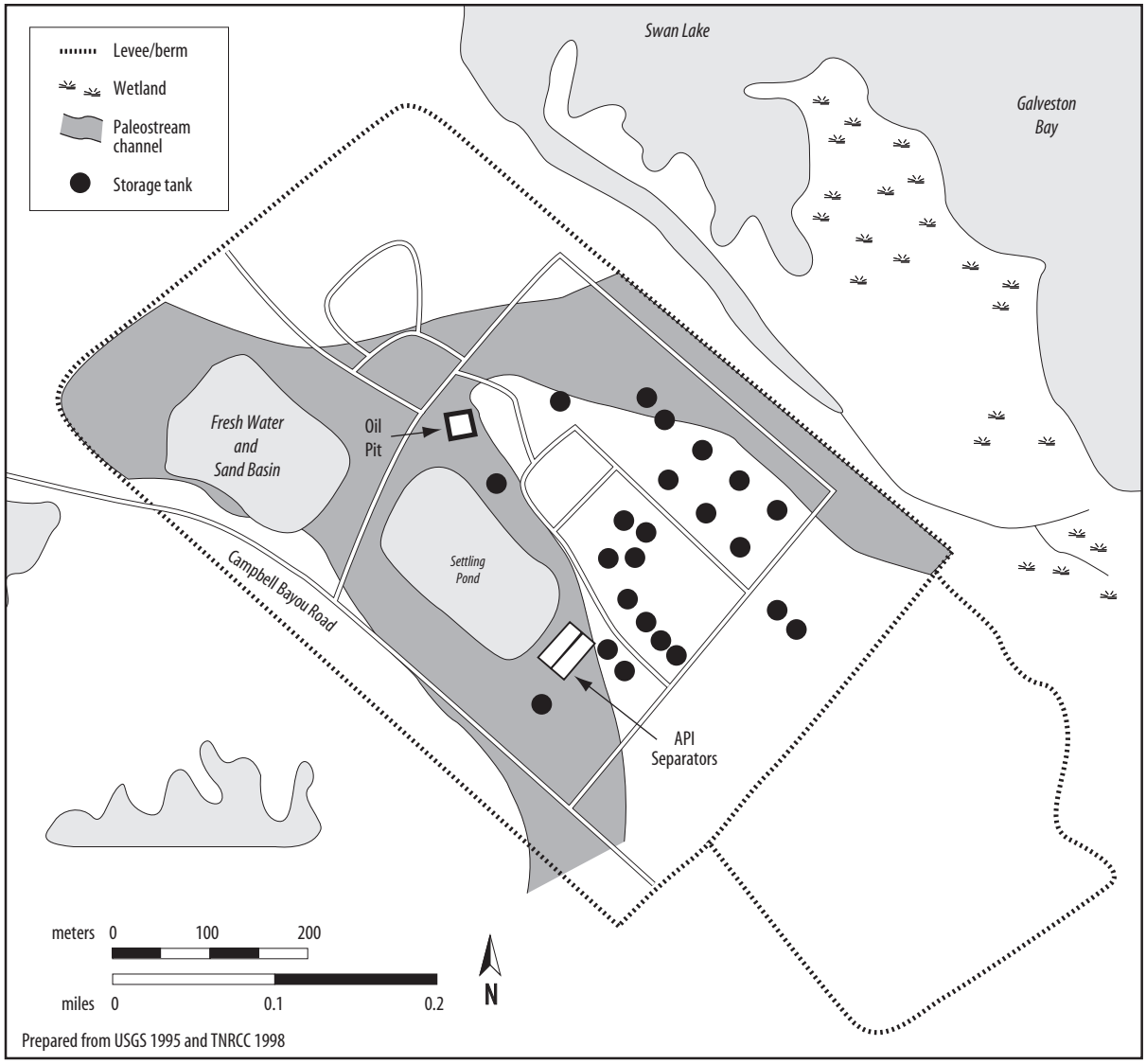

Figure 2. Detail of the Malone Service Company site.

In 1979 and 1987, API separators were installed to replace the settling pond and oil pit. The separators were unlined, but were built on top of a tight clay layer at a depth of 6 m (20 ft) below the ground surface. The settling pond and oil pit were never cleaned out, leaving behind hazardous liquid wastes and solids. A cap was placed on the oil pit in 1983, but the cap has undergone serious damage as a result of pooling storm water (TNRCC 1998; USEPA 2001). The MSC site was proposed to the National Priorities List (NPL) on August 24, 2000, and was placed on the NPL on June 14, 2001. The primary pathways for the migration of contaminants to NOAA trust resources are surface water runoff and groundwater transport.

