PRELIMINARY ASSESSMENT

Globe-Union Battery
Garland, Dallas County, Texas
TXD980626642

REGION 6

Prepared in cooperation with the
U.S. Environmental Protection Agency

September 2019

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1111 S. Shiloh Rd.
Dallas, Dallas County, Texas
TXD980626642

SIGNATURE PAGE

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1 INTRODUCTION

The Texas Commission on Environmental Quality (TCEQ) was tasked by the United States Environmental Protection Agency (EPA) Region 6 to conduct a Preliminary Assessment (PA) at the Globe-Union Battery site in Garland, Dallas County, Texas. The specific goals for the PA are:

- Determine the potential threat to public health or the environment posed by the site;
- Determine the potential for a release of hazardous constituents into the environment; and
- Determine the potential for placement of the site on the National Priorities List (Ref. 1).

Completion of the PA was consistent with EPA guidance for performing preliminary assessments under CERCLA and included reviewing existing site information, collecting receptor information within the range of site influence, determining regional geology, groundwater, surface water, determining surrounding population characteristics, and conducting on- and off-site reconnaissance (Ref. 2). This document includes a discussion of background site information (Section 2), a discussion of migration/exposure pathways and potential receptors (Section 3), and a list of pertinent references (Section 4).

2 SITE INFORMATION

2.1 SITE LOCATION

Site Name:	Globe-Union Battery
SEMS ID No.:	TXD980626642
Location:	Garland, Dallas County, Texas, 75042
Latitude:	32.922636°
Longitude:	-96.665409°
Legal Description:	Globe Union Blk A Lt 1
Congressional District:	Texas's 5th US Congressional District

2.2 SITE DESCRIPTION

The former Globe-Union, Inc. battery facility (site) lies on two parcels totaling approximately 12.13 acres located at 1111 S. Shiloh Road in Garland, Texas (Figures 1 and 2; Ref. 3, pp. 1, 21, 22, 40). From the 1950s until 1995 this facility manufactured lead oxide batteries for the automobile market (Ref. 4, p. 1; Ref. 5 p. 1; Ref. 6, p. 9; Ref. 7, p. 1). A trucking company operated at the site from the late 1990s until approximately 2008, after which the site was vacant for five years before Copier Exporter, Inc. (CEI), an exporter of used photocopiers to foreign markets, began using a portion of the site as a warehouse (Ref. 3, pp. 7, 8, 11; Ref. 8, p. 1). CEI remains the principal business at the site (Ref. 9, p. 4).

The building footprint at the facility expanded over the course of operations so that by 1979 the contiguous warehouse and office was greater than 225,000 square feet (Ref. 3, p. 2; Ref. 6, p. 9). A separate 4,800 square foot garage was constructed in the southern portion of the property by 1968. As operations at the site expanded, so too did the amount of impervious concrete cover such that only a few narrow strips of vegetation along Shiloh Road remain unpaved (Ref. 5 pp. 1-4; Ref. 9, p. 7; Ref. 10, pp. 1-3; Ref. 11, p. 5, 7-9, 13-16). The site is essentially flat with a slight slope to the west in the direction of a creek known as stream 2C4, an intermittently flowing tributary to Duck Creek (Figures 1 and 2).

Drainage is to the east on the east side of the property, where it flows into street drains. Runoff on the west and south sides of the facility drains to the west until immediately off site, then flows south along railroad tracks, passes through a culvert under Marquis Street, and continues along the railroad tracks until it enters stream 2C4 (Figure 2; Ref. 9, p. 2; Ref. 12, p. 2). A stormwater retention pond west of the site and the railroad tracks receives water from points north and west. It drains into a large culvert under Marquis Street (west of the previously-mentioned culvert) and forms the beginning of stream 2C4 (Figure 2; Ref. 10, p. 3; Ref. 12, pp. 2-3).

Commercial and industrial activities predominate to the north and west of the site, including a large Sherwin Williams facility to the north and a US Foods facility to the northeast (Ref. 11, p. 8). Smaller warehouses and office space lie to the west, and various retail entities operate to the south along Shiloh Road. A large residential neighborhood constructed through the 1950s and 1960s lies to the east and southeast (Figure 2; Ref. 3, 41-49; Ref. 5 p. 1).

2.3 OWNERSHIP HISTORY

Globe-Union, Inc., the first known owner of record, built the facility in the mid-1950s on a 9.4-acre parcel east of Garland which was previously used for agricultural purposes (Ref. 4, p. 1). As the facility expanded to the south, Globe Union purchased an adjacent 2.7-acre property from the Emporia Building Company by 1960, thus forming the present property extent (Ref. 4, p. 1; Ref. 6, p. 9). Johnson Controls, Inc. (later, Johnson Controls Battery Group, Inc.) became the site owner in 1978 when it bought out Globe-Union (Ref. 3, pp. 9, 10, 29, 30; Ref. 13, p. 1). After battery production ceased in 1995, the property was sold to Roderick Bell, president of Texas American Express, Inc., who operated a long-haul trucking business at the site through 2008 (Ref. 3, pp. 7, 8, 11, 27, 28, 31; Ref. 8, p. 1; Ref. 14, pp. 17-19). Mr. Bell sold the site to Grand Six LLC in 2011, who then sold the site to Dinesh and Manee Ralhan, owners of CEI, in 2013. Realm Management, which is owned by Dinesh Ralhan, became the owner name of record in 2017 (Ref. 3, pp. 6, 26; Ref. 14, pp. 1, 2).

