FINAL

HUMAN HEALTH RISK ASSESSMENT WORK PLAN

SONFORD CHEMICAL SITE
Flowood, Rankin County, Mississippi

USEPA Work Assignment 685-RICO-04J5
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Acronyms and Abbreviations

amsl	above mean sea level
ARAR	Applicable or Relevant and Appropriate Requirements
AT	Averaging Time
ATSDR	Agency for Toxic Substances Disease Registry
BW	Body weight
CalEPA	California Environmental Protection Agency
Cm^2	Square Centimeters
Cm/s	Centimeters per Second
CFWD	City of Flowood Water Department
COC	Chemical(s) of Concern
COPC	Chemical(s) of Potential Concern
CPWD	City of Pearl Water Department
CSF	Cancer Slope Factor
CSM	Conceptual Site Model
CT	Central Tendency
DDE	4, 4-p, p'-dichlorodiphenyldichoroethylene
DDT	4, 4-p, p'-dichloroediphenyltrichloroethylene
DI	Daily Intake
°	Degrees
ED	Exposure Duration
EF	Exposure Frequency
EPA	U.S. Environmental Protection Agency
EPC	Exposure Point Concentration
EPS	Environmental Protection Systems, Inc.
ESSV	Ecological Soil Screening Values
ET	Exposure Time
F	Fahrenheit
GAF	Gastrointestinal Absorption Aactor
HCDD	Hexachlorodibenzodioxin
HEAST	Health Effects Assessment Summary Table
HHRA	Human Health Risk Assessment
HI	Hazard Index
HIF	Human Intake Factor
HQ	Hazard Quotient
I	Intake
ILCR	Incremental Lifetime Cancer Risk
IRSE	Integrated Removal Site Evaluation
IRIS	Integrated Risk Information System
kg	kilogram
km	kilometer

Acronyms and Abbreviations (Continued)

LAI	Louisiana Agriclimatic Information
L/day	Liter per day
MBPC	Mississippi Bureau of Pollution Control
MCL	Maximum contaminant levels
MDEQ	Mississippi Department of Environmental Quality
MDNR	The Mississippi Department of Natural Resources
m^3	cubic meter
mg	milligram
mg/m^3	milligrams per cubic meter
mg/kg	milligrams per kilograms
mg/kg-day	milligrams per kilogram per day
mg/L	milligrams per liter
mg/m^3	milligrams per cubic meter
Φg/kg	micrograms per kilograms
Φg/L	micrograms per liter
$Φg/m^3$	micrograms per cubic meter
mph	Miles per hour
MRL	Minimal Risk Levels
NPL	National Priorities List
OCDD	Octachlorodibenzodioxin
OSRTI	Office of Superfund Remediation and Technology Innovation
OSWER	Office of Solid Waste and Emergency Response
PA	Preliminary Assessment
PA/SI	Preliminary Assessment/Site Investigation
PCP	Pentachlorophenol
PEF	Particulate emissions factor
ppm	Parts per million
PPRTV	Provisional Peer-Reviewed Toxicity Values
PRG	Preliminary Remedial Goals
PSS	Preliminary Scoring Strategy
RAGS	Risk Assessment for Superfund
RBC	Risk-Based Concentration
RBSC	Risk-Based Screening Concentration
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentration
RfD	Reference Dose
RFI	RCRA Facility Investigation
RGO	Remedial Goal Option
RME	Reasonable Maximum Exposure
SA	Surface Area

Acronyms and Abbreviations
(Continued)

SAS	Special Analytical Services
SESD	Science and Ecosystem Support Division
SeSV	Sediment Screening Value
SF	Slope Factor
SI	Site Investigation
Sonford	Sonford Chemical
SVOC	Semivolatile Organic Compound
TAL	Target Analyte List
TCDD	2,3,4,6-tetrachlorophenol, 2,4,5-trichlorophenol, tetrachlorodibenzodioxin
TCL	Target Compound List
TEQ	Toxic Equivalency Value
TIC	Tentatively Identified Compounds
UCL	Upper Confidence Limit
URF	Unit Risk Factor
VOC	Volatile Organic Compound
Weston	Weston Solutions, Inc.
WHO	World Health Organization
WO	Water+Organism

1.0 Introduction

This Human Health Risk Assessment (HHRA) Work Plan has been prepared in response to a request by EPA Region 4, under contract number 68-W-99-043, to conduct a Remedial Investigation/Feasibility Study (RI/FS) at the Sonford Chemical (Sonford) Site in Flowood, Rankin County, Mississippi, issued to Black & Veatch Special Projects Corp. (Black & Veatch) on July 13, 2006, by the U.S. Environmental Protection Agency Region 4 (EPA) (EPA, 2006a).

The purpose of this HHRA) Work Plan is to describe the protocol for evaluating risk to human health receptors associated with exposure to surface soil, subsurface soil, sediment, surface water, and groundwater at the Sonford site. The primary objective of the HHRA Work Plan is to provide risk-based information to be used as input for site management decisions.

This HHRA Work Plan is intended to provide general information about the technical approach that will be used to conduct the HHRA for the Sonford site. The HHRA will include all the equations and variables necessary for quality control and replication of computations used to calculate risks associated with the surface soil, subsurface soil, sediment, surface water, and groundwater at or near the site.

1.1 Site Location and Description

The Sonford site is located at 3506 Payne Drive, Flowood, Rankin County, Mississippi. The Sonford site consists of six acres currently being used for the construction of concrete and formerly fiberglass septic tanks. The septic tank construction operations are conducted by Lacey's Wastewater Treatment and Septic. The property currently contains a concrete pad, a shed, a concrete cistern, a building formerly used as the forming area for fiberglass septic tanks, three steel-beam framed structures with metal roofs, and one steel-beam framed structure. In addition to these structures, there is a multi-family residential structure containing approximately five apartment units located on the northeast portion of the site. A single-wide mobile home is located at the southeast corner of the site. In 2006, a total of five people resided on the Sonford property, three in the apartments and two in the mobile home [U.S. Environmental Protection Agency (EPA), 2005a; Black & Veatch, 2006a]. The general study area location is shown in Figure 1-1. The general site layout is shown in Figure 1-2.

1.1.1 Surrounding Land Use

The Sonford site is located at 506 Payne Drive, Flowood, Rankin County, Mississippi and is located within a mixed area of residential and commercial properties with vacant and wooded land. The coordinates of the center of the site are 32.29251 degrees (°) North latitude and 90.14222° West longitude (EPA, 2005b). The site is approximately six acres in size (EPA, 2005b).

The Sonford site is located within the Jackson Prairie Belt Physiographic Unit of the East Gulf Coastal Plain Physiographic Province of Mississippi (USDA, 1998; USGS, 1984; MGETS, 1971). In Rankin County, the East Gulf Coastal Plain ranges from gently rolling to steep with the elevation ranging from 220 to 612 feet above mean sea level (amsl). The soils at the Sonford site are composed of the Cascilla-Arkabutla soil group (nearly level, well-drained and somewhat poorly drained, silty soil) (USDA, 1998).

Beneath the alluvial soils in the area lay the Claiborne Group and the Wilcox Group. The Claiborne Group consists of multiple formations which, in descending order include, the Cockfield, Cook Mountain, Sparta Sand, Zilpha, Winona, and Tallahatta formations (MGS, 1985).

The Cockfield Formation is comprised of irregularly bedded laminated lignitic clay, sand, and lignite, which is slightly glauconitic (Pentecost, undated). The top of this formation is located at approximately 40 feet below the ground surface and ranges in thickness from 120 to 180 feet near the site (Pentecost, undated; Sistrunk, 1981).

The Cook Mountain Formation lies beneath the Cockfield and consists of marl, limestone, glauconitic sand, and chocolate colored clay (MGS, 1985). The Cook Mountain is approximately 220 feet thick in the area of the Sonford site (Pentecost, undated).

The Sparta Sand Formation, also known as the Kosciusko Formation, is comprised of an irregularly bedded sand with clay and some quartzite. The Sparta Sand is approximately 280 feet thick near the site, but reaches over 800 feet thick in southwestern Hinds County, west of the site (USGS, 1964; Pentecost, undated).

The Zilpha and Winona formations lie beneath the Sparta Sand and consist of a chocolate colored clay containing glauconitic sand (Zilpha) and a highly glauconitic clayey sand (Winona) (MGS, 1985). The Zilpha Formation ranges in thickness from 200 feet to 420 feet, while the Winona ranges in thickness from 10 feet to 65 feet (MGETS, 1971).

The Tallahatta Formation consists of glauconitic claystone and clay with lenses of sand and some sandstone (MGS, 1985).

The Wilcox Group, which underlies the Claiborne Group, contains irregularly bedded fine to coarse sand, lignitic clay and lignite (MGS, 1985). The Wilcox ranges in thickness from 1,100 feet to 2,830 feet in southern Rankin County (MGETS, 1971).

There are three aquifers in the area of the Sonford site that are currently available for water supplies. In descending stratgraphic order these aquifers are the Cockfield Formation, the Sparta Sand Formation and the Wilcox Group. These aquifers are part of the larger Eocene aquifer system in Mississippi. This system extends west, southwest and south and contains freshwater in approximately 50 percent of the State. These three aquifers are regional in extent and merge northward, with the exception of the Cockfield and the lower Wilcox, into a single aquifer south of Memphis, Tennessee (USGS, 1984).

Currently, the majority of local residences have their drinking water supplied to them from the City of Flowood Water Department (CFWD) and from the City of Pearl Water Department (CPWD). CFWD obtains its drinking water from six wells in the area, which are screened in the Cockfield Formation and the Sparta Sand (Weston, 2004a; Miller, 2003). The CPWD also obtains its drinking water from the Cockfield Formation and the Sparta Sand with eight wells (Jackson, 2005). Six of these wells (two from CFWD and four from CPWD) are located within a four-mile radius of the Sonford site. All six wells are screened in the Sparta Sand (Weston, 2004b; Jackson, 2005).

The Cockfield Formation is a major water supply source in the area. Water supplies for several small municipalities in the area are within the Cockfield, with some wells yielding as much as 500 gallons per minute (USGS, 1964). The top of the Cockfield is located beneath the alluvial soils at a depth of approximately 40 below the surface at the Sonford site. It ranges in thickness from 120 to 180 feet (USGS, 1964; Pentecost, undated; Sistrunk, 1981). The hydraulic

conductivity of the Cockfield is approximately 1 x 10^{-2} centimeters per second (cm/s) (Freeze and Cherry, 1979; Pentecost, undated). Underlying the Cockfield is the Cook Mountain Formation, which serves as a confining layer between the Cockfield and the Sparta Sand (USGS, 1964).

The Sparta Sand lies beneath the Cook Formation and is approximately 280 feet thick in the area of the site (USGS, 1964). The Sparta Sand has a hydraulic conductivity of approximately 1 x 10^{-2} cm/s and is the most extensively developed aquifer in the area of the site (Freeze and Cherry, 1979; USGS, 1964). The Sparta Sand is underlain by the Zilpha and Winona formations, which serve as the confining unit between the Sparta Sand and the Wilcox Group (USGS, 1964).

The Wilcox Group contains a large reserved of soft water, which has been used by a few small-supply wells. The water from the Wilcox is more mineralized and warmer than the water from the Cockfield and Sparta Sand. The water quality from the Wilcox is good in Madison and northern Rankin Counties, but deteriorates toward Hinds County to the west (USGS, 1964).

1.1.2 Climate

The area surrounding the site in Rankin County has a humid subtropical climate. The annual average temperature in the area near the site is 64 degrees Farenheit ($^{\circ}$ F). Average monthly temperatures range from a high of 85° F in July to a low of 70° F January. The average annual precipitation in the area is approximately 0.75 inches and the mean annual lake evaporation is 43 inches, yielding a net annual precipitation of 9 inches (USDC, 1983). The 2-year, 24-hour rainfall event for the area is approximately 3.8 inches (USDC, 1961).

1.2 Operational and Regulatory History

From 1972 to 1985, the site housed two separate chemical processing plants operated by Sonford International and Sonford Products. The operations of both companies involved turning pentachlorophenol (PCP) into liquid formulations. Sonford International operated at the site from 1972 to 1980 and produced a water-soluble product, sodium pentachlorophenate, used for the short-termed protection of wood products from mildew. Sonford Products operated at the site from 1980 to March 1985 (MBPC, 1989b). Sonford Products produced an oil-soluble PCP product used for the long-term protection of wood products. In addition to the PCP product Sonford Products also produced products for the control of pests and products to control the growth of mold and sap stains in freshly cut lumber (Weston, 2005b).

On September 12, 1978, the Mississippi Bureau of Pollution Control (MBPC) issued air permit No. 2380-00037-000 to Sonford International. This permit expired on July 12, 1980 (MBPC, 1980; MAPC, 1978).

In April 1980, the Sonford International facility closed because of allegations that an employee had died as the result of poisoning from high exposure levels of PCP (MBPC, 1989a; MBPC, 1985a).

On September 3, 1980, a Resource Conservation and Recovery Act (RCRA) Notification for a Part A permit was filed by Sonford Products, which resulted in the facility being classified as a RCRA generator where the hazardous wastes were required to be shipped off-site within 90 days (MBPC, 1980; EPA, 2003a).

The Mississippi Department of Environmental Quality (MDEQ) conducted a hazardous waste inspection on December 31, 1980, at the Sonford facility. This inspection identified waste and waste quantities generated during the facility's operations including 550 pounds of PCP and 6,000 pounds of sodium pentachlorophenate (MBPC, 1980). The waste product generated during the production of PCP was a sludge, which was stored in drums on the site and transported for disposal at Chemical Waste Management in Emelle, Alabama (MBPC, 1980). The sodium pentachlorophenate was also stored on site in drums and then transported to a Sonford facility in St. Paul, Minnesota for reuse (MBPC, 1980).

On June 4, 1982, Environmental Protection Systems, Inc. (EPS) sampled the process retort stack for PCP emissions at the site on behalf of Sonford Products. Three samples were collected over a period of 1.5 hours and contained concentrations of PCP ranging from 0.0699 parts per million (ppm) to 0.1375 ppm (EPS, 1982). Due to these results the Mississippi Department of Natural Resources (MDNR), on July 1, 1982, requested additional information regarding the increase in PCP concentrations in the air emissions (MDNR, 1982a). On October 19, 1982, MDNR required Sonford to conduct additional air testing and at least a ten-fold reduction of PCP in order to protect nearby residents (MDNR, 1982b). Sonford Products responded to MDNR on November 12, 1982, that they would install equipment to reduce the PCP emissions (Sonford, 1982).

On April 15, 1983, Sonford Products submitted to EPA a Pesticide Report for Pesticide-Producing Establishments (Sonford, 1983). Products listed as being produced by Sonford Products included Sta-Brite, Penta-Care Concentrate, Penta-Care Ready to Use, and SP-60 (Sonford, 1983).

A reactor containing glycol ether, sodium hydroxide, and tetrachlorophenol caught fire on June 14, 1983, and a vapor cloud from the burning chemicals migrated over the adjacent residential area (MDNR, 1983a). Local fire departments and a representative from the MDNR, MBPC responded to the fire at the Sonford site (MBPC, 1985a; 1989b; Bush, 1983). Reportedly the fire was due to human error. Directions for formulating "Starbright M" had not been followed and a large quantity of sodium hydroxide was added at an improper time (MDNR, 1983a).

On June 15, 1983, MBPC collected a total of nine soil samples at the Sonford site and surrounding properties. Four samples were collected onsite, four were collected from properties within the surrounding neighborhood, and one offsite background sample was collected. The samples were analyzed for PCP, 2,3,4,6-tetrachlorophenol, 2,4,5-trichlorophenol, tetrachlorodibenzodioxin (TCDD); hexachlorodibenzodioxin (HCDD); and octachlorodibenzodioxin (OCDD). Laboratory analysis detected chlorophenol compounds in the soil samples ranging from 0.01 ppm to 3,300 ppm. Several soil samples had concentrations of chlorophenol compounds significantly above the background concentration. OCDD concentrations ranged from non-detect to 1,910 parts per billion (ppb). The background sample contained no detectable concentrations for dioxin compounds (MDNR, 1983b).

MDNR issued Order No. 641-83 in July 1983 against Sonford Products for emitting contaminants to the air without a valid permit. MDNR instructed Sonford Products to cease the production of any products other than Penta-Care Concentrate 1-10, submit to MBPC a plan to reduce emissions from the PCP production process, and cease all operations on or before March 1, 1985 (MDNR, 1983c).

On February 5, 1985, the Mayor of the Town of Flowood required that Sonford Products cease and desist all operations in Flowood (Flynt, 1985).

Air emissions testing were conducted for Sonford Products on February 22, 1985, by Environmental Monitoring Laboratories in order to determine the amount of PCP emissions from

the scrubber (EML, 1985). A total of three samples were collected over a three hour period. All three samples has PCP concentrations of 0.02 ppm (EML, 1985).

On March 7, 1985, MDNR denied a request by Sonford Products to extend Order No. 641-83 to September 1, 1985. On March 14, 1985, MDNR inspected the Sonford site and confirmed that manufacturing and blending operations had ceased in accordance with Order No. 641-83 (MDNR, 1985b). On March 20, 1985, MDNR issued Order 843-85, which supported the denied request for an extension of Order 641-83. The new order also only allowed operations at the site be for the purpose of receiving, storing and selling packaged products; the carrying out of all other corporate activities that result in no environmental emissions; required the removal or sale of all materials stored in tanks or in bulk form and prohibited the additional storage of materials in storage tanks or in bulk form; the decontamination of the facility; relocate all activities, and evaluate the magnitude of decontamination needed as determined by MBPC (EPA, 1985).

On April 8, 1985, MBPC collected seven soil samples, one sediment sample and one surface water sample from the Sonford site, an adjacent palustrine forested wetland, and an area containing stagnant water on the western portion of the site. The purpose of this sampling event was to define the extent of contamination (USDI, 1974; MBPC, 1989a; MBPC, 1985c). PCP was detected in concentrations ranging from 1995 micrograms per kilogram (µg/kg) to 22,000,000 µg/kg (MBPC, 1985a).

On April 18, 1985, approximately 2,000 gallons of PCP were spilled into the wetland south of the property (USDI, 1974; EPA, 1985). MDNR responded to the spill and began remediation of the wetland area (USDI, 1974; Hancock, 1985). The wetland was contaminated with PCP, mercury, lindane, and phenylmercuric acetate. On April 21 and 22, 1985, EPA assumed responsibility for remediation at the Sonford site (USDI, 1974; MBPC, 1989a; EPA, 1985; MBPC, 1985c). Remediation of the wetland included the excavation and removal of approximately 2,500 cubic yards of impacted soils. The contaminated soils were transported to a chemical waste disposal facility in Emelle, Alabama. The remediation efforts also included the disposal of more that 10,000 gallons of oil and treating solution at an incinerator in South Carolina and the treatment and disposal of approximately 100,000 gallons of existing wastewater (EPA, 1985, ADEM, 1985). EPA remedial action for the 2,000 gallon PCP release was completed on May 10, 1985 (EPA, 1985).

On April 26, 1985, EPA issued Order No. 85-13-C to Sonford Products indicating that EPA had determined the potential of an imminent and substantial endangerment to the public health or welfare or the environment due to the release or the threat of a release of hazardous substances from Sonford Products (EPA, 1985). Sonford Products was required by the Order to assume responsibility of remediation activities by May 8, 1985, and complete the activities within 30 days; comply with federal, state and local laws; provide EPA with split samples upon request; assure site access to designated parties; ensure that all remedial action activities was performed by a qualified professional engineer or certified geologist with hazardous waste site cleanup experience and expertise; in accordance with EPA guidance use quality assurance/quality control and chain of custody procedures throughout all remedial action; and preserve all records developed pursuant to implementation of the Order for six years (EPA, 1985).

Three groundwater monitoring wells (SP-1 through SP-3) were installed at the Sonford site on May 9 and 10, 1985. These were installed for pre-remedial assessment purposes (EPA, 1985;,MDNR, 1985c). SP-1 was installed as a background well for comparison with SP-2 and SP-3. MBPC monitored and maintained the three wells (EPA, 1985).

In June of 1985, MBPC prepared a Preliminary Assessment (PA), which detailed site operations, releases, and response actions at the Sonford facility. The site was assessed as a medium priority for further inspection (MBPC, 1985a).

On July 10, 1985, a desktop Site Investigation (SI) was prepared by MBPC, which included documentation of site operations, past site activities, enforcement and response actions, and ownership data (MBPC, 1985c).

On July 16, 1985, a hearing was conducted by the MDNR Commission of Natural Resources to access Sonford Products with the following violations: discharging, without a permit, improperly treated wastewater on April 18, 1985; and, air pollution caused by the discharge of an odorous industrial solvent from the facility (MDNR, 1985d). No representative from Sonford Products attended the hearing. As a result of the violations Sonford Products was assessed a monetary penalty of $50,000 (MDNR, 1985d).

On July 17, 1985, MDNR issued Order 893-85 to Sonford Products. This Order addressed the April 18, 1985, wastewater discharge and air releases from the facility. It also documented the

hearing conducted on July 16, 1985, at which there was testimony given by MDPC representatives along with documentation, where a representative from Sonford Products failed to attend, and where Sonford Products was assessed a monetary penalty of $50,000 (MDNR, 1985e).

In November 1985, MPBC sampled monitoring wells SP-1 through SP-3 for extractable and inorganic compounds (MDNR, 1985f). Elevated levels, when compared with background levels, of inorganic compounds were detected in SP-2 and SP-3. Selenium was the only inorganic compound detected at a significantly elevated concentration. Selenium was detected in the background well (SP-1) at a concentration of 3 micrograms per liter (µg/L) and at a concentration of 48.1 µg/L in SP-2 (MDNR, 1985f).

MBPC collected three surface soil and two groundwater samples during April and May 1986 at the Sonford site (MDNR, 1986). The samples were analyzed for inorganic constituents. The groundwater sample did not have elevated inorganic constituents when compared to the background concentration. Inorganic constituents were detected in the soil samples but no background sample was collected for comparison (MDNR, 1986).

In September 1989, a PA Reassessment was prepared for the Sonford site by MBPC. No sampling occurred in preparation of this report but based upon previous sampling results from previous investigations MBPC recommended no further remedial action for the Sonford site (MPBC, 1989a.

From April 1985 until January 1989 the Sonford site was unoccupied. On January of 1989 Sunrise Truck Lines began leasing the property (Sonford, 1987; MBPC, 1989b) Sunrise Truck Lines transported non-food dry commodities, which was not stored on-site (MBPC, 1989a). It is unknown how long Sunrise Truck Line leased the property (MBPC, 1989a; MBPC, 1989b).

In 2004, Weston Solutions, Inc. (Weston) START-2 prepared a Preliminary Assessment/Site Investigation (PA/SI) for the Sonford site. The PA/SI was prepared in order to determine if the Sonford site had the potential to be placed on the National Priorities List (NPL). In 2003, as part of the PA/SI, EPA Region 4, US EPA Science and Ecosystem Support Division (SESD) collected six surface soil samples, three subsurface soil samples, three groundwater samples, and four sediment samples. SESD was unable to collect two additional surface soil, two subsurface

soil, and one groundwater sample originally scheduled for collection due to elevated levels of volatile organic compounds (VOCs) in the breathing zone (Weston, 2004b). In the samples that were collected elevated concentrations of inorganic constituents were detected. These included: cadmium, lead, nickel, mercury, and zinc (EPA, 2003b). Organic compounds detected in elevated concentrations included: PCP (170 µg/kg – 13,000 µg/kg), several pesticides including lindane (16 µg/kg – 230 µg/kg), and dioxins (EPA, 2003b).

In April 2005, Weston collected 24 surface soil, 18 subsurface soil, 6 groundwater, 8 sediment, and 6 surface water samples at the Sonford site as part of an Integrated Removal Site Evaluation (RSE) and Preliminary Scoring Strategy (PSS) (Weston, 2005b). Laboratory analysis detected several inorganic, volatile and extractable organic, pesticide, and dioxin and dibenzofuran compounds at elevated concentrations in samples collected from the former PCP processing area. The detected constituents included: acetone; aldrin; alpha chlordane; arsenic; barium; bis (2-ethylhexyl) phthalate; cadmium; chromium; copper; dichlorodiphenyldicholoethylene (DDD) dichlorophenylethylene (DDE); dichlorodiphenyltrichloroethylene (DDT); 2,4-dichlorophenol; dieldrin; endosulfan; mercury; gamma chlordane; manganese; PCP; toxaphene; vanadium; zinc; 2,3,7,8-Tetrachlorodibenzodioxin (2,3,7,8-TCDD); 1,2,3,7,8-Pentachlorodibenzodioxin (1,2,3,7,8-PeCDD); 1,2,3,7,8,9-Hexachlorodibenzodioxin (1,2,3,7,8,9-HxCDD); 2,3,7,8-Tetrachlorodibenzofuran (2,3,7,8-TCDF); 1,2,3,7,8-Pentachlorodibenzofuran (1,2,3,7,8-PeCDF); 1,2,3,4,7,8-Hexachlorodibenzodioxin (1,2,3,4,7,8-HxCDD); 1,2,3,6,7,8-Hexachlorodibenzodioxin (1,2,3,6,7,8-HxCDD); 1,2,3,4,7,8-Hexachlorodibenzofuran (1,2,3,4,7,8-HxCDF); 1,2,3,7,8,9-Hexachlorodibenzofuran (1,2,3,7,8,9-HxCDF); 1,2,3,4,6,7,8-Heptachlorodibenzodioxin (1,2,3,4,6,7,8-HpCDD); 1,2,3,4,6,7,8-Heptachlorodibenzofuran (1,2,3,4,6,7,8-HpCDF); 2,3,4,6,7,8-Hexachlorodibenzofuran (2,3,4,6,7,8-HxCDF); and, 1,2,3,4,7,8,9-Heptachlorodibenzofuran (1,2,3,4,7,8,9-HpCDF) (EPA, 2005). These analytical results are summarized in the tables from the report which are included as Appendix A.

During the 2005 sampling event conducted by Weston several inorganic, pesticides, and dioxin and dibenzofuran compounds were detected in a soil sample from stockpiled soil north of the former PCP and oil mixing area. These compounds included: lead; gamma chlordane; manganese; zinc; 2,3,7,8-TCDD; 1,2,3,7,8-PeCDD; 1,2,3,7,8,9-HxCDD; 2,3,7,8-TCDF; 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 1,2,3,4,7,8-HxCDF; 1,2,3,4,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDF; 1,2,3,4,6,7,8-HpCDD; 1,2,3,4,6,7,8-HpCDF; and1,2,3,4,7,8,9-HpCDF (EPA, 2005). Elevated levels of several inorganic, extractable, and dioxin and dibenzofuran compounds were

detected in a soil sample from stockpiled soil located south of the former PCP and oil mixing area. These compounds included: arsenic; chromium; fluoranthene; lead; toxaphene; vanadium; zinc; 2,3,7,8-TCDD; 1,2,3,7,8-PeCDD; 1,2,3,7,8,9-HxCDD; 2,3,7,8-TCDF; 1,2,3,7,8-PeCDF; 2,3,4,7,8-PeCDF; 1,2,3,4,7,8-HxCDF; 1,2,3,6,7,8-HxCDF; 1,2,3,7,8,9-HxCDF; 1,2,3,4,6,7,8-HpCDD; 1,2,3,4,6,7,8-HpCDF; and1,2,3,4,7,8,9-HpCDF (EPA, 2005). A soil sample collected from stockpiled soil located south of the current septic tank molding area contained elevated concentrations of several inorganic, pesticide, and dioxin and dibenzofuran compounds. These included: arsenic; chromium; DDT; iron; lead; PCP; vanadium; zinc; 1,2,3,7,8,9-HxCDD; 1,2,3,4,7,8-HxCDF; 1,2,3,4,6,7,8-HpCDD; 1,2,3,4,6,7,8-HpCDF; and1,2,3,4,7,8,9-HpCDF (EPA, 2005). These analytical results are summarized in the tables from the report which are included as Appendix A.

Summary tables including results and screening values of the surface soil, subsurface soil, sediment, surfaces water, and groundwater samples collected in 2003 and 2005 are presented as Tables 1-1, 1-2, 1-3, 1-4, and 1-5, respectively (EPA, 2003b; EPA, 2005).

(1) Surface soil samples were compared to EPA Region 9 Preliminary Remedial Goals (PRGs) for residential soil (EPA, 2004a) Elevated levels of the following contaminants were detected in the surface soil samples collected.

Dioxins/Furans: 2,3,7,8-TCDD and mammalian toxic equivalency value (TEQ) from World Health Organization (WHO) TEQ-98 (Van den Berg, M. et al., 1998).

Semivolatiles: benzo (a) pyrene; fluroanthene; hexachlorobenzene; PCP; phenanthrene; phenol; and pyrene.

Pesticides/Polychlorinated Biphenyls (PCBs): 4, 4-p, p'-dichlorodiphenyldichoroethylene (DDE); 4, 4-p, p'-dichloroediphenyltrichloroethylene (DDT); aldrin; alpha-BHC; beta-BHC; dieldrin; endrin; gamma-BHC; and toxaphene.

Metals: aluminum; arsenic; barium; chromium; copper; iron; lead; manganese; mercury; vanadium; and zinc.

(2) Subsurface soil samples were compared to EPA Region 9 PRGs for industrial soil (EPA, 2004b). Elevated levels of the following contaminants were detected in the subsurface soil samples collected.

Dioxins/Furans: 2,3,7,8-TCDD and mammalian TEQ (Van den Berg, M. et al., 1998).

Semivolatiles: 2,4,6-trichlorophenol and PCP.

Pesticides/Polychlorinated Biphenyls (PCBs): alpha-BHC and gamma-BHC.

Metals: arsenic.

(3) Groundwater samples were compared to EPA Region 9 PRGs for tap water (EPA, 2004a) and EPA drinking water maximum contaminant levels (MCLs) (EPA, 2002b). Elevated levels of the following contaminants were detected in the groundwater samples collected.

Dioxins/Furans: 2,3,7,8-TCDD and TEQ mammalian (Van den Berg, M. et al., 1998).

Semivolatiles: 2,4,6-trichlorophenol; 3-nitroaniline; bis(2-ethylhexyl)phthalate; isophorone; naphthalene; and PCP.

Volatiles: 1,2,4-trichlorobenzene; 1,4-dichlorobenzene; 4-methyl-2-pentanone; acetone; benzene; ethylbenzene; tetrachloroethene (PCE); and trichloroethene (TCE).

Pesticides/Polychlorinated Biphenyls (PCBs): alpha-BHC; gamma-BHC; and heptachlor epoxide.

Metals: aluminum; arsenic; chromium; copper; iron; manganese; thallium; and vanadium.

Surface water were compared to EPA Region 9 PRGs for tap water (EPA, 2004 and EPA Human Health for Consumption of Water+Organism (WO) (EPA, 2006b). Elevated levels of the following contaminants were detected in the groundwater samples collected.

Dioxins/Furans: 2,3,7,8-TCDD.

Semivolatiles: bis (2-ethylhexyl) phthalate; and PCP.

Volatiles: 1,4-dichlorobenzene.

Pesticides/Polychlorinated Biphenyls (PCBs): alpha-BHC; beta-BHC; delta-BHC; gamma-BHC; and heptachlor epoxide.

Metals: aluminum; cyanide; iron; lead; and manganese.

(4) Sediment samples were compared to EPA Region 9 PRGs for residential soil (EPA, 2004a) (EPA, 2004b). Elevated levels of the following contaminants were detected in the sediment collected.

Dioxins/Furans: 2,3,7,8-TCDD and mammalian TEQ (Van den Berg, M. et al., 1998).

Semivolatiles: benzo (a) pyrene; and PCP.

Pesticides/Polychlorinated Biphenyls (PCBs): 4,4-DDE; 4,4-DDT; and gamma-BHC.

Metals: arsenic; copper; iron; lead; manganese; and mercury.

1.3 Baseline Risk Assessment Protocol

This HHRA Work Plan is based on U.S. EPA guidance including, but not limited to, the following:

- *Risk Assessment Guidance for Superfund* (RAGS), Volume I, Human Health Evaluation Manual (Part A), Interim Final, Office of Emergency and Remedial Response, Washington, DC, /540/1-89/002 (EPA, 1989).

- *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual Supplemental Guidance, Standard Default Exposure Factors*, Interim Final, Office of Solid Waste and Emergency Response (OSWER), OSWER Directive: 9285.6-03. (EPA, 1991).

- *Guidance for Data Usability in Risk Assessment (Part A)*, Final, PB92-963356. Office of Emergency and Remedial Response, Washington, DC. April. (EPA, 1992)

- E*xposure Factors Handbook*, Office of Research and Development, EPA/600/P-95/002, August. (EPA, 1997).

- *Supplemental to RAGS: Region 4 Bulletins Human Health Risk Assessment Bulletins.* EPA Region 4, originally published November 1995, Website version last updated May 2000: http://www.epa.gov/region4/waste/oftecser/healtbul.htm. (EPA, 2000).

- *Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual, Part E,* Supplemental Guidance for Dermal Risk Assessment, Final, July. (EPA, 2004c).

- U.S. EPA 2004b, *Region 9 Preliminary Remediation Goals (PRGs) 2004*, Annual Update, San Francisco, California, October. (EPA, 2004b)

- Integrated Risk Information System (IRIS), On-line, National Center for Environmental Assessment, Cincinnati, Ohio. (EPA, 2006c)

1.4 Organization of the Baseline Risk Assessment

The HHRA will present the human health assessment methods used, results generated, and the interpretation of these results. The HHRA will be organized as follows:

- ***Introduction:*** Provides a brief description of the site, site issues, history, regulatory framework, and physical setting of the site. It also describes the protocol and organization of the HHRA.

- ***Data Collection and Evaluation:*** Identifies data sources, evaluates data quality, and identifies the chemicals present at the site that will be included in the risk assessment process. This step:

  $ gathers and analyzes relevant data;
  $ summarizes and tabulates the analytical data for each environmental medium;
  $ presents the screening values that are used in the risk assessment to select chemicals of potential concern (COPCs);
  $ presents the rationale for the selection of COPCs (based on a comparison with screening levels, etc.); and,
  $ identifies uncertainties associated with data evaluation.

- ***Exposure Assessment:*** Identifies receptors and pathways, describes and calculates exposure point concentrations (EPCs), selects exposure assumptions, and presents methods for calculating chemical intake rates.

- ***Toxicity Assessment:*** Involves the collection of quantitative and qualitative toxicity information and a determination of the appropriate values to be used.

- ***Risk Characterization:*** Describes quantitative methods for evaluating cancer risks and noncancer hazards, and presents quantitative results and remedial goal options (RGOs). It summarizes data evaluation, exposure assessment, and toxicity assessment. The risk characterization will identify and discuss contaminants and media of concern at the site. RGOs are developed based on receptors and exposure routes.

- ***Uncertainty Analysis:*** Identifies uncertainties in all phases of the HHRA and discusses their individual effects on the risk assessment results and interpretation. An uncertainty analysis is presented as a sub-section of each major section of the HHRA (e.g., data evaluation, exposure assessment, etc.).

- ***Conclusions:*** Summarizes the results of the risk characterization, with a sufficient level of elucidation addressing the effects that uncertainty may have on the results. Summary and discussion are focused on those results and issues that are most likely to directly affect site management decisions.

$ ***References:*** Provides a complete list of reference material used in preparation of the HHRA Work Plan.

2.0 Human Health Risk Assessment

2.1 Data Evaluation

Data used for the HHRA will consist of the analytical results from the surface soil, subsurface soil, sediment, surface water, and groundwater samples collected during the field investigations in 2003, 2005, and 2006 (pending). The data results for samples collected during previous investigations at the site in 1983 and 1985 were not deemed acceptable for inclusion in the HHRA. The results are considered outdated, conditions at the site have changed, and the quality of the data is lacking. The results from 1983 and 1985 will be used to provide historical information about contamination at the site.

A list of chemicals present in site samples will be compiled as a first step of the data evaluation. From this list, COPCs will be selected to be carried forward into the exposure assessment (Section 2.2). The processes of evaluating the data quality (Section 2.1.1) and identifying COPCs (Section 2.1.2) are described in the following subsections.

2.1.1 Evaluating Data Quality

In accordance with EPA guidance (EPA, 1989), the list of constituents selected for the quantitative HHRA for the Sonford site includes those that were:

$ Positively identified in at least one sample in a given medium, including (a) constituents with no qualifiers attached and (b) constituents with qualifiers attached that indicate known identity but uncertain concentration; and tentative identification and unknown concentrations.

$ Detected at levels significantly elevated above levels of the same chemicals detected in associated blank samples.

$ The samples included in Tables 1-1 through 1-5 will be used to conduct the HHRA for the Sonford site, in conjunction with samples collected during the scheduled 2006 field investigation.

Once the analytical data are obtained, the first step is to evaluate the data following procedures described in the EPA Guidance for Data Useability in Risk Assessments (EPA, 1992).

Evaluation under this guidance involves gathering the analytical data generated during site investigations and sorting the data by medium; evaluating analytical methods; evaluating the quality of data with respect to sample quantitation limits, qualifiers, and blanks; and producing a set of data that qualifies for use in the HHRA.

The analytical data will be subjected to a data validation process in accordance with the EPA Contract Laboratory Program National Functional Guidelines.

The analytical data may have qualifiers from the analytical laboratory quality control or from the data validation process that reflect the level of confidence in the data. Some of the more common qualifiers and their meanings are (EPA, 1989):

- U - Chemical was analyzed for but not detected; the associated value is the reporting limit.
- J - Value is estimated.
- R - Quality control indicates the data are unusable (chemical may or may not be present).
- N - The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification."

Data results flagged with the "J" qualifier will be used in the HHRA. However, "N" qualified data will be evaluated on a case-by-case basis to determine its suitability for use in the HHRA. None of the "R" qualified data will be used in the HHRA. The handling of "U" qualified data (nondetects) in the HHRA will be discussed in Section 2.2.4.1. The use of data with other less common qualifiers will also be evaluated on a case-by-case basis.

If a blank contains detectable levels of common laboratory contaminants (e.g., acetone, methyl ethyl ketone, phthalate esters, etc.), then the sample results will be retained for further consideration only if the concentrations in the sample exceeds ten times the maximum amount detected in any blank. If a blank contains detectable levels of uncommon laboratory contaminants, then the sample results will be retained for further consideration only if the concentrations in the sample exceed five times the maximum amount detected in any blank.

Tentatively identified compounds (TICs) will be evaluated as follows.

When only a few TICs are present compared to the target analyte list (TAL) and target compound list (TCL) chemicals, and no historical or other site information indicates that either a particular TIC may indeed be present at the site (e.g., because it may be a by-product of a chemical operation conducted when the site was active) or that the estimated concentration may be very high (i.e., the risk would be dominated by the TIC), then the TICs will not be included in the risk assessment. The Project Manager will be consulted about omitting TICs from the quantitative risk assessment and reasons for excluding TICs will be documented in the risk assessment report.

If many TICs are present relative to the TAL and TCL compounds identified, or if TIC concentrations appear high or site information indicates that TICs are indeed present, then further evaluation of TICs will be necessary. If sufficient time is available, special analytical services (SAS) will be used to confirm the identity and to positively and reliably measure the concentrations of TICs prior to their use in the risk assessment. If SAS methods to identify and measure TICs are unavailable, or if there is insufficient time to use SAS, then the TICs will be included as COPCs in the risk assessment and the uncertainty in both identity and concentration will be noted.

Any duplicate samples collected during the field investigations will be averaged to reduce the bias introduced when more than one sample is collected from any one location.

According to EPA Region 4 guidance, it is generally unnecessary to evaluate exposure to sediments covered by water; however, sediments in ditches, wetlands, and the intermittent streams or creeks should be considered as surface soil for the portion of the year the stream is without water (EPA, 2000).

Some of the surfaces at the site are covered with gravel. Therefore, in instances where a sample is collected beneath the gravel, the sample will be considered a subsurface soil sample.

2.1.2 Identification of COPCs

COPC identification is a screening process designed to focus the HHRA on the chemicals that may contribute significantly to overall risk. Only those analytes detected in at least one sample will be evaluated. Chemicals for which all samples yield nondetects are considered not to be present and, thus, are not evaluated. In this screening, chemical concentrations in environmental

media are compared to chemical- and medium-specific risk-based screening concentrations derived from standard exposure scenarios.

2.1.2.1 Risk-Based Screening. The maximum detected concentration is compared to the appropriate risk-based screening concentration (RBSC). If the maximum detected concentration of a chemical is less than or equal to its RBSC, the chemical in this medium is not considered further in the HHRA because it is very unlikely that chemical concentrations at or below the RBSCs would contribute significantly to risk or hazard. If the maximum detected concentration exceeds the RBSC, the chemical is considered to be a COPC.

RBSCs are derived from EPA Region 9 PRGs which are based on conservative, standard exposure assumptions (EPA, 2004b). PRGs for noncancer effects are calculated using a hazard quotient (HQ) of 1.0 and for carcinogenic effects are calculated using an incremental lifetime cancer risk (ILCR) of 1×10^{-6}. Soil RBSCs are based on the "integrated" residential soil PRG values and groundwater RBSCs are based on the household "tap water" PRG values. For cancer effects, the residential PRG values are used directly as RBSCs. Soil and groundwater RBSC values for noncancer effects are derived by multiplying the integrated residential soil and tap water PRG values by a factor of 0.1, respectively. This results in RBSC values associated with a HQ of 0.1, which is selected to provide additional protection for simultaneous exposure to multiple chemicals (EPA, 2000).

For chemicals with both carcinogenic and noncancer PRG values, the more conservative (health-protective) of the two values (the cancer-based risk-based concentration (RBC) or the noncancer-based value calculated using an HQ of 0.1) will be selected as the RBSC for the HHRA.

Essential nutrients such as calcium, chloride, iodine, magnesium, phosphorus, potassium, and sodium may be eliminated as COPCs, provided that their presence in a particular medium is judged to be unlikely to cause adverse effects on human health (EPA, 2000).

In accordance with EPA Region 4 guidance (EPA, 2000), the following screening criteria will be used to select or eliminate each chemical:

- Surface soil and dry sediment data concentrations of detected chemicals will be compared to the EPA Region 9 PRGs for residential soil (EPA, 2004b. If the maximum detected

concentration is less than a carcinogenic risk level of 1×10^{-6} or HQ of 0.1, the chemical will be eliminated from the COPC list (EPA, 2000).

