HRS DOCUMENTATION RECORD COVER SHEET

Name of Facility: Red Panther Chemical Company
EPA ID No. MSD000272385

Contact Persons

U.S. Environmental Protection Agency (EPA), Region 4:

Ralph Howard, Remedial Project Manager
(404) 562-8829
Jennifer Wendel, NPL Coordinator
(404) 562-8799

Investigation:
Preliminary Assessment 06/01/1984
Preliminary Assessment Reassessment 02/22/1990
Screening Site Inspection 01/31/1991
Site Investigation Prioritization 01/30/1992
Site Investigation Report 09/22/2008
Preliminary Scoring Strategy 05/29/2009
Air Deposition Study 11/11/10

Documentation Record:
Alexis McKinnon, Project Manager
Oneida Total Integrated Enterprises, Inc. (OTIE), START
(678) 355-5550

Pathways, Components, or Threats Not Scored

The Red Panther Chemical Company is being scored on the ground water migration and soil exposure pathways. The evaluation of the ground water migration and soil exposure pathways yields a score above the National Priorities List (NPL) listing cutoff value of 28.50. Level I and Level II residential targets have been identified in a neighborhood adjacent to the Red Panther Chemical Company facility, and municipal drinking water wells are located within a 4-mile radius of the sources. The surface water and air migration pathways were not scored and do not affect the listing decision.

HRS DOCUMENTATION RECORD

Name of Facility: Red Panther Chemical Company

EPA Region: 4 Date Prepared: March 2011

Street Address of Facility*: 1201 Normandy Avenue

City, County, State, Zip: Clarksdale, Coahoma County, Mississippi, 38614

General Location in the State: Northwest

Topographic Map: Clarksdale, Mississippi

Latitude:* 34° 11' 14.67" North Longitude:* 90° 33' 41.85" West

(Refs. 3, 49)

The geographic coordinates were calculated from the north corner of the office and labs building on the property (See Figure 2)(Ref. 49, pp. 1-2).

*The street address, coordinates, and contaminant locations presented in this Hazard Ranking System (HRS) documentation record identify the general area in which the site is located. They represent one or more locations that the U.S. Environmental Protection Agency (EPA) considers to be part of the site based on the screening information EPA used to evaluate the site for National Priority List (NPL) listing. EPA lists national priorities among the known "releases or threatened releases" of hazardous substances; thus, the focus is on the release, not precisely delineated boundaries. A site is defined as where a hazardous substance has been "deposited, stored, placed, or otherwise come to be located." Generally, HRS scoring and the subsequent listing of a release merely represent the initial determination that a certain area may need to be addressed under the Comprehensive Environmental Response, Compensation, and Recovery Act (CERCLA). Accordingly, EPA contemplates that the preliminary description of facility boundaries at the time of scoring will be refined as more information is developed as to where the contamination has come to be located.

Scores

Air Pathway	Not Scored
Ground water Pathway	53.89
Soil Exposure Pathway	57.60
Surface Water Pathway	Not Scored
HRS SCORE	**39.43**

WORKSHEET FOR COMPUTING HRS SCORE

		S		S^2
1.	Ground water Migration Pathway Score (S_{gw})	53.89		2904.1321
2a.	Surface Water Overland/Flood Migration Component (from Table 4-1, line 30)	NS		NS
2b.	Ground water to Surface Water Migration Component (from Table 4-25, line 28)	NS		NS
2c.	Surface Water Migration Pathway Score (S_{sw}) Enter the larger of lines 2a and 2b as the pathway score.	NS		NS
3.	Soil Exposure Pathway Score (S_s) (from Table 5-1, line 22)	57.60		3,317.7600
4.	Air Migration Pathway Score (S_a) (from Table 6-1, line 12)	NS		NS
5.	Total of $S_{gw}^2 + S_{sw}^2 + S_s^2 + S_a^2$			6,222.8921
6.	**HRS Score** Divide the value on line 5 by 4 and take the square root		**39.43**	

NS - Not Scored
Reference 1, Table 3-1

GROUND WATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors	Maximum Value	Value Assigned
Likelihood of Release to an Aquifer:		
1. Observed Release	550	550
2. Potential to Release:		
2a. Containment	10	
2b. Net Precipitation	10	
2c. Depth to Aquifer	5	
2d. Travel Time	35	
2e. Potential to Release [lines 2a x (2b + 2c + 2d)]	500	
3. Likelihood of Release (higher of lines 1 and 2e)	550	550
Waste Characteristics:		
4. Toxicity/Mobility	a	10,000
5. Hazardous Waste Quantity	a	10
6. Waste Characteristics	100	18
Targets:		
7. Nearest Well	50	20
8. Population:		
8a. Level I Concentrations	b	0
8b. Level II Concentrations	b	0
8c. Potential Contamination	b	424.1
8d. Population (lines 8a + 8b + 8c)	b	424.1
9. Resources	5	0
10. Wellhead Protection Area	20	5
11. Targets (lines 7 + 8d + 9 + 10)	b	449.1
GROUND WATER MIGRATION SCORE FOR AN AQUIFER		
12. Aquifer Score [(lines 3 x 6 x 11)/82,500][c]	100	53.89
GROUND WATER MIGRATION PATHWAY SCORE		
13. Pathway Score (S_{gw}), (highest value from line 12 for all aquifers evaluated)[c]	100	53.89

[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]Do not round to nearest integer.

SOIL EXPOSURE PATHWAY SCORESHEET

Factor Categories and Factors	Maximum Value	Value Assigned
Resident Population Threat:		
Likelihood of Exposure		
1. Observed Contamination	550	550
Waste Characteristics:		
2. Toxicity/Mobility	a	10,000
3. Hazardous Waste Quantity	a	10
4. Waste Characteristics	100	18
Targets:		
5. Resident Individual	50	50
6. Resident Population:		
6a. Level I Concentrations	b	376.6
6b. Level II Concentrations	b	48.42
6c. Resident Population (lines 6a + 6b)	50	425.02
7. Workers	15	5
8. Resources	5	0
9. Terrestrial Sensitive Environments	c	0
10. Targets (lines 5 + 6c + 7 + 8 + 9)	b	480.02
Resident Population Threat Score:		
Resident Population Threat Score (lines 1 x 4 x 10)	b	4,752,198

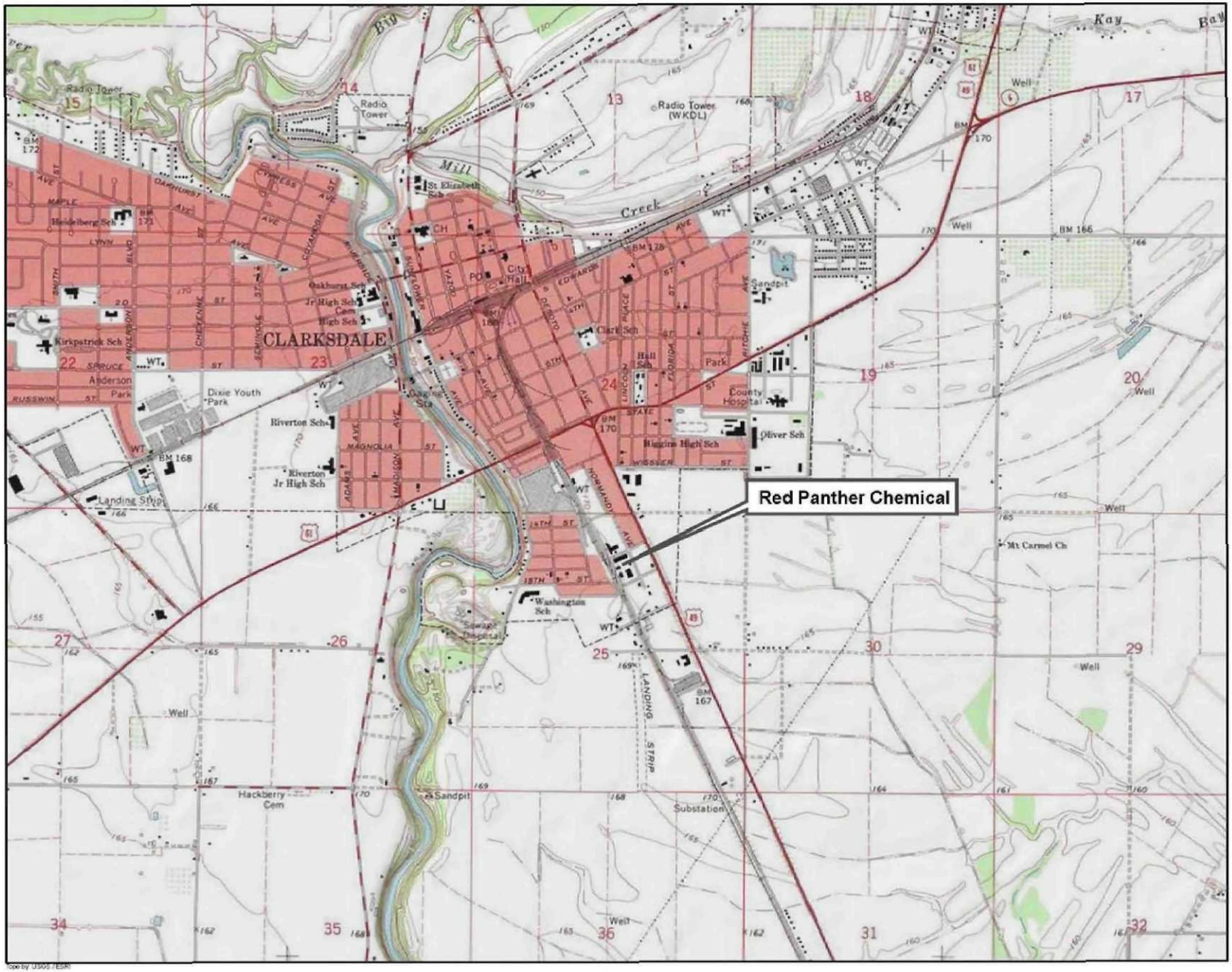
[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]Do not round to nearest integer.

SOIL EXPOSURE PATHWAY SCORESHEET (Continued)

Factor Categories and Factors	Maximum Value	Value Assigned
Nearby Population Threat		
Likelihood of Exposure:		
12. Attractiveness/Accessibility*	100	0
13. Area of Contamination	100	5
14. Likelihood of Exposure	500	
Waste Characteristics:		
15. Toxicity/Mobility	a	NS
16. Hazardous Waste Quantity	a	NS
17. Waste Characteristics	100	NS
Targets:		
18. Nearby Individual	1	NS
19. Population within 1 mile	b	NS
20. Targets (lines 18 + 19)	b	NS
Nearby Population Threat Score:		
21. Nearby Population Threat Score (lines 14 x 17 x 20)	b	NS
Soil Exposure Pathway Score:		
22. Soil Exposure Pathway Score (lines [11 + 21]/82,500)	100	57.60

[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]Do not round to nearest integer.
NS - Not Scored

*The Nearby Population Threat was not scored because the Attractiveness/ Accessibility factor value is zero. Therefore, the threat does not significantly change the Soil Exposure Pathway score (Ref. 1, Table 5-6).



BASEMAP REFERENCE: USGS CLARKSDALE, MISSISSIPPI NE/4 CLARKSDALE 15' QUADRANGELE, N3407.5 - W9030/7.5, 1967, AMS 2852 II NE- SERIES V843

N

Feet

0 1,000 2,000 4,000

Clarksdale
Coahoma County,
Mississippi

United States Environmental Protection Agency

RED PANTHER CHEMICAL
CLARKSDALE
COAHOMA COUNTY,
MISSISSIPPI
TDD No: TNA-05-003-0004

FIGURE 1
FACILITY LOCATION MAP

OTIE
Oneida Total Integrated Enterprises

\GIS Workspace\Red Panther

Legend

- Facility Boundary
- Adjacent Red Panther Property

Source: Refs. 18; 49

N

Feet

0 75 150 300

Clarksdale
Coahoma County,
Mississippi

United States Environmental Protection Agency

RED PANTHER CHEMICAL
CLARKSDALE
COAHOMA COUNTY,
MISSISSIPPI
TDD No: TNA-05-003-0004

FIGURE 2
PROPERTY LAYOUT MAP

OTIE
Oneida Total Integrated Enterprises

\GIS Workspace\Red Panther Mapping\Base Map 06-22-09\mxds

N

0 200 400

SCALE IN FEET

13TH ST.
14TH ST.
15TH ST.
16TH ST.
17TH ST.
18TH ST.
19TH ST.
ARDENNES ST.
NORMANDY AVE.
SUNFLOWER AVE.
CENTER ST.
W. TALLAHATCHIE ST.
E. TALLAHATCHIE ST.
HWY 49/322
HACKETT COVE
GOODEN COVE
RICHARDSON COVE
PAGE AVE.
SASSE ST.
HICKS ST.

SN-26-SS
SN-24-SS
SN-29-SS
SN-25-SS
SN-20-SS
SN-27-SS
SN-18-SS
SN-21-SS
SN-19-SS
SN-14-SS
SN-13-SS
SN-16-SS
SN-12-SS
SN-11-SS
SN-30-SS
SN-07-SS
SN-08-SS
SN-04-SS
SN-31-SS
SN-06-SS
SN-03-SS
SN-05-SS

RP-TW-02
RP-TW-07

LEGEND

	LEGAL PROPERTY BOUNDARY
	ADJACENT RED PANTHER PROPERTY
RP-TW-01	TEMPORARY MONITORING WELL LOCATION
SN-31-SS	SOIL SAMPLE LOCATION
TW	TEMPORARY WELL
SS	SOIL SAMPLE

REFERENCES:

RESIDENTIAL SAMPLE LOCATIONS FROM: WESTON, FINAL REMOVAL ASSESSMENT LETTER REMOVAL REPORT: 18TH STREET NEIGHBORHOOD, DECEMBER 22, 2006.

BASEMAP FROM: WESTON, FINAL REMOVAL ACTION LETTER REPORT, REVISION 1: RED PANTHER CHEMICAL COMPANY, DECEMBER 27, 2006.

GROUNDWATER LOCATIONS FROM: TN&A, SITE INVESTIGATION REPORT FOR THE RED PANTHER CORPORATION, REVISION 1, SEPTEMBER 22, 2006.