2.4 OPERATIONS AND WASTE CHARACTERISTICS

Lead acid battery production is the largest single use of lead in the United States (Ref. 15, p. 6) By the 1970s, Globe-Union had become the nation's largest manufacturer of lead-acid automobile batteries (Ref. 16, p. 2). The Garland location was one of many Globe-Union facilities throughout the United States which manufactured batteries for Interstate and Sears DieHard brands (Ref. 6, pp. 20-21). Former employees have stated that 1,700 employees worked in three shifts at the height of site operations (Ref. 9, p. 4). Available records confirm that the facility was on a 24-hour schedule (presumably requiring three 8-hour shifts), and that at times the facility ran 6 days per week (Ref. 6, pp. 7, 8, 19).

At this location, lead oxide was transported from Mexico via train or truck to the facility to be smelted and pressed into electrodes, or plates (Ref. 6, pp. 10, 14; Ref. 15, p. 14; Ref. 17, pp. 2, 10). The lead smelting process generates a variety of contaminants including lead particulate and sulfur dioxide. Particulate matter generated during the lead smelting process has been controlled since the early 1900s through the use of baghouses- large filters, often set up in an array (Ref. 18, pp. 1-3). In 1970 the Clean Air Act established limits on lead and particulate emissions from industrial facilities (Ref. 19, pp. 36-38). The Globe-Union facility in Garland had one baghouse present by 1973 (installation date unknown) when they requested and received approval from the Texas Air Control Board (TACB) to install a second baghouse to allow for an increase in production capacity while maintaining air emissions standards. A permitted central vacuum system, used to clean indoor air from the plant, was also routed to the baghouses (Ref. 6, pp. 10-12, 22-30). A drying tower was constructed in the late 1970s to reduce sulfur dioxide emissions (Ref. 5 pp. 2-3). TACB files detail several additional air permits for various processes within the plant which were in place from the 1970s until the conclusion of operations in 1995 (Ref. 6, p. 5).

Controls over site emissions inevitably changed through time as technology advanced and local, state, and federal regulations were imposed. A 1982 EPA Preliminary Assessment

report notes that during this time the City of Garland was testing plant effluent on a monthly basis, noting that city officials were 'satisfied' with facility operations. The report recorded approximately 80,000 gallons per day of liquid waste (presumably the above-mentioned effluent) as well as 12.5 tons per month of solid waste including fly ash and defective lead plates as well as workers clothing. Drummed waste during this period was staged on the west side of the facility between the baghouses until manifested and disposed at a facility in Louisiana (Ref. 17, pp. 2, 6, 8).

None of the entities which have operated at the former Globe-Union plant since 1995 conduct operations that fall under TCEQ regulations.

2.5 PREVIOUS INVESTIGATIONS

TACB records of site air emissions testing beginning in 1973 record particulate readings far below allowable limits. Early 1980s air emissions investigations by the City of Garland found that property line air testing was consistently below the permitted limit. TACB records note a lack of complaints or violations through the second half of the 80s (Ref. 6, pp. 15, 16, 22).

An EPA Preliminary Assessment from 1982 noted no apparent issues at the facility. Wastewater from the site- up to 80,000 gallons per day- was treated to control pH before disposal to the sanitary sewer. Up to 12.5 tons per month of solid waste was disposed, which included unusable battery plates, scrap, and clothing. Disposal records were available from the Globe-Union office at the time. Investigators ultimately noted that the company "runs a very clean operation" (Ref. 17, pp. 1-3).

State personnel inspected the facility in June 1986, noting non-compliance on a variety of minor (non-environmental) issues which were subsequently resolved (Ref. 7, p. 1).

Two 10,000-gallon diesel tanks were removed from the southwest corner of the site in February 1989. Corrosion holes were observed in both tanks, and soil sampling indicated

total petroleum hydrocarbon (TPH) contamination in the tank hold area. Contaminated soil was removed and disposed (Ref. 20, pp. 1-10). A 20,000-gallon diesel tank installed shortly thereafter was also removed in March 1995 when the site ceased operations. Samples obtained from the tank hold, pipe chase, and dispenser island found non-detectable benzene, less than 30 µg/kg BTEX (benzene, toluene, ethylene, and xylene), and less than 70 mg/kg TPH. Stockpiled backfill with 388 mg/kg TPH and non-detectable benzene was returned to the former tank hold along with 165 additional yards of clean fill and concreted over. The State of Texas subsequently approved site closure (Ref. 20, pp. 11-29).

The Texas Department of State Health Services conducted a cancer cluster study in the vicinity of the site in 2018 at the request of concerned community members. Focusing on census tracts which encompass residences 1 mile to the east and approximately 1.6 miles to the south, the study found that there was no statistically significant increase in cancer rates among the nearby population (Ref. 21, pp. 1-9).

2.6 SITE VISIT

Bret Kendrick from the EPA and Stephen Ellis from the TCEQ visited the site on April 3, 2019. The primary onsite business currently in operation is Copier Exporter, Inc. (CEI), a reseller of used photo copiers. They purchase used copiers in bulk, refurbish as necessary, and sell to foreign buyers (Ref. 9, p. 4). Copiers are housed predominantly in the central portion of the facility. As previous correspondence indicated, all equipment associated with battery production was removed when production ceased in 1995 (Ref. 22, p. 1). One room contains pallets of material belonging to Advanced Water Management. Remnants of a pallet painting area are evident in the northernmost section of the main warehouse (Ref. 8, p. 1; Ref. 9, p. 5). There is no evidence of residual contamination within the current facility or in the parking lot where the baghouses and waste staging area were formerly located (Ref. 11, pp. 9-15). Based on reports of potential drums discarded in the nearby creek, efforts were made to locate drums or identify any evidence of prior dumping or impaired or stressed vegetation (Ref. 23, p. 1). Although

discarded tires were evident, the stormwater retention pond located immediately west of the site and across the railroad tracks appeared to be unimpaired. A number of nesting ducks and other waterfowl were observed (Ref. 11, pp. 1-3).

