FORMER NIKE CL-59 LAUNCH AREA
PARMA, CUYAHOGA COUNTY, OHIO

DERP FUDS PROJECT NUMBER G05OH005301

SITE INSPECTION

Final
Revision 0

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LIST OF ACRONYMS

ASTM	American Society of Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	Below ground surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CLP	Contract Laboratory Program
COPCs	Constituents of Potential Concern
DQCR	Daily Quality Control Report
EM	Engineer Manual
FSP	Field Sampling Plan
GSA	General Services Administration
HEW	Department of Health, Education and Welfare
HHB	Headquarters and Headquarters Battery
HSA	Hollow stem auger
ICBM	Intercontinental ballistic missile
ID	Inside diameter
IDW	Investigation derived waste
IRFNA	Inhibited red fuming nitric acid
LCT	Launch control trailer
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
mm	Millimeter
MS	Matrix Spike
MSD	Matrix Spike Duplicate
MSL	Mean sea level
MTR	Missile tracking radar
OAC	Ohio Administrative Code
ODNR	Ohio Department of Natural Resources
OEPA	Ohio Environmental Protection Agency
PA	Preliminary Assessment
PAH	Polycyclic aromatic hydrocarbon
PCB	Polychlorinated biphenyl
PID	Photoionization detector
PLEXUS	Plexus Scientific Corporation
PRG	Preliminary remediation goal
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
SALT	Strategic Arms Limitation Talks
SI	Site Inspection
SVOC	Semivolatile organic compound
TAL	Target Analyte List
TCL	Target Compound List
TTR	Target tracking radar
UDMH	Unsymmetrical dimethyl hydrazine
µg	Microgram

USACE	U.S. Army Corps of Engineers
USCS	Unified Soil Classification System
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
UST	Underground storage tank
VA	Veterans Administration
VOC	Volatile organic compound

EXECUTIVE SUMMARY

The former Nike Site CL-59 Launch Area is located at the entrance of the Cuyahoga Community College off of West Pleasant Valley Road within the City of Parma, Cuyahoga County, Ohio. The Launch Area also extends to the west of the community college into Nike Park. The CL-59 Launch Area consisted of three underground missile magazines, Barracks, Missile Assembly and Test Building, Generator Building, and Acid Fueling Station. The site housed only Nike Ajax Missiles.

Former Nike Missile Site CL-59 was activated in July 1956 and was deactivated in 1961. After deactivation, the site was briefly used to support Army Reserve training and other Army activities. Cuyahoga Community College later acquired the property and demolished the western most of the three underground Nike missile magazines in 1972. In the late 1970's, the other two missile magazines were filled in with soil from an unknown source. The other structures at the Launch Area were demolished as part of the school development.

As part of this investigation, eight surface and twenty-two subsurface soil samples were collected during the field activities. Six of the eight borings were installed at locations of former Nike site structures, where activities may have impacted environmental quality at the site. One groundwater sample was collected from an open borehole adjacent to the eastern most missile magazine to give an indication of groundwater quality in the area. Groundwater did not accumulate in any other borehole. Two borings were in areas of ground disturbance identified from historic aerial photographs during the PA.

No volatile organic compounds exceeded the U.S. Environmental Protection Agency (USEPA) Region 9 Preliminary Remediation Goals (PRGs). Polychlorinated biphenyls (PCBs) were not detected in either soils or the groundwater sample. The groundwater sample was analyzed for pesticides and none were detected.

The greatest number and concentrations of polycyclic aromatic hydrocarbons (PAH) in soil were at or near the ground surface on the south and east portions of the site. Three PAHs were detected in surface soils above PRGs and none of the subsurface soil samples exceed PAH PRGs. It is unknown if the detected PAHs are related to past Nike activities or are related to the urban setting. Two metals (arsenic and iron) were detected in both surface and subsurface soils above PRGs. Arsenic exceeded PRGs in all samples. The arsenic and iron levels may reflect natural levels present in the soils of Ohio, past activities in the area, or a combination of the two.

Two PAHs, a phthalate, arsenic, and thallium exceed the Region 9 PRG for tap water. The one PAH (benzo(a)pyrene) for which there is a Maximum Contaminant Level (MCL) was just below the limit and thallium exceeded the MCL. The detections may not accurately represent groundwater conditions, as the sample was highly turbid. Groundwater is not used for potable purposes within a one-mile radius of the site and its use between one and four miles from the site is likely to be limited as the area is served by municipal water systems.

It is possible that storm water or wind could transport contaminated surface soil from the site but as the Launch Area is well vegetated it is unlikely that this is a significant migration pathway. Surface water is not used for potable purposes along the surface water migration pathway.

The former Launch Area is currently used as an open space buffer between the college buildings and the neighborhood. The potential for exposure to contaminants in surface soils or fugitive dust is somewhat mitigated as the area is well vegetated and not heavily used.

1. Introduction

The United States Army Corps of Engineers (USACE), Louisville District tasked Plexus Scientific Corporation (Plexus) (Contract Number DACA27-98-D-0031, Delivery Order 0005), to conduct a Preliminary Assessment (PA) and Site Inspection (SI) at the Former Nike Missile Site CL-59 property. The PA addressed both the Launch and Control areas of the property and the SI addresses only the former Launch Area. The Launch Area is in Parma, Cuyahoga County, Ohio. The PA was conducted to determine if there are any unidentified disposal areas related to past military use of the site. This Launch Area SI involved on-site sampling and will be used to determine the presence or absence of contamination related to historical use of the site. The investigation results were qualitatively evaluated against the U.S. Environmental Protection Agency (USEPA) Region 9 Preliminary Remedial Goals (PRGs) (USEPA, 2000b) in conjunction with historic information to determine the need for additional phases of investigation.

The SI field activities were conducted and this report has been prepared in conformance with the requirements contained in the USEPA Region 5 Model Quality Assurance Project Plan (USEPA, undated), the USEPA *Guidance for Conducting Site Inspections Under CERCLA* (USEPA, 1992) the USACE Engineer Manual (EM) 200-1-3, *Requirements for the Preparation of Sampling and Analysis Plans* (USACE, 2001), and the sampling and analysis plans developed for this project (Plexus, 2001a).

2. Site Description

2.1 Location

The former Nike Site CL-59 Launch Area is located at the entrance of the Cuyahoga Community College off of West Pleasant Valley Road within the City of Parma, Cuyahoga County, Ohio (Figure 2-1). The Launch Area also extends to the west of the community college into Nike Park. The geographic coordinates of the site are 41° 21' 49.4" north latitude and 81° 45' 56.9" west longitude (USGS, 1963a). To reach the Launch Area, take State Route 71 to Bagley Road east, which becomes West Pleasant Valley Road. The Control Area located in the City of Parma Heights is approximately ½ mile northwest of the Launch Area and is now known as Nathan Hale Park (USGS, 1963a; Sebesta & Associates, 1998). The geographic coordinates of the Control Area are 41° 22' 12" north latitude and 81° 46' 34" west longitude (USGS, 1963a). This SI addresses only the Launch Area.

2.2 Site Description

The former Launch Area lies on the property of Cuyahoga Community College and the City of Parma. The site is bordered to the north by the college, to the west by Nike Park, by residential areas to the south and a commercial area to the east (USGS, 1963a; Sebesta & Associates, 1998; Plexus, 2001b). The fenced portion of the Launch Area was approximately 22 acres, which was utilized for the storage, maintenance, refueling, and launching of missiles. The Launch Area is currently being used as open area, roads and parking for the community college (Plexus, 2001b).

Only four buildings relating to the Nike site activity still remain. They are a former Nike Maintenance Building located about 1800 feet west of the former Launch Area, and a guardhouse, administrative building and motor pool building in the Control Area. The maintenance building is in Nike Park and is in use by the City of Parma Service Department (Sebesta & Associates, 1998; USGS, 1963a).

Presently, the entrance road to the college off Pleasant Valley Road is about 400 feet west of the former entrance road to the Launch Area and the college entrance crosses the former Launch Area (Plexus, 2001b; USGS, 1963a; Sebesta & Associates, 1998). The former Nike Site Launch Area is well vegetated with little evidence of the facility. There are some scattered areas where pavement presumably from the site is visible (Plexus, 2001b).

2.3 Operational History and Waste Characteristics

2.3.1 Nike Site CL-59 History

Former Nike Missile Site CL-59 was activated in July 1956 and deactivated in 1961 (Lonnquest and Winkler, 1996; Morgan and Berhow, 1996). After deactivation, the site was briefly used to support Army Reserve training and other Army activities (Genetti, 1992).

The units assigned to the site were the Headquarters and Headquarters Battery (HHB) of the 351st Army and Battery B of the 351st Army from July 1956 through September 1958. From

September 1958 through August 1961, the assigned units were the HHB and Battery B both of the 1st Battalion of the 68th Army (Morgan and Berhow, 1996).

The Army acquired 187.2 acres in fee and 12.8 acres by permit from the Veterans Administration (VA) by letter transfer in 1957. On August 29, 1960, 0.69 acres were excessed to the General Services Administration (GSA), which disposed of the property to the City of Parma on October 27, 1961 for use as a fire station. On January 2, 1968, 186.51 acres were reported excess to GSA. On July 22, 1969, 11.4121 acres that had been assigned to the Department of Health, Education, and Welfare (HEW) for disposal were transferred to the Parma City Board of Education. On January 19, 1971, HEW transferred 57.641 acres to the Board of Trustees of the Cuyahoga Community College District. On April 22, 1971, the Secretary of the Interior transferred two adjacent tracts to the cities of Parma (92.5681 acres) and Parma Heights (124.8905 acres). These properties became Nike Memorial Park and Nathan Hale Memorial Park, respectively (Genetti, 1992). The discrepancy between the start of operations and the date when the Army acquired the property could not be resolved at the time of this report.

The Nike CL-59 Launch Area was built south of Crile General Hospital. The hospital was built in 1943 and in 1946 the hospital was transferred to the newly created VA. The Crile Hospital was closed in 1964. Cuyahoga Community College was created in 1965 and moved into the vacated Crile Hospital facility (Sebesta & Associates, 1998). The Nike CL-59 Launch Area was not constructed on any area actively utilized by the hospital and thus the hospital property is not addressed by this study.

The CL-59 Launch Area had three underground missile magazines (Lonnquest and Winkler, 1996). One was a design modified to handle both Ajax and Hercules missiles and was 49 feet long by 60 feet wide. The other two magazines were designed for the Ajax missile only, and were 42 feet long and 63 feet wide. Both types of magazine had the capability of launching a missile from the elevator (Morgan and Berhow, 1996; Lonnquest and Winkler, 1996; Carlson et. al., 1996). The site was equipped with 30 Ajax Missiles and 12 Ajax type launchers (Morgan and Berhow, 1996; Lonnquest and Winkler, 1996). Ajax Missiles had a solid fueled booster, a liquid fueled sustainer motor, and a three high-explosive warheads (Carlson et. al., 1996). Other structures at the Launch Area included Barracks, Missile Assembly and Test Building, Generator Building, and Acid Fueling Station (Figure 2-2)(Sebesta & Associates, 1998; Carlson et al., 1996).

Cuyahoga Community College demolished some of Crile Hospital to make room for new buildings in 1972. During the hospital demolition, the western most of the three underground Nike missile magazines was also demolished. In the late 1970's, the other two missile magazines were filled in with soil from an unknown source (Madison, 1972; Sebesta & Associates, 1998; USACE, 2000). The buildings at the Launch Area were demolished as part of the school development. The college never used either the missile magazines or any other Launch Area building (USACE, 2000). The college has no records available to indicate if any tanks were removed as part of the demolition or if any contamination was encountered. During the PA site visit, a handheld magnetometer (Schonstedt Magnetic Locator, Model GA-52Cx) was used and no evidence of any remaining underground storage tanks (USTs) was found (Plexus, 2001a).

The Parma City Engineer's office reported that their records do not indicate whether the site was served by the municipal sewer system. However, the sewer line on West Pleasant Valley Road was installed in the 1920s or 1930s and it is likely that the site was connected to the sewer system (Wangler, 2001).

A veteran who served in the CL-59 Launch Area was interviewed. According to the interviewee, the site was well kept and "housekeeping" practices were good. He reported that the missiles were cleaned with alcohol. He believes that the scarring evident in the aerial photographs was related to construction of the berms around the Acid Fueling Station. Although he believes there were USTs on site, he did not know where they were located. He described the maintenance building in Nike Park as being used by the ordnance maintenance crew (Rigney, 2001).

Analysis of aerial photographs was conducted as part of the PA. The two ground scars were identified on the northern portions of the site. Scar 1 has a crescent-shaped configuration and is located north of what is presumed to be a Missile Assembly and Test Building. This scar measures approximately 200 feet long (east to west extremes) and approximately 60 feet wide at its greatest width. A faintly visible linear feature runs from the corner of a concrete and asphalt pad on the west side of the building to ground scar #1. The scarred area shows no evidence of being caused by vehicular activity. The second scar (#2) is situated north of the missile magazines and east of the Acid Fueling Station in an open, grass-covered field. This scar exhibits a generally mottled, disturbed appearance; evidence of vehicular activity is also noted. A portion of this area appears to be mounded and darker in appearance. Vegetative cover that differs from the surrounding grass-covered grounds may be the cause of this darkened condition. This roughly circular scar occupies and area estimated to measure approximately 50 feet in diameter (Plexus, 2001c). An overlay of the former Launch Area features on a 1994 orthophoto quadrangle is presented as Figure 2-3.

2.3.2 Background of Nike Missile Installations

Nike missiles provided the last line of defense for the U.S. population and its industrial centers against advancing technology in air warfare. The U.S. Army built the first Nike missile batteries in 1953. This effort produced three generations of Nike missiles, Nike Ajax, Nike Hercules, and Nike Zeus (Carlson et. al., 1996). Former Nike Site CL-59 housed only the Nike Ajax missiles (Morgan and Berhow, 1996; Lonnquest and Winkler, 1996).

Nike Ajax missiles used a two-stage propulsion system. The first stage was a solid-fuel booster, which would separate and fall away after the first 2.5 seconds of ignition. The second stage of propulsion consisted of a liquid-fuel sustainer motor. The Ajax weighed over 2,455 pounds, had a speed of Mach 2.3, and a range of 30 miles (Carlson et. al., 1996).

The booster motor was a cast double-base propellant monolith. The propellant contained nitroglycerine and nitrocellulose with burn modifiers and stabilizers distributed in a plastic matrix (Davie, 2000). The liquid-fuel sustainer motor used unsymmetrical dimethylhydrazine (UDMH) or aniline/furfuryl alcohol as the starting mixture. The fuel was a mixture of JP-4 and UDMH with inhibited red fuming nitric acid (IRFNA) acting as an oxidizer. The liquids for the sustainer motor were shipped to the site in drums with the missile (Army, 1958; Carlson et. al.,

1996). The Nike Ajax carried three high explosive warheads mounted in the nose, center and aft sections of the missile. The warheads weighed 12, 179, and 122 pounds, respectively (Carlson et. al., 1996).

The Nike system was created in response to Russian efforts to design and deploy long-range bombers. However, fearing that their manned aircraft would be too vulnerable to attack by American interceptor aircraft, the Russians focused on developing Intercontinental Ballistic Missiles (ICBMs) against which there existed no effective defense (Bender, 1999). In response the Nike Zeus, the final Nike Missile, was developed with the goal of intercepting ICBMs. After limited success during testing and development, the system was terminated in 1963 without ever being produced or deployed (Carlson et. al., 1996).

The shifting nature of the Soviet threat meant that the air defense role, for which Nike was originally intended, became relatively less critical as time passed. Accordingly, beginning in the mid-1960s, the total number of operational Nike bases within the continental U.S. was steadily reduced on an almost annual basis (Bender, 1999).

The 1972 signing of the Strategic Arms Limitation Talks (SALT I) treaty limited the number of missiles with Anti-Ballistic Missile capabilities including the Nike Hercules. In 1974, the remaining U.S. sites in the Nike air defense system were inactivated. Shortly thereafter, the Army Air Defense Command, which administered the system, was dissolved (Bender, 1999).

2.3.3 Nike Site Launch Area Layout and Waste Characterization

The buildings and structures on a typical Nike base were organized into two geographically separate areas: the Integrated Fire Control Area (Control Area) and the Launch Area. Occasionally, a there was also a third area for housing. The Control and Launch areas were separated by between 0.5 and 3.5 miles. Control Areas were typically constructed on high ground to improve radar coverage of the area and were usually located between the area being defended and the Launch Area (Bender, 1999; Carlson et. al., 1996).

The Control Area contained the ground-based radar and computer systems designed to detect and track incoming enemy aircraft and to guide the missiles to their target (Bender, 1999; Carlson et. al., 1996). The Control Area also contained housing, administration buildings, mess halls, barracks, and recreation facilities (Carlson et. al., 1996).

The Launch Area contained a Launch Control Trailer, Missile Test and Assembly Building, Underground Storage Magazines and Launcher-Loader Assemblies, and a Generator Building (Carlson et. al., 1996). At CL-59, there was also a barracks at the Launch Area (See Section 2.3.1). The missiles were stored horizontally in heavily fortified underground magazines. An elevator brought the missiles to the surface where site personnel would manually push the missiles along rails to the launchers. The missiles were then attached to the launchers, which were erected to a near-vertical position for firing. The near-vertical firing position was used to ensure that the missile's booster would not land on the missile site when spent, but would land within a predetermined "impact area" (Bender, 1999).

Four operations were carried out in the Launch Area that potentially resulted in contamination. These operations are: missile assembly and disassembly, missile warheading, missile maintenance and testing, and general launcher and magazine maintenance. Based on previous studies at Nike facilities, wastes potentially present on-site include solvents, diesel fuel, hydraulic fluid, oils and lubricants. Solvents were used for cleaning and degreasing. Fuels were stored for electric power generation. Fuel tanks were typically buried underground. Lead and chromium may also be present on-site. Possible contaminant sources include washout sumps, leaching fields, underground fuel storage tanks, miscellaneous disposal or release areas (Law, 1986), and surface discharge from buildings. Some sites had seepage systems that probably consisted of drainage tiles and/or seepage pits for disposal of wastes such as material collected in the magazine sumps. The construction of the seepage system varied from site to site depending on local conditions and in some cases sump discharges were directed to surface water drainages (Law, 1986).

Nike Missile sites across the Nation utilized standardized buildings and structures. These buildings served the same purpose from site to site; a characterization of the waste produced and a correlation to nearby buildings is possible. Although there were some variations, most buildings were one-story structures with cinder-block walls and slanted metal roofs. Also, Nike Missiles were designed to be mobile and much of the equipment designed to control the missiles and radars was housed in trailers that had been adapted for use at permanent facilities. Many bases also had their own water treatment and sewage facilities, which might include wells, pump houses, sewage lagoons, holding tanks, and/or septic tanks (Carlson et. al., 1996). It is important to note that the numbers of buildings and the structure types did vary from base to base and the following building descriptions are generalized.

The various missile components were assembled, maintained, and prepared for firing in the Launch Area. The majority of routine maintenance and testing activities for the missiles to assure they were flight ready were conducted here. However, missiles were periodically returned to the Battalion support shop for more extensive maintenance and testing (Law, 1986). The following provide generic descriptions of the facilities at CL-59.

Launch Control Trailer (LCT): This trailer contained the launching control panel, the launching control switchboard, and test responder. The controls, displays, and communication equipment required to supervise and monitor the launching sections during an engagement were on the control panel. This trailer functioned as the relay station and control center between the Launch and Control Areas (McMaster et al, 1984; Carlson et. al., 1996). Law (1986) did not identify any environmental concerns associated with this structure.

Missile Test and Assembly Building: Large, cinder block building with two large garage-like doors, one at each end of the building, for rolling the missiles in and out of the building. Missiles were assembled and tested in these buildings before warhead assembly. Older Nike sites that handled the Nike Ajax had a concrete walkway connecting the Missile Test and Assembly Building to the Acid Fueling Station (Carlson et. al., 1996). Ethylene oxide used in the missile accessory power supply system was both reactive and volatile and would not be persistent in the environment. Missile assembly and maintenance involved the use of various solvents, anticorrosion products, and paints as the missiles were assembled and disassembled.

The buildings were typically equipped with a full-length drainage system. In most cases, the drainage system was gravity fed and discharged to a small seepage pit or a small system consisting of perforated tile. The construction of the seepage system varied from site to site depending on local conditions and in some cases sump discharges may have been directed to surface water drainages (Law, 1986).

Acid Fueling Station: Only used at bases with Nike Ajax missiles, this consisted of a concrete slab with two mounds and two small depressions. A hoist and platform were used to lift a cask of IRFNA fuel above the missile and allow it to gravity feed into the missile sustainer prior to its mating with the booster. This operation was performed on a concrete walkway surrounded by an eight to ten foot high earthen berm (Carlson et. al., 1996). IRFNA was both reactive and volatile and would not be persistent in the environment (Law, 1986).

Acid Storage Shed: A small metal storage shed with a nearby emergency shower in case of accidental contact with the dangerous chemicals and fuels. This shed was located near the Acid Fueling Station. Law (1986) did not identify any environmental concerns associated with this structure.

Underground Storage Magazines and Launchers: Underground magazines were standard and were commonly found in groups of three. Each underground magazine had an associated launch pad and large elevator doors that opened downwards. The underground magazines had a large elevator to carry missiles to the surface (Carlson et. al., 1996). The hydraulic system for each elevator had oil tanks and sumps with a capacity of 271 to 311 gallons (Army, 1959). The launching control cabinet was located in a room in the magazine (or in a revetment in above ground installations) and contained the necessary controls, indicators, and communications facilities to allow the launching section to control the preparation and firing of its missiles. The cabinet was also used to coordinate the activities of the launching section with the launching control panel operator in the launching control trailer (McMaster et al, 1984).

The magazines typically had a floor drainage system that permitted waste materials to be washed to a central sump under the missile elevator. A pump would deliver the water and waste to a seepage system or ground surface. Solvents, paints, and hydraulic fluid were routinely washed into the sump. Volatile organics (benzene, carbon tetrachloride, tetrachloroethylene, toluene, 1,1,1-trichloroethane, 1,1,2-trichloroethane, trichloroethene) were used in the cleaning and maintenance of the missiles (Law, 1986). A CL-59 Launch Area worker reported that they used alcohol to clean the missiles (Rigney, 2001).

Kennel: Small, metal buildings surrounded by chain link and barbed wire fence. Housed the dogs that were an important part of a Nike base's security (Carlson et. al., 1996). Law (1986) did not identify any environmental concerns associated with this structure. The kennel may not have been present at Ajax installations.

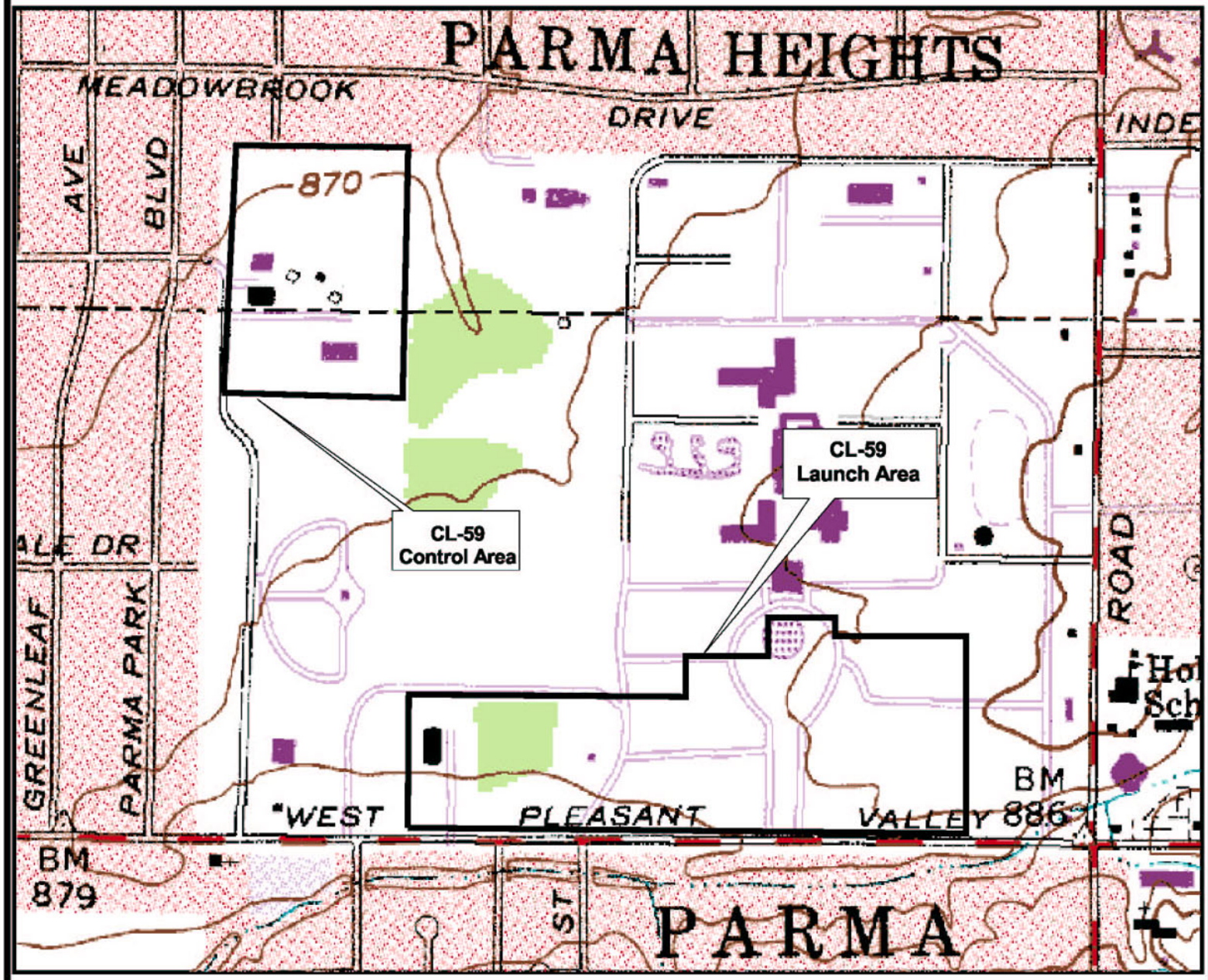
Generator Building: Housed diesel-driven generators that powered the elevators and launch area equipment when commercial power was unavailable. Transformers were mounted on a concrete pad adjacent to the building and diesel fuel for the generators was stored in either aboveground storage tanks or in USTs near the generator buildings (Carlson et. al., 1996).

Environmental concerns associated with the generator building relate to the storage of fuel for the generators and the possible use of polychlorinated biphenyls (PCBs) in the transformers at the building (Law, 1986).

2.4 Previous Environmental Investigations

A PA covering both the Launch and Control Areas of former Nike Site CL-59 was completed on behalf of USACE in 2001 (Plexus, 2001c). The findings of the PA relating to the Launch Area are presented in the background information above and were utilized in determining the sampling locations and analytical suite for this SI.

In 1998, a Limited Phase I Environmental Site Assessment of the land formerly occupied by the Crile VA Hospital and Nike Site CL-59 was conducted for Cuyahoga Community College. The assessment concluded that "there is no evidence that the site may have been extensively contaminated by the operation of either Crile Hospital or the Nike Missile Site but there is some potential for localized environmental impairments directly associated with specific work and research operations including the use of degreasers and solvents, operations related to petroleum underground storage tanks and hydraulic elevators, battery maintenance operations and incinerator ash disposal [incinerator was associated with hospital operations]." The report recommended that documents be reviewed to determine the status of all underground and aboveground storage tanks that may have been located at the site. If documents could not confirm the removal of all underground storage tanks from the site, the report recommended that a magnetometer survey, soil borings and other site assessment studies be conducted to locate the tanks and measure any site-related contamination (Sebesta & Associates, 1998).



400 0 400 800 1200 1600 2000 Feet

Source: 7.5 MINUTE QUADRANGLE BEREA, OHIO, 1963 (PHOTOREVISED, 1984).

FIGURE 2-1
SITE LOCATION MAP

FORMER NIKE MISSILE
SITE CL-59

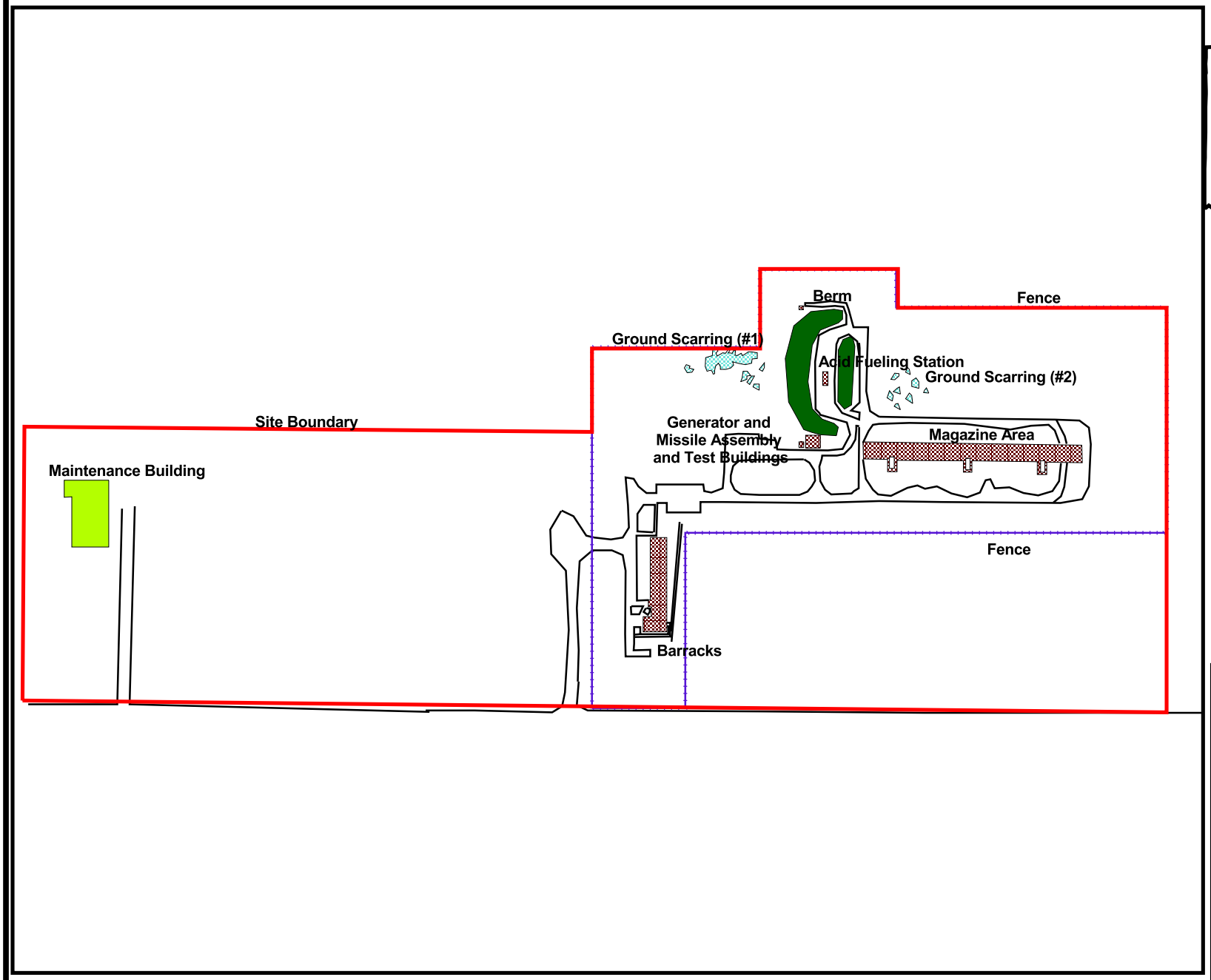
PARMA, CUYAHOGA COUNTY OHIO

U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

PLEXUS

PROJECT NO. 0032-005R

FILE NO. CL-59.APR



N

Legend

- Demolished Structures
- Existing buildings
- Launch Area Boundary

200 0 200 400 Feet

Source: Sebesta & Associates, Inc.,1998; USGS Digital Orthophoto Quadrangle (DOQ) Data, Berea,1994; Aerial Photography, May 3, 1962

FIGURE 2-2
SITE LAYOUT

FORMER NIKE MISSILE
SITE CL-59
LAUNCH AREA

PARMA, CUYAHOGA COUNTY OHIO

U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

PLEXUS scientific

PROJECT NO.	FILE NO.
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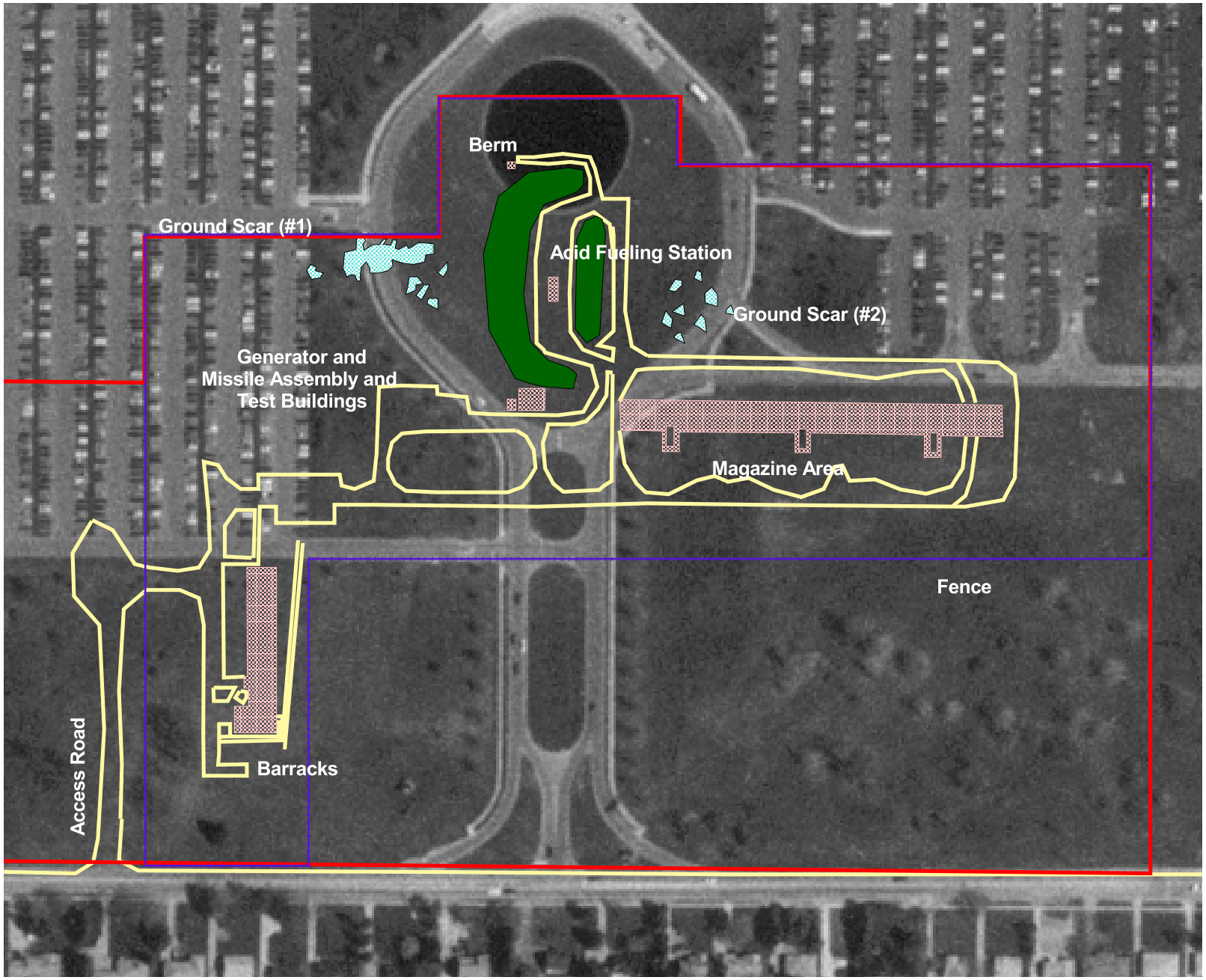


N

Legend

Demolished Structures

Fenceline

Launch Area Boundary

200 0 200 400 Feet

Source: Sebesta & Associates, Inc.,1998; USGS Digital Orthophoto Quadrangle (DOQ)
Data, Berea,1994; Aerial Photography, May 3, 1962

FIGURE 2-3
LAUNCH AREA
OVERLAY

FORMER NIKE MISSILE
SITE CL-59
LAUNCH AREA

PARMA, CUYAHOGA COUNTY OHIO

U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

PLEXUS scientific

PROJECT NO. 0032-005B

FILE NO. cl59.APR

3. PHYSICAL CHARACTERISTICS OF THE STUDY AREA

3.1 Surface Features

The entrance to Cuyahoga Community College overlies the former Launch Area. The site of the Acid Fueling Station, Generator building, and Missile Test and Assembly Building is within the traffic circle. A pond and decorative fountain lie within the traffic circle immediately north of the former Acid Fueling Station. The former Missile Magazines form a slight rise immediately east of the college entrance (Plexus, 2001b,c). The Launch Area elevation varies from 900 feet mean sea level (MSL) in the northeast corner to 880 feet MSL in the southwest corner of the site (USGS, 1963a). The Launch Area is well vegetated and all of its related structures have been demolished or filled. The site is fairly flat with no evidence of the Launch Area remaining except a small amount of asphalt at the former entrance along Pleasant Valley Road. The site is open with no restriction to access by the public. No blowing dust, odors, stressed vegetation, debris or exposed waste was noted (Plexus, 2001b,c).

3.2 Meteorology

The mean annual precipitation in the area is approximately 34 inches, while mean annual lake evaporation is 31 inches (U.S. Department of Commerce, 1968). The 1-year, 24-hour rainfall is 2 inches (U.S. Department of Commerce, 1961).

3.3 Geology

The former Nike Missile Site CL-59 lies in the Appalachian Plateaus physiographic province. Within this province, the site lies in the Killbuck-Glaciated Allegheny Plateaus (ODGS, 1998). The surface soils at the site consisted of loose to medium dense sands ranging from one to two feet in thickness. The sands contained gravel, silts and clay-sized particles with fragmented gravel-sized, gray shale particles (USDA, 1980).

The eight geologic borings completed at CL-59 confirm that glacial tills dominate the surficial geology of the site. Boring locations are shown on Figures 4-1 and 4-2. These moraine deposits are mostly heterogeneous and consists of silt, clay, sand, and gravel from subangular to rounded in shape. The gravel-sized clasts contained in the clayey till were mostly comprised of shale and sandstone particles. Four samples were collected and tested for Atterburg Limits. The grain size, Liquid Limits, and Plasticity Index from those samples (Appendix A) confirm the field descriptions identification of soils. Glacial tills at the former Nike Site range from 13 to 25 feet in thickness and groundwater was found to be approximately 25 feet below the ground surface (bgs). Groundwater was only encountered in one of the geologic borings, SB08; and, therefore, shallow groundwater flow direction and its continuity across the site were not determined.

Bedrock in the area consists of gray to brown shale and interbedded sandstones. Mapped as the Cuyahoga Formation the bedrock was encountered at between 14 and 26 feet bgs. The depth below ground surface that bedrock was encountered appeared to generally increase towards the west of the site. Drilling operations were stopped whenever bedrock was encountered, but where mapped in portions of northern Ohio, the thickness of the Cuyahoga Formation ranges from 0 to

180 feet (ODGS, 1996). The geology encountered during drilling operations was consistent with the formations described in ODGS, 1999. Copies of the boring logs are located in Appendix B.

3.4 Surface Water Hydrology

Precipitation falling on the site is likely to infiltrate with surface runoff only during heavy precipitation events because the site is fairly flat and well vegetated. Surface water runoff from the Nike Launch Area flows south. It is captured by storm water drains along West Pleasant Valley Road which discharges to a small unnamed creek located about 150-feet south of the site (Wangler, 2001; Plexus, 2001; USGS, 1963a). The creek flows west for 1-mile and enters Baldwin Creek (USGS, 1963a, c, d, e). Baldwin Creek winds west for 5.1 miles passing Coe Lake. When needed, stream flow from Baldwin Creek is diverted into Coe Lake, which is used as a backup water supply for the city of Berea (OEPA, 2000a). Coe Lake drains into Baldwin Creek, which flows for 0.5 miles until its confluence with the East Branch Rocky River. The river winds northerly for 5 miles to its confluence with the West Branch Rocky River where the river becomes Rocky River. Rocky River winds northward to the extent of the 15-mile surface water migration pathway (USGS, 1963a, c, d, e). The 15-mile surface water pathway is shown on Figure 3-1.

Under Ohio Administrative Code (OAC) 3745-1-20, Baldwin Creek and the Rocky River (river mile 12.1 to the mouth) are state resource waters with the following use designations:

- Aquatic life habitat – warm water habitat
- Water supply – agricultural and industrial water supplies (Rocky River and Baldwin Creek) and public water supply (Baldwin Creek only)
- Recreation – primary contact recreation (OAC, undated).

The use designations are based on the results of a biological field assessment performed by Ohio Environmental Protection Agency (OEPA) (OEPA, 2000b; OEPA, 1999).

Altered habitat and urban runoff largely mask impacts to Baldwin Creek from wastewater treatment plants. Habitat impairments in Baldwin Creek are caused by habitat alterations, flow alteration, nutrients, and to a lesser extent by pathogens. The sources of impairments are urban runoff, channelization/development, stream bank destabilization and to a lesser extent by municipal point sources (OEPA, 2000b). Two wastewater treatment plants discharge to Baldwin Creek, one upstream of influence from the Nike site and one downstream (OEPA, 2000a). Coe Lake (water body ID# OH87 05-090) is 23 acres and listed as usable for water supply and recreation. Coe Lake has been identified as impaired due to agriculture, urban runoff, land development, highway maintenance and runoff, and municipal point sources (OEPA, 2000a). The East Branch Rocky River is impacted from upstream of the confluence with Baldwin Creek to the mouth of the river by the Strongville B wastewater treatment plant. The causes of impairment in the East Branch Rocky River are mainly nutrients and flow alteration with a smaller contribution from pathogens. The sources of the impairments are municipal point sources and other urban runoff. Sediment sampling in the East Branch Rocky River found cadmium, copper, and zinc at highly elevated levels. The Rocky River is largely in an urban watershed and the cumulative effects of a high proportion of treated effluent and impacts associated with urban runoff have prevented the limit of full attainment of the warmwater habitat

use. Sediment sampling in the Rocky River found copper, iron, and zinc at highly elevated levels (OEPA, 2000b).

Based on the historic aerial photographs, it appears that surface water from the Launch Area was previously conveyed away from the site by a ditch around the perimeter that discharged to an open area to the north. The ditch was not noted during the site reconnaissance and is believed to have been graded over.

3.5 Demography and Land Use

The Launch Area is used as open space. No workers except for those performing grounds maintenance are present on-site. The former Nike Site Launch Area is bordered on the west by Nike Park (Plexus, 2001c).

The total population within a 4-mile radius of the Launch Area is 124,658. The nearest residence is south of the Launch Area on West Pleasant Valley Road within 200 feet of the site (USGS, 1963a; Plexus, 2001c). Population within ¼ mile is approximately 652 between ¼ and ½ mile 1,978, ½ and 1 mile is 7,427, between 1 and 2 miles is 25,852, 2 and 3 miles is 52,552, between 3 and 4 miles is 72,106 (USEPA, 2000a).

The Cuyahoga County Board of Health reports that there are no potable wells in use within a mile of the Launch Area. However, there are some wells in use within the four-mile radius (Seifert, 2001). The majority of the population within a 4-mile radius of the Launch Area relies on municipal water provided by the Cleveland Water Department. The system obtains its water from Lake Erie (Rogers, 2000). There are no municipal groundwater sources within a 4-mile radius of the site.

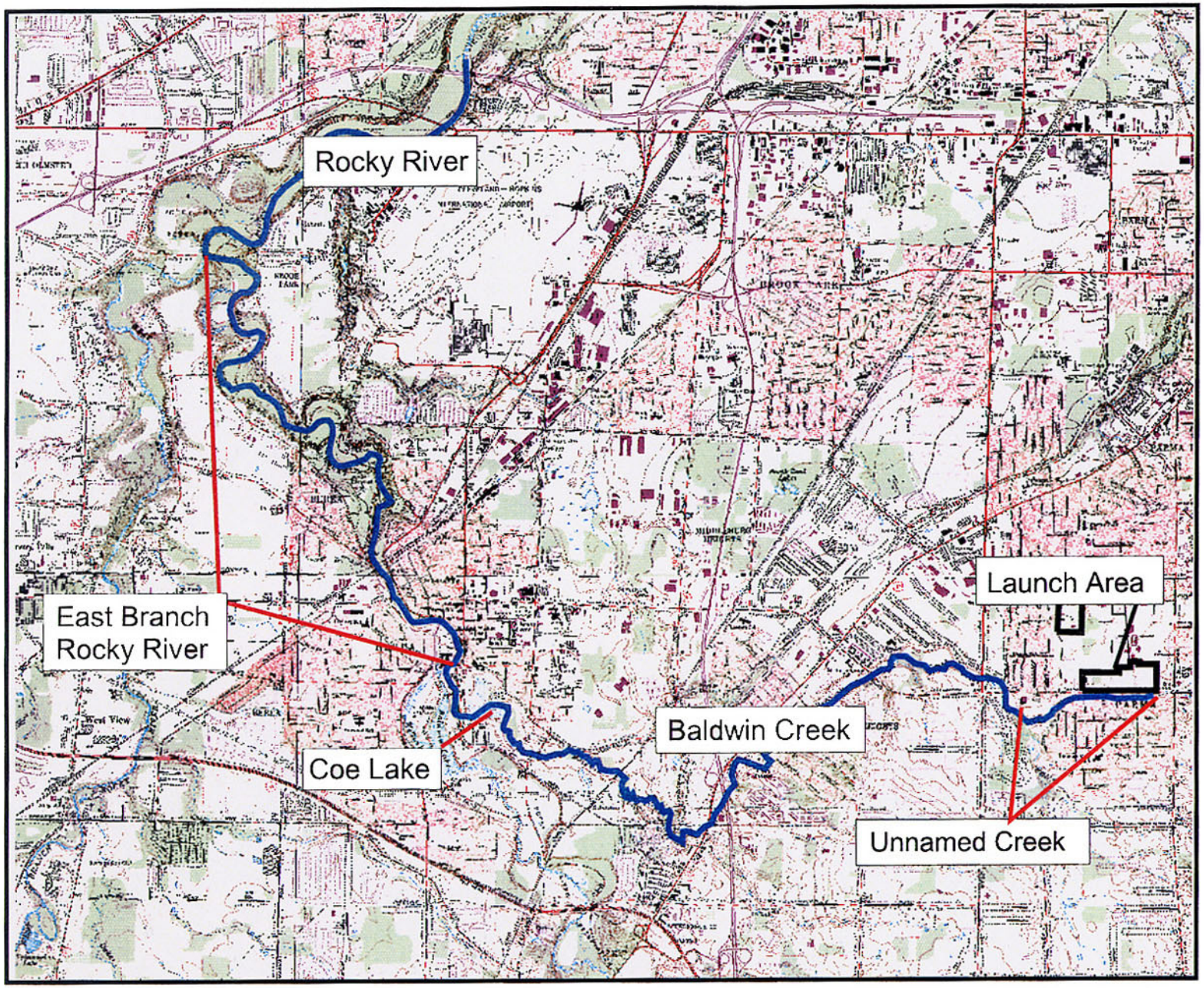
There are approximately 293 acres of scattered wetlands within a 4-mile radius of the Launch Areas. The nearest is about 0.7 acres and lies approximately 500 feet north of the Launch Area. The distribution of wetlands is approximately as follows: 10 acres between ½ and 1 mile; 22 acres between 1 and 2 miles; 40 acres between 2 and 3 miles; and 218 acres between 3 and 4 miles (USFWS, 1977a, b, c, d).

The Launch Area lies within the range of the Indiana bat *(Myotis sodalis*) and the piping plover (*Charadrius melodus*) both are Federally listed endangered species. The presence of the piping plover is not expected due to the location of the site. The site also lies within the range of the eastern massasauga (*Sistrurus catenatus catenatus),* a docile rattlesnake that is a federal candidate species (Lammers, 2001). The Fish and Wildlife Service did not identify either Indiana bat or the eastern massasauga as being present on the site; only that the sites lie within the range of the species. The site is mowed on a regular basis and it is unlikely to provide suitable habitat for any of these species.

The population within a 4-mile radius relies on municipal water provided by the Cleveland Water Department, which obtains its water from Lake Erie (Rogers, 2000). The intake is not along the 15-mile surface water pathway (USGS, 1963a,b, c, d). The Cuyahoga County Board of Health reports that they know of no intakes along the surface water pathway (Siefert, 2001).

There are seven species along the Launch Area 15-mile surface water migration pathways with special status. The Bigmouth Shiner (*Notropis dorsalis*) is an Ohio threatened special animal and inhabits Baldwin Creek, approximately 4.2 stream miles from the Launch Area. The Canadian Buffalo-Berry (*Shepheridia canadensis*) is an Ohio potentially threatened special plant and is found in three portions of the East Branch Rocky River; approximately 10.5 stream miles, 12.1 stream miles, and 12.3 stream miles from the Launch Area. Round-Leaved Dogwood (*Cornus rugosa*) is an Ohio potentially threatened special plant and inhabits a portion of the East Branch Rocky River approximately 10.5 stream miles from the site. Ground Juniper (*Juniperus communis*) is an Ohio endangered special plant and inhabits the East Branch Rocky River approximately 10.5 stream miles from the launch area. Bewick's Wren (*Thryomanes bewickii*) is an Ohio endangered special plant and inhabits a portion of the Rocky River approximately 12.7 stream miles from the launch area. The Solitary *Vireo (Vireo solitarus*) and the Wood Turtle (*Clemmys insculpta*) are listed as special animals by the Ohio Department of Natural Resources, Division of Natural Areas and Preserves, but are not legally recognized by the state of Ohio as a potentially threatened, threatened, or endangered animal. The bird and the turtle inhabit portions of the Rocky River, approximately 12.5 and 12.65 stream miles from the launch area, respectively (ODNR, 2000).

The Rocky River is used for fishing (Siefert, 2001). The Rocky River portions of the surface water pathway lies within reservations of the Cleveland Metro Park District. A portion of Baldwin Creek flows through the Big Creek Reservation (ODNR, 2000).



1 0 1 2 3 4 Miles

FIGURE 3-1
15-STREAM MILE
SURFACE WATER
PATHWAY

FORMER NIKE MISSILE
SITE CL-59
LAUNCH AREA

PARMA, CUYAHOGA COUNTY OHIO

U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
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PLEXUS

PROJECT NO
0032-0068

Source: 7.5 MINUTE QUADRANGLE BEREA, OHIO, 1963 (PHOTOREVISED, 1984); LAKEWOOD, 1963 (PHOTOREVISED, 1985); NORTH OLMSTED, 1963 (PHOTOREVISED, 1985); WEST VIEW, 1963 (PHOTOREVISED, 1985.

4. FIELD INVESTIGATION

The analytical program is based on a review of individual areas and potential contamination at typical Nike Sites. A discussion of contamination at typical Nike sites is presented in *Investigation of Former Nike Missile Sites for Potential Toxic and Hazardous Waste Contamination* (Law, 1986).

The following section describes methods and field procedures necessary to implement the sampling program including soil borings, surface and subsurface soil sampling, and water sampling. Sample numbers, location, analysis, and detections exceeding screening values are provided on Table 4-1 and locations are shown on Figure 4-1.