OTIE
Oneida Total Integrated Enterprises

FIGURE 3
SAMPLE LOCATION MAP

RED PANTHER CHEMICAL COMPANY
CLARKSDALE, COAHOMA COUNTY, MISSISSIPPI
EPA ID NO. MSD000272385

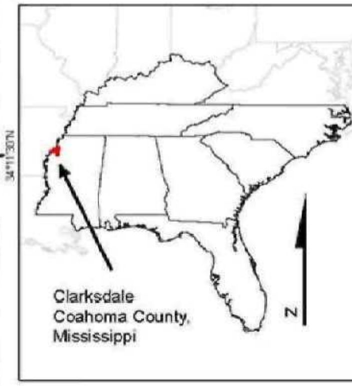
FILE NAME: FIGURE 3 – SAMPLE LOCATION MAP – NOV 2010.DWG

Legend

- Red Panther Chemical Company
- Legal Parcel Boundary
- Air Deposition Study Sample Locations

Source: Refs. 31; 40; 49

Feet
0 750 1,500



United States Environmental Protection Agency

RED PANTHER CHEMICAL COMPANY CLARKSDALE, COAHOMA COUNTY, MISSISSIPPI EPA ID No. MSD000272385

FIGURE 4
Air Deposition Study Sample Location Map

OTIE
Oneida Total Integrated Enterprises

E:\GIS Workspace\Red Panther 4003 task 1108 Map Author: Doug Fraley

REFERENCES

Ref. No.	Description of the Reference
1.	U.S. Environmental Protection Agency (EPA). Hazard Ranking System, 40 CFR Part 300, Appendix A, 55 FR 51533. December 14, 1990. Excerpt. 34 pages. [A complete copy can be obtained from the Regional Docket upon request.]
2.	EPA. Superfund Chemical Data Matrix. January 2004. Excerpt. 54 pages. A complete copy of SCDM is available at http://www.epa.gov/superfund/sites/npl/hrsres/tools/scdm.htm.
3.	Oneida Total Integrated Enterprises (OTIE). Red Panther Chemical Company, Clarksdale, Coahoma County, Mississippi, Map including Municipal Well Locations and Target Distance Rings of Red Panther Chemical Company. EPA ID No. MSD000272385. January 29, 2010. 1 map.
4.	Weston Solutions, Inc. (Weston). Final Removal Action Letter Report, Revision 1: Red Panther. Prepared for the U.S. Environmental Protection Agency (USEPA) Region 4. December 27, 2005. 160 pages.
5.	Mississippi Bureau of Pollution Control (BPC). A Preliminary Assessment Reassessment (PAR) Report for Red Panther Chemical Company. February 22, 1990. 10 pages.
6.	URS Corporation (URS). Phase I Removal Action Report, Red panther Site, Clarksdale, MS. Prepared for Red Panther PRP Group. March 18, 2003. 311 pages.
7.	EPA Region 4. Administrative Order on Consent for Removal Action. In the Matter of Red Panther Pesticide Superfund Site. Signed July 2001. 48 pages.
8.	Oneida Total Integrated Enterprises-T N & Associates, Inc. (OTIE-TN&A). E-mail Correspondence between Stacy Kowalski, OTIE-TN&A and Tom Davis, Treasurer, Red Panther Chemical Company. Subject: Number of Workers at Coahoma Warehousing Facility (former Red Panther Chemical facility). January 27, 2010. 2 pages.
9.	EPA Region 4. Action Memorandum. Subject: Request for an Enforcement Removal Action at the Red Panther Site, Clarksdale, Mississippi. Signed September 6, 2001. 12 pages.
10.	EPA Envirofacts Warehouse. Envirofacts query results for "MSD000272385". EPA Facility Information and Superfund CERCLIS query results. Internet address: http://oaspub.epa.gov/enviro/multisys2.get_list?facility_uin=110023128630. Accessed September 21, 2009. 4 pages.
11.	Mississippi Office of Pollution Control (OPC). Screening Site Inspection Report: Red Panther Chemical Company. January 31, 1991. 47 pages.
12.	Mississippi Department of Environmental Quality (MDEQ). Site Investigation Prioritization (SIP). January 30, 1992. 30 pages.
13.	Tetra Tech EM, Inc. Superfund Technical Assessment and Response Team (START). Letter Report: Red Panther Chemical. Prepared for EPA Region 4. September 2, 1999. 53 pages.
14.	EPA Region 4. Environmental News. Subject: EPA Announces the Availability of the Administrative Record for the Red Panther Chemical Site, Clarksdale, Mississippi. December 22, 2003. 1 page.
15.	URS. Report, Phase I Soil Characterization Report: Red Panther Site. Prepared for Red Panther PRP Group. March 18, 2003. 390 pages.
16.	URS. Phase II Final Design Sampling Draft Report: Red Panther Site. Prepared for Red Panther PRP Group. August 5, 2004. 224 pages.

REFERENCES (Continued)

17. NewFields and URS. Phase II Soil Removal Report: Red Panther Site Clarksdale, Mississippi. Prepared for EPA. October 14, 2005. 218 pages.

18. Weston Superfund Technical Assessment Response Team-2 (START-2). Final Removal Assessment Letter Report: 18th Street Neighborhood. Submitted to USEPA Region 4. December 22, 2005. 175 pages.

19. T N & Associates, Inc. (TN&A). Site Inspection Report: Red Panther Chemical Company, Revision 1. Prepared for EPA Region 4. September 22, 2008. 325 pages.

20. USGS and Mississippi Research and Development Center. *Water for Industrial and Agricultural Development in Coahoma, De Soto, Panola, Quitman, Tate, and Tunica Counties, Mississippi*. 1976. Excerpt. 17 pages.

21. USGS. *Characterization of Aquifers Designated As Potential Drinking-Water Sources In Mississippi*. Date unknown. Excerpt. 13 pages.

22. Alexis McKinnon, Project Manager, OTIE. Project Note to File. Subject: Red Panther Municipal Well Search Results. February 14, 2011. 5 pages.

23. USGS and Mississippi Research and Development Center. Sources for Water Supplies in Mississippi. 1980. 120 pages.

24. U.S. Census Bureau. American FactFinder. Fact Sheet for Coahoma County, Mississippi, 2005-2009 American Community Survey 5-year Estimates Data Profile Highlights. Access: http://factfinder.census.gov. Accessed on February 8, 2011. 2 pages.

25. Environmental Data Resources, Inc. (EDR). The EDR Radius Map™ Report with GeoCheck®. Prepared for the Red Panther Site, Inquiry Number 2561917.2s. August 14, 2009. 315 pages.

26. Eco-USA.net. Toxaphene. Accessed online at: http://www.eco-usa.net/toxics/chemicals/toxaphene.shtml. October 4, 2009. 2 pages.

27. Eco-USA.net. Aldrin. Accessed online at: http://www.eco-usa.net/toxics/chemicals/aldrin.shtml. October 4, 2009. 2 pages.

28. MDEQ, Robert Huckaby. Memorandum to Red Panther File. Subject: Review of Clarksdale Sanborn® Maps. August 7, 2009. 1 page.

29. EDR. The EDR Aerial Photo Decade Package. Prepared for the Red Panther Site, Inquiry Number 2561917.5. August 14, 2009. 10 pages.

30. MDEQ, Robert Huckaby. Memorandum to Ralph Howard, EPA Region 4. Subject: September 15th & 16th, 2009 Trip Report – Red Panther Site – Clarksdale, MS. Included with the memo is an attachment of historic and current industry listings for Clarksdale, MS. 20 pages.

31. Technical Service Industries, Inc. (TSI). Coahoma County, Mississippi. Plat Map. 18th Street Neighborhood. 1 map.

32. Air and Water Pollution Control Commission, State of Mississippi. Report of Field Investigation. Subject: Riverside Chemical Company, Clarksdale, Coahoma County, Mississippi. May 6, 1975. 2 pages.

33. EPA. Office of Emergency and Remedial Response, Hazardous Site Evaluation Division (5204G). Quick Reference Fact Sheet. Using Qualified Data to Document an Observed Release and Observed Contamination. November 1996. 18 pages.

REFERENCES (Continued)

34. MDEQ. Mississippi Source Water Environmental Quality, Office of Pollution Control. Mississippi Source Water Assessment Program, Source Water Protection. Accessed online at: http://www.deq.state.ms.us/MDEQ.nsf/pdf/GPB_MSSourceWaterAssessmentProgram/$FILE/msswapp.pdf?OpenElement. January 28, 2009. Excerpt. 12 pages.

35. Stacy Kowalski, Project Manager, OTIE. Phone Record with Rusty Manuel, Operator of Records, Clarksdale Public Utilities. Subject: Clarksdale Municipal Wells. January 28, 2010. 1 page.

36. World of Molecules. DDT Pesticide Molecule. Accessed online at: http://www.worldofmolecules.com/pesticides/ddt.htm. January 28, 2010. 3 pages.

37. Stacy Kowalski, Project Manager, OTIE. Project Note to File. Subject: Pesticide Information Profiles. January 28, 2010. 37 pages.

38. Author Unknown. 2,4-D fact sheet. Accessed online at: http://www.pan-uk.org/pestnews/Actives/24d.htm. January 28, 2010. 3 pages.

39. IPCS INCHEM. Chlordane JMPR 1974. World Health Organization Pesticide Residues Series 4. Accessed online at: http://www.inchem.org/documents/jmpr/jmpmono/v074pr09.htm. January 28, 2010. 3 pages.

40. Greg Kowalski, OTIE. Letter with Attachment to Ralph Howard, EPA. Subject: Air Deposition Study Report, Revision 1, Red Panther Chemical Company. November 11, 2010. 298 pages.

41. OTIE. Quality Assurance Project Plan/Site Sampling Plan, Pesticide Contamination – Air Deposition Study, Red Panther Chemical Company, Revision 1. June 25, 2010. 54 pages.

42. Douglas Fraley, OTIE. Email to Alexis McKinnon, OTIE. Subject: Property Lines for Red Panther. November 15, 2010. 1 page.

43. EPA. USEPA Contract Laboratory Program Statement of Work for Inorganic Analysis, Multi-Media, Multi-Concentration, ILM05.3. March 2004. 93 pages.

44. EPA. Office of Solid Waste and Emergency Response. Multi-Media, Multi-Concentration for Organic Analytical Service for Superfund (SOM01.2). EPA Publication 540-FS-07-001. August 2007. 6 pages.

45. Shanna Davis, Tetra Tech EM Inc. Record of Telephone Conversation with Charlie Appleby, Quality Assurance Section, Science and Ecosystem Support Division, Management and Technical Services Branch, EPA Region 4. Subject: Definitions Of Minimum Reporting Limit, Minimum Quantitation Limit, Contract Required Quantitation Limit, And Sample Quantitation Limit. July 9, 2008. 1 page.

46. Stacy Kowalski, OTIE. Email with Attachment to Alexis McKinnon, OTIE. Subject: FW: Air Permits. November 10, 2010. 46 pages.

47. United States Department of Agriculture, Natural Resources Conservation Services (NRCS), National Water and Climate Center. Wind Rose Data. Accessed online via: http://www.wcc.nrcs.usda.gov/ftpref/downloads/climate/windrose/tennesee/memphis/memphis_dec.gif. 15 pages.

48. Greg Kowalski, OTIE. Email with attachment to Alexis McKinnon, OTIE. Subject: 1938 Aerial Photo of 18th Street Neighborhood. November 11, 2010. 2 pages.

REFERENCES (Continued)

49. Alexis McKinnon, Project Manager, OTIE. Project Note with Attachment. Subject: Source of Base Images and Latitude/Longitude. February 8, 2011. 2 pages.

50. Robert Huckaby and Tommie Whitten, MDEQ. Email with Attachments. Subject: Coahoma County Well Logs. February 9, 2011. 5 pages.

General Facility Description and History

The Red Panther Chemical Company (Red Panther) is located at 1201 Normandy Avenue in Clarksdale, Coahoma County, Mississippi (see Figure 1 of this Documentation Record) (Refs. 3; 8, p. 1). The geographic coordinates of the property on which Red Panther operated are 34° 11' 14.67" North latitude and 90° 33' 41.85" West longitude as calculated from the north corner of the office and labs building on the property (Refs. 3; 49, pp. 1-2) (See Figure 2). The facility is bordered to the north by commercial property (Graeber Brothers), to the south by commercial property (Master Mix Concrete, Inc.), to the east by Normandy Avenue, and to the west by East Tallahatchie Street (Ref. 4, p. 4). For the purposes of this HRS documentation package, the Red Panther site consists of contaminated soil on the Red Panther Chemical Company property, contaminated ground water associated with releases from the contaminated soil source, and contaminated soil in the residential area surrounding the Red Panther facility.

The Red Panther property is comprised of approximately 6.5 acres (Refs. 5, p. 4; 6, p. 8; 7, p. 2). Former operation features included a septic tank and drainfield located on the north side of the property, and three hazardous waste above-ground storage tanks (ASTs) with a total capacity of 33,000 gallons located on the south side of the property (Ref. 5, p. 4). A small wastewater settling basin was located on the east central side of the property (Ref. 5, p. 4). Several structures remain on the property and are still used by Coahoma, Inc. as a warehouse storing feed and farm supplies (Refs. 6, p. 8; 7, p. 2; 8, p. 1). See Figure 2 of this Documentation Record for the property layout map.

Red Panther operated as a pesticide formulation plant between 1949 and 1996 formulating liquid and dry herbicide, insecticide, and fungicide products (Refs. 4, p. 4; 5, p. 3; 6, p. 8; 7, p. 2). Chemicals used in the formulation process included toxaphene; aldrin; arsenic; 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane (4,4'-DDT); methyl parathion; chloropyrifos; 2,4-dichlorophenoxy acetic acid (2,4-D); malathion; carbaryl; diazinon; methoxychlor; disodium methanearsonate (DSMA); monosodium acid methanearsonate (MSMA); chlorothalonil; and parathion (Refs. 6, p. 8; 7, p. 3; 9, p. 2). Four stacks were part of the manufacturing process, with heights between 20 and 30 feet (Ref. 46, p. 29). According to air permit records, arsenic; 2,4-D; methanol; xylene; and ethylene glycol were emitted at the facility from the four stacks (Ref. 46, pp. 28-31, 42). Wastewater and solvents containing pesticide and solvent residues were generated from equipment cleaning (Refs. 5, p. 3; 6, p. 8). Prior to obtaining interim status, wastewater containing pesticide and solvent residues were generated during equipment cleaning at the facility and discharged either directly to a drainage ditch or into an underground septic tank and drain field on the facility property (Refs. 5, p. 5; 6, pp. 8-9). Contamination on the property is believed to have originated from numerous spills during loading and unloading operations, contaminated wastewater releases, from spills and leaking underground piping in the tank farm area, as well as particulate releases to surrounding areas (Refs. 9, pp. 2, 3).

Previous owners of the facility include Coahoma Chemical Company, Riverside Chemical Company, and MFC Services (Refs. 6, p. 8; 7, p. 2). The property is currently used by Coahoma, Inc. as a storage facility for feed and farm supplies (Refs. 6, p. 8; 7, p. 2; 8, p. 1).