- Subsurface soil data concentrations of detected chemicals will be compared to the EPA Region 9 PRGs for commercial/industrial (EPA, 2004b). If the maximum detected concentration is less than a carcinogenic risk level of 1×10^{-6} or HQ of 0.1, the chemical will be eliminated from the COPC list (EPA, 2000).

- Groundwater data concentrations will be compared to the EPA Region 9 PRGs for tap water (EPA, 2004b). If the maximum detected concentration is less than a carcinogenic risk level of 1×10^{-6} or HQ of 0.1, the chemical is eliminated from the COPC list (EPA, 2000).

- Surface water data will be compared to the National Recommended Water Quality Criteria – Human Health For Consumption of Water and Organism (EPA, 2006b).

- Inorganic chemicals will be eliminated from further consideration if the chemical is less than 2 times the background concentrations or considered to be an essential nutrient and have relatively low toxicity (i.e., calcium, magnesium, potassium, and sodium) (EPA, 2000).

2.1.3 Data Summary

The data evaluation will be presented for each medium in table format. These tables will include the following information:

- Exposure point.
- CAS number.
- Chemical name.
- Range of detected concentrations.
- Location of maximum concentration.
- Detection frequency.
- Range of detection limits.
- Concentration used for screening.
- Screening toxicity value.

- Potential Applicable or Relevant and Appropriate Requirements (ARAR).
- COPC flag.
- Rationale for contaminant selection or deletion.

2.2 Exposure Assessment

Exposure is the contact of a receptor with a chemical or physical agent. An exposure assessment estimates the type and magnitude of potential exposure of a receptor to COPCs found at or migrating from a site (EPA, 1989). The exposure pathways are included in Table 2-1 and the exposure assessment includes the following steps:

- Characterize the physical setting.
- Identify the contaminant sources, release mechanisms, and migration pathways.
- Identify the potentially exposed receptors.
- Identify the potential exposure pathways.
- Estimate exposure concentrations.
- Estimate chemical intakes or contact rates.

2.2.1 Conceptual Site Model

The conceptual site model (CSM) provides the basis for identifying and evaluating the potential risks to human health. The CSM, which is presented as Figure 2-1, includes the receptors appropriate for all plausible land-use scenarios and potential exposure pathways. It graphically presents all possible pathways by which a potential receptor may be exposed (including all source media, release and transport pathways, and exposure routes), facilitates consistent and comprehensive evaluation of risk to human health, and helps to prevent potential pathways from being overlooked. The elements of a CSM include:

$ Source.
$ Initially contaminated environmental medium.
$ Contaminant release mechanism.
$ Contaminant transport pathways.
$ Intermediate or transport media.
$ Exposure media.
$ Receptors.
$ Routes of exposure.

The receptors and pathways in Figure 2-1 reflect plausible scenarios developed from information regarding site background and history, topography, climate, and demographics.

2.2.2 Contaminant Sources, Release Mechanisms, and Migration Pathways

The CSM for the Sonford site, Figure 2-1, incorporates information on the potential chemical sources, affected media, release mechanisms, routes of migration, and known or potential human receptors. The purpose of the CSM is to provide a framework with which to identify potential exposure pathways occurring at the site.

An exposure pathway consists of four elements: (1) a source and mechanism of chemical release; (2) a retention or transport medium (or media in cases involving media transfer of chemicals); (3) a point of potential human contact with the contaminated medium; and (4) an exposure route (e.g., ingestion) at the contact point (EPA, 1989). When all of these elements are present, the pathway is considered complete. The assessment of pathways by which human receptors may be exposed to COPCs includes an examination of existing migration pathways (i.e., soil) and exposure routes (i.e., ingestion, dermal absorption), as well as those that may be reasonably expected in the future.

After the sources of COPCs were identified, the next step in the development of the conceptual model was to determine mechanisms of release to environmental media. The primary release mechanism was spills and leaks from leaching of contaminated waste stored onsite in storage tanks or in bulk form to the surface and subsurface surrounding the facility. Materials were also deposited in the wetlands. Secondary release mechanisms include surface runoff and infiltration. Percolation of rainwater through contaminant source areas and other contaminated subsurface soils may result in contaminants leaching into groundwater. Contaminated groundwater may discharge to surface water features on- and off-site, including nearby creeks, rivers, and lakes.

Contaminant sources, releases mechanisms, and migration pathways are presented in Figure 2-1.

2.2.3 Receptors and Exposure Pathway Descriptions

Receptors will be selected to represent the upper bound on exposure to all plausibly exposed groups of people at the Sonford site. Receptors that will be evaluated include current/future adolescent trespasser/visitor, current/future industrial worker (outdoor), current/future onsite and offsite residents and future construction worker.

The exposure models and assumptions are presented in Tables 2-2 through 2-13. Each table defines the exposure route variables and includes assumptions (i.e., exposure parameters) that will be used in the model for each scenario. Additional information regarding the assumptions is presented in the text. In the absence of site-specific exposure data, EPA's standard default assumptions (EPA, 1991; EPA, 1997) will be used to estimate reasonable maximum exposures (RME) for each receptor. EPA Region 4's Supplemental Guidance to RAGS (EPA, 2000) and RAGS Part E Supplemental Guidance for Dermal Assessment (EPA, 2004b) will also used, where appropriate.

Chronic daily intakes (DI) were calculated for each exposure route applicable to the current/future onsite and offsite adolescent trespasser/visitor, current and future onsite and offsite resident, current/future onsite worker, and future onsite construction worker. Chronic DIs was estimated separately for potential carcinogenic and noncarcinogenic health effects in accordance with EPA methodology (EPA, 1989).

The current/future onsite and offsite trespasser scenario assumed that an adolescent (age 7 to 16) periodically visits the site. A body weight (BW) of 45 kilograms (kg) was used for this scenario (EPA, 2000). While it is possible that both adults and adolescents may trespass at the site, the adolescent trespasser is considered to be the most sensitive receptor that would be expected to realistically trespass on a regular basis. It is assumed that an adult trespasser would result in similar or lower risks due to equal or less conservative exposure assumptions.

The current/future onsite and offsite residential scenario assumed that individuals live in the same residence for 30 years (EPA, 2000). In addition, it was assumed that residents take about two weeks of vacation per year, spending 350 days per year at home (EPA, 2000). Two age groups were evaluated: a child (age 1 to 6) and an adult; consequently, exposure durations of 6 and 24 years, respectively were used. A BW of 15 kg was used for a child resident while a BW of 70 kg was used for an adult resident (EPA, 1991a).

The current/future onsite worker scenario assumed that an individual works at the site for 25 years. This value represents the 95th percentile for time spent working at one location (EPA, 1997). It was further assumed that the onsite worker is at work 5 days a week for 50 weeks per year (250 days total) (EPA, 1997).

It was assumed that future onsite construction activities will need to occur at the site and would last for one year. Therefore, the future onsite construction worker scenario assumed that an individual works at the site 250 days (5 days a week for 50 weeks) for a period of one year. A BW of 70 kg was used for construction workers (EPA, 1991a).

The EPA has developed exposure algorithms for use in calculating RME chemical intakes through the exposure pathways and routes that are relevant for this site. These algorithms combine the chemical EPCs with potential pathways and route-specific parameters to produce RMEs that can be expected to occur at the site. Ultimately, these algorithms result in potential daily chemical intakes or doses which are expressed in terms of milligrams (mg) of chemical that could be taken into the body per kg of body weight per day (mg/kg-day).

The intent of RME assumptions is to estimate the highest exposure level that could reasonably be expected to occur, but not necessarily the worst possible case (EPA, 1989; 1991). It is interpreted as reflecting the 90 to 95th percentile on exposure. As a result, these estimates are not intended to represent a broadly defined population (EPA, 1989). In keeping with EPA (1991) guidance, variables chosen for a baseline RME scenario for contact rate, exposure frequency (EF) and exposure duration (ED) are generally upper-bound estimates. Other variables (e.g., BW) and surface area (SA) are generally central or average values.

The averaging time (AT) for noncancer evaluation is computed as the product of ED (in years) times 365 days per year, to estimate an average daily dose over the entire exposure period (EPA, 1989). For cancer evaluation, AT is computed as the product of 70 years, the assumed human lifetime, times 365 days per year, to estimate an average daily dose prorated over a lifetime.

2.2.4 Exposure Pathway Rationale

This narrative discusses the rationale for selection of exposure pathways for both the current and future exposure scenarios. Table 2-1 outlines the scenarios, exposure pathways, and routes of exposure that will be quantitatively or qualitatively evaluated in the HHRA.

As indicated on Table 2-1, inhalation of VOC is quantitatively evaluated; however, inhalation of fugitive dusts is only qualitatively evaluated for most receptors. The dispersive capacity of the atmosphere is of primary interest when estimating the potential atmospheric migration of site

emissions from contaminated surface soil. The following paragraphs contain a qualitative assessment of the potential to inhale emissions of COPCs from contaminated soil at the Sonford site.

It is possible that site-related COPCs may be released to the air from contaminated surface soil via two mechanisms: (1) volatilization of organic compounds and (2) particulate emissions during wind erosion events.

Organic compounds are divided into two categories - VOCs and semivolatile organic compounds (SVOC). Of these two categories, VOCs will volatilize the most readily. Very few low levels of VOCs were retained in subsurface soil at the Sonford site. Therefore, the construction worker will be evaluated for inhalation of surface and subsurface soil.

Entrainment in dust can be a transport mechanism for inorganic and organic compounds. Gravel covered surfaces, overgrown grassy areas, and wooded areas characterize many areas of the site. Such surfaces require high threshold wind speeds [wind speeds of approximately 22 miles per hour (mph)] for wind erosion to occur, and particulate emission rates tend to decay rapidly during an erosion event (EPA, 1985). The annual average wind speed for Newton, the city closest to Flowood is 3.9 mph (LAI, 2006). Therefore, it is unlikely that exposure via inhalation of fugitive dusts would present a significant exposure pathway at the Sonford site in Flowood, Mississippi.

Based on the above discussion, it is not assumed that particulate emissions from soil at Sonford would not constitute a significant exposure pathway under current or future exposure conditions. Therefore, the inhalation of particulate emissions from soil will not be quantitatively evaluated for adolescent trespasser, industrial worker (outdoor), or residents. However, due to intense contact with soil, inhalation of VOCs and particulates will be quantitatively evaluated for the construction worker.

VOCs were detected in the groundwater samples collected at the site, therefore, the onsite and offsite residents may be evaluated for inhalation and dermal contact with VOCs while showering.

2.2.5 Exposure Pathways and Routes

The following exposure pathways and exposure routes will be quantitatively evaluated in the HHRA.

2.2.5.1 Current/Future Onsite and Offsite Adolescent Visitor/Trespasser. The adolescent visitor/trespasser is assumed to be a developing child, ages 7 through 16 years, with an average BW of 45 kg throughout this 10-year exposure period (ED = 10 years). This receptor may live near the site, but not on the site. The adolescent visitor/trespasser is assumed to be exposed to contaminants in onsite surface soil/dry sediment via incidental ingestion and dermal contact. Visitors/trespassers may also be exposed to contaminants in onsite and offsite surface water via incidental ingestion.

2.2.5.2 Current/Future Onsite Industrial Worker (Outdoor). Septic tank construction activities are presently operating at the site. Also, other portions of the site may be re-developed for commercial/industrial use in the future. The future worker is assumed to be a 70 kg adult who spends 25 years working at the site (ED = 25 years), working 8 hours per day (exposure time (ET) = 8 hours/day), 250 days per year (EF = 250 days). The worker is assumed to be exposed to contaminants in onsite surface soil via incidental ingestion and dermal contact; onsite surface water via incidental ingestion; and onsite groundwater via incidental ingestion while working at the site.

2.2.5.3 Current/Future Onsite and Offsite Resident. Residents living at and near the site will be evaluated to estimate the upper-bound exposure. Onsite and offsite residents may be exposed to contaminants in surface water. Onsite and offsite residents may also be exposed to contaminants in surface soil and groundwater. Relevant pathways for residential exposure include incidental ingestion and with surface water; incidental ingestion and dermal contact with surface soil; and future ingestion and inhalation of and dermal contact with groundwater while showering.

2.2.5.4 Future Onsite Construction Worker. Portions of the site may be re-developed for residential/commercial/industrial use in the future. The future construction worker is assumed to be a 70 kg adult who spends 1 year working at the site (ED = 1 year), working 8 hours per day (ET = 8 hours/day), 250 days per year (EF = 250 days). The worker is assumed to be exposed to

contaminants in onsite surface soil and subsurface soil via incidental ingestion, dermal contact, and inhalation; and onsite groundwater via incidental ingestion while working at the site.

2.2.6 Exposure Assumptions

The following subsection presents the assumptions that were used to calculate chronic DIs (i.e., doses) of chemicals of potential concern for each receptor through the applicable exposure routes.

(1) Incidental Ingestion of Surface Soil/Dry Sediment. Incidental surface soil and dry sediment ingestion can result from placing soil-covered hands or objects in the mouth. Surface soil/dry sediment ingestion is a potential route of exposure for the current/future onsite trespasser, current/future onsite and offsite residents, current/future onsite industrial worker (outdoor), and future onsite construction worker.

A multi-family residential unit with approximately five apartment units is located on the northeast portion of the site. A single-wide mobile home is located on the southeast corner of the site. In 2006, a total of five people resided on the Sonford property, three in the apartments and two in the mobile home. Additional residential areas surround the site. The current/future onsite and offsite resident was assumed to be exposed to surface soil/dry sediment during outdoor activities, such as yard work or recreational activities. An exposure period of 350 days per year to surface soil/dry sediment was assumed (EPA, 1997). It has been estimated that children ages 1 to 6 incidentally ingest 200 mg of surface soil or dry sediment on a daily basis and that individuals over the age of 6 ingest 100 mg of surface soil/dry sediment per day (EPA, 1997). Therefore, residential exposure will be divided into two age groups to reflect these varying ingestion rates.

Access to the site is unrestricted and other features may make the site attractive to trespassers, particularly adolescents. Therefore, it was assumed that current/future onsite trespassers periodically visit the site. Site trespassers were assumed to ingest 100 mg of soil per day, the same rate that is specified for adults (EPA, 1997). In the absence of site-specific data regarding current and future exposure patterns, it was assumed that trespassers gain access to the site an average of 1 day a week, or 52 days per year.

Lacey's Wastewater Treatment Septic Company currently conducts septic tank construction operations at the site. The surface soil/dry sediment ingestion rate that was assumed for current/future onsite industrial workers (outdoor) was 100 mg per day, the soil ingestion rate recommended for workers (EPA, 1997). It was assumed that a current/future onsite industrial worker (outdoor) is exposed to COPCs in surface soil/dry sediment 5 days a week for 50 weeks per year (a total of 250 days per year) for 25 years.

It was assumed that a future onsite construction worker is exposed to COPCs in surface soil/subsurface soil/dry sediment 5 days a week for a period of one year (a total of 250 days). Due to intensive contact with soil during the initial phases of construction projects (e.g., installation of underground utilities, foundation installation), it was assumed that a future onsite construction worker ingests 330 mg/day - EPA Region 4's default soil ingestion rate for this receptor (EPA, 2001c).

(2) Dermal Absorption from Surface Soil/Dry Sediment. Dermal contact with surface soil/dry sediment could result in absorption of chemicals through the skin. Dermal absorption of chemicals from soil/dry sediment is a potential exposure route for the current/future onsite adolescent trespasser, current/future onsite and offsite residents, current/future onsite industrial worker (outdoor), and future onsite construction worker.

The exposed skin areas that were used to evaluate dermal contact with surface soil/dry sediment are outlined below:

- Current/Future Onsite Adolescent Trespasser/Visitor was based on the Soccer #1 activity and assumes face, hands, forearms, and lower legs [3,522 square centimeters (cm^2)] are exposed (EPA, 2004b).

- Current/Future Onsite and Offsite Adult Resident was based on Gardeners/Grounds Keeper activity and assumes face, forearms, hands, and lower legs (5,700cm^2)are exposed (EPA, 2004b).

- Current/Future Onsite and Offsite Child Resident was based on children playing in wet soil and assumes face, forearms, hands, lower legs, and feet (2,800 cm^2) are exposed (EPA 2004b).

- Current/Future Onsite Industrial Worker (Outdoor) was based on the adult male Utility Worker activity and assumes face, forearms, and hands (3,300 cm^2) are exposed (EPA, 2004b). It is expected that all other body areas will be covered while working on the site and that there is minimal contact with soil (EPA, 1997).

- Future Onsite Construction Worker was assumed to be 25 percent of the 50th percentile total body surface area of an adult male (5,000 cm2). This is the recommended value in US EPA's Exposure Factors Handbook for adults and outdoor soil (EPA, 1997).

In the absence of chemical-specific absorption factors, as recommended in the EPA Region 4 Guidance (EPA, 2000), absorption factors of 1.0 percent and 0.1 percent were used for organics and inorganics, respectively. EPA Region 4 guidance also recommends a range of 0.2 - 1.0 milligrams per square centimeter (mg/cm^2) for the soil to skin adherence factor (EPA, 2000). An adherence factor of 0.3 mg/cm^2 was used for the adolescent trespasser/visitor, a factor of 0.2 mg/cm^2 was used for the industrial worker (outdoor), and 1.0 mg/cm^2 was used for the adult and child residents.

(3) Inhalation of Particulate Emissions from Soil. Inhalation of particulate emissions from soil could occur during excavation and construction activities at the site. Inhalation of particulate emissions from surface and subsurface soil is a potential exposure route for the future onsite construction worker. It was assumed that a construction worker inhales site-related COPCs at a rate of 20 cubic meters (m^3) per day, 250 days per year, for a period of one year. It was also assumed that a particulate emissions factor (PEF) of 2.92E+06 would be appropriate for this site. The following equation was used to calculate the PEF (EPA, 2002d):

$$PEF_{sc} = Q/C_{sr} \times \frac{1}{F_D} \times \frac{T \times A_R}{\frac{2.6 \times (s/12)^{0.8} (W/3)^{0.4}}{(M_{dry}/0.2)^{0.3}} \times \left[\frac{(365-p)}{365}\right] \times 281.9 \times \Sigma VKT} \qquad \text{Eq. 2-1}$$

PEF_{sc} = Subchronic particulate emission factor for unpaved road traffic (cubic meters per kilogram; m^3/kg).

Q/C_{sr} = Inverse of 1-h. Average air concentration along a straight road segment bisecting a square site (g/m^2-s per kg/m^3). See Equation E-19, Default values for Mississippi, = 52.3115 g/m^2-s per kg/m^3

F_D = Dispersion correction factor (unitless). See Equation E-16. Assumed 365 days, = 0.1858.

T = Total time over which construction occurs = 31,536,000 seconds.

A_R = Surface area contaminated road segment (m^2), $A_R = L_R \times W_R \times 0.092903$ m^3/ft^2, = 678.3660 m^2.

s = Road surface silt content (percent; %); default = 8.5%

W = Mean vehicle weight (tons) = 8 tons.

M_{dry} = Road surface material moisture content under dry, uncontrolled conditions (%), default = 0.2%

p = Number of days per year with at least 0.01 inches of precipitation (Exhibit E-1) = 110 days per year.

$\Im VKT$ = Sum of fleet vehicle kilometers (km) traveled during the exposure duration = 868 km.

L_R = Length of road segment (feet; ft)

LR = square root of site surface contamination configured as a square = 365 ft.

W_R = Width of road segment (ft), default = 20ft.

(4) Incidental Ingestion of Surface Water. Incidental ingestion of surface water was evaluated for current/future onsite and offsite adolescent trespassers, current/future onsite residents, and current/future onsite outdoor workers. It was assumed that current/future onsite residents (child and adult) were exposed to surface water eight times (2 per week) per month during spring and summer (April-September) (48 days/year). It was assumed that current/future onsite and offsite trespassers are exposed to surface water in the area each time they visit the site, or 52 days per year. It was assumed that current/future onsite industrial worker's (outdoor) work day is 8 hours for 250 days/year with only ten minutes/day (0.16) of cleaning debris from surface water. Due to shallow water depths, it was assumed that the resident's and worker's exposure to the wetlands and ditches would be limited. Also, the trespasser's exposure to the wetlands, ditches, and Neely Creek is also limited due to shallow depths.

(5) Ingestion of Groundwater. Groundwater ingestion is considered to be a potential exposure route for future onsite residents, future onsite industrial workers (outdoor) and future onsite construction workers. The drinking water ingestion rates that were used for the residents (children and adults) assume that all daily water intakes occur at home. The drinking water ingestion rate for the adult resident is 2 liters per day (L/day) (EPA, 1991). It was assumed that the drinking water intake for children is 1 L/day. The drinking water ingestion intake used for workers assumed that one-half of the daily water intake, or 1 L/day, occurs at the workplace.

(6) Inhalation/Dermal Contact While Showering. VOCs may be released to indoor air through a variety of home activities, including showering, cooking, dish washing, and laundering clothes. Inhalation and dermal contact while showering were evaluated to account for doses of VOCs received from noningestion uses of water for future onsite and offsite adult and child residents. Some researchers believe that inhalation/dermal contact doses of VOCs through typical home use may be as great as or greater than doses from the ingestion of water. Based on experimental results for the transfer of trichloroethene from water to air in the shower stall, McKone and Knezovich (1991) report that inhalation/dermal exposures in showers could be equivalent to drinking water contact of one to four liters. In accordance with EPA Region 4 guidance (EPA, 2000), this risk assessment assumed that the dose from inhalation of and dermal contact with VOCs while showering was equivalent to an ingestion rate of 2 liters per day as described by McKone and Knezovich. Therefore, when calculating hazards and cancer risks for the inhalation/dermal pathways, the EPCs of each VOC and the intake are identical to the EPCs and intake for ingestion of groundwater.

2.2.7 Quantification of Exposure

The following basic equation will be used to calculate human intake of a COPC (EPA, 1989):

$$DI = C \times HIF \qquad \text{Eq. 2.2}$$

Where:

DI = Daily Intake (milligram of chemical per kg of body weight.

C = Concentration of the chemical in [milligram per kilogram (mg/kg) or milligram per liter (mg/L) parts per million (ppm)].

HIF = Human Intake Factor (kg of medium per kg body weight per day).

Each intake variable in the above equation has a range of values. The intake variable values for a given pathway will be selected so that the combination of intake variables results in an estimate of the RME that can be expected to occur (EPA, 1989). This section describes the method by which the exposure concentrations and the HIFs will be derived. Tables 2-2 through 2-13 present all chronic DI equations.

An example of how a HIF is derived is listed below:

$$\text{HIF for a child resident ingesting soil} = \frac{IR \times EF \times ED \times CF \times FI}{BW \times AT} \qquad \text{Eq. 2-3}$$

Where:

IR	=	Ingestion Rate of Soil	mg/day	200
EF	=	Exposure Frequency	days/year	350
ED	=	Exposure Duration	years	6
CF	=	Conversion Factor	kg/mg	10-6
FI	=	Fraction Ingested	unitless	1
BW	=	Body Weight	kg	15
AT-N	=	Averaging Time (Non-Cancer)	days	2,190

In this case, the HIF is 1.3E-05 mg/kg-day.

2.2.7.1 Exposure Point Concentrations. The concentration term used in the intake equations is an upper bound estimate of the arithmetic average concentration for a COPC based on a validated set of site sampling results. Ideally the exposure point concentration should be the true average concentration within an exposure unit. Due to the uncertainty associated with estimating the true average concentration at a site, the 95 percent upper confidence limit (UCL) of the arithmetic mean will be used for this variable (EPA, 1989). The 95 percent UCL and arithmetic mean concentrations for each COPC will be derived using the EPA ProUCL Software Version 3.0. The following procedures will be implemented prior to calculating the 95 percent UCL for the COPC:

- Duplicate samples will be averaged to reduce the bias introduced when more than one sample was available from any one location. If the difference between the sample and its duplicate is large, then the highest of the two samples will be used.

- Constituent concentrations reported as non-detect will be assumed to be equal to one-half the sample quantitation unit.

- Non-detects (analytical data with a "U" qualifier) will be omitted from the analysis if one-half the sample quantitation limit exceeds the maximum detected concentration for a given chemical. The remedial project manager will be notified if this situation presents itself.

$ The 95 percent UCL will not be calculated for data sets that contain less than 10 samples and a minimum of 7 concentrations are either not qualified or have "J", "I", or "T" qualifiers or more than 15 percent of the data set is reported as non-detect (UOF, 2005). The maximum detected concentration will be used in these instances or the risk management decision will be made to use another approved statistical method.

- The 95 percent UCL for dioxin/furan data will be derived for the toxic equivalent (TEQ) concentrations.

$ When the 95 percent UCL exceeds the maximum detected concentration, the maximum detected concentration will be used as the EPC.

$ Region 4 makes an exception to the use of the UCL as the EPC for groundwater (EPA, 2000). Groundwater EPCs should be the arithmetic average of the wells in the highly concentrated area of the plume (EPA, 2000). Also, it is unacceptable to use data from filtered groundwater samples in the HHRA (EPA, 1989).

2.3 Toxicity Evaluation

The purpose of the toxicity assessment is to identify the types of adverse health effects that a

COPC may potentially cause to define the relationship between the dose of a compound and the likelihood and magnitude of an adverse effect (response). Adverse effects are characterized by the EPA as carcinogenic and noncarcinogenic. Dose-response relationships are defined by the EPA for oral and inhalation exposures. Oral dose-response values will be used to derive appropriate dermal toxicity values.

The dose-response assessment evaluates the available toxicity information and quantitatively describes the relationship between the level of exposure (either from animal or human epidemiological studies) and the occurrence of an adverse health effect. This relationship is described by a cancer slope factor (CSF) or unit risk factor (URF) for carcinogens and a reference dose (RfD) or reference concentration (RfC) for systemic toxicants, collectively called toxicity values.

Toxicity is defined as the ability of a chemical to induce adverse effects in biological systems. The purpose of the toxicity assessment is two-fold:

- Identify the cancer and noncancer effects that may arise from exposure of humans to the COPCs (hazard assessment).

- Provide an estimate of the quantitative relationship between the magnitude and duration of exposure and the probability or severity of adverse effects (dose-response assessment).

The latter is accomplished by the derivation of cancer and noncancer toxicity values, as described in the following sections.

2.3.1 Cancer Evaluation

Few chemicals are known to exhibit carcinogenic effects in humans, but numerous chemicals are suspected to be human carcinogens. The evaluation of the potential carcinogenicity of a chemical includes both a qualitative and a quantitative aspect. The qualitative aspect is a weight-of-evidence evaluation of the likelihood that a chemical might induce cancer in humans. The EPA recognizes six weight-of-evidence group classifications for carcinogenicity:

- Group A - Human Carcinogen: human data are sufficient to identify the chemical as a human carcinogen.

- Group B1 - Probable Human Carcinogen: human data indicate that a causal association is credible, but alternative explanations cannot be dismissed.

- Group B2 - Probable Human Carcinogen: human data are insufficient to support a causal association, but testing data in animals support a causal association.

- Group C - Possible Human Carcinogen: human data are inadequate or lacking, but animal data suggest a causal association, although the studies have deficiencies that limit interpretation.

- Group D - Not Classifiable as to Human Carcinogenicity: human and animal data are lacking or inadequate.

- Group E - Evidence of Noncarcinogenicity to Humans: human data are negative or lacking, and adequate animal data indicate no association with cancer.

The toxicity value for carcinogenicity, called a cancer slope factor (SF) is an estimate of potency. The SF estimates an upper-bound probability of an individual developing cancer as a result of a lifetime of exposure to a particular level of a potential carcinogen. Potency estimates are developed only for chemicals in Groups A, B1, B2 and C, and only if the data are sufficient. The potency estimates are statistically derived from the dose-response curve, using the best human or animal study or studies of the chemical. Although human data are often considered to be more reliable than animal data because there is no need to extrapolate the results obtained in one species to another, most human studies have one or more of the following limitations:

- The duration of exposure is usually considerably less than lifetime.

- The concentration or dose of chemical to which the humans were exposed can be approximated only crudely, usually from historical data.

- Concurrent exposure to other chemicals frequently confounds interpretation.

- Data regarding other factors (e.g., tobacco, alcohol, illicit or medicinal drug use,

nutritional factors and dietary habits, heredity) are usually insufficient to eliminate confounding or quantify its effect on the results.

- Most epidemiologic studies are occupational investigations of workers, which may not accurately reflect the range of sensitivities of the general population.

- Most epidemiologic studies lack the statistical power (i.e., sample size) to detect a low, but chemical-related increased incidence of tumors.

Most potency estimates are derived from animal data, which present different limitations:

- It is necessary to extrapolate from results in animals to predict results in humans; usually done by estimating an equivalent human dose from the animal dose.

- The range of sensitivities arising from genotypic and phenotypic diversity in the human population is not reflected in the animal models ordinarily used in cancer studies.

- Usually very high doses of chemical are used, which may alter normal biology, creating a physiologically artificial state and introducing substantial uncertainty regarding the extrapolation to the low-dose range expected with environmental exposure.

- Individual studies vary in quality (e.g., duration of exposure, group size, scope of evaluation, adequacy of control groups, appropriateness of dose range, absence of concurrent disease, sufficient long-term survival to detect tumors with long induction or latency periods).

The SF is usually expressed as "extra risk" per unit dose; that is, the additional risk above background in a population corrected for background incidence. It is calculated by the equation:

$$SF = (p_{(d)} - p_{(0)}) / (1 - p_{(0)}) \qquad \text{Eq. 2.4}$$

Where:

SF = Cancer slope factor (mg/kg-day).

$p_{(d)}$ = The probability of developing the types of cancer associated with the

chemical at a dose of 1 mg/kg-day.

$p_{(0)}$ = The background probability of developing the types of cancer associated with the chemical at a dose of 0 mg/kg-day.

The SF is expressed as risk per mg/kg-day. In order to be appropriately conservative, the SF is usually the 95 percent upper bound on the slope of the dose-response curve extrapolated from high (experimental) doses to the low-dose range expected in environmental exposure scenarios. EPA assumes that there are no thresholds for carcinogenic expression; therefore, any exposure represents some quantifiable risk.

The oral SF is usually derived directly from the experimental dose data, because oral dose is usually expressed as mg/kg-day. When the test chemical was administered in the diet or drinking water, oral dose first must be estimated from data for the concentration of the test chemical in the food or water, food or water intake data, and BW data so that dose rates may be expressed as mg/kg-day.

The EPA IRIS (EPA, 2006c) expresses inhalation cancer potency as a URF based on concentration, or risk per microgram of chemical per cubic meter (m^3) of ambient air. Because cancer risk characterization requires a potency expressed as risk per mg/kg-day, the URF must be converted to the mathematical equivalent of an inhalation cancer SF, or risk per unit dose. Since the inhalation unit risk is based on continuous lifetime exposure of an adult human (assumed to inhale 20 m^3 of air per day and to weigh 70 kgs), the mathematical conversion consists of multiplying the unit risk [per microgram per cubic meter ($\Phi g/m^3$)] by 70 kgs and by 1,000 Φg/kg, and dividing the result by 20 cubic meters per day.

2.3.2 Evaluation of Noncancer Effects

Many chemicals, whether or not associated with carcinogenicity, are associated with noncarcinogenic effects. The evaluation of noncancer effects (EPA, 1989) involves:

- Qualitative identification of the adverse effect(s) associated with the chemical; these may differ depending on the duration (e.g., acute or chronic) or route (e.g., oral or inhalation) of exposure.

- Identification of the critical effect for each duration of exposure (i.e., the first adverse effect that occurs as dose is increased).

- Estimation of the threshold dose for the critical effect for each duration of exposure.
- Development of an uncertainty factor; i.e., quantification of the uncertainty associated with interspecies extrapolation, intraspecies variation in sensitivity, severity of the critical effect, slope of the dose-response curve, and deficiencies in the data base, in regard to developing a RfD for human exposure.
- Identification of the target organ for the critical effect for each route of exposure.

These information points are used to derive an exposure route- and duration-specific toxicity value called an RfD, expressed as mg/kg-day, which is considered to be the dose for humans, with uncertainty of an order of magnitude or greater, at which adverse effects are not expected to occur. Mathematically, it is estimated as the ratio of the threshold dose (usually a no-observed-adverse-effect level in study animals) to the uncertainty factor.

IRIS (EPA, 2006c) expresses the inhalation noncancer reference value as a RfC in units of milligrams per cubic meter (mg/m^3). Because noncancer risk characterization requires a reference value expressed as mg/kg-day, the RfC must be converted to an inhalation RfD. Since the inhalation RfC is based on continuous exposure of an adult human (assumed to inhale 20 cubic meters of air/day and to weigh 70 kgs), the mathematical conversion consists of multiplying the RfC (mg/m^3) by 20 m^3/day and dividing the result by 70 kgs.

2.3.3 Dermal Toxicity Values

Dermal RfDs and SFs are derived from the corresponding oral values, provided there is no evidence to suggest that dermal exposure induces exposure route-specific effects that are not appropriately modeled by oral exposure data. In the derivation of a dermal RfD, the oral RfD is multiplied by the gastrointestinal absorption factor (GAF), expressed as a decimal fraction. The resulting dermal RfD, therefore, is based on absorbed dose. The RfD based on absorbed dose is the appropriate value with which to compare a dermal dose, because dermal doses are expressed as absorbed rather than exposure doses. The dermal SF is derived by dividing the oral SF by the GAF. The oral SF is divided, rather than multiplied, by the GAF because SFs are expressed as reciprocal doses.

2.3.4 Target Organ Toxicity

As a matter of science policy, EPA (1989) assumes dose- and effect-additivity for

noncarcinogenic effects. This assumption provides the justification for adding the HQs or hazard indices (HI) in the risk characterization for noncancer effects resulting from exposure to multiple chemicals, pathways, or media. However, EPA (1989) acknowledges that adding all HQ or HI values may overestimate hazard, because the assumption of additivity is probably appropriate only for those chemicals that exert their toxicity by the same mechanism. HI and HQ values are described in Section 2.4.2 and are introduced here, because the application of hazard additivity hinges upon the following discussion.

Mechanism of toxicity data sufficient for predicting additivity with a high level of confidence is available for very few chemicals. In the absence of such data, EPA (1989) assumes that chemicals that act on the same target organ may do so by the same mechanism of toxicity, unless the data clearly indicate otherwise. That is, the target organ serves as a surrogate for mechanism of toxicity. When the sum of HI values for all media for a receptor exceeds 1 due to the contributions of several chemicals, it is appropriate to segregate the chemicals by route of exposure and mechanism of toxicity (i.e., target organ) and estimate separate HI values for each target organ.

As a practical matter, since human environmental exposures are likely to involve near- or sub-threshold doses, the target organs chosen for a given chemical are the ones associated with the critical effects. Target organs are also selected on the basis of duration of exposure (i.e., the target organs for chronic or subchronic exposure to low or moderate doses are selected rather than the target organs for acute exposure to high doses) and route of exposure. Because dermal RfD values are derived from oral RfD values, the target organs for oral exposure are adopted as the target organs for dermal exposure. For some chemicals, no target organ is identified. This occurs when no adverse effects are observed or when adverse effects such as reduced longevity or growth rate are not accompanied by recognized organ- or system-specific functional or morphologic alteration.

2.3.5 Sources of Toxicity Information

Toxicity values will be obtained from the following hierarchy of sources in accordance with the EPA Office of Superfund Remediation and Technology Innovation (OSRTI) (EPA, 2003c):

$ Tier 1 - Integrated Risk Information System (IRIS).

$ Tier 2 – Provisional Peer-Reviewed Toxicity Values (PPRTVs).

$ Tier 3 - Other (Peer Reviewed) Values, including: Agency for Toxic Substances Disease Registry (ATSDR) Minimal Risk Levels (MRLs); California Environmental Protection Agency (CalEPA) values; and Health Effects Assessment Summary Tables (HEAST).

All toxicity values, regardless of their source, will be evaluated for appropriateness for use in the HHRA. Tables that list the cancer and noncancer toxicity values, as well as other pertinent information will be included in the risk assessment. Toxicity profiles for the COPCs will also be included in the report.

2.4 Risk Characterization

Risk characterization is the process of applying numerical methods and professional judgment to determine the potential for adverse human health effects to result from the presence of site-specific contaminants. This is done by combining the intake rates estimated during the exposure assessment, with the appropriate toxicity information identified during the toxicity assessment. Noncancer hazards and cancer risks are characterized separately.

Quantitative expressions are calculated during risk characterization that describe the probability of developing cancer (ILCRs), or the nonprobabilistic comparison of estimated dose with a RfD for noncancer effects (HQs and HIs). Quantitative estimates are developed for individual chemicals, exposure pathways, exposure media, and source media for each receptor. These quantitative risk characterization expressions, in combination with qualitative information, are used to guide risk management decisions.

Generally, the risk characterization follows the methodology prescribed by EPA (1989), as modified by more recent information and guidance. EPA methods are appropriately designed to be health-protective, and tend to overestimate rather than underestimate risk.

2.4.1 Cancer Risk

The risk from exposure to potential chemical carcinogens is estimated as the probability of an individual developing cancer over a lifetime, and is the ILCR. In the low-dose range, which would be expected for most environmental exposures, cancer risk is estimated from the following linear equation (EPA, 1989):

$$ILCR = (I)\ (SF) \qquad \text{Eq. 2.5}$$

Where:

ILCR = Incremental lifetime cancer risk, a unitless expression of the probability of developing cancer, adjusted for background incidence, calculated.
I = Intake of chemical, averaged over 70 years (mg/kg-day).
SF = Cancer slope factor (per mg/kg-day).

The "I" term in Equation 2.5 is equivalent to the "DI" term (intake) in Equation 2.2.

The use of Equation 2.6 assumes that chemical carcinogenesis does not exhibit a threshold, and that the dose-response relationship is linear in the low dose range. Because this equation could generate theoretical cancer risks greater than 1 for high dose levels, it is considered to be inaccurate at cancer risks greater than 1 x 10^{-2}. In these cases, cancer risk is estimated by the one-hit model:

$$ILCR = 1 - e^{[(I)(SF)]} \qquad \text{Eq. 2.6}$$

where:

ILCR = Incremental lifetime cancer risk, a unitless expression of the probability of developing cancer, adjusted for background incidence, calculated.
$-e^{(I)(SF)}$ = The exponential of the negative of the risk calculated using Equation 2.9.

As a matter of policy, EPA considers the carcinogenic potency of simultaneous exposure to low doses of carcinogenic chemicals to be additive, regardless of the chemical's mechanisms of toxicity or sites (organs of the body) of action. Cancer risk arising from simultaneous exposure by a given pathway to multiple chemicals is estimated from the following equation:

$$Risk_p = ILCR_{(chem.1)} + ILCR_{(chem.2)} + \ldots ILCR_{(chem.3)} \qquad \text{Eq. 2.7}$$

where:

$Risk_p$ = Total pathway risk of cancer incidence, calculated.
$ILCR(chem_i)$ = Individual chemical cancer risk.

Cancer risk for a given receptor across pathways and across media is summed in the same manner.

Lifetime cancer risks in the range of 1×10^{-6} and 1×10^{-4} are generally regarded as acceptable (EPA, 2000); risks less than this range are regarded as negligible.

2.4.2 Noncancer Hazards of Chemicals

The hazards associated with noncancer effects of chemicals are evaluated by comparing an exposure level or intake with an RfD. The HQ, defined as the ratio of intake to RfD, is estimated as (EPA, 1989):

$$HQ = I / RfD \qquad \text{Eq. 2.8}$$

where:

HQ = Hazard quotient (unitless, calculated).
I = Intake of chemical averaged over subchronic or chronic exposure period (mg/kg-day).
RfD = Reference dose (mg/kg-day).

The I term in Equation 2.8 is equivalent to the "I" or "HIF" term (intake) in Equation 2.2.

As shown above, both "I" and the RfD are in units of mg/kg-day. The RfD has been developed to represent a dose rate unlikely to result in any adverse noncancer health effects, even to the most susceptible members of the population. Therefore, if "I" is equal to or less than the RfD (i.e., $HQ \leq 1$), adverse noncancer health effects are unlikely. HQ values exceeding 1 do not indicate that noncancer hazard is likely to occur, but rather that the occurrence of an adverse noncancer health effect can not be termed "unlikely." The HQ does not define a particular risk level, nor can it be used to infer information regarding a dose-response curve. That is, an HQ of 0.01 does not imply a 1 in 100 chance of an adverse effect, but indicates that the estimated intake is 100 times lower than the RfD. This approach is different from the probabilistic approach described in Section 2.4.1 to evaluate cancer risks.

In the case of simultaneous exposure of a receptor to several chemicals, an HI is calculated as the sum of the HQs by:

$$HI = I_1 / RfD_1 + I_2 / RfD_2 + \ldots I_i / RfD_i \qquad \text{Eq. 2.9}$$

where:

HI = Hazard index (unitless, calculated).
I_i = Intake for the i^{th} toxicant.
RfD_i = Reference dose for the i^{th} toxicant.

If an HI for a given pathway exceeds 1, individual HI values may be calculated for each target organ associated with COPC in that pathway, as discussed in Section 2.3.4. These are calculated as described in the equation below:

$$HI_{Organ} = I_{Organ\text{-}1} / RfD_{Organ\text{-}1} + I_{Organ\text{-}2} / RfD_{Organ\text{-}2} + \ldots I_{Organ\text{-}i} / RfD_{Organ\text{-}i} \qquad \text{Eq. 2.10}$$

where:

HI_{Organ} = Hazard index (unitless, calculated) associated with a given target organ.
I_i = Intake for the i^{th} toxicant associated with a given target organ.
$RfD_{Organ\text{-}i}$ = Reference dose for the i^{th} toxicant affecting a given target organ.

2.4.3 Risk Characterization Results

Risk characterization results will be presented in tables and discussed in text. Results are presented separately for cancer and adverse noncancer effects using the methods described in Sections 2.4.1 and 2.4.2, and discussed for each receptor and environmental medium. Detailed spreadsheet calculations will be appended to the HHRA.

2.5 Remedial Goal Option Development

Region 4 requires development of risk-based RGOs as part of the HHRA (EPA, 2000). RGOs

are site-specific risk-based concentrations that are back-calculated from the HHRA exposure and toxicity input assumptions at specified target risk or hazard levels. Therefore, risk-based RGOs are source medium-, receptor-, and chemical-specific.