NOAA Trust Resources

The NOAA habitats of concern are the surface waters of Swan Lake and Galveston Bay, as well as the surrounding wetlands. Swan Lake is a contiguous embayment of Galveston Bay. Together, these two water bodies compose the seventh largest estuary in the United States and have been designated a National Estuary as part of the National Estuary Program. The wetlands between the MSC site, Swan Lake, and Galveston Bay are considered an intertidal, estuarine environment (TNRCC 1998)

Numerous NOAA trust resources (Table 1), including both invertebrate and marine/estuarine fish species, use the surface waters of Swan Lake and Galveston Bay for a variety of habitat functions, including spawning and nursery areas as well as for adult habitat and as a migratory route. Many of the NOAA trust resources support both commercial and/or recreational fisheries, as indicated on Table 1 (Nelson 1992; Robinson 2002). In addition, a number of endangered species exist in the vicinity of the MCS site. Federal- and state-listed endangered leatherback sea turtles, Atlantic hawksbill sea turtles, and Kemp's ridley sea turtles, as well as state-listed endangered loggerhead sea turtles, have all been identified in the area (TNRCC 1998). There are currently no consumption advisories in effect for lower Galveston Bay in the vicinity of the site.

Site-Related Contamination

In 1997, an inspection of the MSC site by the Texas Natural Resource Conservation Commission (TNRCC) determined that hazardous substances originally found in the impoundment and the API separators had been released to the underlying aquifer and were present in the groundwater (TNRCC 1998).

Nine groundwater samples, 14 sediment samples, and three soil samples were collected from the MSC site and analyzed for metals, semivolatile organic compounds (SVOCs), including polynuclear aromatic hydrocarbons (PAHs), and pesticides. The sediment samples were also analyzed for polychlorinated biphenyls (PCBs). No surface water samples were collected. Table 2 summarizes maximum concentrations of the contaminants of concern detected in these media.

In soil samples, the maximum concentrations of arsenic, chromium, copper, lead, nickel and zinc did not exceed mean U.S. soil guidelines. The samples were not analyzed for cadmium, mercury, selenium, and silver. Pyrene was the only PAH detected, and DDT was the only pesticide detected. No mean U.S. soil guidelines are available for comparison to the maximum concentrations of these compounds.

Groundwater contained maximum concentrations of arsenic and mercury that exceeded the ambient water quality criteria (AWQC) by more than two orders of magnitude. The maximum concentration of nickel exceeded the AWQC by more than one order of magnitude, and the maximum concentration of chromium exceeded the AWQC by just under one order of magnitude. Copper slightly exceeded the AWQC, while cadmium, lead, selenium, and zinc were detected at maximum concentrations below the AWQC. Silver was not analyzed for. All of the six PAHs for which groundwater samples were analyzed were also detected; however, only fluoranthene was detected at a maximum concentration that exceeded the AWQC. Maximum concentrations of PAHs ranged from 18 µg/L (fluoranthene and phenanthrene) to 130 µg/L (naphthalene). Several pesticides were also detected in the groundwater samples; all maximum concentrations exceeded the AWQC, with the exceptions of aldrin and DDE; there is no AWQC available for DDE. Maximum concentrations of DDT, dieldrin, endosulfan, endrin, and heptachlor epoxide exceeded the AWQC by at least two orders of magnitude.

Table 1. NOAA trust resources found in Swan Lake and Galveston Bay waters (Nelson 1992; Robinson 2002).

Species		Habitat Use				Fisheries	
Common Name	Scientific Name	Migratory Route	Spawning Area	Nursery Area	Adult Habitat	Comm. Fishery	Rec. Fishery
MARINE/ESTUARINE FISH							
Atlantic croaker	*Micropogonias undulaus*		◆	◆	◆	◆	◆
Atlantic menhaden	*Brevoortia tyrannus*	◆	◆	◆			
Bay anchovy	*Anchoa mitchilli*	◆	◆	◆	◆		
Bay squid	*Lolliguncula brevis*		◆	◆	◆	◆	
Black drum	*Pogonias cromis*	◆		◆	◆	◆	◆
Gizzard shad	*Dorosoma cepedianum*				◆		
Gulf killifish	*Fundulus grandis*		◆	◆	◆	◆	
Gulf kingfish	*Menticirrhus littoralis*				◆	◆	◆
Hardhead catfish	*Arius felis*		◆	◆	◆		
Pigfish	*Orthopristis chrysoptera*	◆		◆			◆
Pinfish	*Lagodon rhomboides*	◆		◆			◆
Red drum	*Sciaenops ocellatus*	◆	◆	◆	◆		◆
Sand seatrout	*Cynoscion arenarius*		◆	◆	◆		◆
Sea catfish	*Arius felis*		◆	◆	◆	◆	◆
Sheepshead	*Archosargus probatocephalus*		◆	◆	◆	◆	◆
Sheepshead minnow	*Cyprinodon variegatus*		◆	◆	◆		
Silver perch	*Bairdiella chrysoura*		◆	◆	◆	◆	◆
Silversides	*Menidia species*			◆	◆		
Southern flounder	*Paralichthys lethostigma*	◆		◆	◆	◆	◆
Spot	*Leiostomus xanthurus*			◆	◆	◆	
Spotted seatrout	*Cynoscion nebulosus*		◆	◆	◆		◆
Striped mullet	*Mugil cephalus*			◆	◆	◆	◆
INVERTEBRATES							
Blue crab	*Callinectes sapidus*	◆		◆	◆	◆	◆
Brown shrimp	*Farfante penaeus aztecus*	◆		◆	◆	◆	◆
Eastern oyster	*Crassostrea virginica*		◆	◆	◆	◆	◆
Grass shrimp	*Palaemonetes pugio*		◆	◆	◆		
Gulf stone crab	*Menippe adina*		◆	◆	◆	◆	◆
Hard clam	*Mercenaria species*		◆	◆	◆		
White shrimp	*Litopenaeus setiferus*	◆		◆	◆	◆	◆

Table 2. Maximum concentrations of contaminants of concern at the Malone Service Company, Inc. site (USEPA 1997a; USEPA 1997b).