2.7 SOURCES

No specific sources associated with the site were identified during the April 3, 2019, site visit or by a review of historical records. Staged waste was disposed of at the conclusion of site operations in 1995.

3 MIGRATION/EXPOSURE PATHWAYS

The following sections describe migration/exposure pathways and potential receptors within the site's range of influence.

3.1 GROUNDWATER MIGRATION PATHWAY

The target distance limit (TDL) for the groundwater migration pathway is a 4-mile radius that extends from the sources at the site. Figure 3 depicts the groundwater 4-mile TDL.

3.1.1 Geologic Setting

Cretaceous-age Austin Chalk underlies the site. The upper and lower parts of the Austin Chalk consist of mostly massive microgranular calcite and some interbeds and partings of calcareous clay, with thin bentonitic beds locally in the lower part. The middle part of the Austin Chalk is mostly thin-bedded marl with interbeds of massive chalk. The Austin Chalk has a thickness of approximately 300 to 500 feet (Ref. 24, pp. 2, 14).

Underlying the Austin Chalk is the Eagle Ford Group of Cretaceous age, which is 200-300 feet thick and comprised predominantly of shale with thin beds of limestone and bentonite. The mostly sandstone Cretaceous-age Woodbine Formation underlies the Eagle Ford Group and is approximately 175-250 feet thick (Ref. 24, p. 14). The Woodbine is underlain by the Cretaceous-age Washita and Fredericksburg Groups, which consist primarily of limestone, dolomite, marl, and shale. The Fredericksburg and Washita Groups have a combined thickness of approximately 1,250 feet and separate the Woodbine from the underlying Paluxy Formation of the Trinity Group (Ref. 25, pp. 16; Ref. 26, pp. 39).

Average annual precipitation in the site area is approximately 41 inches (Ref. 27, pp. 1).

Groundwater is not known to be used for large scale irrigation, livestock watering, commercial aquaculture, or recreation in the immediate vicinity of the site, however in

general the Woodbine Aquifer provides water for industrial, livestock, and small irrigation supplies, and a small portion of the Trinity Aquifer is used for irrigation and livestock (Ref. 25, pp. 42, 47; Ref. 28, pp. 33-34, 41).

Table 1. Site Stratigraphy

System	Series	Group	Stratigraphic Units	Approximate Maximum Thickness	Water-Bearing Characteristics
Cretaceous	Gulf	Austin	Undifferentiated	700	Yields small to moderate quantities of water in northeastern part of North Central Texas. Very limited as an aquifer.
		Eagle Ford		650	Yields small quantities of water to shallow wells.
		Woodbine		700	Yields moderate to large quantities of water to municipal, industrial and irrigation wells.
	Comanche	Washita	Grayson Marl	1000	Yields small quantities of water to shallow wells.
			Mainstreet, Pawpaw, Weno, Denton		
			Fort Worth, Duck Creek		
			Kiamichi		
		Fredericksburg	Goodland	250	Yields small quantities of water to shallow wells.
			Walnut Clay		
		Trinity	Paluxy Formation	400	Yields small to moderate quantities of water to wells.
			Glen Rose Formation	1500	Yields small quantities of water in localized areas.
			Twin Mountains Formation	1000	Yields moderate to large quantities of water to wells.

(Ref. 25, p. 16)

3.1.2 Aquifer System

Several monitor wells are installed in the immediate site vicinity at depths of 15 to 33 feet below ground surface (bgs) (Ref. 29, pp. 2-3). Groundwater gradient information is not available for the shallow aquifer. Hydraulic conductivity is low in the Austin Chalk, which is very limited as an aquifer (Ref. 25, p. 16; Ref. 26, p. 57). The Woodbine Aquifer and Twin Mountains Formation of the Trinity Aquifer are also present below the site based on area well drilling logs (Ref. 29, pp. 1-3).

Underlying the Austin Chalk is the Eagle Ford Group. The 200-300-foot-thick Eagle Ford Group unconformably overlays the Woodbine Aquifer and acts as a confining unit (Ref. 24, pp. 5-6, 14, 15; Ref. 26, p. 57). The Woodbine Aquifer is categorized by the Texas Water Development Board (TWDB) as a minor aquifer consisting of sandstone interbedded with shale and clay that form three distinct water bearing zones. The Woodbine Aquifer reaches 600 to 700 feet in thickness in subsurface areas, with freshwater saturated thickness averages of about 160 feet (Ref. 25, pp. 19-20; Ref. 26, p. 45; Ref. 28, p. 41). Groundwater gradient in the Woodbine Aquifer is generally to the east-southeast (Ref. 25, p. 51).

The Washita Group underlies the Woodbine and overlies the Fredericksburg Group. The two groups are generally considered a confining unit above the Trinity Aquifer and yield only small amounts of water (Ref. 25, pp. 15-16; Ref. 26, p. 13).

The Trinity Aquifer underlies the Fredericksburg Group. The two water-bearing formations of the Trinity Group in the site vicinity are the Paluxy and Twin Mountains Formations, separated by the Glen Rose Formation (Table 1; Ref. 25, pp. 15-16). The Glen Rose Formation yields small amounts of water to localized areas only (Ref. 25, p. 16). The top of the Paluxy Formation occurs from approximately 1,700 to 2,000 feet bgs, with a maximum thickness of approximately 400 feet. The Paluxy Formation yields small to moderate quantities of fresh to slightly saline water to municipal, industrial, domestic,

and livestock wells (Ref. 25, pp. 19, 44; Ref. 26, p. 45). The Twin Mountains Formation has a maximum thickness of up to 1,000 feet and the top of the formation occurs from approximately 2,300 to 2,800 feet bgs. It is the primary Cretaceous-age water-bearing formation in the region and yields moderate to large quantities of fresh to slightly saline water to municipal and industrial wells (Ref. 25, pp. 16, 19; Ref. 26, p. 45). Groundwater gradient in both aquifers is generally to the east (Ref. 25, pp. 41, 44). The Trinity is the largest and most prolific aquifer in the region; however, the aquifer has been overdeveloped, resulting in significant water level declines across the region (Ref. 25, pp. 8-9).