Prior to start of fieldwork, USACE received authorization to conduct intrusive activities from OEPA under Ohio Administrative Code 3745-27-13. USACE provided a copy of the acceptance for disposal of the soil cutting generated during the fieldwork per the authorization granted by the Director of OEPA.

In August 2001, the following activities were conducted:

- Soil Sampling;
- Groundwater Sampling;
- Location Survey;
- Chemical and Physical Analysis;
- Quality Assurance/Quality Control (QA/QC) Assessment; and
- Data Evaluation.

One groundwater, eight surface soil, and 22 subsurface soil samples were collected from the former Launch Area as part of the field activities. Soil samples were taken from locations near the Missile Magazines, Acid Fueling Station, Missile Assembly and Test Building, Generator Building, and historic scars. The field program centered on determining if past military use of the property has impacted soil or groundwater quality. Determination of the nature and extent of contamination is beyond the scope of this investigation. Sample locations are presented in Figure 4-1 and Table 4-1. Figure 4-2 depicts the sample locations in relation to the former Launch Area facilities.

4.1 Sample Locations and Rationale

The number, location, and analytical suite for the samples was determined based on a review of typical activities at Nike missile sites, experience from previous investigations at similar sites, and a review of aerial photographs of CL-59. The samples were collected around buildings (Acid Fueling Station, Missile Test and Assembly Building, and Generator Building) and missile magazines where it is most likely that solvent, petroleum products and other potential contaminants were utilized or disposed. Analysis of the historic aerial photographs during the PA identified two disturbed areas (Scars 1 and 2) that were sampled during the SI. The number and analyses were modified by USACE following a meeting with OEPA. Following the meeting

with OEPA, Plexus was directed to collect a minimum of four subsurface soil samples from the 50-foot borings (those at the Missile Magazines) and three from the 15-foot borings (all others) based on the following criteria:

- Each time water is encountered. That is, the soil sampled at the upper soil/water interface will be analyzed in the laboratory. If the soil samples become dry again, then wet again (indicating the upper layer was a sand seam), the next wet soil sample will be analyzed, and so on.

- The three samples exhibiting the highest photoionization detector (PID) readings. If these are the water interface samples, the next three highest PID readings will be analyzed.

- If no or minimal water is encountered and/or no significant PID readings are revealed, the samples will be selected following visual indications, and missing those they will be distributed somewhat evenly throughout the soil column with priority to the deepest sample.

4.1.1 Missile Magazines

The magazines typically had a floor drainage system that permitted waste materials to be washed to a central sump under the missile elevator. A pump would deliver the water and waste to either a seepage system or to the ground surface. Solvents, paints, and hydraulic fluid may have been washed into the sump. The seepage system, if present, probably consisted of drainage tiles and/or a seepage pit. The construction of the seepage systems varied from site to site depending on local conditions.

Three surface and 11 subsurface soil samples were collected adjacent to the missile magazines. Sampling procedures are discussed in Section 4.2.1. The soil samples were analyzed for Target Compound List (TCL) (OLM04.2) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), PCBs, and Target Analyte List (TAL) (ILM04.1) metals. The analytical suite was selected to determine if solvents that may have been used for maintenance and cleaning, polycylic aromatic hydrocarbons from fuel or hydraulic systems, PCBs from hydraulic or electrical equipment, or metals from construction or maintenance had been released to the environment. Sample locations are described in Table 4-1 and are shown on Figures 4-1 and 4-2.

One boring was installed adjacent to the elevator pit at each of the three magazines. All three borings were terminated when competent bedrock was encountered (SB06 at 14.4 feet bgs, SB07 at 22 feet bgs, and SB08 at 27.3 feet bgs). Due to the shallow depth to rock in SB06 only three subsurface soil samples were collected but four subsurface soils were collected from each of the others.

A representative sample of each 2-foot split spoon was screened with a PID, and visually inspected to identify any releases or sources of contamination from the Magazines. Slightly elevated PID readings (7.7 to 12.8 parts per million) were encountered between 0.5 and 2 feet bgs in SB08. No other PID readings above background were encountered during the project and

no radiation readings above background were encountered during the project. No visual evidence of contamination was noted during the investigation. All samples were classified in accordance with the Unified Soil Classification System (USCS) using field index tests. Laboratory Atterburg limits were determined for SB07A and SB08A and sieve analysis of SB07A, SB07E, and SB08A was performed to verify the field descriptions of the soils.

Groundwater was encountered in SB08. One foot of water collected in the bottom of the boring and was sampled as described in Section 4.2.2. The sample was analyzed for TCL VOCs, TCL SVOCs, PCBs, pesticides, and TAL metals. The analytical suite was selected to match that for the soil in the area and pesticide analysis was added following the meeting between USACE and OEPA.

4.1.2 Acid Fueling Station

The Acid Fueling Station had a drainage system. UDMH, IFRNA, and aniline/furfuryl alcohol associated with missile fueling would have been handled here but all are highly reactive compounds and would not be persistent in the environment. Battery electrolyte solutions were also handled in this area and some lead contamination may have resulted from this operation but other sources of lead, such as, paint are likely to have a greater impact.

One surface and three subsurface soil samples were collected from the vicinity of the former Acid Fueling Station. Sampling procedures are discussed in Section 4.2.1. The soil samples were analyzed for TCL VOCs, TCL SVOCs, and TAL metals. The analytical suite was selected to determine if solvents that may have been used for maintenance and cleaning, polycyclic aromatic hydrocarbons (PAHs) from fuel or hydraulic systems, or metals from battery electrolyte solutions had been released to the environment. Sample locations are described in Table 4-1 and are shown on Figures 4-1 and 4-2.

One boring (SB03) was installed just south of the center of the former fueling pad. The boring was terminated at 14.3 feet bgs when competent bedrock was encountered. Groundwater was not found in the boring. All samples were classified in accordance with the USCS using field index tests.

4.1.3 Missile Assembly and Test Building and Generator Building

Missile assembly and maintenance involved the use of various solvents, anticorrosion products, and paints as the missiles were assembled and disassembled. The buildings were typically equipped with a full-length drainage system. In most cases, the drainage system was gravity fed and discharged to a small seepage pit or a small system consisting of perforated tile. The construction of the seepage system varied from site to site depending on local conditions and in some cases sump discharges may have been directed to surface water drainages.

The generator building would have had either underground or aboveground storage tanks for diesel fuel. In addition, transformers associated with the generators may have contained PCB oil.

A surface soil and three subsurface soil samples were collected adjacent to each building. Sampling procedures are discussed in Section 4.2.1. The soil samples were analyzed for TCL VOCs, TCL SVOCs, PCBs, and TAL metals. The analytical suite was selected to determine if solvents that may have been used for maintenance and cleaning, PAHs from fuel or hydraulic systems, PCBs from hydraulic or electrical equipment, or metals from corrosion control had been released to the environment. Sample locations are described in Table 4-1 and are shown on Figures 4-1 and 4-2.

One boring (SB04) was installed just west of the former Missile Assembly and Test Building and SB05 was installed just east of the former generator building. The borings was terminated at the target depth of 15 feet bgs. Groundwater was not found in either boring. All samples were classified in accordance with the USCS using field index tests. Laboratory Atterburg limits were determined for SB04C and SS05 and sieve analysis of SB04C and SS05 was performed to verify the field descriptions of the soils.

4.1.4 Scars

A surface soil sample will be collected from each of the scars identified in the 1959 aerial photograph. Scar #1 has a crescent-shaped configuration and is located west of the Acid Fueling Station berms. This scar measures approximately 200 feet long (east to west extremes) and approximately 60 feet wide at its greatest width. A faintly visible linear feature runs from the corner of a concrete and asphalt pad on the west side of the building to ground scar #1. The scarred area shows no evidence of being caused by vehicular activity.

The second scar (#2) is situated north of the missile magazines and east of the Acid Fueling Station in an open, grass-covered field. This scar exhibits a generally mottled, disturbed appearance; evidence of vehicular activity is also noted. A portion of this area appears to be mounded and darker in appearance. Vegetative cover that differs from the surrounding grass-covered grounds may be the cause of this darkened condition. This roughly circular scar occupies and area estimated to measure approximately 50 feet in diameter.

A surface soil and subsurface soil sample was collected from each scar. The subsurface soil samples were added during the field effort with the approval of USACE and OEPA. Sampling procedures are discussed in Section 4.2.1. The soil samples were analyzed for TCL VOCs, TCL SVOCs, PCBs, and TAL metals. The analytical suite was selected to determine if any of the potential site contaminants were disposed of in the scars. Sample locations are described in Table 4-1 and are shown on Figures 4-1 and 4-2.

4.2 Sample Collection

4.2.1 Soil Sampling

Surface and subsurface soil sampling was conducted at eight locations. All samples were analyzed for TAL metals, TCL VOCs, TCL SVOCs, TCL pesticides, and PCBs. Locations and rationales are presented in Table 4-1 and were discussed in Section 4.1. The locations closely corresponded to those proposed in the work plans.

Surface soil samples were collected in order to identify contamination in the surface soil and to evaluate potential threats due to direct contact with surface soils. All surface samples were taken from the 0- to 12-inch depth interval using a stainless hand auger or split spoons. The VOC sample was collected from the 6- to 12-inch interval. The soil samples were described according to the USCS (ASTM D2488-93). A PID was used to screen all samples. A stainless steel spoon and bowl was used for homogenizing the soil samples before being placed in containers. The sampling and mixing equipment was thoroughly decontaminated prior to use at each location. The VOC sample was not homogenized.

Subsurface soil samples were collected from split spoons at depths from two to 27 feet bgs. Intervals for individual samples are presented in Table 4-1. Samples were selected for analysis using the criteria specified by USACE (presented in Section 4.1). Soil borings were located adjacent to potential sources identified by USACE and during the PA.

A geologist observed completion of all the soil borings. The geologist logged the subsurface conditions encountered in the boring and recorded the information on a soil boring log. Boring logs are included in Appendix B. The boring logs were completed per Corps of Engineers guidance document EM 1110-1-4000. The boring logs include observations on soil type, grain size distribution, changes in stratigraphy, stained soil or chemical odor, soil moisture, depth to groundwater, depth intervals of laboratory samples, total depth of boring and PID screening results.

Eight soil borings were installed and sampled as part of this project. Drilling and sampling equipment (i.e., split spoons) were decontaminated on arrival at the facility and between each groundwater monitoring well. The augers were steam cleaned between holes and the split spoons were scrubbed with a laboratory detergent and rinsed with deionized water between samples. Hollow-stem augers (HSAs) with an inside diameter (ID) of 4.25 inches were used for the borings and standard split spoon sample methods (ASTM D1586) were used to collect unconsolidated soil samples from the borings.

All soil borings were abandoned by filling the hole with Baroid Drilling Fluids, Quick-grout™ (a sodium-based bentonite grout) tremied into place from the bottom of the hole. Six-inches of concrete was placed over the grout and covered with one-foot of soil.

4.2.2 Groundwater Sampling

A groundwater sample and a duplicate were collected from SB08 (adjacent to the eastern most missile magazine) during the investigation to determine the presence of potential contaminants and to provide an indication of the overall groundwater quality at the site. No other groundwater was encountered during the field program. The sample was analyzed for VOCs, SVOCs, pesticides, PCBs, and metals (dissolved). Refer to Table 4-2 for analytical methods.

When groundwater was encountered during drilling, the augers were backed out several feet and a new disposable bailer was inserted through the auger stem to collect a groundwater sample. As sampling proceeded, soil could be heard sloughing into the hole.

The groundwater sample fraction analyzed for metals was field filtered using a disposable 0.45 micron capsule filter on the end of a length of silicon tubing and allowing the water to flow into the sample collection bottle. The turbidity of the water was so high that the sample had to be filtered multiple times to achieve clarity.

The borehole was not purged prior to sampling due to the poor production of the hole. The field parameters for the groundwater were: pH 7.95, conductivity 671mS/cm, and turbidity 1000+NTU. The temperature obtained for the sample was measured but is not considered a true representation of the groundwater.

4.2.3 Investigation Derived Waste

Installation of the soil borings resulted in the generation of six 55-gallon drums of soil cuttings. One composite sample (WS09) of soil from the drums was collected and analyzed. The analytical results are presented in Appendix C. The soil was disposed of off-site as solid waste at WM Suburban RDF, Glenford, Ohio. The Director of OEPA was notified in advance of the disposal arrangements in accordance with the conditions specified in his August 2, 2001 letter providing the U.S. Army Engineer District, Louisville OAC Rule 3745-27-13 Authorization and OAC Rule 3745-27-13I(10).

4.3 Location Survey

Surveying of sampling points was conducted by Plexus personnel using a Trimble Model 33302-51 (Serial number 0224014593) with real time differential correction. The survey data is presented in Table 4-3.

4.4 Sample Analysis

4.4.1 Chemical Analysis

Soil and groundwater samples were submitted for chemical analysis. The analytical methods used are identified on Table 4-2. The primary laboratory was Severn Trent Laboratories (North Canton, Ohio) with ten percent sent to CompuChem (Cary, North Carolina) for quality assurance. Both laboratories hold current validation from the USACE Missouri River Division.

4.4.2 Quality Assurance/Quality Control (QA/QC) Assessment

The various elements of QA/QC applied in the course of the sampling and analysis program included: (1) laboratory selection and certification; (2) pre-field planning and preparedness; (3) assessment of both field and laboratory activities during implementation; (4) collection and analysis of various field QC samples; and, (5) third party review of analytical data packages. The laboratories selected for the work were certified by the USACE for the analyses they performed.

The laboratories were afforded the opportunity to review and comment on the work plans prior to the initiation of field activities and to resolve any questions or concerns. A “readiness review” was conducted one week prior to the initiation of field activities to ensure that all necessary resources were available and that lines of communication were clearly established. Thereafter,

and well beyond the end of field work, regularly scheduled conference calls were conducted with all parties involved in the work to ensure that any necessary corrective actions were implemented in a timely manner.

Various field QC samples, including trip blanks, field duplicates and QC split samples were collected during sampling activities. In order to achieve the quality assurance objectives for this project, a number of field quality assurance samples were collected. The quality assurance samples are used to verify sample collection techniques, decontamination procedures and sample integrity. A full discussion of the types, frequency and use of quality assurance samples is given in the Quality Assurance Project Plan (QAPP) (Plexus, 2001a). Analytical results from the trip blanks are presented in Appendix C. Chain of custody records are presented in Appendix D.

One triplicate sample was collected for every 10 media specific (groundwater and soil) samples. Overall handling procedures for each portion are identical except that the first two portions are sent to the project laboratory (Severn Trent Laboratories, North Canton) and the last is sent to secondary laboratory (CompuChem, North Carolina) for external QA.

Data validation consists of a stringent review of each analytical chemical data package with respect to sample receipt and handling, analytical methods, data reporting, deliverables, and document control. The data were validated according to the USACE *Louisville Chemistry Guideline*, modified to reflect the level of review requested and the specific variances to the analytical method employed and the specific requirements of the Louisville District as indicated in Section 6 of the approved QAPP. The analytical methods were taken from SW-846, *Test Method for Evaluating Solid Waste* (USEPA, 1998) incorporating all of the then current updates (i.e., Final Update III, July 1998). The applied data validation flags (Table 4-4) are further explained by reason codes (Table 4-5), which indicate the type of quality control failure that lead to the application of the validation flag. The laboratory also applies flags (Table 4-6) to their data to call attention to various aspects of the results.

Data quality is measured in terms of precision, accuracy, representativeness, comparability, completeness, and sensitivity (PARCCS). The following summarizes the quality of laboratory data, by fraction, for this field effort.

VOCs - As qualified for various routine anomalies, VOC data were found to be uniformly usable for data interpretation.

SVOCs - As qualified for various routine anomalies, SVOC data were found to be uniformly usable excepting a small number of poor recoveries in surrogates, continuing calibration checks, and/or laboratory control spikes (LCSs). A bad reagent batch caused the soxhlet extracts to degrade the GC/MS column. An attempted corrective action was unsuccessful. All phenolic compounds were affected and may exhibit a low bias to the non-detect results reported.

As qualified for various routine anomalies, PAH data were found to be uniformly usable for data interpretation excepting fluorene due to a percent difference exceedence in an initial calibration verification that resulted in the rejection of all non-detects of this compound in the associated

samples (STL SDG A1H090102). As this exceedance was biased high, the data for detections is considered usable.

Pesticides - As qualified for various routine anomalies, pesticide data were found to be uniformly usable excepting sample GW08 (analyzed by the primary laboratory) that displayed poor surrogate recoveries.

PCBs - As qualified for various routine anomalies, PCB data were found to be uniformly usable for data interpretation.

Metals - As qualified for various routine anomalies, metals data were found to be uniformly usable for data interpretation.

The data from the quality assurance laboratory was compared to the primary laboratory's data and found to be within control excepting the magnesium results for CL59-SS07 that displayed a 108% relative percent difference.

4.5 Data Evaluation

In order to streamline the risk decision-making process for screening constituents of potential concern (COPCs) at the site, USACE agreed with OEPA to compare the levels of constituents detected to the USEPA Region 9 PRGs (USEPA, 2000b). PRGs are risk-based tools for evaluating and cleaning up contaminated sites. The PRGs have been compared point by point to the detected levels of contaminants to identify the COPCs. The point-by-point comparison is an extremely conservative method for identifying COPCs as more compounds are identified for further evaluation. In a typical evaluation, a statistical analysis of all of the data is conducted and only those with a mean (average) value above the PRG would be identified as COPCs. Once the COPCs have been identified, additional evaluation can be conducted using standard risk assessment practices to determine if the contaminants pose a credible risk to human health based on the concentrations present across the sites.

The Region 9 PRGs combine current USEPA toxicity values with "standard" exposure factors to estimate contaminant concentrations in environmental media (soil, air, and water) that are considered protective of humans, including sensitive groups, over a lifetime. Chemical concentrations above these levels would not automatically designate a site as "dirty" or trigger a response action. However, exceeding a PRG suggests that further evaluation of the potential risks that may be posed by site contaminants is appropriate. Further evaluation may include additional sampling, consideration of ambient levels in the environment, or a reassessment of the assumptions contained in these screening-level estimates (e.g. appropriateness of route-to-route extrapolations, appropriateness of using chronic toxicity values to evaluate childhood exposures, appropriateness of generic exposure factors for a specific site etc.).

The USEPA Region 9 PRGs are chemical concentrations that correspond to fixed levels of cancer risk (i.e. 1E-6) or a noncarcinogenic hazard quotient of one. For exposure to multiple chemicals across multiple pathways, the OEPA Office of Federal Facilities Oversight (OFFO) uses the target risk level of 1 E-5 (cumulative risk level) and the hazard quotient of 1 as the acceptable target levels for establishing acceptable cleanup goals for unrestricted reuse.

Therefore, the whole Region 9 PRG value for carcinogenic constituents was used for screening analytical data and selecting COPCs for human health, and the Region 9 PRGs for noncarcinogenic constituents were adjusted by 1/10th of the Region 9 PRG value to ensure that the threshold of 1 (ie HQ=1) is not exceeded as a result of exposure to multiple chemicals affecting the same target organ (i.e. assuming additivity).

Groundwater detections exceeding the screening values were also compared to the Safe Drinking water Act Maximum Contaminant Levels (MCLs). MCLs are the maximum permissible level of a contaminant in water delivered to users of a public water system.

TABLE 4-1
SAMPLE SUMMARY, LOCATION, ANALYSIS, AND DETECTIONS EXCEEDING SCREENING VALUES
FORMER NIKE SITE CL-59 LAUNCH AREA, PARMA, OHIO

Sample Number	Location	Analysis	Detected Compounds	**Detections Exceeding Human Health Screening Values[1,2]**
Scars				
CL59-SS01	Collected in scar 1 near west side of traffic circle at a depth of 0 to 1 foot bgs to determine the presence or absence of contamination in surface soil.	TCL VOC, TCL SVOC, TAL Metals, PCBs	1 Volatile 10 PAHs 18 Metals	Aluminum**,** **Arsenic**, Iron, Manganese
CL59-SB01A	Shallow subsurface soil collocated with SS01 at a depth of 2 to 4 feet bgs to determine the presence or absence of contamination in subsurface soil indicating possible contaminant migration.	TCL VOC, TCL SVOC, TAL Metals, PCBs	1 Volatile 1 PAH 18 Metals	Aluminum**,** **Arsenic**, Iron, Manganese
CL59-SS02	Collected in scar 2 near east side of traffic circle at a depth of 0 to 1 foot bgs to determine the presence or absence of contamination in surface soil indicating possible contaminant migration.	TCL VOC, TCL SVOC, TAL Metals, PCBs	1 Volatile 15 PAHs 19 Metals	Aluminum**,** **Arsenic**, Iron, Manganese
CL59-SB02A	Shallow subsurface soil collocated with SS02 at a depth of 3 to 4 feet bgs. To determine the presence or absence of contamination in subsurface soil.	TCL VOC, TCL SVOC, TAL Metals, PCBs	3 PAHs 17 Metals	Aluminum**,** **Arsenic**, Iron, Manganese
Acid Fueling Station				
CL59-SS03	Collected south of the center of traffic circle in former Acid Fueling Station at a depth of 0 to 1 bgs to determine the presence or absence of contamination in surface soil.	TCL VOC, TCL SVOC, TAL Metals	14 PAHs 19 Metals	Aluminum**,** **Arsenic**, Iron, Manganese, Thallium
CL59-SB03A	Subsurface soil collocated with SS03 at a depth of 3 to 5 feet bgs to determine the presence or absence of contamination in subsurface soil indicating possible contaminant migration.	TCL VOC, TCL SVOC, TAL Metals	16 PAHs 18 Metals	Aluminum**,** **Arsenic**, Iron, Manganese, Thallium
CL59-SB03B	Subsurface soil collocated with SS03 at a depth of 9 to 10.5 feet bgs to determine the presence or absence of contamination in subsurface soil indicating possible contaminant migration.	TCL VOC, TCL SVOC, TAL Metals	1 PAH 17 Metals	**Arsenic**, Iron, Manganese
CL59-SB03C	Subsurface soil collocated with SS03 at a depth of 13 to14.3 feet bgs (just above bedrock) to determine the presence or absence of contamination in subsurface soil indicating possible contaminant migration.	TCL VOC, TCL SVOC, TAL Metals	3 Volatiles 5 PAHs 18 Metals	**Arsenic**, Iron, Manganese

Sample Number	Location	Analysis	Detected Compounds	**Detections Exceeding Human Health Screening Values[1,2]**
Generator And Missile Assembly and Test Buildings				
CL59-SS04	Collected on south edge of traffic circle at the former Missile Assembly and Test Building site at a depth of 0 to 1 bgs to determine the presence or absence of contamination in surface soil.	TCL VOC, TCL SVOC, TAL Metals, PCBs	1 phthalate 18 PAHs 18 Metals	**Benzo(a)pyrene** Aluminum**,** **Arsenic**, Iron, Manganese
CL59-SB04A	Subsurface soil collocated with SS04 at a depth of 3 to 4 feet bgs to determine the presence or absence of contamination in subsurface soil indicating possible contaminant migration.	TCL VOC, TCL SVOC, TAL Metals, PCBs	9 PAHs 17 Metals	Aluminum**,** **Arsenic**, Iron, Manganese
CL59-SB04B	Subsurface soil collocated with SS04 at a depth of 9 to 10 feet bgs to determine the presence or absence of contamination in subsurface soil indicating possible contaminant migration.	TCL VOC, TCL SVOC, TAL Metals, PCBs	2 Volatiles 17 Metals	**Arsenic,** Iron, Manganese
CL59-SB04C	Subsurface soil collocated with SS05 at a depth of 11 to 13 feet bgs (13 to 15 feet bgs for Atterburg limits and grain size) to determine the presence or absence of contamination in subsurface soil indicating possible contaminant migration.	TCL VOC, TCL SVOC, TAL Metals, PCBs, Atterburg Limits, Grain size	19 Metals	**Arsenic,** Iron, Manganese, Thallium
CL59-SS05/105	Collected on south edge of traffic circle at the former Generator Building site at a depth of 0 to 1 bgs to determine the presence or absence of contamination in surface soil.	TCL VOC, TCL SVOC, TAL Metals, PCBs, Atterburg Limits, Grain size	2 Volatiles 18 PAHs 21 Metals	**Benzo(a)pyrene,** Aluminum**,** **Arsenic**, Iron, Manganese, Thallium
CL59-SB05A	Subsurface soil collocated with SS05 at a depth of 4 to 5 feet bgs to determine the presence or absence of contamination in subsurface soil indicating possible contaminant migration.	TCL VOC, TCL SVOC, TAL Metals, PCBs	2 PAHs 19 Metals	Aluminum**,** **Arsenic**, Iron, Manganese, Thallium
CL59-SB05B	Subsurface soil collocated with SS05 at a depth of 8 to 9.5 feet bgs to determine the presence or absence of contamination in subsurface soil indicating possible contaminant migration.	TCL VOC, TCL SVOC, TAL Metals, PCBs	18 Metals	**Arsenic** Iron, Manganese
CL59-SB05C	Subsurface soil collocated with SS05 at a depth of 13 to 14 feet bgs to determine the presence or absence of contamination in subsurface soil indicating possible contaminant migration.	TCL VOC, TCL SVOC, TAL Metals, PCBs	1 Volatile 4 PAHs 20 Metals	**Arsenic,** Iron, Manganese, Thallium

Sample Number	Location	Analysis	Detected Compounds	**Detections Exceeding Human Health Screening Values[1,2]**
Missile Magazines				
CL59-SS06/106	Collected on south side of western most Missile Magazine at a depth of 0 to 1 bgs to determine the presence or absence of contamination in surface soil.	TCL VOC, TCL SVOC, TAL Metals, PCBs	3 Volatiles 19 PAHs 21 Metals	**Benzo(a)pyrene, Dibenz(a,h)anthracene** Aluminum**,** **Arsenic**, Iron, Manganese, Thallium
CL59-SB06A	Subsurface soil collocated with SS06 at a depth of 6 to 8 feet bgs to determine the presence or absence of contamination in subsurface.	TCL VOC, TCL SVOC, TAL Metals, PCBs	1 PAH 18 Metals	Aluminum**,** **Arsenic**, Iron, Manganese
CL59-SB06B	Subsurface soil collocated with SS06 at a depth of 10 to 12 feet bgs to determine the presence or absence of contamination in subsurface.	TCL VOC, TCL SVOC, TAL Metals, PCBs	1 Volatile 17 Metals	**Arsenic**, Iron
CL59-SB06C	Subsurface soil collocated with SS06 at a depth of 12 to 13.75 feet bgs (just above bedrock) to determine the presence or absence of contamination in subsurface.	TCL VOC, TCL SVOC, TAL Metals, PCBs	2 PAHs 17 Metals	**Arsenic,** Iron, Manganese
CL59-SS07/107	Collected on slope on north side of middle Missile Magazine at a depth of 0 to 1 bgs to determine the presence or absence of contamination in surface soil.	TCL VOC, TCL SVOC, TAL Metals, PCBs	8 Volatiles 15 PAHs 22 Metals	**Benzo(a)pyrene,** Aluminum, **Arsenic,** Iron, Manganese, Thallium
CL59-SB07A	Subsurface soil collocated with SS07 at a depth of 6 to 8 feet bgs to determine the presence or absence of contamination in subsurface.	TCL VOC, TCL SVOC, TAL Metals, PCBs, Atterburg Limits, Grain size	3 PAHs 18 Metals	Aluminum, **Arsenic,** Iron, Manganese
CL59-SB07B	Subsurface soil collocated with SS07 at a depth of 10 to 12 feet bgs to determine the presence or absence of contamination in subsurface.	TCL VOC, TCL SVOC, TAL Metals, PCBs	1 Volatile 2 PAHs 17 Metals	Aluminum, **Arsenic,** Iron, Manganese
CL59-SB07C	Subsurface soil collocated with SS07 at a depth of 14 to 16 feet bgs to determine the presence or absence of contamination in subsurface.	TCL VOC, TCL SVOC, TAL Metals, PCBs	9 PAHs 19 Metals	**Arsenic,** Iron, Manganese
CL59-SB07D	Subsurface soil collocated with SS07 at a depth of 18 to 19.1 feet bgs to determine the presence or absence of contamination in subsurface.	TCL VOC, TCL SVOC, TAL Metals, PCBs	9 PAHs 20 Metals	**Arsenic**, Iron, Manganese
CL59-SB07E	Subsurface soil collocated with SS07 at a depth of 20 to 21.1 feet bgs to determine physical characteristic of geologic material.	Grain size	Not applicable	Not applicable
CL59-SS08/108	Collected on slope on south side of eastern most Missile Magazine at a depth of 0 to 1 bgs to determine the presence or absence of contamination	TCL VOC, TCL SVOC, TAL Metals, PCBs	9 Volatiles 1 Phthalate 1 Furan 19PAHs	**Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenz(a,h)anthracene,** Aluminum,

Sample Number	Location	Analysis	Detected Compounds	**Detections Exceeding Human Health Screening Values[1,2]**
	in surface soil.		21 Metals	**Arsenic**, Iron, Manganese, Thallium
CL59-SB08AA	Subsurface soil collocated with SS08 at a depth of 5 to 7 feet bgs to determine the presence or absence of contamination in subsurface.	TCL VOC, TCL SVOC, TAL Metals, PCBs	2 Volatiles 18 Metals	Aluminum, **Arsenic**, Iron, Manganese
CL59-SB08A	Subsurface soil collocated with SS07 at a depth of 12 to 14 feet bgs (10 to 12 feet bgs for grain size and Atterburg limits) to determine the presence or absence of contamination in subsurface.	TCL VOC, TCL SVOC, TAL Metals, PCBs, Atterburg Limits, Grain size	1 Volatile 8 PAHs 18 Metals	Aluminum, **Arsenic,** Iron, Manganese
CL59-SB08B	Subsurface soil collocated with SS07 at a depth of 16 to 18 feet bgs to determine the presence or absence of contamination in subsurface.	TCL VOC, TCL SVOC, TAL Metals, PCBs	2 Volatiles 9 PAHs 18 Metals	Aluminum, **Arsenic,** Iron, Manganese
CL59-SB08C	Subsurface soil collocated with SS07 at a depth of 24 to 25.5 feet bgs (just above bedrock) to determine the presence or absence of contamination in subsurface.	TCL VOC, TCL SVOC, TAL Metals, PCBs	1 Volatile 12 PAHs 21 Metals	Aluminum, **Arsenic**, Iron, Thallium
CL59-GW08	To provide an indication of groundwater quality at the east end of the former Missile Magazine Area.	TCL VOC, TCL SVOC, TAL Metals (dissolved), PCBs, Pesticides	6 Volatiles 8 PAHs 1 Phthalate Caprolactam 13 Metals	**Bis(2-ethylhexyl)phthalate,** **Benzo(a)anthracene,** **Benzo(a)pyrene,** Naphthalene, Antimony, **Arsenic**, Thallium
IDW Characterization				
CL59-WS09	To characterize soil cuttings for off-site disposal	TCL VOC, PCBs, TAL Metals	1 Volatile 20 Metals	Not evaluated

[1] Compounds not in bold text exceed 10% USEPA Region 9 PRG values for non-carcinogens. Tap water and residential soil PRGs were utilized.
[2] Bolded compounds exceeded the full value of USEPA Region 9 PRGs for carcinogens.

TABLE 4-2
ANALYTICAL METHODS
FORMER NIKE SITE CL-59 LAUNCH AREA, PARMA, OHIO

Analysis	USEPA Analytical Method	
	Aqueous	Soils
TCL Volatiles (OLM04.2)	5030B/8260B	5035A/8260B
TCL Semivolatiles (OLM04.2)	3510C/8270C	3540C/8270C
Pesticides (OLM04.2)	3510C/8081A	--
PCBs (OLM04.2)	3510C/8082	3540C/3545/8082
TAL Metals (ILM04.1)	3005A/3010A/6010B	3050B/6010B
Mercury	7470A	7471A
Atterburg Limits	--	ASTM D4318
Grain size	--	ASTM D2217/D422

Source: ASTM, 2001a,b,c; USEPA, 1996

TABLE 4-3
SAMPLE LOCATION COORDINATESS
FORMER NIKE SITE CL-59 LAUNCH AREA, PARMA, OHIO

Sample Number	North American Datum 1983 Ohio State Plane Coordinates (feet)		High Precision Geodetic Network 1983	
	Northing	Easting	Latitude (north)	Longitude (west)
SS01	620020.1061	2170072.440	41° 21’ 58.159”	81° 45’ 56.278”
SS02	620004.5948	2170393.733	41° 21’ 58.001”	81° 45’ 52.056”
SS03	619970.5315	2170243.046	41° 21’ 57.673”	81° 45’ 54.034”
SS04	619842.8266	2170222.162	41° 21’ 56.404”	81° 45’ 54.338”
SS05	619853.3176	2170169.919	41° 21’ 56.534”	81° 45’ 55.002”
SS06	619738.5554	2170387.741	41° 21’ 55.362”	81° 45’ 52.181”
SS07	619852.8676	2170548.732	41° 21’ 56.472”	81° 45’ 50.022”
SS08	619730.5901	2170739.170	41° 21’ 55.271”	81° 45’ 47.570”

Plexus, 2001a

TABLE 4-4
DATA VALIDATION FLAGS

Flag	Interpretation
J	The analyte was positively identified; the associated numerical value is the approximate concentration of the analyte in the sample.
NJ	The analysis indicates the presence of an analyte that has been tentatively identified and the associated numerical value represents its approximate concentration.
N	The analysis indicates the present of an analyte for which there is presumptive evidence to make a tentative identification.
M	The analyte results show a matrix effect.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
UJ	The analyte was not detected above the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.

Two types of data qualifying codes or flags were applied in the course of the data review. The data validation flags indicate data that are more than normally biased and/or variable, not representative of field conditions, or are not usable for decision-making. These codes and their definitions are presented in the hierarchy stipulated in the USEPA National Functional Guidelines for Data Review (September 1994). Further information on the flags applied is given by the reason codes (refer to Table 4-5).

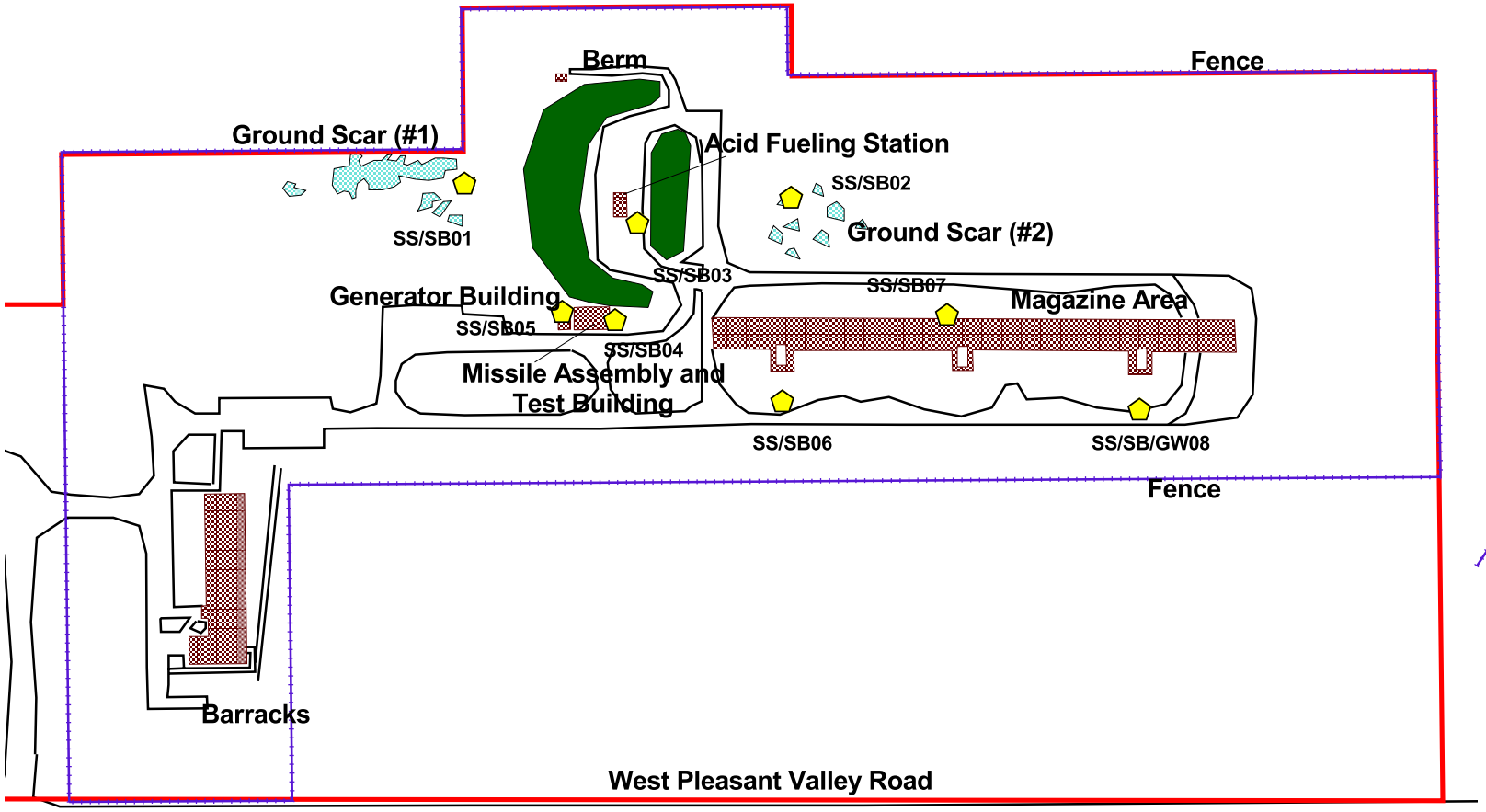
TABLE 4-5
DATA VALIDATION REASON CODES

GC/MS Organics		GC and HPLC Organics		Inorganics and Conventionals	
Code	**Interpretation**	**Code**	**Interpretation**	**Code**	**Interpretation**
a	Incorrect or incomplete analytical sequence	a	Incorrect or incomplete analytical sequence	a	Incorrect or incomplete analytical sequence
c	Calibration failure; poor or unstable response	b	Instrument performance failure	c	Calibration failure
d	MS/MSD imprecision	c	Calibration failure; poor or unstable response	d	MS/MSD imprecision
e	LCSD imprecision	d	MS/MSD imprecision	e	LCSD imprecision
f	Field duplicate imprecision	e	LCSD imprecision	f	Field duplicate imprecision
h	Holding time violation	f	Field duplicate imprecision	h	Holding time violation
i	Internal standard failure	g	Dual column confirmation imprecision	k	Laboratory duplicate imprecision
j	Poor mass spectrometer performance	h	Holding time violation	l	LCS recovery failure
l	LCS recovery failure	i	Internal standard failure	m	MS/MSD recovery failure
m	MS/MSD recovery failure	l	LCS recovery failure	n	ICS failure
p	Poor chromatography	m	MS/MSD recovery failure	o	Calibration blank contamination
r	Linearity failure in initial calibration	p	Poor chromatography	p	Preparation blank contamination
s	Surrogate failure	r	Linearity failure in initial calibration	r	Linearity failure in calibration or MSA
t	Tuning failure	s	Surrogate failure	s	Serial dilution failure
w	Identification criteria failure	u	No confirmation column	v	Post-digestion spike failure
x	Field blank contamination	w	Retention time failure	x	Field blank contamination
y	Trip blank contamination	x	Field blank contamination	z	Laboratory storage blank contamination
z	Method blank contamination	z	Method blank contamination	Q	Other - see bottom of data report for explanation
Q	Other - see bottom of data report for explanation	Q	Other - see bottom of data report for explanation		
K	Tentatively Identified Compounds (TICs)				

The reason code indicates the type of quality control failure that lead to the application of the data validation flag.

TABLE 4-6
LABORATORY DATA FLAGS

Flag	Interpretation
Organic Data	
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	Reported value is estimated. This could arise because the compound is a TIC and was not calibrated or the compound was detected at a level less than the CRQL.
N	Applied to all TICs when a definitive compound is reported. Not used for generic descriptions of TICs such as "chlorinated hydrocarbon".
NJ	Applied to TICs when an estimated amount has been determined for a definitive compound.
P	Used for Pesticide/PCB target analytes when more than 25% difference in quantitation exists between the two columns. The lower of the 2 values is reported and flagged.
C	Used for Pesticide/PCB target analytes when the presence is confirmed by GC-MS.
B	Used when the reported target analyte or TIC is also found in the blank.
E	Used for target analytes when the reported value exceeds the upper limit of the calibration curve.
D	Used to indicate that the value for the analyte was obtained from a diluted re-analysis. Separate Form Is are used for original analysis and diluted re-analysis. All results on the diluted Form I will be flagged with a D.
A	Used to indicate that the reported TIC is a suspected aldol condensation product.
X, Y, Z	Laboratory defined flags.
Inorganic Data	
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
B	The reported value was obtained from a reading that was less than the CRDL but greater than or equal to the IDL.
E	Estimated value
M	Duplicate injection precision was not met.
N	Spiked sample recovery was not within control limits.
S	Reported value determined by method of standard additions (MSA).
W	Post digestion spike for graphite furnace AA analysis is out of control limits and sample absorbance is less than 50% of spike absorbance.



N

Legend

- Sample Locations
- Demolished Structures
- Fenceline
- Launch Area Boundary

200 0 200 400 Feet

Source: Sebesta & Associates, Inc.,1998; USGS Digital Orthophoto Quadrangle (DOQ) Data, Berea,1994; Aerial Photography, May 3, 1962

FIGURE 4-1
SAMPLE LOCATION

FORMER NIKE MISSILE
SITE CL-59
LAUNCH AREA

PARMA, CUYAHOGA COUNTY OHIO

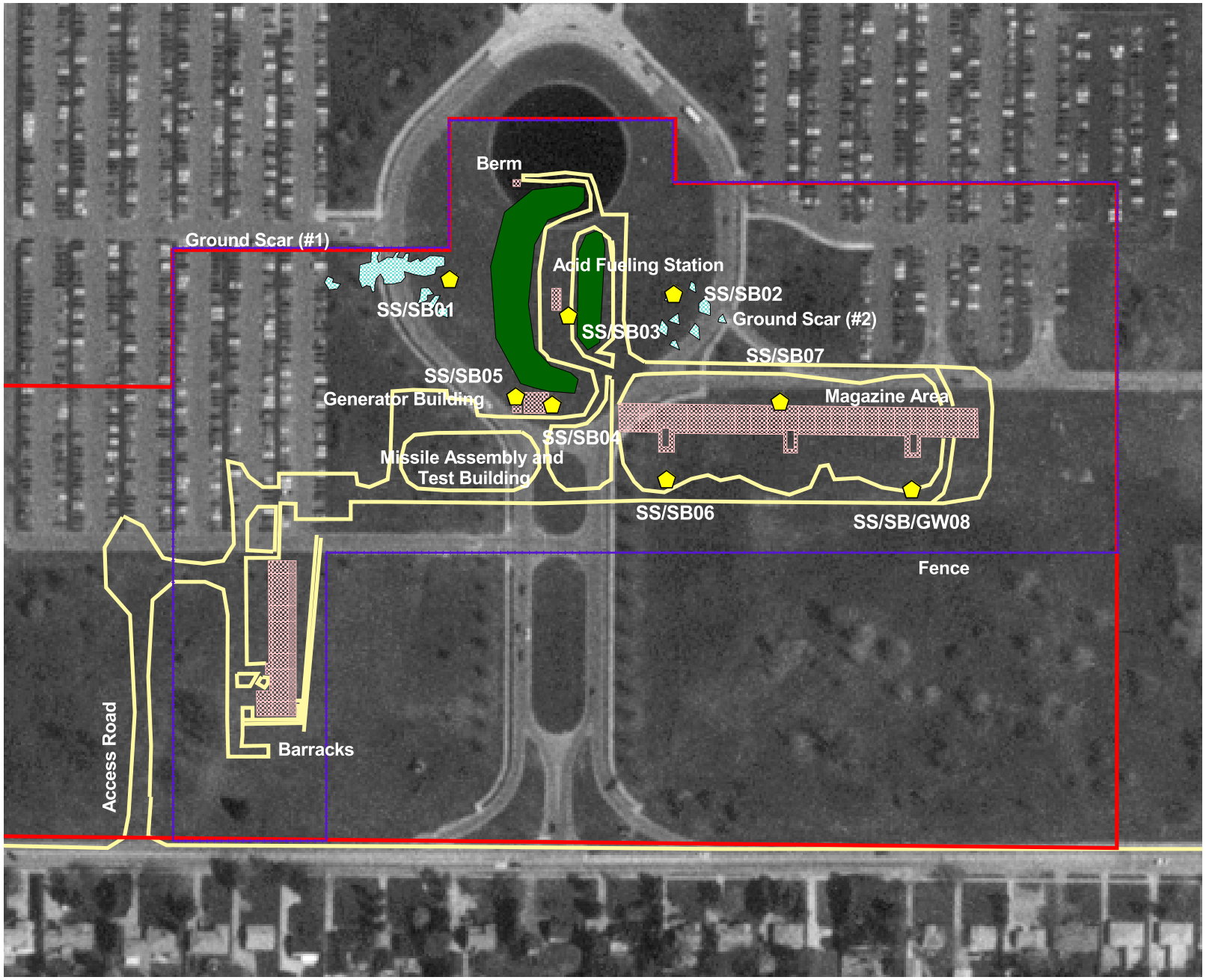
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

U.S. ARMY CORPS OF ENGINEERS

PLEXUS scientific

PROJECT NO. 0032-005B

FILE NO. cl 59.APR



N

Legend

- Sample Locations
- Demolished Structures
- Fenceline
- Launch Area Boundary

200 0 200 400 Feet

Source: Sebesta & Associates, Inc.,1998; USGS Digital Orthophoto Quadrangle (DOQ) Data, Berea,1994; Aerial Photography, May 3, 1962

FIGURE 4-2
SAMPLE LOCATION OVERLAY

FORMER NIKE MISSILE SITE CL-59
LAUNCH AREA

PARMA, CUYAHOGA COUNTY OHIO

U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
LOUISVILLE, KENTUCKY

PLEXUS scientific

PROJECT NO. 0032-005B

FILE NO. cl 59.APR

5. PRESENTATION OF ANALYTICAL RESULTS

Eight surface and twenty-two subsurface soil samples were collected during the field activities. Six of the borings were installed at locations of structures formerly at the Nike site that may have impacted soil or groundwater quality. One groundwater sample was collected from an open borehole adjacent to the eastern most missile magazine to give an indication of groundwater quality at that location. Groundwater did not accumulate in any other borehole. Two of the borings were in areas of ground disturbance identified from historic aerial photographs during the PA. The analytical program and rationale were presented in Section 4. The sample locations, description, analytical suite presented on Table 4-1. A summary of the compounds detected in soils is presented in Tables 5-1 and 5-2 and a summary of the compounds detected in groundwater is presented in Tables 5-3 and 5-4. Complete analytical results including tentatively identified compounds are presented in Appendix C. Sample collection field sheets are contained in Appendix B.

VOCs were detected in six of the eight surface soil samples and in ten of the 22 subsurface soil samples but no concentrations exceed the Region 9 residential soil PRGs. VOCs were also detected in the groundwater sample and did not exceed the Region 9 PRG for tap water.

PAHs were detected in all surface soil samples and 17 of the 22 subsurface soil samples. Total PAH concentrations ranged from 104 to 4373 µg/kg in surface soil and from non-detect to 833 µg/kg in the subsurface soil samples. The greatest number and concentrations of PAHs were at or near the ground surface on the south and east portions of the site. Only benzo(a)pyrene in SS05, SS06, SS07 and SS08; dibenz(a,h)anthracene in SS06 and SS08; and benzo(b)fluoranthene in SS08 exceeded the Region 9 Residential Soil PRGs. Note that dibenz(a,h)anthracene and benzo(b)fluoranthene exceeded the PRGs in the sample but not in the associated field duplicate. No subsurface soils PAH concentrations exceeded the Region 9 PRGs.

PAHs are ubiquitous in soil. PAHs are a group of over 100 different chemicals that are formed during the incomplete burning of coal, oil and gas, garbage, or other organic substances. PAHs enter the environment mostly as releases to air from volcanoes, forest fires, residential wood burning, and exhaust from automobiles and trucks. PAHs are found in asphalt, coal tar, crude oil, creosote, and roofing tar, but a few are used in medicines or to make dyes, plastics, and pesticides. PAHs generally occur as complex mixtures (for example, as part of combustion products such as soot), not as single compounds. They are found throughout the environment in the air, water, and soil. They can occur in the air, either attached to dust particles or as solids in soil or sediment (ATSDR, 1995).

The Agency for Toxic Substances and Disease Registry (ATSDR) reports the urban background soil concentration as 165 to 220 µg/kg for benzo(a)pyrene and 15,000 to 62,000 µg/kg for benzo(b)fluoranthene (ATSDR, 1995). The PAH levels detected were mostly within these concentration ranges. Only benzo(a)pyrene in SS06 and SS08 exceeds the urban background soil concentration upper limit.

Eight PAHs were detected in the groundwater sample. Benzo(a)pyrene and benzo(a)anthracene exceed the Region 9 PRG for tap water. Benzo(a)pyrene was just below the 0.2 µg/L Maximum Contaminant Level (MCL) for drinking water. There is no MCL for benzo(a)anthracene. Naphthalene is the only noncarcinogenic PAH to exceed ten percent of the tap water PRG. The PAH detections may not accurately represent groundwater conditions as the groundwater sample was highly turbid. Although groundwater contamination cannot be ruled out, the very limited solubility of PAHs makes it likely that the PAH detections were associated with the suspended materials in the sample.

There were miscellaneous detections of several other organic compounds in soils. None of the detections exceeded Region 9 Residential Soil PRGs.

Bis(2-ethylhexyl)phthalate and caprolactam were detected in groundwater. The phthalate exceeded the Region 9 tap water PRG. Bis(2-ethylhexyl)phthalate is a common laboratory contaminant and sampling artifact, but was not present in the laboratory blanks.

PCBs were not detected in either soils or the groundwater sample. The groundwater sample was analyzed for pesticides and none were detected.

As expected in all soils, a variety of metals were detected. Arsenic exceeded PRGs in all samples collected. Arsenic concentrations ranged from 8.5 to 14.2 mg/kg in surface soils and from 8 to 27.6 mg/kg in subsurface soils. Arsenic is found at naturally high levels in soils in portions of Ohio. Iron was detected in all soil samples collected and exceeded the Region 9 PRGs in seven of the eight surface soil samples and twelve of the twenty-two subsurface soil samples and exceeded ten percent of the PRG in all other soil samples. Naturally occurring iron rich nodules were noted in several of the samples and thus the likely source of iron is the native geologic materials. The noncarcinogenic metals, aluminum and manganese, exceeded ten percent of the residential soil PRGs in all samples (except for manganese in SB08C). Thallium exceeded ten percent of the PRG in five surface and five subsurface soil samples.

Arsenic exceeded the tap water PRG and thallium in groundwater exceeded both the tap water PRG and the Safe Drinking Water Act MCL (2 µg/L). Antimony exceeded ten percent of the Region 9 tap water PRG. The groundwater sample may not be representative of the water in the formation as the water collected was excessively turbid prior to filtering.

