
**Preliminary Assessment/
Site Inspection Report
for the Callaway Drum
Recycling Site, Auburndale,
Polk County, Florida**

EPA I.D. No. FLN000407303

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Prepared for:

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION

Site Screening Superfund Subsection

2600 Blair Stone Road

Tallahassee, Florida 32399-2400

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List of Acronyms and Abbreviations

a.k.a	also known as
ASTM	American Society for Testing and Materials
BGS	below ground surface
BNA	base, neutral and acid extractable organic compound
CDR	Callaway Drum Recycling
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (of 1980)
CompQAP	Comprehensive Quality Assurance Plan
CR	County Road
DOT	United States Department of Transportation
DQO	data quality objective
E & E	Ecology and Environment, Inc.
e.g.	for example
EISOPQAM	Environmental Investigation Standard Operating Procedures and Quality Assurance Manual
EPA	United States Environmental Protection Agency
FDEP	Florida Department of Environmental Protection, formerly FDER
FDER	Florida Department of Environmental Regulation, now FDEP
FGS	Florida Geological Survey
FIRM	Flood Insurance Rate Map
FS	Florida Statute
ft ² /day	square feet per day
gpm	gallons per minute
HRS	hazard ranking system

List of Acronyms, cont.

ID	inside diameter
IDW	investigation-derived waste
ml	milliliter
msl	mean sea level
NGVD	National Geodetic Vertical Datum
NPL	National Priorities List
NTU	nephelometric turbidity units
NWI	National Wetland Inventory
PA	Preliminary Assessment
PCB	polychlorinated biphenyl
PG	Professional Geologist
ppb	parts per billion
PUBHx	Palustrine, unconsolidated bottom, permanently flooded, excavated
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control
SARA	Superfund Amendments and Reauthorization Act
SESD	(EPA) Science and Ecosystem Support Division
SI	site inspection
SWFWMD	Southwest Florida Water Management District
TAL	target analyte list
TCL	target compound list
TVA	total vapor analyzer
USC	United States Code
USGS	United States Geological Survey
VOA	volatile organic analysis
VOC	volatile organic compound

This Preliminary Assessment/Site Inspection (PA/SI) report summarizes the results of investigation activities conducted at the Callaway Drum Recycling (CDR) Site (EPA ID# FLN000407303), Auburndale, Polk County, Florida. Ecology and Environment, Inc. (E & E) conducted the PA/SI in October 2001 for the Florida Department of Environmental Protection (FDEP), under Contract Number HW-363. The purpose of this PA/SI is to characterize soil and groundwater conditions at the CDR site.

This PA/SI, described in E & E's August 2001 PA/SI work plan [37], is designed to obtain the information necessary to prepare a Hazard Ranking System (HRS) evaluation and determine whether further work is warranted, pursuant to the authority of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, 42 USC 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act (SARA), Public Law 99-499, and Florida Statutes, Chapter 403. The objective of the PA/SI is to determine the presence and nature of contamination at the site resulting from alleged release of hazardous substances into the environment. This PA/SI report will present the site background and findings of previous investigations, identify migration pathways that were inspected, identify the number of samples and sample locations that were collected during the PA/SI to define the nature of the contamination, describe sampling methodologies, and present the results and findings of the PA/SI. During the PA/SI, all data quality objectives (DQOs) were performed in accordance with the prescribed guidance documents set forth by the United States Environmental Protection Agency (EPA) Region IV including the EPA Science and Ecosystem Support Division Region IV Environmental Investigation Standard Operating Procedures and Quality Assurance Manual, EPA Contract Laboratory Program (CLP) Statement of Work for Organics and Inorganics Analysis, and the National Functional Guidelines and Data Validation SOP for CLP Routine Analytical Services, Version 2.1. These DQOs specifically apply to sampling locations, sample types, sampling procedures, use of data, data types, and field QA/QC samples.

Samples collected during the PA/SI were used to document releases of hazardous substances from the property, to define the nature of contamination, and to determine whether such releases have resulted in actual contamination of target populations.

The objectives of this PA/SI Report are as follows:

- Discuss the findings of previous investigations and other background information,
- Further define the site characteristics and contaminant sources, including waste type and volume,
- Determine the human population, sensitive environments, and fisheries that are threatened or potentially threatened by releases of hazardous materials from the site,
- Identify migration pathways and HRS data gaps,
- Identify the number of samples and sampling locations required to fill HRS data gaps and define the nature of contamination,
- Propose PA/SI activities to confirm the preliminary HRS data, fill HRS data gaps, and define the nature of contamination, and
- Provide FDEP and EPA the necessary information to make decisions on any other actions warranted at the site.

The results of the PA/SI are being used to prepare a Site Inspection Report and will then be incorporated into the HRS evaluation (effective March 1991) for the CDR site and will be used to determine what, if any, further action is required by EPA and/or FDEP to address possible contamination at the site.

2.1 Site Description

The CDR site is a vacant property located on County Road (CR) 655 (a.k.a. Berkley Road) in Auburndale, Polk County, Florida, within Section 33, Township 27 South, Range 25 East [1, 2, 3]. Based on the Auburndale topographic map, the approximate latitudinal and longitudinal coordinates for the site are 28E5'11" N (28.086382) and 81E49'11"W (81.819805), respectively [1]. Figure 1 depicts the site location and a 1-mile radius around the site [1].

The CDR site is located in a rural residential area, approximately 450 feet north of the intersection of CR 655 and Lake Myrtle Drive [2, 4]. The site is rectangular in shape covering an area of 10.66 acres [2, 3]. According to records obtained from the Polk County Property Appraisers Office, Adams Packing Association, Inc. has owned the site since 1947 [3]. Available site file information suggests that CDR operated on the property from some time prior to 1971, until approximately 1979 [5, 6, 9, 10]. However, the exact dates that CDR operated on the site are unknown.

The site is a vacant property having the approximate dimensions of 1,000 feet east-west by 500 feet north-south. No permanent structures currently exist on the property and the majority of the site is densely vegetated.

Several manmade features and areas of debris, located on the site, may be attributable to the former drum recycling operations (see Figure 2). A large excavated area composed of a series of ditches and berms running north-south is located in the northwest section of the site. The remains of many drums were observed in this area during the site reconnaissance and PA/SI field investigation. A similar excavated area was observed in the southwest section of the site and remains of drums and piles of crushed aluminum juice cans were observed in this area. Labeling on the aluminum juice cans indicated that the cans had contained or were intended to contain Adams grapefruit juice.

Two large trenches that run east-west are located in the southeast section of the site. A less densely vegetated area is located centrally on the eastern half of the site. A former employee indicated that the main drum reconditioning operations were conducted in this area. Remnants of many drums and possible reconditioning equipment were observed in the vicinity of the former reconditioning area. In addition, a large pile of pallets and large open-top containers were observed in this same area. The containers, estimated to hold greater than 100 gallons, carried Adams Packing labels and appeared to be associated with juice processing. A former employee remembered that there was a well on the site; however, the employee could not remember the exact location. The well was not located during the site reconnaissance or field investigation.

2.2 Ownership History

According to the Polk County property appraiser's office, the site has been owned by Adams Packing Association Inc. since 1947 [3].

2.3 Operational History

Very little is known about CDR operations at the site. Some information has been obtained from telephone interviews with two former employees, as well as a site walkover with one of these former employees. Historical aerial analysis and employee interviews suggest that drum recycling operations ceased at the site in the late 1970s. However, the start date of drum recycling operations is unknown. Analysis of the aerial photographs suggests that excavation operations apparently began at the site about 1958. Drum recycling operations are not apparent on aerial photographs until 1971.

Interviews with former employees indicated that drums were received and unloaded at the rear (west) of the property and any remaining contents were poured on the ground [6, 8]. The drums were reconditioned in the eastern half of the site. One former employee described the drum reconditioning process. After the drums were emptied, they were brought to the reconditioning areas to be rinsed and cleaned. The drums were placed on racks to dry; then they were straightened and repainted to be sold.

Although the descriptions of the drum recycling operations given by the former employees were not detailed, it appears that the operation process may have been similar to those described at a CDR facility subsequently operated in Lake Alfred, Florida [11, 12]. This site operated from mid-1977 through early 1991 and was placed on EPA's National Priorities List (NPL) in May 2000 [35]. The Auburndale facility was initially brought to the attention of EPA and FDEP during the Lake Alfred facility NPL listing process. Although the former employees stated that some drums were

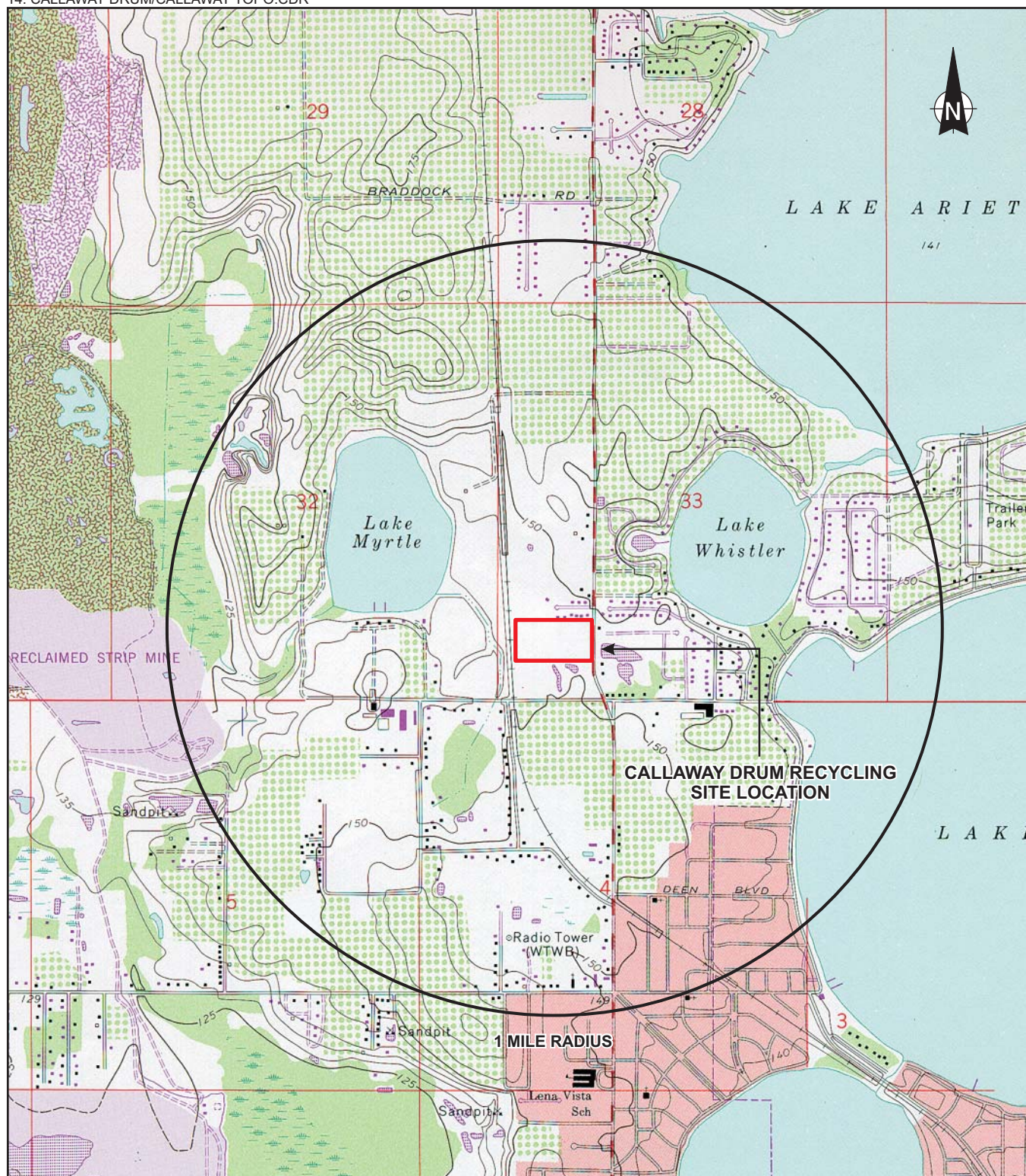
labeled as caustic and corrosive, the source and the contents of the drums received at the site are unknown at this time [6, 8].