The Woodbine and Trinity Aquifers extend well across the TDL over multiple north Texas counties (Ref. 24, p. 2; Ref. 25, p. 17; Ref. 26, pp. 22, 26-27).

The Woodbine Aquifer and the Paluxy Formation of the Trinity Aquifer are unlikely to have interconnectivity in this area as the two aquifers are separated from one another by confining units of the Eagle Ford and Washita/Fredericksburg Groups, as discussed earlier in this section (Ref. 25, p. 16). Interconnectivity between the Paluxy and Twin Mountains Formations of the Trinity Aquifer is also unlikely in the site vicinity as they are separated by the Glen Rose Formation, which yields small amounts of water (Ref. 25, p. 16; Ref. 28, p. 35). Additionally, the upper part of the Twin Mountains Formation is mostly claystone and few wells are developed in the upper part of the formation (Ref. 24, p. 17; Ref. 25, p. 19). The Glen Rose Formation pinches out towards the north and is absent in northern Texas counties where the Paluxy and Twin Mountains Formations coalesce into the Antlers Formation; however, this area is located outside the TDL (Ref. 26, p. 108; Ref. 28, p. 35).

3.1.3 Drinking Water Receptors

The Trinity Aquifer supplies wells for pubic supply, industrial, irrigation, domestic, and livestock use. Irrigation use constitutes a small portion of overall pumpage in the Paluxy and Twin Mountains Formations and is generally limited to irrigation of golf courses and lawns. Irrigation of crops from the Twin Mountains Formation is confined to the outcrop

areas located in Hood, Parker, and Wise Counties. Approximately 55 percent of total groundwater use in the Twin Mountains Formation is for municipal and industrial purposes. Municipal and domestic use of the Paluxy Formation accounted for approximately 50 and 24 percent of total groundwater pumpage, respectively (Ref. 25, pp. 8, 19, 42-44, 47).

Within the 1-mile TDL, there are 150 monitor wells, 60 environmental soil borings, 28 injection wells, and 7 wells listed as "other" (likely monitor wells, given the owner and location) (Ref. 29, pp. 1-7). A monitor well installed on site in 2012 was plugged the same day it was drilled (Ref. 29, pp. 8-9). The City of Garland has plugged all wells which formerly supplied the city in favor of purchasing water from the North Texas Municipal Water District (Ref. 29, pp. 2-3; Ref. 30, p. 2). Figure 3 shows the locations of well distributions within the 4-mile TDL.

There is no evidence at this time that groundwater is used for irrigation of food or forage crops of five or more acres, for commercial livestock watering, as an ingredient in commercial food preparation, for commercial aquaculture, or for major or designated recreation in the 4-mile TDL.

The site is not located within a wellhead protection area (Ref. 31, p. 1).

The total population in Dallas County is approximately 2,637,772, with 2,718 people per square mile and 2.78 people per household (Ref. 32, pp. 1-3).

3.2 SURFACE WATER MIGRATION PATHWAY

The surface water migration pathway TDL begins at the probable point of entry (PPE) of surface water runoff from the site to a surface water body and extends downstream for 15 miles. Figure 4 depicts the surface water 15-mile TDL.

3.2.1 Overland Route

All runoff from the west side of the site flows west across the parking lot until reaching a grassy area adjacent to railroad tracks, which force all runoff to the south. From the southwest corner of the site property, runoff continues to flow for approximately 300 feet until entering stream 2C4, an intermittent creek (Figure 2; Ref. 12, p. 2). The overland route continues to the southeast for approximately 1.5 miles until stream 2C4 joins Ruperds Branch, a perennial creek which is the probable point of entry (PPE). Ruperds Branch flows approximately 0.7 mile to the east until joining Duck Creek (Ref. 33, p. 2). The 15-Mile TDL ends approximately 1.5 miles before Duck Creek empties into the East Fork of the Trinity River (Figure 4).

The site is located outside the 100-year floodplain (Ref. 12, pp. 2-3). The two-year twenty-four-hour rainfall event has been calculated at 4 inches (Ref. 34, p. 2).

Impervious cover overlies most site soils except for narrow strips on the north property boundary and along Shiloh Road (and distant from the former operations area) which is comprised of the Dalco-Urban land complex, a soil up to 40 inches in depth with a 0 to 3 percent slope. Offsite soils in the immediate surface water drainage pathway are comprised of the Houston Black-Urban land complex, a soil up to 80 inches in depth with a 0 to 4 percent slope (Ref. 35, pp. 1-4, 6).

3.2.2 Drinking Water Receptors

There are no downstream surface water intakes along the 15-Mile TDL (Ref. 36, p. 1).

There are approximately 2.78 people per household in Dallas County (Ref. 32, p. 2).

3.2.3 Human Food Chain Receptors

Along the 15-Mile TDL, especially beginning at the Duck Creek Greenbelt, there are multiple opportunities for recreational fishing; however, there is no evidence of commercial harvesting of human food chain organisms (Ref. 37, pp. 1, 3; Ref. 38, pp. 1-7).