	Soil (mg/kg)		Water (µg/L)		Sediment (mg/kg)	
Contaminant	Soil	Mean U.S.[a]	Groundwater	AWQC[b]	Sediment	ER-L[c]
METALS						
Arsenic	3.4	5.2	6000	36	29	8.2
Cadmium	N/A	0.06	4.7	9.3	2.3	1.2
Chromium[j]	6.2	37	470	50	79	81
Copper	4.2	17	3.9	3.1	110	34
Lead	13	16	4.8	8.1	230	46.7
Mercury	N/A	0.058	9.6	0.094[d]	0.25	0.15
Nickel	4	13	620	8.2	16	20.9
Selenium	N/A	NA	12	71	N/A	1.0[g]
Silver	N/A	0.05	N/A	0.95[e]	3.5	1
Zinc	21	48	30	81	320	150
PAHs						
Acenaphthene	N/A	NA	24	710[f]	0.18	0.016
Acenaphthylene	N/A	NA	N/A	300[f,e,i]	0.19	0.044
Anthracene	N/A	NA	N/A	300[f,e,i]	0.57	0.0853
Benz(a)anthracene	N/A	NA	N/A	300[f,e,i]	1.1	0.261
Chrysene	N/A	NA	N/A	300[f,e,i]	1.1	0.384
Dibenz(a,h)anthracene	N/A	NA	25	300[f,e,i]	0.26	0.0634
Fluoranthene	N/A	NA	18	16[f]	1.4	0.6
Fluorene	N/A	NA	N/A	NA	0.21	0.019
2-Methylnaphthalene	N/A	NA	N/A	300[f,e,i]	0.25	0.07
Naphthalene	N/A	NA	130	2350[f,e]	0.16	0.16
Phenanthrene	N/A	NA	18	NA	1.6	0.24
Pyrene	0.02	NA	43	300[f,e,i]	3.5	0.665
PESTICIDES/PCBs						
Aldrin	N/A	NA	0.6	1.3[e]	0.004	NA
DDE	N/A	NA	0.31	NA	0.05	0.0022[k]
DDT	0.001	NA	0.6	0.001	0.02	0.00158[h]
Dieldrin	N/A	NA	0.53	0.0019	0.02	0.00002
Endosulfan (alpha + beta)	N/A	NA	1.3	0.0087	0.011	NA
Endrin	N/A	NA	0.35	0.0023	0.03	NA
Gamma-BHC (Lindane)	N/A	NA	0.54	0.16[e]	0.003	NA
Heptachlor	N/A	NA	0.2	0.0036	0.001	NA
Heptachlor Epoxide	N/A	NA	0.77	0.0036	31	NA
PCBs (as Aroclors)	N/A	NA	N/A	0.03	0.33	0.0227

ND: Not detected; detection limit not available.
NA: Screening guidelines not available.
N/A: Contaminant not analyzed for.

a: Shacklette and Boerngen (1984), except for cadmium and silver, which represent average concentrations in the Earth's crust from Lindsay (1979).
b: Ambient water quality criteria for the protection of aquatic organisms (USEPA 1993, 1999). Marine chronic criteria presented.
c: Effects range-low represents the 10th percentile for the dataset in which effects were observed or predicted in studies compiled by Long et al. (1998).
d: Derived from inorganics but applied to total.
e: Chronic criterion not available; acute criterion presented.
f: Lowest Observable Effect Level (LOEL).
g: Marine apparent effects threshold (AET) for amphipod bioassay. The AET represents the concentration above which adverse biological impacts would be expected.
h: Expressed as Total DDT.
i: Value for chemical class.
j: Screening guidelines represent concentrations for Cr^{+6}.
k: Expressed as p,p-DDE.

Sediment samples contained maximum concentrations of arsenic, cadmium, copper, lead, mercury, silver, and zinc that exceeded the effects range-low (ER-L) guidelines by less than one order of magnitude. Lead showed the greatest exceedance at approximately five times the ER-L. Chromium and nickel were detected, but not at concentrations in excess of the ER-Ls. Selenium was not analyzed for. All of the PAHs for which the sediment samples were analyzed were detected at maximum concentrations that either exceeded or were equal to the ER-Ls. Exceedances ranged from just over twice the ER-L (fluoranthene) to more than an order of magnitude (acenaphthene and fluorene). Three pesticides were detected at maximum concentrations that exceeded the ER-Ls by one order of magnitude (DDE and DDT) to three orders of magnitude (dieldrin). ER-Ls are not available for comparison to the maximum concentrations of other pesticides detected in sediment samples. PCBs were detected at a maximum concentration that exceeded the ER-L by one order of magnitude.

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