2.5.1 Selection of Chemicals of Concern

The first step in RGO development is selection of chemicals of concern (COC). Either of the following two conditions results in designation of a COPC as a COC:

- The concentration of the COPC exceeds its medium-specific applicable or relevant and appropriate requirements.

- The COPC contributes significantly to unacceptable cancer risk (total site-related ILCR greater than 1 x 10^{-4}) or hazard (total site-related HI greater than 1).

Significant contribution to cancer risk is defined as contributing an ILCR across all exposure pathways for a given source medium exceeding 1 x 10^{-6}; significant contribution to hazard is defined as contributing an HI across all exposure pathways for a given source medium exceeding 0.1. The COC, therefore, may be selected because of their cancer risk (cancer COPC) or noncancer hazard (noncancer COPC). The RGO estimation process for all the receptors, source media and exposure pathways is described in the following section.

2.5.2 Remedial Goal Options Estimation Methodology

Cancer and noncancer RGOs are calculated for each medium in which COCs are identified. Medium-specific RGOs are calculated for each receptor across all applicable exposure routes. RGOs for cancer for a receptor and medium are calculated by the following equation (EPA, 2000):

$$RGO_{coc} = \frac{EPC_{coc}\ TR}{ILCR_{coc}}$$

Eq. 2.11

where:

RGO_{coc} = Remedial goal option for a given COC, receptor and source medium,

calculated [mg/kg or micrograms per liter (Φg/L)].

EPC_{coc} = Exposure point concentration of the COC in the given medium (mg/kg or Φg/L).

TR = Target risk level (1×10^{-6}, 1×10^{-5}, 1×10^{-4}).

$ILCR_{coc}$ = Total incremental lifetime cancer risk for the COC, for a given receptor added across all exposure routes for a given source medium.

RGOs for noncancer COC are estimated as follows:

$$RGO_{coc} = \frac{EPC_{coc} \; THI}{ILCR_{COC}} \qquad \text{Eq. 2.12}$$

where:

RGO_{coc} = Remedial goal option for a given COC, receptor and source medium, calculated (mg/kg or Φg/L).

EPC_{coc} = Exposure point concentration of the COC in the given medium (mg/kg or Φg/L).

THI = Target hazard index (0.1, 1, 3).

HI_{coc} = Total hazard index for the COC, for the receptor across all routes for given source medium.

The range of RGOs for each COC, for a given receptor and medium, are based on target risk values of 10^{-6}, 10^{-5}, 10^{-4} and target HI values of 0.1, 1, and 3 (EPA, 2000).

2.6 Uncertainty Analysis

The primary objective of the HHRA is to characterize and quantify potential human health risks. However, these risks are estimated using incomplete and imperfect information that introduces uncertainties at various stages of the risk assessment process. Uncertainties associated with earlier stages of the risk assessment become magnified when they are concatenated with other uncertainties in the latter stages.

The chief goal of the uncertainty analysis is to evaluate uncertainties and present them in context of their potential impact on the interpretation of the HHRA results and the types of environmental management decisions that may be based on these results. Although the HHRA will include generic uncertainties that are common to human health risk assessment protocols

(e.g., additivity of health effects in the risk characterization), the uncertainty analysis will focus on those uncertainties that are peculiar to the Sonford site and assumptions made in the HHRA.

2.6.1 Types of Uncertainty

Uncertainties in risk assessment are categorized into two general types: 1) variability inherent in the (true) heterogeneity of the data set, measurement precision, and measurement accuracy; and 2) uncertainty that arises from data gaps.

Estimates of the degree of variability tend to decrease as the sample size increases. This is because larger data sets are less impacted by individual samples/measurements and typically allow for greater accuracy. Uncertainty that arises from data gaps is addressed by applying models and assumptions. Models are applied because they represent a level of understanding to address certain exposure parameters that are impractical or impossible to measure (e.g., COPC concentrations in shower room air). Assumptions represent an educated estimate to address information that is not available (e.g., surface water ingestion rates, additivity of carcinogenic effects).

2.6.2 Sources of Uncertainty

A discussion will be provided to describe an overview of general sources of uncertainty and focus on those most likely to affect the interpretation of the HHRA results. These sources may include, but are not limited to, the following:

- Representativeness of samples.
- Sampling methods.
- Background concentrations.
- Laboratory procedures.
- Land-use assumptions.
- Routes of exposure.
- Estimation of EPCs.
- Exposure assessment values.
- Toxicity values.
- Interactions of multiple contaminants.

The HHRA conducted for the Sonford site will identify and describe the associated unique set of

uncertainties. Special attention will be given to those uncertainties that are thought to have the most significant impact on interpretation of risk estimates and remediation decisions.

EPA (1992b) guidance urges risk assessors to address or provide descriptions of individual risk to include the "high end" portions and "central tendency (CT)" of the risk distribution. One way of fulfilling this request, if either cancer or noncancer risk exceed generally acceptable limits (cancer risk greater than 1×10^{-4} or target organ-specific HI greater than 1), is to re-compute the ILCRs or HIs using CT values for as many intake model variables as possible. In contrast to the RME evaluation, which uses upper-end values for intake or contact rates, EF and ED, the CT evaluation chooses average or mid-range values for these variables (EPA, 1991). The intent is to provide perspective for risk managers. A CT will be included in the uncertainty section of the risk characterization.

2.7 Human Health Risk Conclusions

The HHRA will include a brief section that will summarize the results of the risk characterization, with a sufficient level of elucidation addressing the effects that uncertainties may have on these results. The goal is to present the HHRA in a context that is most appropriate for the support of environmental decision-making.

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TABLES

Table 1-1
Surface Soil Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Reg 9 PRG	Reg 4 SS SV	SO08SB_0403 Apr-03	SP009SS_0406 Apr-05	SP01SS_0405 Apr-05 Background	SP02DSS_0405 Apr-05	SP02SS_0403 Apr-03	SP02SS_0405 Apr-05	SP03SS_0405 Apr-05	SP04SS_0403 Apr-03
DIOXINS (ng/kg)										
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	NE	NE	NA	NA	74	66000 J	35000	27000 J	62000 J	220000 J
1,2,3,4,6,7,8-Heptachlorodibenzofuran	NE	NE	NA	NA	4.2	22000	12000	9200	15000 J	56000
1,2,3,4,7,8,9-Heptachlorodibenzofuran	NE	NE	NA	NA	0.85 U	2200	1200	890	1200	6800
1,2,3,4,7,8-Hexachlorodibenzodioxin	NE	NE	NA	NA	1 J	1800	410 J	900	1400	7300 J
1,2,3,4,7,8-Hexachlorodibenzofuran	NE	NE	NA	NA	0.6 U	2000	1100 J	970	1200	8500 J
1,2,3,6,7,8-Hexachlorodibenzodioxin	NE	NE	NA	NA	2.1 J	5900	2100	2800	3900	18000 J
1,2,3,6,7,8-Hexachlorodibenzofuran	NE	NE	NA	NA	0.58 U	1600	570	740	980	3200 J
1,2,3,7,8,9-Hexachlorodibenzodioxin	NE	NE	NA	NA	2.9	3900	1000	1500	2800	22000 J
1,2,3,7,8,9-Hexachlorodibenzofuran	NE	NE	NA	NA	0.85 U	780	220 U	350	360	760 J
1,2,3,7,8-Pentachlorodibenzodioxin	NE	NE	NA	NA	0.64 U	1600	170 U	1300	860	4900
1,2,3,7,8-Pentachlorodibenzofuran	NE	NE	NA	NA	0.25 U	350	130 U	300	210	1400 U
2,3,4,6,7,8-Hexachlorodibenzofuran	NE	NE	NA	NA	0.66 J	2500	330 UJ	1200	1500	1900 J
2,3,4,7,8-Pentachlorodibenzofuran	NE	NE	NA	NA	0.4 U	640	120 U	580	360	1400
2,3,7,8-Tetrachlorodibenzodioxin	**3.9**	NE	NA	NA	0.7 U	**130**	90 U	**120**	**52**	750 UJ
2,3,7,8-Tetrachlorodibenzofuran	NE	NE	NA	NA	0.41 U	59	140 U	57	36	280 J
Heptachlorodibenzodioxin (Total)	NE	NE	NA	NA	180 J	110000 J	58000 J	45000 J	110000 J	390000 J
Heptachlorodibenzofuran (Total)	NE	NE	NA	NA	11 J	67000 J	45000 J	26000 J	43000 J	230000 J
Hexachlorodibenzodioxin (Total)	NE	NE	NA	NA	35 J	36000 J	7200 J	15000 J	26000 J	190000 J
Hexachlorodibenzofuran (Total)	NE	NE	NA	NA	4.4 J	53000 J	17000 J	23000 J	32000 J	140000 J
Octachlorodibenzodioxin	NE	NE	NA	NA	3500	210000 J	530000 J	110000 J	190000 J	3300000 J
Octachlorodibenzofuran	NE	NE	NA	NA	6.4 U	25000 J	31000	9400 J	11000 J	170000
Pentachlorodibenzodioxin (Total)	NE	NE	NA	NA	1.3 J	6800 J	170 UJ	8100 J	4200 J	75000 J
Pentachlorodibenzofuran (Total)	NE	NE	NA	NA	2.6 J	18000 J	32000 J	14000 J	10000 J	2400000 J
Percent Moisture	NE	NE	NA	NA	14	26	8	30	35	4
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	NE	NE	NA	NA	3.3 J	4000 J	NA	2800	2400 J	NA
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	NE	NE	NA	NA	2.9 J	4100 J	NA	2700	2500 J	NA
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	**0.0039**	NE	NA	NA	**3.6 J**	**4800 J**	NA	**3000**	**3100 J**	NA
TEQ (Toxic. Equiv. Value, From I-Tef/89)	NE	**2.5**	NA	NA	NA	NA	**1600 J**	NA	NA	**16000 J**
Tetrachlorodibenzodioxin (Total)	NE	NE	NA	NA	0.85 J	1300 J	90 UJ	1300 J	350 J	28000 J
Tetrachlorodibenzofuran (Total)	NE	NE	NA	NA	0.41 UJ	2900 J	4800 J	2700 J	2200 J	2200 J
EXTRACTABLES (ug/kg)										
(3-and/or 4-)Methylphenol	NE	NE	NA	450 U	380 U	470 U	180 U	520 U	460 U	170 U
1,2,4-Trichlorobenzene	**6200**	NE	NA	NA	NA	NA	28 J	NA	NA	120 J
2,3,4,6-Tetrachlorophenol	180000	**20000**	NA	NA	NA	NA	1100	NA	NA	130 J
2,4,5-Trichlorophenol	610000	**4000**	NA	1100 U	950 U	1200 U	180 U	1300 U	1100 U	170 U
2,4,6-Trichlorophenol	**610**	10000	NA	270 J	380 U	470 U	180 U	520 U	460 U	170 U
2,4-Dichlorophenol	**18000**	NE	NA	380 J	380 U	470 U	180 U	520 U	460 U	170 U
2-Methylnaphthalene	NE	NE	NA	450 U	380 U	470 U	180 U	520 U	460 U	170 U
Acenaphthene	370000	**20000**	NA	450 U	380 U	470 U	18 U	520 U	460 U	15 J
Acenaphthylene	NE	NE	NA	450 U	380 U	470 U	18 U	520 U	460 U	17 U
Acetophenone	NE	NE	NA	450 U	380 U	470 U	180 U	520 U	460 U	17 U
Anthracene	2200000	**100**	NA	450 U	380 U	110 J	180 U	520 U	460 U	170 U
Benzaldehyde	**610000**	NE	NA	450 U	380 U	470 U	18 U	520 U	460 U	5.1 J
Benzo(a)anthracene	**620**	NE	NA	450 U	380 U	850 J	180 U	330 J	460 U	33 J
Benzo(a)pyrene	**62**	100	NA	450 U	380 U	470 U	18 U	520 U	47 J	7.5 J
Benzo(b)fluoranthene	**620**	NE	NA	450 U	380 U	470 U	18 U	520 U	460 U	8.8 J
Benzo(g,h,i)perylene	NE	NE	NA	450 U	380 U	470 U	18 U	520 U	460 U	22
Benzo(k)fluoranthene	**6200**	NE	NA	450 U	380 U	470 U	18 U	520 U	460 U	8.2 J

Table 1-1
Surface Soil Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Reg 9 PRG	Reg 4 SS SV	SO08SB_0403 Apr-03	SP009SS_0405 Apr-05	SP01SS_0405 Apr-05 Background	SP02DSS_0405 Apr-05	SP02SS_0403 Apr-03	SP02SS_0405 Apr-05	SP03SS_0405 Apr-05	SP04SS_0403 Apr-03
Bis(2-ethylhexyl)phthalate	35000	NE	NA	1200	380 U	470 U	180 U	520 U	460 U	170 U
Butylbenzylphthalate	12000000	NE	NA	450 U	380 U	470 U	1000	520 U	460 U	170 U
Carbazole	24000	NE	NA	450 U	380 U	470 U	180 U	520 U	460 U	170 U
Chrysene	62000	NE	NA	450 U	380 U	470 U	18 U	520 U	54 J	23
Dibenzofuran	15000	NE	NA	450 U	380 U	470 U	180 U	520 U	460 U	170 U
Fluoranthene	230000	100	NA	450 U	380 U	470 U	18 U	520 U	70 J	34
Fluorene	270000	30000	NA	450 U	380 U	470 U	18 U	520 U	460 U	17 U
Hexachlorobenzene	300	2.5	NA	1400	380 U	470 U	180 U	520 U	460 U	60 J
Indeno(1,2,3-cd)pyrene	620	NE	NA	450 U	380 U	470 U	180 U	520 U	460 U	7.8 J
Naphthalene	5600	100	NA	450 U	380 U	470 U	18 U	520 U	460 U	51
Pyrene	230000	100	NA	56 J	380 U	470 U	18 U	520 U	78 J	17
VOLATILES (ug/kg)										
1,3,5-Trimethylbenzene	2100	NE	0.57 J	NA	NA	NA	1 U	NA	NA	1.3 U
Acetone	1400000	NE	64 UJ	11 U	10 U	17 U	26 UJ	13 U	20 U	32 UJ
Toluene	520000	50	0.98 U	11 U	10 U	3 J	1 U	13 U	3 J	1.3 U
METALS (mg/kg)										
Aluminum	7600	50	NA	4700	3800	5400	2000	7700	3800	2700
Antimony	3.1	3.5	NA	1.1 J	7.2 U	0.76 UJ	0.25 U	0.89 UJ	0.89 UJ	0.25 U
Arsenic	0.39	10	NA	6	1.8	2.5	1.6	8.2	6.2	1.9
Barium	540	165	NA	130	39	110	13	280	39	69
Beryllium	15	1.1	NA	0.15 J	0.19 UJ	0.19 UJ	0.3 U	0.33 UJ	0.16 UJ	0.3 U
Cadmium	3.7	1.6	NA	1	0.6 U	0.17 UJ	0.12 U	0.21 UJ	0.21 UJ	0.19
Calcium	NE	NE	NA	19000 J	520 J	29000 J	1000	38000 J	8500 J	3600
Chromium	30	0.4	NA	13	4.5	9.6	5.8	13	12	6.5
Cobalt	900	20	NA	4.3 J	1.2 UJ	2.7 UJ	0.67	7 UJ	2.5 UJ	2.2
Copper	310	40	NA	53 J	3.7	13	3	17	23	9.2
Iron	2300	50	NA	13000	5300	6300	5900	11000	8400	6200
Lead	400	50	NA	390	6.9	76	150	99	55	310
Magnesium	NE	NE	NA	1700	350 J	1700	270	2100	550 J	500
Manganese	180	100	NA	200	69	220	39	1300	160	120
Mercury	0.61	0.1	NA	8.4	0.01 UJ	0.02 UJ	0.49	0.04 UJ	0.02 UJ	0.12 A
Molybdenum	39	2	NA	NA	NA	NA	0.5 U	NA	NA	0.5 U
Nickel	160	30	NA	8.4	2 UJ	6.2	1	9.2	6.5	3.7
Potassium	NE	NE	NA	700 J	210 J	450 J	200 U	580 J	420 J	220
Selenium	39	0.81	NA	4.4 U	4.2 U	0.52 R	0.5 U	5.4 U	5 U	0.5 U
Silver	39	2	NA	0.33 R	0.21 R	1.2 U	0.5 U	1.5 U	1.4 U	0.5 U
Sodium	NE	NE	NA	1200	140 UJ	240 J	200 U	310 J	300 J	200 U
Strontium	4700	NE	NA	NA	NA	NA	4.6	NA	NA	11
Tin	4700	53	NA	NA	NA	NA	2.5 U	NA	NA	2.7
Titanium	10000	1000	NA	NA	NA	NA	30	NA	NA	39
Vanadium	78	2	NA	13	6.5	15	11	26	15	10
Yttrium	NE	NE	NA	NA	NA	NA	1.9	NA	NA	2.4
Zinc	2300	50	NA	520	15	79	99	95	99	150
PESTICIDES/PCB (ug/kg)										
4,4'-DDD	2400	NE	NA	1200 N	3.8 U	4.7 U	31	5.1 U	4.5 U	360 U
4,4'-DDE	1700	NE	NA	770 U	3.8 U	4.7 U	19	5.1 U	4.5 U	1900 C
4,4'-DDT	1700	NE	NA	4700	3.8 U	4.7 U	150	5.1 U	4.5 U	5500 C
Aldrin	29	2.5	NA	310 U	1.9 U	2.4 U	15 U	2.6 U	2.3 U	63
alpha-BHC	90	NE	NA	110 N	1.9 U	2.4 U	110	2.6 U	2.3 U	16 J

Table 1-1
Surface Soil Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Reg 9 PRG	Reg 4 SS SV	SO08SB_0403 Apr-03	SP009SS_0405 Apr-05	SP01SS_0405 Apr-05 Background	SP02DSS_0405 Apr-05	SP02SS_0403 Apr-03	SP02SS_0405 Apr-05	SP03SS_0405 Apr-05	SP04SS_0403 Apr-03
alpha-Chlordane	NE	NE	NA	110	1.9 U	2.4 U	16 U	2.6 U	2.3 U	5.8 J
beta-BHC	320	NE	NA	2600	1.9 U	2.4 U	220	2.6 U	2.3 U	850
delta-BHC	NE	NE	NA	310	1.9 U	2.4 U	120	2.6 U	2.3 U	75 J
Dieldrin	30	0.5	NA	620 U	3.8 U	4.7 U	7.3 J	5.1 U	4.5 U	930
Endosulfan I	NE	NE	NA	320	1.9 U	2.4 U	15 U	2.6 U	2.3 U	16 U
Endrin	1800	1	NA	240 U	3.8 U	4.7 U	36 U	5.1 U	4.5 U	18 J
Endrin aldehyde	NE	NE	NA	690 U	3.8 U	4.7 U	NA	5.1 U	4.5 U	
Endrin ketone	NE	NE	NA	230 N	3.8 U	4.7 U	36 U	5.1 U	4.5 U	78 U
gamma-BHC	440	NE	NA	1400 J	1.9 U	2.4 U	230	2.6 U	3.1	16
gamma-Chlordane	NE	NE	NA	23 U	1.9 U	2.4 U	15 U	2.6 U	2.3 U	45 U
Heptachlor	110	NE	NA	56 N	1.9 U	2.4 U	15 U	2.6 U	2.3 U	16 U
Heptachlor epoxide	53	NE	NA	23 U	1.9 U	2.4 U	15 U	2.6 U	2.3 U	5.2 J
Toxaphene	440	NE	NA	2300 U	190 U	240 U	1500 U	260 U	230 U	1600 U
trans-Nonachlor	NE	NE	NA	NA	NA	NA	15 U	NA	NA	16 U

Table 1-1
Surface Soil Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Reg 9 PRG	Reg 4 SS SV	SP04SS_0405 Apr-05	SP05SS_0405 Apr-05	SP06SS_0403 Apr-03	SP06SS_0405 Apr-05	SP07SS_0403 Apr-03	SP07SS_0405 Apr-05	SP08SS_0403 Apr-03
DIOXINS (ng/kg)									
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	NE	NE	69000 J	22000	76000 J	56000 J	3100	78000 J	180000 J
1,2,3,4,6,7,8-Heptachlorodibenzofuran	NE	NE	17000 J	3400	28000 J	9900 J	21000	10000 J	38000
1,2,3,4,7,8,9-Heptachlorodibenzofuran	NE	NE	1900 J	350	3600 J	880	2400	1200 J	4000
1,2,3,4,7,8-Hexachlorodibenzodioxin	NE	NE	1100	310	2000 J	430	1900	850 J	2500
1,2,3,4,7,8-Hexachlorodibenzofuran	NE	NE	1700	290	3800 J	700	2000 J	1600	2500 J
1,2,3,6,7,8-Hexachlorodibenzodioxin	NE	NE	4400	1100	6400 J	3000	5200	4000	12000 J
1,2,3,6,7,8-Hexachlorodibenzofuran	NE	NE	1000	160	2700 J	460	1500	1100	2400 J
1,2,3,7,8,9-Hexachlorodibenzodioxin	NE	NE	1800	690	4600 J	850	4900	1700 J	6400 J
1,2,3,7,8,9-Hexachlorodibenzofuran	NE	NE	810	140	290 UJ	310	72 U	480	200 J
1,2,3,7,8-Pentachlorodibenzodioxin	NE	NE	620	300	1300 J	250	1100	1200	1600
1,2,3,7,8-Pentachlorodibenzofuran	NE	NE	300	48	780 J	130	350 J	230	750
2,3,4,6,7,8-Hexachlorodibenzofuran	NE	NE	1600	260	1800 J	760	1200 J	1400	1800 J
2,3,4,7,8-Pentachlorodibenzofuran	NE	NE	540	87	580 J	250	270 U	400	620
2,3,7,8-Tetrachlorodibenzodioxin	**3.9**	NE	**48**	**55**	170 UJ	**18**	47 U	**84**	**150**
2,3,7,8-Tetrachlorodibenzofuran	NE	NE	51	7.1	250 UJ	19	72 U	33	130 J
Heptachlorodibenzodioxin (Total)	NE	NE	110000 J	36000 J	140000 J	80000 J	140000 J	120000 J	300000 J
Heptachlorodibenzofuran (Total)	NE	NE	59000 J	11000 J	110000 J	31000 J	72000 J	38000 J	140000 J
Hexachlorodibenzodioxin (Total)	NE	NE	19000 J	7200 J	42000 J	11000 J	34000 J	15000 J	61000 J
Hexachlorodibenzofuran (Total)	NE	NE	44000 J	5700 J	74000 J	18000 J	47000 J	38000 J	82000 J
Octachlorodibenzodioxin	NE	NE	200000 J	150000 J	1100000 J	220000 J	1300000 J	560000 J	4000000 J
Octachlorodibenzofuran	NE	NE	7700 J	3800 J	45000 J	19000 J	55000	25000 J	92000 J
Pentachlorodibenzodioxin (Total)	NE	NE	2900 J	2400 J	3400 J	1300 J	4100 J	4300 J	7100 J
Pentachlorodibenzofuran (Total)	NE	NE	9200 J	1200 J	34000 J	3300 J	18000 J	5100 J	38000 J
Percent Moisture	NE	NE	22	11	1	12	5	21	6
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	NE	NE	2400 J	710	NA	1100 J	NA	2700 J	
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	NE	NE	2400 J	730	NA	1100 J	NA	2700 J	
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	**0.0039**	NE	**3100 J**	**970**	NA	**1700 J**	NA	**3600 J**	
TEQ (Toxic. Equiv. Value, From I-Tef/89)	NE	**2.5**	NA	NA	**5300 J**	NA	**3900 J**		**10000 J**
Tetrachlorodibenzodioxin (Total)	NE	NE	550 J	910 J	340 J	200 J	440 J	630 J	1500 J
Tetrachlorodibenzofuran (Total)	NE	NE	1300 J	230 J	2500 J	370 J	1400 J	600 J	1900 J
EXTRACTABLES (ug/kg)									
(3-and/or 4-)Methylphenol	NE	NE	420 U	410 U	170 U	370 U	190 U	400 U	19 J
1,2,4-Trichlorobenzene	**6200**	NE	NA	NA	170 U	NA	190 U	NA	180 U
2,3,4,6-Tetrachlorophenol	180000	**20000**	NA	NA	180	NA	41 J	NA	460
2,4,5-Trichlorophenol	610000	**4000**	1100 U	1000 U	170 U	930 U	190 U	1000 U	180 U
2,4,6-Trichlorophenol	**810**	10000	420 U	410 U	170 U	370 U	190 U	400 U	180 U
2,4-Dichlorophenol	**18000**	NE	420 U	410 U	170 U	370 U	190 U	400 U	180 U
2-Methylnaphthalene	NE	NE	420 U	410 U	10 J	370 U	17 J	400 U	20
Acenaphthene	370000	**20000**	420 U	410 U	17 U	370 U	19 U	400 U	4.3 J
Acenaphthylene	NE	NE	420 U	410 U	17 U	370 U	19 U	400 U	9.3 J
Acetophenone	NE	NE	420 U	410 U	170 U	370 U	190 U	400 U	180 U
Anthracene	2200000	**100**	420 U	410 U	17 U	370 U	5.2 J	400 U	18
Benzaldehyde	**610000**	NE	190 J	410 U	26 J	370 U	67 J	280 J	69 J
Benzo(a)anthracene	**620**	NE	420 U	410 U	8.2 J	370 U	6.1 J	43 J	60
Benzo(a)pyrene	**62**	100	420 U	410 U	8.4 J	370 U	6.5 J	**66 J**	**71**
Benzo(b)fluoranthene	**620**	NE	420 U	410 U	11 J	370 U	10 J	400 U	90
Benzo(g,h,i)perylene	NE	NE	420 U	410 U	6.5 J	370 U	6.9 J	83 J	34
Benzo(k)fluoranthene	**6200**	NE	420 U	410 U	11 J	370 U	9 J	400 U	100

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Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Reg 9 PRG	Reg 4 SS SV	SP04SS_0405 Apr-05	SP05SS_0405 Apr-05	SP06SS_0403 Apr-03	SP06SS_0405 Apr-05	SP07SS_0403 Apr-03	SP07SS_0405 Apr-05	SP08SS_0403 Apr-03
Bis(2-ethylhexyl)phthalate	35000	NE	420 U	410 U	170 U	370 U	190 U	400 U	180 U
Butylbenzylphthalate	12000000	NE	420 U	410 U	170 U	370 U	240	400 U	180 U
Carbazole	24000	NE	420 U	410 U	170 U	370 U	190 U	400 U	46 J
Chrysene	62000	NE	420 U	410 U	12 J	370 U	14 J	110 J	83
Dibenzofuran	15000	NE	420 U	410 U	170 U	370 U	190 U	400 U	180 U
Fluoranthene	230000	100	420 U	410 U	19	370 U	14 J	400 U	130
Fluorene	270000	30000	420 U	410 U	17 U	370 U	19 U	400 U	18 U
Hexachlorobenzene	300	2.5	420 U	410 U	44 J	370 U	190 U	400 U	120 J
Indeno(1,2,3-cd)pyrene	620	NE	420 U	410 U	4.8 J	370 U	5 J	400 U	32
Naphthalene	5600	100	420 U	410 U	14 J	370 U	14 J	400 U	29
Pyrene	230000	100	420 U	410 U	16 J	370 U	13 J	110 J	110
VOLATILES (ug/kg)									
1,3,5-Trimethylbenzene	2100	NE	NA	NA	1.3 U	NA	1.3 U	NA	1.9 U
Acetone	1400000	NE	14	12 U	33 UJ	10	32 UJ	12 U	47 UJ
Toluene	520000	50	2 J	12 U	1.3 U	10 U	1.3 U	12 U	1.9 U
METALS (mg/kg)									
Aluminum	7600	50	5200	5000	1400	2900	5700	4300	3600
Antimony	3.1	3.5	0.75 R	0.51 R	0.25 U	6.9 UJ	0.25 U	0.97 J	0.25 U
Arsenic	0.39	10	5	5.3	0.74	2.9	2.1	9.2	2.8
Barium	540	165	65	51	15	28	120	230	64
Beryllium	15	1.1	0.35 J	0.34 J	0.3 U	0.13 J	0.42	0.36 J	0.31
Cadmium	3.7	1.6	0.15 J	0.21 J	0.12 U	0.57 U	0.19	0.75	0.22
Calcium	NE	NE	3400 J	2600 J	5600	2100 J	33000	8400 J	19000
Chromium	30	0.4	9.7	9.2	3.7	8.4	13	15	8.8
Cobalt	900	20	4.6 J	4.4 J	0.81	2.2 J	3	5.8 J	4.1
Copper	310	40	11 J	11 J	3.7	6.9 J	15	35 J	12
Iron	2300	50	11000	12000	2500	7700	9300	21000	7500
Lead	400	50	58	63	97	22	110	44	93
Magnesium	NE	NE	630 J	620	260	390 J	1700	1300	890
Manganese	180	100	430	360	48	100	520	1200	350
Mercury	0.61	0.1	0.07 UJ	0.04 UJ	0.098 U	0.05 UJ	0.1 U	0.18	0.14
Molybdenum	39	2	NA	NA	0.51	NA	0.65	NA	0.64
Nickel	160	30	5.6	5.1	2.9	3.4 J	7.6	11	4.5
Potassium	NE	NE	380 J	360 J	200 U	550 J	310	860 J	480
Selenium	39	0.81	4.5 U	4.3 U	0.5 U	4 U	0.5 U	0.47 J	0.5 U
Silver	39	2	0.32 R	0.28 R	0.5 U	1.1 U	0.5 U	0.76 J	0.5 U
Sodium	NE	NE	260 J	260 J	200 U	470 J	200 U	680	200 U
Strontium	4700	NE	NA	NA	9.1	NA	70	NA	45
Tin	4700	53	NA	NA	2.5 U	NA	2.5 U	NA	2.5 U
Titanium	10000	1000	NA	NA	18	NA	110	NA	42
Vanadium	78	2	17	18	4.2	13	18	23	12
Yttrium	NE	NE	NA	NA	0.88	NA	6.4		4.6
Zinc	2300	50	65	64	58	31	85	310	82
PESTICIDES/PCB (ug/kg)									
4,4'-DDD	2400	NE	4.2 U	6.1 U	63 U	3.7 U	38 U	91	60 U
4,4'-DDE	1700	NE	6.5	4.2 U	23	3.7 U	15 U	40 U	41
4,4'-DDT	1700	NE	8.3 U	12 U	35	3.7 U	38 U	1200	42 J
Aldrin	29	2.5	2.1 U	4.3 N	13 U	1.9 U	15 U	21 U	14 U
alpha-BHC	90	NE	2.1 U	2.1 U	13 U	1.9 U	15 U	21 U	14 U

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	Reg 9 PRG	Reg 4 SS SV	SP04SS_0405 Apr-05	SP05SS_0405 Apr-05	SP06SS_0403 Apr-03	SP06SS_0405 Apr-05	SP07SS_0403 Apr-03	SP07SS_0405 Apr-05	SP08SS_0403 Apr-03
alpha-Chlordane	NE	NE	2.1 U	2.1 U	18 U	1.9 U	15 U	21 U	22 U
beta-BHC	320	NE	2.1 U	2.1 U	15 J	1.9 U	15 U	21 U	15 J
delta-BHC	NE	NE	2.1 U	2.1 U	13 U	1.9 U	15 U	21 U	22
Dieldrin	30	0.5	5.9 N	4.2 U	30 U	3.7 U	15 U	40 U	74 U
Endosulfan I	NE	NE	2.1 U	2.1 U	13 U	1.9 U	15 U	21 U	18 U
Endrin	1800	1	4.2 U	4.2 U	34 U	3.7 U	38 U	40 U	56 U
Endrin aldehyde	NE	NE	4.2 U	5.3 U		3.7 U		40 U	
Endrin ketone	NE	NE	4.2 U	4.2 U	34 U	3.7 U	38 U	40 U	36 U
gamma-BHC	440	NE	2.1 U	2.1 U	4.4 J	5.7 U	15 U	21 U	16
gamma-Chlordane	NE	NE	2.1 U	2.2	13 U	1.9 U	15 U	21 U	14 U
Heptachlor	110	NE	2.1 U	2.1 U	13 U	1.9 U	15 U	21 U	14 U
Heptachlor epoxide	53	NE	2.1 U	2.1 U	13 U	1.9 U	15 U	21 U	24 U
Toxaphene	440	NE	210 U	210 U	1300 U	190 U	1500 U	2100 U	1400 U
trans-Nonachlor	NE	NE	NA	NA	1.9 J	NA	15 U	NA	8.5 J

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	Reg 9 PRG	Reg 4 SS SV	SP08SS_0405 Apr-05	SP09DSS_0405 Apr-05	SP09SS_0405 Apr-05	SP10SS_0405 Apr-05	SP11SS_0405 Apr-05	SP12SS_0405 Apr-05	SP13SS_0405 Apr-05	SP14SS_0405 Apr-05	SP15SS_0405 Apr-05	SP16SS_0405 Apr-05
DIOXINS (ng/kg)												
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	NE	NE	240000	1700000	2600000	140000	380000	69000	210000	13000	15000	6200
1,2,3,4,6,7,8-Heptachlorodibenzofuran	NE	NE	72000	450000	740000	19000	51000	12000	53000	4300	1700	750
1,2,3,4,7,8,9-Heptachlorodibenzofuran	NE	NE	6800	52000	85000	1600 J	3600	1300	3100 J	450	110	50
1,2,3,4,7,8-Hexachlorodibenzodioxin	NE	NE	2100 J	13000	17000	700 J	2700 J	320	2000 J	480	230	110
1,2,3,4,7,8-Hexachlorodibenzofuran	NE	NE	3200	33000	56000	1400 J	3300	1200	2100 J	430	70	33
1,2,3,6,7,8-Hexachlorodibenzodioxin	NE	NE	11000	77000	110000	7400	20000	6400	8000	1400	480	220
1,2,3,6,7,8-Hexachlorodibenzofuran	NE	NE	2000 J	15000	23000	980 J	2200 J	620	1900 J	240	81	29
1,2,3,7,8,9-Hexachlorodibenzodioxin	NE	NE	5200	29000	38000	1500 J	6600	720	4200	860	400	210
1,2,3,7,8,9-Hexachlorodibenzofuran	NE	NE	1200 J	12000	22000	740 U	1600 J	660	720 U	190	15	7.9
1,2,3,7,8-Pentachlorodibenzodioxin	NE	NE	1400 J	6600	940 J	380 J	1700 J	210	840 J	230	100	51
1,2,3,7,8-Pentachlorodibenzofuran	NE	NE	360 U	3100	6100	400 U	710 J	440	260 U	74	10	5.2
2,3,4,6,7,8-Hexachlorodibenzofuran	NE	NE	3300	24000	39000	1400 J	3600	1100	2700 J	540	91	43
2,3,4,7,8-Pentachlorodibenzofuran	NE	NE	780 J	5600	9900	720 U	1600 J	890	470 U	140	18	6.6
2,3,7,8-Tetrachlorodibenzodioxin	**3.9**	NE	**190 J**	**510 J**	630 U	66 UJ	200 UR	**22 J**	220 UR	**21 J**	**7.4 J**	**3.9 J**
2,3,7,8-Tetrachlorodibenzofuran	NE	NE	170 U	350 J	650	160 U	230 U	99	180 U	13	3.5	1.6
Heptachlorodibenzodioxin (Total)	NE	NE	440000 J	2800000 J	4300000 J	240000 J	670000 J	100000 J	370000 J	21000 J	30000 J	13000 J
Heptachlorodibenzofuran (Total)	NE	NE	240000 J	1600000 J	2900000 J	58000 J	140000 J	41000 J	120000 J	13000 J	4300 J	1800 J
Hexachlorodibenzodioxin (Total)	NE	NE	57000 J	290000 J	370000 J	24000 J	82000 J	17000 J	51000 J	8400 J	3500 J	1700 J
Hexachlorodibenzofuran (Total)	NE	NE	78000 J	570000 J	980000 J	34000 J	87000 J	29000 J	63000 J	10000 J	1700 J	700 J
Octachlorodibenzodioxin	NE	NE	5600000 J	3.50E+07 J	4.80E+07	3100000	8600000 J	190000	2900000	97000 J	110000 J	83000 J
Octachlorodibenzofuran	NE	NE	290000	1100000	1800000	64000	120000	19000	120000	6300 J	3500 J	2000 J
Pentachlorodibenzodioxin (Total)	NE	NE	6400 J	33000 J	36000 J	1200 J	8000 J	1800 J	9000 J	1400 J	480 J	180 J
Pentachlorodibenzofuran (Total)	NE	NE	13000 J	78000 J	120000 J	7100 J	19000 J	9100 J	14000 J	2400 J	380 J	120 J
Percent Moisture	NE	NE	18	19	19	20	26	32	31	35	37	30
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	NE	NE	5900 J	36000	48000	2700 J	7700 J	2000	4200 J	750	250	130
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	NE	NE	5800 J	36000	47000	2400 J	7200 J	1500	4200 J	800	310	150
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	**0.0039**	NE	**8600 J**	**56000**	**77000**	**4200 J**	**12000 J**	**2800**	**5400 J**	**930**	**430**	**200**
TEQ (Toxic. Equiv. Value, From I-Tef/89)	NE	**2.5**										
Tetrachlorodibenzodioxin (Total)	NE	NE	190 J	4000 J	2400 J	66 UJ	370 J	370 J	420 J	250 J	48 J	16 J
Tetrachlorodibenzofuran (Total)	NE	NE	1200 J	11000 J	16000 J	630 J	2300 J	960 J	2500 J	340 J	61 J	14 J
EXTRACTABLES (ug/kg)												
(3-and/or 4-)Methylphenol	NE	NE	400 U	390 U	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
1,2,4-Trichlorobenzene	**6200**	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	180000	**20000**	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	610000	**4000**	1000 U	42 J	NA	1100 U	1200 U	1400 U	1200 U	1300 U	1400 U	1400 U
2,4,6-Trichlorophenol	**610**	10000	400 U	260 J	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
2,4-Dichlorophenol	**18000**	NE	400 U	430	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
2-Methylnaphthalene	NE	NE	150 J	390 U	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
Acenaphthene	370000	**20000**	400 U	390 U	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
Acenaphthylene	NE	NE	400 U	390 U	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
Acetophenone	NE	NE	400 U	130 J	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
Anthracene	2200000	**100**	400 U	390 U	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
Benzaldehyde	**610000**	NE	400 U	390 U	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
Benzo(a)anthracene	**620**	NE	400 U	390 U	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
Benzo(a)pyrene	**62**	100	400 U	390 U	NA	440 U	470 U	550 U	490	510 U	560 U	540 U
Benzo(b)fluoranthene	**620**	NE	400 U	390 U	NA	440 U	57 J	550 U	**300 J**	510 U	560 U	540 U
Benzo(g,h,i)perylene	NE	NE	400 U	390 U	NA	440 U	100 J	550 U	540	510 U	560 U	540 U
Benzo(k)fluoranthene	**6200**	NE	400 U	390 U	NA	440 U	470 U	550 U	51 J	510 U	560 U	540 U
							470 U	550 U	170 J	510 U	560 U	540 U

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	Reg 9 PRG	Reg 4 SS SV	SP08SS_0405 Apr-05	SP09DSS_0405 Apr-05	SP09SS_0405 Apr-05	SP10SS_0405 Apr-05	SP11SS_0405 Apr-05	SP12SS_0405 Apr-05	SP13SS_0405 Apr-05	SP14SS_0405 Apr-05	SP15SS_0405 Apr-05	SP16SS_0405 Apr-05
Bis(2-ethylhexyl)phthalate	35000	NE	400 U	1200	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
Butylbenzylphthalate	12000000	NE	400 U	390 U	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
Carbazole	24000	NE	400 U	390 U	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
Chrysene	62000	NE	400 U	390 U	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
Dibenzofuran	15000	NE	400 U	390 U	NA	440 U	64 J	550 U	570	510 U	560 U	540 U
Fluoranthene	230000	100	400 U	390 U	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
Fluorene	270000	30000	400 U	390 U	NA	440 U	470 U	550 U	910	510 U	560 U	540 UJ
Hexachlorobenzene	300	2.5	59 J	1300	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
Indeno(1,2,3-cd)pyrene	620	NE	400 U	390 U	NA	440 U	470 U	550 U	470 U	510 U	560 U	540 U
Naphthalene	5600	100	85 J	390 U	NA	440 U	470 U	550 U	200 J	510 U	560 U	540 U
Pyrene	230000	100	44 J	62 J	NA	440 U	53 J	550 U	470 U	510 U	560 U	540 U
VOLATILES (ug/kg)									660	510 U	560 U	540 U
1,3,5-Trimethylbenzene	2100	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	1400000	NE	11 U	12 U	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	520000	50	11 U	12 U	NA	NA	NA	NA	NA	NA	NA	NA
METALS (mg/kg)												
Aluminum	7600	50	3500	4600	NA	6800	2400	4900	5000	7700	4100	5300
Antimony	3.1	3.5	0.52 J	1.2 R	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	0.39	10	4	5.8	NA	2.5	3.7	2.9	3.9	1.8	1.7	0.93 UJ
Barium	540	165	77	89	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	15	1.1	0.2 J	0.12 J	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	3.7	1.6	0.46 J	0.92	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NE	NE	6400 J	17000 J	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	30	0.4	13	10	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	900	20	5.3 J	4.2 J	NA	NA	NA	NA	NA	NA	NA	NA
Copper	310	40	17 J	49 J	NA	NA	NA	NA	NA	NA	NA	NA
Iron	2300	50	9500	12000	NA	8500	9900	6800	9000	5400	4300	3600
Lead	400	50	61	400	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NE	NE	720	1200	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	180	100	310	210	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	0.61	0.1	1	9.8	NA	NA	NA	NA	NA	NA	NA	NA
Molybdenum	39	2	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	160	30	5.3	7.6	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NE	NE	330 J	630 J	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	39	0.81	4.2 U	4.6 U	NA	NA	NA	NA	NA	NA	NA	NA
Silver	39	2	1.2 U	0.29 J	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NE	NE	1200	1300	NA	NA	NA	NA	NA	NA	NA	NA
Strontium	4700	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tin	4700	53	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Titanium	10000	1000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	78	2	13	11	NA	NA	NA	NA	NA	NA	NA	NA
Yttrium	NE	NE			NA	NA	NA	NA	NA	NA	NA	NA
Zinc	2300	50	540	560	NA	NA	NA	NA	NA	NA	NA	NA
PESTICIDES/PCB (ug/kg)												
4,4'-DDD	2400	NE	60 N	830 N	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDE	1700	NE	28 N	700 U	NA	NA	NA	NA	NA	NA	NA	NA
4,4'-DDT	1700	NE	63 U	3100	NA	NA	NA	NA	NA	NA	NA	NA
Aldrin	29	2.5	2.1 U	250 U	NA	NA	NA	NA	NA	NA	NA	NA
alpha-BHC	90	NE	2.1 U	140 N	NA	NA	NA	NA	NA	NA	NA	NA