3.2.4 Environmental Receptors

A mix of temporarily and seasonally flooded freshwater forested scrub and freshwater emergent wetlands begins approximately 2.2 miles after the PPE for the surface water pathway. Duck Creek Park, which is the beginning of these wetlands, is the first of numerous parks along the 15-mile TDL. The vast majority of the pathway from this point lies in the aforementioned sensitive environments (Ref. 39, p. 1).

Endangered species in Dallas County include: white-faced ibis (*Plegadis chihi*), wood stork (*Mycteria americana*), bald eagle (*Haliaeetus leucocephalus*), whooping crane (*Grus americana*), piping plover (*Charadrius melodus*), red knot (*Calidris canutus rufa*), interior least tern (*Sterna antillarum athalassos*), black-caped vireo (*Vireo atricapilla*), golden-cheeked warbler (*Setophaga chrysoparia*), alligator snapping turtle (*Macrochelys temminckii*), Texas horned lizard (*Phrynosoma cornutum*), timber rattlesnake (*Crotalus horridus*), sandbank pocketbook (*Lampsilis satura*), Louisiana pigtoe (*Pleurobema riddellii*), Texas heelsplitter (*Potamilus amphichaenus*) , black rail (Laterallus jamaicensis), blue sucker (Cycleptus elongatus), sharpnose shiner (Notropis oxyrhynchus), and the western creek chubsucker (Erimyzon claviformis) (Ref. 40, pp. 1-12).

3.3 SOIL EXPOSURE PATHWAY

The soil exposure pathway is evaluated based on the threat to resident and nearby populations from hazardous substances present within two feet of the surface.

3.3.1 Site Setting and Sources

The site is surrounded on all sides by a six-foot metal fence (Ref. 11, pp. 5-9). Two car access gates front Shiloh Road and one fronts Marquis Drive (Figure 2). As previously discussed, exposed on-site soils are limited to small areas in the northeast and southeast sections fronting Shiloh Road and a narrow strip along the north property boundary (Ref. 11, pp. 8-9). There is no historical evidence that soil in these areas could have been adversely affected by Globe-Union operations. Soils within the right of way of the railroad

track on the west side of the property may have been contaminated in the past by parking lot runoff; however, no contamination has ever been confirmed either by sampling or direct observation.

3.3.2 Receptors

The Globe-Union Battery site is located along a commercial thoroughfare, with industrial pursuits and warehouses to the north, west, and south, and a large residential neighborhood to the east and southeast (Figure 1). CEI has four full-time employees on site, and there are an unknown number of employees working at a truck tire service facility in the south portion of the site. Additionally, there are an unknown number of individuals that lease parking space on site (Ref. 8, p. 1; Ref. 9, p. 4). There are four single-family residences and a small apartment complex located within 200 feet of the northeast corner of the site (Figure 2).

There is a possibility that soils in the near vicinity of the site may have been affected as the result of wind dispersion of air emissions from Globe-Union. The primary area of concern is the neighborhood located to the southeast of the site (Figure 1). Meteorological data indicates a strong tendency for wind to blow directly from the south through much of the year, with winter being the most likely time that winds blow toward the south-southeast or southeast. Easterly and east-southeasterly flow is minimal throughout the year(Ref. 41, pp. 1-12). Property line air testing conducted during facility operations found no exceedances of permitted limits (Ref. 6, pp. 15, 22). There has been no known testing of off-site soils for contaminants related to Globe-Union operations.

Potentially contaminated soils in the drainage ditch on the west side of the property could be transported south via overland flow following precipitation to stream 2C4 and along the surface water pathway as detailed in section 3.2.1 (Figure 2).

The closest HRS sensitive environment is the stormwater retention pond which begins approximately 75 feet west of the site; however, site runoff is not in communication with

this pond because the raised railroad tracks direct all runoff on the east side of the tracks to the south. The pond appeared to be unimpaired and generally healthy (Ref. 9, p. 1; Ref. 11, pp. 1-3; Ref. 39, p. 1).

There are no schools or day care facilities within 200 feet of the potentially contaminated soil area (Figure 2; Ref. 8, p. 10). There are no sensitive terrestrial environments, and no commercial land resources located within 200 feet of the site.

3.4 AIR MIGRATION PATHWAY

The air migration pathway TDL is a 4-mile radius that extends from sources at the site (Figure 3).

