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LIBBEY-OWENS-FORD PLANT SITE

CERCLIS ID No.: WVD005008412

Charleston, Kanawha County, West Virginia

EXECUTIVE SUMMARY REPORT

Prepared for:

West Virginia Department of Environmental Protection

Office of Environmental Remediation

601 57th Street, SE

Charleston, West Virginia 25304

Prepared by:

ERC

Environmental Resources & Consulting, LLC

6 Coco Road

Elkview, West Virginia 25071

ERC Project #701-35-014

March 2008

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TABLE 6-1 --AIR MIGRATION PATHWAY SCORESHEET

Factor categories and factors	Maximum Value	Value Assigned	
Likelihood of Release:			
1. Observed Release	550	0	
2. Potential to Release:			
2a. Gas Potential to Release	500	7	
2b. Particulate Potential to Release	500	0	
2c. Potential to Release (higher of lines 2a and 2b)	500	7	
3. Likelihood of Release (higher of lines 1 and 2c)	550		7
Waste Characteristics:			
4. Toxicity/Mobility	(a)	200	
5. Hazardous Waste Quantity	(a)	100	
6. Waste Characteristics	100		10
Targets:			
7. Nearest Individual	50	20	
8. Population:			
8a. Level I Concentrations	(b)	0	
8b. Level II Concentrations	(b)	0	
8c. Potential Contamination	(c)	5	
8d. Population (lines 8a + 8b + 8c)	(b)	5	
9. Resources	5	5	
10. Sensitive Environments:			
10a. Actual Contamination	(c)	0	
10b. Potential Contamination	(c)	1	
10c. Sensitive Environments (lines 10a + 10b)	(c)	1	
11. Targets (lines 7 + 8d + 9 + 10c)	(b)		31
Air Migration Pathway Score:			
12. Pathway Score (S_a) [(lines 3 x 6 x 11)/82,500][d]	100		0.0263030303030303

[a] Maximum value applies to waste characteristics category
[b] Maximum value not applicable
[c] No specific maximum value applies to factor. However, pathway score based solely on sensitive environments is limited to a maximum of 60.
[d] Do not round to nearest integer

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Former Libbey-Owens-Ford Plant Site

USEPA Site ID No.: WVD005008412

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ACRONYM GLOSSARY

CERCLIS	Comprehensive Environmental Response and Compensation Liability Information System
EDR	Environmental Data Resources, Inc.
ERC	Environmental Resources & Consulting, LLC
LOF	Libbey-Owens-Ford Glass Company
PA	Preliminary Assessment
OER	Office of Environmental Remediation
NFRAP	No Further Remedial Action Planned
RCRA	Resource Conservation and Recovery Act
US	United States
USDA	US Department of Agriculture
USEPA	US Environmental Protection Agency
USGS	US Geological Survey
WVDEP	West Virginia Department of Environmental Protection
WVGS	West Virginia Geological and Economic Survey
WVDHHR	West Virginia Department of Health and Human Resources

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1.0 INTRODUCTION

1.1 Authorization

Environmental Resources & Consulting, LLC (ERC) received Notice to Proceed from the West Virginia Department of Environmental Protection (WVDEP), Office of Environmental Remediation (OER) under the WVDEP CERCLIS Group 5 Contract (Contract No.: DEP13518) dated January 16, 2007. Under this contract, ERC was tasked to review available Site information, and prepare an Executive Summary Report for multiple sites.

1.2 Scope of Work

The scope of work performed prior to preparation of this Report included:
Site visit;
Property ownership records review;
Inspection of aerial photographs; and
Review of environmental databases.