Table 1-1
Surface Soil Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Reg 9 PRG	Reg 4 SS SV	SP08SS_0405 Apr-05	SP09DSS_0405 Apr-05	SP09SS_0405 Apr-05	SP10SS_0405 Apr-05	SP11SS_0405 Apr-05	SP12SS_0405 Apr-05	SP13SS_0405 Apr-05	SP14SS_0405 Apr-05	SP15SS_0405 Apr-05	SP16SS_0405 Apr-05
alpha-Chlordane	NE	NE	2.1 U	100	NA	NA	NA	NA	NA	NA	NA	NA
beta-BHC	320	NE	6.3 U	1700	NA	NA	NA	NA	NA	NA	NA	NA
delta-BHC	NE	NE	3.3 U	200	NA	NA	NA	NA	NA	NA	NA	NA
Dieldrin	30	0.5	9.2 U	710 U	NA	NA	NA	NA	NA	NA	NA	NA
Endosulfan I	NE	NE	3.4 U	250 N	NA	NA	NA	NA	NA	NA	NA	NA
Endrin	1800	1	4 U	39 U	NA	NA	NA	NA	NA	NA	NA	NA
Endrin aldehyde	NE	NE	27	280 U	NA	NA	NA	NA	NA	NA	NA	NA
Endrin ketone	NE	NE	8.6 U	39 U	NA	NA	NA	NA	NA	NA	NA	NA
gamma-BHC	440	NE	26 U	1400	NA	NA	NA	NA	NA	NA	NA	NA
gamma-Chlordane	NE	NE	2.1 U	20 U	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor	110	NE	2.1 U	63 U	NA	NA	NA	NA	NA	NA	NA	NA
Heptachlor epoxide	53	NE	2.1 U	56 U	NA	NA	NA	NA	NA	NA	NA	NA
Toxaphene	440	NE	210 U	2000 U	NA	NA	NA	NA	NA	NA	NA	NA
trans-Nonachlor	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 1-1
Surface Soil Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Reg 9 PRG	Reg 4 SS SV	SP17SS_0405 Apr-05	SP18SS_0405 Apr-05	SP19SS_0405 Apr-05	SP20SS_0405 Apr-05	SP21SS_0405 Apr-05	SP22SS_0405 Apr-05	SP23SS_0405 Apr-05	SP24SS_0405 Apr-05
DIOXINS (ng/kg)										
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	NE	NE	9600	8000	37000	3800	5500	6800	480000	33000
1,2,3,4,6,7,8-Heptachlorodibenzofuran	NE	NE	1200	880	10000	440	620	720	57000	5400
1,2,3,4,7,8,9-Heptachlorodibenzofuran	NE	NE	84	67	680	28	44	48	5300	550
1,2,3,4,7,8-Hexachlorodibenzodioxin	NE	NE	160	110	510	65	90	90	3900	760
1,2,3,4,7,8-Hexachlorodibenzofuran	NE	NE	55	40	440	20	28	26	4000	800
1,2,3,6,7,8-Hexachlorodibenzodioxin	NE	NE	350	260	1700	140	180	220	19000	2900
1,2,3,6,7,8-Hexachlorodibenzofuran	NE	NE	47	36	370	18	21	25	2100 J	490
1,2,3,7,8,9-Hexachlorodibenzodioxin	NE	NE	330	210	920	130	180	180	9900	1200
1,2,3,7,8,9-Hexachlorodibenzofuran	NE	NE	12	11	120	4.5	7.6	5.8	2000 J	440
1,2,3,7,8-Pentachlorodibenzodioxin	NE	NE	76	55	280	31	43	38	2200 J	880
1,2,3,7,8-Pentachlorodibenzofuran	NE	NE	7.4	6.6	57	2.9	5.0	3.4	690 J	190
2,3,4,6,7,8-Hexachlorodibenzofuran	NE	NE	73	54	620	25	32	37	3600	800
2,3,4,7,8-Pentachlorodibenzofuran	NE	NE	11	10	110	4.5	7.3	5.4	1300 J	370
2,3,7,8-Tetrachlorodibenzodioxin	**3.9**	NE	**6.4 J**	**4.9 J**	**17 J**	3.0 J	3.3 J	3.2 UR	340 U	**150**
2,3,7,8-Tetrachlorodibenzofuran	NE	NE	1.9	1.9	11	0.72	1.1	0.93	190 U	43
Heptachlorodibenzodioxin (Total)	NE	NE	19000 J	18000 J	63000 J	7400 J	11000 J	14000 J	870000 J	57000 J
Heptachlorodibenzofuran (Total)	NE	NE	3200 J	2400 J	33000 J	1100 J	1600 J	1800 J	170000 J	18000 J
Hexachlorodibenzodioxin (Total)	NE	NE	2600 J	1900 J	9800 J	1100 J	1400 J	1700 J	110000 J	16000 J
Hexachlorodibenzofuran (Total)	NE	NE	1300 J	960 J	17000 J	450 J	570 J	590 J	84000 J	20000 J
Octachlorodibenzodioxin	NE	NE	110000 J	86000 J	160000 J	61000 J	79000 J	84000 J	1.40E+07 J	230000 J
Octachlorodibenzofuran	NE	NE	2700 J	1600 J	38000 J	700 J	950 J	1200 J	140000	9200 J
Pentachlorodibenzodioxin (Total)	NE	NE	320 J	250 J	1200 J	140 J	180 J	190 J	17000 J	6900 J
Pentachlorodibenzofuran (Total)	NE	NE	200 J	160 J	2900 J	73 J	78 J	110 J	12000 J	4600 J
Percent Moisture	NE	NE	34	36	48	34	26	22	18	23
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	NE	NE	190	140	850	78 J	110 J	100 J	9200 J	2000
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	NE	NE	230	160	940	93 J	130	130	9200 J	2000
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	**0.0039**	NE	**310**	**240**	**1300**	**120**	**170**	**190**	**14000 J**	**2400**
TEQ (Toxic. Equiv. Value, From I-Tef/89)	NE	**2.5**								
Tetrachlorodibenzodioxin (Total)	NE	NE	33 J	22 J	140 J	13 J	7.3 J	11 J	1300 J	2300 J
Tetrachlorodibenzofuran (Total)	NE	NE	27 J	24 J	430 J	9.6 J	8.4 J	14 J	1000 J	1100 J
EXTRACTABLES (ug/kg)										
(3-and/or 4-)Methylphenol	NE	NE	500 U	530 U	620 U	530 U	460 U	420 U	440 U	430 U
1,2,4-Trichlorobenzene	**6200**	NE	NA	NA	NA	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	180000	**20000**	NA	NA	NA	NA	NA	NA	NA	NA
2,4,5-Trichlorophenol	610000	**4000**	1300 U	1300 U	1600 U	1300 U	1100 U	1100 U	1100 U	1100 U
2,4,6-Trichlorophenol	**610**	10000	500 U	530 U	620 U	530 U	460 U	420 U	440 U	430 U
2,4-Dichlorophenol	**18000**	NE	500 U	530 U	620 U	530 U	460 U	420 U	440 U	430 U
2-Methylnaphthalene	NE	NE	500 U	530 U	620 U	530 U	460 U	420 U	440 U	430 U
Acenaphthene	370000	**20000**	500 U	530 U	620 U	530 U	460 U	420 U	440 U	430 U
Acenaphthylene	NE	NE	500 U	530 U	620 U	530 U	460 U	420 U	440 U	79 J
Acetophenone	NE	NE	500 U	530 U	620 U	530 U	460 U	420 U	440 U	430 U
Anthracene	2200000	**100**	500 U	530 U	620 U	530 U	460 U	420 U	440 U	430 U
Benzaldehyde	**610000**	NE	500 U	530 U	620 U	530 U	460 U	420 U	440 U	96 J
Benzo(a)anthracene	**620**	NE	500 U	530 U	620 U	530 U	460 U	420 U	440 U	100 J
Benzo(a)pyrene	**62**	100	500 U	530 U	620 U	530 U	460 U	420 U	440 U	200 J
Benzo(b)fluoranthene	**620**	NE	500 U	530 U	620 U	530 U	460 U	420 U	440 U	**150 J**
Benzo(g,h,i)perylene	NE	NE	500 U	530 U	620 U	530 U	460 U	420 U	440 U	220 J
Benzo(k)fluoranthene	**6200**	NE	500 U	530 U	620 U	530 U	460 U	420 U	440 U	110 J
										99 J

Table 1-1
Surface Soil Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Reg 9 PRG	Reg 4 SS SV	SP17SS_0405 Apr-05	SP18SS_0405 Apr-05	SP19SS_0405 Apr-05	SP20SS_0405 Apr-05	SP21SS_0405 Apr-05	SP22SS_0405 Apr-06	SP23SS_0405 Apr-05	SP24SS_0405 Apr-06
Bis(2-ethylhexyl)phthalate	35000	NE	500 U	530 U	620 U	530 U	460 U	420 U	440 U	430 U
Butylbenzylphthalate	12000000	NE	500 U	530 U	620 U	530 U	460 U	420 U	440 U	430 U
Carbazole	24000	NE	500 U	530 U	620 U	530 U	460 U	420 U	440 U	100 J
Chrysene	62000	NE	500 U	530 U	620 U	530 U	460 U	420 U	440 U	180 J
Dibenzofuran	15000	NE	500 U	530 U	620 U	530 U	460 U	420 U	440 U	50 J
Fluoranthene	230000	100	500 UJ	530 UJ	620 U	530 U	460 U	420 U	440 U	480
Fluorene	270000	30000	500 U	530 U	620 U	530 U	460 U	420 U	440 U	71 J
Hexachlorobenzene	300	2.5	500 U	530 U	620 U	530 U	460 U	420 U	300 J	430 U
Indeno(1,2,3-cd)pyrene	620	NE	500 U	530 U	620 U	530 U	460 U	420 U	440 U	110 J
Naphthalene	5600	100	500 U	530 U	620 U	530 U	460 U	420 U	440 U	72 J
Pyrene	230000	100	500 U	530 U	620 U	530 U	460 U	420 U	440 U	330 J
VOLATILES (ug/kg)										
1,3,5-Trimethylbenzene	2100	NE	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	1400000	NE	NA	NA	NA	NA	NA	NA	10 U	11 U
Toluene	520000	50	NA	NA	NA	NA	NA	NA	10 U	11 U
METALS (mg/kg)										
Aluminum	7800	50	4600	5200	5000	5200	8100	6600	3900	7300
Antimony	3.1	3.5	NA	NA	NA	NA	NA	NA	1.5 J	0.56 R
Arsenic	0.39	10	1.6	4.6	2.1	1.9	3.7	3.9	6.1	8.2
Barium	540	165	NA	NA	NA	NA	NA	NA	56	47
Beryllium	15	1.1	NA	NA	NA	NA	NA	NA	0.17 J	0.27 J
Cadmium	3.7	1.6	NA	NA	NA	NA	NA	NA	1	0.1 R
Calcium	NE	NE	NA	NA	NA	NA	NA	NA	9400 J	3600 J
Chromium	30	0.4	NA	NA	NA	NA	NA	NA	14	25
Cobalt	900	20	NA	NA	NA	NA	NA	NA	11	2.8 J
Copper	310	40	NA	NA	NA	NA	NA	NA	31 J	18 J
Iron	2300	50	3700	8300	5500	5100	10000	8800	15000	24000
Lead	400	50	NA	NA	NA	NA	NA	NA	170	28
Magnesium	NE	NE	NA	NA	NA	NA	NA	NA	660	710
Manganese	180	100	NA	NA	NA	NA	NA	NA	260	190
Mercury	0.61	0.1	NA	NA	NA	NA	NA	NA	0.43	0.13 U
Molybdenum	39	2	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	160	30	NA	NA	NA	NA	NA	NA	11	4.8 J
Potassium	NE	NE	NA	NA	NA	NA	NA	NA	710 J	600 J
Selenium	39	0.81	NA	NA	NA	NA	NA	NA	0.58 R	0.7 J
Silver	39	2	NA	NA	NA	NA	NA	NA	0.31 J	0.63 R
Sodium	NE	NE	NA	NA	NA	NA	NA	NA	2500	230 J
Strontium	4700	NE	NA	NA	NA	NA	NA	NA	NA	NA
Tin	4700	53	NA	NA	NA	NA	NA	NA	NA	NA
Titanium	10000	1000	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	78	2	NA	NA	NA	NA	NA	NA	12	39
Yttrium	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	2300	50	NA	NA	NA	NA	NA	NA	1200	81
PESTICIDES/PCB (ug/kg)										
4,4'-DDD	2400	NE	NA	NA	NA	NA	NA	NA	56 N	25 U
4,4'-DDE	1700	NE	NA	NA	NA	NA	NA	NA	44 U	16 U
4,4'-DDT	1700	NE	NA	NA	NA	NA	NA	NA	94	24 U
Aldrin	29	2.5	NA	NA	NA	NA	NA	NA	23 U	2.2 U
alpha-BHC	90	NE	NA	NA	NA	NA	NA	NA	23 U	2.2 U

Table 1-1
Surface Soil Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Reg 9 PRG	Reg 4 SS SV	SP17SS_0405 Apr-05	SP18SS_0405 Apr-05	SP19SS_0405 Apr-05	SP20SS_0405 Apr-05	SP21SS_0405 Apr-05	SP22SS_0405 Apr-05	SP23SS_0405 Apr-05	SP24SS_0405 Apr-05
alpha-Chlordane	NE	NE	NA	NA	NA	NA	NA	NA	23 U	2.2 U
beta-BHC	320	NE	NA	NA	NA	NA	NA	NA	47 U	2.2 U
delta-BHC	NE	NE	NA	NA	NA	NA	NA	NA	23 U	2.2 U
Dieldrin	30	0.5	NA	NA	NA	NA	NA	NA	44 U	13 U
Endosulfan I	NE	NE	NA	NA	NA	NA	NA	NA	27 N	4.2 U
Endrin	1800	1	NA	NA	NA	NA	NA	NA	44 U	4.3 U
Endrin aldehyde	NE	NE	NA	NA	NA	NA	NA	NA	44 U	19 N
Endrin ketone	NE	NE	NA	NA	NA	NA	NA	NA	44 U	4.3 U
gamma-BHC	440	NE	NA	NA	NA	NA	NA	NA	23 U	2.2 U
gamma-Chlordane	NE	NE	NA	NA	NA	NA	NA	NA	23 U	2.2 U
Heptachlor	110	NE	NA	NA	NA	NA	NA	NA	23 U	2.2 U
Heptachlor epoxide	53	NE	NA	NA	NA	NA	NA	NA	23 U	2.2 U
Toxaphene	440	NE	NA	NA	NA	NA	NA	NA	2300 U	640
trans-Nonachlor	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA

Table 1-1
Surface Soil Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

Notes:

PRG	U.S. Environmental Protection Agency Region 9 Preliminary Remedial Goals for Residential Soil, 2004 Update
SS SV	U.S. Environmental Protection Agency Region 4 Screening Values for Residential Soil, 1998 Update

mg/kg	milligrams per kilogram
ug/kg	micrograms per kilogram
ng/kg	nanogram per kilogram
U	Analyte not detected at or above reporting limit
J	Identification of analyte is acceptable;reported value is an estimate
UJ	Analyte noted detected at or above reporting limit. Reporting limit is an estimate.
N	Presumptive evidence analyte is present; analyte reported as tentative identification
NJ	Presumptive evidence analyte is present; analyte reported as tentative identification. Reported value is an estimate.
NA	Not Analyzed
NE	Not Evaluated
A	Analyte analzed in replicate. Reported value is "average" of replicates
R	Presence or absence of analyte can not be determined from data due to severe quality control problems. Data are rejected and considered unusable.

Blank Action Levels	Indicates standard not established
Bold Face Type	Indicates governing standard.
Shading	Indicates the governing standard as been exceeded.
Italic	Indicates a duplicate sample
Compounds	Tentatively identified compounds are shown in all CAPS

Table 1-2
Subsurface Soil Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Region 9 PRG	SP01SB_0405 Apr-05 Background	SP02SB_0403 Apr-05	SP02SB_0405 Apr-05	SP03SB_0405 Apr-05	SP04SB_0405 Apr-05	SP05SB_0405 Apr-05	SP08SB_0403 Apr-05	SP10SB_0405 Apr-05	SP11SB_0406 Apr-05	SP12SB_0405 Apr-05	SP13SB_0405 Apr-05
Dioxon (ng/kg)												
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	NE	180	5500 J	630	78000	12000	67000 J	11000	2800	1000	1800	1700
1,2,3,4,6,7,8-Heptachlorodibenzofuran	NE	11	1600	290	20000	2300	14000 J	4300	570	120	360	430
1,2,3,4,7,8,9-Heptachlorodibenzofuran	NE	0.71 U	180	11	2000	300	1300	560	76	11	58	29
1,2,3,4,7,8-Hexachlorodibenzodioxin	NE	2.4 J	72	7.4	480	88	890	74	18	6.5	4.8	17
1,2,3,4,7,8-Hexachlorodibenzofuran	NE	1.1 U	160 J	13	1800	210	900	180 J	62	13	35	22
1,2,3,6,7,8-Hexachlorodibenzodioxin	NE	4.8	260	24	6000	780	4000	470	160	70	120	78
1,2,3,6,7,8-Hexachlorodibenzofuran	NE	0.86 J	97	9.1	800	100	590	110	30	7.5	17	18
1,2,3,7,8,9-Hexachlorodibenzodioxin	NE	5.2	120	14	1200	180	1600	200	48	18	17	43
1,2,3,7,8,9-Hexachlorodibenzofuran	NE	0.71 J	7.7	3.9	710	130	360	9.8 U	25	8.4	18	7.9
1,2,3,7,8-Pentachlorodibenzodioxin	NE	1.6 U	25	4.7	210	63	660	35	7.8	6.0	4.3	9.9
1,2,3,7,8-Pentachlorodibenzofuran	NE	0.22 U	16	2.1 J	500	50	130	24 J	14	4.3	9.6	2.7
2,3,4,6,7,8-Hexachlorodibenzofuran	NE	0.84 U	52 J	15	1400	220	980	68 J	51	14.3	33	28
2,3,4,7,8-Pentachlorodibenzofuran	NE	0.46 J	17	8	870	110	260	20 U	28	9.7	17	6.2
2,3,7,8-Tetrachlorodibenzodioxin	16	0.75 U	1.4 U	0.68	10	4.6 U	88	7.2 U	0.61 J	0.78 J	0.62 J	1.6 UR
2,3,7,8-Tetrachlorodibenzofuran	NE	0.36 U	5.0 U	0.54	210	8	40	10 U	2.7	1.2	1.6	0.56
Heptachlorodibenzodioxin (Total)	NE	410 J	8700 J	1300 J	120000 J	20000 J	100000 J	19000 J	4800 J	1700 J	3000 J	3000 J
Heptachlorodibenzofuran (Total)	NE	30 J	6500 J	630 J	76000 J	12000 J	48000 J	21000 J	2300 J	410 J	1500 J	1300 J
Hexachlorodibenzodioxin (Total)	NE	47 J	970 J	210 J	20000 J	2500 J	19000 J	2100 J	560 J	250 J	350 J	460 J
Hexachlorodibenzofuran (Total)	NE	13 J	3200 J	310 J	40000 J	6100 J	24000 J	4300 J	1300 J	330 J	760 J	620 J
Octachlorodibenzodioxin	NE	12000 J	53000 J	8500 J	430000 J	87000 J	210000 J	240000 J	36000	14000 J	16000 J	20000 J
Octachlorodibenzofuran	NE	26	3600	160	47000 J	11000 J	28000 J	25000	1300	260	890	900
Pentachlorodibenzodioxin (Total)	NE	3.3 J	81 J	48 J	1200 J	250 J	3700 J	82 J	38 J	24 J	79 J	87 J
Pentachlorodibenzofuran (Total)	NE	2.3 J	7500 J	83 J	8000 J	930 J	4600 J	670 J	260 J	92 J	200 J	140 J
Percent Moisture	NE	20	11	17	12	14	16	7	17	21	25	20
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	NE	5.7 J	NA	25	2400	340	1800 J	NA	77	29	45	40
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	NE	5.7 J	NA	22	1800	300	1900 J	NA	64	24	36	40
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	0.016	7.3 J	NA	28	3000	450	2800 J	NA	101	38	62	60
TEQ (Toxic. Equiv. Value, From I-Tef/89)	0.016	NA	230 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachlorodibenzodioxin (Total)	NE	0.75 UJ	1.4 UJ	12 J	180 J	65 J	900 J	15 J	3.5 J	4.5 J	4.8 J	19 J
Tetrachlorodibenzofuran (Total)	NE	0.36 UJ	44 J	26 J	1500 J	100 J	860 J	22 J	28 J	12 J	19 J	33 J
Extractable (ug/kg)												
1,2,4-Trichlorobenzene	22000	NA	25 J	NA	NA	NA	NA	180 U	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	1800000	NA	300	NA	NA	NA	NA	820	NA	NA	NA	NA
2,4,6-Trichlorophenol	6200	390 U	180 U	390 U	9500 J	94 J	390 U	180 U	400 U	400 U	410 U	420 U
2-Methylnaphthalene	NE	390 U	18 U	51 J	10000 UJ	390 U	390 U	18 U	400 U	400 U	410 U	420 U
Benzo(a)anthracene	2100	390 U	18 U	390 U	10000 UJ	390 U	88 J	6.5 J	400 U	400 U	410 U	420 U
Benzo(a)pyrene	210	390 U	18 U	390 U	10000 UJ	390 U	75 J	6.2 J	400 U	400 U	410 U	420 U
Benzo(b)fluoranthene	2100	390 U	18 U	390 U	10000 UJ	390 U	140 J	8 J	400 U	400 U	410 U	420 U
Benzo(k)fluoranthene	21000	390 U	18 U	390 U	10000 UJ	390 U	55 J	7.5 J	400 U	400 U	410 U	420 U
Chrysene	210000	390 U	18 U	390 U	10000 UJ	390 U	97 J	10 J	400 U	400 U	410 U	420 U
Fluoranthene	2200000	390 U	18 U	41 J	10000 UJ	390 U	150 J	13 J	400 U	400 U	410 U	420 U
Indeno(1,2,3-cd)pyrene	2100	390 U	18 U	390 U	10000 UJ	390 U	69 J	18 U	400 U	400 U	410 U	420 U
Isophorone	510000	390 U	180 U	390 U	1100 J	390 U	390 U	180 U	400 U	400 U	410 U	420 U
Pentachlorophenol	9000	990 U	11000	990 U	230000 J	5300	2700	18000	1000 UJ	1000 UJ	1000 UJ	1100 UJ

Table 1-2
Subsurface Soil Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Region 9 PRG	SP01SB_0405 Apr-05 Background	SP02SB_0403 Apr-05	SP02SB_0405 Apr-05	SP03SB_0405 Apr-05	SP04SB_0405 Apr-05	SP05SB_0405 Apr-05	SP08SB_0403 Apr-05	SP10SB_0405 Apr-05	SP11SB_0405 Apr-05	SP12SB_0405 Apr-05	SP13SB_0405 Apr-05
henanthrene	NE	390 U	18 U	62 J	10000 UJ	390 U	390 U	9.4 J	400 U	400 U	410 U	420 U
yrene	2900000	390 U	18 U	42 J	10000 UJ	390 U	130 J	9.8 J	400 U	400 U	410 U	420 U
olatiles (ug/kg)												
2,4-Trichlorobenzene	22000	11 U	1.2 U	14 U	2 J	11 U	15 U	NA	NA	NA	NA	NA
2-Dichlorobenzene	600000	11 U	1.2 U	14 U	1 J	11 U	15 U	NA	NA	NA	NA	NA
4-Dichlorobenzene	7900	11 U	1.2 U	14 U	4 J	11 U	15 U	NA	NA	NA	NA	NA
-Butanone	11000000	11 U	15 UJ	28	11 U	11 U	15 U	NA	NA	NA	NA	NA
-Methyl-2-pentanone	4700000	11 U	15 U	3 J	2 J	11 U	15 U	NA	NA	NA	NA	NA
cetone	5400000	11 U	47 UJ	350 J	55	17	15 U	NA	NA	NA	NA	NA
hlorobenzene	53000	11 U	1.2 U	14 U	1 J	11 U	15 U	NA	NA	NA	NA	NA
,p-Xylene	NE	11 U	2.4 U	2 J	11 U	11 U	15 U	NA	NA	NA	NA	NA
oluene	520000	2 J	1.2 U	4 J	6 J	11 U	15 U	NA	NA	NA	NA	NA
richlorofluoromethane	200000	2 J	6.1 U	14 U	10 J	11 U	15 U	NA	NA	NA	NA	NA
inyl Chloride	750	11 U	1.2 U	14 U	11 U	11 U	15 U	NA	NA	NA	NA	NA
etals (mg/kg)												
luminum	100000	9600	2700 A	3200	4000	4200	4200	1600	4800	7000	10000	10000
rsenic	1.6	6	2 A	2.3	2.6	3.8	4.5	1.2	0.94 UJ	1.1 UJ	2.9	5.5
arium	6700	51	17 AJ	71	25	39	48	10	NA	NA	NA	NA
eryllium	190	0.33 UJ	0.3 U	0.12 J	0.13 J	0.18 J	0.26 J	0.3 U	NA	NA	NA	NA
admium	45	0.61 U	0.12 U	0.04 J	0.57 U	0.59 U	0.08 J	0.12 U	NA	NA	NA	NA
alcium	NE	410 J	530 A	19000 J	4200 J	1100 J	1500 J	510	NA	NA	NA	NA
hromium	64	12	6.6 A	4.8	7.4	7.3	8	5.2	NA	NA	NA	NA
obalt	1900	4 UJ	0.5 U	1.5 J	2.4 J	1.9 J	4.2 J	0.69	NA	NA	NA	NA
opper	4100	7.6	3.4 A	7.9 J	4.9 J	5.8 J	12 J	2.2	NA	NA	NA	NA
on	100000	16000	7900 A	6800	7800	9900	12000	4700	3000	5100	9400	15000
ead	80	8.4	13 A	9.5	7.5	8.6	21	6.3	NA	NA	NA	NA
agnesium	NE	570 J	200 A	430 J	450 J	400 J	350 J	87	NA	NA	NA	NA
anganese	1900	230	39 A	220	300	99	300	74	NA	NA	NA	NA
ercury	6.2	0.03 UJ	0.1 U	0.01 UJ	0.04 UJ	0.12 U	0.28	0.095 U	NA	NA	NA	NA
ickel	2000	3.8 UJ	1 U	4.6 J	2.3 J	2.6 J	3.9 J	1.3	NA	NA	NA	NA
otassium	NE	340 J	200 U	370 J	260 J	390 J	280 J	200 U	NA	NA	NA	NA
elenium	510	1 J	0.5 U	4.2 U	4 U	0.33 R	0.51 J	0.5 U	NA	NA	NA	NA
ilver	510	0.37 R	0.5 U	1.2 U	1.1 U	1.2 U	0.35 J	0.5 U	NA	NA	NA	NA
odium	NE	100 UJ	200 U	180 J	130 J	110 J	290 J	200 U	NA	NA	NA	NA
trontium	100000	NA	4.2 A	NA	NA	NA	NA	2.5	NA	NA	NA	NA
hallium	100000	NA	37 A	NA	NA	NA	NA	27	NA	NA	NA	NA
anadium	100	25	15 A	13	14	19	17	9.4	NA	NA	NA	NA
ttrium	NE	NA	2.8 A	NA	NA	NA	NA	1.6	NA	NA	NA	NA
nc	100000	21	12 AJ	36	15	22	93	6	NA	NA	NA	NA

Subsurface Soil Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Region 9 PRG	SP01SB_0405 Apr-05 Background	SP02SB_0403 Apr-05	SP02SB_0405 Apr-05	SP03SB_0405 Apr-05	SP04SB_0405 Apr-05	SP05SB_0405 Apr-05	SP08SB_0403 Apr-05	SP10SB_0405 Apr-05	SP11SB_0405 Apr-05	SP12SB_0406 Apr-05	SP13SB_0405 Apr-05
Pesticides/PCB												
4,4'-DDD	**10000**	3.9 U	38 U	3.9 U	400 U	10 U	4.2	37 U	NA	NA	NA	NA
4,4'-DDE	**7000**	3.9 U	15 U	3.9 U	400 U	3.9 U	5.6	15 U	NA	NA	NA	NA
4,4'-DDT	**7000**	3.9 U	7.8 J	3.9 U	400 U	7.7	15 N	37 U	NA	NA	NA	NA
Aldrin	**100**	2 U	15 U	17	200 U	2 U	2 U	15 U	NA	NA	NA	NA
alpha-BHC	**360**	2 U	16	2 U	**5000**	2 U	2 U	15 U	NA	NA	NA	NA
beta-BHC	**1300**	2 U	10 J	2 U	1100	2 U	2 N	15 U	NA	NA	NA	NA
delta-BHC	NE	2 U	20	2 U	5500	2 U	2 U	19	NA	NA	NA	NA
Dieldrin	**110**	3.9 U	3.1 J	16	400 U	3.9 U	4 U	15 U	NA	NA	NA	NA
Endrin ketone	NE	3.9 U	38 U	3.9 U	400 U	4.2 N	4 U	37 U	NA	NA	NA	NA
gamma-BHC	**1700**	2 U	37	2 U	**31000**	2 U	2 U	16 J	NA	NA	NA	NA

Table 1-2
Subsurface Soil Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Region 9 PRG	SP01SB_0405 Apr-05 Background	SP14SB_0405 Apr-05	SP15SB_0405 Apr-05	SP16SB_0405 Apr-05	SP17SB_0405 Apr-05	SP18SB_0405 Apr-05	SP19SB_0405 Apr-05	SP20SB_0405 Apr-05	SP21SB_0405 Apr-05	SP22SB_0405 Apr-05
ioxon (ng/kg)											
,2,3,4,6,7,8-Heptachlorodibenzodioxin	NE	180	220	60	36	120	440	1600	120	44	34
,2,3,4,6,7,8-Heptachlorodibenzofuran	NE	11	18	2.7	1.5 J	12	47	450	20	1.8 J	2.0 J
,2,3,4,7,8,9-Heptachlorodibenzofuran	NE	0.71 U	2.1 J	0.33 U	0.34 U	0.97 J	3.5	29	1.1 J	1.1 U	0.47 U
,2,3,4,7,8-Hexachlorodibenzodioxin	NE	2.4 J	1.4 J	1.0 J	0.65 U	3.7 U	7.0	19	1.9 J	1.5 U	0.74 U
,2,3,4,7,8-Hexachlorodibenzofuran	NE	1.1 U	1.8 J	0.20 J	0.24 U	0.99 U	2.5	18	0.83 U	0.58 U	0.24 U
,2,3,6,7,8-Hexachlorodibenzodioxin	NE	4.8	4.2 U	1.6 J	0.82 J	3.6 U	15	66	4.3	1.5 U	1.2 J
,2,3,6,7,8-Hexachlorodibenzofuran	NE	0.86 J	1.2 J	0.27 U	0.25 U	0.55 U	3.0 U	15	0.76 J	0.59 U	0.26 U
,2,3,7,8,9-Hexachlorodibenzodioxin	NE	5.2	3.3 U	1.7 U	1.1 J	3.3	14	45	3.3	1.5 U	1.2 J
,2,3,7,8,9-Hexachlorodibenzofuran	NE	0.71 J	0.93 J	0.41 U	0.35 U	0.57 U	4.5 U	5.6	0.78 U	0.94 U	0.43 U
,2,3,7,8-Pentachlorodibenzodioxin	NE	1.6 U	1.1 U	0.59 U	0.56 J	1.5 U	4.1	9.8	1.6 J	0.82 U	0.30 U
,2,3,7,8-Pentachlorodibenzofuran	NE	0.22 U	0.43 J	0.16 U	0.14 U	0.17 U	0.56 J	2.2 J	0.43 U	0.29 U	0.17 U
,3,4,6,7,8-Hexachlorodibenzofuran	NE	0.84 U	2.2 J	0.34 U	0.23 U	0.75 U	3.1	23	1.2 J	0.80 U	0.29 U
,3,4,7,8-Pentachlorodibenzofuran	NE	0.46 J	0.74 U	0.12 U	0.12 U	0.32 J	0.57 J	4.7	0.58 J	0.25 U	0.13 U
,3,7,8-Tetrachlorodibenzodioxin	16	0.75 U	0.63 J	0.49 UJ	0.48 UJ	0.34 UJ	0.61 J	0.84 UR	0.43 UJ	0.54 UJ	0.45 UJ
,3,7,8-Tetrachlorodibenzofuran	NE	0.36 U	0.32 U	0.31 U	0.31 U	0.19 J	0.21 J	0.36 J	0.25 U	0.29 U	0.25 U
eptachlorodibenzodioxin (Total)	NE	410 J	490 J	150 J	90 J	270 J	920 J	2800 J	240 J	100 J	69 J
eptachlorodibenzofuran (Total)	NE	30 J	62 J	7.7 J	1.5 J	38 J	120 J	1400 J	38 J	4.0 J	4.2 J
exachlorodibenzodioxin (Total)	NE	47 J	21 J	14 J	9.8 J	23 J	110 J	380 J	31 J	1.5 UJ	6.7 J
exachlorodibenzofuran (Total)	NE	13 J	38 J	1.5 J	1.6 J	11 J	47 J	510 J	16 J	0.66 UJ	1.3 J
ctachlorodibenzodioxin	NE	12000 J	54000 J	6100 J	3600	7700 J	8800 J	16000 J	3900	4800 J	1500
ctachlorodibenzofuran	NE	26	21 J	6.2	1.7 J	28	120	1100	24	2.2 U	4.2 U
ntachlorodibenzodioxin (Total)	NE	3.3 J	3.3 J	0.70 J	1.9 J	0.93 J	13 J	45 J	3.6 J	0.82 UJ	0.47 J
ntachlorodibenzofuran (Total)	NE	2.3 J	8.4 J	0.13 UJ	0.13 UJ	0.32 J	9.6 J	99 J	3.9 J	0.27 UJ	0.15 UJ
rcent Moisture	NE	20	23	19	21	21	20	22	21	22	20
EQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	NE	5.7 J	10 J	2.6 J	2.2 J	4.2 J	11 J	36	4.4 J	3.0 J	1.6 J
EQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	NE	5.7 J	9.4 J	2.5 J	2.0 J	5.2 J	12 J	38	4.4 J	3.1 J	1.6 J
EQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	0.016	7.3 J	11 J	3.0 J	2.2 J	5.4 J	16 J	55	5.4 J	3.2 J	1.8 J
EQ (Toxic. Equiv. Value, From I-Tef/89)	0.016	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
trachlorodibenzodioxin (Total)	NE	0.75 UJ	0.63 J	0.49 UJ	0.48 UJ	0.34 UJ	1.2 J	1.6 J	0.43 UJ	0.54 UJ	0.45 UJ
trachlorodibenzofuran (Total)	NE	0.36 UJ	0.25 J	0.68 J	0.31 UJ	1.5 J	2.3 J	13 J	0.34 J	0.37 J	0.25 UJ
ctractable (ug/kg)											
2,4-Trichlorobenzene	22000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
3,4,6-Tetrachlorophenol	1800000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
4,6-Trichlorophenol	6200	390 U	420 U	380 U	420 U	410 U	420 U	430 U	420 U	420 U	410 U
Methylnaphthalene	NE	390 U	420 U	380 U	420 U	410 U	420 U	430 U	420 U	420 U	410 U
nzo(a)anthracene	2100	390 U	420 U	380 U	420 U	410 U	420 U	430 U	420 U	420 U	410 U
nzo(a)pyrene	210	390 U	420 U	380 U	420 U	410 U	420 U	430 U	420 U	420 U	410 U
nzo(b)fluoranthene	2100	390 U	420 U	380 U	420 U	410 U	420 U	430 U	420 U	420 U	410 U
nzo(k)fluoranthene	21000	390 U	420 U	380 U	420 U	410 U	420 U	430 U	420 U	420 U	410 U
rysene	210000	390 U	420 U	380 U	420 U	410 U	420 U	430 U	420 U	420 U	410 U
uoranthene	2200000	390 U	420 UJ	380 UJ	420 UJ	410 UJ	420 U	430 U	420 U	420 U	410 U
deno(1,2,3-cd)pyrene	2100	390 U	420 U	380 U	420 U	410 U	420 U	430 U	420 U	420 U	410 U
ophorone	510000	390 U	420 U	380 U	420 U	410 U	420 U	430 U	420 U	420 U	410 U
ntachlorophenol	9000	990 U	1100 U	950 U	1000 U	1000 U	1000 U	1100 U	1000 U	1100 U	1000 U

Table 1-2
Subsurface Soil Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Region 9 PRG	SP01SB_0405 Apr-05 Background	SP14SB_0405 Apr-05	SP15SB_0405 Apr-05	SP16SB_0405 Apr-05	SP17SB_0405 Apr-05	SP18SB_0405 Apr-05	SP19SB_0405 Apr-05	SP20SB_0405 Apr-05	SP21SB_0405 Apr-05	SP22SB_0405 Apr-05
Phenanthrene	NE	390 U	420 U	380 U	420 U	410 U	420 U	430 U	420 U	420 U	410 U
Pyrene	2900000	390 U	420 U	380 U	420 U	410 U	420 U	430 U	420 U	420 U	410 U
Volatiles (ug/kg)											
1,2,4-Trichlorobenzene	22000	11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	600000	11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	7900	11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	11000000	11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
4-Methyl-2-pentanone	4700000	11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	5400000	11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	53000	11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
m,p-Xylene	NE	11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	520000	2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
Trichlorofluoromethane	200000	2 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vinyl Chloride	750	11 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metals (mg/kg)											
Aluminum	100000	9600	12000	9700	9700	7500	7900	8600	6900	15000	16000
Arsenic	1.6	6	2.4	3.6	1.4	2.5	5.6	3.9	2.0	6.7	7.5
Barium	6700	51	NA	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	190	0.33 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	45	0.61 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	NE	410 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	64	12	NA	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	1900	4 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
Copper	4100	7.6	NA	NA	NA	NA	NA	NA	NA	NA	NA
Iron	100000	16000	12000	13000	7200	6900	9900	12000	7700	22000	22000
Lead	80	8.4	NA	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	NE	570 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	1900	230	NA	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	6.2	0.03 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	2000	3.8 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	NE	340 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	510	1 J	NA	NA	NA	NA	NA	NA	NA	NA	NA
Silver	510	0.37 R	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	NE	100 UJ	NA	NA	NA	NA	NA	NA	NA	NA	NA
Strontium	100000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Titanium	100000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	100	25	NA	NA	NA	NA	NA	NA	NA	NA	NA
Yttrium	NE	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	100000	21	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 1-2
Subsurface Soil Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Region 9 PRG	SP01SB_0405 Apr-05 Background	SP14SB_0405 Apr-05	SP15SB_0405 Apr-05	SP16SB_0405 Apr-05	SP17SB_0405 Apr-05	SP18SB_0405 Apr-05	SP19SB_0405 Apr-05	SP20SB_0405 Apr-05	SP21SB_0405 Apr-05	SP22SB_0405 Apr-05
sticides/PCB											
4'-DDD	**10000**	3.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
4'-DDE	**7000**	3.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
4'-DDT	**7000**	3.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
drin	**100**	2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
pha-BHC	**360**	2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
ta-BHC	**1300**	2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
ta-BHC	NE	2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
ldrin	**110**	3.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
drin ketone	NE	3.9 U	NA	NA	NA	NA	NA	NA	NA	NA	NA
mma-BHC	**1700**	2 U	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 1-2
Subsurface Soil analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

Notes:

PRG	U.S. Environmental Protection Agency Region 9 Preliminary Remedial Goals for Industrial Soil, 2004 Update
mg/kg	milligrams per kilogram
ug/kg	micrograms per kilogram
ng/kg	nanograms per kilogram
U	Analyte not detected at or above reporting limit
J	Identification of analyte is acceptable; reported value is an estimate
UJ	Analyte noted detected at or above reporting limit. Reporting limit is an estimate.
N	Presumptive evidence analyte is present; analyte reported as tentative identification
NJ	Presumptive evidence analyte is present; analyte reported as tentative identification. Reported value is an estimate.
NA	Not Analyzed
NE	Not Established
A	Analyte analzed in replicate. Reported value is "average" of replicates
R	Presence or absence of analyte can not be determined from data due to severe quality control problems. Data are rejected and considered unusable.
Blank Action Levels	Indicates standard not established
Bold Face Type	Indicates governing standard.
Shading	Indicates the governing standard as been exceeded.
Italic	Indicates a duplicate sample
Compounds	Tentatively identified compounds are shown in all CAPS