TABLE 5-1
SUMMARY OF ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Scar 1			Scar 1			Scar 2			Scar 2			Acid Fueling Station			Acid Fueling Station		
Sample ID		CL59-SS01			CL59-SB01A			CL59-SS02			CL59-SB02A			CL59-SS03			CL59-SB03A		
Sample Depth (feet)		0-1			2-4			0-1			3-4			0-1			3-5		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/6/2001			8/6/2001		
Laboratory	Residential Soil	STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles - Method 8260 (ug/kg)																			
1,2,4-Trichlorobenzene*	650,000	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U		--	U	
1,2-Dibromo-3-chloropropane	450	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U		--	U	
1,2-Dichlorobenzene*	370,000	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U		--	U	
1,3-Dichlorobenzene*	13,000	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U		--	U	
1,4-Dichlorobenzene	3,400	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U		--	U	
2-Butanone (MEK)*	7,325,377	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c
2-Hexanone	--	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c
Acetone*	1,569,639	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c
Benzene	650	--	U		--	U		--	U		--	U		--	U		--	U	
Methylene Chloride	8,881	--	U		--	U		--	U		--	U		--	U		--	U	
Toluene*	520,000	**1.4**	J		**0.94**	J		**0.68**	J		--	U		--	U		--	U	
Xylenes (total)*	210,000	--	U		--	U		--	U		--	U		--	U		--	U	
Semivolatiles - Method 8270 (ug/kg)																			
2,4-Dimethylphenol*	1,222,062	--	U	R,l	--	U	R,l	--	U	R,l	--	U	R,l	--	U		--	U	
2,4-Dinitrophenol*	122,206	--	U	R,c	--	U	R,c	--	U	R,c	--	U	R,c	--	U	R,c	--	U	R,c
2-Methylnaphthalene	--	--	U		--	U		--	U		--	U		--	U		--	U	
3,3'-Dichlorobenzidine	1,081	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l
4-Nitrophenol*	488,825	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	R,l	--	U	R,l
Acenaphthene*	3,681,706	--	U		--	U		--	U		--	U		--	U		--	U	
Anthracene*	21,896,121	--	U		--	U		--	U		--	U		--	U		--	U	
Atrazine	2,200	--	U		--	U		--	U		--	U		--	U		--	U	
Benzaldehyde*	6,100,000	--	U		--	U		--	U		--	U		--	U		--	U	
Benzo(a)anthracene	621	--	U		--	U		--	U		--	U		--	U		--	U	
Benzo(a)pyrene	62	--	U		--	U		--	U		--	U		--	U		--	U	
Benzo(b)fluoranthene	621	--	U		--	U		--	U		--	U		**72**	J		--	U	
Benzo(ghi)perylene	--	--	U		--	U		--	U		--	U		**69**	J		--	U	
Benzo(k)fluoranthene	6,215	--	U		--	U		--	U		--	U		--	U		--	U	
Bis(2-Ethylhexyl)phthalate	34,741	--	U		--	U		--	U		--	U		--	U		--	U	
Carbazole	24,319	--	U		--	U		--	U		--	U		--	U		--	U	
Chrysene	62,148	--	U		--	U		**56**	J		--	U		--	U		**62**	J	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-1
SUMMARY OF ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Scar 1			Scar 1			Scar 2			Scar 2			Acid Fueling Station			Acid Fueling Station		
Sample ID		CL59-SS01			CL59-SB01A			CL59-SS02			CL59-SB02A			CL59-SS03			CL59-SB03A		
Sample Depth (feet)		0-1			2-4			0-1			3-4			0-1			3-5		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/6/2001			8/6/2001		
Laboratory	Residential Soil	STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Dibenz(a,h)anthracene	62	--	U		--	U		--	U		--	U		--	U		--	U	
Dibenzofuran*	290,526	--	U		--	U		--	U		--	U		--	U		--	U	
Fluoranthene*	2,293,610	--	U		--	U		**96**	J		--	U		**68**	J		**150**	J	
Fluorene*	2,643,614	--	U		--	U		--	U		--	U		--	U		--	U	
Hexachlorocyclopentadiene*	423,336	--	U	UJ,I	--	U	UJ,I	--	U	UJ,I	--	U	UJ,I	--	U		--	U	
Indeno(1,2,3-cd)pyrene	621	--	U		--	U		--	U		--	U		--	U		--	U	
Naphthalene*	55,916	--	U		--	U		--	U		--	U		--	U		--	U	
Phenanthrene	--	--	U		--	U		**68**	J		--	U		--	U		**120**	J	
Pyrene*	2,308,676	--	U		--	U		**79**	J		--	U		**61**	J		**110**	J	
PAHs - Method 8270 SIM (ug/kg)																			
1-Methylnaphthalene	--	--	U		--	U		--	U		--	U		--	U		--	U	
2-Methylnaphthalene	--	--	U		--	U		--	U		**6.7**	J		--	U		--	U	
Acenaphthene*	3,681,706	--	U		--	U		**9.8**			--	U		--	U		**16**		
Acenaphthylene	--	--	U		--	U		--	U		--	U		**5.9**	J		--	U	
Anthracene*	21,896,121	--	U		--	U		**13**			--	U		**3.9**	J		**30**		
Benzo(a)anthracene	621	**7**	J		--	U		**44**			--	U		**42**			**61**		
Benzo(a)pyrene	62	**8.7**			--	U		**43**			--	U		**56**			**54**		
Benzo(b)fluoranthene	621	**12**			--	U		**51**			--	U		**77**			**50**		
Benzo(ghi)perylene	--	**9.3**			--	U		**32**			--	U		**44**			**32**		
Benzo(k)fluoranthene	6,215	**6.6**	J		--	U		**31**			--	U		**37**			**43**		
Carbazole	24,319	--	U		--	U		**13**		M,m	--	U		**3.5**	J		**14**		
Chrysene	62,148	**15**			**17**			**58**			**25**			**52**			**62**		
Dibenz(a,h)anthracene	62	--	U		--	U		**7.9**			--	U		**10**			**8.8**		
Fluoranthene*	2,293,610	**19**			--	U		**110**			--	U		**74**			**170**		
Fluorene*	2,643,614	--	U		--	U		**9.2**			--	U		--	U	R,c	**18**		J,c
Indeno(1,2,3-cd)pyrene	621	**6.2**	J		--	U		**26**			--	U		**37**			**29**		
Naphthalene*	55,916	--	U		--	U		--	U		--	U		--	U		**5.5**	J	
Phenanthrene	--	**8.4**			--	U		**73**			**20**			**22**			**140**		
Pyrene*	2,308,676	**12**			--	U		**69**			--	U		**53**			**100**		
PCBs - Method 8082 (ug/kg)		--			--			--			--			--			--		

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-1
SUMMARY OF ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Acid Fueling Station			Acid Fueling Station			Assembly & Test			Assembly & Test			Assembly & Test			Assembly & Test		
Sample ID		CL59-SB03B			CL59-SB03C			CL59-SS04			CL59-SB04A			CL59-SB04B			CL59-SB04C		
Sample Depth (feet)		9-10.5			13-14.3			0-1			3-4			9-10			11-13		
Sample Date	Region 9 PRG	8/6/2001			8/6/2001			8/6/2001			8/6/2001			8/6/2001			8/6/2001		
Laboratory	Residential Soil	STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles - Method 8260 (ug/kg)																			
1,2,4-Trichlorobenzene*	650,000	--	U		--	U	UJ,s	--	U		--	U		--	U	UJ,s	--	U	
1,2-Dibromo-3-chloropropane	450	--	U		--	U	UJ,s	--	U		--	U		--	U	UJ,s	--	U	
1,2-Dichlorobenzene*	370,000	--	U		--	U	UJ,s	--	U		--	U		--	U	UJ,s	--	U	
1,3-Dichlorobenzene*	13,000	--	U		--	U	UJ,s	--	U		--	U		--	U	UJ,s	--	U	
1,4-Dichlorobenzene	3,400	--	U		--	U	UJ,s	--	U		--	U		--	U	UJ,s	--	U	
2-Butanone (MEK)*	7,325,377	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	**3.4**	J	J,c	--	U	UJ,c
2-Hexanone	--	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c
Acetone*	1,569,639	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	**13**	J	J,c	--	U	UJ,c
Benzene	650	--	U		**1.1**	J	J,s	--	U		--	U		--	U	UJ,s	--	U	
Methylene Chloride	8,881	--	U		**2.3**	J	J,s	--	U		--	U		--	U	UJ,s	--	U	
Toluene*	520,000	--	U		**2.5**	J	J,s	--	U		--	U		--	U	UJ,s	--	U	
Xylenes (total)*	210,000	--	U		--	U	UJ,s	--	U		--	U		--	U	UJ,s	--	U	
Semivolatiles - Method 8270 (ug/kg)																			
2,4-Dimethylphenol*	1,222,062	--	U		--	U		--	U		--	U		--	U		--	U	
2,4-Dinitrophenol*	122,206	--	U	R,c	--	U	R,c	--	U	R,c	--	U	R,c	--	U	R,c	--	U	R,c
2-Methylnaphthalene	--	--	U		--	U		--	U		--	U		--	U		--	U	
3,3'-Dichlorobenzidine	1,081	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l
4-Nitrophenol*	488,825	--	U	R,l	--	U	R,l	--	U	R,l	--	U	R,l	--	U	R,l	--	U	R,l
Acenaphthene*	3,681,706	--	U		--	U		--	U		--	U		--	U		--	U	
Anthracene*	21,896,121	--	U		--	U		--	U		--	U		--	U		--	U	
Atrazine	2,200	--	U		--	U		--	U		--	U		--	U		--	U	
Benzaldehyde*	6,100,000	--	U		--	U		--	U		--	U		--	U		--	U	
Benzo(a)anthracene	621	--	U		--	U		**79**	J		--	U		--	U		--	U	
Benzo(a)pyrene	62	--	U		--	U		**89**	J		--	U		--	U		--	U	
Benzo(b)fluoranthene	621	--	U		--	U		**110**	J		--	U		--	U		--	U	
Benzo(ghi)perylene	--	--	U		--	U		--	U		--	U		--	U		--	U	
Benzo(k)fluoranthene	6,215	--	U		--	U		**76**	J		--	U		--	U		--	U	
Bis(2-Ethylhexyl)phthalate	34,741	--	U		--	U		**76**	J		--	U		--	U		--	U	
Carbazole	24,319	--	U		--	U		--	U		--	U		--	U		--	U	
Chrysene	62,148	--	U		--	U		**100**	J		--	U		--	U		--	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-1
SUMMARY OF ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Acid Fueling Station			Acid Fueling Station			Assembly & Test			Assembly & Test			Assembly & Test			Assembly & Test		
Sample ID		CL59-SB03B			CL59-SB03C			CL59-SS04			CL59-SB04A			CL59-SB04B			CL59-SB04C		
Sample Depth (feet)		9-10.5			13-14.3			0-1			3-4			9-10			11-13		
Sample Date	Region 9 PRG	8/6/2001			8/6/2001			8/6/2001			8/6/2001			8/6/2001			8/6/2001		
Laboratory	Residential Soil	STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Dibenz(a,h)anthracene	62	--	U		--	U		--	U		--	U		--	U		--	U	
Dibenzofuran*	290,526	--	U		--	U		--	U		--	U		--	U		--	U	
Fluoranthene*	2,293,610	--	U		--	U		**170**	J		--	U		--	U		--	U	
Fluorene*	2,643,614	--	U		--	U		--	U		--	U		--	U		--	U	
Hexachlorocyclopentadiene*	423,336	--	U		--	U		--	U		--	U		--	U		--	U	
Indeno(1,2,3-cd)pyrene	621	--	U		--	U		--	U		--	U		--	U		--	U	
Naphthalene*	55,916	--	U		--	U		--	U		--	U		--	U		--	U	
Phenanthrene	--	--	U		--	U		**78**	J		--	U		--	U		--	U	
Pyrene*	2,308,676	--	U		--	U		**150**	J		--	U		--	U		--	U	
PAHs - Method 8270 SIM (ug/kg)																			
1-Methylnaphthalene	--	--	U		**4**	J		**5.6**	J		--	U		--	U		**8**		
2-Methylnaphthalene	--	--	U		**5.2**	J		**6.7**	J		--	U		**3.8**	J		**11**		
Acenaphthene*	3,681,706	--	U		--	U		**5.7**	J		--	U		--	U		--	U	
Acenaphthylene	--	--	U		--	U		--	U		--	U		--	U		--	U	
Anthracene*	21,896,121	--	U		--	U		**13**			--	U		--	U		--	U	
Benzo(a)anthracene	621	--	U		--	U		**79**			**4.6**	J		**7.1**	J		--	U	
Benzo(a)pyrene	62	--	U		--	U		**94**			**5.7**	J		**11**			--	U	
Benzo(b)fluoranthene	621	--	U		--	U		**120**			**9.9**			**14**			**5.1**	J	
Benzo(ghi)perylene	--	--	U		**14**			**62**			**7.8**	J		**11**			**17**		
Benzo(k)fluoranthene	6,215	--	U		--	U		**65**			**3**	J		**4.8**	J		--	U	
Carbazole	24,319	--	U		--	U		**11**			--	U		--	U		--	U	
Chrysene	62,148	--	U		**23**			**98**			**14**			**15**			**26**		
Dibenz(a,h)anthracene	62	--	U		--	U		**15**			--	U		--	U		--	U	
Fluoranthene*	2,293,610	--	U		--	U		**190**			**11**			**12**			--	U	
Fluorene*	2,643,614	--	U	R,c	--	U	R,c	**5.5**	J	J,c	--	U	R,c	--	U	R,c	--	U	R,c
Indeno(1,2,3-cd)pyrene	621	--	U		--	U		**56**			--	U		**6.8**	J		--	U	
Naphthalene*	55,916	--	U		--	U		**5.3**	J		--	U		--	U		**4**	J	
Phenanthrene	--	**3.5**	J		**18**			**79**			**9.6**			**12**			**37**		
Pyrene*	2,308,676	--	U		--	U		**120**			**7.3**	J		**9.2**			**8.2**		
PCBs - Method 8082 (ug/kg)		--			--			--			--			--			--		

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-1
SUMMARY OF ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg		
Sample ID		CL59-SS05			CL59-SS05			CL59-SS105 (duplicate			CL59-SB05A			CL59-SB05B			CL59-SB05C		
Sample Depth (feet)		0-1			0-1			0-1			4-5			8-9.5			13-14		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles - Method 8260 (ug/kg)																			
1,2,4-Trichlorobenzene*	650,000	--	U		--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m
1,2-Dibromo-3-chloropropane	450	--	U		--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m
1,2-Dichlorobenzene*	370,000	--	U		--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m
1,3-Dichlorobenzene*	13,000	--	U		--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m
1,4-Dichlorobenzene	3,400	--	U		--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m
2-Butanone (MEK)*	7,325,377	--	U		--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c
2-Hexanone	--	--	U		--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c
Acetone*	1,569,639	**11**	J		--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c
Benzene	650	--	U		--	U		--	U		--	U		--	U		--	U	
Methylene Chloride	8,881	**2**	J		--	U		--	U		--	U		--	U		--	U	
Toluene*	520,000	--	U		--	U		--	U		--	U		--	U		**0.81**	J	
Xylenes (total)*	210,000	--	U		--	U		--	U		--	U		--	U		--	U	
Semivolatiles - Method 8270 (ug/kg)																			
2,4-Dimethylphenol*	1,222,062	--	U		--	U	R,l	--	U	R,l	--	U	R,l	--	U	R,l	--	U	R,l
2,4-Dinitrophenol*	122,206	--	U	R,c	--	U		--	U		--	U	R,c	--	U		--	U	R,c
2-Methylnaphthalene	--	--	U		--	U		--	U		--	U		--	U		--	U	
3,3'-Dichlorobenzidine	1,081	--	U	R,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l
4-Nitrophenol*	488,825	--	U	R,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l
Acenaphthene*	3,681,706	--	U		--	U		--	U		--	U		--	U		--	U	
Anthracene*	21,896,121	--	U		--	U		--	U		--	U		--	U		--	U	
Atrazine	2,200	--	U	R,c	--	U		--	U		--	U		--	U		--	U	
Benzaldehyde*	6,100,000	--	U	R,c	--	U		--	U		--	U		--	U		--	U	
Benzo(a)anthracene	621	--	U		**76**	J		**100**	J		--	U		--	U		--	U	
Benzo(a)pyrene	62	--	U		**110**	J		**140**	J		--	U		--	U		--	U	
Benzo(b)fluoranthene	621	--	U		**140**	J		**170**	J		--	U		--	U		--	U	
Benzo(ghi)perylene	--	--	U		**86**	J		**110**	J		--	U		--	U		--	U	
Benzo(k)fluoranthene	6,215	--	U		**77**	J		**110**	J		--	U		--	U		--	U	
Bis(2-Ethylhexyl)phthalate	34,741	--	U		--	U		--	U		--	U		--	U		--	U	
Carbazole	24,319	--	U		--	U		--	U		--	U		--	U		--	U	
Chrysene	62,148	--	U		**100**	J		**140**	J		--	U		--	U		--	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-1
SUMMARY OF ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg		
Sample ID		CL59-SS05			CL59-SS05			CL59-SS105 (duplicate			CL59-SB05A			CL59-SB05B			CL59-SB05C		
Sample Depth (feet)		0-1			0-1			0-1			4-5			8-9.5			13-14		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Dibenz(a,h)anthracene	62	--	U		--	U		--	U		--	U		--	U		--	U	
Dibenzofuran*	290,526	--	U		--	U		--	U		--	U		--	U		--	U	
Fluoranthene*	2,293,610	--	U		**130**	J		**200**	J		--	U		--	U		--	U	
Fluorene*	2,643,614	--	U		--	U		--	U		--	U		--	U		--	U	
Hexachlorocyclopentadiene*	423,336	--	U	R,c	--	U	UJ,I	--	U	UJ,I	--	U	UJ,I	--	U	UJ,I	--	U	UJ,I
Indeno(1,2,3-cd)pyrene	621	--	U		--	U		**97**	J		--	U		--	U		--	U	
Naphthalene*	55,916	--	U		--	U		--	U		--	U		--	U		--	U	
Phenanthrene	--	--	U		--	U		**72**	J		--	U		--	U		--	U	
Pyrene*	2,308,676	--	U		**110**	J		**170**	J		--	U		--	U		--	U	
PAHs - Method 8270 SIM (ug/kg)																			
1-Methylnaphthalene	--	NA			--	U		--	U		--	U		--	U		--	U	
2-Methylnaphthalene	--	NA			**4.8**	J		**5.3**	J		--	U		--	U		--	U	
Acenaphthene*	3,681,706	NA			--	U		**4.7**	J		--	U		--	U		--	U	
Acenaphthylene	--	NA			**9.1**			**15**			--	U		--	U		--	U	
Anthracene*	21,896,121	NA			**9.2**			**16**			--	U		--	U		--	U	
Benzo(a)anthracene	621	NA			**88**			**120**			--	U		--	U		--	U	
Benzo(a)pyrene	62	NA			**130**			**150**			--	U		--	U		--	U	
Benzo(b)fluoranthene	621	NA			**150**			**210**			--	U		--	U		--	U	
Benzo(ghi)perylene	--	NA			**82**			**100**			**6**	J		--	U		**11**		
Benzo(k)fluoranthene	6,215	NA			**63**			**110**			--	U		--	U		--	U	
Carbazole	24,319	NA			**5.8**	J	M,m	**8.5**		M,m	--	U		--	U		--	U	
Chrysene	62,148	NA			**110**			**140**			**8.6**			--	U		**17**		
Dibenz(a,h)anthracene	62	NA			**24**			**30**			--	U		--	U		--	U	
Fluoranthene*	2,293,610	NA			**160**			**250**			--	U		--	U		--	U	
Fluorene*	2,643,614	NA			--	U		**5.8**	J		--	U		--	U		--	U	
Indeno(1,2,3-cd)pyrene	621	NA			**80**			**97**			--	U		--	U		--	U	
Naphthalene*	55,916	NA			**5.2**	J		**5.6**	J		--	U		--	U		--	U	
Phenanthrene	--	NA			**55**			**81**			--	U		--	U		**25**		
Pyrene*	2,308,676	NA			**110**			**160**			--	U		--	U		**4.3**	J	
PCBs - Method 8082 (ug/kg)		--			--			--			--			--			--		

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-1
SUMMARY OF ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)		
Sample ID		CL59-SS06			CL59-SS06			CL59-SS106 (duplicate)			CL59-SB06A			CL59-SB06B			CL59-SB06C		
Sample Depth (feet)		0-1			0-1			0-1			6-8			10-12			12-13.75		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles - Method 8260 (ug/kg)																			
1,2,4-Trichlorobenzene*	650,000	--	U		--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m
1,2-Dibromo-3-chloropropane	450	--	U		--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m
1,2-Dichlorobenzene*	370,000	--	U		--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m
1,3-Dichlorobenzene*	13,000	--	U		--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m
1,4-Dichlorobenzene	3,400	--	U		--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m
2-Butanone (MEK)*	7,325,377	--	U		--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c
2-Hexanone	--	--	U		--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c
Acetone*	1,569,639	**10**	J		--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c
Benzene	650	--	U		--	U		--	U		--	U		--	U		--	U	
Methylene Chloride	8,881	**2**	J		--	U		--	U		--	U		--	U		--	U	
Toluene*	520,000	--	U		--	U		**0.69**	J		--	U		**0.79**	J		--	U	
Xylenes (total)*	210,000	--	U		--	U		--	U		--	U		--	U		--	U	
Semivolatiles - Method 8270 (ug/kg)																			
2,4-Dimethylphenol*	1,222,062	--	U		--	U	R,l	--	U	R,l	--	U	R,l	--	U	R,l	--	U	R,l
2,4-Dinitrophenol*	122,206	--	U	R,c	--	U		--	U		--	U	R,c	--	U	R,c	--	U	R,c
2-Methylnaphthalene	--	--	U		--	U		--	U		--	U		--	U		--	U	
3,3'-Dichlorobenzidine	1,081	--	U	R,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l
4-Nitrophenol*	488,825	--	U	R,l	--	U	M,m	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l
Acenaphthene*	3,681,706	--	U		--	U		--	U		--	U		--	U		--	U	
Anthracene*	21,896,121	--	U		**85**	J		**120**	J		--	U		--	U		--	U	
Atrazine	2,200	--	U	R,c	--	U		--	U		--	U		--	U		--	U	
Benzaldehyde*	6,100,000	--	U	R,c	--	U		--	U		--	U		--	U		--	U	
Benzo(a)anthracene	621	--	U		**340**	J		**280**	J		--	U		--	U		--	U	
Benzo(a)pyrene	62	--	U		**400**			**290**	J		--	U		--	U		--	U	
Benzo(b)fluoranthene	621	--	U		**550**			**330**	J		--	U		--	U		--	U	
Benzo(ghi)perylene	--	--	U		**250**	J		**210**	J		--	U		--	U		--	U	
Benzo(k)fluoranthene	6,215	--	U		**170**	J		**200**	J		--	U		--	U		--	U	
Bis(2-Ethylhexyl)phthalate	34,741	--	U		--	U		--	U		--	U		--	U		--	U	
Carbazole	24,319	--	U		--	U		**74**	J		--	U		--	U		--	U	
Chrysene	62,148	--	U		**390**			**320**	J		--	U		--	U		--	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-1
SUMMARY OF ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)		
Sample ID		CL59-SS06			CL59-SS06			CL59-SS106 (duplicate)			CL59-SB06A			CL59-SB06B			CL59-SB06C		
Sample Depth (feet)		0-1			0-1			0-1			6-8			10-12			12-13.75		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Dibenz(a,h)anthracene	62	--	U		**66**	J		--	U		--	U		--	U		--	U	
Dibenzofuran*	290,526	--	U		--	U		--	U		--	U		--	U		--	U	
Fluoranthene*	2,293,610	**300**	J		**590**			**680**			--	U		--	U		--	U	
Fluorene*	2,643,614	--	U		**96**	J		**62**	J		--	U		--	U		--	U	
Hexachlorocyclopentadiene*	423,336	--	U	R,c	--	U		--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l
Indeno(1,2,3-cd)pyrene	621	--	U		**230**	J		**190**	J		--	U		--	U		--	U	
Naphthalene*	55,916	--	U		--	U		--	U		--	U		--	U		--	U	
Phenanthrene	--	**210**	J		**350**	J		**520**			--	U		--	U		--	U	
Pyrene*	2,308,676	**280**	J		**640**			**550**			--	U		--	U		--	U	
PAHs - Method 8270 SIM (ug/kg)																			
1-Methylnaphthalene	--	NA			**9.9**			**11**			--	U		--	U		--	U	
2-Methylnaphthalene	--	NA			**14**			**15**			--	U		--	U		--	U	
Acenaphthene*	3,681,706	NA			**36**			**62**			--	U		--	U		--	U	
Acenaphthylene	--	NA			**19**			**8.1**			--	U		--	U		--	U	
Anthracene*	21,896,121	NA			**120**		M,d	**140**			--	U		--	U		--	U	
Benzo(a)anthracene	621	NA			**350**		M,m	**320**			--	U		--	U		--	U	
Benzo(a)pyrene	62	NA			**450**		M,m	**330**			--	U		--	U		--	U	
Benzo(b)fluoranthene	621	NA			**410**		M,m	**380**			--	U		--	U		--	U	
Benzo(ghi)perylene	--	NA			**370**		M,m	**170**			--	U		--	U		--	U	
Benzo(k)fluoranthene	6,215	NA			**250**		M,m	**240**			--	U		--	U		--	U	
Carbazole	24,319	NA			**52**		M,d	**67**		M,m	--	U		--	U		--	U	
Chrysene	62,148	NA			**400**		M,m	**320**			**4.8**	J		--	U		**7.2**	J	
Dibenz(a,h)anthracene	62	NA			**100**		M,d	**53**			--	U		--	U		--	U	
Fluoranthene*	2,293,610	NA			**670**		M,m	**790**			--	U		--	U		--	U	
Fluorene*	2,643,614	NA			**35**		M,d	**68**			--	U		--	U		--	U	
Indeno(1,2,3-cd)pyrene	621	NA			**340**		M,m	**170**			--	U		--	U		--	U	
Naphthalene*	55,916	NA			**22**			**27**			--	U		--	U		--	U	
Phenanthrene	--	NA			**410**		M,m	**580**			--	U		--	U		**4.9**	J	
Pyrene*	2,308,676	NA			**500**		M,m	**470**			--	U		--	U		--	U	
PCBs - Method 8082 (ug/kg)		--			--			--			--			--			--		

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-1
SUMMARY OF ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)		
Sample ID		CL59-SS07			CL59-SS07			CL59-SS107 (duplicate)			CL59-SB07A			CL59-SB07B			CL59-SB07C			CL59-SB07D		
Sample Depth (feet)		0-1			0-1			0-1			6-8			10-12			14-16			18-19.1		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles - Method 8260 (ug/kg)																						
1,2,4-Trichlorobenzene*	650,000	**6**	J		--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m
1,2-Dibromo-3-chloropropane	450	**2**	J	J,c	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m
1,2-Dichlorobenzene*	370,000	**3**	J		--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m
1,3-Dichlorobenzene*	13,000	**2**	J		--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m
1,4-Dichlorobenzene	3,400	**2**	J		--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m	--	U	M,m
2-Butanone (MEK)*	7,325,377	--	U		--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c
2-Hexanone	--	**5**	J	J,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c
Acetone*	1,569,639	--	U		--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	**3.7**	J	J,c	--	U	UJ,c	--	U	UJ,c
Benzene	650	--	U		--	U		--	U		--	U		--	U		--	U		--	U	
Methylene Chloride	8,881	**2**	J		--	U		--	U		--	U		--	U		--	U		--	U	
Toluene*	520,000	--	U		--	U		--	U		--	U		--	U		--	U		--	U	
Xylenes (total)*	210,000	**2**	J	J,c	--	U		--	U		--	U		--	U		--	U		--	U	
Semivolatiles - Method 8270 (ug/kg)																						
2,4-Dimethylphenol*	1,222,062	--	U		--	U	R,l	--	U	R,l	--	U	R,l	--	U	R,l	--	U	R,l	--	U	R,l
2,4-Dinitrophenol*	122,206	--	U	R,c	--	U	R,c	--	U	R,c	--	U	R,c	--	U	R,c	--	U	R,c	--	U	R,c
2-Methylnaphthalene	--	--	U		--	U		--	U		--	U		--	U		--	U		**150**	J	
3,3'-Dichlorobenzidine	1,081	--	U	R,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l
4-Nitrophenol*	488,825	--	U	R,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l
Acenaphthene*	3,681,706	--	U		--	U		--	U		--	U		--	U		--	U		--	U	
Anthracene*	21,896,121	--	U		--	U		--	U		--	U		--	U		--	U		--	U	
Atrazine	2,200	--	U	R,c	--	U		--	U		--	U		--	U		--	U		--	U	
Benzaldehyde*	6,100,000	--	U	R,c	--	U		--	U		--	U		--	U		--	U		--	U	
Benzo(a)anthracene	621	--	U		--	U		**84**	J		--	U		--	U		--	U		--	U	
Benzo(a)pyrene	62	--	U		--	U		**98**	J		--	U		--	U		--	U		--	U	
Benzo(b)fluoranthene	621	--	U		--	U		**110**	J		--	U		--	U		--	U		--	U	
Benzo(ghi)perylene	--	--	U		--	U		--	U		--	U		--	U		--	U		--	U	
Benzo(k)fluoranthene	6,215	--	U		--	U		--	U		--	U		--	U		--	U		--	U	
Bis(2-Ethylhexyl)phthalate	34,741	--	U		--	U		--	U		--	U		--	U		--	U		--	U	
Carbazole	24,319	--	U		--	U		--	U		--	U		--	U		--	U		--	U	
Chrysene	62,148	--	U		--	U		**110**	J		--	U		--	U		--	U		--	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-1
SUMMARY OF ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)		
Sample ID		CL59-SS07			CL59-SS07			CL59-SS107 (duplicate)			CL59-SB07A			CL59-SB07B			CL59-SB07C			CL59-SB07D		
Sample Depth (feet)		0-1			0-1			0-1			6-8			10-12			14-16			18-19.1		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Dibenz(a,h)anthracene	62	--	U		--	U		--	U		--	U		--	U		--	U		--	U	
Dibenzofuran*	290,526	--	U		--	U		--	U		--	U		--	U		--	U		--	U	
Fluoranthene*	2,293,610	--	U		--	U		**120**	J		--	U		--	U		--	U		--	U	
Fluorene*	2,643,614	--	U		--	U		--	U		--	U		--	U		--	U		--	U	
Hexachlorocyclopentadiene*	423,336	--	U	R,c	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l
Indeno(1,2,3-cd)pyrene	621	--	U		--	U		--	U		--	U		--	U		--	U		--	U	
Naphthalene*	55,916	--	U		--	U		--	U		--	U		--	U		--	U		--	U	
Phenanthrene	--	--	U		--	U		--	U		--	U		--	U		--	U		**83**	J	
Pyrene*	2,308,676	--	U		--	U		**110**	J		--	U		--	U		--	U		--	U	
PAHs - Method 8270 SIM (ug/kg)																						
1-Methylnaphthalene	--	NA			--	U		--	U		--	U		--	U		**18**			**130**		
2-Methylnaphthalene	--	NA			--	U		**4.2**	J		--	U		--	U		**21**			**170**		
Acenaphthene*	3,681,706	NA			--	U		--	U		--	U		--	U		**4.9**	J		--	U	
Acenaphthylene	--	NA			--	U		**6.2**	J		--	U		--	U		--	U		--	U	
Anthracene*	21,896,121	NA			--	U		**10**			--	U		--	U		--	U		--	U	
Benzo(a)anthracene	621	NA			**30**			**100**			--	U		--	U		--	U		--	U	
Benzo(a)pyrene	62	NA			**38**			**110**			--	U		--	U		--	U		--	U	
Benzo(b)fluoranthene	621	NA			**53**			**120**			--	U		--	U		--	U		**8.8**		
Benzo(ghi)perylene	--	NA			**36**			**65**			--	U		--	U		**12**			**53**		
Benzo(k)fluoranthene	6,215	NA			**29**			**72**			--	U		--	U		--	U		--	U	
Carbazole	24,319	NA			--	U		**5.2**	J	M,m	--	U		--	U		--	U		--	U	
Chrysene	62,148	NA			**41**			**110**			**21**			**5.7**	J		**21**			**39**		
Dibenz(a,h)anthracene	62	NA			**9.9**			**23**			--	U		--	U		--	U		--	U	
Fluoranthene*	2,293,610	NA			**51**			**150**			**5.5**	J		--	U		--	U		**7**	J	
Fluorene*	2,643,614	NA			--	U		--	U		--	U		--	U		**8.6**			--	U	
Indeno(1,2,3-cd)pyrene	621	NA			**32**			**63**			--	U		--	U		--	U		--	U	
Naphthalene*	55,916	NA			--	U		--	U		--	U		--	U		**7.4**			**49**		
Phenanthrene	--	NA			**16**			**28**			**28**			**6.6**	J		**25**			**88**		
Pyrene*	2,308,676	NA			**36**			**100**			--	U		--	U		**7**	J		**18**		
PCBs - Method 8082 (ug/kg)		--			--			--			--			--			--			--		

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-1
SUMMARY OF ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)		
Sample ID		CL59-SS08			CL59-SS08			CL59-SS108 (duplicate)			CL59-SB08AA			CL59-SB08A			CL59-SB08B			CL59-SB08C		
Sample Depth (feet)		0-1			0-1			0-1			5-7			10-12			16-18			24-25.5		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles - Method 8260 (ug/kg)																						
1,2,4-Trichlorobenzene*	650,000	**6**	J		--	U		--	U		--	U		--	U		--	U		--	U	
1,2-Dibromo-3-chloropropane	450	**1**	J	J,c	--	U		--	U		--	U		--	U		--	U		--	U	
1,2-Dichlorobenzene*	370,000	**2**	J		--	U		--	U		--	U		--	U		--	U		--	U	
1,3-Dichlorobenzene*	13,000	**3**	J		--	U		--	U		--	U		--	U		--	U		--	U	
1,4-Dichlorobenzene	3,400	**3**	J		--	U		--	U		--	U		--	U		--	U		--	U	
2-Butanone (MEK)*	7,325,377	--	U		--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c
2-Hexanone	--	**3**	J	J,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	--	U	UJ,c
Acetone*	1,569,639	--	U		--	U	UJ,c	--	U	UJ,c	--	U	UJ,c	**9.1**	J	J,c	**9.6**	J	J,c	**4.6**	J	J,c
Benzene	650	--	U		--	U		--	U		--	U		--	U		--	U		--	U	
Methylene Chloride	8,881	**1**	J		--	U		--	U		**1.8**	J		--	U		**1.5**	J		--	U	
Toluene*	520,000	**2**	J		**0.86**	J		--	U		**0.98**	J		--	U		--	U		--	U	
Xylenes (total)*	210,000	**2**	J	J,c	--	U		--	U		--	U		--	U		--	U		--	U	
Semivolatiles - Method 8270 (ug/kg)																						
2,4-Dimethylphenol*	1,222,062	--	U		--	U		--	U		--	U		--	U		--	U		--	U	
2,4-Dinitrophenol*	122,206	--	U	R,c	--	U	R,c	--	U	R,c	--	U	R,c	--	U	R,c	--	U	R,c	--	U	R,c
2-Methylnaphthalene	--	--	U		--	U		--	U		--	U		**83**	J		--	U		**190**	J	
3,3'-Dichlorobenzidine	1,081	--	U	R,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l	--	U	UJ,l
4-Nitrophenol*	488,825	--	U	R,l	--	U	R,l	--	U	R,l	--	U	R,l	--	U	R,l	--	U	R,l	--	U	R,l
Acenaphthene*	3,681,706	--	U		**140**	J		--	U		--	U		--	U		--	U		--	U	
Anthracene*	21,896,121	--	U		**270**	J		--	U		--	U		--	U		--	U		--	U	
Atrazine	2,200	--	U	R,c	--	U		--	U		--	U		--	U		--	U		--	U	
Benzaldehyde*	6,100,000	--	U	R,c	--	U		--	U		--	U		--	U		--	U		--	U	
Benzo(a)anthracene	621	--	U		**520**			**94**	J		--	U		--	U		--	U		--	U	
Benzo(a)pyrene	62	--	U		**520**			**110**	J		--	U		--	U		--	U		--	U	
Benzo(b)fluoranthene	621	--	U		**630**			**130**	J		--	U		--	U		--	U		--	U	
Benzo(ghi)perylene	--	--	U		**280**	J		**70**	J		--	U		--	U		--	U		**80**	J	
Benzo(k)fluoranthene	6,215	--	U		**310**	J		**100**	J		--	U		--	U		--	U		--	U	
Bis(2-Ethylhexyl)phthalate	34,741	**940**	J		--	U		--	U		--	U		--	U		--	U		--	U	
Carbazole	24,319	--	U		**170**	J		--	U		--	U		--	U		--	U		--	U	
Chrysene	62,148	--	U		**570**			**110**	J		--	U		--	U		--	U		--	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-1
SUMMARY OF ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)		
Sample ID		CL59-SS08			CL59-SS08			CL59-SS108 (duplicate)			CL59-SB08AA			CL59-SB08A			CL59-SB08B			CL59-SB08C		
Sample Depth (feet)		0-1			0-1			0-1			5-7			10-12			16-18			24-25.5		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Dibenz(a,h)anthracene	62	--	U		**80**	J		--	U		--	U		--	U		--	U		--	U	
Dibenzofuran*	290,526	--	U		**79**	J		--	U		--	U		--	U		--	U		--	U	
Fluoranthene*	2,293,610	--	U		**1300**			**170**	J		--	U		--	U		--	U		--	U	
Fluorene*	2,643,614	--	U		**150**	J		--	U		--	U		--	U		--	U		--	U	
Hexachlorocyclopentadiene*	423,336	--	U	R,c	--	U		--	U		--	U		--	U		--	U		--	U	
Indeno(1,2,3-cd)pyrene	621	--	U		**260**	J		--	U		--	U		--	U		--	U		--	U	
Naphthalene*	55,916	--	U		--	U		--	U		--	U		--	U		--	U		**59**	J	
Phenanthrene	--	--	U		**1200**			**60**	J		--	U		--	U		--	U		**100**	J	
Pyrene*	2,308,676	--	U		**1100**			**150**	J		--	U		--	U		--	U		--	U	
PAHs - Method 8270 SIM (ug/kg)																						
1-Methylnaphthalene	--	NA			**22**			**4.9**	J		--	U		**70**			**20**			**150**		
2-Methylnaphthalene	--	NA			**33**			**6**	J		--	U		**95**			**14**			**220**		
Acenaphthene*	3,681,706	NA			**150**			**4.5**	J		--	U		--	U		--	U		**19**		
Acenaphthylene	--	NA			**7.2**	J		**9.9**			--	U		--	U		--	U		--	U	
Anthracene*	21,896,121	NA			**280**			**12**			--	U		--	U		--	U		**10**		
Benzo(a)anthracene	621	NA			**590**			**94**			--	U		--	U		--	U		--	U	
Benzo(a)pyrene	62	NA			**510**			**110**			--	U		--	U		--	U		--	U	
Benzo(b)fluoranthene	621	NA			**570**			**140**			--	U		**5.3**	J		**6.2**	J		**14**		
Benzo(ghi)perylene	--	NA			**280**			**66**			--	U		**7.7**	J		**12**			**75**		
Benzo(k)fluoranthene	6,215	NA			**390**			**80**			--	U		--	U		--	U		--	U	
Carbazole	24,319	NA			**180**			**8.9**			--	U		--	U		--	U		--	U	
Chrysene	62,148	NA			**560**			**100**			--	U		**22**			**20**			**43**		
Dibenz(a,h)anthracene	62	NA			**87**			**20**			--	U		--	U		--	U		--	U	
Fluoranthene*	2,293,610	NA			**1500**			**190**			--	U		--	U		**5**	J		**7.5**		
Fluorene*	2,643,614	NA			**160**		J,c	**4.8**	J	J,c	--	U	R,c	--	U	R,c	--	U	R,c	**22**		J,c
Indeno(1,2,3-cd)pyrene	621	NA			**270**			**65**			--	U		--	U		--	U		--	U	
Naphthalene*	55,916	NA			**21**			**5.4**	J		--	U		**26**			**5.7**	J		**59**		
Phenanthrene	--	NA			**1200**			**55**			--	U		**53**			**20**			**100**		
Pyrene*	2,308,676	NA			**830**			**130**			--	U		**7.4**	J		**14**			**31**		
PCBs - Method 8082 (ug/kg)		--			--			--			--			--			--			--		

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-2
SUMMARY OF INORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Scar 1			Scar 1			Scar 2			Scar 2			Acid Fueling Station			Acid Fueling Station		
Sample ID		CL59-SS01			CL59-SB01A			CL59-SS02			CL59-SB02A			CL59-SS03			CL59-SB03A		
Sample Depth (feet)		0-1			2-4			0-1			3-4			0-1			3-5		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/6/2001			8/6/2001		
Laboratory	Residential Soil	STL			STL			STL			STL			STL			STL		
Parameter	(mg/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Metals (mg/kg)																			
Aluminum*	76,142	**9900**		M,k	**11300**		M,k	**12400**		M,k	**11700**		M,k	**14000**			**10500**		
Arsenic	0.39	**15**		M,k	**9.5**		M,k	**14.2**		M,k	**9.9**		M,k	**12.7**			**11**		
Barium*	5,375	**70.1**		M,k	**75.1**		M,k	**77.4**		M,k	**84.4**		M,k	**78.5**			**70.3**		
Beryllium*	154	**0.59**			**0.57**	B		**0.68**			**0.63**			**0.7**		J,s	**0.61**		J,s
Cadmium*	37.0	**0.47**	B		**0.37**	B		**0.45**	B		**0.47**	B		**0.27**	B		**0.22**	B	
Calcium*	--	**15500**			**38100**			**12100**			**37300**			**14400**		M,k	**36700**		M,k
Chromium	210	**15.1**		M,k	**16.8**		M,k	**17.2**		M,k	**18.4**		M,k	**18.8**			**17.1**		
Cobalt*	4,693	**11.5**		M,k	**11.4**		M,k	**38.7**		M,k	**12.6**		M,k	**12.6**			**10.8**		
Copper*	2,905	**24.4**		M,k	**23.8**		M,k	**20.1**		M,k	**28.3**		M,k	**18.4**			**22.5**		
Iron*	23,463	**28300**		M,k	**22500**		M,k	**30500**		M,k	**25400**		M,k	**27300**			**25100**		
Lead*	400	**13.2**			**9.8**			**23.9**			**12.3**			**20.3**			**12.3**		
Magnesium*	--	**4910**			**9350**			**4210**			**10900**			**4730**			**8510**		
Manganese*	1,762	**446**		M,k	**298**		M,k	**1050**		M,k	**375**		M,k	**765**		M,k	**481**		M,k
Mercury*	23.5	**0.013**	B		**0.012**	B		**0.028**	B		--	U		**0.038**	B		--	U	
Nickel*	1,564	**29.5**		M,k	**28.1**		M,k	**21.7**		M,k	**33.4**		M,k	**22.8**			**28.9**		
Potassium*	--	**1220**		M,k	**2010**		M,k	**1180**		M,k	**2140**		M,k	**1240**			**1630**		
Selenium*	391	--	U		--	U		**0.65**	B		--	U		--	U		--	U	
Silver*	391	--	U		--	U		--	U		--	U		--	U		--	U	
Sodium*	--	--	U		--	U		--	U		--	U		--	U		--	U	
Thallium*	5.2	--	U		--	U		--	U		--	U		**1.2**	B		**0.63**	B	
Vanadium*	547	**23.9**		M,k	**19.5**		M,k	**25.1**		M,k	**21.5**		M,k	**25.7**			**18.8**		
Zinc*	23,463	**65.4**			**59.1**			**64.9**			**68.3**			**113**		M,m	**65.9**		M,m

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-2
SUMMARY OF INORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Acid Fueling Station			Acid Fueling Station			Assembly & Test			Assembly & Test			Assembly & Test			Assembly & Test		
Sample ID		CL59-SB03B			CL59-SB03C			CL59-SS04			CL59-SB04A			CL59-SB04B			CL59-SB04C		
Sample Depth (feet)		9-10.5			13-14.3			0-1			3-4			9-10			11-13		
Sample Date	Region 9 PRG	8/6/2001			8/6/2001			8/6/2001			8/6/2001			8/6/2001			8/6/2001		
Laboratory	Residential Soil	STL			STL			STL			STL			STL			STL		
Parameter	(mg/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Metals (mg/kg)																			
Aluminum*	76,142	**5950**			**5040**			**11900**			**9280**			**4310**			**6210**		
Arsenic	0.39	**13.2**			**20.6**			**10.6**			**23.9**			**8.6**			**19.8**		
Barium*	5,375	**28.4**			**71.7**			**66.1**			**57.5**			**32.4**			**58.6**		
Beryllium*	154	**0.43**	B	J,s	**0.47**	B	J,s	**0.62**		J,s	**0.66**		J,s	**0.4**	B	J,s	**0.55**	B	J,s
Cadmium*	37.0	**0.61**			**1.2**			**0.095**	B		**0.44**	B		**0.16**	B		**0.84**		
Calcium*	--	**3340**		M,k	**47600**		M,k	**3290**		M,k	**18000**		M,k	**42000**		M,k	**17900**		M,k
Chromium	210	**10.5**			**9.3**			**15.1**			**14.3**			**7.6**			**11.4**		
Cobalt*	4,693	**9.1**			**9.7**			**8.1**			**12.9**			**4.6**			**10.3**		
Copper*	2,905	**19**			**23.9**			**15.1**			**28.5**			**9.8**			**35**		
Iron*	23,463	**20100**			**25800**			**23500**			**32800**			**10200**			**22800**		
Lead*	400	**25.1**			**21.9**			**21.4**			**24.6**			**9.1**			**22.9**		
Magnesium*	--	**2700**			**8030**			**2400**			**6230**			**3230**			**4390**		
Manganese*	1,762	**237**		M,k	**486**		M,k	**442**		M,k	**527**		M,k	**238**		M,k	**327**		M,k
Mercury*	23.5	--	U		**0.03**	B		**0.032**	B		--	U		--	U		**0.011**	B	
Nickel*	1,564	**23.4**			**33.3**			**16.9**			**37.8**			**12.7**			**40.1**		
Potassium*	--	**1060**			**1180**			**1020**			**1450**			**636**			**1320**		
Selenium*	391	--	U		--	U		--	U		--	U		--	U		--	U	
Silver*	391	--	U		--	U		--	U		--	U		--	U		--	U	
Sodium*	--	--	U		--	U		--	U		--	U		--	U		--	U	
Thallium*	5.2	--	U		--	U		--	U		--	U		--	U		**0.6**	B	
Vanadium*	547	**12.1**			**17.7**			**21.6**			**18.2**			**8.8**			**18.7**		
Zinc*	23,463	**434**		M,m	**255**		M,m	**67.1**		M,m	**147**		M,m	**56.2**		M,m	**198**		M,m

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-2
SUMMARY OF INORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg		
Sample ID		CL59-SS05			CL59-SS05			CL59-SS105 (duplicate			CL59-SB05A			CL59-SB05B			CL59-SB05C		
Sample Depth (feet)		0-1			0-1			0-1			4-5			8-9.5			13-14		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL		
Parameter	(mg/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Metals (mg/kg)																			
Aluminum*	76,142	**12800**			**12300**			**12100**			**9240**			**6200**			**3570**		
Arsenic	0.39	**13.6**		M,m	**13.4**			**10.3**			**19.5**			**13.7**			**8.8**		
Barium*	5,375	**76.9**			**71.4**			**71.4**			**54.3**			**36.6**			**39.3**		
Beryllium*	154	**0.66**			**0.61**			**0.56**	B		**0.52**	B		**0.37**	B		**0.34**	B	
Cadmium*	37.0	**0.31**	B		**0.37**	B		**0.36**	B		**0.58**			**0.52**	B		**1.3**		
Calcium*	--	**21800**			**15300**		M,k	**10500**		M,k	**2280**		M,k	**17700**		M,k	**78800**		M,k
Chromium	210	**16.9**			**18.4**			**16.1**			**13.5**			**10.8**			**7**		
Cobalt*	4,693	**10.8**			**11**		M,k	**9.3**		M,k	**10.4**		M,k	**8**		M,k	**11.2**		M,k
Copper*	2,905	**24.6**			**22.9**		M,k	**18.5**		M,k	**33.4**		M,k	**20.3**		M,k	**17.3**		M,k
Iron*	23,463	**27400**			**25600**			**24300**			**26400**			**21200**			**15800**		
Lead*	400	**17.7**			**19.2**			**16.1**			**23.8**			**16.3**			**12.7**		
Magnesium*	--	**6360**			**5430**		M,k	**4680**		M,k	**3310**		M,k	**4110**		M,k	**3270**		M,k
Manganese*	1,762	**413**		M,k	**475**			**845**			**471**			**514**			**556**		
Mercury*	23.5	**0.03**	B		**0.015**	B		--	U		**0.016**	B		--	U		**0.02**	B	
Nickel*	1,564	**28.4**		M,m	**24.2**		M,k	**19.6**		M,k	**35.7**		M,k	**21**		M,k	**32.2**		M,k
Potassium*	--	**2080**			**1360**		M,k	**1210**		M,k	**1110**		M,k	**1120**		M,k	**977**		M,k
Selenium*	391	**0.87**	B	M,m	**0.51**	B		**0.55**	B		--	U		--	U		--	U	
Silver*	391	--	U		--	U		--	U		--	U		--	U		--	U	
Sodium*	--	**145**	B		--	U		--	U		--	U		**72.3**	B		**95.1**	B	
Thallium*	5.2	**0.88**	B		--	U		--	U		**0.59**	B		--	U		**0.97**	B	
Vanadium*	547	**22**			**23.1**			**21.6**			**17**			**14.1**			**14.9**		
Zinc*	23,463	**81.3**			**74.5**			**66.5**			**151**			**109**			**116**		

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-2
SUMMARY OF INORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)		
Sample ID		CL59-SS06			CL59-SS06			CL59-SS106 (duplicate			CL59-SB06A			CL59-SB06B			CL59-SB06C		
Sample Depth (feet)		0-1			0-1			0-1			6-8			10-12			12-13.75		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL		
Parameter	(mg/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Metals (mg/kg)																			
Aluminum*	76,142	**13600**			**12300**			**12900**			**9880**			**7860**			**6010**		
Arsenic	0.39	**10.9**		M,m	**11.4**			**9.3**			**16.4**			**12.2**			**9.1**		
Barium*	5,375	**86.2**			**75.6**			**95.2**			**64.9**			**36**			**29.2**		
Beryllium*	154	**0.86**			**0.65**			**0.67**			**0.57**	B		**0.44**	B		**0.33**	B	
Cadmium*	37.0	**0.25**	B		**0.31**	B		**0.28**	B		**0.47**	B		**0.46**	B		**0.4**	B	
Calcium*	--	**16300**			**10500**		M,k	**5590**		M,k	**10300**		M,k	**20400**		M,k	**62900**		M,k
Chromium	210	**16.1**			**16.8**			**17.7**			**14.9**			**12.2**			**11.3**		
Cobalt*	4,693	**8.4**			**11.9**		M,k	**9.4**		M,k	**16.2**		M,k	**11**		M,k	**6.9**		M,k
Copper*	2,905	**17.8**			**21.5**		M,k	**19.8**		M,k	**26.3**		M,k	**26.9**		M,k	**16.5**		M,k
Iron*	23,463	**24500**			**24700**			**24200**			**26200**			**23600**			**17800**		
Lead*	400	**22.6**			**19**			**18**			**19.2**			**12.9**			**10.4**		
Magnesium*	--	**4130**			**4320**		M,k	**3190**		M,k	**5960**		M,k	**5620**		M,k	**5240**		M,k
Manganese*	1,762	**1140**		M,k	**549**			**482**			**411**			**504**			**370**		
Mercury*	23.5	**0.035**	B		**0.039**	B		**0.041**	B		**0.034**	B		--	U		--	U	
Nickel*	1,564	**17.6**		M,m	**23.2**		M,k	**21.3**		M,k	**36.7**		M,k	**25.4**		M,k	**19.3**		M,k
Potassium*	--	**1440**			**1180**		M,k	**968**		M,k	**1520**		M,k	**1380**		M,k	**1130**		M,k
Selenium*	391	**1.6**	B	M,m	**0.51**	B		**0.53**	B		--	U		--	U		--	U	
Silver*	391	--	U		--	U		--	U		--	U		--	U		--	U	
Sodium*	--	**154**	B		--	U		--	U		--	U		--	U		--	U	
Thallium*	5.2	**0.98**	B		--	U		**0.85**	B		--	U		--	U		--	U	
Vanadium*	547	**23.9**			**22.4**			**21.4**			**17.5**			**14.8**			**12.2**		
Zinc*	23,463	**71.5**			**77.6**			**71.8**			**115**			**84.9**			**95.4**		