A query for MSD000272385 in the EPA Envirofacts database listed a site discovery date of November 1, 1979 (Ref. 10, p. 4). In 1980, Red Panther filed for a Resource Conservation and Recovery Act (RCRA) hazardous waste management activity notification and Part A application for the storage of wastewater and used solvents (Refs. 4, p. 5; 5, p. 3; 6, p. 8). In November 1984, the Mississippi Bureau of Pollution Control (MBPC) granted the facility a RCRA Part B permit to store wastewater and spent solvents at the facility (Ref. 5, p. 4).

A Preliminary Assessment (PA) was conducted in June 1984 (Ref. 10, p. 4). In August 1984, the MBPC conducted a sampling inspection at the facility (Ref. 5, p. 5). Environmental samples were collected around the property to determine and characterize any hazardous substances present. Two composite soil samples were collected from the adjacent ditch along Normandy Street and Patton Street (Ref. 5, p. 5). One water sample was collected from where wastewater leaves the property and discharges into the ditch (Ref. 5, p. 5). One subsurface composite soil sample was collected around the septic tank and drainage field (Ref. 5, p. 5). All samples were analyzed for pesticides and total arsenic (Ref. 5, p. 5). Results indicated elevated levels of several pesticides and arsenic in the soil and sediment samples (Ref. 5, p. 5).

In November 1985, a fire erupted at one of the Red Panther warehouses (Refs. 5, p. 5; 11, p. 5). Contaminated runoff resulting from the fire-fighting efforts caused a fish kill in the nearby Sunflower River (Ref. 11, p. 5). The contaminant was determined to be Lorox, a slightly toxic herbicide (Ref. 11, p. 5). A large volume of contaminated water was contained on the property and later shipped to a commercial hazardous waste disposal facility (Ref. 11, p. 5). During cleanup of the fire, approximately 382 old fiber drums were discovered in the crawlspace below the warehouse (Ref. 11, p. 5). Of those drums, 287 were empty and were crushed and sent to the local municipal landfill (Ref. 11, p. 5). Ninety-five drums contained trace residues of technical grade dieldrin and were disposed of at a commercial hazardous waste facility. A new warehouse was built over this area in 1986 (Ref. 11, p. 5).

In November 1986, the Red Panther RCRA storage permit was terminated because Red Panther lost its liability insurance coverage that is required for long-term storage of hazardous wastes (Ref. 11, p. 5). At that time, Red Panther reverted to the status of a hazardous waste generator with short-term (less than 90 days) storage only (Ref. 11, p. 5).

On February 22, 1990, MBPC submitted the Preliminary Assessment Reassessment (PAR) report to EPA Region 4 (Ref. 5, pp. 1-8). The PAR report summarized the investigations and findings at the facility and recommended a Site Screening Investigation (SSI) on a medium priority basis (Ref. 5, pp. 1-8).

On January 31, 1991, the Mississippi Department of Environmental Quality (MDEQ) Office of Pollution Control (OPC) submitted the SSI report (Ref. 11, p. 1). The sampling investigation was conducted at the facility on November 12 and 13, 1990 (Ref. 11, pp. 3, 21-47). A total of nine samples were collected during the SSI including one surface soil, three sediment samples, two subsurface soil samples, and three ground water samples (Ref. 11, pp. 10-11, 16). From the nine samples, one surface (RPC-SDS-03) and one subsurface soil (RPC-SBS-04) sample were collected from the commercial property north of the Red Panther property and were designated as background samples (Ref. 11, pp. 10-11, 16). Samples were analyzed for all compounds listed in the EPA Target Compound List (TCL) (Ref. 11, pp. 10, 16). According to the 1991 SSI, sediment samples contained high levels of pesticides, metals, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs) (Ref. 11, pp. 10-12, 17-20). Ground water samples contained only detections of metals (Ref. 11, pp. 11-12). Based on these results, MDEQ OPC recommended further investigation on a medium-priority basis (Ref. 11, p. 12).

On January 30, 1992, MDEQ submitted a Site Investigation Prioritization (SIP) to EPA Region 4 (Ref. 12, p. 1). The SIP recommended that no further remedial action be planned (NFRAP) for Red Panther, due to the low score generated using data from the 1991 SSI report (Ref. 12, p. 1). The site score, which was calculated based on the sample results available during the SIP evaluation, was not sufficient to place the site on the NPL (Ref. 12, p. 3). The site was archived on January 31, 1992 (Ref. 10, p. 4).

In 1999, EPA tasked Tetra Tech EM, Inc., under the Superfund Technical Assessment and Response Team (START)contract, to conduct surface and subsurface soil sampling of the drainage ditches to the east of the property, the former facility leaching field and septic tank on the north side of the property, and the rail spur in front of the loading dock that runs along the west side of the property (Ref. 13, pp. 4, 5, 13-26). Samples were analyzed for RCRA metals and pesticides (Ref. 13, p. 10). The results from the sampling event indicated that the facility was contaminated with arsenic, organochlorinated pesticides, and the degradation by-products including, but not limited to, aldrin; chlordane; dieldrin; 4,4'-DDT; endrin; endosulfan II; and toxaphene (Ref. 13, pp. 10, 27-41). The analytical results also revealed a wide concentration range for lead; however, lead concentrations were below 400 mg/kg (Ref. 13, pp. 10, 27-41).

On September 4, 2001, an Administrative Order on Consent for the Red Panther property between the Potentially Responsible Parties (PRP) and EPA Region 4 was finalized (Ref. 7, pp. 25-48). The Administrative Order on Consent identified four constituents of concern (COCs) for surface soil criteria and three COCs for subsurface soil criteria (Ref. 7, pp. 6-7, 21-24). The surface COCs were identified as arsenic, toxaphene, dieldrin, and total chlorinated pesticides (Ref. 7, p. 6). The subsurface COCs were identified as arsenic, toxaphene, and dieldrin (Ref. 7, p. 7). The Administrative Order on Consent required the PRPs to perform two phases of removal activities and disposal of excavated materials under all requirements of the Administrative Order on Consent (Ref. 7, pp. 5-9). EPA subsequently submitted the Action Memorandum documenting approval of the proposed removal action (Ref. 9).

The PRP commenced the removal action on November 11, 2002 and had completed the activities by July 29, 2005 (Ref. 10, p. 3). The PRP retained NewFields and URS Corporation (URS) to perform the work required to fulfill the requirements of the Administrative Order on Consent (Ref. 6, p. 9). The Administrative Order on Consent required the work to be performed in two phases. Phase I consisted of the following components:

- Excavation of surface soils from drainage ditches between the Red Panther property boundaries and Route 49, and the disposal or temporary stockpiling of the excavated material,
- Characterization of facility soils and the remaining ditch soils,
- Design of Phase II removal activities, and
- Preparation of a Phase II Work Plan detailing additional removal tasks necessary to complete the requirements of the Administrative Order on Consent (Ref. 6, p. 6).

On March 18, 2003, URS submitted the Phase I Removal Action Report and the Phase I Soil Characterization Report (Refs. 6, p. 1; 15, p. 1). Based on the results, URS recommended addressing the soils exceeding performance standards and addressing disposal options for the stockpiled soils in Ditch 1 in the Phase II Work Plan (Ref. 6, p. 17). The report was approved by EPA on April 10, 2003 (Ref. 16, p. 8).

Administrative records were compiled on November 6, 2003 (Ref. 10, p. 3). On December 22, 2003, EPA announced the availability of the Red Panther Administrative Record for public review (Ref. 14, p. 1). The Administrative Record includes documents that form the basis for selection of the removal action (Ref. 14, p. 1).

Phase II of the removal action consisted of on-site soil removal activities (Ref. 16, p. 8). On October 14, 2005, URS and NewFields submitted the Phase II Soil Removal Report for Red Panther (Ref. 17, p. 1). The PRP Group requested a "No Further Action" and termination of the order based on the successful completion of the Administrative Order on Consent requirements (Ref. 17, p. 8). The Administrative Order on Consent requirements were completed by implementing the

Phase I ditch characterization and removal in 2002, the Phase I characterization of the facility soils in 2002 and 2003, and the Phase II soil removal in 2005 (Ref. 17, p. 8).

All PRP removal activities were overseen and documented by Weston Solutions, Inc. (Weston) under EPA's START-2 contract at the request of EPA (Ref. 4, p. 4). After completion of the removal activities, EPA tasked Weston to conduct an environmental assessment of the nearby 18th Street Neighborhood located just west of Red Panther (Ref. 18, p. 4). On December 22, 2005, Weston submitted a Final Removal Assessment Letter Report for the 18th Street Neighborhood site (Ref. 18, p. 1).

On August 9, 2005, Weston began collecting samples for EPA at the 18th Street Neighborhood for the Removal Assessment (Ref. 18, p. 7). The 18th Street Neighborhood is a residential area located to the west of Red Panther (Refs. 3; 18, pp. 4, 13; 31). The neighborhood consists of single family dwellings on approximately 0.25 acre lots (Ref. 31). The areas sampled included properties on 13th, 14th, 15th, 16th, 17th, 18th, 19th, and West Tallahatchie Streets (Ref. 18, p. 7).

During the Removal Assessment, a total of 31 composite samples including a background (SN-01-SS) were collected from the residential yards in the 18th Street Neighborhood (Ref. 18, pp. 7, 24-47). The background sample was collected from the B.F. McLaurin Park as a reference to determine what direct impact Red Panther operations might have had on the soils in the neighborhood (Ref. 18, pp. 7, 40-41, 49). During the investigation, four active municipal ground water supply wells were also sampled (Ref. 18, p. 8). Of these four wells, two were shallow wells (approximately 600 feet deep) and two were deep wells (approximately 1,000 feet deep) (Ref. 18, p. 8). All samples collected during the investigation were analyzed for pesticides, aluminum, arsenic, iron, and other metals (Ref. 18, pp. 16-22, 78-171). Of the 30 residences sampled, 24 soil samples were elevated above background concentrations for pesticides (Ref. 18, pp. 16-22). No pesticides were detected in the municipal ground water samples. No metals were detected at elevated concentrations in any samples (Ref. 18, pp. 78-171).

Red Panther Chemical was removed from the EPA archive list on November 7, 2005 (Ref. 10, p. 3).

In October 2007, T N & Associates (TN&A) under the START contract conducted a Site Investigation (SI) to fill data gaps related to the Ground water Migration Pathway (Ref. 19, pp. 15-16, 288-304). Fourteen ground water samples were collected; nine temporary monitoring well samples, one permanent monitoring well sample, and four municipal well samples (Ref. 19, pp. 16, 288-304). The temporary monitoring wells were installed to depths ranging from 25.12 feet to 47.8 feet (Ref. 19, pp. 16, 288-304). The temporary monitoring wells were compared to sample RP-TW-02, and elevated concentrations of contaminants were detected in all wells except well RP-TW-01 (Ref. 19, pp. 162-286). Constituents detected at elevated levels in the temporary monitoring wells included pesticides and metals (Ref. 19, pp. 36-37). One existing on-site permanent monitoring well (RP-TW-02) was sampled and indicated the presence of pesticides and metals; however, no background well was available for comparison (Ref. 19, pp. 173-174, 202). Four municipal wells located within a 4-mile radius of the property were also sampled (Ref. 19, p. 17). Two wells completed in the Sparta aquifer (shallow aquifer) indicated the presence of several metals including barium, copper, iron, lead, manganese, and zinc at HRS-elevated concentrations; however, no site-attributable constituents were detected (Ref. 19, pp. 35, 86-93, 116, 121, 123, 125, 127, 129, 131, 133, 135, 160). The deeper municipal wells, completed in the Meridian Upper-Wilcox aquifer, indicated no elevated levels of analytes (Refs. 19, pp. 35, 44-80; 22, pp. 3-4).

During the week of June 28, 2010, Oneida Total Integrated Enterprises (OTIE)(formerly TN&A) conducted an Air Deposition Study (ADS) on behalf of EPA in the areas surrounding the former Red Panther facility (Refs. 40, pp. 5, 14; 41, pp. 1, 6). The purpose of the ADS was to evaluate the presence of pesticides in the surface soils surrounding the former Red Panther facility and to identify background soil samples outside the area of influence for the Red Panther facility (Refs. 40, p. 5; 41, pp. 24-25). Field investigation activities included the collection of surface soil samples in every direction from the facility to determine if contaminant concentrations previously identified in the residential neighborhood to the west of the facility (18th Street Neighborhood) were a result of the pesticide formulation activities at the facility or if the presence of the nearby agricultural fields contributed to the pesticide contamination (Ref. 40, p. 5). A total of 76 composite surface soil samples were collected in a 0.25-mile area surrounding the facility (Refs. 40, pp. 14-17; 41, pp. 31-32). Three background composite samples were collected northwest and north/northeast of the facility from areas 0.7- to 1.1-mile distant from the facility to ensure an adequate background for comparison purposes (Refs. 40, pp. 14-17, 25; 41, pp. 31-32). Although other pesticide constituents were detected in the background samples, toxaphene was not detected in any of the three background samples (Ref. 40, p. 18-20). Concentrations of DDT, 4,4'-dichlorodiphenyldichloroethane (DDD), and 4,4'-dichlorodiphenyldichloroethylene (DDE) increased in areas closer to the facility (Ref. 40, p. 18-20, 28, 29, 31, 35-48). Toxaphene was identified in eight samples collected near the facility, with concentrations increasing closer to the facility (Ref. 40, p. 20, 30, 35-48). Modeling of the toxaphene contaminant concentrations suggests the facility is the source of toxaphene, not general agricultural use in the area (Ref. 40, p. 20). Dieldrin was identified in half of the samples collected, generally in higher concentrations near the facility declining to non-detect concentrations in the outlying samples (Ref. 40, p. 20). The highest dieldrin concentration (3,800 micrograms per kilogram [ug/kg]) was identified in the sample collected closest to the facility (Ref. 40, p. 20). According to the ADS, the absence of dieldrin in samples adjacent to agricultural fields and the presence of higher concentrations near the facility indicate that Red Panther is the source of dieldrin contamination in the area (Ref. 40, pp. 19-20). In general, the ADS concluded that the higher contaminant concentrations located near the facility suggested contamination is the result of historic Red Panther facility activities, not the result of pesticide application in nearby agricultural fields (Ref. 40, pp. 20-21).

2.2 SOURCE CHARACTERIZATION

Number of the source: 1

Name and description of the source: Contaminated soil at the Red Panther facility

HRS Source Type: Contaminated soil

Contaminated soil is located throughout the Red Panther property at a depth of 2 feet and greater below ground surface (bgs) (Ref. 17, pp. 22-25, 184-189).

The Phase I and Phase II removal actions were conducted during 2004 and 2005 by URS and Newfields for Red Panther in order to fulfill the requirements of the September 2001 Administrative Order on Consent (Ref. 17, p. 6). Based on confirmation samples collected from Area B (AST storage area), Area C (loading dock and Railroad spur), and Area D (silo area), hazardous substances including arsenic, toxaphene, and dieldrin are still present in the surface (2 feet) and subsurface soils at the property (Ref. 17, pp. 14, 22-25, 184-189).