Table 1-3
Sediment Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Reg 9 PRG	Reg 4 SED SV	SP01SD_0405 Apr-05 Background	SP02SD_0405 Apr-05	SP03SD_0405 Apr-05	SP04SD_0405 Apr-05	SP05SD_0405 Apr-05	SP06SD_0405 Apr-05	SP07SD_0405 Apr-05	SP08SD_0405 Apr-05	SP09SD_0403 Apr-03	SP10SD_0403 Apr-03	SP11SD_0403 Apr-03
DIOXINS (ng/kg)													
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	NE	NE	550	71000 J	280000	44000 J	60000 J	620000	77000 J	60000 J	230000 J	92000	200000 J
1,2,3,4,6,7,8-Heptachlorodibenzofuran	NE	NE	44	13000 J	44000	9800 J	6200 J	64000	29000 J	18000 J	29000	9600	18000
1,2,3,4,7,8,9-Heptachlorodibenzofuran	NE	NE	3.4	1000	4000	810	470	3400 J	3000	1300	2500	800	1400
1,2,3,4,7,8-Hexachlorodibenzodioxin	NE	NE	6.5	870	1600 J	280	140	670 J	1300	810	130 U	500	670 UJ
1,2,3,4,7,8-Hexachlorodibenzofuran	NE	NE	3	690	3200	650	760	5700	1600	920	2000 J	710 J	1600 J
1,2,3,6,7,8-Hexachlorodibenzodioxin	NE	NE	16	3500	12000	1400	5400	43000	4400	3300	14000	6100	13000
1,2,3,6,7,8-Hexachlorodibenzofuran	NE	NE	2.3 J	600	1700 J	280	370	3000 J	1400	780	2100	850	1300 J
1,2,3,7,8,9-Hexachlorodibenzodioxin	NE	NE	21	1400	4400	570	460	3600	2300	1500	4700	1900	2800
1,2,3,7,8,9-Hexachlorodibenzofuran	NE	NE	1.4 J	210	1400 U	180	580	4400	580	280	180 U	35 U	180 U
1,2,3,7,8-Pentachlorodibenzodioxin	NE	NE	3	420	760 J	110	77	440 J	660	350	670 J	220 J	210 U
1,2,3,7,8-Pentachlorodibenzofuran	NE	NE	0.65 J	150	570 U	69	250	1900 J	180	130	490	290 J	540
2,3,4,6,7,8-Hexachlorodibenzofuran	NE	NE	3	1000	3000	440	720	5600	2100	1100	1200 J	550 J	960 J
2,3,4,7,8-Pentachlorodibenzofuran	NE	NE	1 J	270	1200 U	120	530	3900	420	240	330 J	160 U	310 UJ
2,3,7,8-Tetrachlorodibenzodioxin	3.9	**2.5**	0.77 U	**33**	110 U	**7.6**	**6.1**	170 U	**33 J**	**25 J**	91 UJ	60 U	92 UJ
2,3,7,8-Tetrachlorodibenzofuran	NE	NE	0.2 J	27	220 U	8.7	57	710	27	18	200 J	100 J	180 J
Heptachlorodibenzodioxin (Total)	NE	NE	1200 J	120000	490000 J	87000 J	90000 J	1000000 J	120000 J	100000 J	400000 J	170000 J	350000 J
Heptachlorodibenzofuran (Total)	NE	NE	130 J	36000 J	130000 J	38000 J	22000 J	160000 J	110000 J	46000 J	97000 J	33000 J	69000 J
Hexachlorodibenzodioxin (Total)	NE	NE	150 J	22000 J	49000 J	7500 J	13000 J	110000 J	23000 J	19000 J	160000 J	49000 J	110000 J
Hexachlorodibenzofuran (Total)	NE	NE	67 J	25000 J	70000 J	14000 J	22000 J	160000 J	48000 J	23000 J	87000 J	25000 J	55000 J
Octachlorodibenzodioxin	NE	NE	36000 J	200000 J	9600000 J	220000 J	170000 J	4600000	210000 J	210000 J	3800000 J	1100000 J	2400000 J
Octachlorodibenzofuran	NE	NE	43 J	12000 J	120000	25000 J	9400 J	69000	120000 J	14000 J	91000	21000	36000
Pentachlorodibenzodioxin (Total)	NE	NE	21 J	4400 J	1800 J	600 J	670 J	2700 J	2800 J	2500 J	44000 J	11000 J	25000 U
Pentachlorodibenzofuran (Total)	NE	NE	14 J	5800 J	13000 J	1500 J	4200 J	30000 J	10000 J	5600 J	32000 J	12000 J	24000 J
TEQ (Avian Toxic Equiv Value, From WHO TEQ-98)	NE	NE	13 J	1500 J	5600 J	670 J	1200 J	9800	2500 J	1400 J	NA	NA	NA
TEQ (Fish Toxic Equiv Value, From WHO TEQ-98)	NE	NE	14 J	1600 J	5100 J	670 J	900 J	7000	2600 J	1500 J	NA	NA	NA
TEQ (Mammalian Toxic Equiv Value, From WHO TEQ-98)	**0.0039**		**19 J**	**2300 J**	**8500 J**	**1100 J**	**1900 J**	**16000**	**3400 J**	**2200 J**	NA	NA	NA
TEQ (Toxic Equiv Value, From I-Tef/89)	NE	NE									9400 J	3300 J	6600 J
Tetrachlorodibenzodioxin (Total)	NE	NE	1.8 J	880 J	110 UJ	79 J	120 J	480 J	290 J	370 J	20000 J	9600 J	11000 J
Tetrachlorodibenzofuran (Total)	NE	NE	2.5 J	1100 J	1400 J	150 J	420 J	3100 J	1700 J	790 J	8300 J	3000 J	4300 J
EXTRACTABLES (ug/kg)													
2,3,4,6-Tetrachlorophenol	**180000**	NE	NA	NA	NA	NA	NA	NA	NA	NA	180 J	78 J	180 J
2-Methylnaphthalene	NE	**330**	400 U	670 U	420 U	480 U	460 U	550 U	NA	NA	35 U	18 J	32 U
Benzaldehyde	**610000**	NE	400 U	180 J	420 U	480 U	460 U	61 J	NA	NA	350 U	270 U	320 U
Benzo(a)anthracene	620	**330**	400 U	670 U	110 J	480 U	460 U	550 U	NA	NA	35 U	27 U	7.6 J
Benzo(a)pyrene	**62**	330	400 U	670 U	**88 J**	480 U	460 U	550 U	NA	NA	13 J	27 U	9.2 J
Benzo(b)fluoranthene	**620**	NE	400 U	670 U	180 J	480 U	460 U	550 U	NA	NA	13 J	27 U	14 J
Benzo(k)fluoranthene	**6200**	NE	400 U	670 U	92 J	480 U	460 U	550 U	NA	NA	9 J	27 U	14 J
Chrysene	62000	**330**	400 U	670 U	170 J	480 U	460 U	550 U	NA	NA	13 J	5.3 J	16 J
Fluoranthene	230000	**330**	400 U	670 U	140 J	480 U	460 U	69 J	NA	NA	28 J	15 J	20 J
Fluorene	270000	**330**	400 U	670 U	420 U	480 U	460 U	550 U	NA	NA	35 U	8.6 J	32 U
Hexachlorobenzene	**300**	NE	400 U	670 U	140 J	480 U	460 U	550 U	NA	NA	350 U	270 U	320 U
Indeno(1,2,3-cd)pyrene	**620**	NE	400 U	670 U	43 J	480 U	460 U	550 U	NA	NA	35 U	27 U	32 U
Naphthalene	5600	**330**	400 U	670 U	420 U	480 U	460 U	550 U	NA	NA	35 U	22 J	32 U
Pentachlorophenol	**3000**	NE	1000 U	1700 U	2000	170 J	1400	**67000**	NA	NA	2300	890	1700
Phenanthrene	NE	**330**	400 U	670 U	74 J	480 U	460 U	550 U	NA	NA	24 J	26 J	7.3 J
Pyrene	230000	**330**	400 U	670 U	250 J	56 J	460 U	110 J	NA	NA	28 J	15 J	28 J

Table 1-3
Sediment Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Reg 9 PRG	Reg 4 SED SV	SP01SD_0405 Apr-05 Background	SP02SD_0405 Apr-05	SP03SD_0405 Apr-05	SP04SD_0405 Apr-05	SP05SD_0405 Apr-05	SP06SD_0405 Apr-05	SP07SD_0405 Apr-05	SP08SD_0405 Apr-05	SP09SD_0403 Apr-03	SP10SD_0403 Apr-03	SP11SD_0403 Apr-03
olatiles (ug/kg)													
2,4-Trimethylbenzene	**5200**	NE	NA	NA	NA	NA	NA	NA	NA	NA	3 4 U	31	2 3 U
3,5-Trimethylbenzene	**2100**	NE	NA	NA	NA	NA	NA	NA	NA	NA	3 4 U	17	2 3 U
Butanone	**2200000**	NE	17 U	200	16 UJ	15 U	14 U	22 U	NA	NA	43 UJ	28 UJ	180 J
etone	**1400000**	NE	57	260	10 J	31	54	58	NA	NA	220 UJ	90 UJ	300 J
hylbenzene	**400000**	NE	17 U	35 U	16 U	15 U	14 U	22 U	NA	NA	3 4 U	1 7 J	2 2 J
opropylbenzene	**57000**	NE	17 U	35 U	16 U	15 U	14 U	22 U	NA	NA	3 4 U	1 6 J	2 3 U
p-Xylene	NE	NE	17 U	35 U	16 U	15 U	14 U	22 U	NA	NA	6 8 U	5 2	4 6 U
Propylbenzene	**240000**	NE	NA	NA	NA	NA	NA	NA	NA	NA	3 4 U	2 2	2 3 U
Xylene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	3 4 U	11	2 3 U
ercent Moisture	NE	NE	41	58	27	34	33	35	NA	NA	53	38	48
Isopropyltoluene	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	12	2.2 U	6
oluene	**520000**	NE	17 U	7 J	3 J	7 J	4 J	5 J	NA	NA	6 7	2 2 U	23
chlorofluoromethane	**39000**	NE	17 U	35 U	2 J	15 U	3 J	22 U	NA	NA	17 U	11 U	11 U
ETALS (mg/kg)													
timanum	**7800**	NE	4600	3800	5000	3300	6000	5300	NA	NA	4600	3000	3500
senic	**0.39**	7.24	**2.1**	1 J	**8.4**	**0.81 J**	**2**	**1.6**	NA	NA	**3.3**	**1.6**	**2.2**
rium	**540**	NE	70	49	76	37	33	42	NA	NA	56	43	58
ryllium	**15**	NE	0 26 UJ	0 24 UJ	0.68	0 18 UJ	0.17 UJ	0 29 UJ	NA	NA	0 45	0.3 U	0 3 U
dmium	3 7	**1**	0 75 U	0 12 UJ	0 15 UJ	0 05 UJ	0.7 U	0.09 UJ	NA	NA	0 39	0 14	0 39
lcium	NE	NE	570 J	2800 J	4600 J	2500 J	1000 J	2000 J	NA	NA	2400	1300	2200
romium	**30**	52 3	5 7	5 7	8 8	**4 8**	6	6 1	NA	NA	8 2	4 5	5 4
balt	**900**	NE	2 7 UJ	1 3 UJ	13	1 3 UJ	1 UJ	1.4 UJ	NA	NA	3 2	1 6	2 4
pper	310	**18.7**	5 1	7 3	9 6	4.3	4.4	**45**	NA	NA	16	7 3	8 3
n	**2300**	NE	**6300**	**2600**	**15000**	**3100**	**7600**	**3800**	NA	NA	**5300**	**2600**	**3400**
ad	400	**30.2**	8.7	27	**39**	14	8 5	18	NA	NA	**97**	14	21
gnesium	NE	NE	340 J	350 J	410 J	250 J	360 J	320 J	NA	NA	380	310	270
nganese	**180**	NE	**470**	150	**1800**	120	50	87	NA	NA	87	69	100
rcury	0 61	**0.13**	0.02 UJ	0 13 UJ	0.1 UJ	0 03 UJ	0 11 UJ	**0.19**	NA	NA	**0.4**	**0.37**	**0.22**
lybdenum	**39**	NE	NA	NA	NA	NA	NA	NA	NA	NA	0 6	0.59	0 56
kel	160	**15.9**	2 3 UJ	2.7 UJ	4.8 UJ	1 9 UJ	1.7 UJ	2.8 UJ	NA	NA	6 2	2 2	8 8
tassium	NE	NE	350 J	670 J	380 J	310 J	520 J	410 J	NA	NA	690	730	490
lenium	**39**	NE	5 2 U	0.63 J	0 77 J	5 3 U	0 56 J	0.62 R	NA	NA	0 5 U	0 5 U	0.5 U
ver	39	**2**	1 5 U	0.4 R	0 44 J	0 28 J	0 4 J	1 5 U	NA	NA	0 5 U	0 5 U	0 5 U
dium	NE	NE	190 UJ	350 UJ	230 UJ	190 UJ	180 UJ	270 J	NA	NA	200 U	200 U	200 U
ontium	**4700**	NE	NA	NA	NA	NA	NA	NA	NA	NA	16	11	14
nium	**10000**	NE	NA	NA	NA	NA	NA	NA	NA	NA	8 5	2 2	3 1
nadium	**78**	NE	11	6 9 J	19	7.7	13	11	NA	NA	13	8 4	9 7
num	NE	NE	NA	NA	NA	NA	NA	NA	NA	NA	5 9	3 6	4
c	2300	**124**	17	50	58	19	15	54	NA	NA	120	41	98

Table 1-3
Sediment Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	Reg 9 PRG	Reg 4 SED SV	SP01SD_0405 Apr-05 Background	SP02SD_0405 Apr-05	SP03SD_0405 Apr-05	SP04SD_0405 Apr-05	SP05SD_0405 Apr-05	SP06SD_0405 Apr-05	SP07SD_0405 Apr-05	SP08SD_0405 Apr-05	SP09SD_0403 Apr-03	SP10SD_0403 Apr-03	SP11SD_0403 Apr-03
PESTICIDES/PCB (ug/kg)													
4,4'-DDD	2400	**3.3**	4 U	6.7 UJ	17 U	4.8 U	4.6 U	5.5 UJ	NA	NA	35 U	40 U	47 U
4,4'-DDE	1700	**3.3**	4 U	6.7 UJ	**19 N**	4.8 U	4.6 U	5.5 UJ	NA	NA	14 U	16 U	19 U
4,4'-DDT	1700	**3.3**	4 U	6.7 UJ	14 U	4.8 U	4.6 U	**32 NJ**	NA	NA	35 U	40 U	47 U
Alpha-BHC	**90**	NE	2 U	26 NJ	12 U	2.4 U	2.4 U	2.8 UJ	NA	NA	14 U	16 U	19 U
Beta-BHC	**320**	NE	2 U	20 NJ	32 N	2.4 U	6 U	18 UJ	NA	NA	12 J	29	26
Delta-BHC	NE	NE	2 U	39 NJ	91	2.4 U	5.7 N	68 NJ	NA	NA	20	38	16 J
Endosulfan II	NE	NE	4 U	6.7 UJ	4.1 U	4.8 U	4.6 U	6.9 J	NA	NA	38 U	40 U	47 U
Gamma-BHC	440	**3.3**	2 U	**63 NJ**	79 U	2.4 U	2.4 U	2.8 UJ	NA	NA	14 U	16 U	19 U
Heptachlor	**110**	NE	2 U	3.4 UJ	7.5 N	2.4 U	2.4 U	2.8 UJ	NA	NA	14 U	16 U	19 U
Toxaphene	**440**	NE	200 U	340 UJ	410	240 U	240 U	280 UJ	NA	NA	1400 U	1600 U	1900 U

Table 1-3
Sediment Analytical Results 2003-2005
Flowood, Rankin County, Mississippi

Notes:

PRG	U.S. Environmental Protection Agency Region 9 Preliminary Remedial Goals for Residential Soil, 2002 Update
SSV	U.S. Environmental Protection Agency Region 4 Sediment Screening Values, 2001

mg/kg	miligrams per kilogram
ug/kg	micrograms per kilogram
ng/kg	nanograms per kilogram
U	Analyte not detected at or above reporting limit
J	Identification of analyte is acceptable: reported value is an estimate
UJ	Analyte noted detected at or above reporting limit. Reporting limit is an estimate.
N	Presumptive evidence analyte is present; analyte reported as tentative identification
NJ	Presumptive evidence analyte is present; analyte reported as tentative identification. Reported value is an estimate.
NA	Not Analyzed
NE	Not Established
A	Analyte analzed in replicate. Reported value is "average" of replicates
R	Presence or absence of analyte can not be determined from data due to severe quality control problems. Data are rejected and considered unusable.

ank Action Levels	Indicates standard not established
Bold Face Type	Indicates governing standard.
Shading	Indicates the governing standard as been exceeded.
Italic	Indicates a duplicate sample
Compounds	Tentatively identified compounds are shown in all CAPS

Table 1-4
Surface Water Analytical Results 2003-2005
Sonford Chemical Site
Flwood, Rankin County, Mississippi

	NAT SWSV	Reg 9 PRG	Reg 4 FRESH SWSV	SP01SW_0405 Apr-05 Background	SP02SW_0405 Apr-05	SP03SW_0405 Apr-05	SP04SW_0405 Apr-05	SP05SW_0405 Apr-05	SP06SW_0405 Apr-05
DIOXINS (ng/L)									
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	NE	NE	NE	0.011 U	5	100	7.8	4.5	12
1,2,3,4,6,7,8-Heptachlorodibenzofuran	NE	550	NE	0.0023 J	1	17	0.051	0.92	1.8
1,2,3,4,7,8,9-Heptachlorodibenzofuran	NE	NE	NE	0.0025 U	0.054	1.4	1.8	0.041	0.12
1,2,3,4,7,8-Hexachlorodibenzodioxin	NE	NE	NE	0.0035 U	0.062	1.9	0.086	0.061	0.084
1,2,3,4,7,8-Hexachlorodibenzofuran	NE	NE	NE	0.0022 U	0.075	1.4	0.14	0.078	0.13
1,2,3,6,7,8-Hexachlorodibenzodioxin	NE	NE	NE	0.0034 U	0.24	5.2	0.36	0.21	0.63
1,2,3,6,7,8-Hexachlorodibenzofuran	NE	NE	NE	0.0022 U	0.058	1.2	0.085	0.056	0.089
1,2,3,7,8,9-Hexachlorodibenzodioxin	NE	NE	NE	0.0035 U	0.17	3.5	0.21	0.17	0.24
1,2,3,7,8,9-Hexachlorodibenzofuran	NE	NE	NE	0.003 U	0.028	0.49	0.051	0.029	0.061
1,2,3,7,8-Pentachlorodibenzodioxin	NE	NE	NE	0.0023 U	0.036	1.4	0.059	0.037	0.051
1,2,3,7,8-Pentachlorodibenzofuran	NE	NE	NE	0.0012 U	0.01 U	0.31	0.025	0.0092 U	0.025
2,3,4,6,7,8-Hexachlorodibenzofuran	NE	NE	NE	0.0022 U	0.072	1.8	0.13	0.065	0.14
2,3,4,7,8-Pentachlorodibenzofuran	NE	NE	NE	0.0012 U	0.018 J	0.54	0.025	0.015 J	0.056
2,3,7,8-Tetrachlorodibenzodioxin	5E-09	5E-07	0.00001	0.0029 U	0.004 U	0.067	0.0076 J	0.0034 U	0.0066 J
2,3,7,8-Tetrachlorodibenzofuran	NE	NE	NE	0.0019 U	0.0018 J	0.061	0.0057	0.0015 J	0.0048
Heptachlorodibenzodioxin (Total)	NE	NE	NE	0.023 J	10 J	23 J	14 J	8.6 J	23 J
Heptachlorodibenzofuran (Total)	NE	NE	NE	0.0023 J	2.1 J	51 J	5.3 J	1.7 J	4.7 J
Hexachlorodibenzodioxin (Total)	NE	NE	NE	0.0035 UJ	1.8 J	47 J	2.1 J	1.7 J	3.8 J
Hexachlorodibenzofuran (Total)	NE	NE	NE	0.0024 UJ	1.4 J	35 J	2.8 J	1.3 J	3.1 J
Octachlorodibenzodioxin	NE	NE	NE	0.32	44 J	1400 J	120 J	30	130 J
Octachlorodibenzofuran	NE	NE	NE	0.0036 U	1.4	24 J	2.6	0.76	2.6
Pentachlorodibenzodioxin (Total)	NE	NE	NE	0.0023 UJ	0.31 J	14 J	0.34 J	0.25 J	0.76 J
Pentachlorodibenzofuran (Total)	NE	NE	NE	0.0012 UJ	0.57 J	13 J	0.74 J	0.55 J	0.95 J
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	NE	NE	NE	0.01 J	0.13	3.5	0.21	0.12	0.24
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	NE	NE	NE	0.0087 J	0.13	3.7	0.21	0.12	0.22
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	NE	0.016	NE	0.0082 J	0.19	4.6	0.29	0.17	0.36
Tetrachlorodibenzodioxin (Total)	NE	NE	NE	0.0029 UJ	0.059 J	2.3 J	0.03 J	0.029 J	0.2 J
Tetrachlorodibenzofuran (Total)	NE	NE	NE	0.0019 UJ	0.17 J	5.6 J	0.17 J	0.14 J	0.21 J
EXTRACTABLES (ug/L)									
(3-and/or 4-)Methylphenol	NE	NE	NE	10 U	10 U	10 U	12	10 U	10 U
Bis(2-ethylhexyl)phthalate	1.2	4.8	0.3	10 U	10 U	10 U	10 U	10 U	38
Butylbenzylphthalate	1500	730	22	10 U	10 U	10 U	16	10 U	10 U
Pentachlorophenol	0.27	0.56	13	25 U	5 J	13 J	25 U	8 J	3 J
Phenol	21000	1100	256	10 U	10 U	10 U	10	10 U	10 U
VOLATILES (ug/L)									
1,2-Dichlorobenzene	420	37	15.8	10 U	10 U	2 J	10 U	2 J	10 U
1,4-Dichlorobenzene	63	0.5	11.2	10 U	10 U	4 J	10 U	2 J	10 U
Acetone	NE	550	NE	10 U	10 U	23	11	12	16
Chlorobenzene	130	11	195	10 U	10 U	6 J	10 U	1 J	10 U
Toluene	1300	72	175	10 U	10 U	10 U	3 J	10 U	10 U

Table 1-4
Surface Water Analytical Results 2003-2005
Sonford Chemical Site
Flwood, Rankin County, Mississippi

	NAT SWSV	Reg 9 PRG	Reg 4 FRESH SWSV	SP01SW_0405 Apr-05 Background	SP02SW_0405 Apr-05	SP03SW_0405 Apr-05	SP04SW_0405 Apr-05	SP05SW_0405 Apr-05	SP06SW_0405 Apr-05
METALS (ug/L)									
Aluminum	NE	3600	87	870 UJ	1000 UJ	2200 J	570 UJ	1100 UJ	1100 J
Barium	NE	260	NE	30 J	31 J	70 J	85 J	50 J	38 J
Calcium	NE	NE	NE	1900 J	17000	56000	31000	19000	25000
Chromium	NE	11	11	10 U	1.4 J	7 J	1.9 J	1.9 R	1.7 J
Cobalt	NE	73	NE	50 U	50 U	50 U	5.9 J	50 U	50 U
Cyanide	140	73	5.2	10 U	10 U	10 U	10 U	10 U	100
Iron	300	1100	1000	540 J	1500 J	1500 J	11000 J	2700 J	3000 J
Lead	NE	15	1.32	10 U	2.4 R	30	7.5 J	2.5 R	3.7 J
Magnesium	NE	NE	NE	690 J	2700 J	4400 J	3500 J	3200 J	3000 J
Manganese	50	88	NE	71	240	82	2100	780	480
Nickel	610	73	87.71	40 U	40 U	2.2 R	4 J	40 U	40 U
Potassium	NE	NE	NE	1400 J	9600 J	10000 J	6000 J	12000 J	8900 J
Sodium	NE	NE	NE	3400 J	5500	9100	5900	6300	5700
Vanadium	NE	3.6	NE	1.2 J	2.3 R	6.6 J	3.2 J	4 J	2.7 J
Zinc	7400	1100	58.91	11 J	13 J	58 J	17 J	24 J	24 J
PESTICIDES/PCB (ug/L)									
alpha-BHC	0.003	0.011	500	0.05 U	0.72	0.43	0.05 U	1.1	0.38
beta-BHC	0.009	0.037	5000	0.05 U	0.29 N	0.74	0.05 U	0.5	0.22
delta-BHC	0.012	NE	NE	0.05 U	0.9	2.3	0.088	1.4	0.6
gamma-BHC	0.98	0.052	0.08	0.05 U	2.9	1.9 N	0.05 U	3.6	1.2
Heptachlor epoxide	4E-05	0.007	0.0038	0.05 U	0.05 U	0.088	0.05 U	0.05 U	0.05 U

Table 1-4
Surface Water Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

Notes:

National SWSV	National Recommended Water Quality Criteria, Human Health, Consumption of Water and Organism, 1999
PRG	U.S. Environmental Protection Agency Region 9 Preliminary Remedial Goals for Tap Water, 2004 Update
SWSV	U.S. Environmental Protection Agency, Region 4 Freshwater Surface Water Screening Values, 2001 update
µg/l	micrograms per liter
U	Analyte not detected at or above reporting limit
J	Identification of analyte is acceptable: reported value is an estimate
UJ	Analyte noted detected at or above reporting limit. Reporting limit is an estimate.
N	Presumptive evidence analyte is present; analyte reported as tentative identification
NJ	Presumptive evidence analyte is present; analyte reported as tentative identification. Reported value is an estimate.
NA	Not Analyzed
NE	Not Established
A	Analyte analzed in replicate. Reported value is "average" of replicates
R	Presence or absence of analyte can not be determined from data due to severe quality control problems. Data are rejected and considered unusable.
Blank Action Levels	Indicates standard not established
Bold Face Type	Indicates governing standard.
Shading	Indicates the governing standard as been exceeded.
Italic	Indicates a duplicate sample
Compounds	Tentatively identified compounds are shown in all CAPS

Table 1-5
Groundwater Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	MCL SMCL	Reg 9 PRG Tap Water	SP01GW_0405 Apr-05 Background	SP01MB_0405 Apr-05	SP02GW_0403 Apr-03	SP02GW_0405 Apr-05	SP03GW_0405 Apr-05	SP04GW_0403 Apr-03	SP04GW_0405 Apr-05	SP05GW_0405 Apr-05	SP06GW_0405 Apr-05
DIOXINS (ng/L)											
1,2,3,4,6,7,8-Heptachlorodibenzofuran	NE	NE	0.0028 UJ	NA	NA	0.0024 U	0.051	NA	43	110	0.22
1,2,3,4,7,8,9-Heptachlorodibenzofuran	NE	550	0.0015 U	NA	NA	0.0013 U	0.0034 U	NA	9.9	17	0.062 U
1,2,3,4,7,8-Hexachlorodibenzodioxin	NE	NE	0.0027 U	NA	NA	0.0021 U	0.0033 U	NA	1.1	1.4	0.0082 U
1,2,3,4,7,8-Hexachlorodibenzofuran	NE	NE	0.0025 U	NA	NA	0.0026 U	0.0025 U	NA	0.076	0.15	0.0035 U
1,2,3,6,7,8-Hexachlorodibenzodioxin	NE	NE	0.0017 U	NA	NA	0.0015 U	0.0014 U	NA	1.1	1.6	0.0083 U
1,2,3,6,7,8-Hexachlorodibenzofuran	NE	NE	0.0023 U	NA	NA	0.0025 U	0.0035 U	NA	2	7.8	0.012 J
1,2,3,7,8,9-Hexachlorodibenzodioxin	NE	NE	0.0017 U	NA	NA	0.0015 U	0.0013 U	NA	0.29	0.58	0.0036 U
1,2,3,7,8,9-Hexachlorodibenzofuran	NE	NE	0.0024 U	NA	NA	0.0026 U	0.0038 U	NA	0.27	0.56	0.0041 U
1,2,3,7,8-Pentachlorodibenzodioxin	NE	NE	0.0024 U	NA	NA	0.0019 U	0.0034 U	NA	0.47	1.2	0.0045 U
1,2,3,7,8-Pentachlorodibenzofuran	NE	NE	0.0013 U	NA	NA	0.002 U	0.0021 U	NA	0.046	0.055	0.002 U
2,3,4,6,7,8-Hexachlorodibenzofuran	NE	NE	0.00076 U	NA	NA	0.001 U	0.0014 U	NA	0.17	0.35	0.0019 U
2,3,4,7,8-Pentachlorodibenzofuran	NE	NE	0.0018 U	NA	NA	0.0014 U	0.0024 U	NA	0.51	1	0.0056 U
2,3,7,8-Tetrachlorodibenzodioxin	0.00003	0.00000045	0.001 U	NA	NA	0.001 U	0.0014 U	NA	0.31	0.73	0.004 U
2,3,7,8-Tetrachlorodibenzofuran	NE	NE	0.0018 U	NA	NA	0.002 U	0.0027 U	NA	0.0056 J	0.0057 U	0.0021 U
Heptachlorodibenzodioxin (Total)	NE	NE	0.0012 U	NA	NA	0.0013 U	0.0017 U	NA	0.048	0.04	0.0018 U
Heptachlorodibenzofuran (Total)	NE	NE	0.0028 U	NA	NA	0.0024 UJ	0.12 J	NA	67 J	180 J	0.39 J
Hexachlorodibenzodioxin (Total)	NE	NE	0.002 UJ	NA	NA	0.0017 UJ	0.01 J	NA	41 J	71 J	0.26 J
Hexachlorodibenzofuran (Total)	NE	NE	0.0024 UJ	NA	NA	0.0026 UJ	0.062 J	NA	5.8 J	17 J	0.031 J
Octachlorodibenzodioxin	NE	NE	0.0019 UJ	NA	NA	0.0016 UJ	0.0054 J	NA	16 J	37 J	0.13 UJ
Octachlorodibenzofuran	NE	NE	0.0055 U	NA	NA	0.012 J	0.69	NA	380 J	580 J	2.3
Pentachlorodibenzodioxin (Total)	NE	NE	0.0029 U	NA	NA	0.0028 U	0.006 U	NA	25 J	32 J	0.17
Pentachlorodibenzofuran (Total)	NE	NE	0.0013 UJ	NA	NA	0.002 UJ	0.0083 J	NA	0.27 J	0.11 J	0.002 UJ
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	NE	NE	0.001 J	NA	NA	0.001 UJ	0.0014 J	NA	2.3 J	4.7 J	0.018 J
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	NE	NE	0.0065 J	NA	NA	0.0075 J	0.0096 J	NA	0.91	1.8	0.014 J
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	NE	NE	0.0057 J	NA	NA	0.0066 J	0.008 J	NA	0.71	1.4	0.011 J
Tetrachlorodibenzodioxin (Total)	NE	0.016	0.0053 J	NA	NA	0.0061 J	0.0082 J	NA	1.3	3.1	0.014 J
Tetrachlorodibenzofuran (Total)	NE	NE	0.0018 UJ	NA	NA	0.002 UJ	0.0027 UJ	NA	0.27 J	0.0057 J	0.0021 UJ
EXTRACTABLES (ug/L)	NE	NE	0.0012 UJ	NA	NA	0.0013 UJ	0.0017 UJ	NA	0.39 J	0.26 J	0.0023 J
1,1'-Biphenyl	NE	30	5 U	NA	14 U	5 U	10 UJ	10 U	10 U	3 J	10 U
1,2,4,5-Tetrachlorobenzene	NE	1.1	5 U	NA	NA	5 U	NA	NA	NA	NA	NA
2,3,4,6-Tetrachlorophenol	NE	110		NA	14 U	NA	NA	47	NA	NA	NA
2,4,5-Trichlorophenol	NE	360	20 U	NA	14 U	20 U	25 UJ	2.5 J	23 J	24 J	3 J
2,4,6-Trichlorophenol	NE	0.36	5 U	NA	14 U	5 U	10 UJ	1.4 J	28	62	10 U
2,4-Dichlorophenol	NE	11	5 U	NA	14 U	5 U	10 UJ	10 U	10 U	10 U	4 J
2-Chloronaphthalene	NE	49	5 U	NA	14 U	5 U	10 UJ	10 U	16	21	10 U
2-Methylnaphthalene	NE	NE	5 U	NA	14 U	5 U	10 UJ	10 U	10	57	2 J
3-Nitroaniline	NE	3.2	20 U	NA	14 U	20 U	25 UJ	10 U	25 U	4 J	25 U
4,6-Dinitro-2-methylphenol	NE	NE	20 U	NA	28 U	20 U	25 UJ	20 U	340 J	25 U	12 J
Acetophenone	NE	NE	5 U	NA	14 U	5 U	10 UJ	10 U	22	87 J	1 J
Anthracene	NE	180	5 U	NA	14 U	5 U	10 UJ	10 U	10 U	2 J	10 U
Benzaldehyde	NE	360	5 U	NA	14 U	5 U	10 UJ	10 U	10 U	10 U	2 J
Bis(2-ethylhexyl)phthalate	NE	4.8	5 U	NA	14 U	5 U	16 J	10 U	10 U	10 U	10 U

Table 1-5
Groundwater Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	MCL SMCL	Reg 9 PRG Tap Water	SP01GW_0405 Apr-05 Background	SP01MB_0405 Apr-05	SP02GW_0403 Apr-03	SP02GW_0405 Apr-05	SP03GW_0405 Apr-05	SP04GW_0403 Apr-03	SP04GW_0405 Apr-05	SP05GW_0405 Apr-05	SP06GW_0405 Apr-06
Butylbenzylphthalate	NE	730	5 U	NA	14 U	5 U	26 J	10 U	10 U	10 U	10 U
Dimethylphthalate	NE	36000	5 U	NA	14 U	5 U	10 UJ	10 U	10 U	16	10 U
Isophorone	NE	71	5 U	NA	14 U	5 U	10 UJ	10 U	420 J	62	10 U
Naphthalene	NE	0.62	5 U	NA	14 U	5 U	10 UJ	10 U	14	100 J	4 J
Pentachlorophenol	1	0.56	5 U	NA	28 U	5 U	14 J	170	3900	92000	1400
Phenanthrene	NE	NE	5 U	NA	14 U	5 U	10 UJ	10 U	1 J	10 U	10 U
Phenol	NE	1100	5 U	NA	14 U	5 U	10 UJ	10 U	33	10 U	10 U
Pyrene	NE	18	5 U	NA	14 U	5 U	2 J	10 U	10 U	10 U	10 U
VOLATILES (ug/L)											
1,1,1-Trichloroethane	200	320	0.5 U	NA	1 U	0.5 U	10 U	1 U	10 U	29	10 U
1,1-Dichloroethane	NE	81	0.5 U	NA	1 U	0.5 U	10 U	1 U	3 J	2 J	10 U
1,1-Dichloroethene	7	34	0.5 U	NA	1 U	0.5 U	10 U	1 U	10 U	4 J	10 U
1,2,4-Trichlorobenzene	70	0.72	0.5 U	NA	1 U	0.5 U	10 U	1 U	10 U	1 J	10 U
1,2-Dichlorobenzene	600	37	0.5 U	NA	1 U	0.5 U	10 U	1.1 A	10 U	10 U	10 U
1,4-Dichlorobenzene	75	0.5	0.5 U	NA	1 U	0.5 U	10 U	1 U	10 U	1 J	10 U
2-Butanone	NE	700	5 U	NA	12 U	5 U	10 U	12 U	110	10 U	10 U
4-Methyl-2-pentanone	NE	200	5 U	NA	2.5 U	5 U	10 U	2.5 U	540	26	10 U
Acetone	NE	550	5 U	NA	27	5 U	10 U	25 U	2500	180	15
Benzene	5	0.35	0.5 U	NA	1 U	0.5 U	10 U	1 U	10	39	2 J
Chlorobenzene	100	11	0.5 U	NA	1 U	0.5 U	10 U	0.8 AJ	10 U	6 J	10 U
cis-1,2-Dichloroethene	70	6.1	0.5 U	NA	1 U	0.5 U	10 U	2.1 A	3 J	10 U	10 U
Cyclohexane	NE	1000	0.5 U	NA	1 U	0.5 UJ	10 U	1 U	10 U	12	10 U
Ethylbenzene	700	130	0.5 U	NA	1 U	0.5 U	10 U	1 U	19	160	6 J
m,p-Xylene	NE	NE	0.5 U	NA	1 U	0.5 U	10 U	1 U	150	930	29
Methylcyclohexane	NE	520	0.5 U	NA	1 U	0.5 UJ	10 U	1 U	10 U	10	10 U
Styrene	100	160	0.5 U	NA	1 U	0.5 U	10 U	1 U	3 J	10 U	10 U
Tetrachloroethene	5	0.1	0.5 U	NA	1 U	0.5 U	10 U	26 A	10 U	5 J	10 U
Toluene	1000	72	0.5 U	NA	1 U	0.5 U	10 U	1 U	43	860	15
Trichloroethene	5	0.028	0.5 U	NA	1 U	0.5 U	10 U	6.2 A	12	58	3 J
METALS (ug/L)											
Aluminum	200	3600	240 U	230	750 A	270 U	2100 J	880	2500 J	1100 J	470 UJ
Antimony	6	1.5	0.97 UJ	60 U	1 U	0.86 UJ	60 U	1 U	60 U	60	60 U
Arsenic	10	0.045	1 U	10 U	1.4 A	1 U	10 U	2.3	10 U	14	10 U
Barium	2000	260	1.4 J	0.32 J	34 A	2.4 J	53 J	69	72 J	210	140 J
Beryllium	4	7.3	1 U	0.2 J	3 U	1 U	0.45 UJ	3 U	0.4 UJ	0.21 UJ	0.2 UJ
Calcium	NE	NE	160 UJ	54 J	1.1 A	750 J	850 J	10	11000	35000	12000
Chromium	100	11	0.13 J	10 U	5 U	0.14 J	2.1 J	5 U	15	4.4 J	1.2 J
Cobalt	NE	73	0.03 R	50 U	5 U	0.03 J	50 U	23	50 U	11 J	4.2 J
Copper	1300	150	1.2 UJ	2.2 J	10 U	0.81 UJ	3.3 UJ	10 U	3.4 UJ	25 U	3.3 UJ
Iron	0.3	1.1	NA	NA	2 A	NA	NA	6	NA		
Iron	300	1100	100 U	100 U		100 U	1300 J		21000 J	43000 J	1200 J
Lead	15	15	0.38 J	10 U	2 U	0.16	10 U	1 U	1.8 R	10 U	10 U
Magnesium	NE	NE	31 J	5000 U	0.55 A	54 J	760 J	2.4	6700	11000	2700 J
Manganese	50	88	0.31 J	15 U	82 A	0.63 UJ	160	1100	1000	3200	290

Table 1-5
Groundwater Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

	MCL SMCL	Reg 9 PRG Tap Water	SP01GW_0405 Apr-05 Background	SP01MB_0405 Apr-05	SP02GW_0403 Apr-03	SP02GW_0405 Apr-05	SP03GW_0405 Apr-05	SP04GW_0403 Apr-03	SP04GW_0405 Apr-05	SP05GW_0405 Apr-05	SP06GW_0405 Apr-05
Nickel	NE	73	0.13 J	40 U	10 U	0 15 J	11 J	10 U	8.5 J	9.1 J	22 J
Potassium	NE	NE	760 UJ	210 J	2 U	800 UJ	980 UJ	NA	2000 J	19000 J	17000 J
Sodium	NE	NE	96000	960 J	4.3 A	100000	6200	29	58000	40000	41000
Strontium	NE	2200	NA	NA	18 A	NA	NA	82	NA	NA	NA
Thallium	2	0.24	1 U	25 U	1 U	1 U	25 U	1 U	9.9 J	12 R	25 U
Titanium	NE	NE	NA	NA	12 A	NA	NA	12	NA	NA	NA
Vanadium	NE	3.8	0 19 J	50 U	5 U	0.26 J	3.5 J	5 U	4.5 J	2.1 J	50 U
Zinc	5000	1100	2.4	60 U	27 A	3	350	21	180	10 J	100
PESTICIDES/PCB (ug/L)											
alpha-BHC	NE	0.011	0.01 U	NA	0.27 U	0.01 U	0.05 UJ	0.19 J	0.44 NJ	1.9 UJ	0.059 NJ
delta-BHC	NE	NE	0.01 U	NA	0.27 U	0.01 U	0.05 UJ	0.22 J	R	R	R
gamma-BHC	0.2	0.052	0.01 U	NA	0.27 U	0.01 U	0.05 UJ	0.36 JN	R	R	R
Heptachlor epoxide	0.2	0.0074	0.01 U	NA	0.27 U	0.01 U	0.05 UJ	0.2 U	0.05 UJ	0.54 J	0.05 UJ

Table 1-5
Groundwater Analytical Results 2003-2005
Sonford Chemical Site
Flowood, Rankin County, Mississippi

Notes:

PRG	U.S. Environmental Protection Agency Region 9 Preliminary Remedial Goals for Tap Water, 2002 Update Noncarcinogenic risk-based calculations have been divided by 10 to screen chemicals at a target Hazard Quotient (HQ) of 0.1
MCL/SMCL	U.S. Environmental Protection Agency National Primary/Secondary Drink Water Regulations (Primary Standards [Maximum Contaminate Levels or MCL]; Secondary Standards [SMCL]), July 2002, (EPA, 2002b)

µg/L	micrograms per liter
U	Analyte not detected at or above reporting limit
J	Identification of analyte is acceptable: reported value is an estimate
UJ	Analyte noted detected at or above reporting limit. Reporting limit is an estimate.
N	Presumptive evidence analyte is present; analyte reported as tentative identification
NJ	Presumptive evidence analyte is present; analyte reported as tentative identification. Reported value is an estimate.
NA	Not Analyzed
NE	Not Established
A	Analyte analzed in replicate. Reported value is "average" of replicates
R	Presence or absence of analyte can not be determined from data due to severe quality control problems. Data are rejected and considered unusable.

Blank Action Levels	Indicates standard not established
Bold Face Type	Indicates governing standard.
Shading	Indicates the governing standard as been exceeded.
Italic	Indicates a duplicate sample
Compounds	Tentatively identified compounds are shown in all CAPS

TABLE 2-1

SELECTION OF EXPOSURE PATHWAYS

Sonford Chemical Site

Flowood, Rankin County, Mississippi

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Onsite/ Offsite	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Surface Soil/Dry Sediment	Surface Soil/Dry Sediment	Onsite	Trespasser	Adolescent	Ingestion Dermal	Onsite	Quant Quant	Trespassers may be exposed to soil/dry sediment across the site.
				Industrial Worker	Adult	Ingestion Dermal	Onsite	Quant Quant	Workers may be exposed to soil/dry sediment across the site.
			Onsite/Offsite	Resident	Adult	Ingestion Dermal	Onsite/Offsite	Quant Quant	Current and future adult residents may be exposed to contaminants in onsite and offsite soils and onsite dry sediment.
					Child	Ingestion Dermal	Onsite/Offsite	Quant Quant	Current and future child residents may be exposed to contaminants in onsite and offsite soils.
		Air	Onsite	Trespasser	Adolescent	Inhalation	Onsite	Qual	Trespassers possibly exposed to airborne contaminants via fugitive dust emissions while visiting the site.
				Industrial Worker	Adult	Inhalation	Onsite	Qual	Workers possibly exposed to airborne contaminants via inhalation of fugitive dust emissions.
			Onsite/Offsite	Resident	Adult	Inhalation	Onsite	Qual	Adults possibly exposed to airborne contaminants via inhalation of VOCs or fugitive dust emissions.
					Child	Inhalation	Onsite	Qual	Children possibly exposed to airborne contaminants via inhalation of VOCs or fugitive dust emissions.
	Surface water	Surface water	Ditch/Wetlands/ Neely Creek/	Trespassers	Adolescent	Ingestion Dermal	Onsite/Offsite	Quant None	Trespassers potentially exposed to contaminants in onsite/offsite surface water.
				Resident	Adult	Ingestion Dermal	Onsite	Quant None	Residents possibly exposed to contaminants in onsite surface water that may be used for recreational or other purposes.
					Child	Ingestion Dermal	Onsite	Quant None	Residents possibly exposed to contaminants in surface water that may be used for recreational or other purposes.
				Industrial Worker	Adult	Ingestion Dermal	Onsite	Quant None	Industrial worker may clear onsite surface water bodies of debris, etc.