2.4 Regulatory/Investigative History

From sometime prior to 1971 until the late 1970s, Callaway and Sons operated a drum recycling facility at the CDR site. A chronological listing of relevant site events is summarized below:

- **January 1, 1947.** Adams Packing Association Inc. purchased the property [3].
- **1970s.** CDR operated a drum recycling facility at the site [5, 6, 8, 9].
- **November 2000.** The EPA Environmental Services Division, Las Vegas, conducted an aerial photographic analysis of the Callaway and Sons Drum Service site in Auburndale. The report presented operational interpretation from aerial photographs taken between 1958 and 1993. [9].
- **March 26, 2001.** Ms. Joni Long, a former Callaway and Sons employee, sent a letter to Congressman Adam Putnam's office (Bartow) providing information about former activities at the site. The letter stated that Ms. Long handled chemicals, and was never told that they could be dangerous. Subsequently Ms. Long explained that she had health problems that her doctors are attributing to chemical and radioactive poisoning. The letter requested direction from Congressman Putnam's office, as Ms. Long is no longer able to work due to health problems [5].
- **March 27, 2001.** Barbara Dick, EPA Region IV, referred the site to FDEP to conduct a combined PA/SI [19].
- **April 12, 2001.** FDEP conducted a windshield survey of the CDR site [7].
- **July 16, 2001.** Personnel representing FDEP Site Screening Superfund Subsection, E & E, and Adams Packing conducted a site reconnaissance of the CDR site. In addition, a former CDR employee was present for part of the site reconnaissance.
- **August, 2001.** E & E submitted to FDEP a final Preliminary Assessment/Site Inspection Work Plan for the CDR site [37].
- **October 1 through October 6, 2001.** Personnel representing FDEP Site Screening Superfund Subsection and E & E conducted the PA/SI field activities [38].

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SOURCE: U.S.G.S. 7.5 Minute Series (Topographic) Quadrangle: Auburndale, Florida 1975, photorevised 1988.

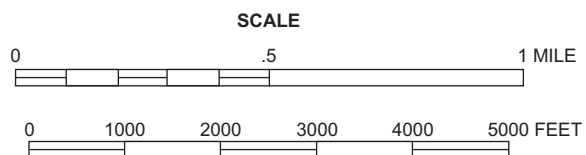
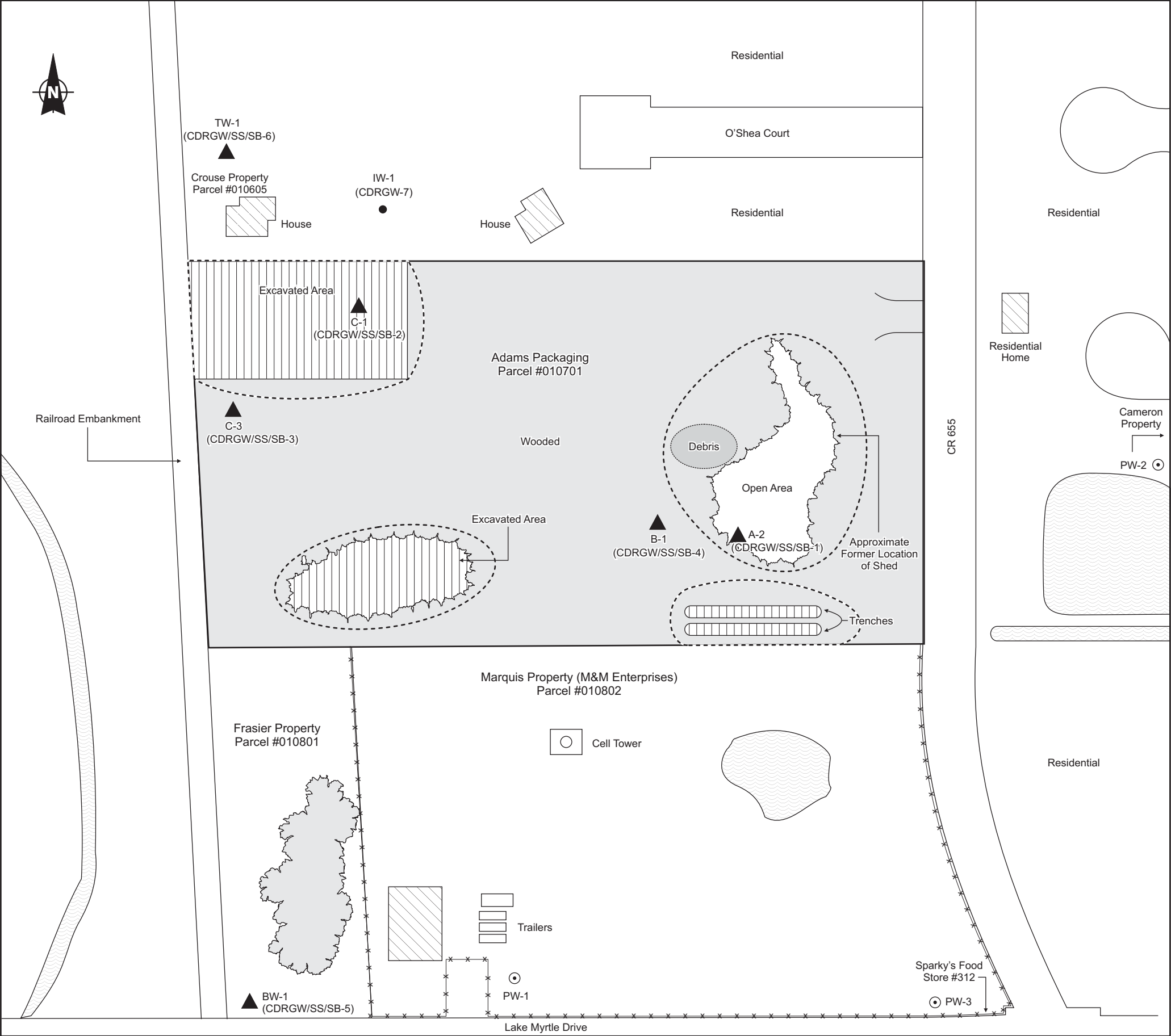


Figure 1 LOCATION MAP -- CALLAWAY DRUM RECYCLING, AUBURNDALE, POLK COUNTY, FLORIDA



KEY:

- Building
- Fence
- Shallow Monitoring Well Location
- Private Supply Well
- Irrigation Well
- Excavated Areas
- Investigation Focus Area
- Pond
- Trees

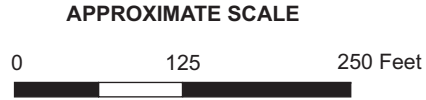


Figure 2 **SITE MAP -- CALLAWAY DRUM RECYCLING, AUBURNDALE, POLK COUNTY, FLORIDA**

3.1 Surrounding Areas

The CDR site is located in an area of mixed land use, primarily rural residential and agricultural [4]. A review of the available historical aerial photographs indicates that the areas in all directions around the site were agricultural prior to 1979 [9, 10]. At present, a small subdivision is located north of the site. Agricultural pastureland is located beyond the subdivision, and CR 655 (a.k.a. Berkley Road) is directly east of the site, beyond which are residential subdivisions. Two properties comprising approximately 10 acres in total and zoned as a commercial enclave are located south of the site. A cellular tower and communications tower construction company currently operates on one of these properties (the Marquis Property – see Figure 2). For approximately ten years from the mid-1970s, the former owner of this property, Mr. Pearson, operated a borrow pit for sand and clay on the Marquis property. The site is bordered on the west by a railroad embankment, beyond which is pastureland.

3.2 Climate

The climate of Polk County is characterized by long, warm, humid summers and short, mild winters. The average monthly temperatures range from 61° F in January to 82° F in July and August. The average annual temperature is 73° F [39]. The average 2-year, 24-hour rainfall event for the area is approximately 5 inches with an annual net precipitation of approximately 6 inches [40, 41]. Average annual mean rainfall for Polk County ranges from 50.36 to 55.21 inches [39].

3.3 Site Topography and Drainage

The site is generally flat with a surface elevation of approximately 145 to 150 feet National Geodetic Vertical Datum (NGVD) [1]. Based on the Flood Insurance Rate Map (FIRM) for Polk County, the site is located within Zone C, described as an area of minimal flooding [13]. Based on

the flat topography and dense vegetation, as well as the railroad embankment and the road to the west and east of the site, respectively, it is unlikely that stormwater runoff flows off site. However, based on observations made during the site reconnaissance and a review of the National Wetland Inventory (NWI) map for the Auburndale quadrangle, an excavated pond exists on the Marquis property adjacent to the southern end of the site (see Figure 2). This area is described on the NWI map as PUBHx (Palustrine, unconsolidated bottom, permanently flooded, excavated) [14]. Stormwater runoff from the site possibly may flow off site toward this area. In addition, analysis of the 1971 aerial photograph suggests that a low moist area may exist in the west-central portion of the site [9]. The existence of this area was not observed during the site reconnaissance and PA/SI field investigation.

3.4 Sensitive Environments

A review of the Florida Natural Areas Inventory (FNAI) database indicates that only one sensitive element is located within a 2-mile radius of the CDR site. Approximately 6,600 feet southeast of the CDR site, and element occurrence (EO) of the round-tailed muskrat (*Neofiber alleni*) has been documented. The round-tailed muskrat is not listed federally or by the Florida Fish and Wildlife Conservation Commission (FFWCC) [42].

3.5 Geology/Hydrogeology

3.5.1 Regional Geology/Hydrogeology

The CDR site is located on the northern portion of the Winter Haven Ridge [21]. Elevations of the Winter Haven Ridge in Polk County range from about 150 to 230 feet above mean sea level (msl) [22].

The uppermost lithologic unit encountered in the site vicinity consists of variably clayey quartz sands of the Plio-Pleistocene Age Cypresshead Formation [23, 24]. In the site vicinity in northern Polk County, Cypresshead Formation sediments are approximately 50 to 60 feet thick [24, 25, 26].

The Cypresshead Formation is underlain by interbedded variably phosphatic sandy clays, clayey sands, limestones, and dolostones of the Miocene-Age Hawthorn Group [27]. In the Auburndale area, sediments of the Hawthorn Group are approximately 80 to 100 feet thick [25, 27].

Three principal hydrogeologic units are present in Polk County. In descending order, these are the surficial aquifer system, intermediate aquifer system, and Floridan aquifer system [28, 29, 30].

In Polk County, the surficial aquifer system consists of permeable quartz sands and clays of the Plio-Pleistocene Age Cypresshead Formation, undifferentiated Pleistocene and Holocene deposits,

and where present, permeable sediments in the uppermost portion of the Peace River Formation of the Hawthorn Group [24, 29, 31]. The surficial aquifer system is approximately 50 feet thick in the vicinity of the site [31].

Groundwater occurs in the surficial aquifer system under generally unconfined conditions in Polk County [31], and the aquifer system is recharged primarily by rainfall. In Polk County, the surficial aquifer system is used as a source of water for lawn irrigation and stock watering [22, 24]. Wells that tap the surficial aquifer system in Polk County typically do not yield more than 20 or 30 gallons per minute (gpm) [22]. The surficial aquifer system is considered a major source of recharge to the underlying intermediate aquifer system in the Polk County area [29,32].

The intermediate aquifer system is present over much of Polk County, south of Polk City, and consists of all water-bearing and confining units lying between the surficial aquifer system and the underlying Floridan aquifer system [28, 29]. Water-bearing units within the intermediate aquifer system consist of discontinuous sand, limestone and dolostone beds within the Peace River and Arcadia Formations of the Hawthorn Group [29]. Low permeability sandy clay and clay within the Peace River Formation comprise the upper confining unit of the intermediate system. Sandy clay and clayey sand in the lower portion of the Arcadia Formation form the lower confining unit of the intermediate system [29]. In northern Polk County in the vicinity of the site, the intermediate aquifer system is approximately 100 feet thick [29, 30].

Groundwater within the intermediate aquifer system occurs under semi-confined conditions. However, the intermediate aquifer system is considered a leaky aquifer system [29, 32] that can transmit water to the overlying surficial aquifer system or the underlying Floridan aquifer system depending on hydraulic head relationships between the three aquifer systems [29, 32].

Transmissivities of the water-bearing units within the intermediate aquifer system are generally less than 1,000 square feet per day (ft^2/day) in northern Polk County [29]. The intermediate aquifer system is an important source of water for domestic, industrial, and agricultural use in Polk County [29, 33]. In northern Polk County, the intermediate aquifer system is recharged by downward leakage from the surficial aquifer system [29, 34].