Source contaminants sampled during the confirmation phase of the Phase II removal include arsenic, dieldrin, and toxaphene (Ref. 17, pp. 22-25, 184-189). Samples were analyzed using EPA Method 6010 for inorganic analysis, and EPA Method 8081A for the analysis of pesticides (Ref. 16, pp. 12-13, 31).

Sampling at the property prior to the implementation of the Administrative Order on Consent indicated the presence of elevated levels of constituents in addition to those listed above, including: endrin; 4,4'-DDT; 4,4'-DDE; 4,4'-DDD; heptachlor; chlordane; gamma-BHC (lindane); and endosulfan II (Refs. 11, pp. 16-20; 13, pp. 10, 27-41). These contaminants are documented to exist in association with historical operations or are degradation products of those substances produced, and are in samples collected from the property (Refs. 4, p. 4; 5, p. 3; 6, p. 8; 7, pp. 2-3; 9, p. 2; 11, pp. 10-12, 16-20; 13, pp. 5, 9-10, 27-41; 15, p. 8, 18-32, 99-390; 36, pp. 1-2).

Location of the source, with reference to a map of the facility:
Contaminated soil is located throughout the Red Panther property at a depth of 2 feet and greater below ground surface (bgs) (Ref. 17, pp. 22-25, 184-189). Maps of the sample locations can be found in Reference 17 on pages 184-189.

Containment:
Release to ground water: No liner beneath the contaminated soil at the property was documented during the Phase I Soil Characterization investigation or the Phase II Soil Removal (Refs. 15, pp. 11-17, 51-97; 17, pp. 11, 15, 19-26). Pesticide-contaminated ground water has been identified in ground water monitoring wells installed in the Mississippi River Valley Alluvial aquifer at the property (Refs. 19, pp. 194-213, 288-304; 21, p. 3).

Based on Table 3-2 of Reference 1, the contaminated soil is assigned a containment value of 10.

Ground water Containment Value: 10
Reference: 1, Section 3.1.2.1, Table 3-2

2.4 WASTE CHARACTERISTICS

2.4.1 HAZARDOUS SUBSTANCES

- Phase II Soil Removal

The contaminated composite surface soil samples listed below were collected during the Phase II Soil Removal activities conducted at Red Panther by URS and Newfields on behalf of Red Panther (Refs. 16, pp. 5, 9; 17, pp. 22-25, 184, 186-187). No background surface soil sample was collected; the samples listed were collected as confirmation samples after removal activities at the property based on the requirements of the 2001 Administrative Order on Consent (Ref. 17, pp. 7-8, 22-25, 184, 186-187). All constituents listed in this section were included in the 2001 Administrative Order on Consent for Red Panther and agreed by the performing PRPs to be remediated (Refs. 7, pp. 1, 3-7, 48; 16, p. 7; 17, p. 12). The samples were analyzed by an on-site laboratory (E.C.C.S. Inc) for arsenic, dieldrin, and toxaphene using methods 8081A and 7010B (Ref. 17, pp. 209-217). Also, only data from samples collected from depths of 2 feet or less were included in the Phase II Soil Removal data package; therefore, only those samples are listed below. However, concentrations of arsenic (2.2 to 322 mg/kg), dieldrin (0.12 to 9.2 mg/kg), and toxaphene (4.9 to 220 mg/kg) are also reported to remain at a depth of greater than 2 feet (Ref. 17, pp. 184-188). See Reference 17, pp. 184, 186-188 of this Documentation Record for sample locations.

-Background Concentrations:

The background composite surface soil sample was collected from BF McLaurin Park located on Sunflower Avenue, near 6th Street, approximately 0.5 mile north of the 18th Street Neighborhood (Ref. 18, pp. 4, 41, 49). Soil contamination in the area of the facility is largely due to air deposition of particulates from the Red Panther facility. There is no one prevailing wind direction in the area (Ref. 40, p. 18). Additionally, some pesticide presence in the background sample is to be expected due to usage in agricultural fields in the area (Ref. 40, pp. 19-21).

The background composite surface soil sample (SN-01-SS) listed below was collected August 10, 2005, during the Removal Assessment by Weston conducted on behalf of EPA Region 4 (Ref. 18, pp. 7-8). All samples collected during the investigation were submitted through the EPA Contract Laboratory Program (CLP) for CLP Pesticides analysis and CLP arsenic, aluminum, and iron analysis (Ref. 18, pp. 7-8, 79-171). In 2005, the CLP Pesticide analysis and CLP arsenic, aluminum, and iron analysis were analyzed by methods SOM01.1 and ILM05.3 (Refs. 18, pp. 7-8, 79-171; 43, p. 1; 44, p. 1). Results were validated by the EPA Science and Ecosystem Support Division (SESD); the data validation report is included in Reference 18 (Ref. 18, pp. 8-9, 172-175). See Figure 3 of this Documentation Record for sample location.

Sample ID	Sample Medium	Depth	Date	Reference
SN-01-SS	Soil	0-3 inches	8/10/05	18, pp. 40-41, 166

Sample ID	Hazardous Substance	Concentration (ug/kg)	Sample Quantitation Limit (ug/kg)	Reference
SN-01-SS	Heptachlor epoxide	1.8U	1.8	18, pp. 85, 125, 166;
	Endosulfan II	3.5U	3.5	
	4,4'-DDD	3.5U	3.5	

Sample ID	Hazardous Substance	Concentration (ug/kg)	Sample Quantitation Limit (ug/kg)	Reference
	Endrin	3.5U	3.5	43, p. 93; 45
	Dieldrin	3.5U	3.5	
	4,4-DDE	15	3.5	
	Toxaphene	180U	180	
	Gamma-chlordane	1.8U	1.8	
	Alpha-chlordane	1.8U	1.8	
	Arsenic	20,000	1,000*	

Notes:
ug/kg - Micrograms per kilogram
U - Constituent analyzed for but not detected above reporting limit.
DDD - 4,4'-dichloro-2,2-bis(p-chlorophenyl)ethylene
DDE - 4,4'-dichloro-2,2-bis(p-chlorophenyl)ethane
* - Contact Required Quantitation Limit (CRQL) (Ref. 43, p. 93)

- Contaminated Samples

The composite surface soil samples listed below were collected during the Phase II Soil Removal activities conducted at Red Panther by URS and Newfields on behalf of Red Panther (Refs. 16, pp. 5, 9; 17, pp. 22-25, 184, 186-187).

Sample ID	Date Collected	Reporting Limit (mg/kg)	Hazardous Substance	Hazardous Substance Concentration (mg/kg)	Background Concentration (SN-01-SS) (mg/kg)	References
BGC-1	5/11/05	3	Toxaphene	3.5	0.18	17, pp. 184, 203, 209; 18, pp. 125, 166; 26, p. 1; 27, p. 1
BGC-15	6/20/05	2	Arsenic	420	20	17, pp. 184, 205, 212; 18, pp. 85, 125, 166; 26, p. 1; 27, p. 1
		0.1	Dieldrin	2.6	0.0035U	
		3	Toxaphene	7.4	0.18	
CGC-2	5/11/05	2	Arsenic	210	20	17, pp. 186, 203, 213; 18, pp. 85, 125, 166; 26, p. 1; 27, p. 1
		0.1	Dieldrin	0.89	0.0035U	
		3	Toxaphene	7.0	0.18	
DGC-1	5/24/05	0.1	Dieldrin	0.54	0.0035U	17, pp. 187, 201, 214; 18, pp. 125, 166; 26, p. 1; 27, p. 1
		3	Toxaphene	7.5	0.18	
DGC-15	6/6/05	0.1	Dieldrin	11	0.0035U	17, pp. 187, 202, 215; 18, pp. 125, 166; 26, p. 1; 27, p. 1
		3	Toxaphene	14	0.18U	
DGC-16	6/2/05	0.1	Dieldrin	2.9	0.0035U	17, pp. 187, 208, 216; 18, pp. 125, 166;
		3	Toxaphene	220	0.18U	

Sample ID	Date Collected	Reporting Limit (mg/kg)	Hazardous Substance	Hazardous Substance Concentration (mg/kg)	Background Concentration (SN-01-SS) (mg/kg)	References
						26, p. 1; 27, p. 1
DGC-17	6/6/05	0.1	Dieldrin	0.83	0.0035U	17, pp. 187, 202, 217; 18, pp. 125, 166; 26, p. 1; 27, p. 1
		3	Toxaphene	3.1	0.18U	

Notes:
mg/kg - Milligrams per kilogram

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1 Hazardous Constituent Quantity

Insufficient data is available to calculate the hazardous constituent quantity.

Hazardous Constituent Quantity Value (S): Not Scored
Reference: 1, Section 2.4.2.1.1

2.4.2.1.2 Hazardous Wastestream Quantity

Insufficient data is available to calculate the hazardous wastestream quantity.

Hazardous Wastestream Quantity Value (W): Not Scored
Reference: 1, Section 2.4.2.1.2

2.4.2.1.3 Volume

Insufficient data is available to calculate the volume.

Volume Value (V): 0
Reference: 1, Section 2.4.2.1.3

2.4.2.1.4 Area

The area of contamination is formed by a perimeter of composite confirmation sample locations CGC-2, BGC-1, BGC-15, DGC-1, DGC-15, DGC-16, and DGC-17 collected during the Phase II Soil Removal by URS and Newfields for Red Panther (Ref. 17, pp. 184, 186-187). Removal activities were conducted by the PRP, and sufficient sampling to determine the extent of contaminated soil remaining has not been performed. Therefore, the area of contaminated soil was determined to be >0 square feet (ft^2) (Ref. 17, pp. 184, 186-187).

Equation for hazardous waste quantity evaluation for the contaminated soil is A/34,000. Therefore, >0 ft^2 /34,000 = >0

Area Assigned Value: >0
Reference: 1, Table 2-5

2.4.2.1.5 Source Hazardous Waste Quantity Value

Source Hazardous Waste Quantity Value: >0
Reference: 1, Section 2.4.2.2

2.2 SOURCE CHARACTERIZATION

Number of the source: 2

Name and description of the source: Contaminated soil in the area surrounding the facility due to air deposition

HRS Source Type: Contaminated soil

Contaminated soil related to facility operations is located throughout the area surrounding the Red Panther facility at a depth of 0 to 12 inches bgs (Refs. 18, pp. 29-47, 78-171; 40, pp. 15).

During a 1975 field investigation at Red Panther conducted by the Mississippi Department of Air and Water Pollution Control, the inspector noted highly dusty conditions inside the plant and open doors during product formulation. The inspector concluded that compounds produced at the facility could be escaping the plant through the open doors (Ref. 32, pp. 1-2). The inspection was a result of a citizen complaint of dead vegetation, including evergreen trees, tomato and pepper plants, and shrubs (Ref. 32, p. 1). The inspector collected samples of the dead vegetation at the residence for analysis and also noted dead vegetation in additional areas adjacent to the plant (Ref. 32, p. 2). The inspector noted in his report that the resident had been financially reimbursed by Riverside Chemical Company in 1974 for a garden that had been impacted (Ref. 32, p. 1).

Elevated concentrations of 4,4'-DDD; 4,4'-DDE; 4,4'-DDT; aldrin; alpha-BHC; beta-BHC; delta-BHC; dieldrin; endosulfan sulfate; endrin; endrin aldehyde; lindane; gamma-chlordane; heptachlor; heptachlor epoxide; and toxaphene were detected in the composite surface soil samples collected during the August 2005 Removal Assessment when compared to the highest concentration of the pesticide in all associated background samples (Ref. 40, pp. 35-48, 88-180). Although pesticide constituents were detected in the background samples, toxaphene was not detected in any of the background samples (Ref. 40, pp. 18-20, 35). Higher concentrations of DDT, DDD, and DDE were detected in areas closer to the facility (Ref. 40, pp. 18-20, 28-30, 35-48). Toxaphene was identified in eight samples collected near the facility, with concentrations increasing closer to the facility (Ref. 40, pp. 19-20, 30, 35-48). Modeling of toxaphene contaminant concentrations in the area suggests the facility is the source of toxaphene (Ref. 40, pp. 19-20, 30). Dieldrin was identified in half of the samples collected, generally in higher concentrations near the facility and declining to non-detect concentrations in the outlying samples (Ref. 40, pp. 19-20, 35-48). The highest dieldrin concentration (3,800 ug/kg) was identified in the sample collected closest to the facility (Ref. 40, pp. 19-20, 31, 35-48). According to the ADS, the absence of dieldrin in samples adjacent to agricultural fields and the presence of higher concentrations near the facility indicate that Red Panther is the source of dieldrin contamination in the area (Ref. 40, pp. 19-20, 31, 35-48).

Source contaminants include 4,4'-DDD; 4,4'-DDE; 4,4'-DDT; aldrin; alpha-BHC; alpha-chlordane; beta-BHC; delta-BHC; dieldrin; endosulfan sulfate; endrin; endrin aldehyde; lindane; gamma-chlordane; heptachlor; heptachlor epoxide; and toxaphene (Refs. 18, pp. 16-21, 29-47, 85-117, 125-157, 159-171; 40, pp. 89-180).

Location of the source, with reference to a map of the facility:
Contaminated soil is located throughout the area surrounding the Red Panther facility at a depth of 0 to 12 inches bgs (Refs. 18, pp. 29-47, 78-171; 40, pp. 15). Maps of the sample locations can be found in Figures 3 and 4 of this documentation record.

Containment:

Release to ground water: No liner beneath the contaminated soil in the neighborhood was documented during the August 2005 Removal Assessment investigation of the 18th Street Neighborhood by Weston for EPA (Refs. 18, pp. 29-47). The nature and extent of the source indicates a liner would be unlikely to be present throughout the area (Ref. 3). Pesticide-contaminated ground water has been identified in ground water monitoring wells installed in the surficial aquifer at the nearby Red Panther property (Ref. 19, pp. 194-213, 288-304).

Based on Table 3-2 of Reference 1, the contaminated soil yields a containment value of 10.

Ground water Containment Value: 10

Reference: 1, Section 3.1.2.1, Table 3-2

2.4 WASTE CHARACTERISTICS

2.4.1 HAZARDOUS SUBSTANCES

A Removal Assessment of the 18th Street Neighborhood was conducted in August 2005 by Weston for EPA to characterize the nature and extent of contaminated soil on residential properties in the neighborhood (Ref. 18, p. 4). Composite samples using three to five aliquots per sample collected from 30 residential properties in the neighborhood indicated the presence of contaminated soil at a depth of less than 1 foot bgs on several of the properties sampled (Ref. 18, pp. 7, 16-21, 29-47, 85-117, 125-157, 159-171). The background sample (SN-01-SS) was collected from the B.F. McLaurin Park as a reference to determine what direct impact Red Panther operations might have had on the soils in the neighborhood (Ref. 18, pp. 7, 40-41). All samples collected during the investigation were analyzed for pesticides, aluminum, arsenic, iron, and other metals (Ref. 18, pp. 16-22, 78-171). Of the 30 residences sampled, 24 soil samples were elevated above background concentrations for pesticides, including dieldrin; toxaphene; 4,4'-DDD; alpha-chlordane; gamma-chlordane; endosulfan sulfate; and endrin (Ref. 18, pp. 16-22). No metals were detected at elevated concentrations in any samples (Ref. 18, pp. 78-171).