A Site inspection was conducted on June 5, 2007 by [redacted] of ERC. Ms. [redacted] was accompanied by Ms. Pamela Hayes, WVDEP CERCLIS Project Manager. An additional Site inspection was performed on March 6, 2008 by [redacted], and Mr. [redacted] of ERC; Ms. Hayes accompanied [redacted]

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2.0 SITE DESCRIPTION AND HISTORY

2.1 Site Location

The Former Libbey-Owens-Ford (LOF) (the Site) is located along MacCorkle Avenue in Charleston, Kanawha County, West Virginia, and is bounded to the West by CSX railway, to the North by MacCorkle Avenue, to the North by 57th Street, and to the South by Interstate 77. The LOF Site is now occupied by the Kanawha Mall, restaurants (i.e., Burger King, Applebee's, La Carretta, etc.) and other retail and office structures. Additionally, LOF had an easement extending to the Kanawha River through the former Owens-Illinois glass container plant which was bounded by 57th Street, Interstate 77, MacCorkle Avenue, and the Kanawha River. The easement provided LOF access to a natural gas metering facility, river water intake and wastewater outfall in the vicinity of the Kanawha River. The former Owens-Illinois Site has most recently been referred to as Kanawha Landing and is occupied by Lowes, Cracker Barrel, and other retail, a warehouse, and office structures.

The land use in the immediate vicinity of the Site is largely retail (along MacCorkle Avenue) with some residential usage. The Libbey-Owens-Ford plant is assigned United States Environmental Protection Agency (USEPA) Site Number WVD005008412. The Site has State ID Number WV-128. The Owens-Illinois Site has no USEPA Site Number.

Figure No. 1 provides the Site location. The Site is shown on the US Geological Survey (USGS) Charleston East West Virginia quadrangle. The approximate center of the Site is at 38.3114, Latitude and 81.5670 Longitude. The elevation of the Site is approximately 600 feet above Mean Sea Level (MSL). The Site ground surface generally slopes to the East toward the Kanawha River.

Table No. 1 provides the average rainfall, average maximum temperature, and average minimum temperature for Charleston, West Virginia.

2.2 Site Description

Glassmaking operations occurred onsite from 1917 to 1980, after which the property was sold, subdivided, and redeveloped for industrial, retail and office use. The sheet glass plant (referred to by LOF during its operational history as Plant Number 1) occupied between 34 to 40 acres on the west side of MacCorkle Avenue. Figure No. 2 shows the Plant Number 1 property. Plant

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Number 1 is identified in the Kanawha County Tax Assessor's Office as Landbook Database Parcel ID 09-67-00001-00000-00000, also referred to as Charleston South Annex Map Number 67, Plot Number 1. Plant Number 1 is bounded by the CSX Corporation railroad right-of-way to the southwest and 57th Avenue to the northwest. Libbey-Owens-Ford also owned a 9.0 acre tract of land between 56th Street and 57th Street (referred to by LOF as Tract #1) immediately northwest of Plant Number 1, which was used for various manufacturing support operations. The 9.0 acre property was developed for office and retail use in the past 25 years.

A glass container plant was on located on the 37.2 acres between MacCorkle Avenue and the Kanawha River (the previously referenced former Owens-Illinois Site) from the early 1920s to the 1960s. The plant made bottles and other containers and operated under various names, including Libbey-Owens Glass Company, Libbey-Owens-Ford Glass Company, and Owens-Illinois Glass Company. The glass container plant property is shown on Figure No. 2, and is identified as Kanawha County Landbook Database Parcel ID 09-65-00001-00000-00000, also referenced as Charleston South Annex Map Number 65, Plot Number 1. The property was used as an industrial park after plant closure. Lowes and other retail operations currently occupy the Site.

LOF also owned a 9.0 acre tract of land between 56th Street and 57th Street (referred to by LOF as Tract #1) immediately northwest of Plant Number 1.