The upper Floridan aquifer system is the major source of water in the Polk County area and consists of a thick series of carbonate ranging from Eocene to Oligocene in age. In descending order, the upper Floridan aquifer system in the Polk County area includes the Oligocene age Suwannee Limestone, the Eocene-Age Ocala Limestone and permeable portions of the Eocene age Avon Park Formation [22, 24]. In northern Polk County, the upper Floridan aquifer is approximately 800 feet thick [33, 34]. Groundwater within the upper Floridan aquifer occurs under confined conditions in the site vicinity [22, 23]. Transmissivities reported for the upper Floridan aquifer in Polk County area

range from approximately 4,000 to greater than 1,000,000 ft²/day [34]. The upper Floridan aquifer is the principal source of water for consumptive use in Polk County [24, 33, 34]. In the site vicinity, the upper Floridan aquifer is recharged by leakage from the overlying intermediate aquifer system [29, 34].

3. 5.2 Site-Specific Geology/Hydrogeology

Land surface elevations at the site range from approximately 145 feet NGVD to 150 feet NGVD. Subsurface lithologies observed during the field investigation to depths of at least 12 feet BGS indicate the site is underlain in descending order by fine to medium grained quartz sand with variable amounts of organic fines and variably silty and clayey very fine to medium grained quartz sand.

3. 6 Drinking Water Targets

The City of Auburndale operates six wells within a 4-mile radius of the site [15, 16]. The City of Auburndale well system collectively serves a population of approximately 31,822 people [16]. The two Winona Park wells operated by the City of Auburndale are located approximately 1.5 miles west-northwest of the site [15]. The three Atlantic Avenue wells, and one Tampa Street well, are located approximately 2.1 and 2.6-miles southwest of the site, respectively [15].

Forty-nine community and non-community well systems exist within 4 miles of the site, collectively serving 6,983 people. The largest system, Mariana Acres Water System, consists of two wells that serve 1,785 people [16]. These wells are located approximately 3.75 miles west of the site [15]. The nearest community system, Happy Day Trailer Park, serves 120 people and is located approximately 1.9 miles southwest of the site [15,16].

At this time, the number of private wells for potable use located within 4 miles of the site is unknown. Observations made during the site reconnaissance and field investigation suggest that the majority of properties in the vicinity of the site are served by public and municipal water systems. However, three private supply wells are known to exist within 0.25 miles of the site. One private potable supply well is located on the property (Marquis) immediately south of the site; the second is located on the Cameron property east of the site beyond CR 655; and the third is located at Sparky's Food Store # 312 located at the southwest corner of the intersection of Lake Myrtle Drive and CR 655 (see Figure 2). A population database search indicates that 24,909 people reside within a 4-mile radius of the site [17].

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Table 3-1 DISTRIBUTION OF POTABLE SUPPLY WELLS WITHIN 4 MILES OF CALLAWAY DRUM RECYCLING SITE AUBURNDALE, POLK COUNTY, FLORIDA						
Supply Wells	0 to 0.25 mile (number of wells/ population served)	0.25 to 0.5 mile (number of wells/population served)	0.5 to 1 mile (number of wells/population served)	1 to 2 miles (number of wells/population served)	2 to 3 miles (number of wells/population served)	3 to 4 miles (number of wells/population served)
City of Auburndale Public Supply Wells ^a	- / -	- / -	- / -	2 / 10,608 ^a	4 / 21,216 ^a	- / -
Community Wells	- / -	- / -	- / -	1 / 120	1 / 210	12 / 4,190
Private Wells	3 / 105	- / -	1 / 185	1 / 30	13 / 1,066	18 / 1,082
Total Number of Wells/Population Served (approximate)	3 / 105 ^b	- / -	1 / 185	4 / 10,758	18 / 24,046	25 / 5,272

Source: FDEP 2001 [16, 17].

Note:

^a The City of Auburndale Public Water Supply System is a blended system serving an approximate population of 31,822 [16, 17].

^b Average population per household for Polk County = 2.53 persons [43].

Key:

- / - = No known potable supply well within described distance from site [32].

NE = Not evaluated.

The following field activities were conducted at the CDR site. Initial field screening included: installation of seventeen 8- to 12-foot borings using direct-push technology; collection of surface and subsurface soil samples from each boring for screening of soil vapors and soil pH; and collection of groundwater grab samples from each boring for field screening. Upon completion of the field screening activities and review of the results, six 0.75-inch inside diameter (ID) “micro” monitoring wells (five permanent and one temporary) were installed. Adjacent to the monitoring wells, one surface soil and one subsurface soil sample were collected for laboratory analysis. In addition, upon completion and development of the monitoring wells, a groundwater sample was collected from each well for laboratory analysis. Water level measurements were recorded for all newly installed monitoring wells. Sample screening and sampling locations are presented in the site survey provided as Appendix D.

The field investigation focused on areas believed to be key during site operations. These included: the excavated areas in the northwest, southwest, and southeast sections of the site; and the former reconditioning operations area in the east-central half of the site. Figure 2 shows the focus areas, and sample locations. Table 4-1 lists the soil and groundwater sample designations, locations, and rationale.

All sampling and fieldwork activities were conducted in accordance with E & E’s FDEP-approved CompQAP (No. 860165G) and E & E’s site-specific health and safety plan.

4.1 Soil Investigation

4.1.1 Soil Screening

Continuous 4-foot soil cores were collected from 17 locations using direct-push technology. Cores were collected from the ground surface to the water table, ranging from 8- to 12-feet BGS. Direct-push locations were selected in the field by the E & E and FDEP project managers based on field observations and site history. Each of the 4-foot core samples were cut into two 2-foot sections

and a soil sample collected from each for field screening using E & E's Color-Tech screening technique and a total vapor analyzer (TVA). In addition, soil samples were screened for pH. Visual and olfactory observations also were noted. E & E's Color-Tech screening technique uses colorimetric detector tubes capable of detecting chlorinated alkenes and hydrocarbons to a detection limit of 50 parts per billion (ppb). At each core depth, approximately 10 grams of soil sample were collected and mixed with approximately 10 milliliters (ml) of analyte-free water in a 40-ml volatile organic analysis (VOA) vial. Two needles were pierced through the vial septa. One was stationed near the top of the vial in the head space (sampling needle), and the other was stationed near the base of the vial in the water soil mixture (inlet purging needle). A colorimetric detector tube and pump was connected to the sampling needle and a sample was drawn from the vial headspace. Tentative analyte quantitation and identification was based on tube concentration readings and color changes. Boring logs and field screening data are provided in Appendix B.

4.1.2 Surface and Subsurface Soil Sampling

Based on the field screening results, six surface soil and six subsurface soil samples (CDRSS-1 through CDRSS-6; and CDRSB-1 through CDRSB-6, respectively) were collected at, or near, the CDR site on October 1 through 3, 2001. Surface and subsurface soil samples were co-located at each borehole. Of these, four soil sampling locations (CDRSS/SB-1 through CDRSS/SB-4) were located in potential source areas on the CDR site, including one sampling location (CDRSS/SB-1) in the vicinity of the former operations area in the eastern portion of the site; two sampling locations (CDRSS/SB-2 and CDRSS/SB-3) in the focus area in the northwest portion of the site; and one sampling location (CDRSS/SB-4) in the focus area toward the southwest portion of the site (Table 4-1; Figures 2 and 3). Two control sampling locations (CDRSS/SB-5 and CDRSS/SB-6) were located off site on the Frazier and Crouse properties, respectively (see Table 4-1; Figures 2 and 3). Surface soil samples were collected from 0 to 2-feet BGS with a stainless steel bucket auger. Subsurface soil samples were collected from the 2-foot interval above the water table at each borehole using a stainless steel bucket auger. Sample depths for the subsurface soil samples ranged from 2 to 4 feet BGS, to 6 to 8 feet BGS.

Each of the surface and subsurface soil samples collected for laboratory analysis were analyzed for: Target Compound List (TCL) VOCs; TCL base, neutral and acid (BNA) extractable organic compounds; pesticides and polychlorinated biphenyls (PCBs); herbicides; and Target Analyte List (TAL) metals and cyanide. Laboratory analyses were performed by the FDEP Central Laboratory in Tallahassee, Florida.

4.2 Groundwater Investigation

4.2.1 Groundwater Grab Sampling and Screening

Groundwater grab samples were collected from each of the direct-push borings. Groundwater grab samples were collected from approximately 5 feet below the water table by advancing a well screen and retractable steel casing assembly. At the desired depth, the steel casing was retracted exposing the screened section, thus allowing water to enter the screened section. A groundwater sample was then collected using a peristaltic pump equipped with Teflon tubing. The groundwater grab samples were field screened using the Color-Tech procedure and the TVA.

4.2.2 Monitoring Well Installation and Abandonment

Four permanent monitoring wells were installed on the CDR site using direct-push techniques. The work plan proposed five on-site monitoring wells, however based on field screening results from the direct-push borings, only four locations exhibited significant contamination. The exact location of each well was determined in the field based on the results of the groundwater and soil field screening. The monitoring wells were installed to depths ranging from 10 to 14.5-feet BGS. One control monitoring well was installed on an adjacent property south of the CDR site (the Frasier property), and one temporary control well on the adjacent property to the north (the Crouse property). With the exception of the temporary well, each well was constructed of 0.75-inch schedule 40 flush-joint polyvinyl chloride (PVC) casing (the length of which was determined in the field) attached to either 5 or 10 feet of 0.010-inch factory-slotted flush-joint threaded PVC screen, and a threaded PVC end cap. The screen/borehole annulus was filled with clean silica sand (20/30 mesh) to a height of approximately 2 feet above the screen/casing joint. An approximately 2-foot thick layer of very fine sand (35-70 mesh) was placed above the sand pack to act as a seal. The remaining annular space was filled with cement grout. The on-site permanent wells were completed with a locking cap and aboveground security cover surrounded by a concrete pad. The control well installed on the Frasier property was completed with a locking cap and flush mounted security cover surrounded by a concrete pad. The temporary well (TW-1) was constructed similarly to the permanent wells, however the well was not completed above the screen interval. Well construction logs are provided in Appendix B of this report. The wells were developed by surging and overpumping using a pump until the water appeared clear, and the pH, specific conductance, turbidity, and temperature had stabilized. The wells were sampled at least 24-hours past completion.

After collecting the groundwater sample from temporary monitoring well (TW-1), the well was abandoned. The PVC screen and casing was pulled from the borehole and the borehole was backfilled from the total depth to the ground surface with clean Portland cement.

4.2.3 Groundwater Sampling

Groundwater samples were collected from the six newly installed monitoring wells shown on Figure 2 (see table 4-1). Prior to sampling, a volume equivalent to at least three times the standing water column was purged from each monitoring well. After each well volume was removed, the pH, specific conductance, turbidity, and temperature were recorded. If these parameters had not stabilized after the removal of three well volumes, purging continued. Groundwater samples were collected when the turbidity readings were below 10 nephelometric turbidity units (NTUs). All monitoring well purging and groundwater sampling was performed by low-flow methodology using a peristaltic pump with Teflon tubing. The teflon tubing was replaced between each monitoring well. All groundwater samples were collected from the tubing prior to passing through the peristaltic pump.

For QA/QC purposes, one duplicate groundwater sample, one groundwater sampling equipment rinsate blank sample, and four trip blanks were collected in conjunction with the groundwater sampling.

Each of the groundwater samples collected from monitoring wells for laboratory analysis were analyzed for TCL VOCs; TCL BNA extractable organic compounds; pesticides and PCBs; herbicides; and TAL metals and cyanide. Laboratory analyses for groundwater samples collected from monitoring wells were performed by the FDEP central laboratory in Tallahassee, Florida.

In addition, Polk County Department of Health (DOH) collected four groundwater samples from private supply wells located in the vicinity of the site, including one sample from the potable well located on the adjacent property to the south (the Marquis property); one from the potable supply well located on the Cameron property east of the site; one from the potable supply well at Sparky's Food Store #312 located at the southwest corner of the intersection of Lake Myrtle Drive and CR 655; and one from the irrigation well located on the Crouse property northwest of the site.

Groundwater samples and trip blanks collected by Polk County DOH were analyzed for VOCs by the Florida DOH laboratory in Jacksonville, Florida.

4.2.4 Hydrologic Assessment

Following the completion of the monitoring well sampling activities, a hydrologic assessment was conducted, consisting of an elevation survey, and measurement of the water levels in the monitoring wells. The elevation survey of the newly installed wells, selected profiling locations, and

selected site features was performed by Southeastern Surveying, a State of Florida licensed professional land surveyor. The site survey is provided as Appendix D of this report.