From June 29 to July 1, 2010, OTIE conducted an ADS on behalf of EPA within a ¼-mile area of the former Red Panther facility (Refs. 40, pp. 5, 14, 182-287; 41, pp. 1, 5). The purpose of the ADS was to evaluate the presence of pesticides in the surface soils surrounding the former Red Panther facility (Ref. 40, p. 5). Field investigation activities included the collection of surface soil samples in every direction from the facility to determine if contaminant concentrations previously identified in the residential neighborhood to the west of the facility (18th Street Neighborhood) were a result of pesticide formulation activities at the facility or if the presence of the nearby agricultural fields contributed to the pesticide contamination (Ref. 40, p. 5). A total of 81 nine-point composite surface soil samples were collected from 73 locations in a ¼-mile area surrounding the facility, including eight duplicate samples, but not including the background samples (Refs. 40, pp. 14-18; 41, pp. 31-32). Four background composite samples, including one duplicate, were collected north and northeast of the facility from areas 0.7- to 1.1-mile distant from the facility to ensure an adequate background for comparison purposes (Refs. 40, pp. 14, 15, 19-20; 41, pp. 31-32). The 73 composite soil samples were collected in a grid pattern with 300-foot centers in all directions from the facility. At each 300-foot center, composite soil samples were collected from the 0- to 3-inch bgs interval; each sample consisted of nine aliquots within a 25-by-25 foot sampling sub-grid (Ref. 40, p. 15). All aliquots of each composite sample were collected from within the respective property boundary and, for residential grids, less than 200 feet from the residential structure (Refs. 40, p. 15; 42, p. 1). Each 25-by-25 foot grid was approximately 300 feet apart, offset when needed to locate the grid completely over soil. The background samples were collected in the same manner from three residential properties located in neighborhoods of approximately the same age as the 18th Street Neighborhood (Ref. 40, pp. 15-16).

- 2005 18th Street Neighborhood Removal Assessment

The composite surface soil samples listed below were collected August 9 and 10, 2005 during the Removal Assessment by Weston conducted on behalf of the EPA Region 4 (Ref. 18, pp. 7-8). All samples collected during the investigation were submitted through the EPA Contract Laboratory Program (CLP) for CLP Pesticides analysis and CLP arsenic, aluminum, and iron analysis (Ref. 18, pp. 8-9, 79-171) In 2005, the CLP Pesticide analysis and CLP arsenic, aluminum, and iron analysis were analyzed by methods SOM01.1 and ILM05.3 (Refs. 18, pp. 8-9, 79-171; 43, p.

1; 44, p. 1). Results were validated by the EPA Science and Ecosystem Support Division (SESD); the data validation report is included in Reference 18 (Ref. 18, pp. 8-9, 172-175). See Figure 3 of this Documentation Record for sample locations.

- Background Concentrations:

The background composite surface soil sample was collected from BF McLaurin Park located on Sunflower Avenue, near 6th Street, approximately 0.5 mile north of the 18th Street Neighborhood (Ref. 18, pp. 7, 41, 49). Soil contamination in the area of the facility is largely due to air deposition of particulates from the Red Panther facility. There is no one prevailing wind direction in the area (Ref. 40, p. 18). Additionally, some pesticide presence in the background sample is to be expected due to usage in agricultural fields in the area (Ref. 40, pp. 19-21).

Sample ID	Sample Medium	Depth	Date	Reference
SN-01-SS	Soil	0-3 inches	8/10/05	18, pp. 40-41, 166

Sample ID	Hazardous Substance	Concentration (ug/kg)	Sample Quantitation Limit (ug/kg)	Reference
SN-01-SS	Heptachlor epoxide	1.8U	1.8	18, pp. 125, 166
	Endosulfan II	3.5U	3.5	
	4,4'-DDD	3.5U	3.5	
	Endrin	3.5U	3.5	
	Dieldrin	3.5U	3.5	
	4,4-DDE	15	3.5	
	Toxaphene	180U	180	
	Gamma-chlordane	1.8U	1.8	
	Alpha-chlordane	1.8U	1.8	

Notes:
ug/kg - Micrograms per kilogram
U - Constituent analyzed for but not detected above reporting limit.
DDD - 4,4'-dichloro-2,2-bis(p-chlorophenyl)ethylene
DDE - 4,4'-dichloro-2,2-bis(p-chlorophenyl)ethane

- Contaminated Samples

The composite surface soil samples listed below were collected by Weston for EPA during the 2005 Removal Assessment conducted at the 18th Street Neighborhood (Ref. 18, pp. 4, 7, 15-22). All composite surface soil samples were collected between 0 to 12 inches bgs from locations within 200 feet of the residences or play grounds located on the properties (see Figure 3)(Refs. 18, pp. 29-47, 156-171). Generally, the soil samples were comprised of light brown sandy silt (Ref. 18, pp. 29-31). The background composite surface soil sample was collected from the playground areas of the BF McLaurin Park located on Sunflower Road approximately 0.5 mile north of the 18th Street Neighborhood (Ref. 18, pp. 7, 41). See Figure 3 of this Documentation Record for sample locations.

Sample ID	Sample Medium	Depth (inches bgs)	Date	Reference
SN-03-SS	Soil	0-12	8/9/05	18, pp. 30, 162, 166
SN-04-SS	Soil	0-12	8/9/05	18, pp. 31, 162, 166

Sample ID	Sample Medium	Depth (inches bgs)	Date	Reference
SN-05-SS	Soil	0-12	8/9/05	18, pp. 31, 159, 166
SN-06-SS	Soil	0-12	8/9/05	18, pp. 32, 54, 159, 166
SN-07-SS	Soil	0-12	8/9/05	18, pp. 36, 159, 166
SN-08-SS	Soil	0-12	8/9/05	18, pp. 37, 159, 166
SN-11-SS	Soil	0-12	8/9/05	18, pp. 38, 159, 167
SN-12-SS	Soil	0-12	8/9/05	18, pp. 38, 159, 167
SN-13-SS	Soil	0-12	8/9/05	18, pp. 39, 159, 167
SN-14-SS	Soil	0-12	8/9/05	18, pp. 39, 160, 167
SN-16-SS	Soil	0-12	8/9/05	18, pp. 39, 160, 167
SN-18-SS	Soil	0-12	8/10/05	18, pp. 44, 160, 167
SN-19-SS	Soil	0-12	8/10/05	18, pp. 44, 160, 167
SN-20-SS	Soil	0-12	8/10/05	18, pp. 43, 160, 168
SN-21-SS	Soil	0-12	8/10/05	18, pp. 44, 160, 168
SN-24-SS	Soil	0-12	8/10/05	18, pp. 34, 71, 161, 168
SN-25-SS	Soil	0-12	8/10/05	18, pp. 47, 161, 168
SN-26-SS	Soil	0-12	8/10/05	18, pp. 35, 161, 168
SN-27-SS	Soil	0-12	8/10/05	18, pp. 46, 161, 168
SN-29-SS	Soil	0-12	8/10/05	18, pp. 46, 161, 169
SN-30-SS	Soil	0-12	8/10/05	18, pp. 42-43, 161, 169
SN-31-SS	Soil	0-12	8/10/05	18, pp. 35, 161, 169

Sample ID	Hazardous Substance	Hazardous Substance Concentration (ug/kg)	Contract Required Quantitation Limit (ug/kg)	Background Concentration (ug/kg)	References
SN-03-SS	4,4-DDE	58	3.3	15	18, pp. 125, 127, 166; 44, p. 3
SN-04-SS	4,4-DDE	58	3.3	15	18, pp. 125, 128, 166; 44, p. 3
SN-05-SS	4,4-DDE	78	3.3	15	18, pp. 125, 129, 166; 44, p. 3
	Dieldrin	42	3.3	3.5U	
SN-06-SS	4,4-DDE	190	3.3	15	18, pp. 125, 130, 166; 44, p. 3
	Dieldrin	58	3.3	3.5U	
SN-07-SS	4,4-DDE	540	3.3	15	18, pp. 125, 131, 166; 44, p. 3
	Dieldrin	200	3.3	3.5U	
	Alpha Chlordane	5.2	1.7	1.8U	
SN-08-SS	4,4-DDE	500	3.3	15	18, pp. 125, 132, 166; 44, p. 3
	4,4-DDD	64	3.3	3.5U	
	Dieldrin	360	3.3	3.5U	
	Endosulfan II	570	3.3	3.5U	
SN-11-SS	4,4-DDE	160	3.3	15	18, pp. 125, 136, 166-167; 44, p. 3
	4,4-DDD	19	3.3	3.5U	
	Dieldrin	77	3.3	3.5U	
	Alpha Chlordane	100	1.7	1.8U	
	Gamma Chlordane	110	1.7	1.8U	
SN-12-SS	4,4-DDE	170	3.3	15	18, pp. 125, 137, 166-167; 44, p. 3
	Toxaphene	4,500	170	180U	
SN-13-SS	4,4-DDE	320	3.3	15	18, pp. 125, 138, 166-167; 44, p. 3
	Alpha Chlordane	53	1.7	1.8U	18, pp. 125, 138, 166-167; 44, p. 3
	Gamma Chlordane	44	1.7	1.8U	
SN-14-SS	4,4-DDE	170	3.3	15	18, pp. 125, 139, 166-167; 44, p. 3
SN-16-SS	4,4-DDE	73	3.3	15	18, pp. 125, 141, 166-167; 44, p. 3

Sample ID	Hazardous Substance	Hazardous Substance Concentration (ug/kg)	Contract Required Quantitation Limit (ug/kg)	Background Concentration (ug/kg)	References
SN-18-SS	4,4-DDE	280	3.3	15	18, pp. 125, 143, 166-167; 44, p. 3
	4,4-DDD	19	3.3	3.5U	
	Gamma Chlordane	29	1.7	1.8U	
	Endrin	7.2	3.3	3.5U	
SN-19-SS	4,4-DDE	260J	3.3	15	18, pp. 125, 144, 166-167; 44, p. 3
	Gamma Chlordane	62J	1.7	1.8U	
SN-20-SS	Dieldrin	10	3.3	3.5U	18, pp. 125, 146, 166, 168; 44, p. 3
SN-21-SS	4,4-DDE	270	3.3	15	18, pp. 125, 147, 166, 168; 44, p. 3
	4,4-DDD	20	3.3	3.5U	
	Dieldrin	380	3.3	3.5U	
	Heptachlor Epoxide	4.6	1.7	1.8U	
	Alpha Chlordane	6.1	1.7	1.8U	
SN-24-SS	4,4-DDE	150	3.3	15	18, pp. 125, 150, 166, 168; 44, p. 3
	Toxaphene	4,700	170	180U	
SN-25-SS	4,4-DDE	82	3.3	15	18, pp. 125, 151, 166, 168; 44, p. 3
	Toxaphene	1,900	170	180U	
	Gamma Chlordane	7.2	1.7	1.8U	
SN-26-SS	4,4-DDE	180	3.3	15	18, pp. 125, 152, 1663, 168; 44, p. 3
	Endosulfan II	12	3.3	3.5U	
	Toxaphene	810	170	180U	
SN-27-SS	4,4-DDE	110	3.3	15	18, pp. 125, 153, 166, 168; 44, p. 3
	4,4-DDD	7.2	3.3	3.5U	
SN-29-SS	4,4-DDE	90	3.3	25	18, pp. 125, 155, 166, 169; 44, p. 3
	Dieldrin	36	3.3	3.5U	
	Alpha Chlordane	3.5	1.7	1.8U	
SN-30-SS	4,4-DDE	250	3.3	15	18, pp. 125, 156, 166, 169; 44, p. 3
	Dieldrin	42	3.3	3.5U	
	Alpha Chlordane	6.6	1.7	1.8U	
SN-31-SS	4,4-DDE	130	3.3	15	18, pp. 125, 157, 166, 169; 44, p. 3
	Dieldrin	32	3.3	3.5U	

Notes:

a - The Contract Required Quantitation Limit is equivalent to the Sample Quantitation Limit (Ref. 45).
J - Constituent was detected, value is an estimate
ug/kg - Micrograms per kilogram
U - Constituent was analyzed for but was not detected at or above reporting limit.

- 2010 OTIE Air Deposition Study

The composite surface soil samples listed below were collected June 29 to July 1, 2010 during the ADS conducted by OTIE on behalf of EPA Region 4 (Ref. 40, pp. 5, 14). A total of 80 nine-point composite surface soil samples were collected from 73 locations in a 0.25-mile area surrounding the facility, including 8 duplicate samples (Refs. 40, pp. 14-17, 19; 41, pp. 31-32). Four background composite samples, including one duplicate sample, were collected north and northeast of the facility from areas 0.7- to 1.1-mile distant from the facility to ensure an adequate background for comparison purposes (Refs. 40, pp. 14-17; 41, pp. 31-32). The composite soil samples were collected in a grid pattern with 300-foot centers in all directions from the facility. At each 300-foot center, composite soil samples were collected from the 0- to 3-inch bgs interval; each sample consisted of nine aliquots within a 25-by-25 foot sampling sub-grid (Ref. 40, pp. 14-15). All aliquots of the composite were collected from within the respective property boundaries and, for residential grids, less than 200 feet from the residential structure (Ref. 40, p. 15). Each 25-by-25 foot grid was approximately 300 feet apart. The background samples were collected in the same manner from three residential properties located in neighborhoods of approximately the same age as the 18th Street Neighborhood (Ref. 40, pp. 15-16).

All samples collected during the investigation were submitted to the EPA SESD laboratory for routine TCL pesticide analytical services using EPA Method 8080 (Ref. 40, pp. 16, 89). Results were validated by EPA SESD; the data validation report is included in Reference 40, pages 90 through 180. See Figure 4 of this Documentation Record for sample locations.

- Background Concentrations:

The four background composite surface soil samples, including one duplicate, were collected from residential properties located 0.7- to 1.1-mile distant from the facility to ensure an adequate background for comparison purposes (Ref. 40, pp. 14-15; 41, pp. 31-32). The highest concentration of each constituent from all four background samples was used for comparison purposes. All samples were collected in accordance with the guidance presented in the EPA-approved site-specific Quality Assurance Project Plan/ Site Study Plan (QAPP/SSP) and in accordance with the EPA SESD Field Branches Quality System and Technical Procedures (FBQSTP) (Refs. 40, pp. 6, 14; 41). Each aliquot of the composite sample was collected from inside the property boundary, within 200 feet of the residential dwelling (Ref. 40, p. 15). The neighborhoods selected for the background samples were of approximately the same age; the background composite soil samples consisted of similar soil types (Ref. 40, pp. 14-15). Soil contamination in the vicinity is largely a result of air deposition of particulates from the Red Panther facility. There is no one prevailing wind direction in the area (Ref. 40, p. 17). In addition, some pesticide presence in the background is to be expected due to the presence of agricultural areas and the application of pesticides (Ref. 40, pp. 19-20).