In the documents reviewed, LOF identified three areas where wastes were disposed. LOF stated that the wastes included: 1) used refractory material which may have contained oxides of chromium and other metals and originated from rebuilding glass furnaces; 2) unusable glass batches that may have contained sand, soda ash, aplite, limestones, rouge, arsenic, salt cake and carbon resulting from off-weight and poor quality materials, and from dust collectors; and 3) Cullet which is broken glass consisting of oxides of silicon, sodium, calcium, and magnesium with trace constituents. Based upon information contained in the documents reviewed, arsenic and potentially other metals are present at significant concentrations in some of these wastes. Refractory waste and flue deposit wastes were analyzed by E.P Toxicity analysis by LOF in 1980. The analytical results showed that arsenic and chromium concentrations exceeded current Resource Conservation and Recovery Act (RCRA) Subpart C hazardous waste criteria in at least one sample.

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The waste disposal areas are designated as Area #1, #2, and #3. Area #1, one acre in size, was in the southwest portion of the LOF Site adjacent to the CSX railroad tracks, southwest of the Kanawha Shopping Center and perimeter road which existed in 1984. Area #2, five acres in size, was located along the Kanawha River and reportedly also received waste glass. Area #3, approximately ten acres in size, was located adjacent to and/or beneath what is currently the Interstate 77 Kanawha City Interchange cloverleaf to the east of the LOF Site. This property was reportedly later sold to the State. In 1984, the areas were open to the public and unrestricted. In 1984, Tom Koralewsk of LOF stated that the waste disposal at these areas occurred from 1917 to 1980, although Area #3 may have continued to receive waste during plant closure. The waste volume at each area is unknown. LOF stated in 1984 that the wastes were not containerized and the waste areas were not covered.

Figure No. 2 shows waste disposal Area #1 and Area #2. The Preliminary Assessment (PA) Report is contained in Appendix C and the map contained therein (Figure No. 2 in the PA Report) shows Area #3.

Area #2, along the riverbank, was on or near the previously referenced Owens-Illinois Site easement, within the federally designated 100-year floodplain. Figure No. 3 shows the Area #2 riverbank waste disposal area. In 1973, WVDEP inspectors observed discharge of a dark liquid along the riverbank at the subject disposal Site. Analysis of the liquid indicated an arsenic concentration of 250 milligrams per liter. Soil samples collected and analyzed from the disposal area were found to contain arsenic at 45 to 78,000 milligrams per kilogram.

WVDNR issued a Consent Order requiring corrective action at Area #2 to alleviate the discharge and bank soil erosion observed in 1973. LOF responded by installing rip rap materials (cell bottoms obtained from FMC, a local chemical manufacturing facility) at the disposal Site along the riverbank to attempt to stabilize the riverbank and minimize erosion. The waste disposal area was then covered with a 9 inch compacted soil cover, thereby completing "reclamation" of the disposal area, according to correspondence from LOF to Mr. John Davies of the WVDNR on October 30, 1973. The LOF reclamation plan is included as Appendix D. The disposal area was overgrown with dense vegetation during a Summer 2007 Site inspection. No evidence of cover maintenance or inspection is present the files reviewed. The disposal area was reportedly 160 feet in length, measured parallel to the riverbank, based on 1970s LOF information, though the waste types, waste volume, waste constituents, and disposal area width are unknown. During the

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March 2008 Site inspection, waste materials were noted to be present along the area where the former railroad spur was located, along the riverbank, and within an area to the southwest that appeared to have been excavated to facilitate surface water drainage. The cell bottoms were also visible along the riverbank.

WVDNR asked LOF on August 8, 1973, to identify if onsite waste disposal was occurring or anticipated after the waste area reclamation. LOF responded on August 22, 1973, indicating difficulty in locating an offsite disposal facility capable of handling the ongoing generation of certain "contaminated" LOF wastes. No further waste disposal information or correspondence is in WVDEP files. LOF evidently continued onsite waste disposal based on later information from LOF referenced in the USEPA Preliminary Assessment Report.

LOF stated in 1984 that wastes were also disposed of at nine offsite locations in the local area. The nine locations are identified by LOF in a 1984 correspondence letter contained in Appendix F which also describes the wastes and disposal practices. Appendix F contains correspondence identifying LOF waste disposal practices.