4.3 Quality Assurance/Quality Control

Duplicate, equipment rinsate, and trip blank samples were collected in conjunction with the sampling efforts at the CDR site. Two duplicate samples (CDRSS-1DUP and CDRSB-1DUP) were collected in conjunction with the surface and subsurface soil sampling effort. One equipment rinsate sample (CDRSS-RB1) was collected in conjunction with the soil sampling effort. Three trip blank samples (CDRSS-TB1 through CDRSS-TB3) were shipped with the soil samples.

One duplicate sample (CDRGW-3DUP) and one equipment rinsate blank sample (CDRGW-RB1) were collected in conjunction with the groundwater sampling effort. Two trip blank samples (CDRGW-TB1 and CDRGW-TB2) were shipped by E & E and FDEP in conjunction with the groundwater samples. In addition, Polk County DOH shipped two trip blank samples in conjunction with the private supply well samples.

4.4 Investigation-Derived Waste

All off-site investigation-derived waste (IDW; i.e., soil cutting and cores, purge water, and decontamination fluids) were containerized in one United States Department of Transportation (DOT)-approved 1A-2, 55-gallon steel drums, clearly labeled and staged on site for subsequent disposal.

Table 4-1**SAMPLE LOCATIONS, RATIONALE AND LABORATORY ANALYSIS FOR THE
CALLAWAY DRUM RECYCLING SITE
AUBURNDALE, POLK COUNTY, FLORIDA**

Sample Type	Sample Designation	Sample Location	Rationale	Analytical Method
Soil	CDRSS-1	Surface Soil: Boring location A-2 located in the vicinity of former operations area in the eastern section of the site.	Potential Source Area	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRSS-2	Surface Soil: Boring location C-1 located in the excavated area in the northwest section of the site.	Potential Source Area	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRSS-3	Surface Soil: Boring location C-3 located in the excavated area in the northwest section of the site.	Potential Source Area	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRSS-4	Surface Soil: Boring location B-1 located in the east/central section of the site.	Potential Source Area	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRSS-5	Surface Soil: Boring location BW-1 located near the southwest corner of the Frasier property southwest of the site.	Background (Control) location	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRSS-6	Surface Soil: Boring location TW-1 located on Crouse property northwest of the site.	Potential Impact Area	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRSB-1	Subsurface Soil: Boring location A-2 located in the vicinity of former operations area in the eastern section of the site.	Potential Source Area	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRSB-2	Subsurface Soil: Boring location C-1 located in the excavated area in the northwest section of the site.	Potential Source Area	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRSB-3	Subsurface Soil: Boring location C-3 located in the excavated area in the northwest section of the site.	Potential Source Area	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRSB-4	Subsurface Soil: Boring location B-1 located in the east/central section of the site.	Potential Source Area	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRSB-5	Subsurface Soil: Boring location BW-1 located near the southwest corner of the Frasier property southwest of the site.	Background (Control) location	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide

Table 4-1**SAMPLE LOCATIONS, RATIONALE AND LABORATORY ANALYSIS FOR THE
CALLAWAY DRUM RECYCLING SITE
AUBURNDALE, POLK COUNTY, FLORIDA**

Sample Type	Sample Designation	Sample Location	Rationale	Analytical Method
Soil (cont.)	CDRSB-6	Subsurface Soil: Boring location TW-1 located on Crouse property northwest of the site.	Potential Impact Area	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
Groundwater	CDRGW-1	Groundwater: Boring location A-2 located in the vicinity of former operations area in the eastern section of the site.	Potential Source Area	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRGW-2	Groundwater: Boring location C-1 located in the excavated area in the northwest section of the site.	Potential Source Area	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRGW-3	Groundwater: Boring location C-3 located in the excavated area in the northwest section of the site.	Potential Source Area	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRGW-4	Groundwater: Boring location B-1 located in the east/central section of the site.	Potential Source Area	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRGW-5	Groundwater: Boring location BW-1 located near the southwest corner of the Frasier property southwest of the site.	Background (Control) location	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRGW-6	Groundwater: Boring location TW-1 located on Crouse property northwest of the site.	Potential Impact Area	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRGW-7	Groundwater: Irrigation well located on the Crouse property northwest of the site.	Potential Impact Area	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	Crouse ^a	Groundwater: Irrigation well located on the Crouse property northwest of the site.	Potential Impact Area	VOCs
	Cameron ^a	Groundwater: Supply well located on the Cameron property east of the site.	Potential Impact Area	VOCs
	M & M ^a	Groundwater: Supply well located on the Marquis property (M & M Enterprises) south of the site.	Potential Impact Area	VOCs
	Sparky's ^a	Groundwater: Supply well located at Sparky's Food Store #312 located at the southwest corner of the intersection of Lake Myrtle Drive and Berkley Road (CR655).	Potential Impact Area	VOCs

Table 4-1

**SAMPLE LOCATIONS, RATIONALE AND LABORATORY ANALYSIS FOR THE
CALLAWAY DRUM RECYCLING SITE
AUBURNDALE, POLK COUNTY, FLORIDA**

Sample Type	Sample Designation	Sample Location	Rationale	Analytical Method
Quality Assurance/ Quality Control	CDRSS-RB1	NA	Soil Sampling equipment rinse blank for surface and subsurface soil samples.	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRSS-TB1	NA	Trip Blank for surface and subsurface soil samples collected on 10/01/01.	VOCs
	CDRSS-TB2	NA	Trip Blank for surface and subsurface soil samples collected 10/02/01.	VOCs
	CDRSS-TB3	NA	Trip Blank for surface and subsurface soil samples collected on 10/03/01.	VOCs
	CDRSS-1DUP	Surface Soil: Boring location A-2 located in the vicinity of former operations area in the eastern section of the site.	Duplicate Surface Soil Sample	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRSB-1DUP	Subsurface Soil: Boring location A-2 located in the vicinity of former operations area in the eastern section of the site.	Duplicate Subsurface Soil Sample	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide
	CDRGW-RB1	NA	Groundwater sampling equipment rinse blank	VOCs
	CDRGW-TB1	NA	Trip Blank for groundwater samples collected on 10/04/01.	VOCs
	CDRGW-TB2	NA	Trip Blank for groundwater samples collected on 10/05/01.	VOCs
	Trip Blank ^a (10/03/01)	NA	Trip Blank for groundwater samples collected from supply wells on 10/03/01.	VOCs
	Trip Blank ^a (10/04/01)	NA	Trip Blank for groundwater samples collected from supply wells on 10/04/01.	VOCs
	CDRGW-3DUP	Groundwater: Boring location C-3 located in the excavated area in the northwest section of the site.	Duplicate Groundwater Sample	VOCS, BNAs, Pest/PCBs, Herbicides, Metals, and Cyanide

Table 4-1

**SAMPLE LOCATIONS, RATIONALE AND LABORATORY ANALYSIS FOR THE
CALLAWAY DRUM RECYCLING SITE
AUBURNDALE, POLK COUNTY, FLORIDA**

^a Sampling conducted by Polk County Department of Health (DOH) and analyzed by the DOH laboratory in Jacksonville, Florida.

Key:

BNA = Base, neutral, and acidic extractable organic compounds.
DUP = Duplicate sample.
PCB = Polychlorinated biphenyl.
Pest = Pesticide.
RB = Rinse blank sample.
TB = Trip blank sample.
VOC = Volatile organic compound.

5.1 Results of Previous Investigations

The site file information indicates that previous investigative activities have not been performed at the CDR site. However, EPA conducted an aerial photographic analysis of the site in November 2000 [9].

5.2 Site Investigation Results

The soil and groundwater analytical results¹ for the CDR site are compared to site-specific background concentrations. Based on the analytical data and groundwater flow direction, samples collected from the Frazier property (CDRSS-5, CDRSB-5 and CDRGW-5) were considered as the background samples (see Figure 3, and Tables 5-1 through 5-4). For HRS purposes, three times the background concentration, when the background concentration is above the sample quantitation limit (SQL) for the analyte, is considered a significant exceedence of the background concentration. If the background concentration is below the SQL for the analyte, any detectable concentration of the analyte found in a sample (above the SQL) is considered to significantly exceed the background concentration. Soil and groundwater analytical results are summarized in Tables 5-1, 5-3, and 5-4 respectively. Results that significantly exceed background concentrations are indicated by bolding and shading. Laboratory reports are provided in Appendix C.

¹ The analytical results of the samples collected during the SI were compared to background concentrations in accordance with EPA's Superfund Site Assessment criteria. The soil and groundwater sample concentrations were compared to cleanup target levels contained in Chapter 62-777, Florida Administrative Code (FAC), and the groundwater results were also compared with federal maximum contaminant levels (MCLs) for drinking water supplies and state groundwater standards in Chapter 62-777, FAC. Please note that the levels contained in Chapter 62-777, FAC, only apply as standards to the cleanup or contaminated sites governed by this statute. The federal MCLs are only applicable to drinking water supplies, and the standards in Chapter 62-777, FAC, are only applicable to specific groundwater classifications.

5.2.1 Surface Soil Analytical Results

A summary of surface soil analytical results is presented in Table 5-1. Bolded and shaded cells on the table denote analytes or compounds that were found at concentrations significantly greater than the background concentrations. Soil sampling locations are presented on Figure 2.

Metals and Cyanide. Surface soil samples collected at and in the vicinity of the CDR site during the SI exhibited concentrations of 14 metals greater than the minimum quantitation limit. Calcium, iron, lead, manganese, and zinc were detected in surface soil samples at concentrations significantly exceeding the background concentrations. Elevated concentrations of one or more of these metals were detected in surface soil CDRSS-2 and CDRSS-3. The equipment rinsate blank (CDRSS-RB1) collected in conjunction with the surface soil sampling exhibited trace concentrations of calcium and magnesium. These low concentrations did not affect the overall interpretation of the data.

The highest concentrations of iron (2,550 mg/kg), lead (15.7 mg/kg), manganese (31.0 mg/kg), and zinc (82.4 mg/kg) exceeding background concentrations were detected in surface soil sample CDRSS-3 at levels greater than 3 times the background concentrations. Sample CDRSS-3 was collected from the excavated area located in the northwest section of the site. None of the concentrations of metals detected exceeded the respective soil cleanup target levels (SCTLs).

The highest concentration of calcium (1,500 mg/kg) was detected in surface soil sample CDRSS-2 collected in the vicinity of the former operations area in the east/central section of the site.

Pesticides and PCBs. Pesticides and PCBs were not detected in background sample, CDRSS-5, collected on the Frazier property. Surface soil samples CDRSS-1DUP, and CDRSS-3 exhibited concentrations of pesticides and PCBs at concentrations greater than the SQL.

Alpha-Chlordane (1.7 µg/kg) and gamma-chlordane (1.6 µg/kg) were exhibited by duplicate surface soil sample CDRSS-1DUP, collected in the vicinity of the former operations area in the east/central section of the site.

PCB-1260 (360 µg/kg) was exhibited by surface soil sample CDRSS-3, collected from the excavated area located in the northwest section of the site.

None of the concentrations of Pesticides and PCBs detected in surface soil samples exceeded the respective SCTLs.

Chlorinated Herbicides, and Organonitrogen/Phosphorus Pesticides. Chlorinated herbicides and organonitrogen/phosphorus pesticides were not detected in surface soil samples collected during this field investigation.

Volatile Organic Compounds. Volatile organic compounds were not detected in surface soil sample collected during this field investigation.

Semivolatile Organic Compounds. Semivolatile organic compounds were not detected in the background surface soil sample CDRSS-5. Surface soil samples CDRSS-1, CDRSS-2, and CDRSS-3 exhibited concentrations of SVOCs, including bis(2-ethylhexyl) phthalate, butyl benzyl phthalate, and isophorone at concentrations greater than the SQL.

Bis(2-ethylhexyl) phthalate (1,600 µg/kg) was detected in surface soil sample CDRSS-1, collected in the vicinity of the former operations area in the east/central section of the site. Butyl benzyl phthalate (540 µg/kg) was detected in surface soil sample CDRSS-2, collected from the excavated area located in the northwest section of the site. Both of these concentrations are below the SCTL for residential and industrial exposure and leachability to groundwater.

Surface soil sample CDRSS-3 exhibited a concentration of isophorone (2,500µg/kg) exceeding the SCTL for leachability based on groundwater criteria. Surface soil sample CDRSS-3, was collected from the excavated area located in the northwest section of the site.