TABLE 2-1

SELECTION OF EXPOSURE PATHWAYS

Sonford Chemical Site

Flowood, Rankin County, Mississippi

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Onsite/ Offsite	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Surface Soil/Dry Sediment	Surface Soil/Dry Sediment	Onsite	Construction Worker	Adult	Ingestion Dermal	Onsite	Quant	Construction worker may be exposed to contaminants at the site during future construction activities onsite.
		Air	Onsite	Construction Worker	Adult	Inhalation	Onsite	Quant	Construction workers possibly exposed to airborne contaminants via inhalation of VOCs or fugitive dust emissions generated while performing excavation and construction activities onsite.
	Subsurface Soil	Subsurface soil	Onsite	Industrial Worker	Adult	Ingestion Inhalation	Onsite	Qual	Workers possibly exposed to airborne contaminants in subsurface soil brought to the surface during construction activitie onsite.
				Construction Worker	Adult	Ingestion Dermal	Onsite	Quat Quat	Construction worker may be exposed to contaminants in the subsurface while performing excavation and construction activities.
				Resident	Adult	Ingestion Dermal	Onsite	Qual Qual	Hypothetical future adult resident may be exposed to contaminants in subsurface soil brought to the surface during construction activities onsite.
					Child	Ingestion Dermal	Onsite	Qual Qual	Hypothetical future child resident may be exposed to contaminants in subsurface soil brought to the surface during construction activities onsite.
		Air	Onsite	Industrial Worker	Adult	Inhalation	Onsite	Qual	Workers possibly exposed to airborne contaminants via inhalation of fugitive dust emissions onsite.
				Construction Worker	Adult	Inhalation	Onsite	Quant	Construction workers possibly exposed to airborne contaminants via inhalation of VOCs or fugitive dust emissions generated while performing excavation and construction activities onsite.
				Resident	Adult	Inhalation	Onsite	Qual	Adults possibly exposed to airborne contaminants via inhalation of VOCs or fugitive dust emissions onsite.
					Child	Inhalation	Onsite	Qual	Children possibly exposed to airborne contaminants via inhalation of VOCs or fugitive dust emissions onsite.
	Groundwater	Groundwater	Tap Water	Resident	Adult	Ingestion Dermal	Onsite	Quant Quant	Residents may install private well onsite.
					Child	Ingestion Dermal	Onsite	Quant Quant	Residents may install private well onsite.
				Industrial Worker	Adult	Ingestion Dermal	Onsite	Quant None	Potable well may be installed onsite.
				Construction Worker	Adult	Ingestion Dermal	Onsite	Quant None	Potable well may be installed onsite.
		Air	Water Vapors at Showerhead	Resident	Adult	Inhalation	Onsite	Quant	Residents may install private well onsite.
					Child	Inhalation	Onsite	Quant	Residents may install private well onsite.

TABLE 2-2
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Sonford Chemical Site
Flowood, Rankin County, Mississippi

Scenario Timeframe:	Current/Future
Medium:	Surface Soil/Dry Sediment
Exposure Medium:	Surface Soil/Dry Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Trespasser/Visitor	Adolescent	Surface Soil/ Dry Sediment Onsite	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR x EF x ET x ED x FI x CF1 x CF2 x 1/BW x 1/AT
				IR	Ingestion Rate of Soil	100	mg/day	EPA, 1997b	
				ET	Exposure Time	2	hr/day	(1)	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	10	years	EPA, 2000	
				FI	Fraction Ingested	1	unitless	Professional Judgment	
				CF1	Conversion Factor 1	1.0E-06	kg/mg	--	
				CF2	Conversion Factor 2	1/24	days/hour	--	
				BW	Body Weight	45	kg	EPA, 1997b	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	EPA, 1989	
Dermal	Trespasser/Visitor	Adolescent	Surface Soil/ Dry Sediment Onsite	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	CDI (mg/kg-day) = CS x SA x CF1 x ABS x AF x EF x ED x 1/BW x 1/AT
				CF1	Conversion Factor 1	1.0E-06	kg/mg	--	
				SA	Skin Surface Area	3,522	cm^2	EPA, 2004a	
				AF	Soil - to - Skin Adherence Factor	0.3	mg/cm^2	EPA, 2004a	
				ABS	Absorption Factor	Chemical-Specific	--	EPA, 2004a	
				EF	Exposure Frequency	52	days/year	(1)	
				ED	Exposure Duration	10	years	EPA, 2000	
				BW	Body Weight	45	kg	EPA, 1997b	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	EPA, 1989	

Sources:

(1) Professional Judgment - assumes an adolescent trespasser/visitor visits the site once per week (52 days/yr) - between ages 7 & 16. Exposure time is assumed to be 2 hr/d (RME).

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1997b. Exposure Factors Handbook.
EPA, 2000. Region 4 Human Health Risk Assessment Bulletins: Supplement to RAGS.
EPA, 2004a. RAGS Vol. I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) interim. RME adherance factor based on Soccer #1 activity--assume face, hands, forearms, and lower legs are exposed.

TABLE 2-3
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Sonford Chemical Site
Flowood, Rankin County, Mississippi

Scenario Timeframe:	Current/Future
Medium:	Surface Water
Exposure Medium:	Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value*	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Trespasser/Visitor	Adolescent	Ditch/Wetlands Onsite	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) = CW x IR x EF x ED x ET x 1/BW x 1/AT
				IR	Ingestion Rate	0.01	L/hour	(1)	
			Neely Creek Offsite	EF	Exposure Frequency	52	days/year	(2)	
				ED	Exposure Duration	10	years	EPA, 2000	
				ET	Exposure Time	2	hour/day	(3)	
				BW	Body Weight	45	kg	EPA,1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	3,650	days	EPA, 1989	

Sources:

(1) Due to shallow water depths (1 foot or less), it was assumed that a trespasser/visitor would incidentally ingest 1/5 of the amount that is ingested while swimming (0.05 L/hour)
(2) It was assumed that an adolescent trespasser/visitor would encounter surrounding surface water once per week (52 days/year) for 10 years (ages 7-16).
(3) Professional Judgement

*Parameters on this table will be used for the Daily Intake Calculations for current trespasser/visitor exposure to shallow surface water (i.e., 1 foot or less).

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991a. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 2000. Region 4 Human Health Risk Assessment Bulletins: Supplement to RAGS.

TABLE 2-4
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Sonford Chemical Site
Flowood, Rankin County, Mississippi

Scenario Timeframe:	Current/Future
Medium:	Surface Soil/Dry Sediment
Exposure Medium:	Surface Soil/Dry Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Outdoor Worker	Adult	Surface Soil/Dry Sediment Onsite	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR x EF x ED x FI x CF1 x 1/BW x 1/AT
				IR	Ingestion Rate of Soil	100	mg/day	EPA,2001e	
				EF	Exposure Frequency	250	days/year	EPA,1997b	
				ED	Exposure Duration	25	years	EPA,1997b	
				FI	Fraction Ingested	1	unitless	Professional Judgment	
				CF1	Conversion Factor 1	1.0E-06	kg/mg	--	
				BW	Body Weight	70	kg	EPA,1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	
Dermal	Outdoor Worker	Adult	Surface Soil/Dry Sediment Onsite	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	CDI (mg/kg-day) = CS x SA x CF1 x ABS x AF x EF x ED x 1/BW x 1/AT
				CF1	Conversion Factor 1	1.0E-06	kg/mg	--	
				SA	Skin Surface Area	3,300	cm^2	EPA, 2004a	
				AF	Soil - to - Skin Adherence Factor	0.2	mg/cm^2	EPA, 2004a	
				ABS	Absorption Factor	Chemical-Specific	--	EPA, 2004a	
				EF	Exposure Frequency	250	days/year	EPA,1997b	
				ED	Exposure Duration	25	years	EPA,1997b	
				BW	Body Weight	70	kg	EPA,1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

Sources:

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991a. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 1997b. Exposure Factors Handbook.
EPA, 2004a. RAGS Vol. I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) interim. RME adherance factor based on Utility Worker--assume exposure to face, forearms, and hands.
EPA, 2001e. Supplemental Guidance for Developing Soil Screening Levels for Supefund Sites, OSWER 9355.4-24, March 2001.

TABLE 2-5
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Sonford Chemical Site
Flowood, Rankin County, Mississippi

Scenario Timeframe:	Current/Future
Medium:	Surface Water
Exposure Medium:	Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value*	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Outdoor Worker	Adult	Ditch/Wetlands Onsite	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) = CW x IR x EF x ED x ET x 1/BW x 1/AT
				IR	Ingestion Rate	0.01	L/hour	(1)	
				EF	Exposure Frequency	250	days/year	EPA,1997b	
				ED	Exposure Duration	25	years	EPA,1997b	
				ET	Exposure Time	0.16	hour/day	EPA,1997b	
				BW	Body Weight	70	kg	EPA,1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

Sources:

(1) Due to shallow water depths (1 foot or less), it was assumed that a worker would incidentally ingest 1/5 of the amount that is ingested while swimming (0.05 L/hour)
(2) Professional Judgement; work day is 8 hours/day for 250 days/year with only 10 minutes/day (0.16 hour) wading in surface water
(3) Due to shallow water depths (1 foot or less), it was assumed that the skin surface area exposed to surface water would be limited to an adult's feet, lower legs, and hands.

*Parameters on this table will be used for the Daily Intake Calculations for current/future industrial worker exposure to shallow and deep surface water.

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991a. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 1997b. Exposure Factors Handbook.

TABLE 2-6
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Sonford Chemical Site
Flowood, Rankin County, Mississippi

Scenario Timeframe:	Current/Future
Medium:	Groundwater
Exposure Medium:	Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Outdoor Worker	Adult	Monitoring Wells Tap Water	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate	1	L/day	EPA, 2000	CW x IR x EF x ED x 1/BW x 1/AT
				EF	Exposure Frequency	250	days/year	EPA, 1991a	
				ED	Exposure Duration	25	years	EPA, 1991a	
				BW	Body Weight	70	kg	EPA, 1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	9,125	days	EPA, 1989	

Sources:

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991a. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 2000. Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health Risk Assessment Bulletins.

TABLE 2-11
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Sonford Chemical Site
Flowood, Rankin County, Mississippi

Scenario Timeframe:	Future
Medium:	Surface Soil/Dry Sediment/ Subsurface Soil
Exposure Medium:	Surface Soil/Dry Sediment/ Subsurface Soil

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Construction Worker	Adult	Surface Soil/Dry Sediment	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
			Subsurface Soil	IR	Ingestion Rate of Soil	330	mg/day	EPA, 1997b	CS x IR x EF x ED x FI x CF1 x 1/BW x 1/AT
			Onsite	EF	Exposure Frequency	250	days/year	EPA, 1991a	
				ED	Exposure Duration	1	years	EPA, 1991a	
				FI	Fraction Ingested	1	unitless	Professional Judgment	
				CF1	Conversion Factor 1	1.0E-06	kg/mg	--	
				BW	Body Weight	70	kg	EPA, 1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	
Dermal	Construction Worker	Adult	Surface Soil/Dry Sediment	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	CDI (mg/kg-day) =
			Subsurface Soil	SA	Skin Surface Area	5,000	cm^2	EPA, 1997b	CS x SA x CF1 x ABS x AF x EF x EV x
			Onsite	CF1	Conversion Factor 1	1.0E-06	kg/mg	--	ED x 1/BW x 1/AT
				AF	Soil - to - Skin Adherence Factor	0.1	mg/cm^2	EPA, 2004a	
				ABS	Absorption Factor	Chemical-Specific	--	EPA, 2004a	
				EV	Event Frequency	1	events/day	EPA, 2004a	
				EF	Exposure Frequency	250	days/year	EPA, 1997b	
				ED	Exposure Duration	1	years	EPA, 1997b	
				BW	Body Weight	70	kg	EPA, 1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	

Sources:

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991a. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 1997b. Exposure Factors Handbook.
EPA, 2004a. RAGS Vol. I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) interim. RME adherance factor based on Construction Worker--assume exposure to face, forearms, and hands.

TABLE 2-12
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Sonford Chemical Site
Flowood, Rankin County, Mississippi

Scenario Timeframe:	Future
Medium:	Surface Soil/Dry Sediment/Subsurface Soil
Exposure Medium:	Particulate

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Inhalation	Construction Worker	Adult	Air Onsite	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) = (CS/PEF) x IR x EF x ED/BW x AT
				IR	Inhalation Rate	20	m3/d	EPA, 2000	
				EF	Exposure Frequency	250	days/year	EPA,1997b	
				ED	Exposure Duration	1	year	EPA,1997b	
				PEF	Particulate Emissions Factor	2.92E+06	m3/kg	EPA,2002, Appendix E	
				BW	Body Weight	70	kg	EPA,1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	

Sources:

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.

EPA, 1991a. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03

EPA, 1997b. Exposure Factors Handbook.

EPA, 2000. Region 4 Human Health Assessment Bulletins: Supplemental to RAGS

EPA, 2002. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites.

TABLE 2-13
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Sonford Chemical Site
Flowood, Rankin County, Mississippi

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Construction Worker	Adult	Monitoring Wells Tap Water	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
				IR	Ingestion Rate	1	L/day	EPA, 1991a	CW x IR x EF x ED x 1/BW x 1/AT
				EF	Exposure Frequency	250	days/year	EPA, 1991a	
				ED	Exposure Duration	1	year	(1)	
				BW	Body Weight	70	kg	EPA, 1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	365	days	EPA, 1989	

Sources:

(1) Professional Judgement

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991a. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03

TABLE 2-7
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Sonford Chemical Site
Flowood, Rankin County, Mississippi

Scenario Timeframe:	Current/Future
Medium:	Surface Soil/Dry Sediment
Exposure Medium:	Surface Soil/Dry Sediment

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Resident	Adult	Surface Soil/Dry Sediment Onsite/Offsite	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) = CS x IR x EF x ED x FI x CF1 x 1/BW x 1/AT
				IR	Ingestion Rate of Soil	100	mg/day	EPA, 1997b	
				EF	Exposure Frequency	350	days/year	EPA, 1997b	
				ED	Exposure Duration	24	years	EPA, 1997b	
				FI	Fraction Ingested	1	unitless	Professional Judgment	
				CF1	Conversion Factor 1	1.0E-06	kg/mg	--	
				BW	Body Weight	70	kg	EPA, 1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Surface Soil/Dry Sediment Onsite/Offsite	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	CDI (mg/kg-day) = CS x IR x EF x ED x FI x CF1 x 1/BW x 1/AT
				IR-S	Ingestion Rate of Soil	200	mg/day	EPA, 1997b	
				EF	Exposure Frequency	350	days/year	EPA, 1997b	
				ED	Exposure Duration	6	years	EPA, 1997b	
				FI	Fraction Ingested	1	unitless	Professional Judgment	
				CF1	Conversion Factor 1	1.0E-06	kg/mg	--	
				BW	Body Weight	15	kg	EPA, 1997b	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	
Dermal	Resident	Adult	Surface Soil/Dry Sediment Onsite/Offsite	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	CDI (mg/kg-day) = CS x SA x CF1 x ABS x AF x EF x EV ED x 1/BW x 1/AT
				CF1	Conversion Factor 1	1.0E-06	kg/mg	--	
				SA	Skin Surface Area	5,700	cm^2	EPA, 2004a	
				AF	Soil - to - Skin Adherence Factor	1.0	mg/cm^2	EPA, 2000	
				ABS	Absorption Factor	Chemical-Specific	--	EPA, 1995; 2004a	
				EF	Exposure Frequency	350	days/year	EPA, 1997b	
				ED	Exposure Duration	24	years	EPA, 1997b	
				EV	Event Frequency	1	events/day	EPA, 2004a	
				BW	Body Weight	70	kg	EPA, 1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
Dermal	Resident	Child	Surface Soil/Dry Sediment Onsite/Offsite	CS	Chemical Concentration in Soil	See Table 3	mg/kg	See Table 3	CDI (mg/kg-day) = CS x SA x CF1 x ABS x AF x EF x EV ED x 1/BW x 1/AT
				CF1	Conversion Factor 1	1.0E-06	kg/mg	--	
				SA	Skin Surface Area	2,800	cm^2	EPA, 2004a	
				AF	Soil - to - Skin Adherence Factor	1.0	mg/cm^2	EPA, 2000	
				ABS	Absorption Factor	Chemical-Specific	--	EPA, 1995; 2004a	
				EF	Exposure Frequency	350	days/year	EPA, 1997b	
				EV	Event Frequency	events/day	1	EPA, 2004a	
				ED	Exposure Duration	6	years	EPA, 1997b	
				BW	Body Weight	15	kg	EPA, 1997b	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	

Sources:

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.

EPA, 1991a. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03

EPA, 1995. Assessing Dermal Exposure from Soil, Technical Guidance Manual. EPA/903-K-95-003.

EPA, 1997b. Exposure Factors Handbook.

EPA, 2000. Region 4 Human Health Risk Assessment Bulletins: Supplement to RAGS.

EPA, 2001c: RAGS Vol. I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) interim. Adherance factors based on the Gardeners and Grounds Keeper activity, respectively. Both assume exposure to face, forearms, hands, and lower legs. Adherance factors for children playing in wet soil - face, forearms, hands, lower legs, and feet are exposed.

TABLE 2-8
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Sonford Chemical Site
Flowood, Rankin County, Mississippi

Scenario Timeframe:	Current/Future
Medium:	Surface Water
Exposure Medium:	Surface Water

Exposure Route	Receptor Population	Receptor Age	Exposure Point*	Parameter Code	Parameter Definition	Value*	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Resident	Adult	Ditch/Wetlands Onsite	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) = CW x IR x EF x ED x ET x 1/BW x 1/AT
				IR	Ingestion Rate	0.01	L/hour	(1)	
				EF	Exposure Frequency	48	days/year	(2)	
				ED	Exposure Duration	24	years	EPA,1997b	
				ET	Exposure Time	2	hour/day	(3)	
				BW	Body Weight	70	kg	EPA,1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Ditch/Wetlands Onsite	CW	Chemical Concentration in Surface Water	See Table 3	mg/L	See Table 3	CDI (mg/kg-day) = CW x IR x EF x ED x ET x 1/BW x 1/AT
				IR	Ingestion Rate	0.05	L/hour	EPA, 1989	
				EF	Exposure Frequency	48	days/year	(2)	
				ED	Exposure Duration	6	years	EPA,1997b	
				ET	Exposure Time	2	hour/day	(3)	
				BW	Body Weight	15	kg	EPA,1997b	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	

Sources:

(1) Due to shallow water depths (1 foot or less), it was assumed than an adult would incientally ingest 1/5 of the amount that is ingested while swimming (0.05 L/hour).
(2) It was assumed that the resident would wade in the surface water eight times (2 per week) per month during spring and summer (April - September).
(3) Professional Judgement

*Parameters on this table will be used for the Daily Intake Calculations for resident exposure to shallow surface water (i.e., 1 foot or less).

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991a. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 1997b. Exposure Factors Handbook.

TABLE 2-9
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Sonford Chemical Site
Flowood, Rankin County, Mississippi

Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Ingestion	Resident	Adult	Monitoring Wells	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) =
			Tap Water	IR	Ingestion Rate of Water	2	L/day	EPA, 2000	CW x IR x EF x ED x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991a	
				ED	Exposure Duration	24	years	EPA, 1991a	
				BW	Body Weight	70	kg	EPA, 1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Monitoring Wells	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	CDI (mg/kg-day) =
			Tap Water	IR	Ingestion Rate of Water	1	L/day	EPA, 2000	CW x IR x EF x ED x 1/BW x 1/AT
				EF	Exposure Frequency	350	days/year	EPA, 1991a	
				ED	Exposure Duration	6	years	EPA, 1991a	
				BW	Body Weight	15	kg	EPA, 1997b	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	

Sources:

EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991a. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 1997b. Exposure Factors Handbook.
EPA, 2000. Region 4 Human Health Risk Assessment Bulletins: Supplement to RAGS.

TABLE 2-10
VALUES USED FOR DAILY INTAKE CALCULATIONS
REASONABLE MAXIMUM EXPOSURE
Sonford Chemical Site
Flowood, Rankin County, Mississippi

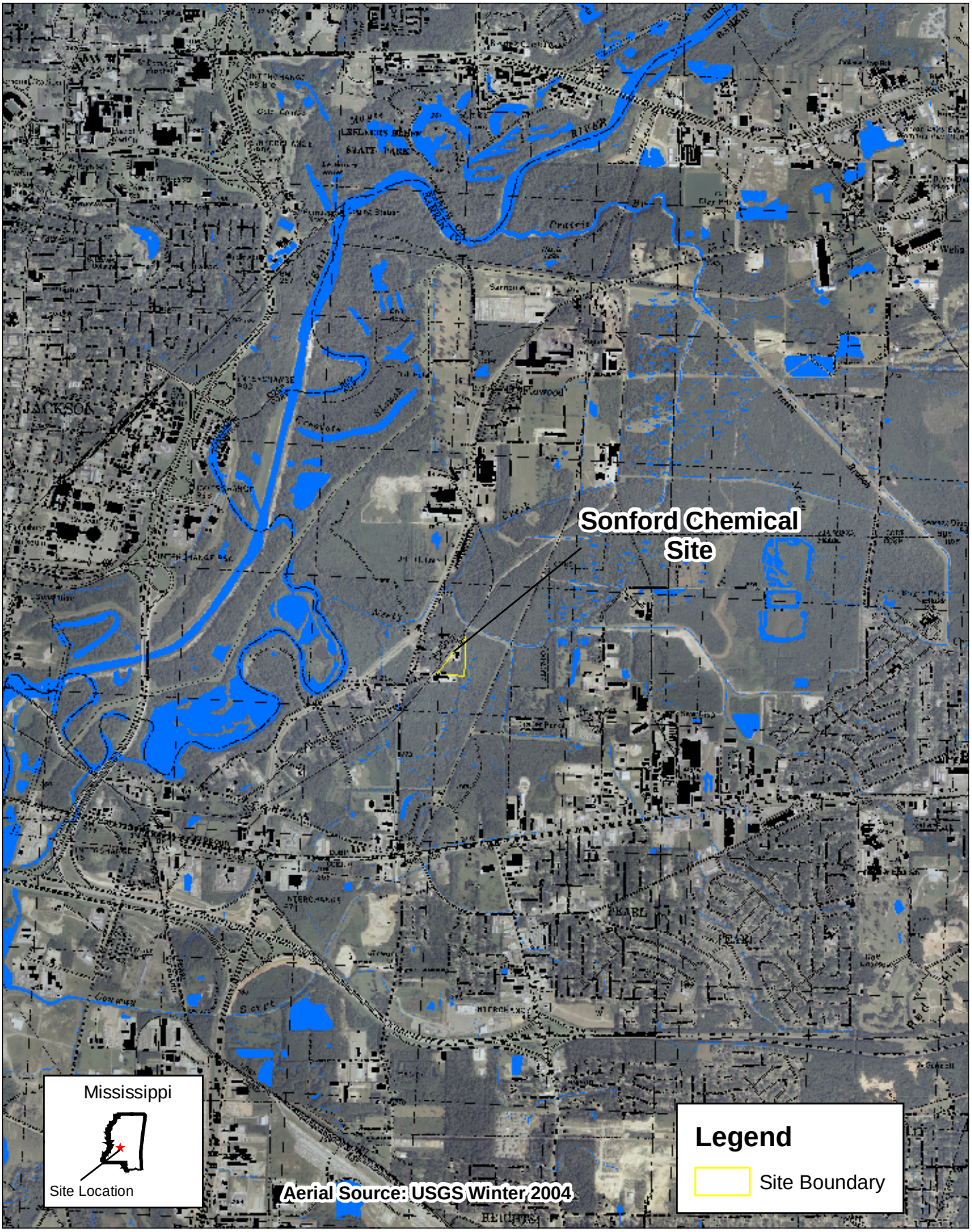
Scenario Timeframe:	Future
Medium:	Groundwater
Exposure Medium:	Groundwater

Exposure Route	Receptor Population	Receptor Age	Exposure Point	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
Inhalation of and Dermal Contact with VOCs	Resident	Adult	Monitoring Wells Tap Water	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	Chronic Daily Intake (CDI) (mg/kg-day) = CW x IR x EF x ED x 1/BW x 1/AT
				IR	Ingestion Rate of Water	2	L/day	EPA, 2000	
				EF	Exposure Frequency	350	days/year	EPA, 1991a	
				ED	Exposure Duration	24	years	EPA, 1991a	
				BW	Body Weight	70	kg	EPA, 1991a	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8,760	days	EPA, 1989	
		Child	Monitoring Wells Tap Water	CW	Chemical Concentration in Groundwater	See Table 3	mg/L	See Table 3	CDI (mg/kg-day) = CW x IR x EF x ED x 1/BW x 1/AT
				IR	Ingestion Rate of Water	1	L/day	EPA, 2000	
				EF	Exposure Frequency	350	days/year	EPA, 1991a	
				ED	Exposure Duration	6	years	EPA, 1991a	
				BW	Body Weight	15	kg	EPA, 1997b	
				AT-C	Averaging Time (Cancer)	25,550	days	EPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2,190	days	EPA, 1989	

Sources:

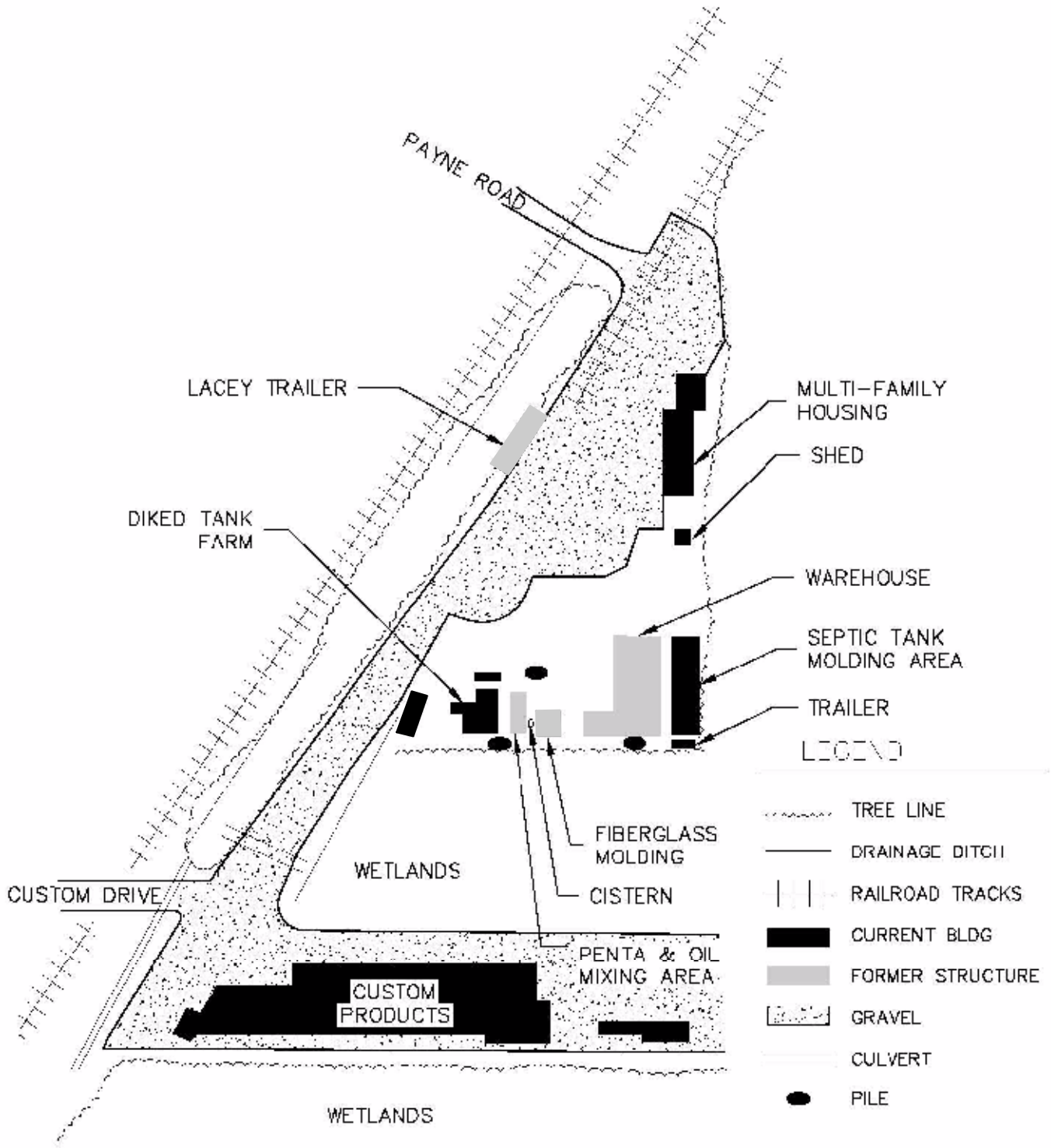
EPA, 1989. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Part A. EPA/540/1-89/002.
EPA, 1991a. Risk Assessment Guidance for Superfund. Volume I: Human Health Evaluation Manual, Supplemental Guidance, Standard Default Factors. Interim Final. OSWER Directive 9285.6-03
EPA, 1997b. Exposure Factors Handbook.
EPA, 2000. Region 4 Human Health Risk Assessment Bulletins: Supplement to RAGS.

FIGURES



Site Location Map
Sonford Chemical
Remedial Investigation / Feasibility Study
Flowood, Rankin County, Mississippi

Figure 1-1



N

0 50 100 200 300

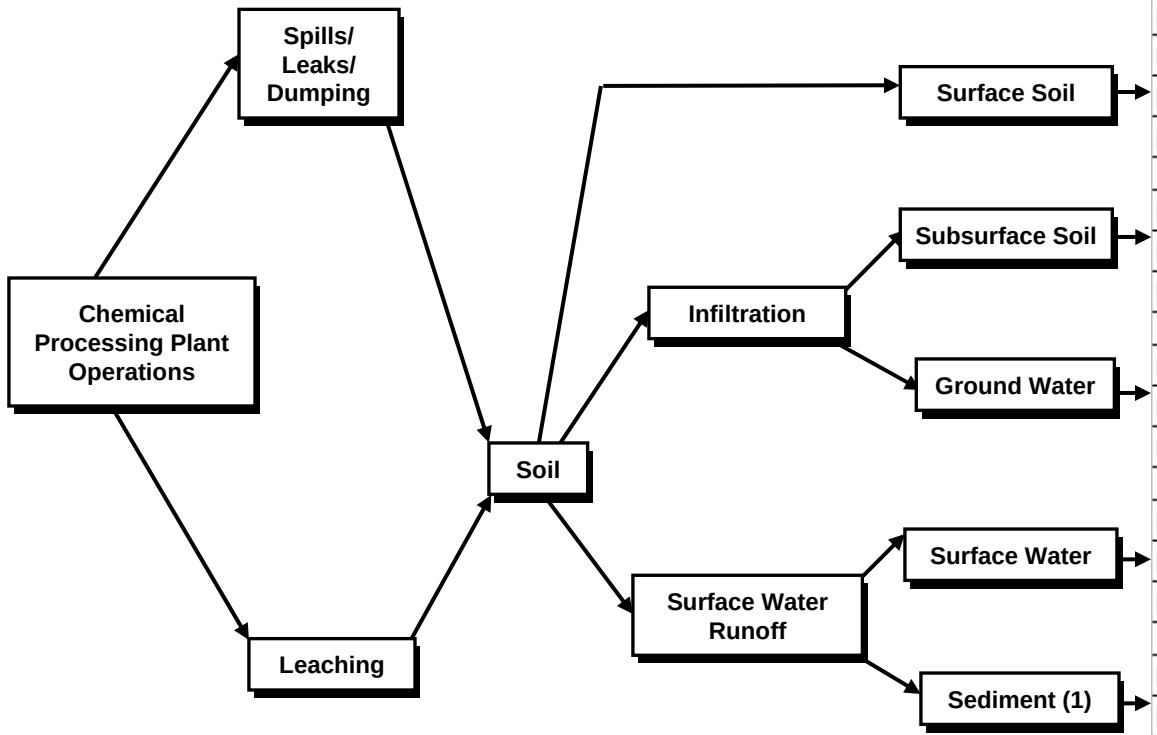
Feet

Not To Scale

Site Layout Map
Sonford Chemical
Remedial Investigation / Feasibility Study
Flowood, Rankin County, Mississippi

Figure 1-2

Figure 2-1
Human Health Conceptual Site Model
Sonford Chemical Site
Flowood, Rankin County, Mississippi



POTENTIAL HUMAN RECEPTORS												
	CURRENT					FUTURE						
	Onsite			Offsite		Onsite				Offsite		
EXPOSURE ROUTE	Resident (Child & Adult)	Trespasser	Onsite Industrial (Outdoor) Worker	Resident (Child & Adult)	Trespasser	Construction Worker	Resident (Child & Adult)	Industrial (Outdoor) Worker	Trespasser	Resident (Child & Adult)	Trespasser
Surface Soil											
Ingestion	X	X	X	X		X	X	X	X	X	
Inhalation											
Dermal Contact	X	X	X	X		X	X	X	X	X	
Subsurface Soil											
Ingestion	●		●			X	●	●			
Inhalation	●		●			X	●	●			
Dermal Contact	●		●			X	●	●			
Ground Water											
Ingestion						X	X	X			
Inhalation						●	X	●			
Dermal Contact						X	X	X			
Surface Water											
Ingestion	X	X	X		X	X	X	X	X		X
Inhalation											
Dermal Contact											
Sediment (1)											
Ingestion	X	X	X			X	X	X	X		
Inhalation	●	●	●			X	●	●	●		
Dermal Contact	X	X	X			X	X	X	X		

X Pathway was quantitatively evaluated
● Pathway was qualitatively evaluated
(1) Sediment will be evaluated as surface soil.

APPENDICES

TABLE 6
SUMMARY OF INORGANIC ANALYTICAL RESULTS
ON-SITE SURFACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background	On-site Samples								
Analyte	**PRG**	**SP-01-SS**	**SP-02-SS**	**SP-02-DSS**	**SP-03-SS**	**SP-04-SS**	**SP-05-SS**	**SP-06-SS**	**SP-07-SS**	**SP-08-SS**	**SP-09-SS**
Inorganics (mg/kg)											
Aluminum	76,000	3,800	7,700	5,400	3,800	5,200	5,000	2,900	4,300	3,500	4,700
Antimony	31	7.2 U	--	--	--	0.75 R	0.51 R	--	0.97 J	0.52 J	1.1 J
Arsenic	0.062	1.8	**6.2**	2.5	**6.2**	5.0	5.3	2.9	**9.2**	4.0	**6.0**
Barium	5,400	39	**260**	110	39	65	51	28	**230**	77	**130**
Beryllium	150	0.19 UJ	--	--	--	0.35 J	0.34 J	0.13 J	0.36 J	0.20 J	0.15 J
Cadmium	37	0.6 U	--	--	--	0.15 J	0.21 J	--	0.75	0.46 J	1.0
Calcium	NL	520 J	**38,000 J**	**29,000 J**	**8,500 J**	**3,400 J**	**2,600 J**	**2,100 J**	**8,400 J**	**6,400 J**	**19,000 J**
Chromium	210	4.5	13	9.6	12	9.7	9.2	8.4	**15**	13	13
Cobalt	900	1.2 UJ	--	--	--	**4.6 J**	**4.4 J**	2.2 J	**5.8 J**	**5.3 J**	**4.3 J**
Copper	3,100	3.7	**17**	**13**	**23**	11 J	11 J	6.9 J	**35 J**	**17 J**	**53 J**
Iron	23,000	5,300	11,000	6,300	8,400	11,000	12,000	7,700	**21,000**	9,500	13,000
Lead	150	6.9	**99**	**76**	**55**	**58**	**63**	**22**	**44**	**61**	**390**
Magnesium	NL	350 J	**2,100**	**1,700**	550 J	630 J	620	390 J	**1,300**	720	**1,700**
Manganese	1,800	69	**1300**	**220**	160	**430**	**360**	100	**1,200**	**310**	200
Nickel	1,600	2 UJ	**9.2**	**6.2**	**6.5**	5.6	5.1	3.4 J	**11**	5.3	**8.4**
Potassium	NL	210 J	580 J	450 J	420 J	380 J	360 J	550 J	**860 J**	330 J	**700 J**
Selenium	390	4.2 UJ	--	0.52 R	--	--	--	--	0.47 J	--	--
Silver	390	0.21 R	--	--	--	0.32 R	0.28 R	--	0.76 J	--	0.33 R
Sodium	NL	140 UJ	310 J	240 J	300 J	260 J	260 J	**470 J**	**680**	**1,200**	**1,200**
Total Mercury	23	0.01 UJ	--	--	--	--	--	--	**0.16**	**1.0**	**8.4**
Vanadium	78	6.5	**26**	15	15	17	18	13	**23**	13	13
Zinc	23,000	15	**95**	**79**	**99**	**65**	**64**	31	**310**	**540**	**520**

TABLE 6 (Continued)
SUMMARY OF INORGANIC ANALYTICAL RESULTS
ON-SITE SURFACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background	On-site Samples		
Analyte	**PRG**	**SP-01-SS**	**SP-09D-SS**	**SP-23-SS**	**SP-24-SS**
Inorganics (mg/kg)					
Aluminum	76,000	3,800	4,600	3,900	7,300
Antimony	31	7.2 U	1.2 R	1.5 J	0.56 R
Arsenic	0.062	1.8	**5.8**	**6.1**	**8.2**
Barium	5,400	39	89	56	47
Beryllium	150	0.19 UJ	0.12 J	0.17 J	0.27 J
Cadmium	37	0.6 U	0.92	1.0	0.10 R
Calcium	NL	520 J	**17,000 J**	9,400 J	3,600 J
Chromium	210	4.5	10	**14**	**25**
Cobalt	900	1.2 UJ	**4.2 J**	**11**	2.8 J
Copper	3,100	3.7	**49 J**	**31 J**	**18 J**
Iron	23,000	5,300	12,000	15,000	**24,000**
Lead	150	6.9	**400**	**170**	**28**
Magnesium	NL	350 J	**1,200**	660	710
Manganese	1,800	69	**210**	**260**	190
Nickel	1,600	2 UJ	**7.6**	**11**	4.8 J
Potassium	NL	210 J	630 J	**710 J**	600 J
Selenium	390	4.2 UJ	--	0.58 R	0.70 J
Silver	390	0.21 R	0.29 J	0.31 J	0.63 R
Sodium	NL	140 UJ	**1,300**	**2,500**	230 J
Total Mercury	23	0.01 UJ	**9.8**	**0.43**	--
Vanadium	78	6.5	11	12	**39**
Zinc	23,000	15	**560**	**1,200**	**81**

Notes:

SP - Sonford Products
SS - Surface Soil Sample
mg/kg - Milligrams per kilogram
NL - Constituent not listed
-- Constituent not detected
J - Estimated value
U - Constituent not detected. Number is the Sample Quantitiation Limit.
PRG - EPA Region 9 Preliminary Remediation Goal (residential soil)
Bold - Constituent is elevated 3 times above background
Shading - Constituent exceeds the PRG
R- Data is not usable.
D - Duplicate sample

TABLE 7
OFF-SITE SURFACE SOIL SAMPLES
SUMMARY OF INORGANIC ANALYTICAL RESULTS
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background	Off-site Samples								
Analyte	**PRG**	**SP-01-SS**	**SP-10-SS**	**SP-10D-SS**	**SP-11-SS**	**SP-12-SS**	**SP-13-SS**	**SP-13D-SS**	**SP-14-SS**	**SP-15-SS**	**SP-16-SS**
Inorganics (mg/kg)											
Aluminum	76,000	3,800	6,800	6,600	2,400	4,900	5,000	5,700	7,700	4,100	5,300
Arsenic	0.062	1.8	2.5	**303**	3.7	2.9	3.9	5.1	1.8	1.7	--
Iron	23,000	5,300	8,500	8,800	9,900	6,800	9,000	11,000	5,400	4,300	3,600

		Background	Off-site Samples							
	PRG	**SP-01-SS**	**SP-17-SS**	**SP-17D-SS**	**SP-18-SS**	**SP-19-SS**	**SP-19D-SS**	**SP-20-SS**	**SP-21-SS**	**SP-22-SS**
Inorganics (mg/kg)										
Aluminum	76,000	3,800	4,600	4,600	5,200	5,000	4,400	5,200	8,100	6,600
Arsenic	0.062	1.8	1.6	--	4.6	2.1	2.8	1.9	3.7	3.9
Iron	23,000	5,300	3,700	3,400	8,300	5,500	5,400	5,100	10,000	8,600

Notes:

SP - Sonford Products
SS - Surface Soil Sample
D - Duplicate sample
mg/kg - Milligrams per kilogram
NL - Constituent not listed
Shading - Constituent is elevated above the PRG
J - Estimated value
U - Constituent not detected. Number is the Sample Quantitiation Limit.
R- Data not usable
-- Constituent not detected
Bold - Constituent is elevated 3 times above background
PRG - EPA Region 9 Preliminary Remediation Goal (residential soil)