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-2
SUMMARY OF INORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)		
Sample ID		CL59-SS07			CL59-SS07			CL59-SS107 (duplicate			CL59-SB07A			CL59-SB07B			CL59-SB07C			CL59-SB07D		
Sample Depth (feet)		0-1			0-1			0-1			6-8			10-12			14-16			18-19.1		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL			STL		
Parameter	(mg/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Metals (mg/kg)																						
Aluminum*	76,142	**10400**			**7840**		M,k	**10500**		M,k	**11000**		M,k	**8550**		M,k	**6790**		M,k	**6970**		M,k
Arsenic	0.39	**10.3**		M,m	**8.5**		M,k	**10**		M,k	**11.4**		M,k	**10.8**		M,k	**15.9**		M,k	**27.6**		M,k
Barium*	5,375	**63.6**			**46.3**		M,k	**74.8**		M,k	**70.7**		M,k	**38.9**		M,k	**44.6**		M,k	**90.1**		M,k
Beryllium*	154	**0.57**			**0.47**	B		**0.59**			**0.59**	B		**0.46**	B		**0.39**	B		**0.46**	B	
Cadmium*	37.0	**0.24**	B		**0.29**	B		**0.3**	B		**0.26**	B		**0.22**	B		**0.36**	B		**1**		
Calcium*	--	**23600**			**40500**			**23100**			**34700**			**17000**			**36000**			**29700**		
Chromium	210	**14.3**			**12.3**		M,k	**15.5**		M,k	**17.1**		M,k	**13**		M,k	**11.9**		M,k	**11.8**		M,k
Cobalt*	4,693	**9**			**8**		M,k	**10.4**		M,k	**9.2**		M,k	**9.8**		M,k	**9.2**		M,k	**12.3**		M,k
Copper*	2,905	**23.8**			**17.9**		M,k	**22.9**		M,k	**25.4**		M,k	**22.3**		M,k	**24**		M,k	**25.2**		M,k
Iron*	23,463	**21800**			**17700**		M,k	**22000**		M,k	**24600**		M,k	**23100**		M,k	**21900**		M,k	**25300**		M,k
Lead*	400	**13.4**			**11.3**			**15.6**			**12.6**			**13.2**			**13.4**			**27.1**		
Magnesium*	--	**6380**			**21600**			**6090**			**13500**			**7050**			**7340**			**5620**		
Manganese*	1,762	**310**		M,k	**302**		M,k	**361**		M,k	**313**		M,k	**266**		M,k	**354**		M,k	**519**		M,k
Mercury*	23.5	**0.029**	B		**0.011**	B		**0.019**	B		**0.025**	B		--	U		**0.018**	B		**0.013**	B	
Nickel*	1,564	--	U	M,m	**20.2**		M,k	**25.1**		M,k	**28.5**		M,k	**25.6**		M,k	**24.7**		M,k	**45.6**		M,k
Potassium*	--	**2060**	B		**1230**		M,k	**1410**		M,k	**2160**		M,k	**1580**		M,k	**1480**		M,k	**1530**		M,k
Selenium*	391	**0.65**	B	M,m	--	U		**0.45**	B		--	U		--	U		--	U		**0.73**	B	
Silver*	391	**0.5**			--	U		--	U		--	U		--	U		--	U		--	U	
Sodium*	--	**115**			**74.9**	B		--	U		--	U		--	U		**60.3**	B		--	U	
Thallium*	5.2	**0.9**			--	U		--	U		--	U		--	U		--	U		**1.2**	B	
Vanadium*	547	**17.1**			**14.4**		M,k	**18.5**		M,k	**19.6**		M,k	**15.3**		M,k	**13.6**		M,k	**18.4**		M,k
Zinc*	23,463	**61.7**			**54.5**			**68.2**			**63.2**			**68.4**			**71.2**			**210**		

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-2
SUMMARY OF INORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)		
Sample ID		CL59-SS08			CL59-SS08			CL59-SS108 (duplicate			CL59-SB08AA			CL59-SB08A			CL59-SB08B			CL59-SB08C		
Sample Depth (feet)		0-1			0-1			0-1			5-7			10-12			16-18			24-25.5		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL			STL		
Parameter	(mg/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Metals (mg/kg)																						
Aluminum*	76,142	**10900**			**11200**			**13100**			**10400**			**12100**			**9980**			**8850**		
Arsenic	0.39	**12.2**		M,m	**10.9**			**12.2**			**11.9**			**8**			**26.3**			**18.6**		
Barium*	5,375	**68.8**			**76.9**			**73.8**			**65.8**			**55**			**44.9**			**139**		
Beryllium*	154	**0.57**			**0.66**		J,s	**0.73**		J,s	**0.69**	L	J,s	**0.71**		J,s	**0.6**		J,s	**0.65**		J,s
Cadmium*	37.0	**0.12**	B		**0.15**	B		**0.19**	B		**0.099**	B		**0.21**	B		**0.79**			**0.52**	B	
Calcium*	--	**5320**			**8080**		M,k	**4730**		M,k	**26900**		M,k	**34100**		M,k	**10300**		M,k	**2940**		M,k
Chromium	210	**13.7**			**14.8**			**16.4**			**16**			**18.3**			**15.3**			**15**		
Cobalt*	4,693	**8.6**			**9.4**			**9.3**			**13.2**			**13.6**			**13.3**			**11.8**		
Copper*	2,905	**17.3**			**19**			**18.3**			**26.7**			**25**			**30.7**			**28.2**		
Iron*	23,463	**21700**			**22300**			**24700**			**23700**			**22100**			**33800**			**24400**		
Lead*	400	**18.3**			**18.3**			**21.2**			**11.9**			**11.4**			**30.4**			**29.5**		
Magnesium*	--	**2840**			**3620**			**2910**			**6400**			**11100**			**6330**			**3510**		
Manganese*	1,762	**528**		M,k	**504**		M,k	**506**		M,k	**342**		M,k	**326**		M,k	**334**		M,k	**152**		M,k
Mercury*	23.5	**0.047**	B		**0.025**	B		--	U		**0.024**	B		--	U		**0.014**	B		**0.023**	B	
Nickel*	1,564	--	U	M,m	**20.2**			**19.5**			**30.8**			**36.6**			**36.3**			**63.1**		
Potassium*	--	**1110**	B		**938**			**1030**			**1840**			**2740**			**1700**			**2270**		
Selenium*	391	--	U	M,m	--	U		--	U		--	U		--	U		--	U		**0.66**	B	
Silver*	391	**0.5**			--	U		--	U		--	U		--	U		--	U		--	U	
Sodium*	--	**95.9**			--	U		--	U		--	U		**73**	B		--	U		**63.6**	B	
Thallium*	5.2	**2**			--	U		--	U		--	U		--	U		--	U		**1.4**	B	
Vanadium*	547	**19.5**			**20.3**			**24.7**			**18.9**			**20.4**			**18.4**			**24**		
Zinc*	23,463	**57.6**			**68.1**		M,m	**75.5**		M,m	**64.2**		M,m	**59.3**		M,m	**201**		M,m	**101**		M,m

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-3
SUMMARY OF ORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLE
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Open Borehole at Missile Magazine (east)								
Sample ID		CL59-GW08			CL59-GW08			CL59-GW108 (duplicate)		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001		
Laboratory	Tap Water	CompuChem			STL			STL		
Parameter	(ug/L)	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatile Organics - Method 8260 (ug/L)										
1,2,4-Trichlorobenzene*	190	--	U		--	U		**0.3**	J	
Acetone*	608	**4**	J	J,c	--	U	UJ,c	**0.54**	J	J,c
Methylcyclohexane*	5,200	NA			--	U		**0.19**	J	
Toluene*	723	**0.3**	J		--	U		--	U	
Semivolatiles - Method 8270 (ug/L)										
Bis(2-Chloroisopropyl) ether [2,2'-oxybis(1-chloropropane)]	0.27	NA			--	U	R,c	--	U	R,c
2-Methylnaphthalene*	--	NA			--	U		**1.4**	J	
Bis(2-Ethylhexyl)phthalate	4.80	NA			--	U		**8.2**	J	
Caprolactam*	18,000	NA			**33**			**42**		
Dimethylphthalate*	364,867	NA			--	U	R,l	--	U	R,l
Hexachlorocyclopentadiene*	255	NA			--	U	R,l	--	U	R,l
PAHs - Method 8270 SIM (ug/L)										
1-Methylnaphthalene	--	**1.4**		J,l	**0.55**			**1.1**		
2-Methylnaphthalene	--	**1.9**		J,l	**0.78**			**1.6**		
Benzo(a)anthracene	0.09	**0.31**		J,l	--	U		--	U	
Benzo(a)pyrene	0.01	**0.19**	J	J,l	--	U		--	U	
Benzo(ghi)perylene	--	**0.44**		J,l	**0.23**			**0.23**		
Naphthalene*	6.2	**0.7**		J,l	**0.26**			**0.51**		
Phenanthrene	--	**0.86**		J,l	**0.3**			**0.49**		
Pyrene*	183	**0.29**		J,l	--	U		**0.12**	J	
PCBs - Method 8082 (ug/L)										
Pesticides - Method 8081 (ug/L)										
4,4'-DDD	0.2801	--	U	UJ,s	--	U	R,s	--	U	
4,4'-DDE	0.1977	--	U	UJ,s	--	U	R,s	--	U	
4,4'-DDT	0.1977	--	U	UJ,s	--	U	R,s	--	U	
Aldrin	0.0040	--	U	UJ,s	--	U	R,s	--	U	
alpha-BHC	0.0107	--	U	UJ,s	--	U	R,s	--	U	
alpha-Chlordane	0.1921**	--	U	UJ,s	--	U	R,s	--	U	
beta-BHC	0.0374	--	U	UJ,s	--	U	R,s	--	U	
delta-BHC	--	--	U	UJ,s	--	U	R,s	--	U	
Dieldrin	0.0042	--	U	UJ,s	--	U	R,s	--	U	
Endosulfan I	--	--	U	UJ,s	--	U	R,s	--	U	
Endosulfan II	--	--	U	UJ,s	--	U	R,s	--	U	
Endosulfan Sulfate	--	--	U	UJ,s	--	U	R,s	--	U	
Endrin*	10.95	--	U	UJ,s	--	U	R,s	--	U	
Endrin Aldehyde	--	--	U	UJ,s	--	U	R,s	--	U	
Endrin Ketone	--	--	U	UJ,s	--	U	R,s	--	U	
gamma-BHC (Lindane)	0.0517	--	U	UJ,s	--	U	R,s	--	U	
gamma-Chlordane	0.1921*	--	U	UJ,s	--	U	R,s	--	U	
Heptachlor	0.0149	--	U	UJ,s	--	U	R,s	--	U	
Heptachlor Epoxide	0.0074	--	U	UJ,s	--	U	R,s	--	U	
Methoxychlor*	182	--	U	UJ,s	--	U	R,s	--	U	
Toxaphene	0.0611	--	U	UJ,s	--	U	R,s	--	U	

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogen

*Compound is noncarcinogenic.
** for technical Chlordane

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

TABLE 5-4
SUMMARY OF INORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLE
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Open Borehole at Missile Magazine (east)								
Sample ID		CL59-GW08			CL59-GW08			CL59-GW108 (duplicate)		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001		
Laboratory	Tap Water	CompuChem			STL			STL		
Parameter	(ug/L)	Result	LF	VF	Result	LF	VF	Result	LF	VF
Dissolved Metals (ug/L)										
Aluminum*	36,499	**231**			**305**		M,m	**534**		M,m
Antimony*	14.6	--	U		**3.8**	B		**3**	B	
Arsenic	0.04	**7.4**	B		**6.6**	B		**9**	B	
Barium*	2,555	**73.7**			**66.1**			**84.4**		
Calcium*	--	**102000**			**100000**			**101000**		
Iron*	10,950	**413**			**457**			**941**		
Magnesium*	--	**38500**			**38200**			**39300**		
Manganese*	876	**68.1**			**67**			**71**		
Nickel*	730	**5.2**	B		**3.1**	B		**3.8**	B	
Potassium*	--	**14500**			**13900**			**12200**		
Sodium*	--	**9680**		J,s	**11100**			**11000**		
Thallium*	2.4	**6**	B		--	U		--	U	
Vanadium*	255	**1.1**	B		**1.5**	B		**2.2**	B	

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed
--Not detected, refer to Appendix C for detection limits

6. Conclusions

The former Nike Site CL-59 Launch Area is located at the entrance of the Cuyahoga Community College off of West Pleasant Valley Road within the City of Parma. The Launch Area also extends to the west of the community college into Nike Park.

Former Nike Missile Site CL-59 was activated in July 1956 and was deactivated in 1961. After deactivation, the site was briefly used to support Army Reserve training and other Army activities. Cuyahoga Community College later acquired the property and the western most of the three underground Nike missile magazines in 1972. In the late 1970's, the other two missile magazines were filled in with soil from an unknown source. The other buildings at the Launch Area were demolished as part of the school development.

The CL-59 Launch Area consisted of three underground missile magazines a Barracks, a Missile Assembly and Test Building, a Generator Building, and an Acid Fueling Station. The site housed only the Nike Ajax Missile system. VOCs associated with missile maintenance and assembly, PAHs associated with fuels and hydraulic fluids, PCBs associated with electrical equipment and hydraulic fluid, and metals associated with battery electrolytes have been identified as potential concerns at Nike Missile sites.

Eight surface and 22 subsurface soil samples were collected during the field activities. The samples were sent for offsite chemical analysis for VOCs, SVOCs, PCBs and metals. Six of the borings were installed at locations of structures formerly at the Nike site that may have impacted environmental quality. One groundwater sample was collected from an open borehole adjacent to the eastern most missile magazine to give an indication of groundwater quality in that location. Groundwater did not accumulate in any other borehole. Two of the borings were in areas of ground disturbance identified from historic aerial photographs during the PA.

Soil sampling detected a variety of organic compounds and metals. The analytical results were compared to USEPA Region 9 residential soil and tap water PRGs. PRGs are risk-based tools for evaluating and cleaning up contaminated sites. The PRGs have been compared point-by-point to the detected levels of contaminants to identify the COPCs. The point-by-point comparison is an extremely conservative method for identifying COPCs as more compounds are identified for further evaluation. Presence of a contaminant below the PRG indicates that the compound is unlikely to present a threat to human health. An exceedance of a PRG indicates that a contaminant should be further evaluated to determine if it poses a threat to human health. Carcinogenic compounds were screened against the full Region 9 PRG while non-carcinogenic compounds were screened against 1/10 of the PRG value to be protective in the event of additive effects from multiple chemicals.

No VOCs exceeded the screening values (full PRGs for carcinogens and 10 percent of the PRG for non-carcinogens). PCBs were not detected in either soils or the groundwater sample. The groundwater sample was analyzed for pesticides and none were detected.

Total PAH concentrations ranged from 104 to 4373 µg/kg in surface soil and from non-detect to 833 µg/kg in the subsurface soil samples. The greatest number and concentrations of PAHs were

at or near the ground surface on the south and east portions of the site. Three PAHs (benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene) were detected in surface soils above PRGs and none of the subsurface soil samples exceed PAH PRGs. Two metals (arsenic and iron) were detected in both surface and subsurface soils above PRGs. PAHs are ubiquitous in soil and may be generated from anthropogenic sources such as the incomplete combustion of coal, oil and gas, or garbage, or from natural sources such as volcanoes and forest fires. PAHs are found in asphalt, coal tar, crude oil, creosote, and roofing tar. PAHs can occur in the air, either attached to dust particles or as solids in soil or sediment. Urban background soil levels are available for benzo(a)pyrene and benzo(b)fluoranthene and all but one detection falls within the range of background values. It is uncertain if the detected PAHs are related to past activities or are present throughout the area. However, the majority of PAHs were encountered in the near surface soils of this heavily urbanized area, their presence is likely due to anthropogenic sources.

Benzo(a)pyrene and benzo(a)anthracene exceed the Region 9 PRG for tap water. Benzo(a)pyrene was just below the 0.2 µg/L MCL for drinking water. There is no MCL for benzo(a)anthracene. The detection may not accurately represent groundwater conditions, as the groundwater sample was highly turbid.

Bis(2-ethylhexyl)phthalate exceeded the Region 9 tap water PRG in one sample but was not detected in the field duplicate or associated blanks. It is not certain if the phthalate, which is a common laboratory contaminant, is site related or was introduced at the laboratory.

Arsenic and iron were the only metals to exceed PRGs in soil. Arsenic exceeded PRGs in all samples collected. Iron was detected in all soil samples collected and exceeded the Region 9 PRGs in seven of the eight surface soil samples and 12 of the 22 subsurface soil samples. The arsenic and iron levels may reflect natural levels present in the soils of Ohio, past activities in the area, or a combination of the two.

Arsenic and thallium in groundwater exceeded both the tap water PRGs and thallium also exceeded the MCL. The groundwater sample may not be representative of the water in the formation as the water collected was excessively turbid prior to filtering.

There are no municipal groundwater sources located within a 4-mile radius of the site. Although some private groundwater usage exists within 4-miles of the site, there are no private wells within one-mile. Although several compounds exceeded PRGs in the groundwater sample, the contaminant levels are relatively low, no source of soil or groundwater contamination was identified, and the nearest well user is over one mile from the Launch Area, making it unlikely that groundwater poses a significant threat to human health.

Storm water or wind could potentially transport contaminated surface soil from the site but as the Launch Area is well vegetated it is unlikely that these are significant migration pathways. Precipitation could result in runoff that could transport surface contaminants but the site is fairly flat and most precipitation is likely to infiltrate rather than runoff. In paved areas, storm drains along the street would intercept runoff. There are no indications of a release of contaminants to surface water at the Launch Area. Surface water is not used for potable purposes along the surface water migration pathway. Some of the water bodies along the surface water pathway are

inhabited by species with special status and surface water is likely used for recreational purposes. For the reasons stated above, the surface water pathway is unlikely to represent a significant risk to human health or the environment.

The former Launch Area is currently used as an open space buffer between the college buildings and the neighborhood. The potential for exposure to contaminants in surface soils or fugitive dust is somewhat mitigated as the area is well vegetated and not heavily used.

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APPENDIX A
Grain Size, Liquid Limit, and Plasticity Index Data

Particle Size of Soils by ASTM D422

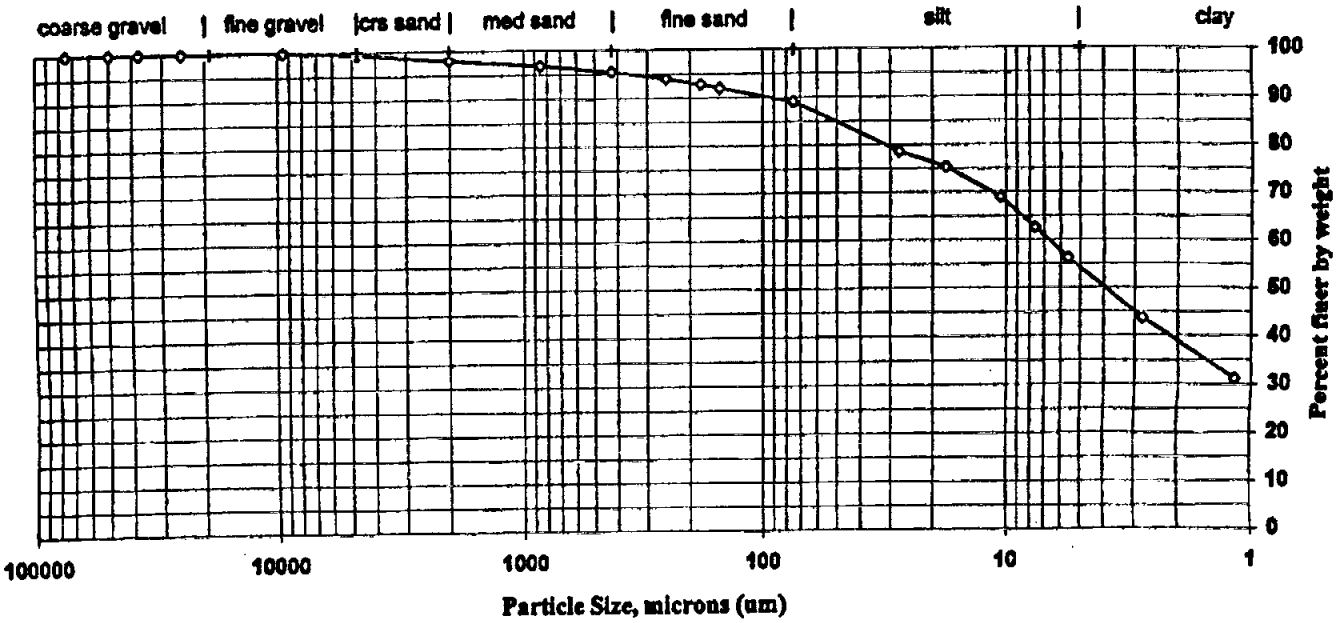
Sample preparation by: D2217

Client:	STLOHN	Project No.:	21000	ETR(s) #:	84341
Client Code:	STLOHN	Job No.:	N/A	SDG(s):	84341
Date Received:	10-Aug-01	Start Date:	27-Aug-01	End Date:	31-Aug-01

Lab ID: 462726 Sample ID: SB07A

Percent Solids: 79.1%
Specific Gravity: 2.65

Maximum Particle Size: 9.5 mm
Shape (> #10): subrounded
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	99.5	0.5
#10	2000	98.2	1.3
#20	850	96.9	1.3
#40	425	95.5	1.4
#60	250	94.1	1.5
#80	180	92.9	1.2
#100	150	92.1	0.8
#200	75	89.2	2.9
Hydrometer	27.5	78.6	10.5
|	17.7	75.4	3.2
|	10.5	69.0	6.4
|	7.6	62.6	6.4
|	5.6	56.2	6.4
|	2.8	43.7	12.5
V	1.2	31.2	12.5

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

0005

Submitted By: Date: 08/31/01

STL - Burlington 84338PS.xls::Report

Particle Size of Soils by ASTM D422

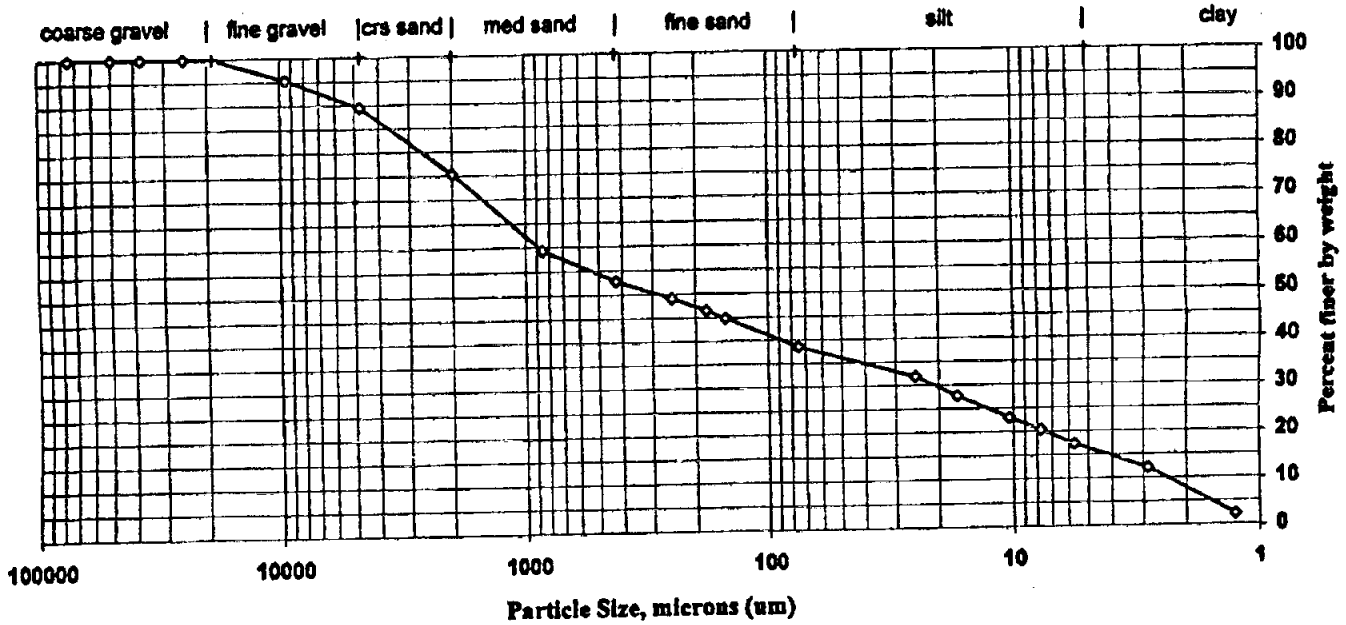
Sample preparation by: D2217

Client:	STLOHN	Project No.:	21000	ETR(s) #:	84341
Client Code:	STLOHN	Job No.:	N/A	SDG(s):	84341
Date Received:	10-Aug-01	Start Date:	27-Aug-01	End Date:	31-Aug-01

Lab ID: 462727 Sample ID: SB07E

Percent Solids: 91.5%
Specific Gravity: 2.65

Maximum Particle Size: 19 mm
Shape (> #10): subangular
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	95.4	4.6
#4	4750	89.5	6.0
#10	2000	75.4	14.1
#20	850	59.4	16.0
#40	425	52.9	6.5
#60	250	49.1	3.8
#80	180	46.6	2.6
#100	150	44.9	1.7
#200	75	38.6	6.3
Hydrometer	24.9	32.0	6.7
|	16.9	27.8	4.2
|	10.4	23.1	4.7
|	7.7	20.5	2.6
|	5.7	17.3	3.1
|	2.9	12.2	5.1
V	1.3	2.4	9.8

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

0006

Submitted By: Date: 08/31/01 STL - Burlington 84338PS.xls::Report

Particle Size of Soils by ASTM D422

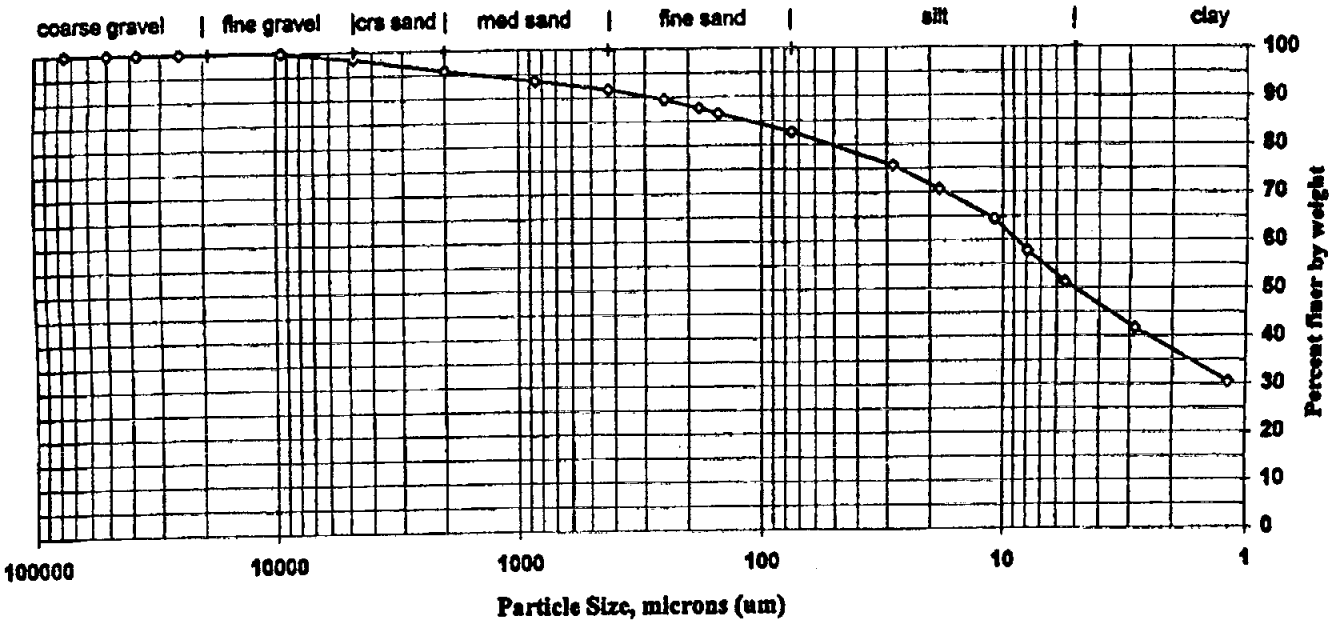
Sample preparation by: D2217

Client:	STLOHN	Project No.:	21000	ETR(s) #:	84341
Client Code:	STLOHN	Job No.:	N/A	SDG(s):	84341
Date Received:	10-Aug-01	Start Date:	27-Aug-01	End Date:	31-Aug-01

Lab ID: 462728 Sample ID: SS05

Percent Solids: 70.3%
Specific Gravity: 2.65

Maximum Particle Size: 9.5 mm
Shape (> #10): subangular
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	100.0	0.0
#4	4750	98.5	1.5
#10	2000	95.9	2.7
#20	850	93.7	2.2
#40	425	91.7	1.9
#60	250	89.6	2.2
#80	180	87.7	1.8
#100	150	86.6	1.2
#200	75	82.8	3.8
Hydrometer	28.3	75.7	7.1
|	18.3	70.7	4.9
|	10.8	64.4	6.3
|	7.9	57.8	6.6
|	5.5	51.3	6.6
|	2.8	41.7	9.6
V	1.2	30.4	11.2

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

0007

Submitted By: Date: 08/31/01 STL - Burlington 84338PS.xls::Report

Particle Size of Soils by ASTM D422

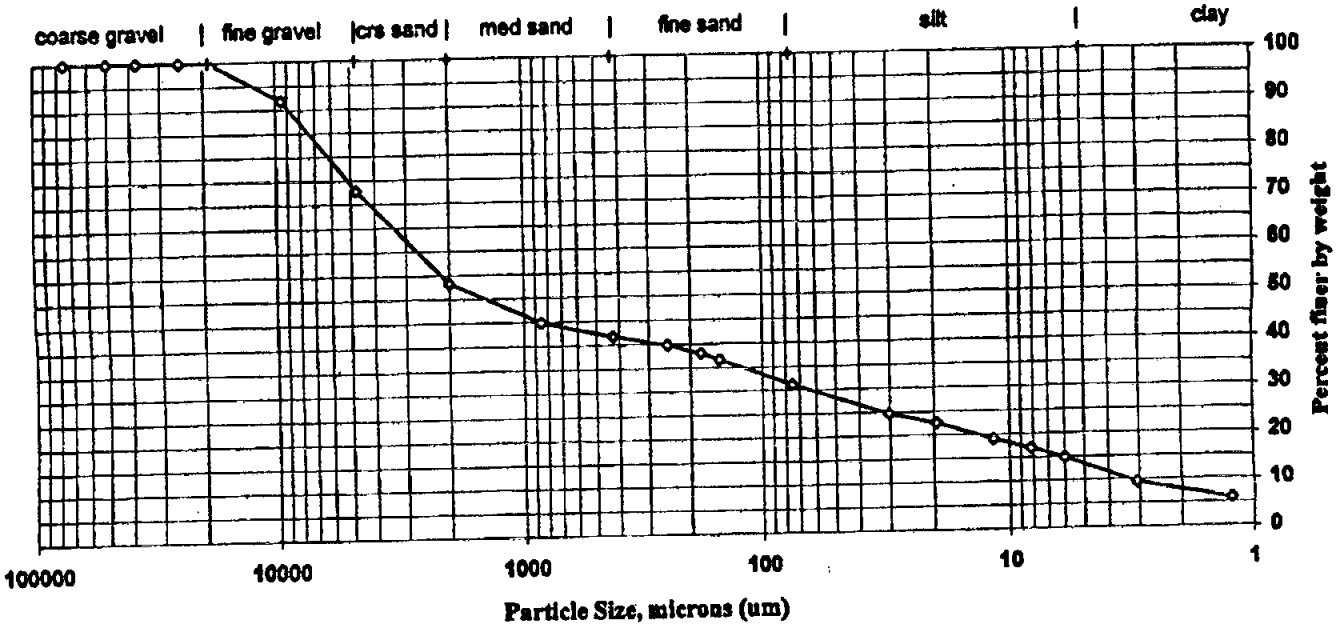
Sample preparation by: D2217

Client:	STLOHN	Project No.:	21000	ETR(s) #:	84341
Client Code:	STLOHN	Job No.:	N/A	SDG(s):	84341
Date Received:	10-Aug-01	Start Date:	27-Aug-01	End Date:	31-Aug-01

Lab ID: 462729 Sample ID: SS04C

Percent Solids: 90.2%
Specific Gravity: 2.65

Maximum Particle Size: 19 mm
Shape (> #10): subangular
Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	91.9	8.1
#4	4750	72.9	19.1
#10	2000	53.3	19.5
#20	850	44.9	8.4
#40	425	41.8	3.1
#60	250	39.9	1.9
#80	180	38.1	1.8
#100	150	36.7	1.4
#200	75	31.3	5.5
Hydrometer	30.3	24.7	6.5
|	19.5	22.6	2.1
|	11.6	19.1	3.5
|	8.2	17.0	2.1
|	6.0	14.9	2.1
|	3.1	9.5	5.4
V	1.2	6.0	3.5

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

0008

Submitted By: Date: 08/31/01

STL - Burlington 84338PS.xls::Report

Particle Size of Soils by ASTM D422

Sample preparation by: D2217

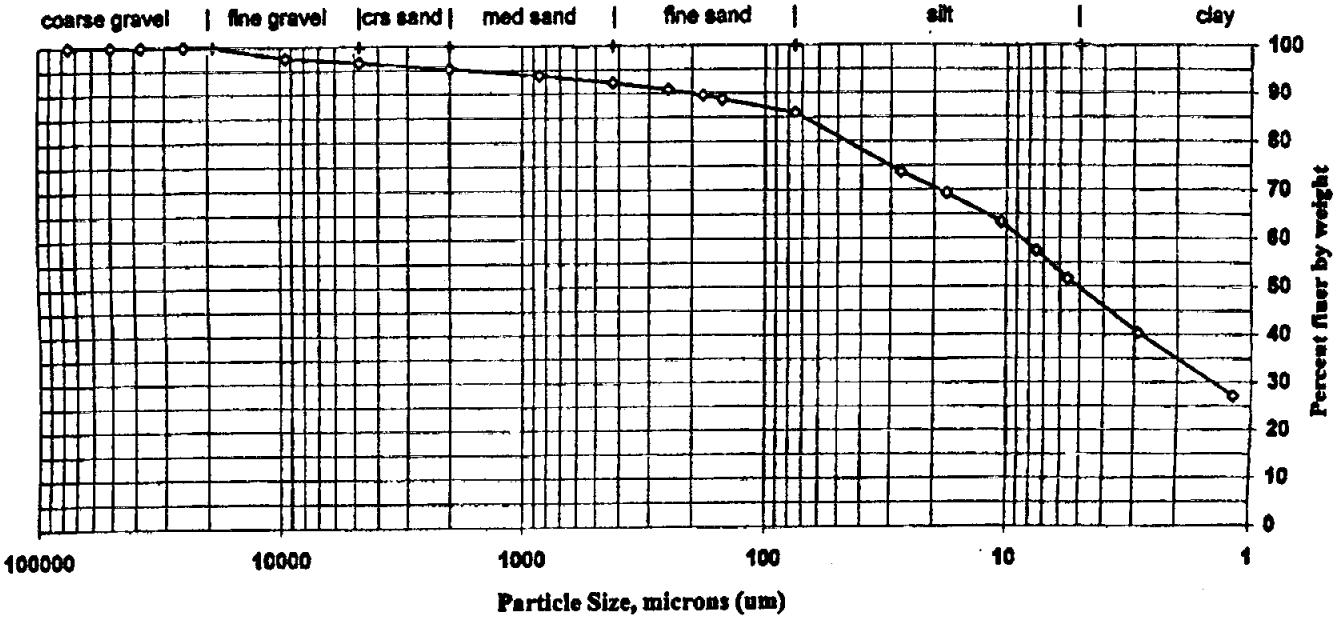
Client:	STLOHN	Project No.:	21000	ETR(s) #:	84341
Client Code:	STLOHN	Job No.:	N/A	SDG(s):	84341
Date Received:	10-Aug-01	Start Date:	27-Aug-01	End Date:	31-Aug-01

Lab ID: 462730 Sample ID: SB08A

Percent Solids: 84.9% Maximum Particle Size: 19 mm

Specific Gravity: 2.65 Shape (> #10): subangular

Hardness (> #10): hard



Sieve size	Particle size, um	Percent finer	Incremental percent
3 inch	75000	100.0	0.0
2 inch	50000	100.0	0.0
1.5 inch	37500	100.0	0.0
1 inch	25000	100.0	0.0
3/4 inch	19000	100.0	0.0
3/8 inch	9500	97.7	2.3
#4	4750	96.7	1.0
#10	2000	95.4	1.3
#20	850	93.9	1.5
#40	425	92.3	1.5
#60	250	90.8	1.5
#80	180	89.6	1.2
#100	150	88.8	0.8
#200	75	85.9	2.9
Hydrometer	27.3	73.7	12.2
I	17.7	69.3	4.4
I	10.5	63.4	5.9
I	7.5	57.6	5.9
I	5.6	51.7	5.9
I	2.9	40.4	11.3
V	1.2	27.2	13.2

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle, operated for at least one minute within a dispersion cup with 125 mls sodium hexametaphosphate

0009

Submitted By: Date: 08/31/01 STL - Burlington 84338PS.xls::Report

SEVERN TRENT SERVICES

STL Burlington

Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4318

Client:	STLOHN	ETR(s):	84341
Client Code:	STLOHN	SDG(s):	84341
Project:	21000	Analyst(s):	MRD/CAT
Case:	21000	Start Date:	29-Aug-01
Date Received:	10-Aug-01	End Date:	30-Aug-01

Sample No.:	462726
Sample ID.:	SB07A

Prep Method: Wet
Calculations: Dry Wt. Basis

Liquid Limit Test

Multi- points analysis

		15 to 25	20 to 30	25 to 35
Closure (blows):		19	24	35
Water Content:	Pan:	0.97	0.96	0.96
	Pan/Wet	8.48	9.25	7.93
	Pan/Dry	6.58	7.18	6.21
	% Water	33.9%	33.3%	32.8%

Liquid Limit = 33

Plasticity Limit Test

		1	2	3
Water Content:	Pan	0.97	0.97	0.97
	Pan/Wet	1.98	2.83	2.55
	Pan/Dry	1.82	2.53	2.29
	% Water	18.8%	19.2%	19.7%

Plastic Limit = 19

Plasticity Index = 14

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0011

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SEVERN TRENT SERVICES

STL Burlington

Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4318

Client:	STLOHN	**ETR(s):**	84341
Client Code:	STLOHN	**SDG(s):**	84341
Project:	21000	**Analyst(s):**	MRD/CAT
Case:	21000	**Start Date:**	29-Aug-01
Date Received:	10-Aug-01	**End Date:**	30-Aug-01

Sample No.: 462728
Sample ID.: SS05

Prep Method: Wet
Calculations: Dry Wt. Basis

Liquid Limit Test

Multi- points analysis

		15 to 25	20 to 30	25 to 35
Closure (blows):		22	30	35
Water Content:	Pan:	0.97	0.97	0.97
	Pan/Wet	10.65	9.91	10.3
	Pan/Dry	8.07	7.62	7.96
	% Water	36.3%	34.4%	33.5%

Liquid Limit = 36

Plasticity Limit Test

		1	2	3
Water Content:	Pan	0.96	0.96	0.97
	Pan/Wet	2.74	3.22	3.02
	Pan/Dry	2.43	2.84	2.69
	% Water	21.1%	20.2%	19.2%

Plastic Limit = 20

Plasticity Index = 15

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SEVERN TRENT SERVICES

STL Burlington

Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4318

Client:	STLOHN	**ETR(s):**	84341
Client Code:	STLOHN	**SDG(s):**	84341
Project:	21000	**Analyst(s):**	MRD/CAT
Case:	21000	**Start Date:**	29-Aug-01
Date Received:	10-Aug-01	**End Date:**	30-Aug-01

Sample No.: 462729
Sample ID.: SS04C

Prep Method: Wet
Calculations: Dry Wt. Basis

Liquid Limit Test

Multi- points analysis

		15 to 25	20 to 30	25 to 35
Closure (blows):		18	25	27
Water Content:	Pan:	0.96	0.96	0.97
	Pan/Wet	11.47	12.25	9.51
	Pan/Dry	9.19	9.87	7.73
	% Water	27.7%	26.7%	26.3%

Liquid Limit = 27

Plasticity Limit Test

		1	2	3
Water Content:	Pan	0.97	0.97	0.97
	Pan/Wet	2.86	2.99	2.55
	Pan/Dry	2.57	2.67	2.32
	% Water	18.1%	18.8%	17.0%

Plastic Limit = 18

Plasticity Index = 9

Submitted by: _____ Date:08/31/01 STL Burlington 84341AL.xls:Report

SEVERN TRENT SERVICES

STL Burlington

Liquid Limit, Plastic Limit, and Plasticity Index of Soils
ASTM D4318

Client:	STLOHN	ETR(s):	84341
Client Code:	STLOHN	SDG(s):	84341
Project:	21000	Analyst(s):	MRD/CAT
Case:	21000	Start Date:	29-Aug-01
Date Received:	10-Aug-01	End Date:	30-Aug-01

Sample No.: 462730
Sample ID.: SB08A

Prep Method: Wet
Calculations: Dry Wt. Basis

Liquid Limit Test

Multi- points analysis

		15 to 25	20 to 30	25 to 35
Closure (blows):		19	30	33
Water Content:	Pan:	0.98	0.96	0.97
	Pan/Wet	6.55	6.67	8.47
	Pan/Dry	5.23	5.35	6.87
	% Water	31.1%	30.1%	27.1%

Liquid Limit = 30

Plasticity Limit Test

		1	2	3
Water Content:	Pan	0.97	0.97	0.96
	Pan/Wet	2.76	2.54	2.56
	Pan/Dry	2.5	2.32	2.33
	% Water	17.0%	16.3%	16.8%

Plastic Limit = 17

Plasticity Index = 13

Submitted by: _____ Date:08/31/01 STL Burlington 84341AL.xls:Report

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APPENDIX B
Field Documentation

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/8/01	1355	CL59-SS01
Sampled By: Coughlin Carton Lopez	Signature(s):	Sampling Method: 3" split spoon	Sample Location: SS01

Solid Sample

Solid Sample Type:	Sample Collection:
☑ Surface Soil	☑ Grab
☐ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	Sample Depth: 0-12"
☐ Other _____	6-12" VOA

Sample Description (sand, clay, dry, moist, wet, etc.): Sand, fine grained, some silts, grave, and shale fragments. Loose to medium dense, mod yellow (10yr5/4) SW

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☐ Volatiles	☐ Cyanide
☐ Semivolatiles	☐ Metals
☐ PCB	☐ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/9/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/8/01	1400	CL59-SB01A
Sampled By: C. Lopez, G. Cartop, J. Coughlin	Signature(s): [signature]	Sampling Method: 2" Split Spoon	Sample Location: SB01

Solid Sample

Solid Sample Type:

- ☐ Surface Soil
- ☑ Subsurface Soil
- ☐ Sediment
- ☐ Waste
- ☐ Other _____

Sample Collection:

- ☑ Grab
- ☐ Composite

Sample Depth: 2-4'

Sample Description (sand, clay, dry, moist, wet, etc.): Clay, w/sand gravel & shale fragments stiff, mod yel Brown (10yr 5/4) CL

Aqueous Sample

Aqueous Sample Type:

- ☐ Surface Water
- ☐ Groundwater
  - ☐ Monitoring Well
  - ☐ Domestic Well
  - ☐ Other _____
- ☐ Seep
- ☐ Waste
- ☐ Other _____

Total Well Depth:

Well Casing Size & Depth:

Static Water Level:

One Casing Volume:

Start Purge (hrs):

End Purge (hrs):

Total Purge Time:

Total Purge Volume (gal):

Purge Method:

Analysis:

- ☑ Volatiles
- ☑ Semivolatiles
- ☑ PCB
- ☐ Pesticides
- ☐ Explosives
- ☐ Other (list): _____

- ☐ Cyanide
- ☑ Metals
  - ☑ TAL Metals
  - ☐ Priority Pollutants
  - ☐ RCRA 8
  - ☐ Selected Metals (list): _____

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/9/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/8/01	1340	CL59-SS02
Sampled By: Carson Vaper Loughlin	Signature(s):	Sampling Method: 3" split spoon	Sample Location: SS02

Solid Sample

Solid Sample Type:	Sample Collection:
☒ Surface Soil	☒ Grab
☒ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	Sample Depth: 0-12"
☐ Other _____	6-12" VOA

Sample Description (sand, clay, dry, moist, wet, etc.): Sands, fngrn, w/silts, gravel & shale fragments, modyelBrn (10yrs/4)

SW

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☒ Volatiles	☐ Cyanide
☒ Semivolatiles	☒ Metals
☒ PCB	☒ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/9/01

Observations/Notes:

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SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/8/01	1350	CL59-SB02A
Sampled By: Cartop Lopez Coughlin	Signature(s):	Sampling Method: 3" Split Spoon	Sample Location: SB02

Solid Sample

Solid Sample Type:	Sample Collection:
☐ Surface Soil	☑ Grab
☑ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	Sample Depth: 3-4'
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.):
Clay, w/ sands, gravel & shale fragments stiff to hard, mod yel Brn (10yr 5/4)
CL

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/9/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL-59	8/6/01	1105	SS03
Sampled By: Gcarton J Coughlin	Signature(s): [signature]	Sampling Method: Hand Auger	Sample Location: 619967.003 2170249.571

Solid Sample

Solid Sample Type:

- ☒ Surface Soil
- ☐ Subsurface Soil
- ☐ Sediment
- ☐ Waste
- ☐ Other _____

Sample Collection:

- ☒ Grab
- ☐ Composite

Sample Depth: 0-12"

Sample Description (sand, clay, dry, moist, wet, etc.):
sands w/some silt + gravel
clotted fines pale yellow brown
SM

Aqueous Sample

Aqueous Sample Type:

- ☐ Surface Water
- ☐ Groundwater
  - ☐ Monitoring Well
  - ☐ Domestic Well
  - ☐ Other _____
- ☐ Seep
- ☐ Waste
- ☐ Other _____

Total Well Depth:

Well Casing Size & Depth:

Static Water Level:

One Casing Volume:

Start Purge (hrs):

End Purge (hrs):

Total Purge Time:

Total Purge Volume (gal):

Purge Method:

Analysis:

- ☒ Volatiles
- ☒ Semivolatiles
- ☐ PCB
- ☐ Pesticides
- ☐ Explosives
- ☐ Other (list):

- ☐ Cyanide
- ☒ Metals
  - ☒ TAL Metals
  - ☐ Priority Pollutants
  - ☐ RCRA 8
  - ☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/7/01

Observations/Notes:

MS/MSD

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL-59	8/6/01	1150	CL59-SB03A
Sampled By: J. Coughlin G. Carton	Signature(s): John Coughlin	Sampling Method: 3" split spoon	Sample Location: SB-03

Solid Sample

Solid Sample Type:

- ☐ Surface Soil
- ☑ Subsurface Soil
- ☐ Sediment
- ☐ Waste
- ☐ Other _____

Sample Collection:

- ☑ Grab
- ☐ Composite

Sample Depth: 3-51

Sample Description (sand, clay, dry, moist, wet, etc.):
CLAY ~~Silts~~ w/sand + gravel
Pale yellow brown some shale
CL

Aqueous Sample

Aqueous Sample Type:

- ☐ Surface Water
- ☐ Groundwater
  - ☐ Monitoring Well
  - ☐ Domestic Well
  - ☐ Other _____
- ☐ Seep
- ☐ Waste
- ☐ Other _____

Total Well Depth:

Well Casing Size & Depth:

Static Water Level:

One Casing Volume:

Start Purge (hrs):

End Purge (hrs):

Total Purge Time:

Total Purge Volume (gal):

Purge Method:

Analysis:

- ☑ Volatiles
- ☑ Semivolatiles
- ☐ PCB
- ☐ Pesticides
- ☐ Explosives
- ☐ Other (list):

- ☐ Cyanide
- ☑ Metals
  - ☑ TAL Metals
  - ☐ Priority Pollutants
  - ☐ RCRA 8
  - ☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/7/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL-59	8 16 01	1210	CL59SB03B
Sampled By: C. Carton, C. Lopez, J. Coughlin	Signature(s):	Sampling Method: Split Spoon	Sample Location:

Solid Sample

Solid Sample Type:	Sample Collection:
☐ Surface Soil	☑ Grab
☑ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	Sample Depth: 9-10.5'
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.): ~~Silty~~ Clay w/sand, gravel, shale some Fe nodules slightly moist, moderate yellow brown CL

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☐ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/7/01

Observations/Notes:

Moist seam in soil

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	816101	1230	CL59-SB03C
Sampled By: G Carton, C Lopez, J. Laughlin	Signature(s):	Sampling Method: split spoon	Sample Location: ~~1230~~ SB03

Solid Sample

Solid Sample Type:	Sample Collection:
☑ Surface Soil	☑ Grab
☐ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	Sample Depth: 13-14.3'
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.): sand w/gravel, shale, silt, Fe nodules, SW mottled color

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☐ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/7/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/6/01	1335	CL59-SS04
Sampled By: John Coughlin, G. Carton	Signature(s): John Coughlin	Sampling Method: Hand auger	Sample Location: SS04

Solid Sample

Solid Sample Type:

- ☒ Surface Soil
- ☐ Subsurface Soil
- ☐ Sediment
- ☐ Waste
- ☐ Other _____

Sample Collection:

- ☒ Grab
- ☐ Composite

Sample Depth: 0-12" except 6-12" VOA

Sample Description (sand, clay, dry, moist, wet, etc.): Sand, very fn grn w/silts & gravel moderate yellow Brown SM

Aqueous Sample

Aqueous Sample Type:

- ☐ Surface Water
- ☐ Groundwater
  - ☐ Monitoring Well
  - ☐ Domestic Well
  - ☐ Other _____
- ☐ Seep
- ☐ Waste
- ☐ Other _____

Total Well Depth:

Well Casing Size & Depth:

Static Water Level:

One Casing Volume:

Start Purge (hrs):