5.2.2 Subsurface Soil Analytical Results

A summary of subsurface soil analytical results is presented in Table 5-2. Bolded and shaded cells on the table denote analytes or compounds that were found at concentrations significantly greater than the background concentrations. Sampling locations are presented on Figure 2.

Metals and Cyanide. Subsurface soil samples collected at and in the vicinity of the CDR site during the SI exhibited 15 metals at concentrations greater than the minimum quantitation limit. Barium, beryllium, calcium, iron, lead, magnesium, manganese, potassium, vanadium, and zinc were detected in subsurface soil samples at concentrations significantly exceeding the background concentrations.

The highest concentrations of calcium (900 mg/kg), iron (22,300 mg/kg), lead (9.4 mg/kg), magnesium (44 mg/kg), manganese (135 mg/kg) and zinc (10.8 J mg/kg) exceeding background concentrations were detected in surface soil sample CDRSB-2. The concentrations of iron and magnesium were greater than three times the respective background concentrations. Calcium, lead and manganese were not detected in the background sample. Sample CDRSB-2 was collected from the excavated area located in the northwest section of the site. None of the concentrations of metals detected exceeded the respective SCTLs.

The highest concentrations of barium (8.38 mg/kg), and beryllium (0.064 mg/kg) were detected in subsurface soil sample CDRSB-1DUP, collected in the vicinity of the former operations area in the east/central section of the site. This concentration of barium is greater than three times the background concentration. Beryllium was not detected in the background sample.

The highest concentrations of potassium (37 mg/kg), and vanadium (5.63 J mg/kg) were detected in subsurface soil sample CDRSB-4, collected in the east/central section of the site. This concentration of vanadium is greater than three times the background concentration. Potassium was not detected in the background sample.

Pesticides and PCBs. Pesticides and PCBs were not detected in the background sample, CDRSB-5, collected on the Frasier property. Surface soil samples CDRSB-2 and CDRSS-3 exhibited concentrations of pesticides and PCBs at concentrations greater than the SQL. Gamma-Chlordane (1.7 µg/kg) was detected surface soil sample CDRSB-2 collected from boring C-1 in the northwest section of the site.

PCB-1260 was detected by subsurface soil samples CDRSB-2 and CDRSB-3. The highest concentration of PCB-1260 was exhibited by CDRSB-3 (180 µg/kg) collected from boring C-3 in the northwest section of the site.

None of the concentrations of Pesticides and PCBs detected in subsurface soil samples exceeded the respective SCTLs.

Chlorinated Herbicides, and Organonitrogen/Phosphorus Pesticides. Chlorinated herbicides and organonitrogen/phosphorus pesticides were not detected in subsurface soil samples collected during this field investigation.

Volatile Organic Compounds. Volatile organic compounds were not detected in subsurface soil samples collected during this field investigation.

Semivolatile Organic Compounds. Semivolatile organic compounds were not detected in the background surface soil sample CDRSB-5. Subsurface soil samples CDRSB-1, CDRSB-1DUP, CDRSB-2, CDRSB-3 and CDRSB-4 exhibited SVOCs at concentrations greater than the SQL.

The highest concentration of and butyl benzyl phthalate (590 µg/kg) was exhibited by duplicate subsurface soil samples CDRSB-1DUP collected in the vicinity of the former operations area.

Subsurface soil sample CDRSB-3 exhibited the highest concentration of isophorone (300 µg/kg). Surface soil sample CDRSB-3, was collected in the northwest section of the site.

None of the concentrations of SVOCs detected in subsurface soil samples exceeded the respective SCTLs.

5.2.3 Groundwater Field Parameters

Table 5-3 presents the pH, specific conductance, temperature, and turbidity values recorded for the groundwater samples collected during the October 2001 PA/SI field investigation. The pH

values for the samples ranged from 4.31 to 5.95 standard international (SI) units. All groundwater samples collected from monitoring wells exhibited a pH values below the Florida SDWS (6.5 to 8.5 SI units). Generally, the surficial aquifer in Polk county is considered to be moderately to highly acidic [32]. Specific conductance readings for the samples ranged from 47 micromhos/cm ($\mu\text{mhos/cm}$) to 1,150 $\mu\text{mhos/cm}$. The temperature readings ranged from 24.1 degrees Celsius ($^{\circ}\text{C}$) to 26.1 $^{\circ}\text{C}$. The turbidity values ranged from 1.74 Nephelometric Turbidity Units (NTUs) to 9.27 NTUs.

5.2.4 Groundwater Analytical Results

Table 5-4 summarizes the groundwater analytical results for samples collected from monitoring wells at the CDR site and private wells in the site vicinity. Shaded cells on the table denote compounds that were found at concentrations significantly greater than the background concentration. All groundwater analytical results were compared to the analytical results for background groundwater sample CDRGW-5 and to state and federal drinking water standards.

Metals and Cyanide. Groundwater samples collected at and in the vicinity of the CDR site during the SI exhibited concentrations of 19 metals greater than the minimum quantitation limit. Boron, chromium, iron, magnesium, manganese, potassium, sodium, vanadium, and zinc were detected in groundwater samples at concentrations significantly exceeding the background concentrations. Aluminum was detected in six (CDRGW-2 through CDRGW-7) of the seven groundwater samples at concentrations greater than the SQL. These concentrations ranged from 2,040 $\mu\text{g/l}$ to 7, 570 $\mu\text{g/l}$, exceeding the federal and state secondary drinking water standards of 50-200 $\mu\text{g/l}$ and 200 $\mu\text{g/l}$, respectively.

The highest concentrations of iron (7,360 $\mu\text{g/l}$), manganese (194 $\mu\text{g/l}$), and vanadium (33.3 $\mu\text{g/l}$) were detected in the duplicate groundwater sample CDRGW-3DUP. Sample CDRGW-3DUP was collected from monitoring well C-3 in the northwest section of the site. The concentrations of iron, manganese, and vanadium were greater than three times the respective background concentration. In addition, the concentrations of iron and exceeded the respective federal and state secondary drinking water standards (SDWS) of 300 $\mu\text{g/l}$ and 50 $\mu\text{g/l}$.

The highest concentrations of boron (717 $\mu\text{g/l}$), magnesium (5.5 mg/l), potassium (5.5 mg/l) and sodium (150 mg/l) were detected in the groundwater sample CDRGW-2. The concentrations of magnesium, potassium and sodium were greater than three times the respective background concentration exhibited by sample CDRGW-5. Boron was not detected in the background sample. Sample CDRGW-2 was collected from monitoring well C-1 in the northwest section of the site.

The highest concentration of chromium (7.9 A µg/l) was detected in groundwater sample CDRGW-4, collected in the east/central section of the site. The concentrations of chromium exhibited in groundwater samples did not exceed the federal or state drinking water standards.

The highest concentration of zinc (66 µg/l) was detected in groundwater sample CDRGW-7, collected from the irrigation well (IW-1) located on the Crouse property northwest of the site. The presence of zinc in a groundwater sample collected from an irrigation well may be attributable to the structure of the well.

Pesticides and PCBs. Pesticides and PCBs were not detected in groundwater samples collected from monitoring wells or the Crouse irrigation well (IW-1).

Chlorinated Herbicides, and Organonitrogen/Phosphorus Pesticides. Chlorinated herbicides and organonitrogen/phosphorus were not detected in groundwater samples collected from monitoring wells or the Crouse irrigation well (IW-1).

Volatile Organic Compounds. The background groundwater sample CDRGW-5 did not exhibit any detectable concentrations of VOCs. Concentrations of VOCs were detected in groundwater samples CDRGW-1 (monitoring well A-2), CDRGW-2 (monitoring well C-1), CDRGW-3 (monitoring well C-3), CDRGW-3DUP (monitoring well C-3), CDRGW-6 (monitoring well TW-1), CDRGW-7 (irrigation well IW-1), and Crouse (irrigation well IW-1). VOCs significantly exceeding background included chloroform, ethylbenzene, tetrachloroethene, toluene, trichloroethene, and xylenes.

Groundwater sample CDRGW-1, collected from monitoring well A-2, exhibited the highest concentration of tetrachloroethene (PCE; 7,300 µg/l), exceeding the federal and state primary drinking water standards (PDWS) of 5 µg/l and 3 µg/l, respectively. Monitoring well A-2 is located in the vicinity of the former operations area in the east/central section of the site.

The highest concentrations of ethylbenzene (1,300 µg/l), toluene (3,300 µg/l), and total xylenes (8,000 µg/l) were exhibited by groundwater sample CDRGW-3, collected from monitoring well C-3 located in the excavated area in the northwest section of the site. The concentration of ethylbenzene and toluene exhibited by groundwater sample exceeded the federal and state PDWS of 700 µg/l and 100 µg/l, respectively. The concentration of xylenes exceeded the state groundwater guidance concentration of 20 µg/l.

Chloroform (7.3 µg/l) was detected in groundwater sample CDRGW-6 collected from temporary monitoring well TW-1 installed on the Crouse property northwest of the site. This concentration exceeds the Florida groundwater guidance concentration for chloroform of 6 µg/l.

Trichloroethene (TCE; 0.52 µg/l) was detected in the groundwater sample collected by Polk DOH from the Crouse irrigation well (IW-1) located northwest of the site. The groundwater sample (CDRGW-7) collected by FDEP and E & E from Crouse irrigation well exhibited a similar concentration (0.32 I µg/l), quantified below the SQL. These concentrations did not exceed the federal or state PDWS for TCE of 5 µg/l and 3µg/l, respectively.

Semivolatile Organic Compounds. The background groundwater sample CDRGW-5 did not exhibit any detectable concentrations of SVOCs. Concentrations of four SVOCs were detected in groundwater samples collected from one monitoring well on the CDR site. Isophorone and naphthalene were detected in groundwater samples CDRGW-3DUP (93 µg/l and 33µg/l) and CDRGW-3 (79 µg/l and 35 µg/l) collected from monitoring well C-3. These concentrations exceeded the respective state groundwater guidance concentrations of 40 µg/l and 6.8 µg/l.

5.2.5 Hydrologic Assessment

On October 5, 2001, depth-to-water measurements were recorded in the newly installed monitoring wells (see Table 5-3). Depth-to-water measurements in the monitoring wells ranged from 4.18 to 8.85- feet below top of casing (BTOC), and groundwater elevations ranged from 143.12 feet NGVD to 144.15 feet NGVD. These measurements indicate that groundwater flow in surficial aquifer across the site was generally north to northwesterly, at the time of the field investigation (see Figure 3).

5.3 Quality Assurance/Quality Control

Two duplicate samples, one sampling equipment rinsate blank, and three trip blank samples were collected in conjunction with the surface and subsurface soil sampling activities at the CDR site. The analytical results for the duplicate surface soil sample (CDRSS-1DUP) and duplicate subsurface soil sample (CDRSB-1DUP) were generally comparable to those of the original samples (CDRSS-1 and CDRSB-1). The surface and subsurface soil sampling equipment rinse blank (CDRSS-RB) exhibited trace concentrations of two metals (calcium and magnesium). These trace concentrations were below the SQL and did not affect the interpretation of the data. The trip blanks (CDRSS-TB1, CDRSS-TB2 and CDRSS-TB3) prepared in conjunction with the surface and subsurface soil sampling did not exhibit any concentrations of VOCs.

One duplicate sample, one sampling equipment rinsate sample, and two trip blank samples were collected in conjunction with the groundwater sampling activities conducted by E & E and FDEP at the CDR site. In addition, two trip blank samples were collected in conjunction with the

groundwater sampling at private supply wells conducted by Polk County DOH. The analytical results of the duplicate sample (CDRGW-3DUP) were comparable to the results of the original sample (CDRGW-3). None of the trip blanks or the equipment rinse blank collected in conjunction with groundwater sampling activities at the CDR site exhibited concentrations of target compounds or analytes.