The Site is not currently listed in Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) database. A Discovery Action was recorded in the USEPA CERCLIS database in 1981, a year after the facility closed. A Preliminary Assessment (PA) began in 1984 and concluded in 1986 according to the CERCLIS database. The PA was concluded with a No Further Remedial Action Planned declaration. The Site is not listed on the Federal Superfund National Priorities List (NPL).

Site inspection photographs are included as Appendix A.

2.3 Historical Operational Activities

In 1917, The Owen Bottle Machine Company, based in Toledo, Ohio, bought the property northeast of MacCorkle Avenue (Central Avenue). The parcel is bounded to the north by 27th Street and to the east by the Kanawha River, from Kanawha Manufacturers Gas Company and constructed a glass bottle manufacturing plant. The company acquired additional adjacent land to the north that had formerly been residential dwellings in the 1920s or 1930s. The company name was later changed to the Owens-Illinois Bottle Company, and later to Owens-Illinois Glass Company (OIGC). The glass container plant property was sold to the County Industrial

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Development Authority in 1965, with the exception of easements for the natural gas metering facilities (jointly owned by LOF and Owens-Illinois), the Kanawha River water intake, and other infrastructure. The OIGC property was occupied in the 1960s and 1970s by a resin, polyethylene, and fertilizer operations, and later by multiple industrial tenants, at which point it was referred to as the Owens Industrial Park. No information indicating releases during the referenced 1960s and 1970s land use period is evident based on our file review. Multiple aboveground fertilizer tanks were in use during this period according to historic mapping. The OIGC property is now generally referred to as Kanawha Landing and is occupied by Lowes, Cracker Barrel, a warehouse and other retail and office operations.

Libbey Owens Sheet Glass Company (LOSGC) purchased property west of MacCorkle Avenue and constructed a six-furnace sheet and plate glass plant, referred to as Plant Number 1. Six additional furnaces were added in 1918 and 1923, allegedly making it the largest plate glass plant in the world. Additional property was acquired from Charles and Nellie Dickinson in 1926 for additional expansion.

Ed Ford Plate Glass Company purchased an interest in LOSGC in 1929 and the company name was eventually changed to Libbey-Owens Ford Glass Company (LOF). The LOF plant operated from 1929 to 1980 and produced plate, window, windshield and non-shattering glass. During World War II, the plant made windshields, canopies, and other glass products for military aircraft and other uses.

All properties described above, with the exception of the 9.0 acre LOF parcel, were within the municipality of Kanawha City, West Virginia, until 1929 when Kanawha City was annexed by the City of Charleston.

The LOF Plant Number 1 had at least one water supply well, constructed in 1917, on the sheet glass plant property. The well was reportedly 100 feet in depth. No other information on construction details, well closure, or usage was revealed by the records review. Two Kanawha River water intakes, located immediately downstream (to the North) of the riverbank waste disposal area, were operated by LOF to provide process water to the plant. Wastewater was discharged to the Kanawha River during facility operation at an outfall upstream (to the South) of the riverbank waste disposal area. Settling basins and clarifiers are visible in the historic Sanborn maps of the facility, but the nature and extent of water and/or wastewater treatment was not

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revealed by the file review. WVDEP files contain records of correspondence between WVDNR and LOF regarding river water quality issues, including dissolved oxygen and color concerns identified by WVDNR, in the 1960s and 1970s.

The file review revealed no records of permits (e.g., RCRA) other than a Water Pollution Control Permit originally issued in 1974 to LOF by the WVDNR.