End Purge (hrs):

Total Purge Time:

Total Purge Volume (gal):

Purge Method:

Analysis:

- ☒ Volatiles
- ☒ Semivolatiles
- ☒ PCB
- ☐ Pesticides
- ☐ Explosives
- ☐ Other (list): _____

- ☐ Cyanide
- ☒ Metals
  - ☒ TAL Metals
  - ☐ Priority Pollutants
  - ☐ RCRA 8
  - ☐ Selected Metals (list): _____

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/7/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL-59	8/6/01	1445	CL59-SB04A
Sampled By:	**Signature(s):**	**Sampling Method:**	**Sample Location:**
J. Caughlin, C. Lopez	[signature]	3" Split Spoon	SB04

Solid Sample

Solid Sample Type:	Sample Collection:
☐ Surface Soil	☑ Grab
☑ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	Sample Depth: 3-4'
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.): Clay, w/some gravel and shale fragments moderate yellow brown w/ fe nodules CL

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):
_____	_____
_____	_____
_____	_____

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/7/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/6/01	1500	CL59-SB04B
Sampled By: J Coughlin, G. Carton	Signature(s): John Coughlin, [illegible]	Sampling Method: 3" Split Spoon	Sample Location: SB04

Solid Sample

Solid Sample Type:	Sample Collection:
☐ Surface Soil	☑ Grab
☑ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	Sample Depth: 9-10'
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.):
Clay w/ sand, gravel & shale fragments
Fe nodules
Mottled color CL

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/7/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name: CL-59	Sample Date: 8/6/01	Sample Time: 1510 1520 Chem	Sample Number: CL59-SB04C
Sampled By: John Coughlin G. Carton	Signature(s): [signature]	Sampling Method: 3" Split Spoon	Sample Location: SB-04

Solid Sample

Solid Sample Type:

- ☐ Surface Soil
- ☑ Subsurface Soil
- ☐ Sediment
- ☐ Waste
- ☐ Other _____

Sample Collection:

- ☑ Grab
- ☐ Composite

Sample Depth: 11-13 atterberg Grain size; 13-15 Chemistry

Sample Description (sand, clay, dry, moist, wet, etc.): ~~clay~~ w/some gravel & shale fragments; Clay/Fe Rich nodules; SAND mottled color

SC [signature]

Aqueous Sample

Aqueous Sample Type:

- ☐ Surface Water
- ☐ Groundwater
  - ☐ Monitoring Well
  - ☐ Domestic Well
  - ☐ Other _____
- ☐ Seep
- ☐ Waste
- ☐ Other _____

Total Well Depth:

Well Casing Size & Depth:

Static Water Level:

One Casing Volume:

Start Purge (hrs):

End Purge (hrs):

Total Purge Time:

Total Purge Volume (gal):

Purge Method:

Analysis:

- ☑ Volatiles
- ☑ Semivolatiles
- ☑ PCB
- ☐ Pesticides
- ☐ Explosives
- ☐ Other (list):

- ☐ Cyanide
- ☑ Metals
  - ☑ TAL Metals
  - ☐ Priority Pollutants
  - ☐ RCRA 8
  - ☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/7/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/8/01	1145	CL59-SS05 / SS105
Sampled By:	**Signature(s):**	**Sampling Method:**	**Sample Location:**
J. Coughlin C. Lopez	[illegible]	3" Split Spoon	

Solid Sample

Solid Sample Type:	Sample Collection:
☑ Surface Soil	☑ Grab
☐ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	Sample Depth: 0-12" All except 1-2 atterberg / grain size 6-12" VOA
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.): sand, fine grained w/silts and gravel, some sandstone fragments and concrete debris

~~SW~~ CL/PC

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☑ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☑ Other (list):	☐ Selected Metals (list):
Grain size	
Atterberg	

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL / Compuchem

Date Shipped: 8/9/01 / 8/8/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/8/01	1205	CL59-SBOSA
Sampled By:	**Signature(s):**	**Sampling Method:**	**Sample Location:**
C. Lopez J. Coughlin		3" split Spoon	

Solid Sample

Solid Sample Type:	Sample Collection:
☐ Surface Soil	☑ Grab
☑ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	**Sample Depth:** 4-5'
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.):
Clay, w/sands, gravel, some shale frag
stiff mod yel Brn (10yr5/4) CL

CL

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):
_____	_____
_____	_____
_____	_____

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/9/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/8/01	1215	CL59-SB05B
Sampled By:	**Signature(s):**	**Sampling Method:**	**Sample Location:**
C. Lopez J. Coughlin		3" split spoon	

Solid Sample

Solid Sample Type:	Sample Collection:
☐ Surface Soil	☑ Grab
☑ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	**Sample Depth:** 8-9.5'
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.):
Clay, w/ gravel, sands, some shale fragments
Fe rich nodules
mod yel Brn (10yr 5/4) CL

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):
_____	_____
_____	_____
_____	_____

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/9/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/8/01	1235	CL59-SB05C
Sampled By: E. Lopez, T. Coughlin, G. Carter	Signature(s):	Sampling Method: 3" Split Spoon	Sample Location:

Solid Sample

Solid Sample Type:	Sample Collection:
☐ Surface Soil	☑ Grab
☑ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	Sample Depth: 13'-14'
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.): SANDS, w/silts, gravel, shale fragments some sandstone, ferich nodules ~~13'-14'~~ mottled color

SW

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):
_____	_____
_____	_____
_____	_____

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/9/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/8/01	0835	CL59-SS06/SS106
Sampled By:	**Signature(s):**	**Sampling Method:**	**Sample Location:**
G. Carton J. Coughlin		3" Split Spoon	

Solid Sample

Solid Sample Type:	Sample Collection:
☑ Surface Soil	☑ Grab
☐ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	Sample Depth: 0-12" except 6-12" VOA
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.): sand, very fine grn, w/silts and gravel & shale fragments mod yel Brn (10yr 5/4)

SW

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL / Compuchem

Date Shipped: 8/9/01 / 8/8/01

Observations/Notes:

MS/MSD

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/8/01	0900	CL59-SB06A
Sampled By: J. Coughlin, C. Lopez	Signature(s):	Sampling Method: 3" split spoon	Sample Location:

Solid Sample

Solid Sample Type:

- ☐ Surface Soil
- ☑ Subsurface Soil
- ☐ Sediment
- ☐ Waste
- ☐ Other _____

Sample Collection:

- ☑ Grab
- ☐ Composite

Sample Depth: 6-8'

Sample Description (sand, clay, dry, moist, wet, etc.): Clay, w/some gravel and shale fragments very stiff, mod yel Brn (10yr 5/4) very slightly moist, little sands CL

Aqueous Sample

Aqueous Sample Type:

- ☐ Surface Water
- ☐ Groundwater
  - ☐ Monitoring Well
  - ☐ Domestic Well
  - ☐ Other _____
- ☐ Seep
- ☐ Waste
- ☐ Other _____

Total Well Depth:

Well Casing Size & Depth:

Static Water Level:

One Casing Volume:

Start Purge (hrs):

End Purge (hrs):

Total Purge Time:

Total Purge Volume (gal):

Purge Method:

Analysis:

- ☑ Volatiles
- ☑ Semivolatiles
- ☑ PCB
- ☐ Pesticides
- ☐ Explosives
- ☐ Other (list): _____

- ☐ Cyanide
- ☑ Metals
  - ☑ TAL Metals
  - ☐ Priority Pollutants
  - ☐ RCRA 8
  - ☐ Selected Metals (list): _____

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/9/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/8/01	0935	CL59-SB06B
Sampled By: J. Coughlin, C. Lopez	Signature(s):	Sampling Method: 3" split spoon	Sample Location:

Solid Sample

Solid Sample Type:

- ☐ Surface Soil
- ☑ Subsurface Soil
- ☐ Sediment
- ☐ Waste
- ☐ Other _____

Sample Collection:

- ☑ Grab
- ☐ Composite

Sample Depth: 10-12'

Sample Description (sand, clay, dry, moist, wet, etc.): Clay, w some gravel & shale fragments stiff, mod yel Brn (10YR 5/4)

CL

Aqueous Sample

Aqueous Sample Type:

- ☐ Surface Water
- ☐ Groundwater
  - ☐ Monitoring Well
  - ☐ Domestic Well
  - ☐ Other _____
- ☐ Seep
- ☐ Waste
- ☐ Other _____

Total Well Depth:

Well Casing Size & Depth:

Static Water Level:

One Casing Volume:

Start Purge (hrs):

End Purge (hrs):

Total Purge Time:

Total Purge Volume (gal):

Purge Method:

Analysis:

- ☑ Volatiles
- ☑ Semivolatiles
- ☑ PCB
- ☐ Pesticides
- ☐ Explosives
- ☐ Other (list): _____

- ☐ Cyanide
- ☑ Metals
  - ☑ TAL Metals
  - ☐ Priority Pollutants
  - ☐ RCRA 8
  - ☐ Selected Metals (list): _____

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/9/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/8/01	1000	CL59-SB06C
Sampled By:	**Signature(s):**	**Sampling Method:**	**Sample Location:**
C. Lopez J. Coughlin	[illegible]	3" Split Spoon	

Solid Sample

Solid Sample Type:	Sample Collection:
☐ Surface Soil	☑ Grab
☑ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	**Sample Depth:** 12-13.8
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.):
Clay, w/sands, gravel, shale fragments sandstone cobble, Fe rich nodules mod yel brn (10yr 5/4)
CL

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):
_____	_____
_____	_____
_____	_____

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/9/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/7/01	1420	CL59-SS07/107
Sampled By: Carton Lopez Coughlin	**Signature(s):** [illegible]	**Sampling Method:** 3" split spoon	**Sample Location:**

Solid Sample

Solid Sample Type:	Sample Collection:
☑ Surface Soil	☑ Grab
☐ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	Sample Depth: 0-12" 6-12" VOA
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.): SAND, dry fn grn, w/silts, gravel & shale some Brick debris. mod yel brn (10yr 5/4) SW

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL Compuchem

Date Shipped: 8/9/01 / 8/8/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL 59	8/7/01	1500	CL59-SB07A
Sampled By: Carton Lopez Caughlin	Signature(s): [illegible]	Sampling Method: 3" split spoon	Sample Location:

Solid Sample

Solid Sample Type:	Sample Collection:
☐ Surface Soil	☑ Grab
☑ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	Sample Depth: 6-8'
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.): Clay w/some gravel & shale some fe rich stains mod yel brown (10yr 5/4) CL

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☑ Other (list):	☐ Selected Metals (list):
	Atterberg limits
	Grain size

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/9/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8 17 01	1515	CL59-SB07B
Sampled By:	**Signature(s):**	**Sampling Method:**	**Sample Location:**
C. Lopez J. Coughlin	[illegible] John Coughlin	3" split spoon	

Solid Sample

Solid Sample Type:	Sample Collection:
☐ Surface Soil	☑ Grab
☑ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	**Sample Depth:**
☐ Other _____	10 -12'

Sample Description (sand, clay, dry, moist, wet, etc.):
Clay, w/some gravel and shale
w/little sand
stiff moyel Brn (10yr 5/4)
CL

Aqueous Sample

Aqueous Sample Type:	Total Well Depth:
☐ Surface Water	Well Casing Size & Depth:
☐ Groundwater	Static Water Level:
☐ Monitoring Well	One Casing Volume:
☐ Domestic Well	Start Purge (hrs):
☐ Other _____	End Purge (hrs):
☐ Seep	Total Purge Time:
☐ Waste	Total Purge Volume (gal):
☐ Other _____	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):
_____	_____
_____	_____
_____	_____

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s):

Date Shipped:

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	817101	1600	CL59-SB07C
Sampled By: Lopez Coughlin Cayton ~~CL59~~	Signature(s): [signature]	Sampling Method: 3" split spoon	Sample Location:

Solid Sample

Solid Sample Type:

- ☐ Surface Soil
- ☑ Subsurface Soil
- ☐ Sediment
- ☐ Waste
- ☐ Other _____

Sample Collection:

- ☑ Grab
- ☐ Composite

Sample Depth: 14-16'

Sample Description (sand, clay, dry, moist, wet, etc.): Clay, w/some gravel & shale very stiff Med Dk gray (4N4) CL

Aqueous Sample

Aqueous Sample Type:

- ☐ Surface Water
- ☐ Groundwater
  - ☐ Monitoring Well
  - ☐ Domestic Well
  - ☐ Other _____
- ☐ Seep
- ☐ Waste
- ☐ Other _____

Total Well Depth:

Well Casing Size & Depth:

Static Water Level:

One Casing Volume:

Start Purge (hrs):

End Purge (hrs):

Total Purge Time:

Total Purge Volume (gal):

Purge Method:

Analysis:

- ☑ Volatiles
- ☑ Semivolatiles
- ☑ PCB
- ☐ Pesticides
- ☐ Explosives
- ☐ Other (list):
- ☐ Cyanide
- ☑ Metals
  - ☑ TAL Metals
  - ☐ Priority Pollutants
  - ☐ RCRA 8
  - ☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped:

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8 17 01	1615	CL59 — SB07D
Sampled By: Coughlin Carton Lopez	Signature(s): [signature]	Sampling Method: 3" split spoon	Sample Location:

Solid Sample

Solid Sample Type:

- ☐ Surface Soil
- ☑ Subsurface Soil
- ☐ Sediment
- ☐ Waste
- ☐ Other _____

Sample Collection:

- ☑ Grab
- ☐ Composite

Sample Depth: 18-19.1

Sample Description (sand, clay, dry, moist, wet, etc.):
SAND, med-coarse grn, some silts gravel & shale mottled color

SW

Aqueous Sample

Aqueous Sample Type:

- ☐ Surface Water
- ☐ Groundwater
  - ☐ Monitoring Well
  - ☐ Domestic Well
  - ☐ Other _____
- ☐ Seep
- ☐ Waste
- ☐ Other _____

Total Well Depth:

Well Casing Size & Depth:

Static Water Level:

One Casing Volume:

Start Purge (hrs):

End Purge (hrs):

Total Purge Time:

Total Purge Volume (gal):

Purge Method:

Analysis:

- ☑ Volatiles
- ☑ Semivolatiles
- ☑ PCB
- ☐ Pesticides
- ☐ Explosives
- ☐ Other (list):

- ☐ Cyanide
- ☑ Metals
  - ☑ TAL Metals
  - ☐ Priority Pollutants
  - ☐ RCRA 8
  - ☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped:

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/7/01	1620	CL59--SB07
Sampled By:	**Signature(s):**	**Sampling Method:**	**Sample Location:**
Coughlin Lopez	[illegible]	3" Split Spoon	

Solid Sample

Solid Sample Type:	Sample Collection:
☐ Surface Soil	☑ Grab
☑ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	Sample Depth: 20-21.1
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.): sand, med to coarse, min, mottled color some silts

SW SM

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☐ Volatiles	☐ Cyanide
☐ Semivolatiles	☐ Metals
☐ PCB	☐ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☑ Other (list): Grain Size Only	☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped:

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/7/01	0800	CL59-SS08/SS108
Sampled By: C. Carlton, J Coughlin	**Signature(s):** [illegible]	**Sampling Method:** 3" split spoon	**Sample Location:**

Solid Sample

Solid Sample Type:	Sample Collection:
☑ Surface Soil	☑ Grab
☐ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	**Sample Depth:** 0-12" all but 6-12" VOA
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.): Sand, very fn grain, w/silts gravel & shale some concrete debris moo yel Brn 10yr 5/4 SW

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):
_____	_____
_____	_____
_____	_____

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL / Compuchem

Date Shipped: 8/7/01

Observations/Notes:

PID reading 12 ppm

Field duplicate and QA split

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/7/01	0845	CL59-SB08A
Sampled By: Carton Coughlin	**Signature(s):**	**Sampling Method:** 3" split spoon	**Sample Location:**

Solid Sample

Solid Sample Type:	Sample Collection:
☐ Surface Soil	☑ Grab
☑ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	**Sample Depth:** 10-12'
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.): Clay w/some gravel & shale stiff med dk gray (4N4)

CL

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):
_____	_____
_____	_____
_____	_____

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/7/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/7/01	1105	CL59-SB08AA
Sampled By:	**Signature(s):**	**Sampling Method:**	**Sample Location:**
Carton Coughlin	[signature]	3" split spoon	

Solid Sample

Solid Sample Type:	Sample Collection:
☐ Surface Soil	☑ Grab
☑ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	Sample Depth: 5-7'
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.):
CLAY, w some gravel & shale
moderel Brn (10YR5/4)

CL

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/7/01

Observations/Notes:

Bore new hole to collect - 5 feet south of original Boring.

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	817101	0910	CL59-SB08B
Sampled By: ~~[illegible]~~ Carton Coughlin	Signature(s): [illegible]	Sampling Method: 3" Split Spoon	Sample Location:

Solid Sample

Solid Sample Type:	Sample Collection:
☐ Surface Soil	☑ Grab
☑ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	Sample Depth: 16-18'
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.):
Smear ZONE
CLAY, w/weathered chale, gravel
some SAND MED STIFF
MOD yel BRN 10YR5/4 slightly wet
CL

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth:
☐ Groundwater	Well Casing Size & Depth:
☐ Monitoring Well	Static Water Level:
☐ Domestic Well	One Casing Volume:
☐ Other _____	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method:

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals
☐ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):
_____	_____
_____	_____
_____	_____

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/7/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/7/01	1025	CL59-SB08C
Sampled By: C Lopez, J. Coughlin	Signature(s): [signature]	Sampling Method: 3" Split Spoon	Sample Location:

Solid Sample

Solid Sample Type:

- ☐ Surface Soil
- ☑ Subsurface Soil
- ☐ Sediment
- ☐ Waste
- ☐ Other _____

Sample Collection:

- ☑ Grab
- ☐ Composite

Sample Depth: 24-25.5

Sample Description (sand, clay, dry, moist, wet, etc.): CLAY, w/ weathered shale, some gravel slightly moist med drk gray (4N4)

CL

Aqueous Sample

Aqueous Sample Type:

- ☐ Surface Water
- ☐ Groundwater
  - ☐ Monitoring Well
  - ☐ Domestic Well
  - ☐ Other _____
- ☐ Seep
- ☐ Waste
- ☐ Other _____

Total Well Depth:

Well Casing Size & Depth:

Static Water Level:

One Casing Volume:

Start Purge (hrs):

End Purge (hrs):

Total Purge Time:

Total Purge Volume (gal):

Purge Method:

Analysis:

- ☑ Volatiles
- ☑ Semivolatiles
- ☑ PCB
- ☐ Pesticides
- ☐ Explosives
- ☐ Other (list):

- ☐ Cyanide
- ☑ Metals
- ☑ TAL Metals
- ☐ Priority Pollutants
- ☐ RCRA 8
- ☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/7/01

Observations/Notes:

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/7/01	1120	CL59-GW08/108
Sampled By: G. Carter, J. Coughlin	**Signature(s):**	**Sampling Method:** bailer	**Sample Location:**

Solid Sample

Solid Sample Type:	Sample Collection:
☐ Surface Soil	☐ Grab
☐ Subsurface Soil	☐ Composite
☐ Sediment	
☐ Waste	Sample Depth:
☐ Other _____	

Sample Description (sand, clay, dry, moist, wet, etc.):

Aqueous Sample

Aqueous Sample Type:	
☐ Surface Water	Total Well Depth: 27 bgs
☑ Groundwater	Well Casing Size & Depth: N/A
☐ Monitoring Well	Static Water Level: 26 BGS
☐ Domestic Well	One Casing Volume:
☑ Other open hole	Start Purge (hrs):
☐ Seep	End Purge (hrs):
☐ Waste	Total Purge Time:
☐ Other _____	Total Purge Volume (gal):
	Purge Method: None

Analysis:

☑ Volatiles	☐ Cyanide
☑ Semivolatiles	☑ Metals
☑ PCB	☑ TAL Metals filtered
☑ Pesticides	☐ Priority Pollutants
☐ Explosives	☐ RCRA 8
☐ Other (list):	☐ Selected Metals (list):

Purge Data:

Volume	pH	S.C. mS/cm	Temp(°C)	Turbidity NTU	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample	7.95	671	24.4	1000+	Temp not true sample had been in sun

Laboratory(s): STL / Compuchem

Date Shipped: 8/7/01 / 8/8/01

Observations/Notes:
extremely turbid, filterd metals twice to get clear, MS/MSD for VOA, gray in color
8" diameter hole

PLEXUS scientific

SAMPLE DATA SHEET

Site Name:	Sample Date:	Sample Time:	Sample Number:
CL59	8/8/01	1430	CL59-WS09
Sampled By: C. Lopez, J. Coughlin	Signature(s): [signature]	Sampling Method: Spoon	Sample Location: Soil cutting drums

Solid Sample

Solid Sample Type:

- ☐ Surface Soil
- ☐ Subsurface Soil
- ☐ Sediment
- ☑ Waste
- ☐ Other _____

Sample Collection:

- ☐ Grab
- ☑ Composite

Sample Depth: ——

Sample Description (sand, clay, dry, moist, wet, etc.): Composite of soils/Drill cuttings from 6 Drums

Aqueous Sample

Aqueous Sample Type:

- ☐ Surface Water
- ☐ Groundwater
  - ☐ Monitoring Well
  - ☐ Domestic Well
  - ☐ Other _____
- ☐ Seep
- ☐ Waste
- ☐ Other _____

Total Well Depth:

Well Casing Size & Depth:

Static Water Level:

One Casing Volume:

Start Purge (hrs):

End Purge (hrs):

Total Purge Time:

Total Purge Volume (gal):

Purge Method:

Analysis:

- ☑ Volatiles
- ☐ Semivolatiles
- ☑ PCB
- ☐ Pesticides
- ☐ Explosives
- ☐ Other (list): _____

- ☐ Cyanide
- ☑ Metals
  - ☐ TAL Metals
  - ☐ Priority Pollutants
  - ☑ RCRA 8
  - ☐ Selected Metals (list): _____

Purge Data:

Volume	pH	S.C.	Temp(°C)	Turbidity	Notes
Initial					
1					
2					
3					
4					
5					
6					
Sample					

Laboratory(s): STL

Date Shipped: 8/9/01

Observations/Notes:

Composite from 6 drums

PLEXUS scientific

Boring Number: SB01

BORING LOG

Site Name & Location: CLSY Nike Site		Date & Time Started: 1345 Date & Time Completed: 1359	
Drilling Company: Fronstr	Foreman: Rob Hamilton	Sampler(s): 3" split spn	Sampler Hammer: 140 / Drop: 30"
Drilling Equipment: CME 550X	Method: HSA	Elevation & Datum	Completion Depth: 4' / Rock Depth
Bit Size(s): 8 1/4 OD 4 1/4 ID	Core Barrel(s)	Geologist(s): John Coughlin	

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
0	1	100%	0	7	SAND, fn grn, some silts gravel & shale fragments loose sand to med dense	mod yel brn (10yr 5/4) SW
		"	0	11		
1		"	0	9	CLAY w sand & gravel & shale stiff	mod yel brn (10yr 5/4) CL
		"	0	9		
2	2	"	0	11	-- same	
		"	0	9		
3		"	0	15		
		"	0	15		
4					4' EOB	
5						
6						
7						
8						
9						
10						

Page 1 of 1 Signature: John Coughlin Date: 8/8/1

PLEXUS scientific

Boring Number: SB02

BORING LOG

Site Name & Location: CL 59 Nike site	Date & Time Started: 8/8/1 1320 Date & Time Completed: 8/8/1 1330
Drilling Company: Frontz Drilling; Foreman: Rob Hamilton	Sampler(s): 3" split spn; Sampler Hammer: 140; Drop: 30"
Drilling Equipment: CME 550X; Method: HSA	Elevation & Datum; Completion Depth: 4'; Rock Depth
Bit Size(s): 8" OD 4 1/4 ID; Core Barrel(s)	Geologist(s): John Coughlin

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
0	1	100%	0	7	Sand, fn grn, w silts gravel & shale fragments	modyel Brn (10yr 5/4) SW verticle striations
		"	0	10		
1		"	0	12	- clay w sands, gravel, & shale fragments stiff	modyel Bry (10yr 5/4) CL verticle striations
		"	0	16	— very stiff	
2	2	"	0	22	same	
		"	0	29	stiff to hard	
3		"	0	30		
		"	0	38		
4					4' EOB	
5						
6						
7						
8						
9						
10						

sample 0-1

sample 3-4'

Page 1 of 1 Signature: [signature] Date: 8/8/1

PLEXUS scientific

Boring Number: SB06

BORING LOG

Site Name & Location: CL59 Nike Site	Date & Time Started: 8/8/1 0830 Date & Time Completed: 8/8/1 1000
Drilling Company: Frontz; Foreman: Rob Hamilton	Sampler(s): 3" split spn; Sampler Hammer: 140 LB; Drop: 30"
Drilling Equipment: CME 550X; Method: HSA	Elevation & Datum: ; Completion Depth: 14.4; Rock Depth: 13.5
Bit Size(s): 8¼ OD 4¼ ID; Core Barrel(s):	Geologist(s): John Coughlin

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
10	6	100%	0	7	Clay w some gravel & shale fragments stiff	mod yel brn (10YR 5/4) CL
		11	0	11		
11		11	0	19		
		11	0	50/4"	- sand, concreted (sandstone) fine grain fe rich nodules	grayish orange (10YR 7/4) SP
12	7	11	0	10	- clay, w/ sands, gravel, sandstone cobble fe rich nodules & shale fragments	mod yel brn (10YR 5/4) CL
		11	0	25		
3		11	0	44		
		11	0	50/5"	- sandstone ~~cobble~~ very fine grain (concreted sand)	Lt gray (7N 7) To grayish org (10YR 7/4) SP
14	8	11	0	50/5"	EOB 14.4'	
5						
16						
7						
18						
9						
20						
10						

Sample 10-11'

Sample 12-13.5

Page 2 of 2 Signature: [signature] Date: 8/8/1

PLEXUS scientific

Boring Number: SB07

BORING LOG

Site Name & Location: CL 59 Nike site	Date & Time Started: 8/7/1 1410 Date & Time Completed: 8/7/1 1620
Drilling Company: Frontz — Foreman: Rob Hamilton	Sampler(s): 3" split spn — Sampler Hammer: 140 LB — Drop: 30"
Drilling Equipment: CME 550X — Method: HSA	Elevation & Datum: — Completion Depth: 22' — Rock Depth: 21'
Bit Size(s): 6 1/4 OD 4 1/4 ID — Core Barrel(s):	Geologist(s): John Coughlin

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
0	1	100%	0	9	Sand, very fn grn w/silts gravel & shale fragments some brick debris	Mod yel Brn (10yr 5/4) ~~SOT~~ SW
		~~0~~	0	11		
1		"	0	9		
		"	0	13	- clay w/some gravel some concrete debris stiff w/some shale frag	Mod yel Brn (10yr 5/4) CL
2	2	"	0	6		
		"	0	10		
3		"	0	11		
		"	0	12	- same no concrete	
4	3	"	0	10		
		"	0	16		
5		"	0	20	- w/ Thin shale layer w/ Fe rich stains 0.1'	med drk gray (4N4) ~~CL~~ ML
		"	0	17		
6	4	"	0	7	- same - very stiff	Mod yel Brn (10yr 5/4) CL
		"	0	19		
7		"	0	21		
		"	0	23		
8	5	"	0	7	same	
		"	0	11		
9		"	0	10		
		"	0	9		
10						

Sample 0-1

SB07A Sample 6-8

Page 1 of 3 Signature: [signature] Date: 8/7/1

PLEXUS scientific

Aaron ~ helper

Boring Number: SB03

BORING LOG

Site Name & Location: CL59SB03 Nike site	Date & Time Started: 8/6/1 1120 Date & Time Completed: 8/6/1 1235
Drilling Company: Fronte — Foreman: Rob Hamilton	Sampler(s): 2" Long 3" split spn — Sampler Hammer: Standard WT Hammer — Drop: 30" 140 LB
Drilling Equipment: 4¼ ID HSA — Method: 8¼ OD	Elevation & Datum: — Completion Depth: 14.3 — Rock Depth: ~~10.3~~ N/A
Bit Size(s): 3" split spoon — Core Barrel(s):	Geologist(s): John Coughlin

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
0		100%	0	Hand	Sand, w some silts pale yel brown, ~~SM~~ SM (10YR 6/2) some stone gravel and clouded fines	
		"	0	Auger		
1	1	"	0	7	~~Silts~~ w some sands & gravel, clay & shale fragments	Pale yel Brn CL (10YR 6/2) some verticle striations
		"	0	18		
2		"	0	14		
		"	0	20		
3	2	"	0	7	same w/ shale & gravel	CL
		"	0	13		
4		"	0	20		
		"	0	24		
5	3	"	0	4	same w/ increasing amounts of shale and Fe nodules	CL
		"	0	12		
6		"	0	10		
		"	0	11		
7	4	"	0	6		
		"	0	6		
8		"	0	5	same w/ increasing water (moist)	CL mod yel Brn 10YR 5/4
		"	0	40		
9	5	"	0	11		
		"	0	23		
10						

sample 3-5

sample 9-10.5

Page 1 of 2 Signature: John Coughlin Date: 8/6/1

PLEXUS scientific

Boring Number: SB03

BORING LOG

Site Name & Location: CLS9SB03 ~~Cayuga~~ Nike site	Date & Time Started: 8/6/1 1120 Date & Time Completed: 8/6/1 1235
Drilling Company: Growts — Foreman: Rob Hamilton	Sampler(s): 3" split spoon — Sampler Hammer: 140 LB — Drop: 30"
Drilling Equipment: 4¼ ID HSA 8¼ OD — Method:	Elevation & Datum: — Completion Depth: 14.3 — Rock Depth: ~~10.3~~ N/A
Bit Size(s): — Core Barrel(s):	Geologist(s): John Coughlin

Cont from Pg 1

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
10		100%	0	31	Silts w/sands & gravel, MOD Yel Brn (10YR 5/4) (moist)	
		11	0	50/4"	sands, very fine grain, concreted, Pale yel Brn (10YR 6/2) (sand stone) SP	
11	6	11	0	24		
		11	0	35	sands w/ gravel & sale & silts Fe nodules SW	mottled colors sand - Pale yel Brn shale - Dusky Brn to Med gray Fe - Light Brown
2		11	0	27		
		11	0	21		
13	7	11	0	15	same	
		11	0	48		
14		100%	0	50/4"	increasing sand stones	
					14.3' EOB	
15						
6						
7						
8						
9						
10						

2" split spoon 11'-13'

Sample 13-14.3

Page 2 of 2 Signature: John Cgh Date: 8/6/1

PLEXUS scientific

Aaron - Helper

Boring Number: SB04

BORING LOG

Site Name & Location: CL 59 Nike Site	Date & Time Started: 8/6/1 1410 Date & Time Completed: 8/6/1 1525
Drilling Company: FroNTZ Foreman: Rob Hamilton	Sampler(s): 2" Long 3" spt spn Sampler Hammer: 140 LB Drop: 30"
Drilling Equipment: 4 1/4 ID HSA Method: 8 1/4 OD	Elevation & Datum: Completion Depth: 15 Rock Depth: N/A
Bit Size(s): CME 550 X Core Barrel(s):	Geologist(s): John Coughlin

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
0		100%	0	HAND	Sand, very fn grn, w/silts, gravel & clayey fines, mod yel Brn	(10 yr 5/4) SWSM
		11	0	Auger	clay w/ some gravel & shale fragments, mod yel Brn, Fe nodules (Rich)	(10 yr 5/4) CL
1	1	50%	0	5		
		100%	0	8		
2		100%	0	11		
		100%	0	10	same	
3	2	100%	0	6		
		100%	0	6		
4		0	—	28		
		0	—	17	Same	
5	3	100%	0	2		
		50%	0	8		
6		0	—	5		
		0	—	6		
7	4	50%	0	50/6	SAME - slightly Moist	
		0	—	—		
8		0	—	—		
		0	—	—	Sand, very fgrn, concreted, lgt gray, (7N 7) SP	
9	5	100%	0	27	clay w some gravel & shale, Fe Nodules (Rich) (1 Piece of fence wire)	mottled color CL
		100%	0	13		Till
10						

Sample 0-1

Sample 3-4

Sample 9-10'

Page 1 of 2 Signature: John Gh Date: 8/6/1

PLEXUS scientific

Boring Number: SB04

BORING LOG

Site Name & Location: CL 59 Nike Site	Date & Time Started: 8/6/1 1410 Date & Time Completed: 8/6/1 1525
Drilling Company: Front 2 — Foreman: Rob H.	Sampler(s): 2' Lng 3" split spn — Sampler Hammer: 140 LB — Drop: ~~6~~ 30"
Drilling Equipment: 4¼ ID HSA — Method: 8¼ OD	Elevation & Datum: — Completion Depth: 15' — Rock Depth: N/A
Bit Size(s): — Core Barrel(s):	Geologist(s): John Coughlin

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
10		0	—	11	No Return	
		0	—	15		
11	6	100%	0	6	- Clay w/ some gravel & shale fragments SAND Fe Rich nodules	mottled color, SC (Till)
		11	0	17		
2		11	0	30		
		11	0	50		
13	7	11	0	8	Same	
		11	0	18		
4		11	0	33		
		11	0	23	EOB 15'	
15						
6						
7						
8						
9						
10						

SB04C Atterberg & grains 11-13

SB04C Sample 13-15

Page 2 of 2 Signature: [signature] Date: 8/6/1

PLEXUS scientific

Boring Number: SB05

BORING LOG

Site Name & Location: CL 59 Nike Site	Date & Time Started: 8/8/1 1135 Date & Time Completed: 8/8/1 1245
Drilling Company: Frontz — Foreman: Rob Hamilton	Sampler(s): 3" split spn — Sampler Hammer: 140 LB — Drop: 30"
Drilling Equipment: CME 550X — Method: HSA	Elevation & Datum: — Completion Depth: 15' — Rock Depth: N/A
Bit Size(s): 8¼ OD 4¼ ID — Core Barrel(s):	Geologist(s): John Coughlin

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
0	1	100%	0	7	- sand, fngrn, w silts & gravel some sandstone fragments & concrete debris	modyel Brn (10yr 5/4) CL
		"	0	9		
1		"	0	9	- clay, w gravel some sands stiff w some shale fragments	modyel Brn (10yr 5/4) CL
		"	0	11		
2	2	"	0	10		
		"	0	12		
3		"	0	11	- sandstone cobble	
		"	0	17		
4	3	"	0	7	- clay (same) w/gravel, sands some shales stiff	modyel Brn (10yr 5/4) CL
		"	0	10		
5		0	—	13		
		0	—	16	- clay same	
6	4	100%	0	9		
		"	0	13		
7		"	0	11		
		"	0	19	- same w/fe rich nodules & increas in sands	
8	5	"	0	18		
		"	0	25		
9		"	0	17		
		"	0	15		
10						

Sample 0-1

1-2 at Berg

Sample 4-5'

Sample 8-9.5'

Page 1 of 2 Signature: John Coughlin Date: 8/8/1

PLEXUS scientific

Boring Number: SB05

BORING LOG

Site Name & Location: CCS9 NIKE SITE	Date & Time Started: 8/8/1 1135 Date & Time Completed: 8/8/1 1245
Drilling Company: Fronte; Foreman: Rob Hamilton	Sampler(s): 3" split spn; Sampler Hammer: 140LB; Drop: 30"
Drilling Equipment: CME 550X; Method: HSA	Elevation & Datum; Completion Depth: 15'; Rock Depth: N/A
Bit Size(s): 8 1/4 OD 4 1/4 ID; Core Barrel(s)	Geologist(s): John Coughlin

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
10	6	100%	0	10	CLAY w/ gravel, sands shale	moderate brn 10yr 5/4 CL
		"	0	16	SANDS, w/ silts gravel shale fragments some sandstone ferich nodules	mottled color SW
1		"	0	15		
		"	0	34		"
12	7	"	0	4	SAME	
		"	0	28		
3		"	0	36		
		"	0	31		"
14	8	"	0	20	SAME	
		"	0	29	No water	
15					EOB 15'	
6						
7						
8						
9						
10						

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PLEXUS scientific

Boring Number: SB06

BORING LOG

Site Name & Location: CL59 Nike Site	Date & Time Started: 8/8/1 0830 Date & Time Completed: 8/8/1 1000
Drilling Company: Frontz — Foreman: Rob Hamilton	Sampler(s): 3" SPLT SPN — Sampler Hammer: 140 LB — Drop: 30"
Drilling Equipment: CME 550X — Method: HSA	Elevation & Datum: — Completion Depth: 14.4 — Rock Depth: 13.5
Bit Size(s): 8¼ OD 4¼ ID — Core Barrel(s):	Geologist(s): John Coughlin

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
0	1	100%	0	7	sand, very fngrn, w/sits & gravel & shale fragments	mod yel BRN 10yr 5/4 SW
		"	0	12		same color CL
1		"	0	13	- clay w some gravel & shale fragments very stiff	
		"	0	17	- same	
2	2	"	0	7		
		"	0	11		
3		"	0	13		
		"	0	12	- same	
4	3	"	0	~~14~~ 4		
		"	0	~~19~~ 11		
5		"	0	19		
		"	0	12	- same w/ ~~some~~ little sands very slightly moist very stiff	CL
6	4	"	0	33		
		"	0	21		
7		"	0	20		
		"	0	12	same	
8	5	"	0	6		
		75%	0	19		
9		25%	0	18		
		0%	—	25		
10						

sample 0-1

sample 6-8

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PLEXUS scientific

Boring Number: SB07

BORING LOG

Site Name & Location: CL 59 Mike site		Date & Time Started: 8/7/1 1910 Date & Time Completed: 8/7/1 1620	
Drilling Company: Frontz	Foreman: Rob Hamilton	Sampler(s): 3" split spn	Sampler Hammer: 140 / Drop: 30
Drilling Equipment: CME 550X	Method: HSA	Elevation & Datum	Completion Depth: 22 / Rock Depth: 21
Bit Size(s): 8 1/4 OD	Core Barrel(s): 4 1/4 ID	Geologist(s): John Coughlin	

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
10	6	100%	0	14	clay w/some gravel & shale fragments stiff w/ little sand	mod yel Brown (10 yr 5/4) CL
		11	0	11		
11		11	0	13	clay w/some gravel & shale fragments very stiff	mod dark gray (4N4) CL
		11	0	19		
12	7	11	0	9	some w/ sandstone clasts (gravel size) and fe rich nodules very little sand	
		11	0	11		
3		11	0	13		
		11	0	15	some w/ some sandstone cobble	
14	8	11	0	8		
		11	0	13		
5		11	0	11		
		11	0	18		
16	9	11	0	26	same hard	
		11	0	39		
7		11	0	38		
		11	0	50/4"	shale slightly weathered thinly layered	med dark gray 4N4 ML
18	10	11	0	21	sand dry w/gravel shale fe rich nodules some silts dry med to coarse grain	mottled color SW
		11	0	48		
9		11	0	50/2"		
		—	—	—		

Sample 10-12'

Sample 14-16'

Sample 18-19.1

20

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PLEXUS scientific

Boring Number: SB07

BORING LOG

Site Name & Location: CL59 Nike Site	Date & Time Started: 8/7/1 1410 Date & Time Completed: 8/7/1 1620
Drilling Company: Frontz — Foreman: R H	Sampler(s): 3" SSPN — Sampler Hammer: 140 — Drop: 30"
Drilling Equipment: CME 550X — Method: HSA	Elevation & Datum: — Completion Depth: 22' — Rock Depth: 21'
Bit Size(s): 8 1/4 OD 4 1/4 ID — Core Barrel(s):	Geologist(s): John Coughlin

SB07E Sample 20-21.1

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
20	11	11	0	11	Sand, w gravel shale, fe rich nods some silts	Mottled color ~~SM~~ MC
		11	0	39	Dry med to coarse grain	~~very pale orange (10YR 8/2) SP~~
21		11	0	50/3"	- sandstone, concreted sands	very pale orange (10YR 8/2) SP
		—	—	—	- EOB 22' - Augers will not	Turn deeper
22	—	—	—	50/0	Attempt spoon - No return	
3						
4						
5						
6						
7						
8						
9						
10						

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PLEXUS scientific

Boring Number: SB08

BORING LOG

Site Name & Location: CL 59 Nike Site	Date & Time Started: 8/7/1 0755 Date & Time Completed: 8/7/1 1110
Drilling Company: Frontz — Foreman: Rob Hamilton	Sampler(s): 3" SPLIT SPN — Sampler Hammer: 140 LB — Drop: 30"
Drilling Equipment: HSA — Method: CME 550X	Elevation & Datum: — Completion Depth: 27.3 — Rock Depth: 25.5
Bit Size(s): 8¼ OD 4¼ ID — Core Barrel(s):	Geologist(s): John Coughlin

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
0	1	100%	0	5	Sand, very fn grn, w silts gravel & shale fragments some concrete debris	mod yel brn 10yR 5/4 SW
		"	12.2	9		
1		"	12.8	5	- clay w some gravel & shale some brick debris - med stif	mod yel brn 10yr 5/4 CL
		"	7.7	7		
2	2	"	0	4		
		"	0	10		
3		"	0	13		
		"	0	13	- same	
4	3	"	0	6	- sand, very fine grain, concreted possible sandstone cobble	very pale orange 10YR 8/2 SP
		"	0	9	- clay, w/some gravel & shale fragments	mod yel brn 10yr 5/4 CL
5		"	0	11		
		"	0	20	- same	
6	4	"	0	9		
		"	0	19		
7		"	0	31	- sandstone cobble	
		"	0	24		
8	5	"	0	13		
		"	0	25	- clay w some gravel & shale fragments ~~[illegible]~~ med dense very stiff	med drk gray (4N4) CL
9		"	0	20		
		"	0	26		
10						

0-1 sample used 2 pns for triplicat

sample 5-7

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PLEXUS scientific

Boring Number: SB08

BORING LOG

Site Name & Location: CL59 Nike site		Date & Time Started: 8/7/1 0755 Date & Time Completed: 8/7/1 1110	
Drilling Company: Frontz	Foreman: Rit	Sampler(s): 3" split spn	Sampler Hammer: 140 LB; Drop: 30"
Drilling Equipment: CME 550 X	Method: HSA	Elevation & Datum:	Completion Depth: 27.3; Rock Depth: 25.5
Bit Size(s): 8 1/4 OD 4 1/4 ID	Core Barrel(s):	Geologist(s): J FC	

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
10	6	100%	0	5	clay w/some gravel & shale frags med dense ~~very~~ stiff	med drk gray (4N4) CL
		"	0	12		
11		"	0	15		
		"	0	17		
12	7	"	0	5	same	
		"	0	9		
13		"	0	14		
		"	0	13		
14	8	"	0	2		
		"	0	3	clay, w/weathered shale (gravel) (moist) some sand med stiff to soft	mod yel brn 10YR5/4 CL
5		"	0	9		
WT		"	0	11	very little water (No GW sample)	
16	9	"	0	12		
		"	0	11	same w/ cobble sized shale & fe rich nodules	
7		"	0	9		
		"	0	9		
18	10	"	0	7		
		"	0	9	clay w/shale (weathered) fragments med dry stiff	med drk gray (4N4) CL
9		"	0	13		
20		"	0	10		

SB08A sample 10-12

sample 16-18

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PLEXUS scientific

Boring Number: SB08

BORING LOG

Site Name & Location: CL59 NIKE SITE	Date & Time Started: 8/7/1 0155 Date & Time Completed: 8/7/1 1110
Drilling Company: frontz; Foreman: RH	Sampler(s): 3" split spn; Sampler Hammer: 140LB; Drop: 30"
Drilling Equipment: CME 550X; Method:	Elevation & Datum: ; Completion Depth: 27.3; Rock Depth: 25.5
Bit Size(s): 8 1/4 OD; Core Barrel(s): 4 1/4 ID	Geologist(s): J C

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
20	11	100%	0	8	Clay w/weathered shale fragments med stiff some gravel sized sandstone dry	med dark gray (4N4) CL
		"	0	11		
1		"	0	11		
		"	0	12		
22	12	"	0	7	- same w/increasing amounts of weathered shale fragments no-sandstone	
		"	0	8		
3		"	0	8		
		"	0	10	- slightly moist same	
24	13	"	0	6		
		"	0	8		
5		"	0	12	- shale slighty weathered thinly layered	med dark gray (4N4) ML
		"	0	50/5"		
26	14	"	0	10	shale less to very little weathering some water	med dark gray (4N4) ML
		"	0	50/3"	EOB 27.25	
7						
28						
9						
30						
10						

sample 24-25.5 wet

collect OW sample 1' of standing water

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27.25

APPENDIX C
Analytical Results

TABLES

NUMBER **PAGE**

C-1 Organic Analytical Results: Soil Samples C-1
C-2 Inorganic Analytical Results: Soil Samples C-19
C-3 Organic Analytical Results: Groundwater Sample C-25
C-4 Inorganic Analytical Results: Groundwater Sample C-29
C-5 Analytical Results, Investigation Derived Waste Sample C-30
C-6 Tentatively Identified Compounds, Soil Samples C-32
C-7 Tentatively Identified Compounds, Groundwater Sample C-38
C-8 Trip Blank Results C-39