3.4.1 Air Pathway Receptors

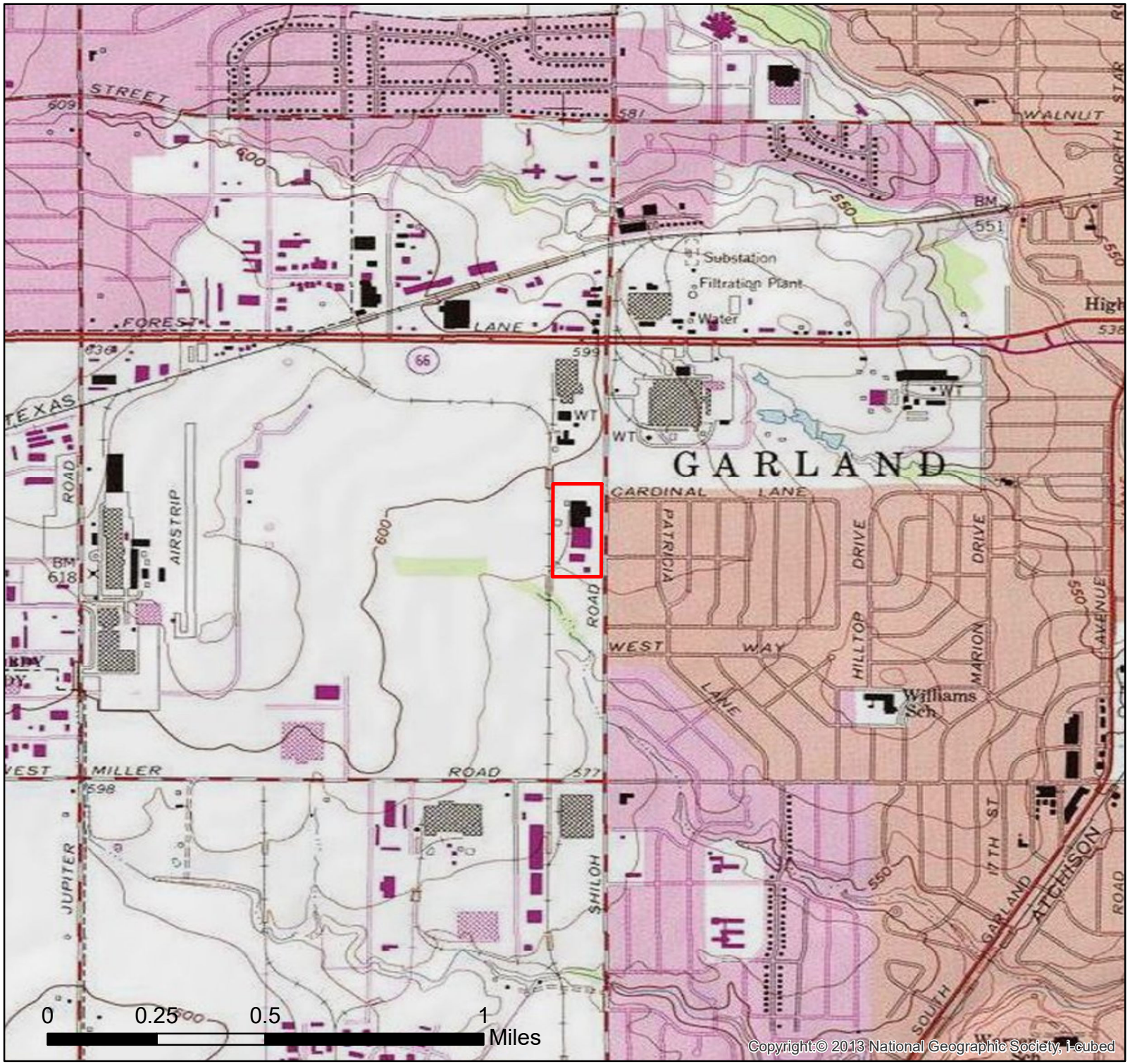
The site is located in a mixed residential and commercial/industrial neighborhood. The nearest residents live in four homes and in an apartment complex within 200 feet to the east of the site. The apartments and all residences were in existence during Globe-Union operations (Ref. 6, p. 1). There are approximately 391 homes within 0.25 mile of the site. Williams Elementary School lies 0.6 mile to the southeast, and Sam Houston Middle School lies 0.8 mile to the south-southeast (Figure 1).

There have been no citizen complaints regarding air releases from the site.

3.4.2 Environmental Receptors

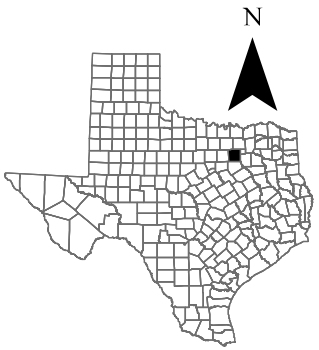
There is no commercial agriculture, silviculture, or designated recreation area within 0.5 mile of the site. Wetland acreage within four miles of the site includes 72.89 acres of freshwater forested/scrub wetland, 87.12 acres of freshwater emergent wetlands, 19.07 acres of freshwater pond, and 50.66 acres of riverine habitat (Ref. 39, p. 1).

FIGURE 1. SITE LOCATION MAP



Globe-Union Battery
1111 S. Shiloh Road
Garland, TX 75042

Site Boundary



The base map is Digital Orthophoto Quarter Quad Imagery of the Oak Cliff and Hutchins Quads in Dallas, provided by the Texas Natural Resource Imagery Service. Datum: NAD 1983, UTM Zone 14. The wetlands layer was downloaded from the US Fish and Wildlife Service National Wetlands Inventory Wetlands Mapper. The roads layer was created by the Texas Department of Transportation. This map was generated by the Remediation Division of the Texas Commission on Environmental Quality. It is intended for illustrative or informational purposes only, and is not suitable for legal, engineering, or survey purposes. This map does not represent an on-the-ground survey conducted by or under the supervision of a registered professional land surveyor. In cases where property boundaries are shown, it only represents their approximate relative location. No claims are made to the accuracy or completeness of the data or to its suitability for a particular use. For more information concerning this map, contact the Remediation Division at 800-633-9363. Map created by Stephen Ellis in June 2019.