LOF was cited in 1981 by USEPA for not submitting a biennial hazardous waste report by the required date in accordance with RCRA requirements. LOF responded that the facility was closed and provided manifests documenting various facility closure waste streams that were removed from the facility and disposed of offsite. No information is contained in the files to indicate the exact plant operation waste streams generated by LOF or its predecessor, or the waste generating processes or waste constituents. LOF submitted a list of reagents and other chemicals to WVDEP in the early 1980s, indicating that the materials were removed and disposed of offsite. A review of environmental databases was conducted by EDR, Inc. and the results are included in Appendix B. The results reveal no information regarding releases. Sanborn Historic Fire Insurance maps dated 1933, 1959, 1972, and 1989, depicting the LOF facility layout are contained in Appendix G.

Historic aerial photographs of the Site were inspected at the West Virginia Geological and Economic Survey (WVGS) in Morgantown, West Virginia in September 2007 with the assistance of Mr. Paul Liston of WVGS. Aerial photographs for the Site date back to 1938. The following aerial photographs were reviewed: November 14, 1938; April 8, 1955; and April 26, 1972. The photographs suggest placement of unknown material on the ground at the riverbank disposal area in the three photographs, with waste transport possibly via rail car from the LOF facility since the waste is located along a rail spur. What appears to be freshly placed material is visible to the southeast of the LOF plant in the approximate future location of the Interstate 77 Kanawha City interchange property in the 1938 photograph, though it is impossible to discern if the referenced material is LOF waste. The subject location is on the southeast side of MacCorkle Avenue. Appendix G contains copies of the photographs.

As previously noted, the exact bounds and ownership of the riverbank waste disposal area is uncertain. The disposal activity occurred on the adjacent former Owens-Illinois Glass Company

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(OIGC) property or on an associated easement. A brief discussion of the OIGC property is as follows:

> In 1917, The Owen Bottle Machine Company, based in Toledo, Ohio, bought property northeast of MacCorkle Avenue (Central Avenue), bounded to the north by 27th Street and to the east by the Kanawha River, from Kanawha Manufacturers Gas Company and constructed a glass bottle manufacturing plant. The company acquired additional adjacent land to the north, formerly residential dwellings, in the 1920s or 1930s. The company name was later changed to the Owens-Illinois Bottle Company, and later to Owens-Illinois Glass Company. The glass container plant property was sold to the County Industrial Development Authority in 1965, with the exception of easements for natural gas metering facilities (jointly owned by LOF and Owens-Illinois), Kanawha River water intake, and other infrastructure. The OIGC property was occupied in the 1960s and 1970s by a resin, polyethylene, and fertilizer operations, and later by multiple industrial tenants, at which point it was referred to as Owens Industrial Park. No information indicating releases during the referenced 1960s and 1970s land use period is evident based on the file review. Multiple aboveground fertilizer tanks were in use during this period according to historic mapping. The OIGC property is now generally referred to as Kanawha Landing and is occupied by Lowes, Cracker Barrel, a warehouse and other retail and office operations.

2.4 Potentially Responsible Parties

LOF sold the 34.98 acre Plant Number 1 property, and the 9.0 acre Tract #1 property (between 56th Street and 57th Street) to Frederick Haddad in May 1981. It was later sold to the New Valley Corporation, and a portion of it was sold to the Kanawha Mall LLC in 1999. Mall outparcels on the former Plant Number 1 property are owned by others. Appendix C contains property ownership information based on Kanawha County records.

- LOF was acquired by the Pilkington Group, a multinational glass manufacturer headquartered in the United Kingdom, in April 1986.

- The former LOF Plant #1 property was sold by LOF, subdivided and is now owned by multiple entities. The former waste disposal area on the LOF property adjacent to the CSX railroad tracks (behind what is now the Kanawha Mall) appears to have been placed on property currently owned by the Kanawha Mall LLC.

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- The former Owens-Illinois Glass Company glass container plant parcel east of MacCorkle Avenue (between MacCorkle Avenue and the Kanawha River) was bought by the Sarah and Pauline Maier Foundation, Inc. in 1997. The exact site and ownership chain of the riverbank disposal area is unclear since the lateral extent of the disposal area is unknown and a professional survey of the area was beyond the scope of the subject work contract.