Sample ID	Sample Medium	Depth	Date	Reference
RP-CS-01 RP-CS-77	Soil	0-3 inches	6/29/10	40, pp. 15-16, 25, 33, 194, 210, 295, 297

Sample ID	Sample Medium	Depth	Date	Reference
(duplicate)				
RP-CS-02	Soil	0-3 inches	7/1/10	40, pp. 15-16, 25, 33, 194, 230, 288
RP-CS-03	Soil	0-3 inches	7/1/10	40, pp. 15-16, 25, 33, 194, 229, 288

Sample ID	Hazardous Substance	Concentration (ug/kg)	Minimum Reporting Limit (ug/kg)[a]	Reference
RP-CS-01	4,4'-DDD	10U, D-4	10	40, pp. 91, 96, 295
	4,4'-DDE	20	5.1	
	4,4'-DDT	30	13	
	Aldrin	1U	1	
	Alpha-BHC	0.51U	0.51	
	Beta-BHC	1U	1	
	Dieldrin	21	5.1	
	Endosulfan sulfate	2.5U	2.5	
	Endrin	29U, D-4	29	
	Endrin aldehyde	4.4U, D-4	4.4	
	Gamma-chlordane	21	5.1	
	Heptachlor	2.4	0.76	
	Heptachlor epoxide	2.7U, D-4	2.7	
	Toxaphene	350U, D-4	350	
RP-CS-02	4,4'-DDD	6.3U	6.3	40, pp. 91, 159, 288
	4,4'-DDE	4.8	3.1	
	4,4'-DDT	9.7	7.9	
	Aldrin	3.1U	3.1	
	Alpha-BHC	1.6U	1.6	
	Beta-BHC	3.1U	3.1	
	Endosulfan sulfate	7.9U	7.9	
	Endrin	6.3U	6.3	
	Endrin aldehyde	7.9U	7.9	
	Gamma-chlordane	3.1U	3.1	
	Heptachlor	2.4U	2.4	
	Heptachlor epoxide	3.1U	3.1	
	Toxaphene	310U	310	

Sample ID	Hazardous Substance	Concentration (ug/kg)	Minimum Reporting Limit (ug/kg)[a]	Reference
RP-CS-03	4,4'-DDD	6.3U	6.3	40, pp. 92, 94, 160, 288
	4,4'-DDE	20	7.8	
	4,4'-DDT	18	7.8	
	Aldrin	3.1U	3.1	
	Alpha-BHC	1.6U	1.6	
	Beta-BHC	3.1U	3.1	
	Dieldrin	52	7.8	
	Endosulfan sulfate	7.8U	7.8	
	Endrin	6.3U	6.3	
	Endrin aldehyde	7.8U	7.8	
	Gamma-chlordane	4.1	3.1	
	Heptachlor	2.4U	2.4	
	Heptachlor epoxide	3.2	3.1	
	Toxaphene	310U	310	
RP-CS-77	4,4'-DDD	34	10	40, pp. 91, 94, 97, 297
	4,4'-DDE	22	5.1	
	4,4'-DDT	34	13	
	Aldrin	1.0U	1.0	
	Alpha-BHC	0.51U	0.51	
	Beta-BHC	1.0U	1.0	
	Dieldrin	23	5.1	
	Endosulfan sulfate	2.5U	2.5	
	Endrin	10U, D-4	10	
	Endrin aldehyde	2.5U	2.5	
	Gamma-chlordane	27	5.1	
	Heptachlor	2.1U, D-4	2.1	
	Heptachlor epoxide	3.6U, D-4	3.6	
	Toxaphene	100U, D-4	100	

Notes:
ug/kg - Micrograms per kilogram
a - Minimum reporting limit is equivalent to the Sample Quantitation limit (Ref. 45).
U - Constituent analyzed for but not detected above reporting limit.
D-4 - MRL elevated due to interference.
Q-4 - Greater than 40% difference between primary and confirmatory GC columns.
DDD - 4,4'-dichloro-2,2-bis(p-chlorophenyl)ethylene
DDE - 4,4'-dichloro-2,2-bis(p-chlorophenyl)ethane
DDT - 4,4'-trichloro-2,2,-bis(p-chlorophenyl)ethane
BHC - Benzenehexachloride

- Contaminated Samples

The composite surface soil samples listed below were collected by OTIE for USEPA from locations in a ¼-mile area surrounding the Red Panther facility (Ref. 40, pp. 1, 14, 15, 18). All composite surface soil samples were collected from 0-to 3-inches bgs and were comprised of a nine aliquots collected from a 25-by-25 foot grid (Ref. 40, pp. 14-15). The centers of the 25-foot grids were located 300 feet apart (Ref. 40, pp. 14-15). All aliquots of each individual sample was collected from within the respective property boundary and, in the case of residential samples, within 200 feet of the building (Ref. 40, pp. 14-15). See Figure 4 of this Documentation Record for sample locations.

Sample ID	Sample Medium	Depth (inches bgs)	Date	Reference
RP-CS-05	Soil	0-3	6/29/10	40, pp. 14-15, 26, 27, 33-34, 194, 197, 295
RP-CS-06	Soil	0-3	6/29/10	40, pp. 14-15, 26, 27, 33-34, 194, 247, 295
RP-CS-08	Soil	0-3	6/29/10	40, pp. 14-15, 26, 27, 33-34, 194, 260
RP-CS-09	Soil	0-3	7/1/10	40, pp. 14-15, 26, 27, 33-34, 194, 277, 288
RP-CS-11	Soil	0-3	6/30/10	40, pp. 14-15, 26, 27, 33-34, 194, 224, 291
RP-CS-12	Soil	0-3	6/30/10	40, pp. 14-15, 26, 27, 33-34, 194, 218, 291
RP-CS-18	Soil	0-3	6/29/10	40, pp. 14-15, 26, 27, 33-34, 194, 248, 295
RP-CS-19	Soil	0-3	6/29/10	40, pp. 14-15, 26, 27, 33-34, 194, 199, 295
RP-CS-20	Soil	0-3	6/29/10	40, pp. 14-15, 26, 27, 33-34, 194, 261, 291
RP-CS-23	Soil	0-3	7/1/10	40, pp. 14-15, 26, 27, 33-34, 194, 278, 288
RP-CS-24	Soil	0-3	6/30/10	40, pp. 14-15, 26, 27, 33-34, 194, 276, 288
RP-CS-26	Soil	0-3	6/30/10	40, pp. 14-15, 26, 27, 33-34, 194, 267, 291
RP-CS-28	Soil	0-3	6/29/10	40, pp. 14-15, 26, 27, 33-34, 194, 250, 295
RP-CS-29	Soil	0-3	6/29/10	40, pp. 14-15, 26, 27, 33-34, 194, 202, 295
RP-CS-32	Soil	0-3	6/29/10	40, pp. 14-15, 26, 27, 33-34, 194, 255, 296
RP-CS-38	Soil	0-3	6/29/10	40, pp. 14-15, 26, 27, 33-34, 194, 254, 296
RP-CS-39	Soil	0-3	6/29/10	40, pp. 14-15, 26, 27, 33-34, 194, 204, 296
RP-CS-47	Soil	0-3	6/29/10	40, pp. 14-15, 26, 27, 33-34, 194, 206, 296
RP-CS-50	Soil	0-3	6/29/10	40, pp. 14-15, 26, 27, 33-34, 194, 257, 297

Sample ID	Sample Medium	Depth (inches bgs)	Date	Reference
RP-CS-57	Soil	0-3	6/29/10	40, pp. 14-15, 26, 27, 33-34, 194, 208, 297
RP-CS-60	Soil	0-3	6/28/10	40, pp. 14-15, 26, 27, 33-34, 194, 259, 297
RP-CS-61	Soil	0-3	7/1/10	40, pp. 14-15, 26, 27, 33-34, 194, 228, 297
RP-CS-62	Soil	0-3	7/1/10	40, pp. 14-15, 26, 27, 33-34, 194, 281, 289
RP-CS-66	Soil	0-3	6/30/10	40, pp. 14-15, 26, 27, 33-34, 194, 264, 293
RP-CS-75	Soil	0-3	7/1/10	40, pp. 14-15, 26, 27, 33-34, 194, 284, 290

Sample ID	Hazardous Substance	Hazardous Substance Concentration (ug/kg)	Minimum Reporting Limit[a] (ug/kg)	Background Concentration (ug/kg)	References
RP-CS-05	4,4'-DDD	220	95	34	40, pp. 91-92, 96-97, 99, 159, 160
	4,4'-DDE	220	48	22	
	4,4'-DDT	310	120	34	
	Aldrin	12	4.8	3.1U	
	Dieldrin	230	48	52	
	Gamma-chlordane	530	48	27	
	Heptachlor	210	36	2.4	
	Heptachlor epoxide	290	48	3.2	
RP-CS-06	Dieldrin	160	4.5	7.9U	40, pp. 91-92, 96-97, 99-100, 159, 160
RP-CS-08	Endrin aldehyde	11	7.8	7.9U	40, pp. 91-92, 96-97, 129, 159, 160
RP-CS-09	4,4'-DDE	84	7.7	22	40, pp. 91-92, 96-97, 159, 160-161
RP-CS-11	4,4'-DDE	94	7.4	22	40, pp. 91-92, 94, 96-97, 130, 159, 160
	4,4'-DDT	110	19	34	
RP-CS-12	Alpha-BHC	3.4	1.7	1.6U	40, pp. 91-92, 96-97, 131, 159, 160

Sample ID	Hazardous Substance	Hazardous Substance Concentration (ug/kg)	Minimum Reporting Limit[a] (ug/kg)	Background Concentration (ug/kg)	References
RP-CS-18	Aldrin	34	4.7	3.1U	40, pp. 91-92, 96-97, 104, 159, 160
	Dieldrin	840	93	52	
RP-CS-19	4,4'-DDE	68	4.7	22	40, pp. 91-92, 96-97, 105, 159, 160
RP-CS-20	Endrin aldehyde	8	7.6	7.9U	40, pp. 91-92, 96-97, 135, 159, 160
RP-CS-23	4,4'-DDE	82	7.7	22	40, pp. 91-92, 96-97, 159, 160, 164
RP-CS-24	4,4'-DDD	120	15	34	40, pp. 91-92, 96-97, 159, 160, 165
	4,4'-DDE	260	76	22	
	4,4'-DDT	240	19	34	
	Dieldrin	2200	380	52	
	Toxaphene	5300	1500	350U	
RP-CS-28	4,4'-DDE	110	42	22	40, pp. 91-92, 96-97, 106, 159, 160
RP-CS-29	4,4'-DDE	99	8.8	22	40, pp. 91-92, 96-97, 107, 159, 160
RP-CS-32	4,4'-DDT	110	12	34	40, pp. 91-92, 96-97, 111, 159, 160
RP-CS-38	4,4'-DDT	330	120	34	40, pp. 91-92, 96-97, 114, 159, 160
	Heptachlor epoxide	51	4.7	3.2	
RP-CS-39	4,4'-DDT	130	13	34	40, pp. 91-92, 96-97, 115, 159, 160
RP-CS-47	4,4'-DDT	170	27	34	40, pp. 91-92, 96-97, 117, 159, 160
	Beta-BHC	9.7	1.1	3.1U	
RP-CS-50	4,4'-DDE	90	9.6	22	40, pp. 91-92, 96-96, 120, 159, 160
RP-CS-57	4,4'-DDE	88	9.6	22	40, pp. 91-92, 96-97,

Sample ID	Hazardous Substance	Hazardous Substance Concentration (ug/kg)	Minimum Reporting Limit[a] (ug/kg)	Background Concentration (ug/kg)	References
					122, 159, 160
RP-CS-60	4,4'-DDE	180	19	22	40, pp. 91-92, 96-97, 125, 159, 160
	4,4'-DDT	280	48	34	
RP-CS-61	4,4'-DDE	1100	140	22	40, pp. 91-92, 93, 94, 96-97, 116, 159, 160, 171
	4,4'-DDT	950	180	34	
	Beta-BHC	56	7.2	3.1U	
	Dieldrin	3800	360	52	
	Endosulfan sulfate	80	18	7.9U	
	Endrin	110	14	29U	
	Toxaphene	5900	2900	350U	
RP-CS-62	4,4'-DDD	80	16	34	40, pp. 91-92, 96-97, 159, 160, 172
	4,4'-DDE	390	79	22	
	4,4'-DDT	140	20	34	
	Dieldrin	1700	320	52	
	Toxaphene	2400	790	350U	
RP-CS-66	4,4'-DDT	120	16	34	40, pp. 91-92, 96-97, 159, 156, 160
RP-CS-75	4,4'-DDE	87	7.2	22	40, pp. 91-93, 94, 96-97, 159, 160, 180
	Dieldrin	210	29	52	

Notes:
a - Minimum reporting limit is equivalent to the Sample Quantitation limit (Ref. 45).
J - Constituent was detected, value is an estimate
ug/kg - Micrograms per kilogram
U - Constituent was analyzed for but was not detected above the reporting limit.

2.4.2 HAZARDOUS WASTE QUANTITY

2.4.2.1.1 Hazardous Constituent Quantity

Insufficient data is available to calculate the hazardous constituent quantity.

Hazardous Constituent Quantity Value (S): Not Scored
Reference: 1, Section 2.4.2.1.1

2.4.2.1.2 Hazardous Wastestream Quantity

Insufficient data is available to calculate the hazardous wastestream quantity.

Hazardous Wastestream Quantity Value (W): Not Scored
Reference: 1, Section 2.4.2.1.2

2.4.2.1.3 Volume

Insufficient data is available to calculate the volume.