Table 5-1
SUMMARY OF SURFACE SOIL AND QA/QC ANALYTICAL RESULTS
CALLAWAY DRUM RECYCLING SITE
AUBURNDALE, POLK COUNTY, FLORIDA
(October, 2001)

	Soil Cleanup Target Levels (Chapter 62-777)			Sample Identification						
Parameter	Residential Direct Exposure	Industrial Direct Exposure	Leachability Based on Groundwater Criteria	CDRSS-1 (A-2)	CDRSS-1 (DUP) (A-2)	CDRSS-2 (C-1)	CDRSS-3 (C-3)	CDRSS-4 (B-1)	CDRSS-5 ^a (BW-1)	CDRSS-6 (TW-1)
Metals and Cyanide (mg/kg)										
Aluminum	72,000	*	**	1,360	1,840	970 J	800 J	720 J	680 AJ	1,390 J
Barium	110 ^d	87,000	1,600	3.51 A	5.54	2.35	4.99	2.57 J	1.85 AJ	4.73
Beryllium	120	800	63	--	--	--	--	--	0.049 U	--
Cadmium	75 ^d	1,300	8	--	--	--	--	--	0.30 U	--
Calcium	NL	NL	NL	--	180 I	1,500	550 I	220 I	180 I	--
Chromium	210	420	38	2.0 I	2.3	1.4 I	2.3	1.1 I	1.3 I	1.4 I
Copper	110 ^d	76,000	**	--	--	3.1 I	4.7	--	5.4 A	1.7 I
Iron	23,000	480,000	**	454 A	582	457	2,550	295	615 A	432
Lead	400	920	**	2.6 I	3.0 I	4.0	15.7	4.0	2.2 I	1.0 I
Magnesium	NL	NL	NL	21 I	35	43	27 I	26 I	27 I	23 I
Manganese	1,600	22,000	**	3.8 A	4.4	18.9	31.0	1.5	5.1 A	3.4
Mercury	3.4	26	2.1	0.011 I	0.012 I	0.0095 I	0.035	0.0059 I	0.0079 I	0.013
Potassium	NL	NL	NL	9.5 I	13 I	29 J	13 I	21	11 I	17 I
Vanadium	15 ^d	7,400	980	0.44 I	0.61	1.36	0.75	0.38 I	0.94 AJ	0.55 I
Zinc	23,000	560,000	6,000	2.6 I	3.6 I	11.4 J	82.4	2.7 I	4.1 A	1.3 I
Pesticides/PCBs (µg/kg)										
Alpha-Chlordane	3,100 ^b	12,000 ^b	9,6000 ^b	1.3 I	1.7	--	0.62 I	--	0.35 U	--

See key at end of table.

Table 5-1
SUMMARY OF SURFACE SOIL AND QA/QC ANALYTICAL RESULTS
CALLAWAY DRUM RECYCLING SITE
AUBURNDALE, POLK COUNTY, FLORIDA
(October, 2001)

	Soil Cleanup Target Levels (Chapter 62-777)			Sample Identification						
Parameter	Residential Direct Exposure	Industrial Direct Exposure	Leachability Based on Groundwater Criteria	CDRSS-1 (A-2)	CDRSS-1 (DUP) (A-2)	CDRSS-2 (C-1)	CDRSS-3 (C-3)	CDRSS-4 (B-1)	CDRSS-5 ^a (BW-1)	CDRSS-6 (TW-1)
Gamma-Chlordane	3,100 ^b	12,000 ^b	9,6000 ^b	1.3 I	1.6	--	1.4 I	--	0.35 U	--
PCB-1260	500	2,100	170,000	--	--	--	360	--	10 U	--
Chlorinated Herbicides (µg/kg)										
None Detected										
Organonitrogen/Phosphorus Pesticides(µg/kg)										
None Detected										
Volatile Organic Compounds (µg/kg)										
None Detected										
Semi-Volatile Organic Compounds (µg/kg)										
bis(2-Ethylhexyl) phthalate	76,000	280,000	36,000,000	1,600	1,400 I	990 I	770 I	--	380 U	--
Butyl benzyl phthalate	15,000,000	320,000,000	3,100,000	570 I	620 I	540	--	--	350 U	--
Isophorone	340,000	580,000	2,000	--	--	--	2,500	--	63 U	--

See key at end of table.

Table 5-1 SUMMARY OF SURFACE SOIL AND QA/QC ANALYTICAL RESULTS CALLAWAY DRUM RECYCLING SITE AUBURNDALE, POLK COUNTY, FLORIDA (October, 2001)							
	Soil Cleanup Target Levels (Chapter 62-777)			Sample Identification			
Parameter	Residential Direct Exposure	Industrial Direct Exposure	Leachability Based on Groundwater Criteria	CDRSS-RB1 ^c	CDRSS-TB1 ^c	CDRSS-TB2 ^c	CDRSS-TB3 ^c
Metals and Cyanide (mg/kg)							
Aluminum	72,000	*	**	--	--	--	--
Barium	110 ^d	87,000	1,600	--	--	--	--
Beryllium	120	800	63	--	--	--	--
Cadmium	75 ^d	1,300	8	--	--	--	--
Calcium	NL	NL	NL	0.65 I	--	--	--
Chromium	210	420	38	--	--	--	--
Copper	110 ^d	76,000	**	--	--	--	--
Iron	23,000	480,000	**	--	--	--	--
Lead	400	920	**	--	--	--	--
Magnesium	NL	NL	NL	0.039 I	--	--	--
Manganese	1,600	22,000	**	--	--	--	--
Mercury	3.4	26	2.1	--	--	--	--
Potassium	NL	NL	NL	--	--	--	--
Vanadium	15 ^d	7,400	980	--	--	--	--
Zinc	23,000	560,000	6,000	--	--	--	--

See key at end of table.

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Table 5-1 SUMMARY OF SURFACE SOIL AND QA/QC ANALYTICAL RESULTS CALLAWAY DRUM RECYCLING SITE AUBURNDALE, POLK COUNTY, FLORIDA (October, 2001)							
	Soil Cleanup Target Levels (Chapter 62-777)			Sample Identification			
Parameter	Residential Direct Exposure	Industrial Direct Exposure	Leachability Based on Groundwater Criteria	CDRSS-RB1 ^c	CDRSS-TB1 ^c	CDRSS-TB2 ^c	CDRSS-TB3 ^c
Pesticides/PCBs (µg/kg)							
Alpha-Chlordane	3,100 ^b	12,000 ^b	9,6000 ^b	--	NA	NA	NA
Gamma-Chlordane	3,100 ^b	12,000 ^b	9,6000 ^b	--	NA	NA	NA
PCB-1260	500	2,100	170,000	--	NA	NA	NA
Chlorinated Herbicides (µg/kg)							
None Detected					NA	NA	NA
Organonitrogen/Phosphorus Pesticides(µg/kg)							
None Detected					NA	NA	NA
Volatile Organic Compounds (µg/kg)							
None Detected					NA	NA	NA
Semi-Volatile Organic Compounds (µg/kg)							
bis(2-Ethylhexyl) phthalate	76,000	280,000	36,000,000	--	NA	NA	NA
Butyl benzyl phthalate	15,000,000	320,000,000	3,100,000	--	NA	NA	NA
Isophorone	340,000	580,000	2,000	--	NA	NA	NA

See key at end of table.

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Table 5-1
SUMMARY OF SURFACE SOIL AND QA/QC ANALYTICAL RESULTS
CALLAWAY DRUM RECYCLING SITE
AUBURNDALE, POLK COUNTY, FLORIDA
(October, 2001)

Notes:

- ^a Background sample. Note: All surface soil samples (CDRSS-1 through CDRSS-4, and CDRSS-6) are compared to background soil sample CDRSS-5.
- ^b The SCTLs reported for alpha and gamma chlordane reflect total chlordane SCTLs.
- ^c Rinsate and trip blank analytical results are presented in mg/L or µg/L, as appropriate.
- ^d Direct exposure value based on acute toxicity considerations.

Key:

- * = Contaminant is not a health concern for this exposure scenario.
- ** = Use site-specific leachability values; no established SCTL.
- = Material was analyzed for but not detected.

Shaded bold text = Significantly above background. Concentration is greater than three times the corresponding background concentration, or the analyte is present at a concentration above the minimum quantitation limit and was not detected in the background sample above the quantitation limit.

- A = Value reported is the mean of two or more determinations.
- DUP = Duplicate sample.
- I = Value reported is less than the minimum quantitation limit and greater than or equal to the minimum detection limit.
- J = Estimated value.
- mg/kg = Milligrams per kilogram.
- NA = Not analyzed
- .NL = No soil cleanup target level (SCTL).
- µg/kg = Micrograms per kilogram.
- U = Material was analyzed for but not detected; the value reported is the minimum detection limit.
- SCTL = Soil cleanup target level.

Table 5-2
SUMMARY OF SUBSURFACE SOIL RESULTS
CALLAWAY DRUM RECYCLING SITE
AUBURNDALE, POLK COUNTY, FLORIDA
(October, 2001)

	Soil Cleanup Target Levels (Chapter 62-777)			Sample Identification						
Parameter	Residential Direct Exposure	Industrial Direct Exposure	Leachability Based on Groundwater Criteria	CDRSB-1 (A-2)	CDRSB-1 (DUP) (A-2)	CDRSB-2 (C-1)	CDRSB-3 (C-3)	CDRSB-4 (B-1)	CDRSB-5 ^a (BW-1)	CDRSB-6 (TW-1)
Metals and Cyanide (mg/kg)										
Aluminum	72,000	*	**	2,100	2,270 J	1,110 J	1,680	1,420	1,250 J	870 J
Barium	110 ^d	87,000	1,600	8.15	8.38	4.71	5.08 J	3.39 J	1.31 J	4.70 J
Beryllium	120	800	63	0.062	0.064	--	--	--	0.049 U	--
Cadmium	75 ^d	1,300	8	--	--	1.1 I	--	--	0.29 U	--
Calcium	NL	NL	NL	--	--	900	290 I	470 I	170 U	--
Chromium	210	420	38	3.7	4.3	2.4	1.5 I	3.2	0.90 I	0.94 I
Copper	110 ^d	76,000	**	--	--	3.2 I	--	--	0.98 U	--
Iron	23,000	480,000	**	308	309	22,300	568	789	94	177
Lead	400	920	**	2.0 I	1.7 I	9.4	2.0 I	1.3 I	0.78 U	--
Magnesium	NL	NL	NL	25 I	28 I	44	31 I	35	9.8 I	18 I
Manganese	1,600	22,000	**	0.61	0.53	135	4.5	0.36 I	0.38 I	0.79
Mercury	3.4	26	2.1	0.011 I	0.011 I	0.0097 I	0.0085 I	0.019 I	0.0080 I	--
Potassium	NL	NL	NL	14 I	15 I	36 J	13 I	37	4.9 U	8.4 I
Vanadium	15 ^d	7,400	980	2.37	3.27	0.91	0.40 I	5.63 J	0.30 I	0.41 I
Zinc	23,000	560,000	6,000	--	--	10.8 J	7.3	--	0.98 U	--
Pesticides/PCBs (µg/kg)										
alpha-Chlordane	3,100 ^b	12,000 ^b	9,6000 ^b	0.93 I	1.1 I	--	--	--	0.40 U	--
gamma-Chlordane	3,100 ^b	12,000 ^b	9,6000 ^b	0.96 I	1.1 I	1.7	0.63 I	--	0.40 U	--

Table 5-2
SUMMARY OF SUBSURFACE SOIL RESULTS
CALLAWAY DRUM RECYCLING SITE
AUBURNDALE, POLK COUNTY, FLORIDA
(October, 2001)

	Soil Cleanup Target Levels (Chapter 62-777)			Sample Identification						
Parameter	Residential Direct Exposure	Industrial Direct Exposure	Leachability Based on Groundwater Criteria	CDRSB-1 (A-2)	CDRSB-1 (DUP) (A-2)	CDRSB-2 (C-1)	CDRSB-3 (C-3)	CDRSB-4 (B-1)	CDRSB-5 ^a (BW-1)	CDRSB-6 (TW-1)
PCB-1260	500	2,100	170,000	--	--	79	180	--	12 U	--
Chlorinated Herbicides (µg/kg)										
None Detected										
Organonitrogen/Phosphorus Pesticides(µg/kg)										
None Detected										
Volatile Organic Compounds (µg/kg)										
None Detected										
Semi-Volatile Organic Compounds (µg/kg)										
bis(2-Ethylhexyl) phthalate	76,000	280,000	36,000,000	1,200 I	1,200 I	850 I	--	530 I	430 U	--
Butyl benzyl phthalate	15,000,000	320,000,000	3,100,000	530	590	520	--	370	350 U	--
Isophorone	340,000	580,000	2,000	--	--	--	300	--	71 U	--

<p style="text-align: center;">Table 5-2 SUMMARY OF SUBSURFACE SOIL RESULTS CALLAWAY DRUM RECYCLING SITE AUBURNDALE, POLK COUNTY, FLORIDA (October, 2001)</p>
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QA/QC analytical results for subsurface soils are presented on Table 5-1.