- The former Interstate 77 Kanawha City interchange disposal area was sold to the State. No other PRPs have been identified.

2.5 Historical Site Investigations and Remedial Activities

2.5.1 USEPA Preliminary Assessment:

As previously referenced, the USEPA's Preliminary Assessment (PA) of Libbey-Owens-Ford, dated September 26, 1986, was prepared for USEPA Region III by NUS Corporation. The report states that "State Site inspection showed soil contamination throughout the plant Site" but no detail or further explanation is provided. Sampling activities are not described, other than the past waste area multi-media sampling previously described. The PA report is included as Appendix C.

2.5.2 Riverbank Reclamation:

Reclamation of the riverbank waste disposal area, conducted in 1973 by LOF, was previously described.

No other Site investigations or remedial activities associated with the property are known to have occurred based on the file review.

2.6 Contaminants of Potential Concern

Contaminants of potential concern include, but are not limited to, arsenic and chromium since these substances are identified as having been used on the Site in the past. Other heavy metals, petroleum compounds, and PCBs might also be expected based on typical hazardous substances on similar industrial properties.

2.7 Areas of Potential Environmental Concern

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- The 5-acre waste disposal Site on the Kanawha River is a potential environmental concern since the wastes are not contained and presumably represent a source of ongoing leaching and migration to groundwater and surface water. Other potential exposure pathways include airborne releases and direct contact associated with trespassers and potential future development.

- The former waste disposal area at the intersection of Interstate 77 and MacCorkle Avenue (Kanawha City Interchange), now reportedly owned by the State, is an area of potential environmental concern.

- The former waste disposal area in the southwest portion of the LOF Site, at the rear of the Kanawha Mall, is an area of potential environmental concern.

- Three underground tanks (two 4,000 gallon gasoline tanks and one 4,000 gallon diesel tank) were removed from the former Owens-Illinois glass container property by the Sarah and Pauline Maier Foundation in 1991. There is no information in the records to indicate if a release was discovered during closure.

- Releases of arsenic compounds and other heavy metals cannot be ruled out at the former LOF plant site. Much of the former LOF plant site is now covered by buildings and paved parking areas.

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3.0 CONTAMINANT MIGRATION PATHWAYS AND RECEPTORS

3.1 Groundwater

The depth to groundwater at the Site is estimated at 20 to 50 feet below existing grade based on U.S. Geological Survey data for the area within a one mile radius. The exact depth to groundwater at the Site is unknown. Groundwater occurs in the alluvial deposits above bedrock. Water wells in the area typically draw water from the bedrock water table aquifer which reportedly has a higher specific yield than the overlying alluvial deposits. Most of the water wells in the region are set in the bedrock (sandstone) water table aquifer at common depths of 100 to 225 feet below existing grade.

Arsenic was detected in the past in leachate at the 5-acre riverbank waste disposal area and these data indicate that groundwater has been impacted in the past, and ongoing impact cannot be conclusively ruled out. Shallow groundwater flows, and discharges, to the Kanawha River.
There are no public water supply wells are within five (5) miles of the Site according to the West Virginia Department of Health and Human Resources (WVDHHR). The area in the vicinity of the Site is served by the West Virginia American Water Company with water reportedly sourced from the Elk River.

There are no potable water intakes along the Kanawha River within five miles of the Site. A door-to-door water well inventory was beyond the contracted scope of work and, as a result, it is unknown if the identified private water supply wells are currently active nor is it known if there are additional active private water supply wells not listed in the USGS database.

3.2 Surface Water

The riverbank waste disposal area and Interstate 77 Kanawha City interchange disposal sites are adjacent to the Kanawha River and surface water runoff would potentially discharge to the river by overland flow. Much of the former plant area has been paved or otherwise developed, though some stormwater runoff from the Site would be expected to discharge directly or indirectly to the Kanawha River. Based upon our March 2008 Site inspection, an area to the southwest of waste disposal area #2 has been cut to allow rapid discharge of surface water to the Kanawha River, and waste material was observed in the cut area.