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Scar 1			Scar 1			Scar 2			Scar 2			Acid Fueling Station			Acid Fueling Station		
Sample ID		CL59-SS01			CL59-SB01A			CL59-SS02			CL59-SB02A			CL59-SS03			CL59-SB03A		
Sample Depth (feet)		0-1			2-4			0-1			3-4			0-1			3-5		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/6/2001			8/6/2001		
Laboratory	Residential Soil	STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles - Method 8260 (ug/kg)																			
1,1,1-Trichloroethane*	768,498	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
1,1,2,2-Tetrachloroethane	384	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
1,1,2-Trichloro-1,2,2-trifluoroethane	5,600,000	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
1,1,2-Trichloroethane	843	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
1,1-Dichloroethane*	589,415	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
1,1-Dichloroethene	54	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
1,2,4-Trichlorobenzene*	650,000	5.6	U	M,m	5.8	U	M,m	5.7	U	M,m	5.8	U	M,m	5.8	U		5.9	U	
1,2-Dibromo-3-chloropropane	450	11	U	M,m	12	U	M,m	11	U	M,m	12	U	M,m	12	U		12	U	
1,2-Dibromoethane	6.9	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
1,2-Dichlorobenzene*	370,000	5.6	U	M,m	5.8	U	M,m	5.7	U	M,m	5.8	U	M,m	5.8	U		5.9	U	
1,2-Dichloroethane	346	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
1,2-Dichloropropane	351	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
1,3-Dichlorobenzene*	13,000	5.6	U	M,m	5.8	U	M,m	5.7	U	M,m	5.8	U	M,m	5.8	U		5.9	U	
1,4-Dichlorobenzene	3,400	5.6	U	M,m	5.8	U	M,m	5.7	U	M,m	5.8	U	M,m	5.8	U		5.9	U	
2-Butanone (MEK)*	7,325,377	22	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c
2-Hexanone*	--	22	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c
4-Methyl-2-Pentanone (MIBK)*	786,532	22	U		23	U		23	U		23	U		23	U		23	U	
Acetone*	1,569,639	22	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c
Benzene	650	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
Bromodichloromethane	1,024	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
Bromoform	61,569	5.6	U	M,m	5.8	U	M,m	5.7	U	M,m	5.8	U	M,m	5.8	U		5.9	U	
Bromomethane*	3,897	11	U		12	U		11	U		12	U		12	U		12	U	
Carbon Disulfide*	355,340	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
Carbon Tetrachloride	239	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
Chlorobenzene*	152,065	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
Chloroethane	3,026	11	U		12	U		11	U		12	U		12	U		12	U	
Chloroform	244	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
Chloromethane	1,227	11	U		12	U		11	U		12	U		12	U		12	U	
cis-1,2-Dichloroethene*	42,942	2.8	U		2.9	U		2.9	U		2.9	U		5.8	U		2.9	U	
cis-1,3-Dichloropropene	700	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
Cyclohexane*	140,000	11	U		12	U		11	U		12	U		12	U		12	U	
Dibromochloromethane	1,109	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
Dichlorodifluoromethane*	94,000	11	U		12	U		11	U		12	U		12	U		12	U	
Ethylbenzene*	230,000	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
Isopropylbenzene (Cumeme)*	16,000	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
Methyl acetate*	22,000,000	11	U	M,m	12	U	M,m	11	U	M,m	12	U	M,m	12	U	M,m	12	U	M,m
Methyl tert-butyl ether	17,000	22	U		23	U		23	U		23	U		23	U		23	U	
Methylcyclohexane*	2,600,000	11	U		12	U		11	U		12	U		12	U		12	U	
Methylene Chloride	8,881	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
Styrene*	1,700,000	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
Tetrachloroethene	5,686	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
Toluene*	520,000	**1.4**	J		**0.94**	J		**0.68**	J		5.8	U		5.8	U		5.9	U	
trans-1,2-Dichloroethene*	63,238	2.8	U		2.9	U		2.9	U		2.9	U		5.8	U		2.9	U	
trans-1,3-Dichloropropene	700	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
Trichloroethene	2,770	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	
Trichlorofluoromethane*	390,000	11	U		12	U		11	U		12	U		12	U		12	U	
Vinyl Chloride	150	11	U		12	U		11	U		12	U		12	U		12	U	
Xylenes (total)*	210,000	5.6	U		5.8	U		5.7	U		5.8	U		5.8	U		5.9	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Scar 1			Scar 1			Scar 2			Scar 2			Acid Fueling Station			Acid Fueling Station		
Sample ID		CL59-SS01			CL59-SB01A			CL59-SS02			CL59-SB02A			CL59-SS03			CL59-SB03A		
Sample Depth (feet)		0-1			2-4			0-1			3-4			0-1			3-5		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/6/2001			8/6/2001		
Laboratory	Residential Soil	STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Semivolatiles - Method 8270 (ug/kg)																			
1,1'-Biphenyl*	350,000	370	U		380	U		380	U		380	U		380	U		390	U	
1,2,4-Trichlorobenzene*	646,181	370	U		380	U		380	U		380	U		380	U		390	U	
1,2-Dichlorobenzene*	370,000	370	U		380	U		380	U		380	U		380	U		390	U	
1,3-Dichlorobenzene*	13,237	370	U		380	U		380	U		380	U		380	U		390	U	
1,4-Dichlorobenzene	3,444	370	U		380	U		380	U		380	U		380	U		390	U	
Bis(2-Chloroisopropyl) ether [2,2'-oxybis(1-chloropropane)]	2,884	370	U		380	U		380	U		380	U		380	U		390	U	
2,4,5-Trichlorophenol*	6,110,310	370	U		380	U		380	U	UJ,s	380	U		380	U		390	U	
2,4,6-Trichlorophenol	44,216	370	U		380	U		380	U	UJ,s	380	U		380	U		390	U	
2,4-Dichlorophenol*	183,309	370	U		380	U		380	U	UJ,s	380	U		380	U		390	U	
2,4-Dimethylphenol*	1,222,062	370	U	R,l	380	U	R,l	380	U	R,l	380	U	R,l	380	U		390	U	
2,4-Dinitrophenol*	122,206	1800	U	R,c	1800	U	R,c	1800	U	R,c	1900	U	R,c	1800	U	R,c	1900	U	R,c
2,4-Dinitrotoluene*	122,206	370	U		380	U		380	U		380	U		380	U		390	U	
2,6-Dinitrotoluene*	61,103	370	U		380	U		380	U		380	U		380	U		390	U	
2-Chloronaphthalene*	4,936,641	370	U		380	U		380	U		380	U		380	U		390	U	
2-Chlorophenol*	63,398	370	U		380	U		380	U	UJ,s	380	U		380	U		390	U	
2-Methylnaphthalene*	--	370	U		380	U		380	U		380	U		380	U		390	U	
2-Methylphenol*	3,055,155	370	U		380	U		380	U	UJ,s	380	U		380	U		390	U	
2-Nitroaniline*	3,492	1800	U		1800	U		1800	U		1900	U		1800	U		1900	U	
2-Nitrophenol*	--	370	U		380	U		380	U	UJ,s	380	U		380	U		390	U	
3,3'-Dichlorobenzidine	1,081	1800	U	UJ,l	1800	U	UJ,l	1800	U	UJ,l	1900	U	UJ,l	1800	U	UJ,l	1900	U	UJ,l
3-Nitroaniline*	--	1800	U		1800	U		1800	U		1900	U		1800	U		1900	U	
4,6-Dinitro-2-methylphenol*	--	1800	U		1800	U		1800	U	UJ,s	1900	U		1800	U		1900	U	
4-Bromophenyl-phenyl ether*	--	370	U		380	U		380	U		380	U		380	U		390	U	
4-Chloro-3-methylphenol*	--	370	U		380	U		380	U	UJ,s	380	U		380	U		390	U	
4-Chloroaniline*	244,412	370	U	UJ,l	380	U	UJ,l	380	U	UJ,l	380	U	UJ,l	380	U		390	U	
4-Chlorophenyl phenyl ether*	--	370	U		380	U		380	U		380	U		380	U		390	U	
4-Methylphenol*	305,515	370	U		380	U		380	U	UJ,s	380	U		380	U		390	U	
4-Nitroaniline*	--	1800	U		1800	U		1800	U		1900	U		1800	U		1900	U	
4-Nitrophenol*	488,825	1800	U	UJ,l	1800	U	UJ,l	1800	U	UJ,l	1900	U	UJ,l	1800	U	R,l	1900	U	R,l
Acenaphthene*	3,681,706	370	U		380	U		380	U		380	U		380	U		390	U	
Acenaphthylene*	--	370	U		380	U		380	U		380	U		380	U		390	U	
Acetophenone*	490	370	U		380	U		380	U		380	U		380	U		390	U	
Anthracene*	21,896,121	370	U		380	U		380	U		380	U		380	U		390	U	
Atrazine	2,200	370	U		380	U		380	U		380	U		380	U		390	U	
Benzaldehyde*	6,100,000	370	U		380	U		380	U		380	U		380	U		390	U	
Benzo(a)anthracene	621	370	U		380	U		380	U		380	U		380	U		390	U	
Benzo(a)pyrene	62	370	U		380	U		380	U		380	U		380	U		390	U	
Benzo(b)fluoranthene	621	370	U		380	U		380	U		380	U		**72**	J		390	U	
Benzo(ghi)perylene	--	370	U		380	U		380	U		380	U		**69**	J		390	U	
Benzo(k)fluoranthene	6,215	370	U		380	U		380	U		380	U		380	U		390	U	
Butylbenzylphthalate*	12,220,619	370	U		380	U		380	U		380	U		380	U		390	U	
Bis(2-Chloroethoxy) methane*	--	370	U		380	U		380	U		380	U		380	U		390	U	
Bis(2-Chloroethyl) ether	211	370	U		380	U		380	U		380	U		380	U		390	U	
Bis(2-Ethylhexyl)phthalate	34,741	370	U		380	U		380	U		380	U		380	U		390	U	
Caprolactam*	31,000,000	370	U		380	U		380	U		380	U		380	U		390	U	
Carbazole	24,319	370	U		380	U		380	U		380	U		380	U		390	U	
Chrysene	62,148	370	U		380	U		**56**	J		380	U		380	U		**62**	J	
Di-n-butylphthalate*	6,110,310	370	U		380	U		380	U		380	U		380	U		390	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Scar 1			Scar 1			Scar 2			Scar 2			Acid Fueling Station			Acid Fueling Station		
Sample ID		CL59-SS01			CL59-SB01A			CL59-SS02			CL59-SB02A			CL59-SS03			CL59-SB03A		
Sample Depth (feet)		0-1			2-4			0-1			3-4			0-1			3-5		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/6/2001			8/6/2001		
Laboratory	Residential Soil	STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Di-n-octylphthalate*	1,222,062	370	U		380	U		380	U		380	U		380	U		390	U	
Dibenz(a,h)anthracene	62	370	U		380	U		380	U		380	U		380	U		390	U	
Dibenzofuran*	290,526	370	U		380	U		380	U		380	U		380	U		390	U	
Diethylphthalate*	48,882,478	370	U		380	U		380	U		380	U		380	U		390	U	
Dimethylphthalate*	100,000,000	370	U		380	U		380	U		380	U		380	U		390	U	
Fluoranthene*	2,293,610	370	U		380	U		**96**	J		380	U		**68**	J		**150**	J	
Fluorene*	2,643,614	370	U		380	U		380	U		380	U		380	U		390	U	
Hexachlorobutadiene	6,200	370	U		380	U		380	U		380	U		380	U		390	U	
Hexachlorobenzene	304	370	U		380	U		380	U		380	U		380	U		390	U	
Hexachlorocyclopentadiene*	423,336	1800	U	UJ,l	1800	U	UJ,l	1800	U	UJ,l	1900	U	UJ,l	1800	U		1900	U	
Hexachloroethane	34,741	370	U		380	U		380	U		380	U		380	U		390	U	
Indeno(1,2,3-cd)pyrene	621	370	U		380	U		380	U		380	U		380	U		390	U	
Isophorone	511,979	370	U		380	U		380	U		380	U		380	U		390	U	
N-nitroso-di-N-propylamine	69	370	U		380	U		380	U		380	U		380	U		390	U	
N-Nitrosodiphenylamine	99,261	370	U		380	U		380	U		380	U		380	U		390	U	
Naphthalene*	55,916	370	U		380	U		380	U		380	U		380	U		390	U	
Nitrobenzene*	19,641	370	U		380	U		380	U		380	U		380	U		390	U	
Pentachlorophenol	2,979	370	U		380	U		380	U	UJ,s	380	U		380	U	UJ,l	390	U	UJ,l
Phenanthrene*	--	370	U		380	U		**68**	J		380	U		380	U		**120**	J	
Phenol*	36,661,858	370	U		380	U		380	U	UJ,s	380	U		380	U		390	U	
Pyrene*	2,308,676	370	U		380	U		**79**	J		380	U		**61**	J		**110**	J	
PAHs - Method 8270 SIM (ug/kg)																			
1-Methylnaphthalene	--	7.4	U		7.7	U		7.7	U		7.7	U		7.7	U		7.8	U	
2-Chloronaphthalene*	4,936,641	7.4	U		7.7	U		7.7	U		7.7	U		7.7	U		7.8	U	
2-Methylnaphthalene	--	8	U		8.3	U		8.3	U		**6.7**	J		8.3	U		8.4	U	
Acenaphthene*	3,681,706	7.4	U		7.7	U		**9.8**			7.7	U		7.7	U		**16**		
Acenaphthylene	--	7.4	U		7.7	U		7.7	U		7.7	U		**5.9**	J		7.8	U	
Anthracene*	21,896,121	7.4	U		7.7	U		**13**			7.7	U		**3.9**	J		**30**		
Benzo(a)anthracene	621	**7**	J		7.7	U		**44**			7.7	U		**42**			**61**		
Benzo(a)pyrene	62	**8.7**			7.7	U		**43**			7.7	U		**56**			**54**		
Benzo(b)fluoranthene	621	**12**			7.7	U		**51**			7.7	U		**77**			**50**		
Benzo(ghi)perylene	--	**9.3**			7.7	U		**32**			7.7	U		**44**			**32**		
Benzo(k)fluoranthene	6,215	**6.6**	J		7.7	U		**31**			7.7	U		**37**			**43**		
Carbazole	24,319	7.4	U		7.7	U		**13**		M,m	7.7	U		**3.5**	J		**14**		
Chrysene	62,148	**15**			**17**			**58**			**25**			**52**			**62**		
Dibenz(a,h)anthracene	62	7.4	U		7.7	U		**7.9**			7.7	U		**10**			**8.8**		
Fluoranthene*	2,293,610	**19**			7.7	U		**110**			7.7	U		**74**			**170**		
Fluorene*	2,643,614	7.4	U		7.7	U		**9.2**			7.7	U		7.7	U	R,c	**18**		J,c
Indeno(1,2,3-cd)pyrene	621	**6.2**	J		7.7	U		**26**			7.7	U		**37**			**29**		
Naphthalene*	55,916	7.4	U		7.7	U		7.7	U		7.7	U		7.7	U		**5.5**	J	
Phenanthrene	--	**8.4**			7.7	U		**73**			**20**			**22**			**140**		
Pyrene*	2,308,676	**12**			7.7	U		**69**			7.7	U		**53**			**100**		
PCBs - Method 8082 (ug/kg)																			
Aroclor 1016*	3,933	37	U		38	U		38	U		38	U		NA			NA		
Aroclor 1221	222	74	U		76	U		76	U		76	U		NA			NA		
Aroclor 1232	222	37	U		38	U		38	U		38	U		NA			NA		
Aroclor 1242	222	74	U		76	U		76	U		76	U		NA			NA		
Aroclor 1248	222	37	U		38	U		38	U		38	U		NA			NA		
Aroclor 1254	222	74	U		76	U		76	U		76	U		NA			NA		
Aroclor 1260	222	37	U		38	U		38	U		38	U		NA			NA		

##	Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens
##	1/2 Nondetect exceeds 10% of PRG for noncarcinogens or the full PRG for carcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Acid Fueling Station			Acid Fueling Station			Assembly & Test			Assembly & Test			Assembly & Test			Assembly & Test		
Sample ID		CL59-SB03B			CL59-SB03C			CL59-SS04			CL59-SB04A			CL59-SB04B			CL59-SB04C		
Sample Depth (feet)		9-10.5			13-14.3			0-1			3-4			9-10			11-13		
Sample Date	Region 9 PRG	8/6/2001			8/6/2001			8/6/2001			8/6/2001			8/6/2001			8/6/2001		
Laboratory	Residential Soil	STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles - Method 8260 (ug/kg)																			
1,1,1-Trichloroethane*	768,498	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
1,1,2,2-Tetrachloroethane	384	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
1,1,2-Trichloro-1,2,2-trifluoroethane	5,600,000	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
1,1,2-Trichloroethane	843	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
1,1-Dichloroethane*	589,415	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
1,1-Dichloroethene	54	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
1,2,4-Trichlorobenzene*	650,000	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
1,2-Dibromo-3-chloropropane	450	11	U		11	U	UJ,s	12	U		12	U		11	U	UJ,s	11	U	
1,2-Dibromoethane	6.9	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
1,2-Dichlorobenzene*	370,000	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
1,2-Dichloroethane	346	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
1,2-Dichloropropane	351	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
1,3-Dichlorobenzene*	13,000	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
1,4-Dichlorobenzene	3,400	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
2-Butanone (MEK)*	7,325,377	23	U	UJ,c	22	U	UJ,c	24	U	UJ,c	24	U	UJ,c	**3.4**	J	J,c	23	U	UJ,c
2-Hexanone*	--	23	U	UJ,c	22	U	UJ,c	24	U	UJ,c	24	U	UJ,c	22	U	UJ,c	23	U	UJ,c
4-Methyl-2-Pentanone (MIBK)*	786,532	23	U		22	U	UJ,s	24	U		24	U		22	U	UJ,s	23	U	
Acetone*	1,569,639	23	U	UJ,c	22	U	UJ,c	24	U	UJ,c	24	U	UJ,c	**13**	J	J,c	23	U	UJ,c
Benzene	650	5.7	U		**1.1**	J	J,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
Bromodichloromethane	1,024	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
Bromoform	61,569	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
Bromomethane*	3,897	11	U		11	U	UJ,s	12	U		12	U		11	U	UJ,s	11	U	
Carbon Disulfide*	355,340	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
Carbon Tetrachloride	239	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
Chlorobenzene*	152,065	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
Chloroethane	3,026	11	U		11	U	UJ,s	12	U		12	U		11	U	UJ,s	11	U	
Chloroform	244	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
Chloromethane	1,227	11	U		11	U	UJ,s	12	U		12	U		11	U	UJ,s	11	U	
cis-1,2-Dichloroethene*	42,942	2.8	U		2.8	U	UJ,s	3	U		3	U		2.7	U	UJ,s	2.8	U	
cis-1,3-Dichloropropene	700	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
Cyclohexane*	140,000	11	U		11	U	UJ,s	12	U		12	U		11	U	UJ,s	11	U	
Dibromochloromethane	1,109	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
Dichlorodifluoromethane*	94,000	11	U		11	U	UJ,s	12	U		12	U		11	U	UJ,s	11	U	
Ethylbenzene*	230,000	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
Isopropylbenzene (Cumeme)*	16,000	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
Methyl acetate*	22,000,000	11	U	M,m	11	U	M,m	12	U	M,m	12	U	M,m	11	U	M,m	11	U	M,m
Methyl tert-butyl ether	17,000	23	U		22	U	UJ,s	24	U		24	U		22	U	UJ,s	23	U	
Methylcyclohexane*	2,600,000	11	U		11	U	UJ,s	12	U		12	U		11	U	UJ,s	11	U	
Methylene Chloride	8,881	5.7	U		**2.3**	J	J,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
Styrene*	1,700,000	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
Tetrachloroethene	5,686	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
Toluene*	520,000	5.7	U		**2.5**	J	J,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
trans-1,2-Dichloroethene*	63,238	2.8	U		2.8	U	UJ,s	3	U		3	U		2.7	U	UJ,s	2.8	U	
trans-1,3-Dichloropropene	700	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
Trichloroethene	2,770	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	
Trichlorofluoromethane*	390,000	11	U		11	U	UJ,s	12	U		12	U		11	U	UJ,s	11	U	
Vinyl Chloride	150	11	U		11	U	UJ,s	12	U		12	U		11	U	UJ,s	11	U	
Xylenes (total)*	210,000	5.7	U		5.6	U	UJ,s	6	U		5.9	U		5.5	U	UJ,s	5.7	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Acid Fueling Station			Acid Fueling Station			Assembly & Test			Assembly & Test			Assembly & Test			Assembly & Test		
Sample ID		CL59-SB03B			CL59-SB03C			CL59-SS04			CL59-SB04A			CL59-SB04B			CL59-SB04C		
Sample Depth (feet)		9-10.5			13-14.3			0-1			3-4			9-10			11-13		
Sample Date	Region 9 PRG	8/6/2001			8/6/2001			8/6/2001			8/6/2001			8/6/2001			8/6/2001		
Laboratory	Residential Soil	STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Semivolatiles - Method 8270 (ug/kg)																			
1,1'-Biphenyl*	350,000	380	U		370	U		400	U		390	U		360	U		370	U	
1,2,4-Trichlorobenzene*	646,181	380	U		370	U		400	U		390	U		360	U		370	U	
1,2-Dichlorobenzene*	370,000	380	U		370	U		400	U		390	U		360	U		370	U	
1,3-Dichlorobenzene*	13,237	380	U		370	U		400	U		390	U		360	U		370	U	
1,4-Dichlorobenzene	3,444	380	U		370	U		400	U		390	U		360	U		370	U	
Bis(2-Chloroisopropyl) ether [2,2'-oxybis(1-chloropropane)]	2,884	380	U		370	U		400	U		390	U		360	U		370	U	
2,4,5-Trichlorophenol*	6,110,310	380	U		370	U		400	U		390	U		360	U		370	U	
2,4,6-Trichlorophenol	44,216	380	U		370	U		400	U		390	U		360	U		370	U	
2,4-Dichlorophenol*	183,309	380	U		370	U		400	U		390	U		360	U		370	U	
2,4-Dimethylphenol*	1,222,062	380	U		370	U		400	U		390	U		360	U		370	U	
2,4-Dinitrophenol*	122,206	1800	U	R,c	1800	U	R,c	1900	U	R,c	1900	U	R,c	1700	U	R,c	1800	U	R,c
2,4-Dinitrotoluene*	122,206	380	U		370	U		400	U		390	U		360	U		370	U	
2,6-Dinitrotoluene*	61,103	380	U		370	U		400	U		390	U		360	U		370	U	
2-Chloronaphthalene*	4,936,641	380	U		370	U		400	U		390	U		360	U		370	U	
2-Chlorophenol*	63,398	380	U		370	U		400	U		390	U		360	U		370	U	
2-Methylnaphthalene*	--	380	U		370	U		400	U		390	U		360	U		370	U	
2-Methylphenol*	3,055,155	380	U		370	U		400	U		390	U		360	U		370	U	
2-Nitroaniline*	3,492	1800	U		1800	U		1900	U		1900	U		1700	U		1800	U	
2-Nitrophenol*	--	380	U		370	U		400	U		390	U		360	U		370	U	
3,3'-Dichlorobenzidine	1,081	1800	U	UJ,l	1800	U	UJ,l	1900	U	UJ,l	1900	U	UJ,l	1700	U	UJ,l	1800	U	UJ,l
3-Nitroaniline*	--	1800	U		1800	U		1900	U		1900	U		1700	U		1800	U	
4,6-Dinitro-2-methylphenol*	--	1800	U		1800	U		1900	U		1900	U		1700	U		1800	U	
4-Bromophenyl-phenyl ether*	--	380	U		370	U		400	U		390	U		360	U		370	U	
4-Chloro-3-methylphenol*	--	380	U		370	U		400	U		390	U		360	U		370	U	
4-Chloroaniline*	244,412	380	U		370	U		400	U		390	U		360	U		370	U	
4-Chlorophenyl phenyl ether*	--	380	U		370	U		400	U		390	U		360	U		370	U	
4-Methylphenol*	305,515	380	U		370	U		400	U		390	U		360	U		370	U	
4-Nitroaniline*	--	1800	U		1800	U		1900	U		1900	U		1700	U		1800	U	
4-Nitrophenol*	488,825	1800	U	R,l	1800	U	R,l	1900	U	R,l	1900	U	R,l	1700	U	R,l	1800	U	R,l
Acenaphthene*	3,681,706	380	U		370	U		400	U		390	U		360	U		370	U	
Acenaphthylene*	--	380	U		370	U		400	U		390	U		360	U		370	U	
Acetophenone*	490	380	U		370	U		400	U		390	U		360	U		370	U	
Anthracene*	21,896,121	380	U		370	U		400	U		390	U		360	U		370	U	
Atrazine	2,200	380	U		370	U		400	U		390	U		360	U		370	U	
Benzaldehyde*	6,100,000	380	U		370	U		400	U		390	U		360	U		370	U	
Benzo(a)anthracene	621	380	U		370	U		**79**	J		390	U		360	U		370	U	
Benzo(a)pyrene	62	380	U		370	U		**89**	J		390	U		360	U		370	U	
Benzo(b)fluoranthene	621	380	U		370	U		**110**	J		390	U		360	U		370	U	
Benzo(ghi)perylene	--	380	U		370	U		400	U		390	U		360	U		370	U	
Benzo(k)fluoranthene	6,215	380	U		370	U		**76**	J		390	U		360	U		370	U	
Butylbenzylphthalate*	12,220,619	380	U		370	U		400	U		390	U		360	U		370	U	
Bis(2-Chloroethoxy) methane*	--	380	U		370	U		400	U		390	U		360	U		370	U	
Bis(2-Chloroethyl) ether	211	380	U		370	U		400	U		390	U		360	U		370	U	
Bis(2-Ethylhexyl)phthalate	34,741	380	U		370	U		**76**	J		390	U		360	U		370	U	
Caprolactam*	31,000,000	380	U		370	U		400	U		390	U		360	U		370	U	
Carbazole	24,319	380	U		370	U		400	U		390	U		360	U		370	U	
Chrysene	62,148	380	U		370	U		**100**	J		390	U		360	U		370	U	
Di-n-butylphthalate*	6,110,310	380	U		370	U		400	U		390	U		360	U		370	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Acid Fueling Station			Acid Fueling Station			Assembly & Test			Assembly & Test			Assembly & Test			Assembly & Test		
Sample ID		CL59-SB03B			CL59-SB03C			CL59-SS04			CL59-SB04A			CL59-SB04B			CL59-SB04C		
Sample Depth (feet)		9-10.5			13-14.3			0-1			3-4			9-10			11-13		
Sample Date	Region 9 PRG	8/6/2001			8/6/2001			8/6/2001			8/6/2001			8/6/2001			8/6/2001		
Laboratory	Residential Soil	STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Di-n-octylphthalate*	1,222,062	380	U		370	U		400	U		390	U		360	U		370	U	
Dibenz(a,h)anthracene	62	380	U		370	U		400	U		390	U		360	U		370	U	
Dibenzofuran*	290,526	380	U		370	U		400	U		390	U		360	U		370	U	
Diethylphthalate*	48,882,478	380	U		370	U		400	U		390	U		360	U		370	U	
Dimethylphthalate*	100,000,000	380	U		370	U		400	U		390	U		360	U		370	U	
Fluoranthene*	2,293,610	380	U		370	U		**170**	J		390	U		360	U		370	U	
Fluorene*	2,643,614	380	U		370	U		400	U		390	U		360	U		370	U	
Hexachlorobutadiene	6,200	380	U		370	U		400	U		390	U		360	U		370	U	
Hexachlorobenzene	304	380	U		370	U		400	U		390	U		360	U		370	U	
Hexachlorocyclopentadiene*	423,336	1800	U		1800	U		1900	U		1900	U		1700	U		1800	U	
Hexachloroethane	34,741	380	U		370	U		400	U		390	U		360	U		370	U	
Indeno(1,2,3-cd)pyrene	621	380	U		370	U		400	U		390	U		360	U		370	U	
Isophorone	511,979	380	U		370	U		400	U		390	U		360	U		370	U	
N-nitroso-di-N-propylamine	69	380	U		370	U		400	U		390	U		360	U		370	U	
N-Nitrosodiphenylamine	99,261	380	U		370	U		400	U		390	U		360	U		370	U	
Naphthalene*	55,916	380	U		370	U		400	U		390	U		360	U		370	U	
Nitrobenzene*	19,641	380	U		370	U		400	U		390	U		360	U		370	U	
Pentachlorophenol	2,979	380	U	UJ,I	370	U	UJ,I	400	U	UJ,I	390	U	UJ,I	360	U	UJ,I	370	U	UJ,I
Phenanthrene*	--	380	U		370	U		**78**	J		390	U		360	U		370	U	
Phenol*	36,661,858	380	U		370	U		400	U		390	U		360	U		370	U	
Pyrene*	2,308,676	380	U		370	U		**150**	J		390	U		360	U		370	U	
PAHs - Method 8270 SIM (ug/kg)																			
1-Methylnaphthalene	--	7.6	U		**4**	J		**5.6**	J		7.9	U		7.3	U		**8**		
2-Chloronaphthalene*	4,936,641	7.6	U		7.5	U		8	U		7.9	U		7.3	U		7.6	U	
2-Methylnaphthalene	--	8.2	U		**5.2**	J		**6.7**	J		8.4	U		**3.8**	J		**11**		
Acenaphthene*	3,681,706	7.6	U		7.5	U		**5.7**	J		7.9	U		7.3	U		7.6	U	
Acenaphthylene	--	7.6	U		7.5	U		8	U		7.9	U		7.3	U		7.6	U	
Anthracene*	21,896,121	7.6	U		7.5	U		**13**			7.9	U		7.3	U		7.6	U	
Benzo(a)anthracene	621	7.6	U		7.5	U		**79**			**4.6**	J		**7.1**	J		7.6	U	
Benzo(a)pyrene	62	7.6	U		7.5	U		**94**			**5.7**	J		**11**			7.6	U	
Benzo(b)fluoranthene	621	7.6	U		7.5	U		**120**			**9.9**			**14**			**5.1**	J	
Benzo(ghi)perylene	--	7.6	U		**14**			**62**			**7.8**	J		**11**			**17**		
Benzo(k)fluoranthene	6,215	7.6	U		7.5	U		**65**			**3**	J		**4.8**	J		7.6	U	
Carbazole	24,319	7.6	U		7.5	U		**11**			7.9	U		7.3	U		7.6	U	
Chrysene	62,148	7.6	U		**23**			**98**			**14**			**15**			**26**		
Dibenz(a,h)anthracene	62	7.6	U		7.5	U		**15**			7.9	U		7.3	U		7.6	U	
Fluoranthene*	2,293,610	7.6	U		7.5	U		**190**			**11**			**12**			7.6	U	
Fluorene*	2,643,614	7.6	U	R,c	7.5	U	R,c	**5.5**	J	J,c	7.9	U	R,c	7.3	U	R,c	7.6	U	R,c
Indeno(1,2,3-cd)pyrene	621	7.6	U		7.5	U		**56**			7.9	U		**6.8**	J		7.6	U	
Naphthalene*	55,916	7.6	U		7.5	U		**5.3**	J		7.9	U		7.3	U		**4**	J	
Phenanthrene	--	**3.5**	J		**18**			**79**			**9.6**			**12**			**37**		
Pyrene*	2,308,676	7.6	U		7.5	U		**120**			**7.3**	J		**9.2**			**8.2**		
PCBs - Method 8082 (ug/kg)																			
Aroclor 1016*	3,933	NA			NA			40	U		39	U		36	U		37	U	
Aroclor 1221	222	NA			NA			80	U		78	U		72	U		74	U	
Aroclor 1232	222	NA			NA			40	U		39	U		36	U		37	U	
Aroclor 1242	222	NA			NA			80	U		78	U		72	U		74	U	
Aroclor 1248	222	NA			NA			40	U		39	U		36	U		37	U	
Aroclor 1254	222	NA			NA			80	U		78	U		72	U		74	U	
Aroclor 1260	222	NA			NA			40	U		39	U		36	U		37	U	

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens
1/2 Nondetect exceeds 10% of PRG for noncarcinogens or the full PRG for carcinogens
*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg		
Sample ID		CL59-SS05			CL59-SS05			CL59-SS105 (duplicate)			CL59-SB05A			CL59-SB05B			CL59-SB05C		
Sample Depth (feet)		0-1			0-1			0-1			4-5			8-9.5			13-14		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles - Method 8260 (ug/kg)																			
1,1,1-Trichloroethane*	768,498	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
1,1,2,2-Tetrachloroethane	384	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
1,1,2-Trichloro-1,2,2-trifluoroethane	5,600,000	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
1,1,2-Trichloroethane	843	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
1,1-Dichloroethane*	589,415	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
1,1-Dichloroethene	54	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
1,2,4-Trichlorobenzene*	650,000	12	U		5.8	U	M,m	5.7	U	M,m	5.7	U	M,m	5.7	U	M,m	5.5	U	M,m
1,2-Dibromo-3-chloropropane	450	12	U		12	U	M,m	11	U	M,m	11	U	M,m	11	U	M,m	11	U	M,m
1,2-Dibromoethane	6.9	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
1,2-Dichlorobenzene*	370,000	12	U		5.8	U	M,m	5.7	U	M,m	5.7	U	M,m	5.7	U	M,m	5.5	U	M,m
1,2-Dichloroethane	346	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
1,2-Dichloropropane	351	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
1,3-Dichlorobenzene*	13,000	12	U		5.8	U	M,m	5.7	U	M,m	5.7	U	M,m	5.7	U	M,m	5.5	U	M,m
1,4-Dichlorobenzene	3,400	12	U		5.8	U	M,m	5.7	U	M,m	5.7	U	M,m	5.7	U	M,m	5.5	U	M,m
2-Butanone (MEK)*	7,325,377	12	U		23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	22	U	UJ,c
2-Hexanone*	--	12	U		23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	22	U	UJ,c
4-Methyl-2-Pentanone (MIBK)*	786,532	12	U		23	U		23	U		23	U		23	U		22	U	
Acetone*	1,569,639	**11**	J		23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	22	U	UJ,c
Benzene	650	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
Bromodichloromethane	1,024	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
Bromoform	61,569	12	U		5.8	U	M,m	5.7	U	M,m	5.7	U	M,m	5.7	U	M,m	5.5	U	M,m
Bromomethane*	3,897	12	U		12	U		11	U		11	U		11	U		11	U	
Carbon Disulfide*	355,340	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
Carbon Tetrachloride	239	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
Chlorobenzene*	152,065	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
Chloroethane	3,026	12	U		12	U		11	U		11	U		11	U		11	U	
Chloroform	244	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
Chloromethane	1,227	12	U		12	U		11	U		11	U		11	U		11	U	
cis-1,2-Dichloroethene*	42,942	12	U		2.9	U		2.9	U		2.8	U		2.8	U		2.8	U	
cis-1,3-Dichloropropene	700	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
Cyclohexane*	140,000	12	U		12	U		11	U		11	U		11	U		11	U	
Dibromochloromethane	1,109	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
Dichlorodifluoromethane*	94,000	12	U	M,m	12	U		11	U		11	U		11	U		11	U	
Ethylbenzene*	230,000	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
Isopropylbenzene (Cumeme)*	16,000	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
Methyl acetate*	22,000,000	12	U		12	U	M,m	11	U	M,m	11	U	M,m	11	U	M,m	11	U	M,m
Methyl tert-butyl ether	17,000	12	U		23	U		23	U		23	U		23	U		22	U	
Methylcyclohexane*	2,600,000	12	U		12	U		11	U		11	U		11	U		11	U	
Methylene Chloride	8,881	**2**	J		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
Styrene*	1,700,000	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
Tetrachloroethene	5,686	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
Toluene*	520,000	12	U		5.8	U		5.7	U		5.7	U		5.7	U		**0.81**	J	
trans-1,2-Dichloroethene*	63,238	12	U		2.9	U		2.9	U		2.8	U		2.8	U		2.8	U	
trans-1,3-Dichloropropene	700	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
Trichloroethene	2,770	12	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	
Trichlorofluoromethane*	390,000	12	U		12	U		11	U		11	U		11	U		11	U	
Vinyl Chloride	150	12	U		12	U		11	U		11	U		11	U		11	U	
Xylenes (total)*	210,000	24	U		5.8	U		5.7	U		5.7	U		5.7	U		5.5	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg		
Sample ID		CL59-SS05			CL59-SS05			CL59-SS105 (duplicate)			CL59-SB05A			CL59-SB05B			CL59-SB05C		
Sample Depth (feet)		0-1			0-1			0-1			4-5			8-9.5			13-14		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Semivolatiles - Method 8270 (ug/kg)																			
1,1'-Biphenyl*	350,000	1200	U		380	U		380	U		380	U		370	U		370	U	
1,2,4-Trichlorobenzene*	646,181	1200	U		380	U		380	U		380	U		370	U		370	U	
1,2-Dichlorobenzene*	370,000	1200	U		380	U		380	U		380	U		370	U		370	U	
1,3-Dichlorobenzene*	13,237	1200	U		380	U		380	U		380	U		370	U		370	U	
1,4-Dichlorobenzene	3,444	1200	U		380	U		380	U		380	U		370	U		370	U	
Bis(2-Chloroisopropyl) ether [2,2'-oxybis(1-chloropropane)]	2,884	1200	U		380	U		380	U		380	U		370	U		370	U	
2,4,5-Trichlorophenol*	6,110,310	1200	U		380	U		380	U		380	U		370	U		370	U	
2,4,6-Trichlorophenol	44,216	1200	U		380	U		380	U		380	U		370	U		370	U	
2,4-Dichlorophenol*	183,309	1200	U		380	U		380	U		380	U		370	U		370	U	
2,4-Dimethylphenol*	1,222,062	1200	U		380	U	R,I	380	U	R,I	380	U	R,I	370	U	R,I	370	U	R,I
2,4-Dinitrophenol*	122,206	6200	U	R,c	1900	U		1800	U		1800	U	R,c	1800	U		1800	U	R,c
2,4-Dinitrotoluene*	122,206	1200	U		380	U		380	U		380	U		370	U		370	U	
2,6-Dinitrotoluene*	61,103	1200	U		380	U		380	U		380	U		370	U		370	U	
2-Chloronaphthalene*	4,936,641	1200	U		380	U		380	U		380	U		370	U		370	U	
2-Chlorophenol*	63,398	1200	U		380	U		380	U		380	U		370	U		370	U	
2-Methylnaphthalene*	--	1200	U		380	U		380	U		380	U		370	U		370	U	
2-Methylphenol*	3,055,155	1200	U		380	U		380	U		380	U		370	U		370	U	
2-Nitroaniline*	3,492	2400	U		1900	U		1800	U		1800	U		1800	U		1800	U	
2-Nitrophenol*	--	1200	U		380	U		380	U		380	U		370	U		370	U	
3,3'-Dichlorobenzidine	1,081	2400	U	R,I	1900	U	UJ,I	1800	U	UJ,I	1800	U	UJ,I	1800	U	UJ,I	1800	U	UJ,I
3-Nitroaniline*	--	2400	U		1900	U		1800	U		1800	U		1800	U		1800	U	
4,6-Dinitro-2-methylphenol*	--	2400	U		1900	U		1800	U		1800	U		1800	U		1800	U	
4-Bromophenyl-phenyl ether*	--	1200	U		380	U		380	U		380	U		370	U		370	U	
4-Chloro-3-methylphenol*	--	1200	U		380	U		380	U		380	U		370	U		370	U	
4-Chloroaniline*	244,412	1200	U		380	U	UJ,I	380	U	UJ,I	380	U	UJ,I	370	U	UJ,I	370	U	UJ,I
4-Chlorophenyl phenyl ether*	--	1200	U		380	U		380	U		380	U		370	U		370	U	
4-Methylphenol*	305,515	1200	U		380	U		380	U		380	U		370	U		370	U	
4-Nitroaniline*	--	2400	U		1900	U		1800	U		1800	U		1800	U		1800	U	
4-Nitrophenol*	488,825	2400	U	R,I	1900	U	UJ,I	1800	U	UJ,I	1800	U	UJ,I	1800	U	UJ,I	1800	U	UJ,I
Acenaphthene*	3,681,706	1200	U		380	U		380	U		380	U		370	U		370	U	
Acenaphthylene*	--	1200	U		380	U		380	U		380	U		370	U		370	U	
Acetophenone*	490	1200	U		380	U		380	U		380	U		370	U		370	U	
Anthracene*	21,896,121	1200	U		380	U		380	U		380	U		370	U		370	U	
Atrazine	2,200	1200	U	R,c	380	U		380	U		380	U		370	U		370	U	
Benzaldehyde*	6,100,000	1200	U	R,c	380	U		380	U		380	U		370	U		370	U	
Benzo(a)anthracene	621	1200	U		**76**	J		**100**	J		380	U		370	U		370	U	
Benzo(a)pyrene	62	1200	U		**110**	J		**140**	J		380	U		370	U		370	U	
Benzo(b)fluoranthene	621	1200	U		**140**	J		**170**	J		380	U		370	U		370	U	
Benzo(ghi)perylene	--	1200	U		**86**	J		**110**	J		380	U		370	U		370	U	
Benzo(k)fluoranthene	6,215	1200	U		**77**	J		**110**	J		380	U		370	U		370	U	
Butylbenzylphthalate*	12,220,619	1200	U		380	U		380	U		380	U		370	U		370	U	
Bis(2-Chloroethoxy) methane*	--	1200	U		380	U		380	U		380	U		370	U		370	U	
Bis(2-Chloroethyl) ether	211	1200	U		380	U		380	U		380	U		370	U		370	U	
Bis(2-Ethylhexyl)phthalate	34,741	1200	U		380	U		380	U		380	U		370	U		370	U	
Caprolactam*	31,000,000	1200	U		380	U		380	U		380	U		370	U		370	U	
Carbazole	24,319	1200	U		380	U		380	U		380	U		370	U		370	U	
Chrysene	62,148	1200	U		**100**	J		**140**	J		380	U		370	U		370	U	
Di-n-butylphthalate*	6,110,310	1200	U		380	U		380	U		380	U		370	U		370	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg		
Sample ID		CL59-SS05			CL59-SS05			CL59-SS105 (duplicate)			CL59-SB05A			CL59-SB05B			CL59-SB05C		
Sample Depth (feet)		0-1			0-1			0-1			4-5			8-9.5			13-14		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Di-n-octylphthalate*	1,222,062	1200	U		380	U		380	U		380	U		370	U		370	U	
Dibenz(a,h)anthracene	62	1200	U		380	U		380	U		380	U		370	U		370	U	
Dibenzofuran*	290,526	1200	U		380	U		380	U		380	U		370	U		370	U	
Diethylphthalate*	48,882,478	1200	U		380	U		380	U		380	U		370	U		370	U	
Dimethylphthalate*	100,000,000	1200	U		380	U		380	U		380	U		370	U		370	U	
Fluoranthene*	2,293,610	1200	U		**130**	J		**200**	J		380	U		370	U		370	U	
Fluorene*	2,643,614	1200	U		380	U		380	U		380	U		370	U		370	U	
Hexachlorobutadiene	6,200	1200	U		380	U		380	U		380	U		370	U		370	U	
Hexachlorobenzene	304	1200	U		380	U		380	U		380	U		370	U		370	U	
Hexachlorocyclopentadiene*	423,336	1200	U	R,c	1900	U	UJ,l	1800	U	UJ,l	1800	U	UJ,l	1800	U	UJ,l	1800	U	UJ,l
Hexachloroethane	34,741	1200	U		380	U		380	U		380	U		370	U		370	U	
Indeno(1,2,3-cd)pyrene	621	1200	U		380	U		**97**	J		380	U		370	U		370	U	
Isophorone	511,979	1200	U		380	U		380	U		380	U		370	U		370	U	
N-nitroso-di-N-propylamine	69	1200	U		380	U		380	U		380	U		370	U		370	U	
N-Nitrosodiphenylamine	99,261	1200	U		380	U		380	U		380	U		370	U		370	U	
Naphthalene*	55,916	1200	U		380	U		380	U		380	U		370	U		370	U	
Nitrobenzene*	19,641	1200	U		380	U		380	U		380	U		370	U		370	U	
Pentachlorophenol	2,979	2400	U		380	U		380	U		380	U		370	U		370	U	
Phenanthrene*	--	1200	U		380	U		**72**	J		380	U		370	U		370	U	
Phenol*	36,661,858	1200	U		380	U		380	U		380	U		370	U		370	U	
Pyrene*	2,308,676	1200	U		**110**	J		**170**	J		380	U		370	U		370	U	
PAHs - Method 8270 SIM (ug/kg)																			
1-Methylnaphthalene	--	NA			7.7	U		7.6	U		7.6	U		7.6	U		7.4	U	
2-Chloronaphthalene*	4,936,641	NA			7.7	U		7.6	U		7.6	U		7.6	U		7.4	U	
2-Methylnaphthalene	--	NA			**4.8**	J		**5.3**	J		8.2	U		8.2	U		8	U	
Acenaphthene*	3,681,706	NA			7.7	U		**4.7**	J		7.6	U		7.6	U		7.4	U	
Acenaphthylene	--	NA			**9.1**			**15**			7.6	U		7.6	U		7.4	U	
Anthracene*	21,896,121	NA			**9.2**			**16**			7.6	U		7.6	U		7.4	U	
Benzo(a)anthracene	621	NA			**88**			**120**			7.6	U		7.6	U		7.4	U	
Benzo(a)pyrene	62	NA			**130**			**150**			7.6	U		7.6	U		7.4	U	
Benzo(b)fluoranthene	621	NA			**150**			**210**			7.6	U		7.6	U		7.4	U	
Benzo(ghi)perylene	--	NA			**82**			**100**			**6**	J		7.6	U		**11**		
Benzo(k)fluoranthene	6,215	NA			**63**			**110**			7.6	U		7.6	U		7.4	U	
Carbazole	24,319	NA			**5.8**	J	M,m	**8.5**		M,m	7.6	U		7.6	U		7.4	U	
Chrysene	62,148	NA			**110**			**140**			**8.6**			7.6	U		**17**		
Dibenz(a,h)anthracene	62	NA			**24**			**30**			7.6	U		7.6	U		7.4	U	
Fluoranthene*	2,293,610	NA			**160**			**250**			7.6	U		7.6	U		7.4	U	
Fluorene*	2,643,614	NA			7.7	U		**5.8**	J		7.6	U		7.6	U		7.4	U	
Indeno(1,2,3-cd)pyrene	621	NA			**80**			**97**			7.6	U		7.6	U		7.4	U	
Naphthalene*	55,916	NA			**5.2**	J		**5.6**	J		7.6	U		7.6	U		7.4	U	
Phenanthrene	--	NA			**55**			**81**			7.6	U		7.6	U		**25**		
Pyrene*	2,308,676	NA			**110**			**160**			7.6	U		7.6	U		**4.3**	J	
PCBs - Method 8082 (ug/kg)																			
Aroclor 1016*	3,933	230	U		38	U		38	U		38	U		37	U		37	U	
Aroclor 1221	222	300	U		76	U		76	U		76	U		74	U		74	U	
Aroclor 1232	222	230	U		38	U		38	U		38	U		37	U		37	U	
Aroclor 1242	222	170	U		76	U		76	U		76	U		74	U		74	U	
Aroclor 1248	222	160	U		38	U		38	U		38	U		37	U		37	U	
Aroclor 1254	222	160	U		76	U		76	U		76	U		74	U		74	U	
Aroclor 1260	222	230	U		38	U		38	U		38	U		37	U		37	U	

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens
1/2 Nondetect exceeds 10% of PRG for noncarcinogens or the full PRG for carcinogens
*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)		
Sample ID		CL59-SS06			CL59-SS06			CL59-SS106 (duplicate			CL59-SB06A			CL59-SB06B			CL59-SB06C		
Sample Depth (feet)		0-1			0-1			0-1			6-8			10-12			12-13.75		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles - Method 8260 (ug/kg)																			
1,1,1-Trichloroethane*	768,498	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
1,1,2,2-Tetrachloroethane	384	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
1,1,2-Trichloro-1,2,2-trifluoroethane	5,600,000	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
1,1,2-Trichloroethane	843	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
1,1-Dichloroethane*	589,415	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
1,1-Dichloroethene	54	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
1,2,4-Trichlorobenzene*	650,000	11	U		5.7	U	M,m	5.7	U	M,m	5.9	U	M,m	5.7	U	M,m	5.7	U	M,m
1,2-Dibromo-3-chloropropane	450	11	U		11	U	M,m	11	U	M,m	12	U	M,m	11	U	M,m	11	U	M,m
1,2-Dibromoethane	6.9	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
1,2-Dichlorobenzene*	370,000	11	U		5.7	U	M,m	5.7	U	M,m	5.9	U	M,m	5.7	U	M,m	5.7	U	M,m
1,2-Dichloroethane	346	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
1,2-Dichloropropane	351	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
1,3-Dichlorobenzene*	13,000	11	U		5.7	U	M,m	5.7	U	M,m	5.9	U	M,m	5.7	U	M,m	5.7	U	M,m
1,4-Dichlorobenzene	3,400	11	U		5.7	U	M,m	5.7	U	M,m	5.9	U	M,m	5.7	U	M,m	5.7	U	M,m
2-Butanone (MEK)*	7,325,377	11	U		23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c
2-Hexanone*	--	11	U		23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c
4-Methyl-2-Pentanone (MIBK)*	786,532	11	U		23	U		23	U		23	U		23	U		23	U	
Acetone*	1,569,639	**10**	J		23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c	23	U	UJ,c
Benzene	650	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
Bromodichloromethane	1,024	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
Bromoform	61,569	11	U		5.7	U	M,m	5.7	U	M,m	5.9	U	M,m	5.7	U	M,m	5.7	U	M,m
Bromomethane*	3,897	11	U		11	U		11	U		12	U		11	U		11	U	
Carbon Disulfide*	355,340	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
Carbon Tetrachloride	239	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
Chlorobenzene*	152,065	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
Chloroethane	3,026	11	U		11	U		11	U		12	U		11	U		11	U	
Chloroform	244	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
Chloromethane	1,227	11	U		11	U		11	U		12	U		11	U		11	U	
cis-1,2-Dichloroethene*	42,942	11	U		2.9	U		2.8	U		2.9	U		2.9	U		2.8	U	
cis-1,3-Dichloropropene	700	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
Cyclohexane*	140,000	11	U		11	U		11	U		12	U		11	U		11	U	
Dibromochloromethane	1,109	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
Dichlorodifluoromethane*	94,000	11	U	M,m	11	U		11	U		12	U		11	U		11	U	
Ethylbenzene*	230,000	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
Isopropylbenzene (Cumeme)*	16,000	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
Methyl acetate*	22,000,000	11	U		11	U	M,m	11	U	M,m	12	U	M,m	11	U	M,m	11	U	M,m
Methyl tert-butyl ether	17,000	11	U		23	U		23	U		23	U		23	U		23	U	
Methylcyclohexane*	2,600,000	11	U		11	U		11	U		12	U		11	U		11	U	
Methylene Chloride	8,881	**2**	J		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
Styrene*	1,700,000	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
Tetrachloroethene	5,686	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
Toluene*	520,000	11	U		5.7	U		**0.69**	J		5.9	U		**0.79**	J		5.7	U	
trans-1,2-Dichloroethene*	63,238	11	U		2.9	U		2.8	U		2.9	U		2.9	U		2.8	U	
trans-1,3-Dichloropropene	700	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
Trichloroethene	2,770	11	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	
Trichlorofluoromethane*	390,000	11	U		11	U		11	U		12	U		11	U		11	U	
Vinyl Chloride	150	11	U		11	U		11	U		12	U		11	U		11	U	
Xylenes (total)*	210,000	23	U		5.7	U		5.7	U		5.9	U		5.7	U		5.7	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)		
Sample ID		CL59-SS06			CL59-SS06			CL59-SS106 (duplicate			CL59-SB06A			CL59-SB06B			CL59-SB06C		
Sample Depth (feet)		0-1			0-1			0-1			6-8			10-12			12-13.75		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Semivolatiles - Method 8270 (ug/kg)																			
1,1'-Biphenyl*	350,000	1100	U		380	U		380	U		390	U		380	U		370	U	
1,2,4-Trichlorobenzene*	646,181	1100	U		380	U		380	U		390	U		380	U		370	U	
1,2-Dichlorobenzene*	370,000	1100	U		380	U		380	U		390	U		380	U		370	U	
1,3-Dichlorobenzene*	13,237	1100	U		380	U		380	U		390	U		380	U		370	U	
1,4-Dichlorobenzene	3,444	1100	U		380	U		380	U		390	U		380	U		370	U	
Bis(2-Chloroisopropyl) ether [2,2'-oxybis(1-chloropropane)]	2,884	1100	U		380	U		380	U		390	U		380	U		370	U	
2,4,5-Trichlorophenol*	6,110,310	1100	U		380	U		380	U		390	U		380	U	UJ,s	370	U	UJ,s
2,4,6-Trichlorophenol	44,216	1100	U		380	U	M,m	380	U		390	U		380	U	UJ,s	370	U	UJ,s
2,4-Dichlorophenol*	183,309	1100	U		380	U		380	U		390	U		380	U	UJ,s	370	U	UJ,s
2,4-Dimethylphenol*	1,222,062	1100	U		380	U	R,l	380	U	R,l	390	U	R,l	380	U	R,l	370	U	R,l
2,4-Dinitrophenol*	122,206	5900	U	R,c	1800	U		1800	U		1900	U	R,c	1800	U	R,c	1800	U	R,c
2,4-Dinitrotoluene*	122,206	1100	U		380	U		380	U		390	U		380	U		370	U	
2,6-Dinitrotoluene*	61,103	1100	U		380	U		380	U		390	U		380	U		370	U	
2-Chloronaphthalene*	4,936,641	1100	U		380	U		380	U		390	U		380	U		370	U	
2-Chlorophenol*	63,398	1100	U		380	U		380	U		390	U		380	U	UJ,s	370	U	UJ,s
2-Methylnaphthalene*	--	1100	U		380	U		380	U		390	U		380	U		370	U	
2-Methylphenol*	3,055,155	1100	U		380	U	M,m	380	U		390	U		380	U	UJ,s	370	U	UJ,s
2-Nitroaniline*	3,492	2300	U		1800	U	M,m	1800	U		1900	U		1800	U		1800	U	
2-Nitrophenol*	--	1100	U		380	U		380	U		390	U		380	U	UJ,s	370	U	UJ,s
3,3'-Dichlorobenzidine	1,081	2300	U	R,l	1800	U	UJ,l	1800	U	UJ,l	1900	U	UJ,l	1800	U	UJ,l	1800	U	UJ,l
3-Nitroaniline*	--	2300	U		1800	U	M,m	1800	U		1900	U		1800	U		1800	U	
4,6-Dinitro-2-methylphenol*	--	2300	U		1800	U		1800	U		1900	U		1800	U	UJ,s	1800	U	UJ,s
4-Bromophenyl-phenyl ether*	--	1100	U		380	U		380	U		390	U		380	U		370	U	
4-Chloro-3-methylphenol*	--	1100	U		380	U		380	U		390	U		380	U	UJ,s	370	U	UJ,s
4-Chloroaniline*	244,412	1100	U		380	U	UJ,l	380	U	UJ,l	390	U	UJ,l	380	U	UJ,l	370	U	UJ,l
4-Chlorophenyl phenyl ether*	--	1100	U		380	U		380	U		390	U		380	U		370	U	
4-Methylphenol*	305,515	1100	U		380	U		380	U		390	U		380	U	UJ,s	370	U	UJ,s
4-Nitroaniline*	--	2300	U		1800	U	M,m	1800	U		1900	U		1800	U		1800	U	
4-Nitrophenol*	488,825	2300	U	R,l	1800	U	M,m	1800	U	UJ,l	1900	U	UJ,l	1800	U	UJ,l	1800	U	UJ,l
Acenaphthene*	3,681,706	1100	U		380	U		380	U		390	U		380	U		370	U	
Acenaphthylene*	--	1100	U		380	U		380	U		390	U		380	U		370	U	
Acetophenone*	490	1100	U		380	U		380	U		390	U		380	U		370	U	
Anthracene*	21,896,121	1100	U		**85**	J		**120**	J		390	U		380	U		370	U	
Atrazine	2,200	1100	U	R,c	380	U		380	U		390	U		380	U		370	U	
Benzaldehyde*	6,100,000	1100	U	R,c	380	U		380	U		390	U		380	U		370	U	
Benzo(a)anthracene	621	1100	U		**340**	J		**280**	J		390	U		380	U		370	U	
Benzo(a)pyrene	62	1100	U		**400**			**290**	J		390	U		380	U		370	U	
Benzo(b)fluoranthene	621	1100	U		**550**			**330**	J		390	U		380	U		370	U	
Benzo(ghi)perylene	--	1100	U		**250**	J		**210**	J		390	U		380	U		370	U	
Benzo(k)fluoranthene	6,215	1100	U		**170**	J		**200**	J		390	U		380	U		370	U	
Butylbenzylphthalate*	12,220,619	1100	U		380	U		380	U		390	U		380	U		370	U	
Bis(2-Chloroethoxy) methane*	--	1100	U		380	U		380	U		390	U		380	U		370	U	
Bis(2-Chloroethyl) ether	211	1100	U		380	U		380	U		390	U		380	U		370	U	
Bis(2-Ethylhexyl)phthalate	34,741	1100	U		380	U		380	U		390	U		380	U		370	U	
Caprolactam*	31,000,000	1100	U		380	U		380	U		390	U		380	U		370	U	
Carbazole	24,319	1100	U		380	U		**74**	J		390	U		380	U		370	U	
Chrysene	62,148	1100	U		**390**			**320**	J		390	U		380	U		370	U	
Di-n-butylphthalate*	6,110,310	1100	U		380	U		380	U		390	U		380	U		370	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)		
Sample ID		CL59-SS06			CL59-SS06			CL59-SS106 (duplicate			CL59-SB06A			CL59-SB06B			CL59-SB06C		
Sample Depth (feet)		0-1			0-1			0-1			6-8			10-12			12-13.75		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Di-n-octylphthalate*	1,222,062	1100	U		380	U		380	U		390	U		380	U		370	U	
Dibenz(a,h)anthracene	62	1100	U		**66**	J		380	U		390	U		380	U		370	U	
Dibenzofuran*	290,526	1100	U		380	U		380	U		390	U		380	U		370	U	
Diethylphthalate*	48,882,478	1100	U		380	U		380	U		390	U		380	U		370	U	
Dimethylphthalate*	100,000,000	1100	U		380	U		380	U		390	U		380	U		370	U	
Fluoranthene*	2,293,610	**300**	J		**590**			**680**			390	U		380	U		370	U	
Fluorene*	2,643,614	1100	U		**96**	J		**62**	J		390	U		380	U		370	U	
Hexachlorobutadiene	6,200	1100	U		380	U		380	U		390	U		380	U		370	U	
Hexachlorobenzene	304	1100	U		380	U		380	U		390	U		380	U		370	U	
Hexachlorocyclopentadiene*	423,336	1100	U	R,c	1800	U		1800	U	UJ,l	1900	U	UJ,l	1800	U	UJ,l	1800	U	UJ,l
Hexachloroethane	34,741	1100	U		380	U		380	U		390	U		380	U		370	U	
Indeno(1,2,3-cd)pyrene	621	1100	U		**230**	J		**190**	J		390	U		380	U		370	U	
Isophorone	511,979	1100	U		380	U		380	U		390	U		380	U		370	U	
N-nitroso-di-N-propylamine	69	1100	U		380	U		380	U		390	U		380	U		370	U	
N-Nitrosodiphenylamine	99,261	1100	U		380	U	M,m	380	U		390	U		380	U		370	U	
Naphthalene*	55,916	1100	U		380	U		380	U		390	U		380	U		370	U	
Nitrobenzene*	19,641	1100	U		380	U		380	U		390	U		380	U		370	U	
Pentachlorophenol	2,979	2300	U		380	U	M,m	380	U		390	U		380	U	UJ,s	370	U	UJ,s
Phenanthrene*	--	**210**	J		**350**	J		**520**			390	U		380	U		370	U	
Phenol*	36,661,858	1100	U		380	U		380	U		390	U		380	U	UJ,s	370	U	UJ,s
Pyrene*	2,308,676	**280**	J		**640**			**550**			390	U		380	U		370	U	
PAHs - Method 8270 SIM (ug/kg)																			
1-Methylnaphthalene	--	NA			**9.9**			**11**			7.8	U		7.6	U		7.5	U	
2-Chloronaphthalene*	4,936,641	NA			7.6	U		7.6	U		7.8	U		7.6	U		7.5	U	
2-Methylnaphthalene	--	NA			**14**			**15**			8.4	U		8.3	U		8.2	U	
Acenaphthene*	3,681,706	NA			**36**			**62**			7.8	U		7.6	U		7.5	U	
Acenaphthylene	--	NA			**19**			**8.1**			7.8	U		7.6	U		7.5	U	
Anthracene*	21,896,121	NA			**120**		M,d	**140**			7.8	U		7.6	U		7.5	U	
Benzo(a)anthracene	621	NA			**350**		M,m	**320**			7.8	U		7.6	U		7.5	U	
Benzo(a)pyrene	62	NA			**450**		M,m	**330**			7.8	U		7.6	U		7.5	U	
Benzo(b)fluoranthene	621	NA			**410**		M,m	**380**			7.8	U		7.6	U		7.5	U	
Benzo(ghi)perylene	--	NA			**370**		M,m	**170**			7.8	U		7.6	U		7.5	U	
Benzo(k)fluoranthene	6,215	NA			**250**		M,m	**240**			7.8	U		7.6	U		7.5	U	
Carbazole	24,319	NA			**52**		M,d	**67**		M,m	7.8	U		7.6	U		7.5	U	
Chrysene	62,148	NA			**400**		M,m	**320**			**4.8**	J		7.6	U		**7.2**	J	
Dibenz(a,h)anthracene	62	NA			**100**		M,d	**53**			7.8	U		7.6	U		7.5	U	
Fluoranthene*	2,293,610	NA			**670**		M,m	**790**			7.8	U		7.6	U		7.5	U	
Fluorene*	2,643,614	NA			**35**		M,d	**68**			7.8	U		7.6	U		7.5	U	
Indeno(1,2,3-cd)pyrene	621	NA			**340**		M,m	**170**			7.8	U		7.6	U		7.5	U	
Naphthalene*	55,916	NA			**22**			**27**			7.8	U		7.6	U		7.5	U	
Phenanthrene	--	NA			**410**		M,m	**580**			7.8	U		7.6	U		**4.9**	J	
Pyrene*	2,308,676	NA			**500**		M,m	**470**			7.8	U		7.6	U		7.5	U	
PCBs - Method 8082 (ug/kg)																			
Aroclor 1016*	3,933	220	U		38	U		38	U		39	U		38	U		37	U	
Aroclor 1221	222	290	U		76	U		76	U		78	U		76	U		74	U	
Aroclor 1232	222	220	U		38	U		38	U		39	U		38	U		37	U	
Aroclor 1242	222	160	U		76	U		76	U		78	U		76	U		74	U	
Aroclor 1248	222	150	U		38	U		38	U		39	U		38	U		37	U	
Aroclor 1254	222	150	U		76	U		76	U		78	U		76	U		74	U	
Aroclor 1260	222	220	U		38	U		38	U		39	U		38	U		37	U	