FIGURE 2. SITE FEATURES MAP

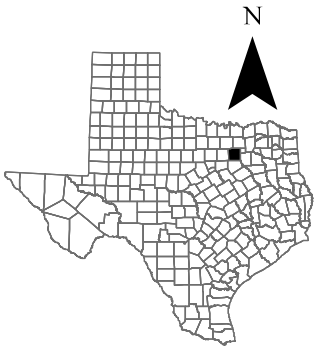
Globe-Union Battery

1111 S. Shiloh Road
Garland, TX 75042

Site Boundary

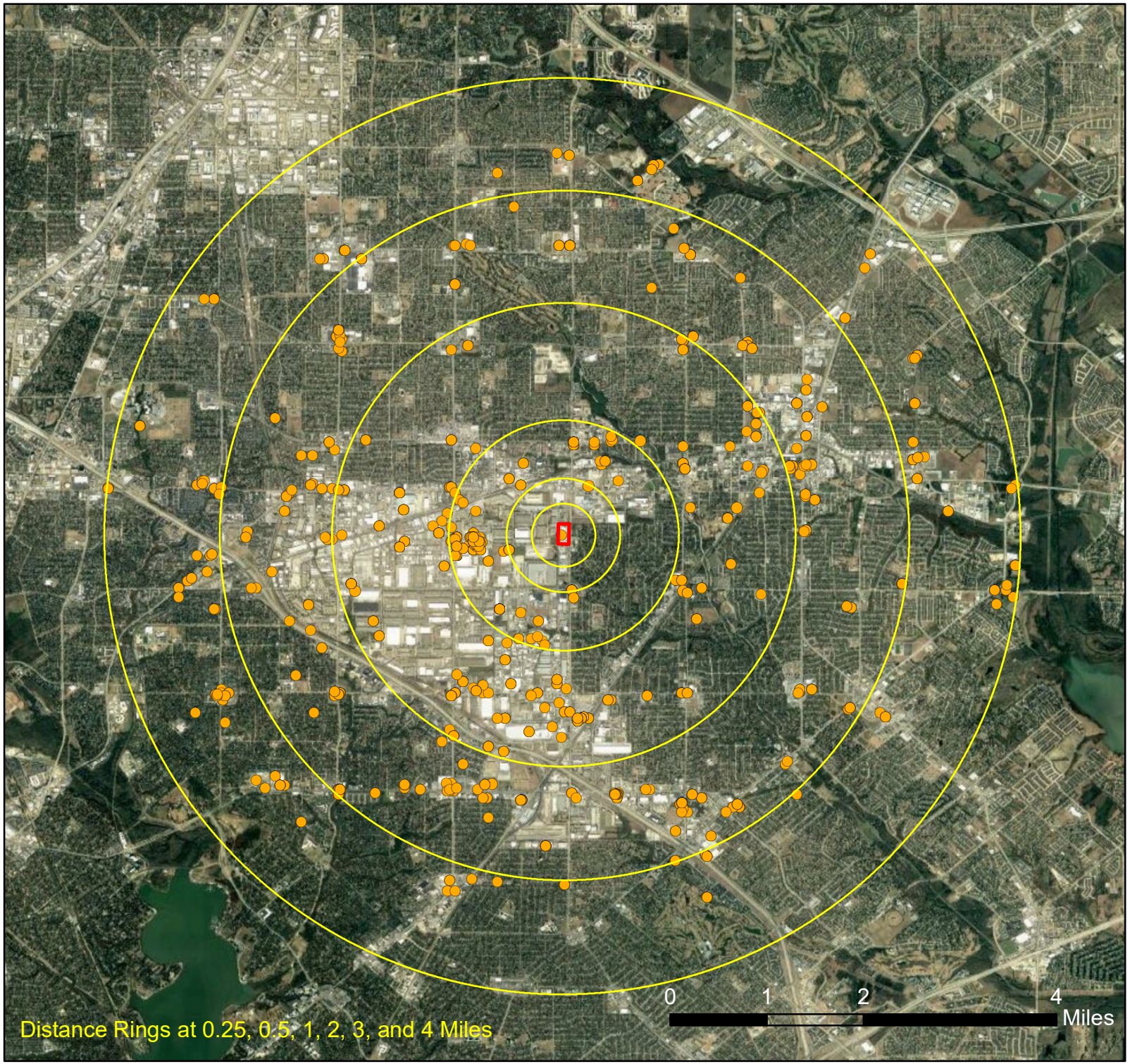
Site Drainage Pathway

Railroad Tracks



The base map is Digital Orthophoto Quarter Quad Imagery of the Oak Cliff and Hutchins Quads in Dallas, provided by the Texas Natural Resource Imagery Service. Datum: NAD 1983, UTM Zone 14. The wetlands layer was downloaded from the US Fish and Wildlife Service National Wetlands Inventory Wetlands Mapper. The roads layer was created by the Texas Department of Transportation. This map was generated by the Remediation Division of the Texas Commission on Environmental Quality. It is intended for illustrative or informational purposes only, and is not suitable for legal, engineering, or survey purposes. This map does not represent an on-the-ground survey conducted by or under the supervision of a registered professional land surveyor. In cases where property boundaries are shown, it only represents their approximate relative location. No claims are made to the accuracy or completeness of the data or to its suitability for a particular use. For more information concerning this map, contact the Remediation Division at 800-633-9363. Map created by Stephen Ellis in June 2019.