TABLE 8
ORGANIC ANALYTICAL RESULTS
SURFACE SOIL SAMPLES
SONFORD PRODUCTS, FLOWOOF, RANKIN COUNTY, MISSISSIPPI

		Background	Sonford Products Property											
Analyte	**PRG**	**SP-01-SS**	**SP-02-SS**	**SP-02D-SS**	**SP-03-SS**	**SP-04-SS**	**SP-05-SS**	**SP-06-SS**	**SP-07-SS**	**SP-08-SS**	**SP-09-SS**	**SP-09D-SS**	**SP-23-SS**	**SP-24-SS**
Volatiles (ug/kg)														
Acetone	14,000,000	10 U	--	--	--	14	--	10	--	--	--	--	--	--
Toluene	520,000	10 U	--	3 J	3 J	2 J	--	--	--	--	--	--	--	--
Extractables (ug/kg)														
2,4,5-Trichlorophenol	6,100,000	950 U	--	--	--	--	--	--	--	--	--	42 J	--	--
2,4,6-Trichlorophenol	6,100	380 U	--	--	--	--	--	--	--	--	270 J	260 J	--	--
2,4-Dichlorophenol	180,000	380 U	--	--	--	--	--	--	--	--	380 J	430	--	--
2-Methylnaphthalene	NL	380 U	--	--	--	--	--	--	--	150 J	--	--	--	--
Acenaphthene	NL	380 U	--	--	--	--	--	--	--	--	--	--	--	79 J
Acetophenone	NL	380 U	--	110 J	--	--	--	--	--	--	--	130 J	--	--
Anthracene	22,000,000	380 U	--	--	--	--	--	--	--	--	--	--	--	96 J
Benzaldehyde	6,100,000	380 U	330 J	850 J	--	190 J	--	--	280 J	--	--	--	--	100 J
Benzo(a)Anthracene	620	380 U	--	--	47 J	--	--	--	43 J	--	--	--	--	200 J
Benzo(b)Fluoranthene	620	380 U	--	--	--	--	--	--	--	--	--	--	--	220 J
Benzo(ghi)Perylene	NL	380 U	--	--	--	--	--	--	83 J	--	--	--	--	110 J
Benzo(k)Fluoranthene	6,200	380 U	--	--	--	--	--	--	--	--	--	--	--	99 J
Benzo-a-Pyrene	62	380 U	--	--	--	--	--	--	66 J	--	--	--	--	150 J
bis(2-Ethylhexyl) Phthalate	35,000	380 U	--	--	--	--	--	--	--	--	**1200**	**1200**	--	--
Carbazole	24,000	380 U	--	--	--	--	--	--	--	--	--	--	--	100 J
Chrysene	3,800	380 U	--	--	54 J	--	--	--	110 J	--	--	--	--	180 J
Dibenzofuran	150,000	380 U	--	--	--	--	--	--	--	--	--	--	--	50 J
Fluoranthene	2,300,000	380 U	--	--	70 J	--	--	--	--	--	--	--	--	480
Fluorene	2,700,000	380 U	--	--	--	--	--	--	--	--	--	--	--	71 J
Hexachlorobenzene (HCB)	300	380 U	--	--	--	--	--	--	--	59 J	**1400**	**1300**	300 J	--
Indeno (1,2,3-cd) Pyrene	620	380 U	--	--	--	--	--	--	--	--	--	--	--	110 J
Naphthalene	56,000	380 U	--	--	--	--	--	--	--	85 J	--	--	--	72 J
Pentachlorophenol	3,000	950 U	1100 J	280 J	120 J	150 J	170 J	470 J	2400	690 J	**17000**	**16000**	**4600**	1000 J
Phenanthrene	NL	380 U	--	63 J	--	--	--	--	--	56 J	48 J	54 J	49 J	390 J
Pyrene	2,300,000	380 U	--	--	78 J	--	--	--	110 J	44 J	56 J	62 J	--	330 J
Pesticides/PCB (ug/kg)														
4,4'-DDD (p,p'-DDD)	2,400	3.8 U	--	--	--	--	--	--	**91**	**60 N**	**1200 N**	--	**56 N**	--
4,4'-DDE (p,p'-DDE)	1,700	3.8 U	--	--	--	6.5	--	--	--	**28 N**	--	--	--	--
4,4'-DDT (p,p'-DDT)	1,700	3.8 U	--	--	--	--	--	--	**1200**	--	**4700**	--	**94**	--
Aldrin	29	1.9 U	--	--	--	--	4.3 N	--	--	--	--	--	--	--
alpha-BHC	90	1.9 U	--	--	--	--	--	--	--	--	**110 N**	--	--	--
alpha-Chlordane /2	NL	1.9 U	--	--	--	--	--	--	--	--	**110**	--	--	--
beta-BHC	320	1.9 U	--	--	--	--	--	--	--	--	**2600**	--	--	--
delta-BHC	NL	1.9 U	--	--	--	--	--	--	--	--	**310**	--	--	--
Dieldrin	30	3.8 U	--	--	--	5.9 N	--	--	--	--	--	--	--	--
Endosulfan I (alpha)	370,000	1.9 U	--	--	--	--	--	--	--	--	**320**	--	**27 N**	--
Endrin Aldehyde	NL	3.8 U	--	--	--	--	--	--	--	**27**	--	--	--	**19 N**
Endrin Ketone	NL	3.8 U	--	--	--	--	--	--	--	--	**230 N**	--	--	--
gamma-BHC (Lindane)	440	1.9 U	--	--	3.1	--	--	--	--	--	**1400 J**	--	--	--
gamma-Chlordane /2	NL	1.9 U	--	--	--	--	2.2	--	--	--	--	--	--	--
Heptachlor	110	1.9 U	--	--	--	--	--	--	--	--	**56 N**	--	--	--
Toxaphene	440	190 U	--	--	--	--	--	--	--	--	--	--	--	**640**

Notes:

SP - Sonford Products
SS - Surface Soil Sample
D - Duplicate sample
ug/kg - Micrograms per kilogram
NL - Constituent not listed
PCB - Polychlorinated biphenyl
PRG - EPA Region 9 Preliminary Remediation Goal (industrial soil)

J - Estimated value
U - Constituent not detected. Number is the Sample Quantitation Limit.
-- Constituent not detected
Shading - Constituent is elevated 3 times above background
Bold - Constituent is elevated above the PRG
N - Tentative identification

TABLE 9
ORGANIC ANALYTICAL RESULTS
OFF-SITE SURFACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background	Off-site Samples										
Analyte	**PRG**	**SP-01-SS**	**SP-10-SS**	**SP-10D-SS**	**SP-11-SS**	**SP-12-SS**	**SP-13-SS**	**SP-13D-SS**	**SP-14-SS**	**SP-15-SS**	**SP-16-SS**	**SP-17-SS**	**SP-17D-SS**
Volatiles (ug/kg)													
Not analyzed for.													
Extractables (ug/kg)													
Benzo(a)Anthracene	620	380 U	--	--	--	--	490	--	--	--	--	--	--
Benzo(b)Fluoranthene	620	380 U	--	--	100 J	--	540	--	--	--	--	--	--
Benzo(ghi)Perylene	NL	380 U	--	--	--	--	51 J	--	--	--	--	--	--
Benzo(k)Fluoranthene	6,200	380 U	--	--	--	--	170 J	--	--	--	--	--	--
Benzo-a-Pyrene	62	380 U	--	--	57 J	--	300 J	--	--	--	--	--	--
Chrysene	3,800	380 U	--	--	64 J	--	570	--	--	--	--	--	--
Fluoranthene	2,300,000	380 U	--	--	--	--	910	--	--	--	--	--	--
Indeno (1,2,3-cd) Pyrene	620	380 U	--	--	--	--	200 J	--	--	--	--	--	--
Pentachlorophenol	3,000	950 U	770 J	--	**3400 J**	930 J	120 J	120 J	--	--	--	--	--
Phenanthrene	NL	380 U	--	--	--	--	120 J	--	--	--	--	--	--
Pyrene	2,300,000	380 U	--	--	53 J	--	660	--	--	--	--	--	--
Pesticides/PCB (ug/kg)													
Not analyzed for.													

		Background	Off-site Samples					
Analyte	**PRG**	**SP-01-SS**	**SP-18-SS**	**SP-19-SS**	**SP-19D-SS**	**SP-20-SS**	**SP-21-SS**	**SP-22-SS**
Volatiles (ug/kg)								
Not analyzed for.								
Extractables (ug/kg)								
Benzo(a)Anthracene	620	380 U	--	--	--	--	--	--
Benzo(b)Fluoranthene	620	380 U	--	--	--	--	--	--
Benzo(ghi)Perylene	NL	380 U	--	--	--	--	--	--
Benzo(k)Fluoranthene	6,200	380 U	--	--	--	--	--	--
Benzo-a-Pyrene	62	380 U	--	--	--	--	--	--
Chrysene	3,800	380 U	--	--	--	--	--	--
Fluoranthene	2,300,000	380 U	--	--	--	--	--	--
Indeno (1,2,3-cd) Pyrene	620	380 U	--	--	--	--	--	--
Pentachlorophenol	3,000	950 U	--	--	--	--	--	--
Phenanthrene	NL	380 U	--	--	--	--	--	--
Pyrene	2,300,000	380 U	--	--	--	--	--	--
Pesticides/PCB (ug/kg)								
Not analyzed for.								

Notes:

SP - Sonford Products
SS - Surface Soil Sample
D - Duplicate sample
ug/kg - Micrograms per kilogram
NL - Constituent not listed
-- Constituent not detected
PRG - EPA Region 9 Preliminary Remediation Goal (industrial soil)
U - Constituent not detected. Number is the Sample Quantitation Limit.
PCB - Polychlorinated biphenyl
J - Estimated value
Bold - Constituent is elevated 3 times above background
Shading - Constituent is elevated above the PRG

TABLE 10
SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS
ON-SITE SURFACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

	Background	On-site Samples						
Analyte	**SP-01-SS**	**SP-02-SS**	**SP-02D-SS**	**SP-03-SS**	**SP-04-SS**	**SP-05-SS**	**SP-06-SS**	**SP-07-SS**
Dioxins/Furans (ng/kg)								
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	74	27,000 J	66,000 J	62,000 J	69,000 J	22,000	56,000 J	78,000 J
1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.2	9,200	22,000	15,000 J	17,000 J	3,400	9,900 J	10,000 J
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.85 U	890	2,200	1,200	1,900 J	350	880	1,200 J
1,2,3,4,7,8-Hexachlorodibenzodioxin	1 J	900	1,800	1,400	1,100	310	430	850 J
1,2,3,4,7,8-Hexachlorodibenzofuran	0.6 U	970	2,000	1,200	1,700	290	700	1,600
1,2,3,6,7,8-Hexachlorodibenzodioxin	2.1 J	2,800	5,900	3,900	4,400	1,100	3,000	4,000
1,2,3,6,7,8-Hexachlorodibenzofuran	0.58 U	740	1,600	980	1,000	160	460	1,100
1,2,3,7,8,9-Hexachlorodibenzodioxin	2.9	1,500	3,900	2,800	1,800	690	850	1,700 J
1,2,3,7,8,9-Hexachlorodibenzofuran	0.85 U	350	780	360	810	140	310	480
1,2,3,7,8-Pentachlorodibenzodioxin	0.64 U	1,300	1,600	860	620	300	250	1,200
1,2,3,7,8-Pentachlorodibenzofuran	0.25 U	300	350	210	300	46	130	230
2,3,4,6,7,8-Hexachlorodibenzofuran	0.66 J	1,200	2,500	1,500	1,600	260	760	1,400
2,3,4,7,8-Pentachlorodibenzofuran	0.4 U	580	640	360	540	87	250	400
2,3,7,8-Tetrachlorodibenzodioxin	0.7 U	120	130	52	48	55	16	84
2,3,7,8-Tetrachlorodibenzofuran	0.41 U	57	59	36	51	7.1	19	33
Heptachlorodibenzodioxin (Total)	180 J	45,000 J	110,000 J	110,000 J	110,000 J	36,000 J	80,000 J	120,000 J
Heptachlorodibenzofuran (Total)	11 J	26,000 J	67,000 J	43,000 J	59,000 J	11,000 J	31,000 J	38,000 J
Hexachlorodibenzodioxin (Total)	35 J	15,000 J	36,000 J	26,000 J	19,000 J	7,200 J	11,000 J	15,000 J
Hexachlorodibenzofuran (Total)	4.4 J	23,000 J	53,000 J	32,000 J	44,000 J	5,700 J	18,000 J	38,000 J
Octachlorodibenzodioxin	3,500	110,000 J	210,000 J	190,000 J	200,000 J	150,000 J	220,000 J	560,000 J
Octachlorodibenzofuran	6.4 U	9,400 J	25,000 J	11,000 J	7,700 J	3,800 J	19,000 J	25,000 J
Pentachlorodibenzodioxin (Total)	1.3 J	6,100 J	6,800 J	4,200 J	2,900 J	2,400 J	1,300 J	4,300 J
Pentachlorodibenzofuran (Total)	2.6 J	14,000 J	18,000 J	10,000 J	9,200 J	1,200 J	3,300 J	5,100 J
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	3.3 J	2,800	4,000 J	2,400 J	2,400 J	710	1,100 J	2,700 J
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	2.9 J	2,700	4,100 J	2,500 J	2,400 J	730	1,100 J	2,700 J
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	3.6 J	3,000	4,800 J	3,100 J	3,100 J	970	1,700 J	3,600 J
Tetrachlorodibenzodioxin (Total)	0.85 J	1,300 J	1,300 J	350 J	550 J	910 J	200 J	630 J
Tetrachlorodibenzofuran (Total)	0.41 U	2,700 J	2,900 J	2,200 J	1,300 J	230 J	370 J	600 J

TABLE 10 (Continued)
SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS
ON-SITE SURFACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

	Background	On-site Samples				
Analyte	**SP-01-SS**	**SP-08-SS**	**SP-09-SS**	**SP-09D-SS**	**SP-23-SS**	**SP-24-SS**
Dioxins/Furans (ng/kg)						
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	74	**240,000**	**2,600,000**	**1,700,000**	**480,000**	**33,000**
1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.2	**72,000**	**740,000**	**450,000**	**57,000**	**5,400**
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.85 U	**6,800**	**85,000**	**52,000**	**5,300**	**550**
1,2,3,4,7,8-Hexachlorodibenzodioxin	1 J	**2,100 J**	**17,000**	**13,000**	**3,900**	**760**
1,2,3,4,7,8-Hexachlorodibenzofuran	0.6 U	**3,200**	**56,000**	**33,000**	**4,000**	**800**
1,2,3,6,7,8-Hexachlorodibenzodioxin	2.1 J	**11,000**	**110,000**	**77,000**	**19,000**	**2,900**
1,2,3,6,7,8-Hexachlorodibenzofuran	0.58 U	**2,000 J**	**23,000**	**15,000**	**2,100 J**	**490**
1,2,3,7,8,9-Hexachlorodibenzodioxin	2.9	**5,200**	**38,000**	**29,000**	**9,900**	**1,200**
1,2,3,7,8,9-Hexachlorodibenzofuran	0.85 U	**1,200 J**	**22,000**	**12,000**	**2,000 J**	**440**
1,2,3,7,8-Pentachlorodibenzodioxin	0.64 U	**1,400 J**	**940 J**	**6,600**	**2,200 J**	**880**
1,2,3,7,8-Pentachlorodibenzofuran	0.25 U	--	**6,100**	**3,100**	**690 J**	**190**
2,3,4,6,7,8-Hexachlorodibenzofuran	0.66 J	**3,300**	**39,000**	**24,000**	**3,600**	**800**
2,3,4,7,8-Pentachlorodibenzofuran	0.4 U	**780 J**	**9,900**	**5,600**	**1,300 J**	**370**
2,3,7,8-Tetrachlorodibenzodioxin	0.7 U	**190 J**	--	**510 J**	--	**150**
2,3,7,8-Tetrachlorodibenzofuran	0.41 U	--	**650**	**350 J**	--	**43**
Heptachlorodibenzodioxin (Total)	180 J	**440,000 J**	**4,300,000 J**	**2,800,000 J**	**870,000 J**	**57,000 J**
Heptachlorodibenzofuran (Total)	11 J	**240,000 J**	**2,900,000 J**	**1,600,000 J**	**170,000 J**	**18,000 J**
Hexachlorodibenzodioxin (Total)	35 J	**57,000 J**	**370,000 J**	**290,000 J**	**110,000 J**	**16,000 J**
Hexachlorodibenzofuran (Total)	4.4 J	**78,000 J**	**980,000 J**	**570,000 J**	**84,000 J**	**20,000 J**
Octachlorodibenzodioxin	3,500	**5,600,000 J**	**48,000,000**	**35,000,000 J**	**14,000,000 J**	**230,000 J**
Octachlorodibenzofuran	6.4 U	**290,000**	**1,800,000**	**1,100,000**	**140,000**	**9,200 J**
Pentachlorodibenzodioxin (Total)	1.3 J	**6,400 J**	**36,000 J**	**33,000 J**	**17,000 J**	**6,900 J**
Pentachlorodibenzofuran (Total)	2.6 J	**13,000 J**	**120,000 J**	**78,000 J**	**12,000 J**	**4,600 J**
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	3.3 J	**5,900 J**	**48,000**	**36,000**	**9,200 J**	**2,000**
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	2.9 J	**5,800 J**	**47,000**	**36,000**	**9,200 J**	**2,000**
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	3.6 J	**8,600 J**	**77,000**	**56,000**	**14,000 J**	**2,400**
Tetrachlorodibenzodioxin (Total)	0.85 J	**190 J**	**2,400 J**	**4,000 J**	**1,300 J**	**2,300 J**
Tetrachlorodibenzofuran (Total)	0.41 U	**1,200 J**	**16,000 J**	**11,000 J**	**1,000 J**	**1,100 J**

Notes:
SP - Sonford Products
SS - Surface Soil
ng/kg - Nanograms per Kilogram
-- Constituent not Detected
J - Estimated value
U - Constituent not detected. Number is the Sample Quantitiation Limit.
Bold - Constituent is elevated 3 times above background
D - Duplicate

TABLE 11
SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS
OFF-SITE SURFACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

	Background	Off-site Samples				
Analyte	**SP-01-SS**	**SP-10-SS**	**SP-10D-SS**	**SP-11-SS**	**SP-12-SS**	**SP-13-SS**
Dioxins/Furans (ng/kg)						
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	74	140,000	84,000	380,000	69,000	210,000
1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.2	19,000	12,000	51,000	12,000	53,000
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.85 U	1,600	1,100	3,600	1,300	3,100
1,2,3,4,7,8-Hexachlorodibenzodioxin	1 J	700	400	2,700	320	2,000
1,2,3,4,7,8-Hexachlorodibenzofuran	0.6 U	1,400	--	3,300	1,200	2,100
1,2,3,6,7,8-Hexachlorodibenzodioxin	2.1 J	7,400	4,500	20,000	6,400	8,000
1,2,3,6,7,8-Hexachlorodibenzofuran	0.58 U	980	--	2,200	620	1,900
1,2,3,7,8,9-Hexachlorodibenzodioxin	2.9	1,500	960	6,600	720	4,200
1,2,3,7,8,9-Hexachlorodibenzofuran	0.85 U	--	--	1,600	660	--
1,2,3,7,8-Pentachlorodibenzodioxin	0.64 U	380	220	1,700	210	840
1,2,3,7,8-Pentachlorodibenzofuran	0.25 U	--	--	710	440	--
2,3,4,6,7,8-Hexachlorodibenzofuran	0.66 J	1,400	--	3,600	1,100	2,700
2,3,4,7,8-Pentachlorodibenzofuran	0.4 U	--	--	1,600	890	--
2,3,7,8-Tetrachlorodibenzodioxin	0.7 U	--	--	--	22	--
2,3,7,8-Tetrachlorodibenzofuran	0.41 U	--	--	--	99	--
Heptachlorodibenzodioxin (Total)	180 J	240,000	140,000	670,000	100,000	370,000
Heptachlorodibenzofuran (Total)	11 J	58,000	35,000	140,000	41,000	120,000
Hexachlorodibenzodioxin (Total)	35 J	24,000	15,000	82,000	17,000	51,000
Hexachlorodibenzofuran (Total)	4.4 J	34,000	22,000	87,000	29,000	63,000
Octachlorodibenzodioxin	3,500	3,100,000	2,100,000	8,600,000	190,000	2,900,000
Octachlorodibenzofuran	6.4 U	64,000	30,000	120,000	19,000	120,000
Pentachlorodibenzodioxin (Total)	1.3 J	1,200	350	8,000	1,800	9,000
Pentachlorodibenzofuran (Total)	2.6 J	7,100	3,900	19,000	9,100	14,000
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	3.3 J	2,700	1,800	7,700	2,000	4,200
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	2.9 J	2,400	1,500	7,200	1,500	4,200
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	3.6 J	4,200	2,600	12,000	2,600	6,400
Tetrachlorodibenzodioxin (Total)	0.85 J	--	--	370	370	420
Tetrachlorodibenzofuran (Total)	0.41 U	630	520	2,300	960	2,500

TABLE 11 (Continued)
SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS
OFF-SITE SUFRACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

	Background	Off-site Samples				
Analyte	**SP-01-SS**	**SP-13D-SS**	**SP-14-SS**	**SP-15-SS**	**SP-16-SS**	**SP-17-SS**
Dioxins (ng/kg)						
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	74	170,000	13,000	15,000	6,200	9,600
1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.2	42,000	4,300	1,700	750	1,200
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.85 U	2,400	450	110	50	84
1,2,3,4,7,8-Hexachlorodibenzodioxin	1 J	1,700	480	230	110	160
1,2,3,4,7,8-Hexachlorodibenzofuran	0.6 U	1,700	430	70	33	55
1,2,3,6,7,8-Hexachlorodibenzodioxin	2.1 J	5,800	1,400	480	220	350
1,2,3,6,7,8-Hexachlorodibenzofuran	0.58 U	1,400	240	61	29	47
1,2,3,7,8,9-Hexachlorodibenzodioxin	2.9	3,700	860	400	210	330
1,2,3,7,8,9-Hexachlorodibenzofuran	0.85 U	--	190	15	7.9	12
1,2,3,7,8-Pentachlorodibenzodioxin	0.64 U	660	230	100	51	76
1,2,3,7,8-Pentachlorodibenzofuran	0.25 U	--	74	10	5.2	7.4
2,3,4,6,7,8-Hexachlorodibenzofuran	0.66 J	2,000	540	91	43	73
2,3,4,7,8-Pentachlorodibenzofuran	0.4 U	--	140	18	6.6	11
2,3,7,8-Tetrachlorodibenzodioxin	0.7 U	--	21	7.4	3.9	6.4
2,3,7,8-Tetrachlorodibenzofuran	0.41 U	--	13	3.5	1.6	1.9
Heptachlorodibenzodioxin (Total)	180 J	300,000	21,000	30,000	13,000	19,000
Heptachlorodibenzofuran (Total)	11 J	98,000	13,000	4,300	1,800	3,200
Hexachlorodibenzodioxin (Total)	35 J	40,000	8,400	3,500	1,700	2,600
Hexachlorodibenzofuran (Total)	4.4 J	47,000	10,000	1,700	700	1,300
Octachlorodibenzodioxin	3,500	2,300,000	97,000	110,000	83,000	110,000
Octachlorodibenzofuran	6.4 U	93,000	6,300	3,500	2,000	2,700
Pentachlorodibenzodioxin (Total)	1.3 J	6,600	1,400	480	180	320
Pentachlorodibenzofuran (Total)	2.6 J	11,000	2,400	380	120	200
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	3.3 J	3,400	750	250	130	190
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	2.9 J	3,400	800	310	150	230
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	3.6 J	5,100	930	430	200	310
Tetrachlorodibenzodioxin (Total)	0.85 J	600	250	48	16	33
Tetrachlorodibenzofuran (Total)	0.41 U	1,700	340	61	14	27

TABLE 11 (Continued)
SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS
OFF-SITE SUFRACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

	Background	Off-site Samples				
Analyte	**SP-01-SS**	**SP-17D-SS**	**SP-18-SS**	**SP-19-SS**	**SP-19D-SS**	**SP-20-SS**
Dioxins (ng/kg)						
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	74	8,700	8,000	37,000	34,000	3,800
1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.2	1,100	880	10,000	10,000	440
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.85 U	74	67	680	600	28
1,2,3,4,7,8-Hexachlorodibenzodioxin	1 J	150	110	510	480	65
1,2,3,4,7,8-Hexachlorodibenzofuran	0.6 U	47	40	440	410	20
1,2,3,6,7,8-Hexachlorodibenzodioxin	2.1 J	290	260	1,700	1,600	140
1,2,3,6,7,8-Hexachlorodibenzofuran	0.58 U	41	36	370	350	18
1,2,3,7,8,9-Hexachlorodibenzodioxin	2.9	290	210	920	810	130
1,2,3,7,8,9-Hexachlorodibenzofuran	0.85 U	9.5	11	120	120	4.5
1,2,3,7,8-Pentachlorodibenzodioxin	0.64 U	63	55	260	220	31
1,2,3,7,8-Pentachlorodibenzofuran	0.25 U	7	6.6	57	56	2.9
2,3,4,6,7,8-Hexachlorodibenzofuran	0.66 J	62	54	620	580	25
2,3,4,7,8-Pentachlorodibenzofuran	0.4 U	9.7	10	110	110	4.5
2,3,7,8-Tetrachlorodibenzodioxin	0.7 U	5.2	4.9	17	15	3
2,3,7,8-Tetrachlorodibenzofuran	0.41 U	1.6	1.9	11	10	0.72
Heptachlorodibenzodioxin (Total)	180 J	17,000	18,000	63,000	58,000	7,400
Heptachlorodibenzofuran (Total)	11 J	2,800	2,400	33,000	31,000	1,100
Hexachlorodibenzodioxin (Total)	35 J	2,200	1,900	9,800	8,900	1,100
Hexachlorodibenzofuran (Total)	4.4 J	1,100	960	17,000	15,000	450
Octachlorodibenzodioxin	3,500	100,000	86,000	160,000	150,000	61,000
Octachlorodibenzofuran	6.4 U	2,800	1,600	38,000	29,000	700
Pentachlorodibenzodioxin (Total)	1.3 J	250	250	1,200	1,100	140
Pentachlorodibenzofuran (Total)	2.6 J	180	160	2,900	2,700	73
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	3.3 J	170	140	850	790	78
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	2.9 J	200	160	940	860	93
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	3.6 J	270	240	1,300	1,200	120
Tetrachlorodibenzodioxin (Total)	0.85 J	20	22	140	120	13
Tetrachlorodibenzofuran (Total)	0.41 U	21	24	430	410	9.6

TABLE 11 (Continued)
SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS
OFF-SITE SUFRACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

	Background	Off-Site Samples	
Analyte	**SP-01-SS**	**SP-21-SS**	**SP-22-SS**
Dioxins (ng/kg)			
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	74	**5,500**	**6,800**
1,2,3,4,6,7,8-Heptachlorodibenzofuran	4.2	**620**	**720**
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.85 U	**44**	**48**
1,2,3,4,7,8-Hexachlorodibenzodioxin	1 J	**90**	**90**
1,2,3,4,7,8-Hexachlorodibenzofuran	0.6 U	**28**	**26**
1,2,3,6,7,8-Hexachlorodibenzodioxin	2.1 J	**180**	**220**
1,2,3,6,7,8-Hexachlorodibenzofuran	0.58 U	**21**	**25**
1,2,3,7,8,9-Hexachlorodibenzodioxin	2.9	**180**	**180**
1,2,3,7,8,9-Hexachlorodibenzofuran	0.85 U	**7.6**	**5.8**
1,2,3,7,8-Pentachlorodibenzodioxin	0.64 U	**43**	**38**
1,2,3,7,8-Pentachlorodibenzofuran	0.25 U	**5**	**3.4**
2,3,4,6,7,8-Hexachlorodibenzofuran	0.66 J	**32**	**37**
2,3,4,7,8-Pentachlorodibenzofuran	0.4 U	**7.3**	**5.4**
2,3,7,8-Tetrachlorodibenzodioxin	0.7 U	**3.3**	--
2,3,7,8-Tetrachlorodibenzofuran	0.41 U	1.1	0.93
Heptachlorodibenzodioxin (Total)	180 J	**11,000**	**14,000**
Heptachlorodibenzofuran (Total)	11 J	**1,600**	**1,800**
Hexachlorodibenzodioxin (Total)	35 J	**1,400**	**1,700**
Hexachlorodibenzofuran (Total)	4.4 J	**570**	**590**
Octachlorodibenzodioxin	3,500	**79,000**	**84,000**
Octachlorodibenzofuran	6.4 U	**950**	**1,200**
Pentachlorodibenzodioxin (Total)	1.3 J	**180**	**190**
Pentachlorodibenzofuran (Total)	2.6 J	**78**	**110**
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	3.3 J	**110**	**100**
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	2.9 J	**130**	**130**
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	3.6 J	**170**	**190**
Tetrachlorodibenzodioxin (Total)	0.85 J	**7.3**	**11**
Tetrachlorodibenzofuran (Total)	0.41 U	**8.4**	**14**

Notes:

SP - Sonford Products

SS - Surface Soil Sample

D - Duplicate sample

ng/kg - Nanograms per kilogram

-- Constituent not detected

Bold - Constituent is elevated 3 times above background

J - Estimated value

U - Constituent not detected. Number is the Sample Quantitiation Limit.

TABLE 12
SUMMARY OF INORGANIC ANALYTICAL RESULTS
ON-SITE SUBSURFACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background	On-site Samples			
Analyte	**PRG**	**SP-01-SB**	**SP-02-SB**	**SP-03-SB**	**SP-04-SB**	**SP-05-SB**
Metals (mg/kg)						
Aluminum	76,000	9,600	3,200	4,000	4,200	4,200
Arsenic	0.062	6.0	2.3	2.6	3.8	4.5
Barium	5,400	51	71	25	39	48
Beryllium	150	0.33 UJ	0.12 J	0.13 J	0.18 J	0.26 J
Cadmium	37	0.61 U	0.04 J	--	--	0.08 J
Calcium	NL	410 J	**19,000 J**	**4,200 J**	1,100 J	**1,500 J**
Chromium	210	12	4.8	7.4	7.3	8.0
Cobalt	900	4 UJ	1.5 J	2.4 J	1.9 J	4.2 J
Copper	3,100	7.6	7.9 J	4.9 J	5.8 J	12 J
Iron	23,000	16,000	6,800	7,800	9,900	12,000
Lead	150	8.4	9.5	7.5	8.6	21
Magnesium	NL	570 J	430 J	450 J	400 J	350 J
Manganese	1,800	230	220	300	99	300
Nickel	1,600	3.8 UJ	4.6 J	2.3 J	2.6 J	3.9 J
Potassium	NL	340 J	370 J	260 J	390 J	280 J
Selenium	390	1.0 J	--	--	0.33 R	0.51 J
Silver	390	0.37 R	--	--	--	0.35 J
Sodium	NL	100 UJ	180 J	130 J	110 J	290 J
Total Mercury	23	0.03 UJ	--	--	--	**0.28**
Vanadium	78	25	13	14	19	17
Zinc	23,000	21	36	15	22	**93**

Notes:

SP - Sonford Products
SB - Subsurface Soil Sample
mg/kg - Milligrams per kilogram
NL - Constituent not listed
-- Constituent not detected
U - Constituent not detected. Number is the Sample Quantitiation Limit.
PRG - EPA Region 9 Preliminary Remediation Goal (residential soil)
Bold - Constituent is elevated 3 times above background
Shading - Constituent exceeds the PRG
R- Data is not usable.
J - Estimated value.

TABLE 13
SUMMARY OF INORGANIC ANALYTICAL RESULTS
OFF-SITE SUBSURFACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background	Off-site Samples						
Analyte	**PRG**	**SP01SB**	**SP10SB**	**SP11SB**	**SP12SB**	**SP13SB**	**SP14SB**	**SP15SB**	**SP16SB**
Metals (mg/kg)									
Aluminum	76,000	9,600	4,800	7,000	10,000	10,000	12,000	9,700	9,700
Arsenic	0.062	6.0	--	--	2.9	5.5	2.4	3.6	1.4
Iron	23,000	16,000	3,000	5,100	9,400	15,000	12,000	13,000	7,200

		Background	Off-site Samples					
Analyte	**PRG**	**SP01SB**	**SP17SB**	**SP18SB**	**SP19SB**	**SP20SB**	**SP21SB**	**SP22SB**
Metals (mg/kg)								
Aluminum	76,000	9,600	7,500	7,900	8,600	6,900	15,000	16,000
Arsenic	0.062	6.0	2.5	5.6	3.9	2.0	6.7	7.5
Iron	23,000	16,000	6,900	9,900	12,000	7,700	22,000	22,000

Notes:

SP - Sonford Products
SB - Subsurface Soil Sample
mg/kg - Milligrams per kilogram
-- Constituent not detected
PRG - EPA Region 9 Preliminary Remediation Goal (residential soil)
Shading - Constituent exceeds the PRG

TABLE 14
SUMMARY OF ORGANIC ANALYTICAL RESULTS
ON-SITE SUBSURFACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background	On-Site Samples			
Analyte	**PRG**	**SP-01-SB**	**SP-02-SB**	**SP-03-SB**	**SP-04-SB**	**SP-05-SB**
Volatiles (ug/kg)						
1,2,4-Trichlorobenzene	62,000	11 U	--	2 J	--	--
1,2-Dichlorobenzene	600,000	11 U	--	1 J	--	--
1,4-Dichlorobenzene	3,400	11 U	--	4 J	--	--
Acetone	14,000,000	11 U	**350 J**	**55**	17	--
Chlorobenzene	150,000	11 U	--	1 J	--	--
Methyl Ethyl Ketone	2,200,000	11 U	28	--	--	--
Methyl Isobutyl Ketone	5,300,000	11 U	3 J	2 J	--	--
Toluene	520,000	2 J	4 J	**6 J**	--	--
Total Xylenes	270,000	11 U	2 J	--	--	--
Trichlorofluoromethane (Freon 11)	390,000	2 J	--	**10 J**	--	--
Extractables (ug/kg)						
2-Methylnaphthalene	NL	390 U	51 J	--	--	--
2,4,6-Trichlorophenol	6,100	390 U	--	**9,500 J**	94 J	--
Benzo(a)Anthracene	620	390 U	--	--	--	88 J
Benzo(b)Fluoranthene	620	390 U	--	--	--	140 J
Benzo(k)Fluoranthene	6,200	390 U	--	--	--	55 J
Benzo-a-Pyrene	62	390 U	--	--	--	75 J
Chrysene	3,800	390 U	--	--	--	97 J
Fluoranthene	2,300,000	390 U	41 J	--	--	150 J
Indeno (1,2,3-cd) Pyrene	620	390 U	--	--	--	69 J
Isophorone	510,000	390 U	--	1,100 J	--	--
Pentachlorophenol	3,000	390 U	--	**230,000 J**	**5,300**	**2,700**
Phenanthrene	NL	390 U	62 J	--	--	--
Pyrene	2,300,000	390 U	42 J	--	--	130 J
Pesticides/PCB (ug/kg)						
4,4'-DDD (p,p'-DDD)	2,400	3.9 U	--	--	--	4
4,4'-DDE (p,p'-DDE)	1,700	3.9 U	--	--	--	6
4,4'-DDT (p,p'-DDT)	1,700	3.9 U	--	--	8	**15 N**
Aldrin	29	2 U	**17**	--	--	--
alpha-BHC	90	2 U	--	**5,000**	--	--
beta-BHC	320	2 U	--	**1,100**	--	2 N
delta-BHC	NL	2 U	--	**5,500**	--	--
Dieldrin	30	3.9 U	**16**	--	--	--
Endrin Ketone	NL	3.9 U	--	--	4 N	--
gamma-BHC (Lindane)	440	2 U	--	**31,000**	--	--

Notes:

SP - Sonford Products
SS - Surface Soil sample
D - Duplicate sample
ug/kg - Micrograms per kilogram
NL - Constituent not listed
PCB - Polychlorinated biphenyl

J - Estimated value
U - Constituent not detected. Number is the Sample Quantitiation Limit.
-- Constituent not detected
Bold - Constituent is elevated 3 times above background
Shading - Constituent is elevated above the PRG
PRG - EPA Region 9 Preliminary Remediation Goal (industrial soil)

TABLE 15
SUMMARY OF ORGANIC ANALYTICAL RESULTS
OFF-SITE SUBSURFACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background	Off-site Samples		
Analyte	**PRG**	**SP-01-SB**	**SP-12-SB**	**SP-17-SB**	**SP-19-SB**
Volatiles					
Not analyzed for.					
Extractables (µg/kg)					
None Detected					
Pesticides / Polychlorinated Biphenyls					
Not analyzed for.					