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3.3 Geology and Soils

The depth to bedrock is estimated at 40 to 50 feet at the Site based on WVGES information. Shallow bedrock below the Site consists of the Pennsylvanian Age Pottsville Formation which consists of grey-brown, massive, coarse-grained, locally cross-bedded sandstone and conglomerates with thin beds of coal, shale, clay, and limestone.

The overlying alluvial deposits consist of sandy clay and gravel.

The USDA Soil Survey of Kanawha County states that soils at the Site consist of Urban Land-Kanawha Complex. Urban land consists of areas covered by buildings, parking lots and industrial properties. Kanawha Complex soils are formed from lime influenced alluvial materials washed from uplands.

3.4 Air

No ambient air analytical data are available for the Site. Air monitoring was conducted during the 1996 USEPA removal action but the results were not reported.

3.5 Ecological

No known critical environments or endangered species are found within the vicinity of the Site based on the Fish and Wildlife Service ECOS CritHab Mapper resource. There is no evidence that the Site is defined as a sensitive environment as defined by USEPA for HRS scoring purposes. Sensitive environments are those defined and delineated by statute, and those that meet a particular classification (e.g., spawning areas critical for the maintenance of fish or shell fish) or statutory definition (e.g., wetlands) but are not statutorily delineated.

3.6 Potential Receptor Populations

Approximately 9,500 people live within a one mile radius of the Site based on the US 2000 census information compiled by SRC LLC. Nearby residences are potential receptors based on potential airborne metals dust exposure and surface water runoff.

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3.7 Climate Data

The average annual temperature of the area is 54 degrees F. The average annual precipitation ranges from 43 to 45 inches, with 22 inches falling between April and September. The average annual snowfall is 30 inches. Table No. 1 summarizes local climate data.

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4.0 HAZARD RANKING SYSTEM (HRS) SITE SCORE

The HRS is the scoring system used by the USEPA Superfund program to assess the relative threat associated with actual or potential releases of hazardous substances. The HRS is the primary screening tool for determining if a Site is to be placed on the NPL. An HRS score for a Site is determined by evaluating four pathways: Groundwater migration, surface water migration (drinking water, human food chain, and environmental), soil exposure (based on resident population and nearby population), and air migration.

The HRS Site score, which ranges from 0 to 100, is obtained by combining the four pathway scores using a root mean squares equation. Any Site scoring 28.50 or greater is eligible for the NPL. The score is a cutoff point that serves as a screening level indicator of the highest priority releases or threatened releases.

ERC utilized Quickscore Version 2.3 to determine a Hazard Ranking System score for the Site. The scoring process evaluated groundwater, surface water, and air pathways. The calculated Site score is 53.98. Appendix H contains the Quick Score scoresheets. The scoring summary is as follows:

	S Pathway	S2 Pathway
Groundwater Migration Pathway Score	3.57	12.7449
Surface Water/Overland Flood Migration Pathway Score	40.54	N/A
Groundwater to Surface Water Migration Pathway	1.79	N/A
Surface Water Migration Pathway Score	40.54	1643.4916
Soil Exposure Pathway Score	100.00	10000
Air Migration Pathway	0.00	0.00
Site Score	**53.98**	

Key scoring assumptions include:

- The shallow aquifer is in the unconsolidated sand, gravel, silt and clay within an estimated twenty feet of the surface on much of the Site. Groundwater from this shallow aquifer is assumed to discharge to the Kanawha River.

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- Overland surface water flow is assumed to discharge to the Kanawha River.

- Arsenic is the principal contaminant of concern.

- The three past waste disposal areas represent sources of hazardous substances for purposes of the scoring. Insufficient information exists on the nature and extent of contaminated surface soil, if any, on the former LOF property.