Notes:

- a Background sample. Note: All surface soil samples (WFSS-02, etc.) are compared to background soil sample WFSS-01.
- b The SCTLs reported for alpha and gamma chlordane reflect total chlordane SCTLs.
- c Rinsate and trip blank analytical results are presented in mg/L or µg/L, as appropriate.
- d Direct exposure value based on acute toxicity considerations.

Key:

- = Material was analyzed for but not detected.
- Shaded bold text** = Significantly above background. Concentration is greater than three times the corresponding background concentration, or the analyte is present at a concentration above the minimum quantitation limit and was not detected in the background sample above the quantitation limit.
- A = Value reported is the mean of two or more determinations.
- DUP = Duplicate sample
- I = Value reported is less than the minimum quantitation limit and greater than or equal to the minimum detection limit.
- SCTL = Soil cleanup target level.
- J = Estimated value.
- U = Material was analyzed for but not detected; The value reported is the minimum detection limit.

Table 5-3
MONITORING WELL CONSTRUCTION, WATER LEVEL, AND GROUNDWATER
FIELD PARAMETER DATA
CALLAWAY DRUM RECYCLING SITE
AUBURNDALE, POLK COUNTY, FLORIDA

Well Construction Data				Water Level Data (October 5, 2001)			Groundwater Field Parameters (October 4 and 5, 2001)			
Monitoring Well	Well Diameter (inches)	Well Depth (feet BGS) ^a	Screened Interval (feet BGS) ^a	Top of Casing Elevation (feet)	Depth to Water (feet BTOC)	Water Level Elevation (feet)	pH (SI units)	Specific Conductance (µmhos/cm)	Temperature (C)	Turbidity (NTUs)
BW-1 ^b (CDRGW-5)	0.75	12	2-12	148.33	4.18	144.15	4.81	109	26.1	9.68
TW-1 ^c (CDRGW-6)	0.75	14	4-14	148.68	5.50	143.18	4.31	741	24.1	7.38
IW-1 ^d (CDRGW-7)	0.75	23	NA	NA	NA	NA	5.71	81	25.1	2.86
A2 ^e (CDRGW-1)	0.75	14.5	4.5-14.5	152.24	8.85	143.39	5.50	47	25.8	1.74
B1 ^e (CDRGW-4)	0.75	14.5	4.5-14.5	150.44	6.99	143.45	5.34	412	24.7	5.34
C1 ^e (CDRGW-2)	0.75	10	5-10	148.30	5.11	143.19	5.95	1,150	24.1	5.11
C3 ^e (CDRGW-3)	0.75	10	5-10	149.17	6.05	143.12	5.35	378	24.5	9.27

Table 5-3
MONITORING WELL CONSTRUCTION, WATER LEVEL, AND GROUNDWATER
FIELD PARAMETER DATA
CALLAWAY DRUM RECYCLING SITE
AUBURNDALE, POLK COUNTY, FLORIDA

^a approximate depth (feet BGS).

^b flush-mounted monitoring well.

^c temporary monitoring well.

^d irrigation well, water level data was not collected due to in-place plumbing.

^e above-ground monitoring well.

Key:

BGS = Below Ground Surface.

BTOC = Below Top of Casing.

NA = Not Available.

Table 5-4
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
CALLAWAY DRUM RECYCLING SITE
AUBURNDALE, POLK COUNTY, FLORIDA
(October 2001)

Parameter	Applicable Standard(s)	CDRGW-1 (A-2)	CDRGW-2 (C-1)	CDRGW-3 (C-3)	CDRGW-3(DUP) (C-3)	CDRGW-4 (B-1)	CDRGW-5 ^g (BW-1)	CDRGW-6 (TW-1)	CDRGW-7 (IW-1)	Crouse ^g (IW-1)
Metals and Cyanide (µg/L)										
Aluminum	50-200 ^a , 200 ^b	150 I	2,040	2,300	2,350	2,010	3,290	7,570	--	NA
Arsenic	500 ^{c,d}	4.0 I	--	--	--	3.1 I	3.0 U	--	--	NA
Barium	2,000 ^{c,d}	--	34	20	21	20 A	14		--	NA
Beryllium	4 ^{c,d}	--	--	--	--	--	0.15 U	0.26 I	--	NA
Boron	NS	27 I	717	185	189	350 A	25 U	--	126	NA
Cadmium	5 ^d	--	--	--	--	1.0 I	0.75 U	--	--	NA
Calcium (mg/L)	NS	0.48 I	47	26.8	27.6	18.1 J	9.53	4.28 J	---	NA
Chromium	100 ^{c,d}	--	4.0	7.4	7.2	7.9 A	2.3 I	6.7	--	NA
Cobalt	NS	--	--	--	--	--	0.75 U	1.4 I	--	NA
Copper	1,000 ^{a,b}	--	--	--	3.3 I	--	2.5 U	--	70.8	NA
Iron	300 ^{a,b}	4,690	4,850	7,180	7,360	1,810 A	1,130	2,280	43 I	NA
Magnesium (mg/L)	NS	1.3	5.5	4.6	4.7	4.7	1.3	4.9	0.16	NA
Manganese	50 ^{a,b}	27.7	162	189	194	114 A	41.9	36.4	--	NA
Molybdenum	NS, 35 ^f	--	--	--	--	2.4 I	1.5 U	--	--	NA
Nickel	100 ^{c,d}	--	4.6 I	2.4 I	2.5 I	--	2.9 I	3.3 I	--	NA
Potassium (mg/L)	NS	0.64	40	9.8	10	14.9	0.28	0.62	4.4	NA
Sodium (mg/L)	NS ^c , 160 ^d	1.89	150	18.5	19	21.1	3.36	137	11.1	NA
Vanadium	49 ^f	--	7.2	32.3	33.3	2.1 I	1.9 I	1.4 I	9.9	NA
Zinc	5,000 ^{a,b}	6.0 I	15 I	12 I	13 I	9.1 I	7.4 I	7.2 I	66	NA
Pesticide/PCBs (ug/L)										
None Detected	--	--	--	--	--	--	--	--	--	NA
Chlorinated Herbicides (ug/L)										
None Detected	--	--	--	--	--	--	--	--	--	NA

See key at end of table.

Table 5-4
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
CALLAWAY DRUM RECYCLING SITE
AUBURNDALE, POLK COUNTY, FLORIDA
(October 2001)

Parameter	Applicable Standard(s)	CDRGW-1 (A-2)	CDRGW-2 (C-1)	CDRGW-3 (C-3)	CDRGW-3(DUP) (C-3)	CDRGW-4 (B-1)	CDRGW-5 ^g (BW-1)	CDRGW-6 (TW-1)	CDRGW-7 (IW-1)	Crouse ^g (IW-1)
Organonitrogen/Phosphorus Pesticides (ug/L)										
None Detected	--	--	--	--	--	--	--	--	--	NA
Volatile Organic Compounds (ug/L)										
Benzene	5 ^c , 1 ^d	--	0.56 I	--	--	--	0.50 U	--	--	--
Bromodichloromethane	100 ^c , 0.6 ^f , 80 ^e	--	--	--	--	--	0.20 U	0.72 I	--	--
Chloroform	100 ^c , 6 ^f , 80 ^e	--	--	--	--	--	0.20 U	7.3	--	--
cis-1,2-Dichloroethene	70 ^{c,d}	--	0.22 I	--	--	--	0.20 U	--	--	--
Ethylbenzene	700 ^{c,d} , 30 ^b	--	--	1,300	1,200	--	0.50 U	--	--	0.16 I
Methylene chloride	5 ^{c,d}	--	--	--	--	--	0.50 U	--	--	0.32 I
Tetrachloroethene	5 ^c , 3 ^d	7,300	--	--	--	--	0.20 U	--	--	--
Toluene	1,000 ^{c,d} , 40 ^b	--	--	3,300	2,500	--	0.50 U	--	--	--
Trichloroethene	5 ^c , 3 ^d	--	--	--	--	--	0.20 U	--	0.32 I	0.52
1,3,5-Trimethylbenzene	60 ^f	NA	NA	NA	NA	NA	NA	NA	NA	0.30 I
o-Xylene	NS	--	--	2,300	2,100	--	0.50 U	--	--	--
m,p-Xylene	NS	--	--	5,700	5,000	--	0.50 U	--	--	--
Xylenes (Total)	10,000 ^{c,d} , 20 ^f	--	--	8,000	7,100	--		--	--	--
Semi-Volatile Organic Compounds (ug/L)										
m,p-Cresols	35 ^f	--	4.5 I	--	--	--	1.9 U	--	--	NA
Isophorone	40 ^f	--	--	79	93	--	0.95 U	--	--	NA
Naphthalene	6.8 ^f	1.3 I	--	35	33	--	0.95 U	--	--	NA
2,4-Dimethylphenol	400 ^f	--	--	67 I	88 I	--	48 U	--	--	NA

See key at end of table.

Table 5-4
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
CALLAWAY DRUM RECYCLING SITE
AUBURNDALE, POLK COUNTY, FLORIDA
(October 2001)

Parameter	Applicable Standard(s)	Cameron ^g	M & M ^g	Sparkys ^g	CDRGW-RB1	CDRGW-TB1	CDRGW-TB2	Trip Blank ^g (10/3/01)	Trip Blank ^g (10/04/01)
Metals and Cyanide (µg/L)									
Aluminum	50-200 ^a , 200 ^b	NA	NA	NA	--	NA	NA	NA	NA
Arsenic	500 ^{c,d}	NA	NA	NA	--	NA	NA	NA	NA
Barium	2,000 ^{c,d}	NA	NA	NA	--	NA	NA	NA	NA
Beryllium	4 ^{c,d}	NA	NA	NA	--	NA	NA	NA	NA
Boron	NS	NA	NA	NA	--	NA	NA	NA	NA
Cadmium	5 ^d	NA	NA	NA	--	NA	NA	NA	NA
Calcium (mg/L)	NS	NA	NA	NA	--	NA	NA	NA	NA
Chromium	100 ^{c,d}	NA	NA	NA	--	NA	NA	NA	NA
Cobalt	NS	NA	NA	NA	--	NA	NA	NA	NA
Copper	1,000 ^{a,b}	NA	NA	NA	--	NA	NA	NA	NA
Iron	300 ^{a,b}	NA	NA	NA	--	NA	NA	NA	NA
Magnesium (mg/L)	NS	NA	NA	NA	--	NA	NA	NA	NA
Manganese	50 ^{a,b}	NA	NA	NA	--	NA	NA	NA	NA
Molybdenum	NS, 35 ^f	NA	NA	NA	--	NA	NA	NA	NA
Nickel	100 ^{c,d}	NA	NA	NA	--	NA	NA	NA	NA
Potassium (mg/L)	NS	NA	NA	NA	--	NA	NA	NA	NA
Sodium (mg/L)	NS ^c , 160 ^d	NA	NA	NA	--	NA	NA	NA	NA
Vanadium	49 ^f	NA	NA	NA	--	NA	NA	NA	NA
Zinc	5,000 ^{a,b}	NA	NA	NA	--	NA	NA	NA	NA
Pesticide/PCBs (ug/L)									
None Detected	--	NA	NA	NA	--	NA	NA	NA	NA
Chlorinated Herbicides (ug/L)									
None Detected	--	NA	NA	NA	--	NA	NA	NA	NA

See key at end of table.

Table 5-4
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
CALLAWAY DRUM RECYCLING SITE
AUBURNDALE, POLK COUNTY, FLORIDA
(October 2001)

Parameter	Applicable Standard(s)	Cameron ^g	M & M ^g	Sparkys ^g	CDRGW-RB1	CDRGW-TB1	CDRGW-TB2	Trip Blank ^g (10/3/01)	Trip Blank ^g (10/04/01)
Organonitrogen/Phosphorus Pesticides (ug/L)									
None Detected	--	NA	NA	NA	--	NA	NA	NA	NA
Volatile Organic Compounds (ug/L)									
Benzene	5 ^c , 1 ^d	--	--	--	--	--	--	--	--
Bromodichloromethane	100 ^c , 0.6 ^f , 80 ^e	--	--	--	--	--	--	--	--
Chloroform	100 ^c , 6 ^f , 80 ^e	--	--	--	--	--	--	--	--
cis-1,2-Dichloroethene	70 ^{c,d}	--	--	--	--	--	--	--	--
Ethylbenzene	700 ^c , 30 ^b	--	--	--	--	--	--	--	--
Methylene chloride	5 ^{c,d}	--	--	--	--	--	--	--	--
Tetrachloroethene	5 ^c , 3 ^d	--	--	--	--	--	--	--	--
Toluene	1,000 ^{c,d} , 40 ^b	--	--	--	--	--	--	--	--
Trichloroethene	5 ^c , 3 ^d	--	--	--	--	--	--	--	--
1,3,5-Trimethylbenzene	60 ^f	--	--	--	--	--	--	--	--
o-Xylene	NS	--	--	--	--	--	--	--	--
m,p-Xylene	NS	--	--	--	--	--	--	--	--
Xylenes (Total)	10,000 ^{c,d} , 20 ^f	--	--	--	--	--	--	--	--
Semi-Volatile Organic Compounds (ug/L)									
m,p-Cresols	35 ^f	NA	NA	NA	--	NA	NA	NA	NA
Isophorone	40 ^f	NA	NA	NA	--	NA	NA	NA	NA
Naphthalene	6.8 ^f	NA	NA	NA	--	NA	NA	NA	NA
2,4-Dimethylphenol	400 ^f	NA	NA	NA	--	NA	NA	NA	NA

See key at end of table.