Volume Value (V): 0
Reference: 1, Section 2.4.2.1.3

2.4.2.1.4 Area

The area of contamination is formed by the following composite sample locations collected during the 18th Street Neighborhood Removal Assessment by Weston for EPA Region 4 and during the 2010 ADS conducted by OTIE on behalf of EPA: SN-03-SS, SN-04-SS, SN-05-SS, SN-06-SS, SN-07-SS, SN-08-SS, SN-11-SS, SN-12-SS, SN-13-SS, SN-14-SS, SN-16-SS, SN-18-SS, SN-19-SS, SN-20-SS, SN-21-SS, SN-24-SS, SN-25-SS, SN-26-SS, SN-27-SS, SN-29-SS, SN-30-SS, SN-31-SS, RP-CS-05,RP-CS-06, RP-CS-08, RP-CS-09, RP-CS-11, RP-CS-12, RP-CS-18, RP-CS-19, RP-CS-20, RP-CS-23, RP-CS-24, RP-CS-26, RP-CS-28, RP-CS-29, RP-CS-32, RP-CS-38, RP-CS-39, RP-CS-47, RP-CS-57, RP-CS-60, RP-CS-61, RP-CS-62, RP-CS-66, and RP-CS-75 (Refs. 18, pp. 29-161; 41, pp. 26, 33-34, 91-180, 194). All soil samples were collected within the property boundaries of each property. Soil contamination due to air deposition from Red Panther facility operations was largely continuous from the facility to the residential sampling locations, but the area of the source was not determined because some data show lack of significant levels of contamination between sampling locations (Refs. 40, p. 15; 42). Therefore, the area of soil contamination was estimated to be >0 ft^2.

Equation for hazardous waste quantity evaluation for the contaminated soil is A/34,000. Therefore, >0 ft^2 /34,000 = >0

Area Assigned Value: >0
Reference: 1, Table 2-5

2.4.2.1.5 Source Hazardous Waste Quantity Value

Source Hazardous Waste Quantity Value: >0
Reference: 1, Section 2.4.2.2

SUMMARY OF SOURCE DESCRIPTIONS

Source No.	Source Hazardous Waste Quantity Value	Containment				
		Ground water	Surface Water	Soil	Air	
					Gas	Particulate
1	>0	10	NS	10	NS	
2	>0	10	NS	10	NS	
SUM	>0					

Notes:
NS- Not Scored

Reference: 1, Section 2.4.2.2, Table 2-6

OTHER POSSIBLE SOURCES

Stacks, Above Ground Storage Tanks, Septic Tank and Drainfield, Waste Water Settling Basin, Drainage Ditch -

Former operation features at Red Panther included a septic tank and drainfield located on the north side of the property, and three hazardous waste above-ground storage tanks (ASTs) with a total capacity of 33,000 gallons located on the south side of the property (Ref. 5, p. 4). A small wastewater settling basin was located on the east central side of the property (Ref. 5, p. 4). Four stacks were part of the manufacturing process, with heights between 20 and 30 feet (Ref. 46, p. 29). According to air permit records, arsenic; 2,4-D; methanol; xylene; and ethylene glycol were emitted at the facility from the four stacks (Ref. 46, pp. 28-31, 42). Prior to obtaining interim status, wastewater containing pesticide and solvent residues were generated during equipment cleaning at the facility and discharged either directly to a drainage ditch or into an underground septic tank and drain field on the facility property (Refs. 5, pp. 3, 5; 6, pp. 8-9). Contamination on the property is believed to have originated from numerous spills during loading and unloading operations, contaminated wastewater releases, from spills and leaking underground piping in the tank farm area, as well as particulate releases to surrounding areas (Refs. 9, p. 2). In November 1985, a fire erupted at one of the Red Panther warehouses (Refs. 5, p. 5; 11, p. 5). Contaminated runoff resulting from the fire-fighting efforts caused a fish kill in the nearby Sunflower River (Ref. 11, p. 5). The contaminant was determined to be Lorox, a slightly toxic herbicide (Ref. 11, p. 5). A large volume of contaminated water was contained on the property and later shipped to a commercial hazardous waste disposal facility (Ref. 11, p. 5). During cleanup of the fire, approximately 382 old fiber drums were discovered in the crawlspace below the warehouse (Ref. 11, p. 5). Of those drums, 287 were empty and were crushed and sent to the local municipal landfill (Ref. 11, p. 5). Ninety-five drums contained trace residues of technical grade dieldrin and were disposed of at a commercial hazardous waste facility. (Ref. 11, p. 5).

3.0 GROUND WATER MIGRATION PATHWAY

3.0.1 GENERAL CONSIDERATIONS

Ground Water Migration Pathway Description

The source of contamination to the Ground Water Migration Pathway is contaminated soil located on the Red Panther property and in the adjacent 18th Street neighborhood (Refs. 11, pp. 10-12, 16-20; 13, pp. 5, 9-10, 27-41; 15, p. 8, 18-32, 99-390; 18, pp. 125-167). The interconnected aquifers being evaluated are the observed release to the Mississippi River Valley Alluvial aquifer, and the underlying hydraulically connected Sparta Sand aquifer (Refs. 19, pp. 19-20, 162-212; 20, pp. 4, 6-7, 13, 15). The Mississippi River Valley Alluvial aquifer is located at land surface in Clarksdale and is the most productive aquifer in the area; however, it is principally used for irrigation and industry (Ref. 20, p. 15).

The Sparta Sand aquifer is not confined from the overlying Mississippi River Valley Alluvial aquifer and the two are hydraulically connected in Clarksdale, within 2 miles of the sources at the site (Refs. 20, pp. 4, 6-7, 13, 15; 50, pp. 3-5). All drinking water in the study area comes from ground water sources.

Regional Geology/Aquifer Description

Clarksdale is located in the northwestern portion of the State of Mississippi within the Mississippi Alluvial Plain physiographic district (Ref. 20, p. 3). The property is underlain in descending stratigraphic order by: the Mississippi River alluvium, Sparta Sand, Zilpha Clay and Winona Sand, Tallahatta Formation, Meridian-Upper Wilcox Aquifer, and Lower Wilcox Aquifer (Ref. 20, pp. 4, 6-7).

The Mississippi River Valley alluvium directly underlies the property (Ref. 20, pp. 4, 6-7). The alluvium ranges from approximately 140 to 200 feet thick in the vicinity of Red Panther (Refs. 20, pp. 4, 6; 21, p. 3). It consists of clay, sand, silt, and gravel (Refs. 20, p. 15; 21, p. 2; 50, pp. 3-5). The lower part of the Mississippi River Valley Alluvial aquifer consists of coarse sand and gravel which grades upward through coarse sand, fine sand, silt, and clay (Refs. 20, p. 15; 50, pp. 3-5).

The Sparta Sand underlies the alluvium beneath the Red Panther property and is composed of rounded, well-sorted quartz grains in two or three thick beds separated by beds of clay (Refs. 20, pp. 4, 6-7; 21, p. 5; 50, p. 3). It contains more sand relative to overall thickness than any other aquifer in the State and to the northwest near Memphis, Tennessee; it combines with underlying sand beds and is known as the Memphis Aquifer (Ref. 21, p. 5). The thickness of the Sparta Sand is approximately 500 feet in the area (Refs. 20, pp. 4, 6-7; 50, p. 3).

The Zilpha Clay and Winona Sand underlie the Sparta Sand and are approximately 100 feet thick in Clarksdale (Ref. 20, pp. 4, 6-7). The Tallahatta Formation underlies the Zilpha Clay and Winona Sand and is hydraulically connected to these overlying units (Ref. 20, pp. 6-7, 13). The Tallahatta generally contains several thick to very thin sand beds that are separated by clay (Ref. 20, p. 13). The Tallahatta is approximately 350 feet thick beneath the property (Ref. 20, pp. 4, 6-7). The combined Zilpha Clay, Winona Sand and the basal beds of the Tallahatta Formation serve as an impermeable confining layer between the Sparta Sand and the underlying Meridian Upper-Wilcox Aquifer (Refs. 20, pp. 6-8; 21, p. 9; 23, pp. 48, 60; 50, p. 3). Based on the overall lithology (clay), the average hydraulic conductivity of this confining layer is approximately 10^{-8} cm/sec (Ref. 1, Table 3-6).

The Wilcox Group underlies the Tallahatta and is a massive unit consisting of fine-to-coarse micaceous sand that dips west to southwest (Ref. 21, p. 9). The Wilcox

Group is approximately 1,000 feet thick in Clarksdale (Ref. 20, pp. 4, 6-7).

The Meridian Sand Member of the Tallahatta Formation, together with the uppermost sands of the Wilcox Group form the Meridian-Upper Wilcox aquifer beneath the property (Refs. 20, p. 11; 21, p. 9). Pumping tests of the aquifer indicate hydraulic conductivities between 30 to 68 ft^3/d (Ref. 20, p. 13). The aquifer ranges in thickness from 50 to 350 feet and wells in Clarksdale screened in the aquifer are completed to depths of 1,122 to 1,299 feet bgs (Refs. 22, pp. 3-4; 20, p. 11). The regional ground water flow in the Meridian Upper-Wilcox aquifer is westward (Ref. 20 p. 13).

Site Geology/Aquifer Description

- Aquifer/Stratum 1 (uppermost): Mississippi River Valley Alluvium

The Mississippi River Valley alluvium directly underlies the property (Refs. 20, pp. 4, 6-7; 50, pp. 3-5). The alluvium ranges from approximately 140 to 200 feet thick in the vicinity of Red Panther (Refs. 20, pp. 4, 6; 21, p. 3; 50, pp. 3-5). It consists of clay, sand, silt, and gravel (Refs. 20, p. 15; 21, p. 2; 50, pp. 3-5). The lower part of the Mississippi River Valley Alluvial aquifer consists of coarse sand and gravel which grades upward through coarse sand, fine sand, silt, and clay (Refs. 20, p. 15; 50, pp. 3-5).

The Mississippi River Valley Alluvial aquifer is the most productive aquifer in the area; however, it is principally used for irrigation and industry (Ref. 20, p. 15). Water levels in the aquifer average 20 feet bgs, but fluctuate seasonally from approximately 30 feet bgs during the summer and fall and near land surface during the spring (Ref. 21, p. 2). Generally, recharge to the aquifer is from the direct infiltration of rainfall and ground water flow is generally south toward streams in the area (Refs. 20, p. 15; 21, p. 2). The transmissivity of the aquifer is commonly greater than 10,000 square feet per day (Refs. 21, p. 2; 23, p. 20). Based on the lithology of the alluvium, the estimated hydraulic conductivity is approximately 10^{-4} centimeters per second (cm/sec) (Ref. 1, Table 3-6; 20, p. 15).

- Aquifer/Stratum 2 (lower): Sparta Sand

The Sparta Sand underlies the alluvium beneath the Red Panther property and is composed of rounded, well-sorted quartz grains in two or three thick beds separated by beds of clay (Refs. 20, pp. 4, 6-7; 21, p. 5; 50, p. 3). It contains more sand relative to overall thickness than any other aquifer in the State (Ref. 21, p. 5). The thickness of the Sparta Sand is approximately 500 feet in the area (Refs. 20, pp. 4, 6-7; 50, p. 3). Water levels in the Sparta range from 450 to 100 feet above sea level (Ref. 21, p. 5). The Sparta aquifer crops out and receives its recharge in parts of DeSoto, Panola, and Tate counties located to the northeast of Coahoma County (Ref. 20, pp. 12-13). The Sparta Sand aquifer is not confined from the Mississippi River Valley Alluvial aquifer and the two are hydraulically connected in Clarksdale, where the Red Panther property is located (Refs. 20, pp. 4, 6, 13, 15; 50, p. 3). The regional movement in the Sparta Sand is from east to west (Ref. 20, p. 15). The average hydraulic conductivity of the Sparta Sand in Mississippi is 67 cubic feet per day per square foot $((ft^3/d)/ft^2)$ or 10^{-6} cm/sec (Refs. 1, Table 3-6; 20, p. 15). Municipal wells in Clarksdale that are screened in the Sparta Sand aquifer are completed to depths of 667 to 760 feet bgs (Refs. 22, pp. 3-4; 35, p. 1; 50, p. 3).

- Aquifer Interconnection/Distance from Source

The Sparta Sand aquifer is not confined from the Mississippi River Valley Alluvial aquifer and the two are hydraulically connected in Clarksdale, where the Red Panther property is located (Refs. 20, pp. 4, 6, 13, 15; 21, p. 2; 50, pp. 3-5). The Sparta Sand underlies the alluvium beneath the Red Panther property and is composed of

rounded, well-sorted quartz grains in two or three thick beds separated by beds of clay (Refs. 20, pp. 4, 6-7; 21, p. 5; 50, p. 3). A persistent clay layer has not been found to be continuous between the Sparta Sand and alluvium within 2 miles of the sources at the site (Refs. 20, pp. 6-7; Ref. 21, p. 5; 50, p. 3).

The Zilpha Clay, Winona Sand and the basal beds of the Tallahatta Formation, generally greater than 50 feet thick, serve as an impermeable confining layer between the Sparta Sand and the underlying Meridian Upper-Wilcox Aquifer (Refs. 20, pp. 6-8; 21, p. 9; 23, pp. 48, 60). Based on the overall lithology (clay), the average hydraulic conductivity of this confining layer is approximately 10^{-8} cm/sec (Ref. 1, Table 3-6).

For purposes of this site scoring, strata below the Sparta Sand are not evaluated as part of the Mississippi River Valley Alluvial aquifer and the underlying hydraulically connected Sparta Sand aquifer.

3.1 LIKELIHOOD OF RELEASE

3.1.1 OBSERVED RELEASE

Aquifer Being Evaluated: The interconnected Mississippi River Valley Alluvial Aquifer and Sparta Sands Aquifer

An observed release of has been documented in the Mississippi River Valley Alluvial Aquifer (Ref. 19, pp. 19-20, 162-212). The Mississippi River Valley Alluvial aquifer is the most productive aquifer in the area; however, it is principally used for irrigation and industry (Ref. 20, p. 15). The underlying Sparta Sand aquifer is not confined from the Mississippi River Valley Alluvial aquifer and the two are hydraulically connected within 2 miles of the sources at the site (Ref. 20, pp. 4, 6, 13, 15).

Direct Observation

An observed release by direct observation has not been documented.

Chemical Analysis

Monitoring Well Samples

- 2007 SI Sampling Investigation

Temporary monitoring wells were installed, as per the November 2001 EPA Region 4 Environmental Investigations Standard Operating Procedures and Quality Assurance Manual (EISOPQAM), on the Red Panther property during the 2007 SI field sampling event conducted by TN&A START for the EPA (Ref. 19, pp. 15-16). Ground water samples collected from the temporary monitoring wells located on the Red Panther property contained elevated concentrations of DDT (Ref. 19, pp. 19-20, 162-212). See Figure 3 of this Documentation Record for temporary monitoring well locations.

The analytical citations for the ground water samples listed below are from the 2007 SI field sampling event (Ref. 19). The concentrations detected in the ground water samples were compared to sample RP-TW-02 located on the north end of the property. Based on the westward ground water flow direction, RP-TW-02 is located in an upgradient/sidegragient location of ground water flow at the property (Refs. 19, pp. 290-300; 20, p. 15; 21, p. 2). See Figure 3 of this Documentation Record for temporary monitoring well locations. Analytical data sheets and QA/QC information are presented in Reference 19. All temporary well ground water samples collected during the TN&A SI field sampling event were analyzed by an EPA CLP laboratory (Ref. 19, pp. 40-286). The samples were analyzed for organic compounds including EPA TCL VOCs, extractable SVOCs, pesticides, and polychlorinated biphenyls (PCBs) using EPA method CLP SOM01.2, and Target Analyte List (TAL) metals and cyanide using EPA method CLP ILM05.4 (Ref. 19, pp. 40-286, 315-322). Data validation was performed by EPA Region 4 SESD personnel (Ref. 19, pp. 162-286). Analytical data sheets and QA/QC information are presented in Reference 19.