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens
1/2 Nondetect exceeds 10% of PRG for noncarcinogens or the full PRG for carcinogens
*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)		
Sample ID		CL59-SS07			CL59-SS07			CL59-SS107 (duplicate			CL59-SB07A			CL59-SB07B			CL59-SB07C			CL59-SB07D		
Sample Depth (feet)		0-1			0-1			0-1			6-8			10-12			14-16			18-19.1		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles - Method 8260 (ug/kg)																						
1,1,1-Trichloroethane*	768,498	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
1,1,2,2-Tetrachloroethane	384	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
1,1,2-Trichloro-1,2,2-trifluoroethane	5,600,000	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
1,1,2-Trichloroethane	843	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
1,1-Dichloroethane*	589,415	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
1,1-Dichloroethene	54	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
1,2,4-Trichlorobenzene*	650,000	**6**	J		5.7	U	M,m	5.6	U	M,m	6	U	M,m	5.9	U	M,m	5.5	U	M,m	5.5	U	M,m
1,2-Dibromo-3-chloropropane	450	**2**	J	J,c	11	U	M,m	11	U	M,m	12	U	M,m	12	U	M,m	11	U	M,m	11	U	M,m
1,2-Dibromoethane	6.9	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
1,2-Dichlorobenzene*	370,000	**3**	J		5.7	U	M,m	5.6	U	M,m	6	U	M,m	5.9	U	M,m	5.5	U	M,m	5.5	U	M,m
1,2-Dichloroethane	346	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
1,2-Dichloropropane	351	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
1,3-Dichlorobenzene*	13,000	**2**	J		5.7	U	M,m	5.6	U	M,m	6	U	M,m	5.9	U	M,m	5.5	U	M,m	5.5	U	M,m
1,4-Dichlorobenzene	3,400	**2**	J		5.7	U	M,m	5.6	U	M,m	6	U	M,m	5.9	U	M,m	5.5	U	M,m	5.5	U	M,m
2-Butanone (MEK)*	7,325,377	11	U		23	U	UJ,c	23	U	UJ,c	24	U	UJ,c	24	U	UJ,c	22	U	UJ,c	22	U	UJ,c
2-Hexanone*	--	**5**	J	J,c	23	U	UJ,c	23	U	UJ,c	24	U	UJ,c	24	U	UJ,c	22	U	UJ,c	22	U	UJ,c
4-Methyl-2-Pentanone (MIBK)*	786,532	11	U		23	U		23	U		24	U		24	U		22	U		22	U	
Acetone*	1,569,639	11	U		23	U	UJ,c	23	U	UJ,c	24	U	UJ,c	**3.7**	J	J,c	22	U	UJ,c	22	U	UJ,c
Benzene	650	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
Bromodichloromethane	1,024	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
Bromoform	61,569	11	U		5.7	U	M,m	5.6	U	M,m	6	U	M,m	5.9	U	M,m	5.5	U	M,m	5.5	U	M,m
Bromomethane*	3,897	11	U		11	U		11	U		12	U		12	U		11	U		11	U	
Carbon Disulfide*	355,340	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
Carbon Tetrachloride	239	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
Chlorobenzene*	152,065	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
Chloroethane	3,026	11	U		11	U		11	U		12	U		12	U		11	U		11	U	
Chloroform	244	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
Chloromethane	1,227	11	U		11	U		11	U		12	U		12	U		11	U		11	U	
cis-1,2-Dichloroethene*	42,942	11	U		2.8	U		2.8	U		3	U		2.9	U		2.7	U		2.7	U	
cis-1,3-Dichloropropene	700	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
Cyclohexane*	140,000	11	U		11	U		11	U		12	U		12	U		11	U		11	U	
Dibromochloromethane	1,109	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
Dichlorodifluoromethane*	94,000	11	U	M,m	11	U		11	U		12	U		12	U		11	U		11	U	
Ethylbenzene*	230,000	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
Isopropylbenzene (Cumeme)*	16,000	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
Methyl acetate*	22,000,000	11	U		11	U	M,m	11	U	M,m	12	U	M,m	12	U	M,m	11	U	M,m	11	U	M,m
Methyl tert-butyl ether	17,000	11	U		23	U		23	U		24	U		24	U		22	U		22	U	
Methylcyclohexane*	2,600,000	11	U		11	U		11	U		12	U		12	U		11	U		11	U	
Methylene Chloride	8,881	**2**	J		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
Styrene*	1,700,000	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
Tetrachloroethene	5,686	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
Toluene*	520,000	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
trans-1,2-Dichloroethene*	63,238	11	U		2.8	U		2.8	U		3	U		2.9	U		2.7	U		2.7	U	
trans-1,3-Dichloropropene	700	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
Trichloroethene	2,770	11	U		5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	
Trichlorofluoromethane*	390,000	11	U		11	U		11	U		12	U		12	U		11	U		11	U	
Vinyl Chloride	150	11	U		11	U		11	U		12	U		12	U		11	U		11	U	
Xylenes (total)*	210,000	**2**	J	J,c	5.7	U		5.6	U		6	U		5.9	U		5.5	U		5.5	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)		
Sample ID		CL59-SS07			CL59-SS07			CL59-SS107 (duplicate			CL59-SB07A			CL59-SB07B			CL59-SB07C			CL59-SB07D		
Sample Depth (feet)		0-1			0-1			0-1			6-8			10-12			14-16			18-19.1		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Semivolatiles - Method 8270 (ug/kg)																						
1,1'-Biphenyl*	350,000	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
1,2,4-Trichlorobenzene*	646,181	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
1,2-Dichlorobenzene*	370,000	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
1,3-Dichlorobenzene*	13,237	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
1,4-Dichlorobenzene	3,444	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Bis(2-Chloroisopropyl) ether [2,2'-oxybis(1-chloropropane)]	2,884	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
2,4,5-Trichlorophenol*	6,110,310	1100	U		370	U		370	U		400	U	UJ,s	390	U		360	U		360	U	
2,4,6-Trichlorophenol	44,216	1100	U		370	U		370	U		400	U	UJ,s	390	U		360	U		360	U	
2,4-Dichlorophenol*	183,309	1100	U		370	U		370	U		400	U	UJ,s	390	U		360	U		360	U	
2,4-Dimethylphenol*	1,222,062	1100	U		370	U	R,I	370	U	R,I	400	U	R,I	390	U	R,I	360	U	R,I	360	U	R,I
2,4-Dinitrophenol*	122,206	5700	U	R,c	1800	U	R,c	1800	U	R,c	1900	U	R,c	1900	U	R,c	1800	U	R,c	1700	U	R,c
2,4-Dinitrotoluene*	122,206	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
2,6-Dinitrotoluene*	61,103	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
2-Chloronaphthalene*	4,936,641	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
2-Chlorophenol*	63,398	1100	U		370	U		370	U		400	U	UJ,s	390	U		360	U		360	U	
2-Methylnaphthalene*	--	1100	U		370	U		370	U		400	U		390	U		360	U		**150**	J	
2-Methylphenol*	3,055,155	1100	U		370	U		370	U		400	U	UJ,s	390	U		360	U		360	U	
2-Nitroaniline*	3,492	2200	U		1800	U		1800	U		1900	U		1900	U		1800	U		1700	U	
2-Nitrophenol*	--	1100	U		370	U		370	U		400	U	UJ,s	390	U		360	U		360	U	
3,3'-Dichlorobenzidine	1,081	2200	U	R,I	1800	U	UJ,I	1800	U	UJ,I	1900	U	UJ,I	1900	U	UJ,I	1800	U	UJ,I	1700	U	UJ,I
3-Nitroaniline*	--	2200	U		1800	U		1800	U		1900	U		1900	U		1800	U		1700	U	
4,6-Dinitro-2-methylphenol*	--	2200	U		1800	U		1800	U		1900	U	UJ,s	1900	U		1800	U		1700	U	
4-Bromophenyl-phenyl ether*	--	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
4-Chloro-3-methylphenol*	--	1100	U		370	U		370	U		400	U	UJ,s	390	U		360	U		360	U	
4-Chloroaniline*	244,412	1100	U		370	U	UJ,I	370	U	UJ,I	400	U	UJ,I	390	U	UJ,I	360	U	UJ,I	360	U	UJ,I
4-Chlorophenyl phenyl ether*	--	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
4-Methylphenol*	305,515	1100	U		370	U		370	U		400	U	UJ,s	390	U		360	U		360	U	
4-Nitroaniline*	--	2200	U		1800	U		1800	U		1900	U		1900	U		1800	U		1700	U	
4-Nitrophenol*	488,825	2200	U	R,I	1800	U	UJ,I	1800	U	UJ,I	1900	U	UJ,I	1900	U	UJ,I	1800	U	UJ,I	1700	U	UJ,I
Acenaphthene*	3,681,706	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Acenaphthylene*	--	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Acetophenone*	490	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Anthracene*	21,896,121	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Atrazine	2,200	1100	U	R,c	370	U		370	U		400	U		390	U		360	U		360	U	
Benzaldehyde*	6,100,000	1100	U	R,c	370	U		370	U		400	U		390	U		360	U		360	U	
Benzo(a)anthracene	621	1100	U		370	U		**84**	J		400	U		390	U		360	U		360	U	
Benzo(a)pyrene	62	1100	U		370	U		**98**	J		400	U		390	U		360	U		360	U	
Benzo(b)fluoranthene	621	1100	U		370	U		**110**	J		400	U		390	U		360	U		360	U	
Benzo(ghi)perylene	--	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Benzo(k)fluoranthene	6,215	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Butylbenzylphthalate*	12,220,619	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Bis(2-Chloroethoxy) methane*	--	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Bis(2-Chloroethyl) ether	211	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Bis(2-Ethylhexyl)phthalate	34,741	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Caprolactam*	31,000,000	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Carbazole	24,319	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Chrysene	62,148	1100	U		370	U		**110**	J		400	U		390	U		360	U		360	U	
Di-n-butylphthalate*	6,110,310	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)		
Sample ID		CL59-SS07			CL59-SS07			CL59-SS107 (duplicate			CL59-SB07A			CL59-SB07B			CL59-SB07C			CL59-SB07D		
Sample Depth (feet)		0-1			0-1			0-1			6-8			10-12			14-16			18-19.1		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Di-n-octylphthalate*	1,222,062	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Dibenz(a,h)anthracene	62	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Dibenzofuran*	290,526	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Diethylphthalate*	48,882,478	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Dimethylphthalate*	100,000,000	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Fluoranthene*	2,293,610	1100	U		370	U		**120**	J		400	U		390	U		360	U		360	U	
Fluorene*	2,643,614	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Hexachlorobutadiene	6,200	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Hexachlorobenzene	304	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Hexachlorocyclopentadiene*	423,336	1100	U	R,c	1800	U	UJ,l	1800	U	UJ,l	1900	U	UJ,l	1900	U	UJ,l	1800	U	UJ,l	1700	U	UJ,l
Hexachloroethane	34,741	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Indeno(1,2,3-cd)pyrene	621	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Isophorone	511,979	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
N-nitroso-di-N-propylamine	69	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
N-Nitrosodiphenylamine	99,261	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Naphthalene*	55,916	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Nitrobenzene*	19,641	1100	U		370	U		370	U		400	U		390	U		360	U		360	U	
Pentachlorophenol	2,979	2200	U		370	U		370	U		400	U	UJ,s	390	U		360	U		360	U	
Phenanthrene*	--	1100	U		370	U		370	U		400	U		390	U		360	U		**83**	J	
Phenol*	36,661,858	1100	U		370	U		370	U		400	U	UJ,s	390	U		360	U		360	U	
Pyrene*	2,308,676	1100	U		370	U		**110**	J		400	U		390	U		360	U		360	U	
PAHs - Method 8270 SIM (ug/kg)																						
1-Methylnaphthalene	--	NA			7.6	U		7.5	U		8	U		7.9	U		**18**			**130**		
2-Chloronaphthalene*	4,936,641	NA			7.6	U		7.5	U		8	U		7.9	U		7.3	U		7.3	U	
2-Methylnaphthalene	--	NA			8.2	U		**4.2**	J		8.7	U		8.4	U		**21**			**170**		
Acenaphthene*	3,681,706	NA			7.6	U		7.5	U		8	U		7.9	U		**4.9**	J		7.3	U	
Acenaphthylene	--	NA			7.6	U		**6.2**	J		8	U		7.9	U		7.3	U		7.3	U	
Anthracene*	21,896,121	NA			7.6	U		**10**			8	U		7.9	U		7.3	U		7.3	U	
Benzo(a)anthracene	621	NA			**30**			**100**			8	U		7.9	U		7.3	U		7.3	U	
Benzo(a)pyrene	62	NA			**38**			**110**			8	U		7.9	U		7.3	U		7.3	U	
Benzo(b)fluoranthene	621	NA			**53**			**120**			8	U		7.9	U		7.3	U		**8.8**		
Benzo(ghi)perylene	--	NA			**36**			**65**			8	U		7.9	U		**12**			**53**		
Benzo(k)fluoranthene	6,215	NA			**29**			**72**			8	U		7.9	U		7.3	U		7.3	U	
Carbazole	24,319	NA			7.6	U		**5.2**	J	M,m	8	U		7.9	U		7.3	U		7.3	U	
Chrysene	62,148	NA			**41**			**110**			**21**			**5.7**	J		**21**			**39**		
Dibenz(a,h)anthracene	62	NA			**9.9**			**23**			8	U		7.9	U		7.3	U		7.3	U	
Fluoranthene*	2,293,610	NA			**51**			**150**			**5.5**	J		7.9	U		7.3	U		**7**	J	
Fluorene*	2,643,614	NA			7.6	U		7.5	U		8	U		7.9	U		**8.6**			7.3	U	
Indeno(1,2,3-cd)pyrene	621	NA			**32**			**63**			8	U		7.9	U		7.3	U		7.3	U	
Naphthalene*	55,916	NA			7.6	U		7.5	U		8	U		7.9	U		**7.4**			**49**		
Phenanthrene	--	NA			**16**			**28**			**28**			**6.6**	J		**25**			**88**		
Pyrene*	2,308,676	NA			**36**			**100**			8	U		7.9	U		**7**	J		**18**		
PCBs - Method 8082 (ug/kg)																						
Aroclor 1016*	3,933	220	U		37	U		37	U		40	U		39	U		36	U		36	U	
Aroclor 1221	222	280	U		74	U		74	U		80	U		78	U		72	U		72	U	
Aroclor 1232	222	220	U		37	U		37	U		40	U		39	U		36	U		36	U	
Aroclor 1242	222	150	U		74	U		74	U		80	U		78	U		72	U		72	U	
Aroclor 1248	222	150	U		37	U		37	U		40	U		39	U		36	U		36	U	
Aroclor 1254	222	150	U		74	U		74	U		80	U		78	U		72	U		72	U	
Aroclor 1260	222	220	U		37	U		37	U		40	U		39	U		36	U		36	U	

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

1/2 Nondetect exceeds 10% of PRG for noncarcinogens or the full PRG for carcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)		
Sample ID		CL59-SS08			CL59-SS08			CL59-SS108 (duplicate			CL59-SB08AA			CL59-SB08A			CL59-SB08B			CL59-SB08C		
Sample Depth (feet)		0-1			0-1			0-1			5-7			10-12			16-18			24-25.5		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles - Method 8260 (ug/kg)																						
1,1,1-Trichloroethane*	768,498	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
1,1,2,2-Tetrachloroethane	384	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
1,1,2-Trichloro-1,2,2-trifluoroethane	5,600,000	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
1,1,2-Trichloroethane	843	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
1,1-Dichloroethane*	589,415	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
1,1-Dichloroethene	54	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
1,2,4-Trichlorobenzene*	650,000	**6**	J		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
1,2-Dibromo-3-chloropropane	450	**1**	J	J,c	11	U		11	U		12	U		12	U		12	U		11	U	
1,2-Dibromoethane	6.9	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
1,2-Dichlorobenzene*	370,000	**2**	J		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
1,2-Dichloroethane	346	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
1,2-Dichloropropane	351	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
1,3-Dichlorobenzene*	13,000	**3**	J		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
1,4-Dichlorobenzene	3,400	**3**	J		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
2-Butanone (MEK)*	7,325,377	11	U		23	U	UJ,c	22	U	UJ,c	23	U	UJ,c	24	U	UJ,c	23	U	UJ,c	22	U	UJ,c
2-Hexanone*	--	**3**	J	J,c	23	U	UJ,c	22	U	UJ,c	23	U	UJ,c	24	U	UJ,c	23	U	UJ,c	22	U	UJ,c
4-Methyl-2-Pentanone (MIBK)*	786,532	11	U		23	U		22	U		23	U		24	U		23	U		22	U	
Acetone*	1,569,639	11	U		23	U	UJ,c	22	U	UJ,c	23	U	UJ,c	**9.1**	J	J,c	**9.6**	J	J,c	**4.6**	J	J,c
Benzene	650	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
Bromodichloromethane	1,024	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
Bromoform	61,569	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
Bromomethane*	3,897	11	U		11	U		11	U		12	U		12	U		12	U		11	U	
Carbon Disulfide*	355,340	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
Carbon Tetrachloride	239	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
Chlorobenzene*	152,065	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
Chloroethane	3,026	11	U		11	U		11	U		12	U		12	U		12	U		11	U	
Chloroform	244	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
Chloromethane	1,227	11	U		11	U		11	U		12	U		12	U		12	U		11	U	
cis-1,2-Dichloroethene*	42,942	11	U		2.8	U		2.8	U		2.9	U		2.9	U		2.9	U		2.8	U	
cis-1,3-Dichloropropene	700	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
Cyclohexane*	140,000	11	U		11	U		11	U		12	U		12	U		12	U		11	U	
Dibromochloromethane	1,109	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
Dichlorodifluoromethane*	94,000	11	U	M,m	11	U		11	U		12	U		12	U		12	U		11	U	
Ethylbenzene*	230,000	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
Isopropylbenzene (Cumeme)*	16,000	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
Methyl acetate*	22,000,000	11	U		11	U	M,m	11	U	M,m	12	U	M,m	12	U	M,m	12	U		11	U	M,m
Methyl tert-butyl ether	17,000	11	U		23	U		22	U		23	U		24	U		23	U		22	U	
Methylcyclohexane*	2,600,000	11	U		11	U		11	U		12	U		12	U		12	U		11	U	
Methylene Chloride	8,881	**1**	J		5.7	U		5.6	U		**1.8**	J		5.9	U		**1.5**	J		5.6	U	
Styrene*	1,700,000	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
Tetrachloroethene	5,686	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
Toluene*	520,000	**2**	J		**0.86**	J		5.6	U		**0.98**	J		5.9	U		5.9	U		5.6	U	
trans-1,2-Dichloroethene*	63,238	11	U		2.8	U		2.8	U		2.9	U		2.9	U		2.9	U		2.8	U	
trans-1,3-Dichloropropene	700	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
Trichloroethene	2,770	11	U		5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	
Trichlorofluoromethane*	390,000	11	U		11	U		11	U		12	U		12	U		12	U		11	U	
Vinyl Chloride	150	11	U		11	U		11	U		12	U		12	U		12	U		11	U	
Xylenes (total)*	210,000	**2**	J	J,c	5.7	U		5.6	U		5.8	U		5.9	U		5.9	U		5.6	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)		
Sample ID		CL59-SS08			CL59-SS08			CL59-SS108 (duplicate			CL59-SB08AA			CL59-SB08A			CL59-SB08B			CL59-SB08C		
Sample Depth (feet)		0-1			0-1			0-1			5-7			10-12			16-18			24-25.5		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Semivolatiles - Method 8270 (ug/kg)																						
1,1'-Biphenyl*	350,000	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
1,2,4-Trichlorobenzene*	646,181	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
1,2-Dichlorobenzene*	370,000	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
1,3-Dichlorobenzene*	13,237	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
1,4-Dichlorobenzene	3,444	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
Bis(2-Chloroisopropyl) ether [2,2'-oxybis(1-chloropropane)]	2,884	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
2,4,5-Trichlorophenol*	6,110,310	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
2,4,6-Trichlorophenol	44,216	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
2,4-Dichlorophenol*	183,309	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
2,4-Dimethylphenol*	1,222,062	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
2,4-Dinitrophenol*	122,206	5800	U	R,c	1800	U	R,c	1800	U	R,c	1800	U	R,c	1900	U	R,c	1900	U	R,c	1800	U	R,c
2,4-Dinitrotoluene*	122,206	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
2,6-Dinitrotoluene*	61,103	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
2-Chloronaphthalene*	4,936,641	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
2-Chlorophenol*	63,398	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
2-Methylnaphthalene*	--	1100	U		370	U		370	U		380	U		**83**	J		390	U		**190**	J	
2-Methylphenol*	3,055,155	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
2-Nitroaniline*	3,492	2300	U		1800	U		1800	U		1800	U		1900	U		1900	U		1800	U	
2-Nitrophenol*	--	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
3,3'-Dichlorobenzidine	1,081	2300	U	R,I	1800	U	UJ,I	1800	U	UJ,I	1800	U	UJ,I	1900	U	UJ,I	1900	U	UJ,I	1800	U	UJ,I
3-Nitroaniline*	--	2300	U		1800	U		1800	U		1800	U		1900	U		1900	U		1800	U	
4,6-Dinitro-2-methylphenol*	--	2300	U		1800	U		1800	U		1800	U		1900	U		1900	U		1800	U	
4-Bromophenyl-phenyl ether*	--	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
4-Chloro-3-methylphenol*	--	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
4-Chloroaniline*	244,412	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
4-Chlorophenyl phenyl ether*	--	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
4-Methylphenol*	305,515	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
4-Nitroaniline*	--	2300	U		1800	U		1800	U		1800	U		1900	U		1900	U		1800	U	
4-Nitrophenol*	488,825	2300	U	R,I	1800	U	R,I	1800	U	R,I	1800	U	R,I	1900	U	R,I	1900	U	R,I	1800	U	R,I
Acenaphthene*	3,681,706	1100	U		**140**	J		370	U		380	U		390	U		390	U		370	U	
Acenaphthylene*	--	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
Acetophenone*	490	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
Anthracene*	21,896,121	1100	U		**270**	J		370	U		380	U		390	U		390	U		370	U	
Atrazine	2,200	1100	U	R,c	370	U		370	U		380	U		390	U		390	U		370	U	
Benzaldehyde*	6,100,000	1100	U	R,c	370	U		370	U		380	U		390	U		390	U		370	U	
Benzo(a)anthracene	621	1100	U		**520**			**94**	J		380	U		390	U		390	U		370	U	
Benzo(a)pyrene	62	1100	U		**520**			**110**	J		380	U		390	U		390	U		370	U	
Benzo(b)fluoranthene	621	1100	U		**630**			**130**	J		380	U		390	U		390	U		370	U	
Benzo(ghi)perylene	--	1100	U		**280**	J		**70**	J		380	U		390	U		390	U		**80**	J	
Benzo(k)fluoranthene	6,215	1100	U		**310**	J		**100**	J		380	U		390	U		390	U		370	U	
Butylbenzylphthalate*	12,220,619	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
Bis(2-Chloroethoxy) methane*	--	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
Bis(2-Chloroethyl) ether	211	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
Bis(2-Ethylhexyl)phthalate	34,741	**940**	J		370	U		370	U		380	U		390	U		390	U		370	U	
Caprolactam*	31,000,000	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
Carbazole	24,319	1100	U		**170**	J		370	U		380	U		390	U		390	U		370	U	
Chrysene	62,148	1100	U		**570**			**110**	J		380	U		390	U		390	U		370	U	
Di-n-butylphthalate*	6,110,310	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-1
ORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)		
Sample ID		CL59-SS08			CL59-SS08			CL59-SS108 (duplicate			CL59-SB08AA			CL59-SB08A			CL59-SB08B			CL59-SB08C		
Sample Depth (feet)		0-1			0-1			0-1			5-7			10-12			16-18			24-25.5		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL			STL		
Parameter	(ug/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Di-n-octylphthalate*	1,222,062	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
Dibenz(a,h)anthracene	62	1100	U		**80**	J		370	U		380	U		390	U		390	U		370	U	
Dibenzofuran*	290,526	1100	U		**79**	J		370	U		380	U		390	U		390	U		370	U	
Diethylphthalate*	48,882,478	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
Dimethylphthalate*	100,000,000	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
Fluoranthene*	2,293,610	1100	U		**1300**			**170**	J		380	U		390	U		390	U		370	U	
Fluorene*	2,643,614	1100	U		**150**	J		370	U		380	U		390	U		390	U		370	U	
Hexachlorobutadiene	6,200	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
Hexachlorobenzene	304	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
Hexachlorocyclopentadiene*	423,336	1100	U	R,c	1800	U		1800	U		1800	U		1900	U		1900	U		1800	U	
Hexachloroethane	34,741	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
Indeno(1,2,3-cd)pyrene	621	1100	U		**260**	J		370	U		380	U		390	U		390	U		370	U	
Isophorone	511,979	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
N-nitroso-di-N-propylamine	69	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
N-Nitrosodiphenylamine	99,261	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
Naphthalene*	55,916	1100	U		370	U		370	U		380	U		390	U		390	U		**59**	J	
Nitrobenzene*	19,641	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
Pentachlorophenol	2,979	2300	U		370	U	UJ,l	370	U	UJ,l	380	U	UJ,l	390	U	UJ,l	390	U	UJ,l	370	U	UJ,l
Phenanthrene*	--	1100	U		**1200**			**60**	J		380	U		390	U		390	U		**100**	J	
Phenol*	36,661,858	1100	U		370	U		370	U		380	U		390	U		390	U		370	U	
Pyrene*	2,308,676	1100	U		**1100**			**150**	J		380	U		390	U		390	U		370	U	
PAHs - Method 8270 SIM (ug/kg)																						
1-Methylnaphthalene	--	NA			**22**			**4.9**	J		7.7	U		**70**			**20**			**150**		
2-Chloronaphthalene*	4,936,641	NA			7.6	U		7.5	U		7.7	U		7.8	U		7.8	U		7.5	U	
2-Methylnaphthalene	--	NA			**33**			**6**	J		8.3	U		**95**			**14**			**220**		
Acenaphthene*	3,681,706	NA			**150**			**4.5**	J		7.7	U		7.8	U		7.8	U		**19**		
Acenaphthylene	--	NA			**7.2**	J		**9.9**			7.7	U		7.8	U		7.8	U		7.5	U	
Anthracene*	21,896,121	NA			**280**			**12**			7.7	U		7.8	U		7.8	U		**10**		
Benzo(a)anthracene	621	NA			**590**			**94**			7.7	U		7.8	U		7.8	U		7.5	U	
Benzo(a)pyrene	62	NA			**510**			**110**			7.7	U		7.8	U		7.8	U		7.5	U	
Benzo(b)fluoranthene	621	NA			**570**			**140**			7.7	U		**5.3**	J		**6.2**	J		**14**		
Benzo(ghi)perylene	--	NA			**280**			**66**			7.7	U		**7.7**	J		**12**			**75**		
Benzo(k)fluoranthene	6,215	NA			**390**			**80**			7.7	U		7.8	U		7.8	U		7.5	U	
Carbazole	24,319	NA			**180**			**8.9**			7.7	U		7.8	U		7.8	U		7.5	U	
Chrysene	62,148	NA			**560**			**100**			7.7	U		**22**			**20**			**43**		
Dibenz(a,h)anthracene	62	NA			**87**			**20**			7.7	U		7.8	U		7.8	U		7.5	U	
Fluoranthene*	2,293,610	NA			**1500**			**190**			7.7	U		7.8	U		**5**	J		**7.5**		
Fluorene*	2,643,614	NA			**160**		J,c	**4.8**	J	J,c	7.7	U	R,c	7.8	U	R,c	7.8	U	R,c	**22**		J,c
Indeno(1,2,3-cd)pyrene	621	NA			**270**			**65**			7.7	U		7.8	U		7.8	U		7.5	U	
Naphthalene*	55,916	NA			**21**			**5.4**	J		7.7	U		**26**			**5.7**	J		**59**		
Phenanthrene	--	NA			**1200**			**55**			7.7	U		**53**			**20**			**100**		
Pyrene*	2,308,676	NA			**830**			**130**			7.7	U		**7.4**	J		**14**			**31**		
PCBs - Method 8082 (ug/kg)																						
Aroclor 1016*	3,933	220	U		37	U		37	U		38	U		39	U	UJ,s	39	U		37	U	
Aroclor 1221	222	290	U		74	U		74	U		76	U		78	U	UJ,s	78	U		74	U	
Aroclor 1232	222	220	U		37	U		37	U		38	U		39	U	UJ,s	39	U		37	U	
Aroclor 1242	222	160	U		74	U		74	U		76	U		78	U	UJ,s	78	U		74	U	
Aroclor 1248	222	150	U		37	U		37	U		38	U		39	U	UJ,s	39	U		37	U	
Aroclor 1254	222	150	U		74	U		74	U		76	U		78	U	UJ,s	78	U		74	U	
Aroclor 1260	222	220	U		37	U		37	U		38	U		39	U	UJ,s	39	U		37	U	

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

1/2 Nondetect exceeds 10% of PRG for noncarcinogens or the full PRG for carcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-2
INORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Scar 1			Scar 1			Scar 2			Scar 2			Acid Fueling Station			Acid Fueling Station		
Sample ID		CL59-SS01			CL59-SB01A			CL59-SS02			CL59-SB02A			CL59-SS03			CL59-SB03A		
Sample Depth (feet)		0-1			2-4			0-1			3-4			0-1			3-5		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/6/2001			8/6/2001		
Laboratory	Residential Soil	STL			STL			STL			STL			STL			STL		
Parameter	(mg/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Metals (mg/kg)																			
Aluminum*	76,142	**9900**		M,k	**11300**		M,k	**12400**		M,k	**11700**		M,k	**14000**			**10500**		
Antimony*	31.3	1.7	U	M,m	1.7	U	M,m	1.7	U	M,m	1.7	U	M,m	1.7	U	M,m	1.3	U	M,m
Arsenic	0.39	**15**		M,k	**9.5**		M,k	**14.2**		M,k	**9.9**		M,k	**12.7**			**11**		
Barium*	5,375	**70.1**		M,k	**75.1**		M,k	**77.4**		M,k	**84.4**		M,k	**78.5**			**70.3**		
Beryllium*	154	**0.59**			**0.57**	B		**0.68**			**0.63**			**0.7**		J,s	**0.61**		J,s
Cadmium*	37.0	**0.47**	B		**0.37**	B		**0.45**	B		**0.47**	B		**0.27**	B		**0.22**	B	
Calcium*	--	**15500**			**38100**			**12100**			**37300**			**14400**		M,k	**36700**		M,k
Chromium*	210	**15.1**		M,k	**16.8**		M,k	**17.2**		M,k	**18.4**		M,k	**18.8**			**17.1**		
Cobalt*	4,693	**11.5**		M,k	**11.4**		M,k	**38.7**		M,k	**12.6**		M,k	**12.6**			**10.8**		
Copper*	2,905	**24.4**		M,k	**23.8**		M,k	**20.1**		M,k	**28.3**		M,k	**18.4**			**22.5**		
Iron*	23,463	**28300**		M,k	**22500**		M,k	**30500**		M,k	**25400**		M,k	**27300**			**25100**		
Lead*	400	**13.2**			**9.8**			**23.9**			**12.3**			**20.3**			**12.3**		
Magnesium*	--	**4910**			**9350**			**4210**			**10900**			**4730**			**8510**		
Manganese*	1,762	**446**		M,k	**298**		M,k	**1050**		M,k	**375**		M,k	**765**		M,k	**481**		M,k
Mercury*	23.5	**0.013**	B		**0.012**	B		**0.028**	B		0.12	U		**0.038**	B		0.12	U	
Nickel*	1,564	**29.5**		M,k	**28.1**		M,k	**21.7**		M,k	**33.4**		M,k	**22.8**			**28.9**		
Potassium*	--	**1220**		M,k	**2010**		M,k	**1180**		M,k	**2140**		M,k	**1240**			**1630**		
Selenium*	391	2.2	U		2.3	U		**0.65**	B		2.3	U		2.3	U		2.3	U	
Silver*	391	0.56	U		0.58	U		0.57	U		0.58	U		0.58	U		0.59	U	
Sodium*	--	558	U		577	U		575	U		581	U		578	U		585	U	
Thallium*	5.2	1.7	U		1.7	U		1.7	U		1.7	U		**1.2**	B		**0.63**	B	
Vanadium*	547	**23.9**		M,k	**19.5**		M,k	**25.1**		M,k	**21.5**		M,k	**25.7**			**18.8**		
Zinc*	23,463	**65.4**			**59.1**			**64.9**			**68.3**			**113**		M,m	**65.9**		M,m

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

1/2 Nondetect exceeds 10% of PRG for noncarcinogens or the full PRG for carcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections

TABLE C-2
INORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Acid Fueling Station			Acid Fueling Station			Assembly & Test			Assembly & Test			Assembly & Test			Assembly & Test		
Sample ID		CL59-SB03B			CL59-SB03C			CL59-SS04			CL59-SB04A			CL59-SB04B			CL59-SB04C		
Sample Depth (feet)		9-10.5			13-14.3			0-1			3-4			9-10			11-13		
Sample Date	Region 9 PRG	8/6/2001			8/6/2001			8/6/2001			8/6/2001			8/6/2001			8/6/2001		
Laboratory	Residential Soil	STL			STL			STL			STL			STL			STL		
Parameter	(mg/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Metals (mg/kg)																			
Aluminum*	76,142	**5950**			**5040**			**11900**			**9280**			**4310**			**6210**		
Antimony*	31.3	1.7	U	M,m	1.66	U	M,m	1.8	U	M,m	1.8	U	M,m	1.6	U	M,m	1.7	U	M,m
Arsenic	0.39	**13.2**			**20.6**			**10.6**			**23.9**			**8.6**			**19.8**		
Barium*	5,375	**28.4**			**71.7**			**66.1**			**57.5**			**32.4**			**58.6**		
Beryllium*	154	**0.43**	B	J,s	**0.47**	B	J,s	**0.62**		J,s	**0.66**		J,s	**0.4**	B	J,s	**0.55**	B	J,s
Cadmium*	37.0	**0.61**			**1.2**			**0.095**	B		**0.44**	B		**0.16**	B		**0.84**		
Calcium*	--	**3340**		M,k	**47600**		M,k	**3290**		M,k	**18000**		M,k	**42000**		M,k	**17900**		M,k
Chromium*	210	**10.5**			**9.3**			**15.1**			**14.3**			**7.6**			**11.4**		
Cobalt*	4,693	**9.1**			**9.7**			**8.1**			**12.9**			**4.6**			**10.3**		
Copper*	2,905	**19**			**23.9**			**15.1**			**28.5**			**9.8**			**35**		
Iron*	23,463	**20100**			**25800**			**23500**			**32800**			**10200**			**22800**		
Lead*	400	**25.1**			**21.9**			**21.4**			**24.6**			**9.1**			**22.9**		
Magnesium*	--	**2700**			**8030**			**2400**			**6230**			**3230**			**4390**		
Manganese*	1,762	**237**		M,k	**486**		M,k	**442**		M,k	**527**		M,k	**238**		M,k	**327**		M,k
Mercury*	23.5	0.11	U		**0.03**	B		**0.032**	B		0.12	U		0.11	U		**0.011**	B	
Nickel*	1,564	**23.4**			**33.3**			**16.9**			**37.8**			**12.7**			**40.1**		
Potassium*	--	**1060**			**1180**			**1020**			**1450**			**636**			**1320**		
Selenium*	391	2.3	U		2.2	U		2.4	U		2.4	U		2.2	U		2.3	U	
Silver*	391	0.57	U		0.56	U		0.6	U		0.59	U		0.55	U		0.57	U	
Sodium*	--	570	U		560	U		599	U		590	U		545	U		566	U	
Thallium*	5.2	1.7	U		1.7	U		1.8	U		1.8	U		1.6	U		**0.6**	B	
Vanadium*	547	**12.1**			**17.7**			**21.6**			**18.2**			**8.8**			**18.7**		
Zinc*	23,463	**434**		M,m	**255**		M,m	**67.1**		M,m	**147**		M,m	**56.2**		M,m	**198**		M,m

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

1/2 Nondetect exceeds 10% of PRG for noncarcinogens or the full PRG for carcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections

TABLE C-2
INORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg		
Sample ID		CL59-SS05			CL59-SS05			CL59-SS105 (duplicate			CL59-SB05A			CL59-SB05B			CL59-SB05C		
Sample Depth (feet)		0-1			0-1			0-1			4-5			8-9.5			13-14		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL		
Parameter	(mg/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Metals (mg/kg)																			
Aluminum*	76,142	**12800**			**12300**			**12100**			**9240**			**6200**			**3570**		
Antimony*	31.3	1	U	M,m	1.7	U	M,m	1.7	U	M,m	1.7	U	M,m	1.7	U	M,m	1.7	U	M,m
Arsenic	0.39	**13.6**		M,m	**13.4**			**10.3**			**19.5**			**13.7**			**8.8**		
Barium*	5,375	**76.9**			**71.4**			**71.4**			**54.3**			**36.6**			**39.3**		
Beryllium*	154	**0.66**			**0.61**			**0.56**	B		**0.52**	B		**0.37**	B		**0.34**	B	
Cadmium*	37.0	**0.31**	B		**0.37**	B		**0.36**	B		**0.58**			**0.52**	B		**1.3**		
Calcium*	--	**21800**			**15300**		M,k	**10500**		M,k	**2280**		M,k	**17700**		M,k	**78800**		M,k
Chromium*	210	**16.9**			**18.4**			**16.1**			**13.5**			**10.8**			**7**		
Cobalt*	4,693	**10.8**			**11**		M,k	**9.3**		M,k	**10.4**		M,k	**8**		M,k	**11.2**		M,k
Copper*	2,905	**24.6**			**22.9**		M,k	**18.5**		M,k	**33.4**		M,k	**20.3**		M,k	**17.3**		M,k
Iron*	23,463	**27400**			**25600**			**24300**			**26400**			**21200**			**15800**		
Lead*	400	**17.7**			**19.2**			**16.1**			**23.8**			**16.3**			**12.7**		
Magnesium*	--	**6360**			**5430**		M,k	**4680**		M,k	**3310**		M,k	**4110**		M,k	**3270**		M,k
Manganese*	1,762	**413**		M,k	**475**			**845**			**471**			**514**			**556**		
Mercury*	23.5	**0.03**	B		**0.015**	B		0.11	U		**0.016**	B		0.11	U		**0.02**	B	
Nickel*	1,564	**28.4**		M,m	**24.2**		M,k	**19.6**		M,k	**35.7**		M,k	**21**		M,k	**32.2**		M,k
Potassium*	--	**2080**			**1360**		M,k	**1210**		M,k	**1110**		M,k	**1120**		M,k	**977**		M,k
Selenium*	391	**0.87**	B	M,m	**0.51**	B		**0.55**	B		2.3	U		2.3	U		2.2	U	
Silver*	391	0.5	U		0.58	U		0.57	U		0.57	U		0.57	U		0.55	U	
Sodium*	--	**145**	B		579	U		571	U		568	U		**72.3**	B		**95.1**	B	
Thallium*	5.2	**0.88**	B		1.7	U		1.7	U		**0.59**	B		1.7	U		**0.97**	B	
Vanadium*	547	**22**			**23.1**			**21.6**			**17**			**14.1**			**14.9**		
Zinc*	23,463	**81.3**			**74.5**			**66.5**			**151**			**109**			**116**		

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

1/2 Nondetect exceeds 10% of PRG for noncarcinogens or the full PRG for carcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections

TABLE C-2
INORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)		
Sample ID		CL59-SS06			CL59-SS06			CL59-SS106 (duplicate			CL59-SB06A			CL59-SB06B			CL59-SB06C		
Sample Depth (feet)		0-1			0-1			0-1			6-8			10-12			12-13.75		
Sample Date	Region 9 PRG	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL		
Parameter	(mg/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Metals (mg/kg)																			
Aluminum*	76,142	**13600**			**12300**			**12900**			**9880**			**7860**			**6010**		
Antimony*	31.3	1	U	M,m	1.7	U	M,m	1.7	U	M,m	1.7	U	M,m	1.7	U	M,m	1.7	U	M,m
Arsenic	0.39	**10.9**		M,m	**11.4**			**9.3**			**16.4**			**12.2**			**9.1**		
Barium*	5,375	**86.2**			**75.6**			**95.2**			**64.9**			**36**			**29.2**		
Beryllium*	154	**0.86**			**0.65**			**0.67**			**0.57**	B		**0.44**	B		**0.33**	B	
Cadmium*	37.0	**0.25**	B		**0.31**	B		**0.28**	B		**0.47**	B		**0.46**	B		**0.4**	B	
Calcium*	--	**16300**			**10500**		M,k	**5590**		M,k	**10300**		M,k	**20400**		M,k	**62900**		M,k
Chromium*	210	**16.1**			**16.8**			**17.7**			**14.9**			**12.2**			**11.3**		
Cobalt*	4,693	**8.4**			**11.9**		M,k	**9.4**		M,k	**16.2**		M,k	**11**		M,k	**6.9**		M,k
Copper*	2,905	**17.8**			**21.5**		M,k	**19.8**		M,k	**26.3**		M,k	**26.9**		M,k	**16.5**		M,k
Iron*	23,463	**24500**			**24700**			**24200**			**26200**			**23600**			**17800**		
Lead*	400	**22.6**			**19**			**18**			**19.2**			**12.9**			**10.4**		
Magnesium*	--	**4130**			**4320**		M,k	**3190**		M,k	**5960**		M,k	**5620**		M,k	**5240**		M,k
Manganese*	1,762	**1140**		M,k	**549**			**482**			**411**			**504**			**370**		
Mercury*	23.5	**0.035**	B		**0.039**	B		**0.041**	B		**0.034**	B		0.11	U		0.11	U	
Nickel*	1,564	**17.6**		M,m	**23.2**		M,k	**21.3**		M,k	**36.7**		M,k	**25.4**		M,k	**19.3**		M,k
Potassium*	--	**1440**			**1180**		M,k	**968**		M,k	**1520**		M,k	**1380**		M,k	**1130**		M,k
Selenium*	391	**1.6**	B	M,m	**0.51**	B		**0.53**	B		2.3	U		2.3	U		2.3	U	
Silver*	391	0.5	U		0.57	U		0.57	U		0.59	U		0.57	U		0.57	U	
Sodium*	--	**154**	B		573	U		569	U		587	U		572	U		566	U	
Thallium*	5.2	**0.98**	B		1.7	U		**0.85**	B		1.8	U		1.7	U		1.7	U	
Vanadium*	547	**23.9**			**22.4**			**21.4**			**17.5**			**14.8**			**12.2**		
Zinc*	23,463	**71.5**			**77.6**			**71.8**			**115**			**84.9**			**95.4**		

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

1/2 Nondetect exceeds 10% of PRG for noncarcinogens or the full PRG for carcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections

TABLE C-2
INORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)		
Sample ID		CL59-SS07			CL59-SS07			CL59-SS107 (duplicate			CL59-SB07A			CL59-SB07B			CL59-SB07C			CL59-SB07D		
Sample Depth (feet)		0-1			0-1			0-1			6-8			10-12			14-16			18-19.1		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL			STL		
Parameter	(mg/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Metals (mg/kg)																						
Aluminum*	76,142	**10400**			**7840**		M,k	**10500**		M,k	**11000**		M,k	**8550**		M,k	**6790**		M,k	**6970**		M,k
Antimony*	31.3	1	U	M,m	1.7	U	M,m	1.7	U	M,m	1.8	U	M,m	1.7	U	M,m	1.6	U	M,m	1.6	U	M,m
Arsenic	0.39	**10.3**		M,m	**8.5**		M,k	**10**		M,k	**11.4**		M,k	**10.8**		M,k	**15.9**		M,k	**27.6**		M,k
Barium*	5,375	**63.6**			**46.3**		M,k	**74.8**		M,k	**70.7**		M,k	**38.9**		M,k	**44.6**		M,k	**90.1**		M,k
Beryllium*	154	**0.57**			**0.47**	B		**0.59**			**0.59**	B		**0.46**	B		**0.39**	B		**0.46**	B	
Cadmium*	37.0	**0.24**	B		**0.29**	B		**0.3**	B		**0.26**	B		**0.22**	B		**0.36**	B		**1**		
Calcium*	--	**23600**			**40500**			**23100**			**34700**			**17000**			**36000**			**29700**		
Chromium*	210	**14.3**			**12.3**		M,k	**15.5**		M,k	**17.1**		M,k	**13**		M,k	**11.9**		M,k	**11.8**		M,k
Cobalt*	4,693	**9**			**8**		M,k	**10.4**		M,k	**9.2**		M,k	**9.8**		M,k	**9.2**		M,k	**12.3**		M,k
Copper*	2,905	**23.8**			**17.9**		M,k	**22.9**		M,k	**25.4**		M,k	**22.3**		M,k	**24**		M,k	**25.2**		M,k
Iron*	23,463	**21800**			**17700**		M,k	**22000**		M,k	**24600**		M,k	**23100**		M,k	**21900**		M,k	**25300**		M,k
Lead*	400	**13.4**			**11.3**			**15.6**			**12.6**			**13.2**			**13.4**			**27.1**		
Magnesium*	--	**6380**			**21600**			**6090**			**13500**			**7050**			**7340**			**5620**		
Manganese*	1,762	**310**		M,k	**302**		M,k	**361**		M,k	**313**		M,k	**266**		M,k	**354**		M,k	**519**		M,k
Mercury*	23.5	**0.029**	B		**0.011**	B		**0.019**	B		**0.025**	B		0.12	U		**0.018**	B		**0.013**	B	
Nickel*	1,564	25.5	U	M,m	**20.2**		M,k	**25.1**		M,k	**28.5**		M,k	**25.6**		M,k	**24.7**		M,k	**45.6**		M,k
Potassium*	--	**2060**	B		**1230**		M,k	**1410**		M,k	**2160**		M,k	**1580**		M,k	**1480**		M,k	**1530**		M,k
Selenium*	391	**0.65**	B	M,m	2.3	U		**0.45**	B		2.4	U		2.4	U		2.2	U		**0.73**	B	
Silver*	391	**0.5**			0.57	U		0.56	U		0.6	U		0.59	U		0.55	U		0.55	U	
Sodium*	--	**115**			**74.9**	B		563	U		600	U		589	U		**60.3**	B		546	U	
Thallium*	5.2	**0.9**			1.7	U		1.7	U		1.8	U		1.8	U		1.6	U		**1.2**	B	
Vanadium*	547	**17.1**			**14.4**		M,k	**18.5**		M,k	**19.6**		M,k	**15.3**		M,k	**13.6**		M,k	**18.4**		M,k
Zinc*	23,463	**61.7**			**54.5**			**68.2**			**63.2**			**68.4**			**71.2**			**210**		