Notes:

SP - Sonford Products
SB - Subsurface Soil Sample
ug/kg - Micrograms per kilogram
PRG - EPA Region 9 Preliminary Remediation Goal (residential soil)

TABLE 16
SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS
ON-SITE SUBSURFACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

	Background	On-site Samples			
Analyte	**SP-01-SB**	**SP-02-SB**	**SP-03-SB**	**SP-04-SB**	**SP-05-SB**
Dioxans (ng/kg)					
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	180	**630**	**78,000**	**12,000**	**67,000 J**
1,2,3,4,6,7,8-Heptachlorodibenzofuran	11	**290**	**20,000**	**2,300**	**14,000 J**
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.71 U	**11**	**2,000**	**300**	**1,300**
1,2,3,4,7,8-Hexachlorodibenzodioxin	2.4 J	**7.4**	**480**	**88**	**890**
1,2,3,4,7,8-Hexachlorodibenzofuran	1.1 U	**13**	**1,800**	**210**	**900**
1,2,3,6,7,8-Hexachlorodibenzodioxin	4.8	**24**	**6,000**	**780**	**4,000**
1,2,3,6,7,8-Hexachlorodibenzofuran	0.86 J	**9.1**	**800**	**100**	**590**
1,2,3,7,8,9-Hexachlorodibenzodioxin	5.2	14	**1,200**	**180**	**1,600**
1,2,3,7,8,9-Hexachlorodibenzofuran	0.71 J	**3.9**	**710**	**130**	**360**
1,2,3,7,8-Pentachlorodibenzodioxin	1.6 U	4.7	**210**	**63**	**660**
1,2,3,7,8-Pentachlorodibenzofuran	0.22 U	**2.1 J**	**500**	**50**	**130**
2,3,4,6,7,8-Hexachlorodibenzofuran	0.84 U	**15**	**1,400**	**220**	**980**
2,3,4,7,8-Pentachlorodibenzofuran	0.46 J	**8.0**	**870**	**110**	**260**
2,3,7,8-Tetrachlorodibenzodioxin	0.75 U	**0.68**	**10**	--	**66**
2,3,7,8-Tetrachlorodibenzofuran	0.36 U	0.54	**210**	**8.0**	**40**
Heptachlorodibenzodioxin (Total)	410 J	**1,300 J**	**120,000 J**	**20,000 J**	**100,000 J**
Heptachlorodibenzofuran (Total)	30 J	**630 J**	**76,000 J**	**12,000 J**	**48,000 J**
Hexachlorodibenzodioxin (Total)	47 J	**210 J**	**20,000 J**	**2,500 J**	**19,000 J**
Hexachlorodibenzofuran (Total)	13 J	**310 J**	**40,000 J**	**6,100 J**	**24,000 J**
Octachlorodibenzodioxin	12,000 J	8,500 J	**430,000 J**	**87,000 J**	**210,000 J**
Octachlorodibenzofuran	26	**160**	**47,000 J**	**11,000 J**	**28,000 J**
Pentachlorodibenzodioxin (Total)	3.3 J	**48 J**	**1,200 J**	**250 J**	**3,700 J**
Pentachlorodibenzofuran (Total)	2.3 J	**83 J**	**8,000 J**	**930 J**	**4,600 J**
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	5.7 J	**25**	**2,400**	**340**	**1,800 J**
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	5.7 J	**22**	**1,800**	**300**	**1,900 J**
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	7.3 J	**28**	**3,000**	**450**	**2,800 J**
Tetrachlorodibenzodioxin (Total)	0.75 UJ	**12 J**	**180 J**	**65 J**	**900 J**
Tetrachlorodibenzofuran (Total)	0.36 UJ	**26 J**	**1,500 J**	**100 J**	**860 J**

Notes:

SP - Sonford Products
SB - Subsurface Soil Sample
ng/kg - Nanograms per kilogram
-- Constituent not detected
U - Constituent not detected. Number is the Sample Quantitiation Limit.
Bold - Constituent is elevated 3 times above background
J - Estimated Value

TABLE 17
SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS
OFF-SITE SUBSURFACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

	Background	Off-site Samples				
Analytes	**SP-01-SB**	**SP-10-SB**	**SP-11-SB**	**SP-12-SB**	**SP-13-SB**	**SP-14-SB**
Dioxans (ng/kg)						
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	180	**2,800**	**1,000**	**1,800**	**1,700**	220
1,2,3,4,6,7,8-Heptachlorodibenzofuran	11	**570**	**120**	**360**	**430**	18
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.71 U	**76**	**11**	**58**	**29**	2.1 J
1,2,3,4,7,8-Hexachlorodibenzodioxin	2.4 J	**18**	6.5	4.8	**17**	1.4 J
1,2,3,4,7,8-Hexachlorodibenzofuran	1.1 U	**62**	**13**	**35**	**22**	1.8 J
1,2,3,6,7,8-Hexachlorodibenzodioxin	4.8	**160**	**70**	**120**	**78**	--
1,2,3,6,7,8-Hexachlorodibenzofuran	0.86 J	**30**	**7.5**	**17**	**18**	1.2 J
1,2,3,7,8,9-Hexachlorodibenzodioxin	5.2	**48**	**18**	**17**	**43**	--
1,2,3,7,8,9-Hexachlorodibenzofuran	0.71 J	**25**	**8.4**	**18**	**7.9**	0.93 J
1,2,3,7,8-Pentachlorodibenzodioxin	1.6 U	**7.8**	**6.0**	4.3	**9.9**	--
1,2,3,7,8-Pentachlorodibenzofuran	0.22 U	**14**	**4.3**	**9.6**	**2.7**	0.43 J
2,3,4,6,7,8-Hexachlorodibenzofuran	0.84 U	**51**	**14.3**	**33**	**28**	2.2 J
2,3,4,7,8-Pentachlorodibenzofuran	0.46 J	**28**	**9.7**	**17**	**6.2**	--
2,3,7,8-Tetrachlorodibenzodioxin	0.75 U	0.61 J	0.78 J	0.62 J	--	0.63 J
2,3,7,8-Tetrachlorodibenzofuran	0.36 U	**2.7**	**1.2**	**1.6**	0.56	--
Heptachlorodibenzodioxin (Total)	410 J	**4,800 J**	**1,700 J**	**3,000 J**	**3,000 J**	490 J
Heptachlorodibenzofuran (Total)	30 J	**2,300 J**	**410 J**	**1,500 J**	**1,300 J**	62 J
Hexachlorodibenzodioxin (Total)	47 J	**560 J**	**250 J**	**350 J**	**460 J**	21 J
Hexachlorodibenzofuran (Total)	13 J	**1,300 J**	**330 J**	**760 J**	**620 J**	38 J
Octachlorodibenzodioxin	12,000 J	36,000	14,000 J	16,000 J	20,000 J	**54,000 J**
Octachlorodibenzofuran	26	**1,300**	**260**	**890**	**900**	21 J
Pentachlorodibenzodioxin (Total)	3.3 J	**38 J**	**24 J**	**79 J**	**87 J**	3.3 J
Pentachlorodibenzofuran (Total)	2.3 J	**260 J**	**92 J**	**200 J**	**140 J**	**8.4 J**
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	5.7 J	**77**	**29**	**45**	**40**	10 J
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	5.7 J	**64**	**24**	**36**	**40**	9.4 J
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	7.3 J	**101**	**38**	**62**	**60**	11 J
Tetrachlorodibenzodioxin (Total)	0.75 UJ	**3.5 J**	**4.5 J**	**4.6 J**	**19 J**	0.63 J
Tetrachlorodibenzofuran (Total)	0.36 UJ	**28 J**	**12 J**	**19 J**	**33 J**	0.25 J

TABLE 17 (Continued)
SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS
OFF-SITE SUBSURFACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

	Background	Off-site Samples				
Analytes	**SP-01-SB**	**SP-15-SB**	**SP-16-SB**	**SP-17-SB**	**SP-18-SB**	**SP-19-SB**
Dioxans (ng/kg)						
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	180	60	36	120	440	**1,600**
1,2,3,4,6,7,8-Heptachlorodibenzofuran	11	2.7	1.5 J	12	**47**	**450**
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.71 U	--	--	0.97 J	**3.5**	**29**
1,2,3,4,7,8-Hexachlorodibenzodioxin	2.4 J	1.0 J	--	--	7.0	**19**
1,2,3,4,7,8-Hexachlorodibenzofuran	1.1 U	0.20 J	--	--	2.5	**18**
1,2,3,6,7,8-Hexachlorodibenzodioxin	4.8	1.6 J	0.82 J	--	**15**	**66**
1,2,3,6,7,8-Hexachlorodibenzofuran	0.86 J	--	--	--	--	**15**
1,2,3,7,8,9-Hexachlorodibenzodioxin	5.2	--	1.1 J	3.3	14	**45**
1,2,3,7,8,9-Hexachlorodibenzofuran	0.71 J	--	--	--	--	**5.6**
1,2,3,7,8-Pentachlorodibenzodioxin	1.6 U	--	0.56 J	--	4.1	**9.8**
1,2,3,7,8-Pentachlorodibenzofuran	0.22 U	--	--	--	0.56 J	**2.2 J**
2,3,4,6,7,8-Hexachlorodibenzofuran	0.84 U	--	--	--	**3.1**	**23**
2,3,4,7,8-Pentachlorodibenzofuran	0.46 J	--	--	0.32 J	0.57 J	**4.7**
2,3,7,8-Tetrachlorodibenzodioxin	0.75 U	--	--	--	0.61 J	--
2,3,7,8-Tetrachlorodibenzofuran	0.36 U	--	--	0.19 J	0.21 J	0.36 J
Heptachlorodibenzodioxin (Total)	410 J	150 J	90 J	270 J	920 J	**2,800 J**
Heptachlorodibenzofuran (Total)	30 J	7.7 J	1.5 J	38 J	**120 J**	**1,400 J**
Hexachlorodibenzodioxin (Total)	47 J	14 J	9.8 J	23 J	110 J	**380 J**
Hexachlorodibenzofuran (Total)	13 J	1.5 J	1.6 J	11 J	**47 J**	**510 J**
Octachlorodibenzodioxin	12,000 J	6,100 J	3,600	7,700 J	8,800 J	16,000 J
Octachlorodibenzofuran	26	6.2	1.7 J	28	**120**	**1,100**
Pentachlorodibenzodioxin (Total)	3.3 J	0.70 J	1.9 J	0.93 J	**13 J**	**45 J**
Pentachlorodibenzofuran (Total)	2.3 J	--	--	0.32 J	**9.6 J**	**99 J**
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	5.7 J	2.6 J	2.2 J	4.2 J	11 J	**36**
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	5.7 J	2.5 J	2.0 J	5.2 J	12 J	**38**
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	7.3 J	3.0 J	2.2 J	5.4 J	16 J	**55**
Tetrachlorodibenzodioxin (Total)	0.75 UJ	--	--	--	1.2 J	1.6 J
Tetrachlorodibenzofuran (Total)	0.36 UJ	0.68 J	--	**1.5 J**	**2.3 J**	**13 J**

TABLE 17 (Continued)
SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS
OFF-SITE SUBSURFACE SOIL SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

	Background	Off-site Samples		
Analytes	**SP-01-SB**	**SP-20-SB**	**SP-21-SB**	**SP-22-SB**
Dioxans (ng/kg)				
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	180	120	44	34
1,2,3,4,6,7,8-Heptachlorodibenzofuran	11	20	1.8 J	2.0 J
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.71 U	1.1 J	--	--
1,2,3,4,7,8-Hexachlorodibenzodioxin	2.4 J	1.9 J	--	--
1,2,3,4,7,8-Hexachlorodibenzofuran	1.1 U	--	--	--
1,2,3,6,7,8-Hexachlorodibenzodioxin	4.8	4.3	--	1.2 J
1,2,3,6,7,8-Hexachlorodibenzofuran	0.86 J	0.76 J	--	--
1,2,3,7,8,9-Hexachlorodibenzodioxin	5.2	3.3	--	1.2 J
1,2,3,7,8,9-Hexachlorodibenzofuran	0.71 J	--	--	--
1,2,3,7,8-Pentachlorodibenzodioxin	1.6 U	1.6 J	--	--
1,2,3,7,8-Pentachlorodibenzofuran	0.22 U	--	--	--
2,3,4,6,7,8-Hexachlorodibenzofuran	0.84 U	1.2 J	--	--
2,3,4,7,8-Pentachlorodibenzofuran	0.46 J	0.58 J	--	--
2,3,7,8-Tetrachlorodibenzodioxin	0.75 U	--	--	--
2,3,7,8-Tetrachlorodibenzofuran	0.36 U	--	--	--
Heptachlorodibenzodioxin (Total)	410 J	240 J	100 J	69 J
Heptachlorodibenzofuran (Total)	30 J	38 J	4.0 J	4.2 J
Hexachlorodibenzodioxin (Total)	47 J	31 J	--	6.7 J
Hexachlorodibenzofuran (Total)	13 J	16 J	--	1.3 J
Octachlorodibenzodioxin	12,000 J	3,900	4,800 J	1,500
Octachlorodibenzofuran	26	24	--	--
Pentachlorodibenzodioxin (Total)	3.3 J	3.6 J	--	0.47 J
Pentachlorodibenzofuran (Total)	2.3 J	3.9 J	--	--
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	5.7 J	4.4 J	3.0 J	1.6 J
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	5.7 J	4.4 J	3.1 J	1.6 J
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	7.3 J	5.4 J	3.2 J	1.8 J
Tetrachlorodibenzodioxin (Total)	0.75 UJ	--	--	--
Tetrachlorodibenzofuran (Total)	0.36 UJ	0.34 J	0.37 J	--

Notes:

SP - Sonford Products

SB - Subsurface Soil Sample

-- Constituent not detected

ng/kg - Nanograms per kilogram

NL - Constituent not listed

Bold - Constituent is elevated 3 times above background

J - Estimated value

U - Constituent not detected. Number is the Sample Quantitiation Limit.

TABLE 18
SUMMARY OF INORGANIC ANALYTICAL RESULTS
SEDIMENT SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background							
Analytes	**RAGS**	**SP-01-SD**	**SP-02-SD**	**SP-03-SD**	**SP-04-SD**	**SP-05-SD**	**SP-06-SD**	**SP-07-SD**	**SP-08-SD**
Metals (mg/kg)									
Aluminum	NL	4,600	3,800	5,000	3,300	6,000	5,300	5,300	5,900
Arsenic	7.24	2.1	1.0 J	**8.4**	0.81 J	2.0	1.6	--	1.8
Barium	NL	70	49	76	37	33	42	--	--
Beryllium	NL	0.26 UJ	--	0.68	--	--	--	--	--
Calcium	NL	570 J	**2,800 J**	**4,600 J**	**2,500 J**	1,000 J	**2,000 J**	--	--
Chromium	52.3	5.7	5.7	8.8	4.8	6.0	6.1	--	--
Cobalt	NL	2.7 UJ	--	**13**	--	--	--	--	--
Copper	18.7	5.1	7.3	9.6	4.3	4.4	**45**	--	--
Iron	NL	6,300	2,600	15,000	3,100	7,600	3,800	3,100	5,400
Lead	30.2	8.7	**27**	**39**	14	8.5	18	--	--
Magnesium	NL	340 J	350 J	410 J	250 J	360 J	320 J	--	--
Manganese	NL	470	150	**1,800**	120	50	67	--	--
Potassium	NL	350 J	670 J	360 J	310 J	520 J	410 J	--	--
Selenium	NL	5.2 U	0.63 J	0.77 J	--	0.56 J	0.52 R	--	--
Silver	2	1.5 U	0.40 R	0.44 J	0.28 J	0.40 J	--	--	--
Sodium	NL	190 UJ	--	--	--	--	270 J	--	--
Total Mercury	0.13	0.02 UJ	--	--	--	--	**0.19**	--	--
Vanadium	NL	11	6.9 J	19	7.7	13	11	--	--
Zinc	124	17	50	**58**	19	15	**54**	--	--

Notes:

SP - Sonford Products
SD - Sediment Sample
mg/kg - Milligrams per kilogram
NL - Constituent not listed
-- Constituent not detected
U - Constituent not detected. Number is the Sample Quantitiation Limit.
RAGS - Risk Assessment Guidance for Superfund
Bold - Constituent is elevated 3 times above background
Shading - Constituent exceeds the RAGS
R - Data is not usable.
J - Estimated value

TABLE 19
SUMMARY OF ORGANIC ANALYTICAL RESULTS
SEDIMENT SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background						
Analyte	**RAGS**	**SP-01-SD**	**SP-02-SD**	**SP-03-SD**	**SP-04-SD**	**SP-05-SD**	**SP-06-SD**	**SP-07-SD**
Volatiles (ug/kg)								
Acetone	NL	57	**260**	10 J	31	54	58	--
Methyl Ethyl Ketone	NL	17 U	**200**	--	--	--	--	--
Toluene	NL	17 U	7 J	3 J	7 J	4 J	5 J	--
Trichlorofluoromethane (Freon 11)	NL	17 U	--	2 J	--	3 J	--	--
Extractables (ug/kg)								
Benzaldehyde	NL	400 U	180 J	--	--	--	61 J	--
Benzo(a)Anthracene	330	400 U	--	110 J	--	--	--	--
Benzo(b)Fluoranthene	NL	400 U	--	180 J	--	--	--	--
Benzo(k)Fluoranthene	NL	400 U	--	92 J	--	--	--	--
Benzo-a-Pyrene	330	400 U	--	88 J	--	--	--	--
Chrysene	330	400 U	--	170 J	--	--	--	--
Fluoranthene	330	400 U	--	140 J	--	--	69 J	--
Hexachlorobenzene (HCB)	NL	400 U	--	140 J	--	--	--	--
Indeno (1,2,3-cd) Pyrene	NL	400 U	--	43 J	--	--	--	--
Pentachlorophenol	NL	1,000 U	--	2,000	170 J	1,400	**67,000**	--
Phenanthrene	330	400 U	--	74 J	--	--	--	--
Pyrene	330	400 U	--	250 J	56 J	--	110 J	--
Pesticides/PCBs (ug/kg)								
4,4'-DDE (P,P'-DDE)	3.3	4 U	--	**19 N**	--	--	--	--
4,4'-DDT (P,P'-DDT)	3.3	4 U	--	--	--	--	**32 NJ**	--
Alpha-BHC	NL	2 U	**26 NJ**	--	--	--	--	--
Beta-BHC	NL	2 U	**20 NJ**	**32 N**	--	--	--	--
Delta-BHC	NL	2 U	**39 NJ**	**91**	--	**5.7 N**	**68 NJ**	--
Endosulfan II (Beta)	NL	2 U	--	--	--	--	**6.9 J**	--
Gamma-BHC (Lindane)	3.3	2 U	**63 NJ**	--	--	--	--	--
Heptachlor	NL	2 U	--	**7.5 N**	--	--	--	--
Toxaphene	NL	200 U	--	410	--	--	--	--

Notes:

SP - Sonford Products
SD - Sediment Sample
ug/kg - Micrograms per kilogram
NL - Constituent not listed
-- Constituent not detected
U - Constituent not detected. Number is the Sample Quantitiation Limit.
RAGS - Risk Assessment Guidance for Superfund
Bold - Constituent is elevated 3 times above background
Shading - Constituent exceeds the RAGS
N - Tentative identification
J - Estimated value

TABLE 20
SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS
SEDIMENT SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

	Background					
Analyte	**SP-01-SD**	**SP-02-SD**	**SP-03-SD**	**SP-04-SD**	**SP-05-SD**	**SP-06-SD**
Dioxins (ng/kg)						
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	550	**71,000 J**	**280,000**	**44,000 J**	**60,000 J**	**620,000**
1,2,3,4,6,7,8-Heptachlorodibenzofuran	44	**13,000 J**	**44,000**	**9,800 J**	**6,200 J**	**54,000**
1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.4	**1,000**	**4,000**	**810**	**470**	**3,400 J**
1,2,3,4,7,8-Hexachlorodibenzodioxin	6.5	**870**	**1,600 J**	**280**	**140**	**670 J**
1,2,3,4,7,8-Hexachlorodibenzofuran	3.0	**690**	**3,200**	**650**	**760**	**5,700**
1,2,3,6,7,8-Hexachlorodibenzodioxin	16	**3,500**	**12,000**	**1,400**	**5,400**	**43,000**
1,2,3,6,7,8-Hexachlorodibenzofuran	2.3 J	**600**	**1,700 J**	**280**	**370**	**3,000 J**
1,2,3,7,8,9-Hexachlorodibenzodioxin	21	**1,400**	**4,400**	**570**	**460**	**3,600**
1,2,3,7,8,9-Hexachlorodibenzofuran	1.4 J	**210**	--	**180**	**580**	**4,400**
1,2,3,7,8-Pentachlorodibenzodioxin	3.0	**420**	**760 J**	**110**	**77**	**440 J**
1,2,3,7,8-Pentachlorodibenzofuran	0.65 J	**150**	--	**69**	**250**	**1,900 J**
2,3,4,6,7,8-Hexachlorodibenzofuran	3.0	**1,000**	**3,000**	**440**	**720**	**5,600**
2,3,4,7,8-Pentachlorodibenzofuran	1.0 J	**270**	--	**120**	**530**	**3,900**
2,3,7,8-Tetrachlorodibenzodioxin	0.77 U	**33**	--	**7.6**	**6.1**	--
2,3,7,8-Tetrachlorodibenzofuran	0.20 J	**27**	--	**8.7**	**57**	**710**
Heptachlorodibenzodioxin (Total)	1,200 J	**120,000**	**490,000 J**	**87,000 J**	**90,000 J**	**1,000,000 J**
Heptachlorodibenzofuran (Total)	130 J	**36,000 J**	**130,000 J**	**38,000 J**	**22,000 J**	**160,000 J**
Hexachlorodibenzodioxin (Total)	150 J	**22,000 J**	**49,000 J**	**7,500 J**	**13,000 J**	**110,000 J**
Hexachlorodibenzofuran (Total)	67 J	**25,000 J**	**70,000 J**	**14,000 J**	**22,000 J**	**160,000 J**
Octachlorodibenzodioxin	36,000 J	**200,000 J**	**9,600,000 J**	**220,000 J**	**170,000 J**	**4,600,000**
Octachlorodibenzofuran	43 J	**12,000 J**	**120,000**	**25,000 J**	**9,400 J**	**69,000**
Pentachlorodibenzodioxin (Total)	21 J	**4,400 J**	**1,800 J**	**600 J**	**670 J**	**2,700 J**
Pentachlorodibenzofuran (Total)	14 J	**5,800 J**	**13,000 J**	**1,500 J**	**4,200 J**	**30,000 J**
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	13 J	**1,500 J**	**5,600 J**	**670 J**	**1,200 J**	**9,800**
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	14 J	**1,600 J**	**5,100 J**	**670 J**	**900 J**	**7,000**
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	19 J	**2,300 J**	**8,500 J**	**1,100 J**	**1,900 J**	**16,000**
Tetrachlorodibenzodioxin (Total)	1.8 J	**880 J**	--	**79 J**	**120 J**	**480 J**
Tetrachlorodibenzofuran (Total)	2.5 J	**1,100 J**	**1,400 J**	**150 J**	**420 J**	**3,100 J**

TABLE 20 (Continued)
SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS
SEDIMENT SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

	Background		
Analyte	**SP-01-SD**	**SP-07-SD**	**SP-08-SD**
Dioxins (ng/kg)			
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	550	**77,000 J**	**60,000 J**
1,2,3,4,6,7,8-Heptachlorodibenzofuran	44	**29,000 J**	**16,000 J**
1,2,3,4,7,8,9-Heptachlorodibenzofuran	3.4	**3,000**	**1,300**
1,2,3,4,7,8-Hexachlorodibenzodioxin	6.5	**1,300**	**810**
1,2,3,4,7,8-Hexachlorodibenzofuran	3.0	**1,600**	**920**
1,2,3,6,7,8-Hexachlorodibenzodioxin	16	**4,400**	**3,300**
1,2,3,6,7,8-Hexachlorodibenzofuran	2.3 J	**1,400**	**780**
1,2,3,7,8,9-Hexachlorodibenzodioxin	21	**2,300**	**1,500**
1,2,3,7,8,9-Hexachlorodibenzofuran	1.4 J	**580**	**280**
1,2,3,7,8-Pentachlorodibenzodioxin	3.0	**660**	**350**
1,2,3,7,8-Pentachlorodibenzofuran	0.65 J	**180**	**130**
2,3,4,6,7,8-Hexachlorodibenzofuran	3.0	**2,100**	**1,100**
2,3,4,7,8-Pentachlorodibenzofuran	1.0 J	**420**	**240**
2,3,7,8-Tetrachlorodibenzodioxin	0.77 U	**33 J**	**25 J**
2,3,7,8-Tetrachlorodibenzofuran	0.20 J	**27**	**18**
Heptachlorodibenzodioxin (Total)	1,200 J	**120,000 J**	**100,000 J**
Heptachlorodibenzofuran (Total)	130 J	**110,000 J**	**46,000 J**
Hexachlorodibenzodioxin (Total)	150 J	**23,000 J**	**19,000 J**
Hexachlorodibenzofuran (Total)	67 J	**48,000 J**	**23,000 J**
Octachlorodibenzodioxin	36,000 J	**210,000 J**	**210,000 J**
Octachlorodibenzofuran	43 J	**120,000 J**	**14,000 J**
Pentachlorodibenzodioxin (Total)	21 J	**2,800 J**	**2,500 J**
Pentachlorodibenzofuran (Total)	14 J	**10,000 J**	**5,600 J**
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	13 J	**2,500 J**	**1,400 J**
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	14 J	**2,600 J**	**1,500 J**
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	19 J	**3,400 J**	**2,200 J**
Tetrachlorodibenzodioxin (Total)	1.8 J	**290 J**	**370 J**
Tetrachlorodibenzofuran (Total)	2.5 J	**1,700 J**	**790 J**

Notes:

SP - Sonford Products

SD - Sediment Sample

ng/kg - Nanograms per kilogram

-- Constituent not detected

Bold - Constituent is elevated 3 times above background

J - Estimated value

U - Constituent not detected. Number is the Sample Quantitiation Limit.

TABLE 21
SUMMARY OF INORGANIC ANALYTICAL RESULTS
MUNICIPAL GROUNDWATER SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background		
Analyte	**MCL**	**SP-01-GW**	**SP-02-GW**	**SP-02D-GW**
Metals (ug/L)				
Aluminum	NL	240 U	--	--
Antimony	6	0.97 UJ	--	--
Arsenic	10	1 U	--	--
Barium	2,000	1.4 J	2.4 J	2.3 J
Beryllium	4	1 U	--	--
Cadmium	5	0.12 R	--	0.12 R
Calcium	NL	160 UJ	**750 J**	**700 J**
Chromium	100	0.13 J	0.14 J	0.11 J
Cobalt	NL	0.03 R	0.03 J	0.02 R
Iron	NL	100 U	--	--
Lead	15	0.38 J	0.16	0.21 J
Magnesium	NL	31 J	54 J	54 J
Manganese	NL	0.31 J	--	--
Nickel	NL	0.13 J	0.15 J	0.12 J
Potassium	NL	760 UJ	--	--
Sodium	NL	96,000	100,000	100,000
Thallium	2	1 U	--	--
Vanadium	NL	0.19 J	0.26 J	0.22 J
Zinc	NL	2.4	3.0	4.3

Notes:

SP - Sonford Products
GW - Groundwater Sample
ug/L - Micrograms per liter
NL - Constituent not listed
-- Constituent not detected
U - Constituent not detected. Number is the Sample Quantitiation Limit.
MCL- Maximinum Contaminant Level
Bold - Constituent is elevated 3 times above background
J - Estimated value.
R- Data is not usable.

TABLE 22
SUMMARY OF INORGANIC ANALYTICAL RESULTS
ON-SITE GROUNDWATER SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background			
Analyte	**RAGS**	**SP-03-GW**	**SP-04-GW**	**SP-05-GW**	**SP-06-GW**
Metals (ug/L)					
Aluminum	NL	2,100 J	2,500 J	1,100 J	--
Antimony	160	60 U	--	60	--
Arsenic	190	10 U	--	14	--
Barium	NL	53 J	72 J	**210**	140 J
Beryllium	0.53	0.45 UJ	--	--	--
Cadmium	0.66	5 U	--	--	--
Calcium	NL	850 J	**11,000**	**35,000**	**12,000**
Chromium	117.32	2.1 J	**15**	4.4 J	1.2 J
Cobalt	NL	50 U	--	11 J	4.2 J
Iron	NL	1,300 J	**21,000 J**	**43,000 J**	1,200 J
Lead	1.32	10 U	1.6 R	--	--
Magnesium	NL	760 J	**6,700**	**11,000**	**2,700 J**
Manganese	NL	160	**1,000**	**3,200**	290
Nickel	87.71	11 J	8.5 J	9.1 J	22 J
Potassium	NL	980 UJ	2,000 J	**19,000 J**	**17,000 J**
Sodium	NL	6,200	**58,000**	**40,000**	**41,000**
Thallium	4	25 U	9.9 J	12 R	--
Vanadium	NL	3.5 J	4.5 J	2.1 J	--
Zinc	58.91	350	180	10 J	100

Notes:

SP - Sonford Products
GW - Groundwater Sample
ug/L - Micrograms per liter
NL - Constituent not listed
-- Constituent not detected
J - Estimated value.
U - Constituent not detected. Number is the Sample Quantitiation Limit.
RAGS - Risk Assessment Guidance for Superfund, chronic screening values.
Bold - Constituent is elevated 3 times above background
Shading - Constituent exceeds the PRG
R- Data is not usable.

TABLE 23
SUMMARY OF ORGANIC ANALYSES
MUNICIPAL GROUNDWATER SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background		
Analyte	**MCL**	**SP-01-GW**	**SP-02-GW**	**SP-02D-GW**
Volatiles (ug/L)				
Chloromethane	NL	0.5 U	--	0.87
Extractables				
None detected.				
Pesticides / PCBs				
None detected.				

Notes:

SP - Sonford Products
GW - Groundwater Sample
ug/L - Micrograms per liter
U - Constituent not detected. Number is the Sample Quantation Limit.
-- Constituent not detected
MCL - Maximum Contaminant Level
NL - Not listed

TABLE 24
SUMMARY OF ORGANIC ANALYTICAL RESULTS
ON-SITE GROUNDWATER SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background	On-Site Samples		
Analyte	**RAGS**	**SP-03-GW**	**SP-04-GW**	**SP-05-GW**	**SP-06-GW**
Volatiles (ug/L)					
1,1,1-Trichloroethane	528	10 U	--	29	--
1,1-Dichloroethane	NL	10 U	3 J	2 J	--
1,1-Dichloroethene (1,1-Dichloroethylene)	303	10 U	--	4 J	--
1,2,4-Trichlorobenzene	NL	10 U	--	1 J	--
1,4-Dichlorobenzene	NL	10 U	--	1 J	--
Acetone	NL	10 U	**2,500**	**180**	15
Benzene	53	10 U	10	**39**	2 J
Chlorobenzene	195	10 U	--	6 J	--
cis-1,2-Dichloroethene	NL	10 U	3 J	--	--
Cyclohexane	NL	10 U	--	12	--
Ethyl Benzene	453	10 U	19	**160**	6 J
Methyl Ethyl Ketone	NL	10 U	**110**	--	--
Methyl Isobutyl Ketone	NL	10 U	**540**	26	--
Methylcyclohexane	NL	10 U	--	10	--
Styrene	NL	10 U	3 J	--	--
Tetrachloroethene (Tetrachloroethylene)	84	10 U	--	5 J	--
Toluene	175	10 U	**43**	**860**	15
Total Xylenes	NL	10 U	**150**	**930**	29
Trichloroethene (Trichloroethylene)	NL	10 U	12	**58**	3 J
Extractables (ug/L)					
1,1-Biphenyl	NL	20 U	--	3 J	--
2,4,5-Trichlorophenol	NL	5 U	**23 J**	**24 J**	3 J
2,4,6-Trichlorophenol	3	5 U	**28**	**62**	--
2,4-Dichlorophenol	36.5	5 U	--	--	4 J

TABLE 24
SUMMARY OF ORGANIC ANALYTICAL RESULTS
ON-SITE GROUNDWATER SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background	On-Site Samples		
Analyte	**RAGS**	**SP-03-GW**	**SP-04-GW**	**SP-05-GW**	**SP-06-GW**
2-Chloronaphthalene	NL	5 U	**16**	**21**	--
2-Methyl-4,6-Dinitrophenol	2	20 U	**340 J**	--	12 J
2-Methylnaphthalene	NL	5 U	10	**57**	2 J
3-Nitroaniline	NL	20 U	--	4 J	--
Acetophenone	NL	5 U	**22**	**87 J**	1 J
Anthracene	NL	5 U	--	2 J	--
Benzaldehyde	NL	5 U	--	--	2 J
Benzyl Butyl Phthalate	22	26 J	--	--	--
bis(2-Ethylhexyl) Phthalate	<0.3	16 J	--	--	--
Dimethyl Phthalate	330	5 U	--	**16**	--
Isophorone	1,170	5 U	**420 J**	**62**	--
Naphthalene	62	5 U	14	**100 J**	4 J
Pentachlorophenol	13	14 J	**3,900**	**92,000**	**1,400**
Phenanthrene	NL	5 U	1 J	--	--
Phenol	256	5 U	**33**	--	--
Pyrene	NL	2 J	--	--	--
Pesticides / PCBs (ug/L)					
alpha-BHC	500	0.05 UJ	**0.44 NJ**	--	0.059 NJ
Heptachlor Epoxide	0.0038	0.05 UJ	--	**0.54 J**	--

Notes:

SP - Sonford Products
GW - Groundwater Sample
ug/L - Micrograms per liter
NL - Constituent not listed
N - Tentative identification
U - Constituent not detected. Number is the Sample Quantitiation Limit.
RAGS - Risk Assessment Guidance for Superfund, chronic screening values.
J - Estimated value.
-- Constituent not detected
Bold - Constituent is elevated 3 times above background
Shading - Constituent exceeds the PRG

TABLE 25
SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS
MUNICIPAL GROUNDWATER SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

	Background	On-site Samples	
Analayte	**SP-01-GW**	**SP-02-GW**	**SP-02D-GW**
Dioxins/Furans (ng/L)			
Octachlorodibenzodioxin	0.0055 U	0.012 J	--
Pentachlorodibenzofuran (Total)	0.0010 J	--	--
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	0.0065 J	0.0075 J	0.0074 J
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	0.0057 J	0.0066 J	0.0064 J
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	0.0053 J	0.0061 J	0.0060 J

Notes:

SP - Sonford Products
GW - Groundwater Sample
ng/L - Nanograms per liter
U - Constituent not detected. Number is the Sample Quantation Limit.
-- Constituent not detected
D - Duplicate
J - Estimated value.

TABLE 26
SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS
ON-SITE GROUNDWATER SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

	Background	On-site Samples		
Anlayte	**SP-03-GW**	**SP-04-GW**	**SP-05-GW**	**SP-06-GW**
Dioxins/Furans (ng/L)				
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	0.051	**43**	**110**	**0.22**
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.0034 U	**9.9**	**17**	--
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.0033 U	**1.1**	**1.4**	--
1,2,3,4,7,8-Hexachlorodibenzodioxin	0.0025 U	**0.076**	**0.15**	--
1,2,3,4,7,8-Hexachlorodibenzofuran	0.0014 U	**1.1**	**1.6**	--
1,2,3,6,7,8-Hexachlorodibenzodioxin	0.0035 U	**2.0**	**7.8**	**0.012 J**
1,2,3,6,7,8-Hexachlorodibenzofuran	0.0013 U	**0.29**	**0.58**	--
1,2,3,7,8,9-Hexachlorodibenzodioxin	0.0038 U	**0.27**	**0.56**	--
1,2,3,7,8,9-Hexachlorodibenzofuran	0.0034 U	**0.47**	**1.2**	--
1,2,3,7,8-Pentachlorodibenzodioxin	0.0021 U	**0.046**	**0.055**	--
1,2,3,7,8-Pentachlorodibenzofuran	0.0014 U	**0.17**	**0.35**	--
2,3,4,6,7,8-Hexachlorodibenzofuran	0.0024 U	**0.51**	**1.0**	--
2,3,4,7,8-Pentachlorodibenzofuran	0.0014 U	**0.31**	**0.73**	--
2,3,7,8-Tetrachlorodibenzodioxin	0.0027 U	0.0056 J	--	--
2,3,7,8-Tetrachlorodibenzofuran	0.0017 U	**0.048**	**0.040**	--
Heptachlorodibenzodioxin (Total)	0.12 J	**67 J**	**180 J**	**0.39 J**
Heptachlorodibenzofuran (Total)	0.010 J	**41 J**	**71 J**	**0.26 J**
Hexachlorodibenzodioxin (Total)	0.062 J	**5.8 J**	**17 J**	0.031 J
Hexachlorodibenzofuran (Total)	0.0054 J	**16 J**	**37 J**	--
Octachlorodibenzodioxin	0.69	**380 J**	**580 J**	**2.3**
Octachlorodibenzofuran	0.006 U	**25 J**	**32 J**	**0.17**
Pentachlorodibenzodioxin (Total)	0.0083 J	**0.27 J**	**0.11 J**	--
Pentachlorodibenzofuran (Total)	0.0014 J	**2.3 J**	**4.7 J**	**0.018 J**
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	0.0096 J	**0.91**	**1.8**	**0.014 J**
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	0.0080 J	**0.71**	**1.4**	**0.011 J**
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	0.0082 J	**1.3**	**3.1**	**0.014 J**
Tetrachlorodibenzodioxin (Total)	0.0027 UJ	**0.27 J**	0.0057 J	--
Tetrachlorodibenzofuran (Total)	0.0017 UJ	**0.39 J**	**0.26 J**	0.0023 J

Notes:

SP - Sonford Products
GW - Groundwater Sample
Bold - Constituent is elevated 3 times above background
U - Constituent not detected. Number is the Sample Quantation Limit.
J - Estiamted value.
ng/L - Nanograms per liter
-- Constituent not detected

TABLE 27
SUMMARY OF INORGANIC ANALYTICAL RESULTS
SURFACE WATER SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background						
Analyte	**RAGS**	**SP-01-SW**	**SP-02-SW**	**SP-03-SW**	**SP-03D-SW**	**SP-04-SW**	**SP-05-SW**	**SP-06-SW**
Metals (ug/L)								
Aluminum	NL	870 UJ	--	2,200 J	1,800 J	--	--	1,100 J
Arsenic	190	10 U	--	--	6.5 J	--	--	--
Barium	NL	30 J	31 J	70 J	63 J	95 J	50 J	38 J
Calcium	NL	1,900 J	**17,000**	**56,000**	**56,000**	**31,000**	**19,000**	**25,000**
Chromium	117.32	10 U	1.4 J	7.0 J	6.6 J	1.9 J	1.9 R	1.7 J
Cobalt	NL	50 U	--	--	--	5.9 J	--	--
Cyanide	5.2	10 U	--	--	--	--	--	**100**
Iron	NL	540 J	1,500 J	1,500 J	1,400 J	**11,000 J**	**2,700 J**	**3,000 J**
Lead	1.32	10 U	2.4 R	**30**	19	7.5 J	2.5 R	3.7 J
Magnesium	NL	690 J	**2,700 J**	**4,400 J**	**4,100 J**	**3,500 J**	**3,200 J**	**3,000 J**
Manganese	NL	71	**240**	82	41	**2,100**	**760**	**460**
Nickel	87.71	40 U	--	2.2 R	2.6 R	4.0 J	--	--
Potassium	NL	1,400 J	**9,600 J**	**10,000 J**	**11,000 J**	**6,000 J**	**12,000 J**	**8,900 J**
Sodium	NL	3,400 J	5,500	9,100	9,900	5,900	6,300	5,700
Vanadium	NL	1.2 J	2.3 R	**6.6 J**	**6.8 J**	3.2 J	**4.0 J**	2.7 J
Zinc	58.91	11 J	13 J	**58 J**	**40 J**	17 J	24 J	24 J

Notes:

SP - Sonford Products
SW - Surface Water Sample
ug/L - Micrograms per liter
NL - Constituent not listed
-- Constituent not detected
J - Estimated value.
U - Constituent not detected. Number is the Sample Quantitiation Limit.
RAGS - Risk Assessment Guidance for Superfund, chronic screening values.
Bold - Constituent is elevated 3 times above background
Shading - Constituent exceeds the PRG
R- Data is not usable.
D - Duplicate sample.

TABLE 28
SUMMARY OF ORGANIC ANALYTICAL RESULTS
SURFACE WATER SAMPLES
SONFORD PRODUCTS
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

		Background						
Analyte	**RAGS**	**SP-01-SW**	**SP-02-SW**	**SP-03-SW**	**SP-03D-SW**	**SP-04-SW**	**SP-05-SW**	**SP-06-SW**
Volatiles (ug/L)								
1,2-Dichlorobenzene	15.8	10 U	--	2 J	--	--	2 J	--
1,4-Dichlorobenzene	11.2	10 U	--	4 J	1 J	--	2 J	--
Acetone	NL	10 U	--	23	22	11	12	16
Chlorobenzene	195	10 U	--	6 J	2 J	--	1 J	--
Toluene	175	10 U	--	--	--	3 J	--	--
Extractables (ug/L)								
(3-and/or 4-)Methylphenol	NL	10 U	--	--	--	12	--	--
Benzo(b)Fluoranthene	NL	10 U	--	--	2 J	--	--	--
Benzo(k)Fluoranthene	NL	10 U	--	--	1 J	--	--	--
Benzyl Butyl Phthalate	NL	10 U	--	--	--	16	--	--
bis(2-Ethylhexyl) Phthalate	<0.3	10 U	--	--	--	--	--	36
Dibenzo(a,h)Anthracene	NL	10 U	--	--	1 J	--	--	--
Pentachlorophenol	13	25 U	5 J	13 J	16 J	--	8 J	3 J
Phenol	256	10 U	--	--	--	10	--	--
Pesticides/ PCBs (ug/L)								
alpha-BHC	500	0.05 U	**0.72**	**0.43**	**0.51**	--	**1.1**	**0.38**
beta-BHC	5,000	0.05 U	**0.29 N**	**0.74**	**1.3**	--	**0.50**	**0.22**
delta-BHC	NL	0.05 U	**0.90**	**2.3**	**3.0**	0.068	**1.4**	**0.60**
gamma-BHC (Lindane)	0.08	0.05 U	**2.9**	**1.9 N**	**2.3 N**	--	**3.6**	**1.2**
Heptachlor Epoxide	0.0038	0.05 U	--	0.086	0.12 N	--	--	--

Notes:

SP - Sonford Products
SW - Surface Water Sample
ug/L - Micrograms per liter
NL - Constituent not listed
PCB - Polychlorinated biphenyls
U - Constituent not detected. Number is the Sample Quantitiation Limit.
RAGS - Risk Assessment Guidance for Superfund, chronic screening values.

J - Estimated value.
-- Constituent not detected
Bold - Constituent is elevated 3 times above background
Shading - Constituent exceeds the PRG
N - Tentative identification

TABLE 29
SUMMARY OF DIOXIN/FURAN ANALYTICAL RESULTS
SURFACE WATER SAMPLES
SONFORD PRODUCTS, FLOWOOD, RANKIN COUNTY, MISSISSIPPI

	Background	On-site Samples					
Analyte	**SP-01-SW**	**SP-02-SW**	**SP-03D-SW**	**SP-03-SW**	**SP-04-SW**	**SP-05-SW**	**SP-06-SW**
Dioxins/Furans (ng/L)							
1,2,3,4,6,7,8-Heptachlorodibenzodioxin	0.011 U	**5.0**	**110**	**100**	**7.8**	**4.5**	**12**
1,2,3,4,6,7,8-Heptachlorodibenzofuran	0.0023 J	**1.0**	**19**	**17**	**0.051**	**0.92**	**1.8**
1,2,3,4,7,8,9-Heptachlorodibenzofuran	0.0025 U	**0.054**	**1.6**	**1.4**	**1.8**	**0.041**	**0.12**
1,2,3,4,7,8-Hexachlorodibenzodioxin	0.0035 U	**0.062**	**2.3**	**1.9**	**0.086**	**0.061**	**0.084**
1,2,3,4,7,8-Hexachlorodibenzofuran	0.0022 U	**0.075**	**1.6**	**1.4**	**0.14**	**0.078**	**0.13**
1,2,3,6,7,8-Hexachlorodibenzodioxin	0.0034 U	**0.24**	**5.9**	**5.2**	**0.36**	**0.21**	**0.63**
1,2,3,6,7,8-Hexachlorodibenzofuran	0.0022 U	**0.058**	**1.4**	**1.2**	**0.085**	**0.056**	**0.089**
1,2,3,7,8,9-Hexachlorodibenzodioxin	0.0035 U	**0.17**	**3.8**	**3.5**	**0.21**	**0.17**	**0.24**
1,2,3,7,8,9-Hexachlorodibenzofuran	0.003 U	**0.028**	**0.54**	**0.49**	**0.051**	**0.029**	**0.061**
1,2,3,7,8-Pentachlorodibenzodioxin	0.0023 U	**0.036**	**1.7**	**1.4**	**0.059**	**0.037**	**0.051**
1,2,3,7,8-Pentachlorodibenzofuran	0.0012 U	--	**0.36**	**0.31**	**0.025**	--	**0.025**
2,3,4,6,7,8-Hexachlorodibenzofuran	0.0022 U	**0.072**	**2.2**	**1.8**	**0.13**	**0.065**	**0.14**
2,3,4,7,8-Pentachlorodibenzofuran	0.0012 U	**0.018 J**	**0.61**	**0.54**	**0.025**	**0.015 J**	**0.056**
2,3,7,8-Tetrachlorodibenzodioxin	0.0029 U	--	**0.080**	**0.067**	0.0076 J	--	0.0056 J
2,3,7,8-Tetrachlorodibenzofuran	0.0019 U	0.0018 J	**0.078**	**0.061**	**0.0057**	0.0015 J	0.0048
Heptachlorodibenzodioxin (Total)	0.023 J	**10 J**	**220 J**	**23 J**	**14 J**	**8.6 J**	**23 J**
Heptachlorodibenzofuran (Total)	0.0023 J	**2.1 J**	**56 J**	**51 J**	**5.3 J**	**1.7 J**	**4.7 J**
Hexachlorodibenzodioxin (Total)	0.0035 UJ	**1.8 J**	**55 J**	**47 J**	**2.1 J**	**1.7 J**	**3.8 J**
Hexachlorodibenzofuran (Total)	0.0024 UJ	**1.4 J**	**39 J**	**35 J**	**2.8 J**	**1.3 J**	**3.1 J**
Octachlorodibenzodioxin	0.32	**44 J**	**1,500 J**	**1,400 J**	**120 J**	**30**	**130 J**
Octachlorodibenzofuran	0.0036 U	**1.4**	**21 J**	**24 J**	**2.6**	**0.76**	**2.6**
Pentachlorodibenzodioxin (Total)	0.0023 UJ	**0.31 J**	**18 J**	**14 J**	**0.34 J**	**0.25 J**	**0.76 J**
Pentachlorodibenzofuran (Total)	0.0012 UJ	**0.57 J**	**16 J**	**13 J**	**0.74 J**	**0.55 J**	**0.95 J**
TEQ (Avian Toxic. Equiv. Value, From WHO TEQ-98)	0.010 J	**0.13**	**4.1**	**3.5**	**0.21**	**0.12**	**0.24**
TEQ (Fish Toxic. Equiv. Value, From WHO TEQ-98)	0.0087 J	**0.13**	**4.4**	**3.7**	**0.21**	**0.12**	**0.22**
TEQ (Mammalian Toxic. Equiv. Value, From WHO TEQ-98)	0.0082 J	**0.19**	**5.4**	**4.6**	**0.29**	**0.17**	**0.38**
Tetrachlorodibenzodioxin (Total)	0.0029 UJ	**0.059 J**	**3.1 J**	**2.3 J**	**0.030 J**	**0.029 J**	**0.20 J**
Tetrachlorodibenzofuran (Total)	0.0019 UJ	**0.17 J**	**6.8 J**	**5.6 J**	**0.17 J**	**0.14 J**	**0.21 J**

Notes:

SP - Sonford Products
SW - Surface Water Sample
ng/L - Nanograms per liter
D - Duplicate sample
U - Constituent not detected. Number is the Sample Quantitiation Limit.
J - Estimated value
Bold - Constituent is elevated 3 times above background
-- Constituent not detected