FIGURE 3. 4-MILE TARGET DISTANCE LIMIT MAP

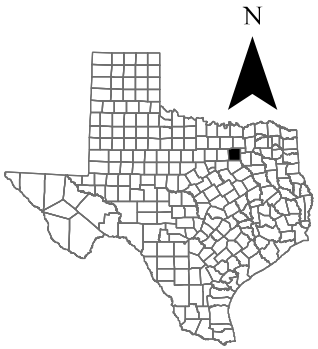


TCEQ

Globe-Union Battery
1111 S. Shiloh Road
Garland, TX 75042

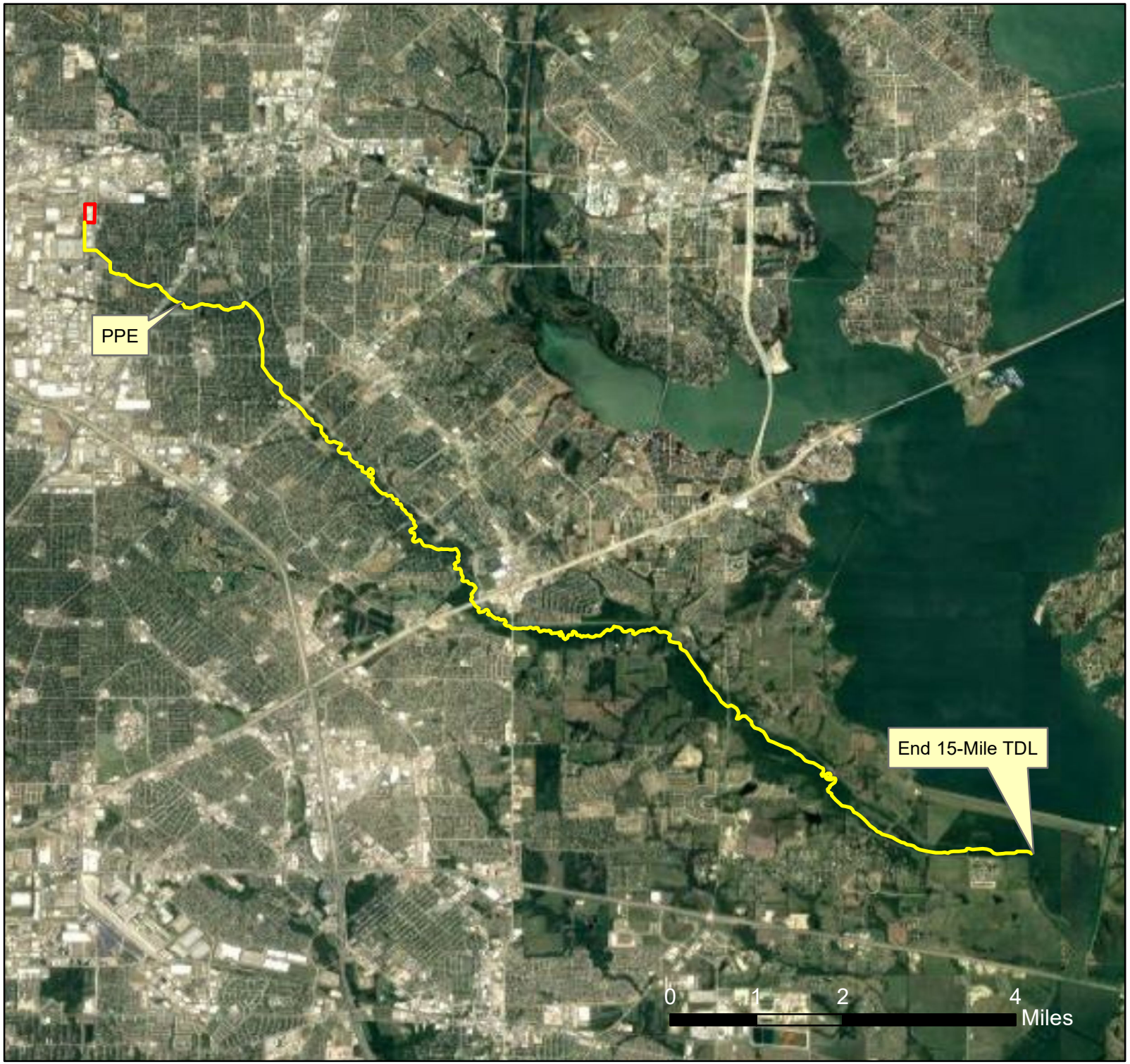
Site Boundary

Groundwater/
Monitor Well



The base map is Digital Orthophoto Quarter Quad Imagery of the Oak Cliff and Hutchins Quads in Dallas, provided by the Texas Natural Resource Imagery Service. Datum: NAD 1983, UTM Zone 14. The wetlands layer was downloaded from the US Fish and Wildlife Service National Wetlands Inventory Wetlands Mapper. The roads layer was created by the Texas Department of Transportation. This map was generated by the Remediation Division of the Texas Commission on Environmental Quality. It is intended for illustrative or informational purposes only, and is not suitable for legal, engineering, or survey purposes. This map does not represent an on-the-ground survey conducted by or under the supervision of a registered professional land surveyor. In cases where property boundaries are shown, it only represents their approximate relative location. No claims are made to the accuracy or completeness of the data or to its suitability for a particular use. For more information concerning this map, contact the Remediation Division at 800-633-9363. Map created by Stephen Ellis in June 2019.

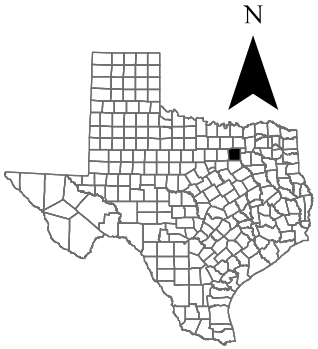
FIGURE 4. 15-MILE TARGET DISTANCE LIMIT MAP



TCEQ

Globe-Union Battery
1111 S. Shiloh Road
Garland, TX 75042

Site Boundary



The base map is Digital Orthophoto Quarter Quad Imagery of the Oak Cliff and Hutchins Quads in Dallas, provided by the Texas Natural Resource Imagery Service. Datum: NAD 1983, UTM Zone 14. The wetlands layer was downloaded from the US Fish and Wildlife Service National Wetlands Inventory Wetlands Mapper. The roads layer was created by the Texas Department of Transportation. This map was generated by the Remediation Division of the Texas Commission on Environmental Quality. It is intended for illustrative or informational purposes only, and is not suitable for legal, engineering, or survey purposes. This map does not represent an on-the-ground survey conducted by or under the supervision of a registered professional land surveyor. In cases where property boundaries are shown, it only represents their approximate relative location. No claims are made to the accuracy or completeness of the data or to its suitability for a particular use. For more information concerning this map, contact the Remediation Division at 800-633-9363. Map created by Stephen Ellis in June 2019.

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