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

1/2 Nondetect exceeds 10% of PRG for noncarcinogens or the full PRG for carcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections

TABLE C-2
INORGANIC ANALYTICAL RESULTS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)		
Sample ID		CL59-SS08			CL59-SS08			CL59-SS108 (duplicate			CL59-SB08AA			CL59-SB08A			CL59-SB08B			CL59-SB08C		
Sample Depth (feet)		0-1			0-1			0-1			5-7			10-12			16-18			24-25.5		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001		
Laboratory	Residential Soil	CompuChem			STL			STL			STL			STL			STL			STL		
Parameter	(mg/kg)	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Metals (mg/kg)																						
Aluminum*	76,142	**10900**			**11200**			**13100**			**10400**			**12100**			**9980**			**8850**		
Antimony*	31.3	1	U	M,m	1.7	U	M,m	1.7	U	M,m	1.7	U	M,m	1.8	U	M,m	1.8	U	M,m	1.7	U	M,m
Arsenic	0.39	**12.2**		M,m	**10.9**			**12.2**			**11.9**			**8**			**26.3**			**18.6**		
Barium*	5,375	**68.8**			**76.9**			**73.8**			**65.8**			**55**			**44.9**			**139**		
Beryllium*	154	**0.57**			**0.66**		J,s	**0.73**		J,s	**0.69**	L	J,s	**0.71**		J,s	**0.6**		J,s	**0.65**		J,s
Cadmium*	37.0	**0.12**	B		**0.15**	B		**0.19**	B		**0.099**	B		**0.21**	B		**0.79**			**0.52**	B	
Calcium*	--	**5320**			**8080**		M,k	**4730**		M,k	**26900**		M,k	**34100**		M,k	**10300**		M,k	**2940**		M,k
Chromium*	210	**13.7**			**14.8**			**16.4**			**16**			**18.3**			**15.3**			**15**		
Cobalt*	4,693	**8.6**			**9.4**			**9.3**			**13.2**			**13.6**			**13.3**			**11.8**		
Copper*	2,905	**17.3**			**19**			**18.3**			**26.7**			**25**			**30.7**			**28.2**		
Iron*	23,463	**21700**			**22300**			**24700**			**23700**			**22100**			**33800**			**24400**		
Lead*	400	**18.3**			**18.3**			**21.2**			**11.9**			**11.4**			**30.4**			**29.5**		
Magnesium*	--	**2840**			**3620**			**2910**			**6400**			**11100**			**6330**			**3510**		
Manganese*	1,762	**528**		M,k	**504**		M,k	**506**		M,k	**342**		M,k	**326**		M,k	**334**		M,k	**152**		M,k
Mercury*	23.5	**0.047**	B		**0.025**	B		0.11	U		**0.024**	B		0.12	U		**0.014**	B		**0.023**	B	
Nickel*	1,564	17.9	U	M,m	**20.2**			**19.5**			**30.8**			**36.6**			**36.3**			**63.1**		
Potassium*	--	**1110**	B		**938**			**1030**			**1840**			**2740**			**1700**			**2270**		
Selenium*	391	1.1	U	M,m	2.3	U		2.2	U		2.3	U		2.4	U		2.3	U		**0.66**	B	
Silver*	391	**0.5**			0.57	U		0.56	U		0.58	U		0.59	U		0.59	U		0.56	U	
Sodium*	--	**95.9**			567	U		562	U		578	U		**73**	B		586	U		**63.6**	B	
Thallium*	5.2	**2**			1.7	U		1.7	U		1.7	U		1.8	U		1.8	U		**1.4**	B	
Vanadium*	547	**19.5**			**20.3**			**24.7**			**18.9**			**20.4**			**18.4**			**24**		
Zinc*	23,463	**57.6**			**68.1**		M,m	**75.5**		M,m	**64.2**		M,m	**59.3**		M,m	**201**		M,m	**101**		M,m

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinogens

1/2 Nondetect exceeds 10% of PRG for noncarcinogens or the full PRG for carcinogens

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections

TABLE C-3
ORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLE
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Open Borehole at Missile Magazine (east)								
Sample ID		CL59-GW08			CL59-GW08			CL59-GW108 (duplicate)		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001		
Laboratory	Tap Water	CompuChem			STL			STL		
Parameter	(ug/L)	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatile Organics - Method 8260 (ug/L)										
1,1,1-Trichloroethane*	792	1	U		1	U		1	U	
1,1,2,2-Tetrachloroethane	0.06	2	U		1	U		1	U	
1,1,2-Trichloro-1,2,2-trifluoroethane*	59,000	2	U		1	U		1	U	
1,1,2-Trichloroethane	0.20	1	U		1	U		1	U	
1,1-Dichloroethane*	811	1	U		1	U		1	U	
1,1-Dichloroethene	0.05	1	U		1	U		1	U	
1,2,4-Trichlorobenzene*	190	1	U		1	U		**0.3**	J	
1,2-Dibromo-3-chloropropane	0.048	1	U		1	U	UJ,c	1	U	UJ,c
1,2-Dibromoethane	0.0008	1	U		1	U		1	U	
1,2-Dichlorobenzene*	370	1	U		1	U		1	U	
1,2-Dichloroethane	0.12	1	U		1	U		1	U	
1,2-Dichloropropane	0.16	1	U		1	U		1	U	
1,3-Dichlorobenzene*	5.5	1	U		1	U		1	U	
1,4-Dichlorobenzene	0.5	1	U		1	U		1	U	
2-Butanone (MEK)*	1,904	5	U		10	U	UJ,c	10	U	UJ,c
2-Hexanone*	--	5	U		10	U	UJ,c	10	U	UJ,c
4-Methyl-2-Pentanone (MIBK)*	158	5	U		10	U		10	U	
Acetone*	608	**4**	J	J,c	10	U	UJ,c	**0.54**	J	J,c
Benzene	0.35	1	U		1	U		1	U	
Bromodichloromethane	0.18	1	U		1	U		1	U	
Bromoform	8.51	1	U		1	U		1	U	
Bromomethane*	8.66	1	U		1	U		1	U	
Carbon Disulfide*	1,043	1	U	M,m	1	U		1	U	
Carbon Tetrachloride	0.17	1	U		1	U		1	U	
Chlorobenzene*	106	1	U		1	U		1	U	
Chloroethane	4.64	1	U		1	U		1	U	
Chloroform	0.16	1	U		1	U		1	U	
Chloromethane	1.51	1	U		1	U		1	U	
cis-1,2-Dichloroethene*	60.8	1	U		0.5	U		0.5	U	
cis-1,3-Dichloropropene	0.40	1	U		1	U		1	U	
Cyclohexane*	35,000	NA			1	U		1	U	
Dibromochloromethane	0.13	1	U		1	U		1	U	
Dichlorodifluoromethane*	390	1	U		1	U		1	U	
Ethylbenzene*	1,340	1	U		1	U		1	U	
Isopropylbenzene (Cumeme)*	660	1	U		1	U		1	U	
Methyl acetate*	6,100	10	U		10	U		10	U	
Methyl tert-butyl ether	20	1	U		5	U	UJ,c	5	U	UJ,c
Methylcyclohexane*	5,200	NA			1	U		**0.19**	J	
Methylene Chloride	4.28	7	U		1	U		1	U	
Styrene*	1,641	1	U		1	U		1	U	
Tetrachloroethene	1.08	1	U		1	U		1	U	
Toluene*	723	**0.3**	J		1	U		1	U	
trans-1,2-Dichloroethene*	122	1	U		0.5	U		0.5	U	
trans-1,3-Dichloropropene	0.40	1	U		1	U		1	U	
Trichloroethene	1.64	1	U		1	U		1	U	
Trichlorofluoromethane*	1,300	1	U		1	U		1	U	
Vinyl Chloride	0.04	1	U		1	U		1	U	
Xylenes (total)*	1,431	2	U		1	U		1	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-3
ORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLE
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Open Borehole at Missile Magazine (east)								
Sample ID		CL59-GW08			CL59-GW08			CL59-GW108 (duplicate)		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001		
Laboratory	Tap Water	CompuChem			STL			STL		
Parameter	(ug/L)	Result	LF	VF	Result	LF	VF	Result	LF	VF
Semivolatiles - Method 8270 (ug/L)										
1,1'-Biphenyl*	300	NA			10	U		10	U	
1,2,4-Trichlorobenzene*	194	NA			10	U		10	U	
1,2-Dichlorobenzene*	370	NA			10	U		10	U	
1,3-Dichlorobenzene*	5.48	NA			10	U		10	U	
1,4-Dichlorobenzene	0.50	NA			10	U		10	U	
Bis(2-Chloroisopropyl) ether [2,2'-oxybis(1-chloropropane)]	0.27	NA			10	U	R,c	10	U	R,c
2,4,5-Trichlorophenol*	3,650	NA			10	U		10	U	
2,4,6-Trichlorophenol	6.11	NA			10	U		10	U	
2,4-Dichlorophenol*	109	NA			10	U		10	U	
2,4-Dimethylphenol*	730	NA			10	U	UJ,l	10	U	UJ,l
2,4-Dinitrophenol*	73	NA			50	U		50	U	
2,4-Dinitrotoluene*	73	NA			10	U		10	U	
2,6-Dinitrotoluene*	36	NA			10	U		10	U	
2-Chloronaphthalene*	487	NA			10	U		10	U	
2-Chlorophenol*	30.4	NA			10	U		10	U	
2-Methylnaphthalene*	--	NA			10	U		**1.4**	J	
2-Methylphenol*	1,825	NA			10	U		10	U	
2-Nitroaniline*	2.09	NA			50	U		50	U	
2-Nitrophenol*	--	NA			10	U		10	U	
3,3'-Dichlorobenzidine	0.15	NA			50	U		50	U	
3-Nitroaniline*	--	NA			50	U		50	U	
4,6-Dinitro-2-methylphenol*	--	NA			50	U	M,m	50	U	M,m
4-Bromophenyl-phenyl ether*	--	NA			10	U		10	U	
4-Chloro-3-methylphenol*	--	NA			10	U		10	U	
4-Chloroaniline*	146	NA			10	U		10	U	
4-Chlorophenyl phenyl ether*	--	NA			10	U		10	U	
4-Methylphenol*	182	NA			60	U		60	U	
4-Nitroaniline*	--	NA			50	U		50	U	
4-Nitrophenol*	292	NA			50	U		50	U	
Acenaphthene*	365	NA			10	U		10	U	
Acenaphthylene*	--	NA			10	U		10	U	
Acetophenone*	0.04	NA			12	U		12	U	
Anthracene*	1,825	NA			10	U		10	U	
Atrazine	0.3	NA			10	U		10	U	
Benzaldehyde*	3,600	NA			10	U		10	U	
Benzo(a)anthracene	0.09	NA			10	U		10	U	
Benzo(a)pyrene	0.01	NA			10	U		10	U	
Benzo(b)fluoranthene	0.09	NA			10	U		10	U	
Benzo(ghi)perylene	--	NA			10	U		10	U	
Benzo(k)fluoranthene	0.92	NA			10	U		10	U	
Butylbenzylphthalate*	7,300	NA			10	U		10	U	
Bis(2-Chloroethoxy) methane*	--	NA			10	U		10	U	
Bis(2-Chloroethyl) ether	0.01	NA			10	U		10	U	
Bis(2-Ethylhexyl)phthalate	4.80	NA			10	U		**8.2**	J	
Caprolactam*	18,000	NA			**33**			**42**		
Carbazole	3.36	NA			10	U		10	U	
Chrysene	9.21	NA			10	U		10	U	
Di-n-butylphthalate*	3,650	NA			10	U		10	U	
Di-n-octylphthalate*	730	NA			10	U		10	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-3
ORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLE
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Open Borehole at Missile Magazine (east)								
Sample ID		CL59-GW08			CL59-GW08			CL59-GW108 (duplicate)		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001		
Laboratory	Tap Water	CompuChem			STL			STL		
Parameter	(ug/L)	Result	LF	VF	Result	LF	VF	Result	LF	VF
Dibenz(a,h)anthracene	0.01	NA			10	U		10	U	
Dibenzofuran*	24.3	NA			10	U		10	U	
Diethylphthalate*	29,199	NA			10	U	M,m	10	U	M,m
Dimethylphthalate*	364,867	NA			12	U	R,I	12	U	R,I
Fluoranthene*	1,460	NA			10	U		10	U	
Fluorene*	243	NA			10	U		10	U	
Hexachlorobutadiene	0.86	NA			10	U		10	U	
Hexachlorobenzene	0.04	NA			10	U		10	U	
Hexachlorocyclopentadiene*	255	NA			50	U	R,I	50	U	R,I
Hexachloroethane	4.80	NA			10	U		10	U	
Indeno(1,2,3-cd)pyrene	0.09	NA			10	U		10	U	
Isophorone	70.8	NA			10	U		10	U	
N-nitroso-di-N-propylamine	0.01	NA			10	U		10	U	
N-Nitrosodiphenylamine	13.7	NA			10	U		10	U	
Naphthalene*	6.20	NA			10	U		10	U	
Nitrobenzene*	3.40	NA			10	U		10	U	
Pentachlorophenol	0.56	NA			10	U	M,m	10	U	M,m
Phenanthrene*	--	NA			10	U		10	U	
Phenol*	21,900	NA			10	U		10	U	
Pyrene*	183	NA			10	U		10	U	
PAHs - Method 8270 SIM (ug/L)										
1-Methylnaphthalene	--	**1.4**		J,I	**0.55**			**1.1**		
2-Chloronaphthalene*	487	NA			0.2	U		0.2	U	
2-Methylnaphthalene	--	**1.9**		J,I	**0.78**			**1.6**		
Acenaphthene*	365	0.26	U	UJ,I	0.2	U		0.2	U	
Acenaphthylene	--	0.26	U	UJ,I	0.2	U		0.2	U	
Anthracene*	1,825	0.26	U	UJ,I	0.2	U		0.2	U	
Benzo(a)anthracene	0.09	**0.31**		J,I	0.2	U		0.2	U	
Benzo(a)pyrene	0.01	**0.19**	J	J,I	0.2	U		0.2	U	
Benzo(b)fluoranthene	0.09	0.26	U	UJ,I	0.2	U		0.2	U	
Benzo(ghi)perylene	--	**0.44**		J,I	**0.23**			**0.23**		
Benzo(k)fluoranthene	0.92	0.26	U	UJ,I	0.2	U		0.2	U	
Carbazole	3.36	NA			0.2	U		0.2	U	
Chrysene	9.21	0.26	U	UJ,I	0.2	U		0.2	U	
Dibenz(a,h)anthracene	0.01	0.26	U	UJ,I	0.2	U		0.2	U	
Fluoranthene*	1,460	0.26	U	UJ,I	0.2	U		0.2	U	
Fluorene*	243	0.26	U	UJ,I	0.2	U		0.2	U	
Indeno(1,2,3-cd)pyrene	0.09	0.26	U	UJ,I	0.2	U		0.2	U	
Naphthalene*	6.2	**0.7**		J,I	**0.26**			**0.51**		
Phenanthrene	--	**0.86**		J,I	**0.3**			**0.49**		
Pyrene*	183	**0.29**		J,I	0.2	U		**0.12**	J	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-3
ORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLE
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Open Borehole at Missile Magazine (east)								
Sample ID		CL59-GW08			CL59-GW08			CL59-GW108 (duplicate)		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001		
Laboratory	Tap Water	CompuChem			STL			STL		
Parameter	(ug/L)	Result	LF	VF	Result	LF	VF	Result	LF	VF
PCBs - Method 8082 (ug/L)										
Aroclor 1016*	0.9605	2	U	UJ,s	1	U	UJ,s	1	U	UJ,s
Aroclor 1221	0.0336	3	U	UJ,s	1	U	UJ,s	1	U	UJ,s
Aroclor 1232	0.0336	2	U	UJ,s	1	U	UJ,s	1	U	UJ,s
Aroclor 1242	0.0336	2	U	UJ,s	1	U	UJ,s	1	U	UJ,s
Aroclor 1248	0.0336	2	U	UJ,s	1	U	UJ,s	1	U	UJ,s
Aroclor 1254	0.0336	2	U	UJ,s	1	U	UJ,s	1	U	UJ,s
Aroclor 1260	0.0336	2	U	UJ,s	1	U	UJ,s	1	U	UJ,s
Pesticides - Method 8081 (ug/L)										
4,4'-DDD	0.2801	0.1	U	UJ,s	0.05	U	R,s	0.05	U	
4,4'-DDE	0.1977	0.05	U	UJ,s	0.05	U	R,s	0.05	U	
4,4'-DDT	0.1977	0.15	U	UJ,s	0.05	U	R,s	0.05	U	
Aldrin	0.0040	0.05	U	UJ,s	0.05	U	R,s	0.05	U	
alpha-BHC	0.0107	0.05	U	UJ,s	0.05	U	R,s	0.05	U	
alpha-Chlordane	0.1921**	0.05	U	UJ,s	0.05	U	R,s	0.05	U	
beta-BHC	0.0374	0.08	U	UJ,s	0.02	U	R,s	0.02	U	
delta-BHC	--	0.05	U	UJ,s	0.05	U	R,s	0.05	U	
Dieldrin	0.0042	0.06	U	UJ,s	0.05	U	R,s	0.05	U	
Endosulfan I	--	0.05	U	UJ,s	0.05	U	R,s	0.05	U	
Endosulfan II	--	0.1	U	UJ,s	0.05	U	R,s	0.05	U	
Endosulfan Sulfate	--	0.1	U	UJ,s	0.05	U	R,s	0.05	U	
Endrin*	10.95	0.1	U	UJ,s	0.05	U	R,s	0.05	U	
Endrin Aldehyde	--	0.1	U	UJ,s	0.05	U	R,s	0.05	U	
Endrin Ketone	--	0.25	U	UJ,s	0.05	U	R,s	0.05	U	
gamma-BHC (Lindane)	0.0517	0.06	U	UJ,s	0.02	U	R,s	0.02	U	
gamma-Chlordane	0.1921**	0.05	U	UJ,s	0.05	U	R,s	0.05	U	
Heptachlor	0.0149	0.06	U	UJ,s	0.05	U	R,s	0.05	U	
Heptachlor Epoxide	0.0074	0.03	U	UJ,s	0.05	U	R,s	0.05	U	
Methoxychlor*	182	0.25	U	UJ,s	0.1	U	R,s	0.1	U	
Toxaphene	0.0611	5	U	UJ,s	2	U	R,s	2	U	

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcino

1/2 Nondetect exceeds 10% of PRG for noncarcinogens or the full PRG for carcino

*Compound is noncarcinogenic.

** for technical Chlordane

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-4
INORGANIC ANALYTICAL RESULTS
GROUNDWATER SAMPLE
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location		Open Borehole at Missile Magazine (east)								
Sample ID		CL59-GW08			CL59-GW08			CL59-GW108 (duplicate)		
Sample Date	Region 9 PRG	8/7/2001			8/7/2001			8/7/2001		
Laboratory	Tap Water	CompuChem			STL			STL		
Parameter	(ug/L)	Result	LF	VF	Result	LF	VF	Result	LF	VF
Dissolved Metals (ug/L)										
Aluminum*	36,499	**231**			**305**		M,m	**534**		M,m
Antimony*	14.6	10	U		**3.8**	B		**3**	B	
Arsenic	0.04	**7.4**	B		**6.6**	B		**9**	B	
Barium*	2,555	**73.7**			**66.1**			**84.4**		
Beryllium*	73.0	5	U		5	U		5	U	
Cadmium*	18.2	5	U		5	U		5	U	
Calcium*	--	**102000**			**100000**			**101000**		
Chromium*	0.20	5	U		5	U		5	U	
Cobalt*	2,190	5	U		5	U		5	U	
Copper*	1,356	15	U		15	U		15	U	
Iron*	10,950	**413**			**457**			**941**		
Lead*	--	10	U		10	U		10	U	
Magnesium*	--	**38500**			**38200**			**39300**		
Manganese*	876	**68.1**			**67**			**71**		
Mercury*	10.9	0.4	U	UJ,m	0.4	U		0.4	U	
Nickel*	730	**5.2**	B		**3.1**	B		**3.8**	B	
Potassium*	--	**14500**			**13900**			**12200**		
Selenium*	182	20	U		20	U		20	U	
Silver*	182	5	U		5	U		5	U	
Sodium*	--	**9680**		J,s	**11100**			**11000**		
Thallium*	2.4	**6**	B		20	U		20	U	
Vanadium*	255	**1.1**	B		**1.5**	B		**2.2**	B	
Zinc*	10,950	40	U		40	U		40	U	

Detection Exceeds USEPA Region 9 PRG for Carcinogens or 10% of PRG for Noncarcinoge

1/2 Nondetect exceeds 10% of PRG for noncarcinogens or the full PRG for carcinoge

*Compound is noncarcinogenic.

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections

TABLE C-5
ANALYTICAL RESULTS
INVESTIGATION DERIVED WASTE
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location	IDW		
Sample ID	CL59-WS09		
Sample Date	8/8/2001		
Laboratory	STL		
Parameter	Result	LF	VF
Volatiles - Method 8260 (ug/kg)			
1,1,1-Trichloroethane	5.9	U	
1,1,2,2-Tetrachloroethane	5.9	U	
1,1,2-Trichloro-1,2,2-trifluoroethane	5.9	U	
1,1,2-Trichloroethane	5.9	U	
1,1-Dichloroethane	5.9	U	
1,1-Dichloroethene	5.9	U	
1,2,4-Trichlorobenzene	5.9	U	
1,2-Dibromo-3-chloropropane	12	U	
1,2-Dibromoethane	5.9	U	
1,2-Dichlorobenzene	5.9	U	
1,2-Dichloroethane	5.9	U	
1,2-Dichloropropane	5.9	U	
1,3-Dichlorobenzene	5.9	U	
1,4-Dichlorobenzene	5.9	U	
2-Butanone (MEK)	24	U	UJ,c
2-Hexanone	24	U	UJ,c
4-Methyl-2-Pentanone (MIBK)	24	U	
Acetone	24	U	UJ,c
Benzene	5.9	U	
Bromodichloromethane	5.9	U	
Bromoform	5.9	U	
Bromomethane	12	U	
Carbon Disulfide	5.9	U	
Carbon Tetrachloride	5.9	U	
Chlorobenzene	5.9	U	
Chloroethane	12	U	
Chloroform	5.9	U	
Chloromethane	12	U	
cis-1,2-Dichloroethene	3	U	
cis-1,3-Dichloropropene	5.9	U	
Cyclohexane	12	U	
Dibromochloromethane	5.9	U	
Dichlorodifluoromethane	12	U	
Ethylbenzene	5.9	U	
Isopropylbenzene (Cumeme)	5.9	U	
Methyl acetate	12	U	
Methyl tert-butyl ether	24	U	
Methylcyclohexane	12	U	
Methylene Chloride	**1.8**	J	
Styrene	5.9	U	
Tetrachloroethene	5.9	U	
Toluene	5.9	U	
trans-1,2-Dichloroethene	3	U	
trans-1,3-Dichloropropene	5.9	U	
Trichloroethene	5.9	U	
Trichlorofluoromethane	12	U	
Vinyl Chloride	12	U	
Xylenes (total)	5.9	U	

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-5
ANALYTICAL RESULTS
INVESTIGATION DERIVED WASTE
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location	IDW		
Sample ID	CL59-WS09		
Sample Date	8/8/2001		
Laboratory	STL		
Parameter	Result	LF	VF
PCBs - Method 8082 (ug/kg)			
Aroclor 1016	39	U	
Aroclor 1221	78	U	
Aroclor 1232	39	U	
Aroclor 1242	78	U	
Aroclor 1248	39	U	
Aroclor 1254	78	U	
Aroclor 1260	39	U	
Tentatively Identified Compounds	None		
Metals (mg/kg)			
Aluminum	**8300**		
Antimony	1.8	U	M,m
Arsenic	**11.1**		
Barium	**56.1**		
Beryllium	**0.45**	B	
Cadmium	**0.16**	B	
Calcium	**16500**		M,k
Chromium	**16.3**		
Cobalt	**8.4**	L	J,s
Copper	**19.5**		
Iron	**21900**		
Lead	**16.3**		
Magnesium	**5700**		
Manganese	**330**		
Mercury	**0.019**	B	
Nickel	**24.6**		
Potassium	**1400**		
Selenium	2.4	U	
Silver	0.59	U	
Sodium	**139**	B	
Thallium	**0.78**	B	
Vanadium	**15**		
Zinc	**80.7**		

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

TABLE C-6
TENTATIVELY IDENTIFIED COMPOUNDS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location	Scar 1			Scar 1			Scar 2			Scar 2			Acid Fueling Station			Acid Fueling Station		
Sample ID	CL59-SS01			CL59-SB01A			CL59-SS02			CL59-SB02A			CL59-SS03			CL59-SB03A		
Sample Depth (feet)	0-1			2-4			0-1			3-4			0-1			3-5		
Sample Date	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/6/2001			8/6/2001		
Laboratory	STL			STL			STL			STL			STL			STL		
Parameter	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles (ug/kg)																		
Unknown	--			--			--			--			--			--		
Semivolatiles (ug/kg)																		
Unknown Hydrocarbon	**1724**	J	NJ,t	**2814**	J	NJ,t	**1815**	J	NJ,t	**4340**	J	NJ,t	**1895**	J	NJ,t	**894**	J	NJ,t
Unknown	**812**	J	NJ,t	--			**500**	J	NJ,t	**790**	J	NJ,t	**1960**	J	NJ,t	**240**	J	NJ,t
Unknown PAH	--			--			--			--			--			--		
Sulfur, MOL. (S8)	--			--			--			--			--			--		
Unknown Organic Acid	--			--			--			--			--			--		
Unknown Aromatic	--			--			--			--			--			--		
Unknown Carboxylic Acid	--			--			--			--			--			--		
Butane	--			--			--			--			--			--		
Unknown Amine	--			--			--			--			--			--		
Unknown Alcohol	--			--			--			--			--			--		
Straight Chain Alkane	--			--			--			--			--			--		
Pentadecanal	--			--			--			--			--			--		
Unknown Aldehyde	--			--			--			--			--			--		

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections

TABLE C-6
TENTATIVELY IDENTIFIED COMPOUNDS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location	Acid Fueling Station			Acid Fueling Station			Assembly & Test			Assembly & Test			Assembly & Test			Assembly & Test		
Sample ID	CL59-SB03B			CL59-SB03C			CL59-SS04			CL59-SB04A			CL59-SB04B			CL59-SB04C		
Sample Depth (feet)	9-10.5			13-14.3			0-1			3-4			9-10			11-13		
Sample Date	8/6/2001			8/6/2001			8/6/2001			8/6/2001			8/6/2001			8/6/2001		
Laboratory	STL			STL			STL			STL			STL			STL		
Parameter	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles (ug/kg)																		
Unknown	--			--			--			--			--			--		
Semivolatiles (ug/kg)																		
Unknown Hydrocarbon	**2456**	J	NJ,t	**9520**	J	NJ,t	**2466**	J	NJ,t	**3820**	J	NJ,t	**2602**	J	NJ,t	**11760**	J	NJ,t
Unknown	**100**	J	NJ,t	**260**	J	NJ,t	**1130**	J	NJ,t	--			**350**	J	NJ,t	**500**	J	NJ,t
Unknown PAH	--			--			--			--			--			--		
Sulfur, MOL. (S8)	--			--			--			--			**4100**	J	NJ,t	--		
Unknown Organic Acid	--			--			--			--			--			--		
Unknown Aromatic	--			--			--			--			--			--		
Unknown Carboxylic Acid	--			--			--			--			--			--		
Butane	--			--			--			--			--			--		
Unknown Amine	--			--			--			--			--			--		
Unknown Alcohol	--			--			--			--			--			--		
Straight Chain Alkane	--			--			--			--			--			--		
Pentadecanal	--			--			--			--			--			--		
Unknown Aldehyde	--			--			--			--			--			--		

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections

TABLE C-6
TENTATIVELY IDENTIFIED COMPOUNDS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location	Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg			Generator Bldg		
Sample ID	CL59-SS05			CL59-SS05			CL59-SS105 (duplicate)			CL59-SB05A			CL59-SB05B			CL59-SB05C		
Sample Depth (feet)	0-1			0-1			0-1			4-5			8-9.5			13-14		
Sample Date	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001		
Laboratory	CompuChem			STL			STL			STL			STL			STL		
Parameter	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles (ug/kg)																		
Unknown	--			--			--			--			--			--		
Semivolatiles (ug/kg)																		
Unknown Hydrocarbon	--			**2141**	J	NJ,t	**1590**	J	NJ,t	**1448**	J	NJ,t	**729**	J	NJ,t	**7220**	J	NJ,t
Unknown	--			**2080**	J	NJ,t	**3330**	J	NJ,t	--			**120**	J	NJ,t	**650**	J	NJ,t
Unknown PAH	--			--			**170**	J	NJ,t	--			--			--		
Sulfur, MOL. (S8)	--			--			--			--			--			--		
Unknown Organic Acid	--			--			**89**	J	NJ,t	--			--			--		
Unknown Aromatic	--			--			--			--			--			--		
Unknown Carboxylic Acid	**650**	J	NJ,t	--			--			--			--			--		
Butane	**1400**	NJ	NJ,t	--			--			--			--			--		
Unknown Amine	--			--			--			--			--			--		
Unknown Alcohol	--			--			--			--			--			--		
Straight Chain Alkane	--			--			--			--			--			--		
Pentadecanal	--			--			--			--			--			--		
Unknown Aldehyde	--			--			--			--			--			--		

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections

TABLE C-6
TENTATIVELY IDENTIFIED COMPOUNDS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location	Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)			Magazine (west)		
Sample ID	CL59-SS06			CL59-SS06			CL59-SS106 (duplicate)			CL59-SB06A			CL59-SB06B			CL59-SB06C		
Sample Depth (feet)	0-1			0-1			0-1			6-8			10-12			12-13.75		
Sample Date	8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001			8/8/2001		
Laboratory	CompuChem			STL			STL			STL			STL			STL		
Parameter	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles (ug/kg)																		
Unknown	--			--			--			--			--			--		
Semivolatiles (ug/kg)																		
Unknown Hydrocarbon	--			**1716**	J	NJ,t	**1901**	J	NJ,t	**1294**	J	NJ,t	**910**	J	NJ,t	**2560**	J	NJ,t
Unknown	**3480**	J	NJ,t	**390**	NJ	NJ,t	**1180**	J	NJ,t	**180**	J	NJ,t	--			--		
Unknown PAH	--			**690**	J	NJ,t	**340**	J	NJ,t	--			--			--		
Sulfur, MOL. (S8)	--			**100**	J	NJ,t	--			--			--			--		
Unknown Organic Acid	--			--			--			--			--			--		
Unknown Aromatic	--			--			--			--			--			--		
Unknown Carboxylic Acid	--			--			--			--			--			--		
Butane	--			--			--			--			--			--		
Unknown Amine	**1200**	J	NJ,t	--			--			--			--			--		
Unknown Alcohol	--			--			--			--			--			--		
Straight Chain Alkane	--			--			--			--			--			--		
Pentadecanal	--			--			--			--			--			--		
Unknown Aldehyde	--			--			--			--			--			--		

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections

TABLE C-6
TENTATIVELY IDENTIFIED COMPOUNDS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location	Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)			Magazine (center)		
Sample ID	CL59-SS07			CL59-SS07			CL59-SS107 (duplicate)			CL59-SB07A			CL59-SB07B			CL59-SB07C			CL59-SB07D		
Sample Depth (feet)	0-1			0-1			0-1			6-8			10-12			14-16			18-19.1		
Sample Date	8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001		
Laboratory	CompuChem			STL			STL			STL			STL			STL			STL		
Parameter	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles (ug/kg)																					
Unknown	**6.49**	J	NJ,t	--			--			--			--			--			--		
Semivolatiles (ug/kg)																					
Unknown Hydrocarbon	**9330**	J	NJ,t	**1404**	J	NJ,t	**669**	J	NJ,t	**2300**	J	NJ,t	**1343**	J	NJ,t	**6220**	J	NJ,t	**14100**	J	NJ,t
Unknown	--			--			**330**	J	NJ,t	**200**	J	NJ,t	**100**	J	NJ,t	**720**	J	NJ,t	**3820**	J	NJ,t
Unknown PAH	--			--			--			--			--			--			--		
Sulfur, MOL. (S8)	--			--			--			--			--			--			--		
Unknown Organic Acid	--			--			--			--			--			--			--		
Unknown Aromatic	--			--			--			--			--			--			--		
Unknown Carboxylic Acid	--			--			--			--			--			--			--		
Butane	--			--			--			--			--			--			--		
Unknown Amine	--			--			--			--			--			--			--		
Unknown Alcohol	**680**	J	NJ,t	--			--			--			--			--			--		
Straight Chain Alkane	**480**	J	NJ,t	--			--			--			--			--			--		
Pentadecanal	--			--			--			--			--			--			--		
Unknown Aldehyde	--			--			--			--			--			--			--		

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections

TABLE C-6
TENTATIVELY IDENTIFIED COMPOUNDS
SOIL SAMPLES
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location	Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)			Magazine (east)		
Sample ID	CL59-SS08			CL59-SS08			CL59-SS108 (duplicate)			CL59-SB08AA			CL59-SB08A			CL59-SB08B			CL59-SB08C		
Sample Depth (feet)	0-1			0-1			0-1			5-7			10-12			16-18			24-25.5		
Sample Date	8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001			8/7/2001		
Laboratory	CompuChem			STL			STL			STL			STL			STL			STL		
Parameter	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles (ug/kg)																					
Unknown	--			--			--			--			--			--			--		
Semivolatiles (ug/kg)																					
Unknown Hydrocarbon	--			**2116**	J	NJ,t	**2050**	J	NJ,t	**937**	J	NJ,t	**6700**	J	NJ,t	**7780**	J	NJ,t	**26640**	J	NJ,t
Unknown	**5290**	J	NJ,t	**886**	J	NJ,t	**2226**	J	NJ,t	--			**850**	J	NJ,t	--			**2380**	J	NJ,t
Unknown PAH	--			**740**	J	NJ,t	**150**	J	NJ,t	--			**240**	J	NJ,t	--			--		
Sulfur, MOL. (S8)	--			--			--			--			--			--			--		
Unknown Organic Acid	--			--			--			--			--			--			--		
Unknown Aromatic	--			--			--			--			--			--			--		
Unknown Carboxylic Acid	--			--			--			--			--			--			--		
Butane	--			--			--			--			--			--			--		
Unknown Amine	--			--			--			--			--			--			--		
Unknown Alcohol	--			--			--			--			--			--			--		
Straight Chain Alkane	**1410**	J	NJ,t	--			--			--			--			--			--		
Pentadecanal	**1300**	NJ	NJ,t	--			--			--			--			--			--		
Unknown Aldehyde	**820**	J	NJ,t	--			--			--			--			--			--		

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections

TABLE C-7
TENTATIVELY IDENTIFIED COMPOUNDS
GROUNDWATER SAMPLE
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Location	Open Borehole at Missile Magazine (east)								
Sample ID	CL59-GW08			CL59-GW08			CL59-GW108 (duplicate)		
Sample Date	8/7/2001			8/7/2001			8/7/2001		
Laboratory	CompuChem			STL			STL		
Parameter	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles - Method 8260 (ug/L)									
	None			**None**			**None**		
Semivolatiles - Method 8270 (ug/L)									
Unknown Hydrocarbon	--			**49.7**	J	NJ,t	**70.1**	J	NJ,t
Unknown	--			**13.7**	J	NJ,t	**22.5**	J	NJ,t
Unknown Aromatic	--						**2.7**	J	NJ,t

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections

TABLE C-8
TRIP BLANK RESULTS
FORMER NIKE CL-59 LAUNCH AREA, PARMA, OHIO

Sample ID	TB-080601			TB-080701			TB-080701		
Sample Date	8/6/2001			8/7/2001			8/7/2001		
Laboratory	STL			STL			CompuChem		
Parameter	Result	LF	VF	Result	LF	VF	Result	LF	VF
Volatiles - Method 8260 (ug/L)									
1,1,1-Trichloroethane	1	U		1	U		1	U	
1,1,2,2-Tetrachloroethane	1	U		1	U		2	U	
1,1,2-Trichloro-1,2,2-trifluoroethane	1	U		1	U		2	U	
1,1,2-Trichloroethane	1	U		1	U		1	U	
1,1-Dichloroethane	1	U		1	U		1	U	
1,1-Dichloroethene	1	U		1	U		1	U	
1,2,4-Trichlorobenzene	**0.29**	J		1	U		1	U	
1,2-Dibromo-3-chloropropane	1	U	UJ,c	1	U	UJ,c	1	U	
1,2-Dibromoethane	1	U		1	U		1	U	
1,2-Dichlorobenzene	1	U		1	U		1	U	
1,2-Dichloroethane	1	U		1	U		1	U	
1,2-Dichloropropane	1	U		1	U		1	U	
1,3-Dichlorobenzene	1	U		1	U		1	U	
1,4-Dichlorobenzene	1	U		1	U		1	U	
2-Butanone (MEK)	10	U	UJ,c	10	U	UJ,c	5	U	
2-Hexanone	10	U	UJ,c	10	U	UJ,c	5	U	
4-Methyl-2-Pentanone (MIBK)	10	U		10	U		5	U	
Acetone	10	U	UJ,c	10	U	UJ,c	15	U	
Benzene	1	U		1	U		1	U	
Bromodichloromethane	1	U		1	U		1	U	
Bromoform	1	U		1	U		1	U	
Bromomethane	1	U		1	U		1	U	
Carbon Disulfide	1	U		1	U		1	U	
Carbon Tetrachloride	1	U		1	U		1	U	
Chlorobenzene	1	U		1	U		1	U	
Chloroethane	1	U		1	U		1	U	
Chloroform	1	U		1	U		1	U	
Chloromethane	1	U		1	U		1	U	
cis-1,2-Dichloroethene	0.5	U		0.5	U		1	U	
cis-1,3-Dichloropropene	1	U		1	U		1	U	
Cyclohexane	1	U		1	U		NA		
Dibromochloromethane	1	U		1	U		1	U	
Dichlorodifluoromethane	1	U		1	U		1	U	
Ethylbenzene	1	U		1	U		1	U	
Isopropylbenzene (Cumeme)	1	U		1	U		1	U	
Methyl acetate	10	U		10	U		10	U	
Methyl tert-butyl ether	5	U	UJ,c	5	U	UJ,c	1	U	
Methylcyclohexane	1	U		1	U		NA		
Methylene Chloride	**0.37**	J B		1	U		7	U	
Styrene	1	U		1	U		1	U	
Tetrachloroethene	1	U		1	U		1	U	
Toluene	1	U		1	U		1	U	
trans-1,2-Dichloroethene	0.5	U		0.5	U		1	U	
trans-1,3-Dichloropropene	1	U		1	U		1	U	
Trichloroethene	1	U		1	U		1	U	
Trichlorofluoromethane	1	U		1	U		1	U	
Vinyl Chloride	1	U		1	U		1	U	
Xylenes (total)	1	U		1	U		2	U	
Tentatively Identified Compounds (VOC)									
Unknown	--			--			**1.43**	J	NJ,t

LF - Laboratory flag (refer to Table 4-6)
VF - Validation flag (refer to Tables 4-4 and 4-5)
Bold values are detections
NA - Not analyzed

APPENDIX D
Chain of Custody Forms

Chain of Custody Record

SEVERN TRENT SERVICES

Severn Trent Laboratories, Inc.

STL-4124 (1200)

Client: Plexus Scientific Corp	Project Manager: Geoff Carton	Date: 8/6/01	Chain of Custody Number: 073043
Address: 8818 Centre Park Dr Ste 107	Telephone Number (Area Code)/Fax Number: 410 715-3865 / 3866	Lab Number:	Page 1 of 2
City: Columbia; State: MD; Zip Code: 21045	Site Contact:	Lab Contact:	
Project Name and Location (State): CL59, Parma, Ohio	Carrier/Waybill Number:		
Contract/Purchase Order/Quote No.:			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil		Containers & Preservatives: Unpres.	H2SO4	HNOS	HCl	NaOH	ZnAc/NaOH		Analysis (Attach list if more space is needed): VOA TCL	SVOA TCL	metals TAL	PCB	Grain size	Atterberg							Special Instructions/ Conditions of Receipt
CL59-SS03	8/6/01	1105				/		/							/	/	/										MS/MSD
TB-080601	8/6/01	1110		/							/				/												
CL59-SB03A	8/6/01	1150				/		/							/	/	/										Please
CL59-SB03B	8/6/01	1210				/		/							/	/	/										homogenize
CL59-SB03C	8/6/01	1230				/		/							/	/	/										samples
CL59-SS04	8/6/01	1335				/		/							/	/	/	/									when
CL59-SB04A	8/6/01	1445				/		/							/	/	/	/									possible
CL59-SB04B	8/6/01	1500				/		/							/	/	/	/									
CL59-SB04C	8/6/01	1510				/													/	/							
CL59-SB04C	8/6/01	1520				/									/	/	/	/									
CL59-SS08	8/7/01	0800				/									/	/	/	/									
CL59-SS108	8/7/01	0800				/									/	/	/	/									

Possible Hazard Identification: ☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☐ Disposal By Lab ☑ Archive For per contract Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☑ Other 30

QC Requirements (Specify):

	Date	Time		Date	Time
1. Relinquished By: [signature]	8/7/01	1330	1. Received By: [signature]	8-7-01	1330
2. Relinquished By:			2. Received By:		
3. Relinquished By:			3. Received By:		

Comments:

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

SEVERN TRENT SERVICES

Severn Trent Laboratories, Inc.

STL-4124 (1200)

Client: Plexus Scientific Corp	Project Manager: Geoff Carton	Date: 8/7/01	Chain of Custody Number: 073019
Address: 8817 Centre Park Dr Ste 107	Telephone Number (Area Code)/Fax Number: 410 715-3865 / 3866	Lab Number:	Page 2 of 2
City: Columbia; State: MD; Zip Code: 21045	Site Contact: G. Carton	Lab Contact: J. Smith	
Project Name and Location (State): CL59, Parma, OH	Carrier/Waybill Number:		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil		Containers & Preservatives: Unpres.	H2SO4	HNOS	HCl	NaOH	ZnAc/NaOH		Analysis (Attach list if more space is needed): TCL VOA	TCL SVOA	PCBs	TAL Metals	Grain size	Atterberg							Special Instructions/ Conditions of Receipt
CL59-SB08A	8/7/01	0845				/		/							/	/	/	/									
CL59-SB08B		0910				/		/							/	/	/	/									
CL59-SB08A		0850				/													/	/							
CL59-SB08C		1025				/		/							/	/	/	/									
CL59-SB08AA		1105				/		/							/	/	/	/									
CL59-SW08		1120		/				/			/				/	/	/	/									MS/MSD what you can if not use extra for pesticide analysis
CL59-SW108		1120		/				/			/				/	/	/	/									

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify):

	Date	Time		Date	Time
1. Relinquished By: [signature]	8/7/01	1330	1. Received By: [signature]	8-7-01	1330
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

SEVERN TRENT SERVICES **Severn Trent Laboratories, Inc.**

STL-4124 (1200)

Client: Plexus Scientific Corp	Project Manager: Geoff Carton	Date: 8/7/01	Chain of Custody Number: 073020
Address: 8818 Centre Park Dr, Ste 107	Telephone Number (Area Code)/Fax Number: 410 715-3865 / 3866	Lab Number	Page 1 of 3
City: Columbia; State: MD; Zip Code: 21045	Site Contact: Geoff Carton	Lab Contact: Jeff Smith	
Project Name and Location (State): CL59, Parma, Ohio	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed	Soil		Containers & Preservatives: Unpres.	H2SO4	HNOS	HCl	NaOH	ZnAc/NaOH		Analysis: TCL VOA	TCL SVOA	PCB	Metals TAL	Atterberg	Grain Size							Special Instructions/ Conditions of Receipt
TB080701	8/7/01	1415		/							/				N												
CL59-SS07	↓	1420				/		/							/	/	/	/									MS/MSD
CL59-SS107		1420				/		/							/	/	/	/									
CL59-SB07A		1500				/		/							/	/	/	/	/	/							
CL59-SB07B		1515				/		/							/	/	/	/									
CL59-SB07C		1600				/		/							/	/	/	/									
CL59-SB07D		1615				/		/							/	/	/	/		~~/~~							
CL59-SB07E	↓	1620				/		/												/							
CL59-SS06	8/8/01	0835				/		/							/	/	/	/									MS/MSD
CL59-SS106	↓	0835				/		/							/	/	/	/									
CL59-SB06A		0900				/		/							/	/	/	/									
CL59-SB06B	↓	0935				/		/							/	/	/	/									

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☐ Disposal By Lab ☑ Archive For per contract Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☑ Other 30

QC Requirements (Specify)

1. Relinquished By: [signature]	Date: 8/9/01	Time: 1010	1. Received By: [signature]	Date: 8-9-01	Time: 1010
2. Relinquished By	Date	Time	2. Received By	Date	Time
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

SEVERN TRENT SERVICES

Severn Trent Laboratories, Inc.

STL-4124 (1200)

Client: Plexus Scientific Corporation	Project Manager: Geoff Carton	Date: 8/8/01	Chain of Custody Number: 073021
Address: 8818 Centre Park Dr, Ste 107	Telephone Number (Area Code)/Fax Number: 410 715-3866 / 3866	Lab Number	Page 2 of 3
City: Columbia; State: MD; Zip Code: 21045	Site Contact: Geoff Carton	Lab Contact: Jeff Smith	
Project Name and Location (State): CL59, Parma, Ohio	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.			

Analysis (Attach list if more space is needed)

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Air	Aqueous	Sed.	Soil		Unpres.	H2SO4	HNOS	HCl	NaOH	ZnAc/NaOH		TCL VOA	TCL SVOC	PCB	TAL Metals	Grain Size	Atterberg							Special Instructions/ Conditions of Receipt
CL59 - SB06C	8/8/01	1000				/		/							/	/	/	/									
CL59- SS05	↓	1145				/		/							/	/	/	/	/	/							
CL59 - SS105		1145				/		/							/	/	/	/									
CL59 - SB05A		1205				/		/							/	/	/	/									
CL59 - SB05B		1215				/		/							/	/	/	/									
CL59 - SB05C		1235				/		/							/	/	/	/									
CL59 - SS02		1340				/		/							/	/	/	/									
CL59 - SB02A		1350				/		/							/	/	/	/									
CL59 - SS01		1355				/		/							/	/	/	/									
CL59 - SB01A	↓	1400				/		/							/	/	/	/									

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By: Carla [illegible]	8/9/01	1010	1. Received By: [illegible] Haidet	8-9-01	1010
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

SEVERN TRENT SERVICES

Severn Trent Laboratories, Inc.

STL-4124 (1200)

Client: Plexus Scientific Corp	Project Manager: Geoff Carton	Date: 8/8/01	Chain of Custody Number: 073022
Address: 8818 Centre Park Dr, Ste 107	Telephone Number (Area Code)/Fax Number: 410-715-3865/3866	Lab Number:	Page 3 of 3
City: Columbia; State: MD; Zip Code: 21045	Site Contact: Geoff Carton; Lab Contact: Jeff Smith		
Project Name and Location (State): CL59, Parma, Ohio	Carrier/Waybill Number:		
Contract/Purchase Order/Quote No.:			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNOS	HCl	NaOH	ZnAc/NaOH	Analysis (Attach list if more space is needed): TCL VOA	PCB	RCRA 8 metals	Special Instructions/ Conditions of Receipt
CL59-WS09	8/8/01	1430				/	/						/	/	/	5 day TAT
~~CL59-WS10~~				/				AC 8/8/01								

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required: ☐ 24 Hours ☐ 48 Hours ☑ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other_____

QC Requirements (Specify):

	Date	Time		Date	Time
1. Relinquished By: Carla [signature]	8/9/01	1010	1. Received By: Al Haidit	8-9-01	1010
2. Relinquished By:			2. Received By:		
3. Relinquished By:			3. Received By:		

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

COMPUCHEM
a division of Liberty Analytical Corp.
501 Madison Avenue
Cary, NC 27513
1-800-833-5097

CHAIN-OF-CUSTODY RECORD

No. 057991

Project Name : CL59	Client Address : Plexus Scientific Corp	Point-of-Contact : Geoff Carton
Carrier : Fedex	8818 Centre Park Dr Ste 107	Telephone No. :
Airbill No. : 8287 5949 5740	Columbia MD 21045	Sampling complete? Y or N (see Note 1)
Sampler Name : G. Carton	Sampler Signature :	Project-specific (PS) or Batch (B) QC ? ____

BOX #1 1. Surface Water 2. Ground Water 3. Leachate 4. Rinsate 5. Soil / Sediment / Sludge 6. Trip Blank 7. Oil 8. Waste 9. Other_____

BOX #2 A. HCl + Ice B. HNO3 + Ice C. NaOH + Ice D. H2SO4 + Ice E. Unpreserved F. Ice Only G. Other_____ H. NaHSO4 + Ice I. ZnAc+NaOH + Ice

BOX #3 F. Filtered U. Unfiltered

Box #4 H. High M. Medium L. Low

Box #5 C. CLP 3/90 S. SW-846 W. CWA 600-series O. Other_____ T. TCLP

Sample ID (9 characters maximum)	Date:Year: 2001	Time	Box #1 Matrix	Box #2 Preservative	Box #3 Filtered / Unfiltered	Box #4 Expected Conc.	Box #5 Method	No. of Bottles	Use for Lab QC (MS or DUP)	VOA TCL	SVOC	Pesticide	PCB	Herbicide	Metals / Mercury	Cyanide	TOC / TOX	O&G / TPH	Remarks / Comments (see Notes 2 & 3)
TB080701	8/7	07:55	Aq 6	A HCL		L 0	8260	2		1									N.
CL59SS08	8/7	08:00	S	F		L	S	3		1	1		1		1				
CL59GW08	8/7	11:20	2	A F	→	L	S	8		1	1		1		1				Metals Filtered
CL59SS07	8/7	14:20	S	F		L	S	3		1	1		1		1				
CL59SS06	8/8	08:35	S	F		L	S	3		1	1		1		1				
CL59SS05	8/8	11:45	S	F		L	S	3		1	1		1		1				
	/	:																	Louisville
	/	:																	Requirements
	/	:																	
	/	:																	

Clients Special Instructions: Temperature _____ °C

Lab: Received in Good Condition? Y or N **Describe Problems, If any:**

#1 Relinquished By: (Sig) Date: 8/8/01	#2 Relinquished By: (Sig) Date:	#3 Relinquished By: (Sig) Date:
Company Name: Plexus Scientific Time: 1730	Company Name: Time:	Company Name: Time:
#1 Received By: (Sig) Date:	#2 Received By: (Sig) Date:	#3 Received By: (Sig) Date:
Company Name: Time:	Company Name: Time:	Company Name: Time:

Note (1): If "N" lab will hold samples to await remainder of project-maximizing batch size and minimizing QC ratio; if "Y" lab will begin processing batches now.
Note (2): Samples stored 60 days after date report mailed at no extra charge. Note (3): All lab copies of data destroyed after three years.