- Residents in the vicinity of the Site are assumed to rely on the local public water system.

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5.0 SUMMARY AND RECOMMENDATIONS

5.1 Summary

- Glassmaking operations occurred on the former LOF Site from 1917 to 1980.

- LOF and its predecessors disposed of waste batch material, refractory waste, flue dust, glass cullet, and potentially other plant wastes at three locations: The Kanawha City Interstate 77 interchange (property reportedly later sold to the State), the rear of the LOF property adjacent CSX railroad tracks, and along the Kanawha River (the "riverbank waste disposal area"). Refractory waste and flue deposit waste, reportedly disposed of at the three areas, were analyzed by E.P Toxicity analysis by LOF in 1980 and arsenic and chromium concentrations exceeded current Resource Conservation and Recovery Act (RCRA) Subpart C hazardous waste criteria in at least one sample.

- Riverbank Waste Disposal Area. A liquid discharge along the river bank was sampled and found to contain arsenic at significant concentrations in the 1990s. Apparent waste disposal activity is visible along the riverbank in the three historic aerial photographs of the Site, and waste was observed during the March 2008 Site inspection. The disposal area is within the 100-year floodplain. No details on the disposal area lateral and vertical extent and waste depth were identified based on the records review. The disposal area was on or near an LOF easement extending from MacCorkle Avenue to the river adjacent to the former Owens-Illinois glass container plant (Kanawha Landing property). Further field reconnaissance and a professional survey would be required to determine the current owner of the riverbank waste disposal area property. A Lowes and other retail and office structures are near the disposal area on the Kanawha Landing property. Potential release mechanisms include discharge to the river and contamination of surface water, contamination of soil, standing liquids, and airborne dust dispersal.

- Interstate 77 and Kanawha City Interchange Waste Disposal Area. LOF reports placing wastes at this offsite location. A 1938 aerial photograph shows suspected material placement on the northeast side of MacCorkle Avenue at the eventual interchange location. The State reportedly now owns the property. No details on the disposal area's lateral and

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vertical extent and waste depth were identified based on the records review. Potentially affected media include the release of contaminated surface water runoff, contaminated soil, standing liquids, and airborne dust dispersal.

- Waste Disposal Area at the Rear of the Former LOF Property Adjacent to CSX Railroad Tracks. The site is apparently behind the Kanawha Mall but the exact location is unknown. No details on the disposal area's lateral and vertical extent and waste depth were identified based on the records review. Potentially affected media include the release of contaminated surface water runoff, contaminated soil, standing liquids, and airborne dust dispersal.

- Soil at the former LOF plant site may have contained arsenic and other heavy metals due to releases during historic operations according to the USEPA PA Report. The fate of this soil is unknown.

- LOF was acquired by Pilkington Group, another glassmaker, in the 1980s.

- The Hazard Ranking System (HRS) score for the Site was determined using USEPA Superfund scoring guidelines, resulting in a score of 53.98. The HRS scoring reflects groundwater, surface water, and air pathways. The calculated Site score exceeds the 28.50 score typically used as a threshold to determine if Sites represent potentially significant risks to human health or the environment.

5.2 Recommendations

- A Site investigation is warranted to determine the nature and extent of contaminants of concern in groundwater, soil, and surface water, since past data are limited and do not adequately characterize the Site or risk to potential receptors.

- Re-score the Site based on the investigation results.

- Evaluate the need for removal and/or engineering and institutional controls to address the waste material remaining on the property.

6.0 CONTACT INFORMATION

Information contained in this report was obtained from the following sources:

1. USEPA Region III
2. Ms. Pamela Hayes, WVDEP
3. Kanawha County Tax Assessor's Office
4. WVDEP
5. WVGS
6. SRC, LLC
7. WVDHHR
8. Sources identified in the Bibliography

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7.0 REFERENCES

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