Table 5-4
SUMMARY OF GROUNDWATER ANALYTICAL RESULTS
CALLAWAY DRUM RECYCLING SITE
AUBURNDALE, POLK COUNTY, FLORIDA
(October 2001)

Notes:

Unless otherwise noted, results are in micrograms per liter (Φ g/L).

^a Federal Secondary Drinking Water Standard.

^b State of Florida Secondary Drinking Water Standard.

^c Federal Primary Drinking Water Standard.

^d State of Florida Primary Drinking Water Standard.

^e Total for trihalomethanes cannot exceed 80 Φ g/L.

^f FDEP groundwater guidance concentrations.

^g Samples collected by Polk County Department of Health

Key:

^g Background sample. Note. All groundwater samples are compared to background sample CDRGW-5.

Shaded bold text = Significantly above background. Concentration is greater than three times the corresponding background concentration or the analyte is present at a concentration above the minimum quantitation limit and was not detected in the background sample above the sample quantitation limit.

-- = Material was analyzed for but not detected; the value reported is the minimum detection limit.

I = Value reported is less than the minimum quantitation limit and greater than or equal to the minimum detection limit.

mg/L = Milligrams per liter.

NA = Not analyzed.

NS = No Standard.

Φ g/L = Micrograms per liter.

See key at end of table.

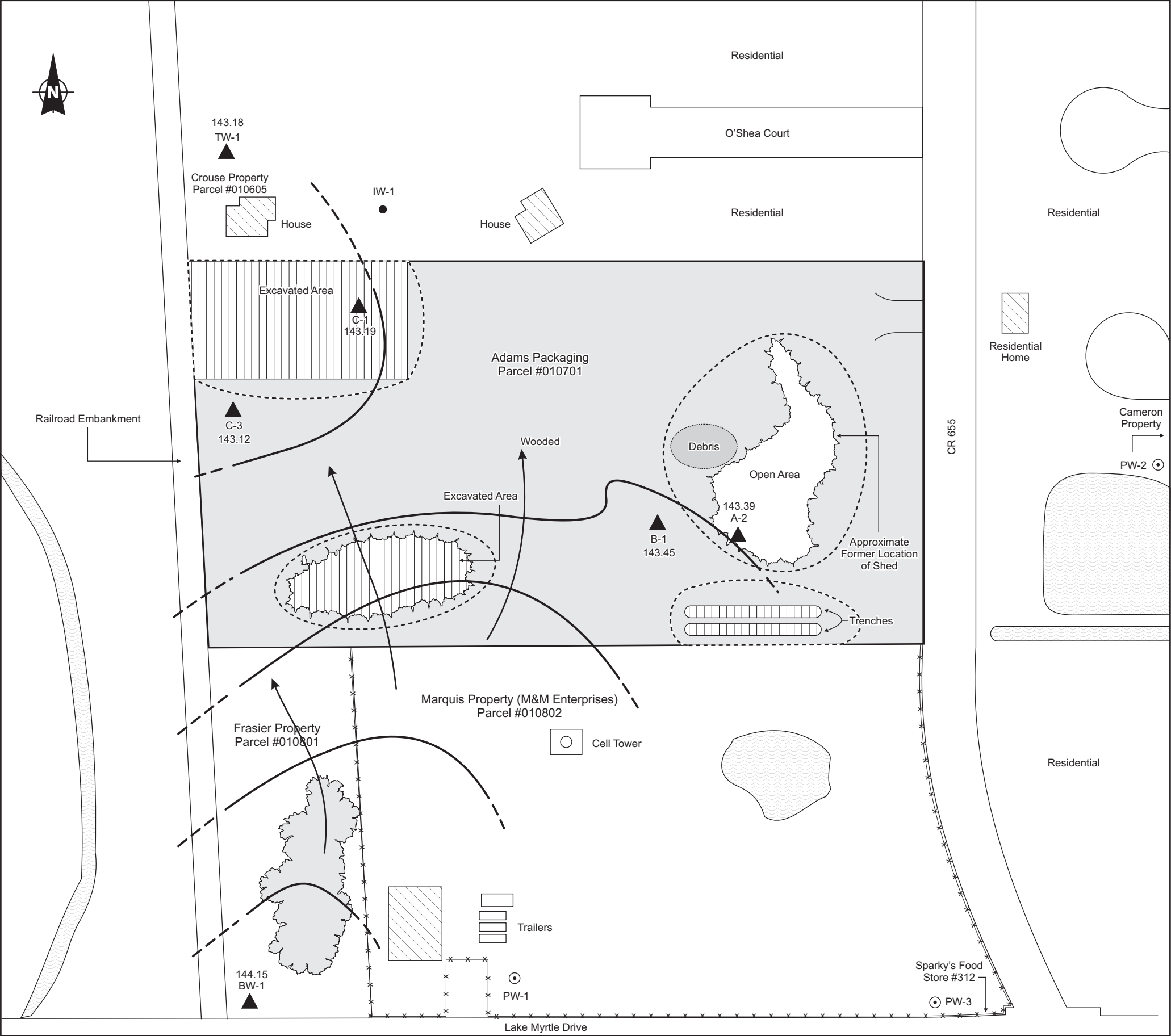


Figure 3 **SHALLOW ZONE WATER LEVEL ELEVATION ISOPLETH (OCTOBER 5, 2001) -- CALLAWAY DRUM RECYCLING, AUBURDALE, POLK COUNTY, FLORIDA**

6.1 Groundwater Pathway

The groundwater migration pathway is of concern at the CDR site. Monitoring wells were installed in the surficial aquifer during the PA/SI field investigation. Groundwater samples collected during the field investigation exhibited concentrations of contaminants exceeding background levels, and federal and state PDWSs and SDWSs. The federal and state PDWSs for ethylbenzene, tetrachloroethene, and toluene, and the federal and state SDWSs for iron and manganese were exceeded by groundwater samples collected during the field investigation. In addition, groundwater samples exhibited concentrations of chloroform, xylenes, isophorone, and naphthalene at concentrations exceeding respective Florida groundwater guidance concentrations.

Available site information indicates that a drum recycling facility operated on the CDR site during the 1970s. The source and contents of the drums received at the facility are not known. However, based on review of the Lake Alfred facility that was subsequently operated by Callaway and Sons, and interviews with former employees, drums labeled as caustic and corrosive, and solvents may have been received at the CDR site and their remaining contents poured onto the ground surface.

Six monitoring wells were installed in the surficial aquifer during the PA/SI field investigation. Based on water levels collected from these locations, groundwater flow direction in the surficial aquifer, at the time of the PA/SI, was north and northwest. Two groundwater samples collected from the irrigation well at the Crouse residence, northwest of the site, exhibited trace concentrations of TCE, a degradation product of PCE. Groundwater samples were collected from private supply wells located south and east of the site. These wells did not exhibit any detectable concentrations of VOCs.

The potential target population may be limited, as the surficial aquifer is not used as a potable water source in the area. According to available potable well information, approximately 40,361 people are serviced by Floridan aquifer wells within 4-miles of the CDR site [16, 17]. However, the

Floridan aquifer, the primary source of potable water in the vicinity, is recharged by infiltration from the overlying aquifers. No groundwater samples were collected from the intermediate and Floridan aquifers on the site during the PA/SI fieldwork.

6.2 Surface Water Pathway

The surface water pathway does not appear to be of concern at the CDR site. Based on surface topography, historical earth moving activities, soil type, and vegetation, it appears that surface water runoff is contained within the site or directed to a closed basin on the Marquis property.

6.3 Soil Migration Pathway

The soil exposure pathway is of limited concern at the CDR site. Surface soil samples collected during the PA/SI field investigation exhibited concentrations of metals, pesticides, PCBs, and SVOCs that exceeded background concentrations. None of the contaminant concentrations exhibited by surface soil samples exceeded the respective SCTLs for residential direct exposure.

The future land use map for Polk County indicates that the CDR site is zoned as a commercial enclave [4]. The adjacent areas to the north and east are zoned as residential [4]. The population database search indicates that 170 people reside within 0.25-miles and 24,909 people within 4-miles of the CDR site. However, based on the contaminant concentrations and dense vegetation, there is minimal potential for air-borne exposure. In addition, observations during the PA/SI suggest minimal use of the property.

6.4 Air Migration Pathway

Sampling of the air migration pathway was not included in the scope of the PA/SI field investigation. Surface soil samples collected during the field investigation exhibited concentration of metals, pesticides, PCBs, and SVOCs that exceeded background concentrations. However, all concentrations were below the respective SCTL for residential direct exposure. Furthermore, the property is well vegetated, which limits the potential for dust and windborne contamination. Therefore, the air migration pathway does not appear to be of concern.

A drum recycling facility operated at the CDR site during the 1970s. Activities at the CDR site have apparently resulted in the contamination of the surface soil, subsurface soil, and the surficial aquifer at the site.

Surficial aquifer groundwater samples collected from beneath the site exhibited concentrations of metals, VOCs, and SVOCs exceeding background levels and applicable drinking water standards. Groundwater samples collected from two monitoring wells (A-2 and C-3; see Figure 2) exhibited concentrations of VOCs, including ethylbenzene, PCE, and toluene, in excess of the respective PDWSs. In addition, groundwater samples collected from the Crouse property irrigation well northwest of the site exhibited trace concentrations of TCE, a degradation product of PCE, suggesting the potential for off-site migration of groundwater contaminants. The surficial aquifer is not used as potable water source in Polk County, however, approximately 40,361 people use the deeper Floridan aquifer within 4 miles of the CDR site as a potable water source. The surficial aquifer is used for irrigation and livestock in the area.

Surface and subsurface soil samples collected at the CDR site exhibited concentrations of metals, pesticides, PCBs, and SVOCs exceeding background levels. None of the concentrations of contaminants exceeded the SCTL for residential direct exposure. However, one SVOC (isophorone) was detected in surface soil sample CDRSS-3 at a concentration exceeding the SCTL for leachability based on groundwater criteria. Isophorone was detected in co-located groundwater sample CDRGW-3.

Drum recycling operations at the CDR site have apparently resulted in contamination of groundwater, surface soil, and subsurface soil on the CDR site and potentially groundwater northwest of the site. The results of this PA/SI indicate further CERCLA action is warranted at the CDR site.

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Florida Professional Geologist Seal

I hereby affix my seal to this Preliminary Assessment/Site Inspection Report for Callaway Drum Recycling Site, Auburndale, Polk County, Florida, in accordance with Chapter 492 of the Florida Statutes and applicable rules and regulations developed pursuant thereto:

Name: Dan W. Foss

License Number: 1387

State: Florida

Expiration Date: July 31, 2002

Dan W. Foss

Date

APPENDIX A
Photographic Documentation Log

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7/17/01 Southwest. Former Reconditioning/Operational area in eastern section of site.



7/17/01 South. Excavated swale in northwest section of site.



7/17/01 West. Pallets and other debris observed in vicinity of boring A1.



7/17/01 West-Northwest. Drum debris observed in swale in southeast section of site.



10/1/01 East-Northeast. Boring F12 located centrally in cleared area of former reconditioning/operation area.



10/1/01 Northeast. Geoprobe drill rig at location B2.



10/5/01 West-Northwest. Monitoring well C3. Drums and other debris observed on ground near well location.



10/5/01. Drums and other debris observed in the vicinity of boring C2.

APPENDIX B
Lithologic Logs, Well Construction Details and Field Screening Data

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APPENDIX C
Laboratory Analytical Data

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APPENDIX D

Site Survey

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