Background sample

Sample ID	Total Depth (feet)[a]	Depth to Water (feet)	Sample Location	Date Sampled	References
RP-TW-02	35	9.30	North end of Red Panther property	10/11/07	19, pp. 29, 32, 198, 295

Notes:
[a] Total depth, depth to water, and screened interval measured from ground surface

RP - Red Panther Chemical Company
TW - Temporary monitoring well

Sample ID	Hazardous Substance	Concentration (ug/L)	MRL (ug/L)	References
RP-TW-02	4,4'-DDT	0.015 J[a] (0.1071)	0.10	19, pp. 199, 205, 318;

Notes:
ug/L - Micrograms per liter
RP - Red Panther Chemical Company
TW - Temporary monitoring well
MRL - Minimum Reporting Limit - the analyte concentration which corresponds to the lowest quantitative point on the calibration curve or the lowest demonstrated level of acceptable quantitation (Refs. 19, p. 251; 45).
J - Constituent was detected, value is an estimate
[a] - The result is qualified "J" due to it being below the low calibration point. The "J" result is estimated, below the SQL or equivalent, and biased unknown. The adjusted value is 0.015 x 7.14 = 0.1071(Refs. 19, pp. 199, 205; 33, pp. 8, 16)

Contaminated Sample

Sample ID	Total Depth[a] (feet)	Depth to Water (feet)	Sample Location	Date Sampled	References
RP-TW-07	45.00	25.55	Former drum waste storage tank area	10/10/07	19, pp. 29, 32, 198, 294, 317

Notes:
[a] Total depth, depth to water, and screened interval measured from ground surface
RP - Red Panther Chemical Company
TW - Temporary monitoring well

Sample ID	Hazardous Substance	Concentration (ug/L)	MRL (ug/L)	References
RP-TW-07	4,4'-DDT	0.78 J*	0.10	19, pp. 199, 205, 209, 317-318; 45

Notes:
ug/L - Micrograms per liter
RP - Red Panther Chemical Company
TW - Temporary monitoring well
MRL - Minimum Reporting Limit - the analyte concentration which corresponds to the lowest quantitative point on the calibration curve or the lowest demonstrated level of acceptable quantitation (Refs. 19, p. 251; 45).
J - Constituent was detected, value is an estimate
* - The result is qualified "J" due to low surrogate recovery. Therefore, the "J" results are estimated and biased low. The result is usable without adjusting (Refs. 19, p. 199; 33, p. 8).

3.1.2 POTENTIAL TO RELEASE

Potential to release was not evaluated.

Attribution:

Red Panther operated as a pesticide formulation plant between 1949 and 1996 producing liquid and dry herbicides, insecticides, and fungicides (Refs. 4, p. 4; 5, p. 3; 6, p. 8; 7, p. 2). Chemicals used in the formulation included toxaphene; methyl parathion; chloropyrifos; 2,4-D; malathion; carbaryl; diazinon; methoxychlor; disodium methanearsonate; monosodium acid methanearsonate; chlorothalonil; and parathion (Ref. 7, p. 3). Contamination on the property is believed to have originated from numerous spills during loading and unloading operations, contaminated wastewater releases, from spills and leaking underground piping in the tank farm area, as well as particulate releases to surrounding areas (Ref. 9, p. 2).

On September 4, 2001, an Administrative Order on Consent for the Red Panther property between the PRPs and EPA Region 4 was finalized (Ref. 7, pp. 25-48). The Administrative Order on Consent identified four COCs for surface soil criteria and three COCs for subsurface soil criteria (Ref. 7, pp. 6-7, 21-24). The surface COCs were identified as arsenic, toxaphene, dieldrin, and total chlorinated pesticides (Ref. 7, p. 6). The subsurface COCs were identified as arsenic, toxaphene, and dieldrin (Ref. 7, p. 7). The Administrative Order on Consent required the PRPs to perform two phases of removal activities and disposal of excavated materials under all requirements of the Administrative Order on Consent (Ref. 7, pp. 5-9). EPA subsequently submitted the Action Memorandum documenting approval of the proposed removal action (Ref. 9).

On March 18, 2003, URS submitted the Phase I Removal Action Report and the Phase I Soil Characterization Report (Refs. 6, p. 1; 15, p. 1). Based on the results, URS recommended addressing the soils exceeding performance standards and addressing disposal options for the stockpiled soils in Ditch 1 in the Phase II Work Plan (Ref. 6, p. 17). The report was approved by EPA on April 10, 2003 (Ref. 16, p. 8). During the Interim Removal, the contents of eight ASTs ranging in size from 200 gallons up to 15,000 gallons in the Tank Farm were cleaned out and the solids and/or liquids impacted with arsenic and/or pesticides were disposed of off the property (Ref. 17, p. 6). During the Phase II Removal, a total of 5,341.27 tons of arsenic-impacted soils and 200 tons of pesticide-impacted soils were removed from the AST storage area; 1,903.73 tons of hazardous pesticide-impacted soils were removed from the loading dock and railroad spur area. Additional soils were removed from the AST storage area, loading dock and railroad spur area, silo area and property ditches, but was not characterized as hazardous or pesticide-impacted soils (Ref. 17, p. 7).

Subsurface soil concentrations of pesticides, including DDT remain beneath the Red Panther property and ground water beneath the property has indicated elevated levels of DDT (Refs. 17, pp. 7-8, 22-25, 184, 186, 187; 19, pp. 19-20, 36-38). Several municipal wells are located within the 4-mile Target Distance Limit (TDL) of the Red Panther property (Refs. 3; 22, pp. 1-5; Figures 2 to 4 of this HRS documentation record).

Sampling at the property prior to the implementation of the Administrative Order on Consent indicated the presence of elevated levels of additional contaminants including: endrin; 4,4'-DDT; 4,4'-DDE; 4,4'-DDD; heptachlor; chlordane; gamma-BHC (lindane); and endosulfan II (Refs. 11, pp. 16-20; 13, pp. 10, 27-41). These contaminants are documented to exist in association with historical operations at the facility and in samples collected from the property (Refs. 4, p. 4; 5, p. 3; 6, p. 8; 7, pp. 2-3; 9, p. 2; 11, pp. 10-12, 16-20; 13, pp. 5, 9-10, 27-41; 15, pp. 8, 18-32, 99-390; 36, p. 2). Analysis of ground water samples from the property during the 2007 SI indicated that metals and pesticides are present in the ground water beneath the property; however, low surrogate and matrix spike recoveries were encountered in several samples; therefore, those results were not used in the observed release documentation (Ref. 19, pp. 162-166, 194-197). Additionally, complete analytical data sets including validation reports, logbook notes, and dilution factors for the post-removal samples collected by URS for the performing PRPs during the Phase II soil removal were not included within the report (Ref. 17).

A radial search for businesses within 2 miles of the Red Panther was conducted by Environmental Data Resources, Inc. (EDR) (Ref. 25, pp. 1-315). The EDR radial report searched multiple databases including, but not limited to, federal, state, tribal, local land records, emergency release reports, and EDR proprietary records (Ref. 25, pp. 4-6, 227-243). Additionally, properties that could not be mapped (orphaned) are listed; however, their exact location in relation to the Red Panther property is unknown (Ref. 25, p. 226). No NPL sites, Indian Reservations, Department of Defense (DOD) sites, or manufactured gas plants are located within a 2-mile radius of the Red Panther property (Ref. 25, p. 16).

The EDR report identified a USS Agri-Chemicals facility located to the northwest within the 0.25 to 0.5-mile radius of the Red Panther property (Ref. 25, pp. 12, 16, 77-78). USS Agri-Chemicals, EPA ID No. MSD000798850, is a private company listed as a RCRA-Non Generator (Ref. 25, p. 78). The facility is listed as having one waste, dimethoate, associated with the business and does not generate or transport hazardous waste (Ref. 25, p. 78). DDT was not shown to be associated with the facility operations (Ref. 25).

DDT was banned from use in the United States in 1972 (Ref. 36, p. 2). DDT was used in the 1940s and 1950s to control mosquitoes and the typhus carried by lice (Ref. 36, p. 2). It was extensively used as an agricultural insecticide after 1945 (Ref. 36, p. 2). DDT is persistent in the environment with a reported half-life of 26 days in river water to 15 years and is immobile in most soils (Ref. 36, p. 1). It breaks down in the environment into DDE and DDD, which are also persistent and have similar physical and chemical properties (Ref. 36, p. 1).

During the 2010 ADS, soil sampling results indicated higher concentrations of DDT, DDD, and DDE in areas closer to the facility (Ref. 40, pp. 18-21). In general, the ADS concluded that the higher contaminant concentrations near the facility suggested that the contamination is the result of historic Red Panther facility activities and not a result of the use of the compounds in nearby agricultural fields (Ref. 40, pp. 20-21).

Hazardous Substances Released:

4,4-DDT

Ground Water Observed Release Factor Value: 550

3.2 WASTE CHARACTERISTICS

3.2.1 TOXICITY/MOBILITY

Hazardous Substance	Source No.	Toxicity Factor Value	Mobility Factor Value[a]	Toxicity/ Mobility	Does Hazardous Substance Meet Observed Release by chemical analysis? (Y/N)	References
Aldrin	2	10,000	0.0001	1	N	2, p. BI-1; 40, pp. 89-180
Alpha-chlordane	2	10,000	0.01	100	N	2, p. BI-3; 40, pp. 89-180
Alpha-Hexachlorocyclohexane (Alpha-BHC)	2	10,000	1	10,000	N	2, BI-7; 40, pp. 89-180
Arsenic	1	10,000	0.01	100	N	2, BI-1; 17, pp. 184, 186, 187
Gamma-chlordane	2	10	0.01	100	N	2, p. BI-3; 40, pp. 89-180
DDD	2	100	0.0001	0	N	2, p. BI-4; 40, pp. 89-180
DDE	2	100	0.0001	0	N	2, p. BI-4; 40, pp. 89-180
DDT	2	1,000	1[b]	1,000	Y	2, p. BI-4; 40, pp. 89-180
Dieldrin	1, 2	10,000	0.01	100	N	2, p. BI-5; 17, pp. 184, 186, 187; 40, pp. 89-180
Endosulfan II	2	100	1	100	N	2, p. BI-6; 40, pp. 89-180
Endrin	2	10,000	0.01	100	N	2, p. BI-6; 40, pp. 89-180
Endrin aldehyde	2	0	0.0001	0	N	2, p. BI-6; 40, pp. 89-180
Heptachlor	2	1,000	0.0001	0	N	2, p. BI-6; 40, pp. 89-180
Heptachlor epoxide	2	10,000	0.0001	1	N	2, p. BI-6; 40, pp. 89-180
Toxaphene	1,2	1,000	0.0001	0	N	2, p. BI-11; 17, pp. 184, 186, 187; 40, pp. 89-180

Notes:
a - Liquid, non-karst values used for those constituents not detected in ground water. (Refs. 4, p. 4; 5, pp. 3, 4; 6, p. 8; 7, p. 2; 9, p. 2)
b - Mobility value of 1 due to observed release of 4,4'-DDT in ground water samples.

Toxicity/Mobility Factor Value: 10,000
(Ref. 1, Table 3-9)

3.2.2 HAZARDOUS WASTE QUANTITY

Source No.	Source Type	Hazardous Waste Quantity
1	Contaminated soil	>0
2	Contaminated Soil	>0
		SUM = >0

Sum of Values: >0

Ground Water Migration Pathway Hazardous Waste Quantity Factor Value:10*

*The hazardous constituent quantity is not adequately established for the source. The value assigned from Table 2-6 without consideration of the removal action would be less than 100. Therefore, a value of 10 has been assigned for the Hazardous Waste Quantity value (Ref. 1, Section 2.4.2.2 and Table 2-6).

3.2.3 WASTE CHARACTERISTICS FACTOR CATEGORY VALUE

Toxicity/Mobility Factor Value: 10,000
Ground Water Migration Pathway Hazardous Waste Quantity Factor Value: 10

Toxicity/Mobility Factor Value (10,000) X
Ground Water Migration Pathway Hazardous Waste Quantity Factor Value (10) = 100,000

Ground Water Migration Pathway Waste Characteristics Factor Category Value: 18
(Ref. 1, Table 2-7)

3.3 TARGETS

The Sparta Sand aquifer directly underlies the Mississippi River Valley Alluvial aquifer, and they are interconnected within 2 miles of the sources at the site(Refs. 20, pp. 4, 6-7, 13, 15; 21, pp. 2, 5). During the 2007 SI, two wells completed in the Sparta aquifer (shallow aquifer) indicated the presence of several metals including barium, copper, iron, lead, manganese, and zinc at elevated concentrations; however, no site-attributable constituents were detected (Ref. 19, pp. 35, 86-93, 116, 121, 123, 125, 127, 129, 131, 133, 135, 160).

All drinking water in the study area comes from ground water sources. A major municipal drinking water supplier in the area is the Clarksdale Public Utilities, which operates 10 wells ranging from approximately 667 to 760 feet deep in the Sparta aquifer and 1,122 to 1,299 deep in the Meridian-Upper Wilcox aquifer (Ref. 22, pp. 1-5). All of the Clarksdale Public Utilities wells contribute equally to the municipal water supply and no one well supplies more than 40% to the total water supply (Ref. 35, p. 1). Seven of the wells draw water from the Sparta Aquifer, and three wells draw water from the deeper Meridian-Upper Wilcox Aquifer. The municipal wells completed in the Sparta aquifer within the 4-mile TDL of the sources at the site are all owned by the Clarksdale Public Utilities and are distributed as follows: 0- to 0.25-mile, 1 well; 0.25- to 0.5-mile, 0 wells; 0.5- to 1-mile, 4 wells; 1- to 2-miles, 2 wells; 2- to 3-miles, 0 wells; 3- to 4-miles, 0 wells (Refs. 3; 22, pp. 1-5; 24, p. 1).

According to the U.S. Census Bureau, the average number of persons per household in Coahoma County based on the 2004-2009 Census population estimates is 2.69 (Ref. 24, p. 1). Clarksdale Public Utilities serves a total of 7,355 connections in the water system; therefore, the total population served by the entire water system of the Clarksdale Public Utilities is approximately 19,784.95 persons served by 10 wells (Refs. 22, pp. 1-5; 35, p. 1). Therefore, the number of persons served per well in the Clarksdale Public Utilities water system is 1,978.495 persons. The population served by the seven wells completed in the Sparta aquifer within the 4-mile TDL of the source are distributed as follows: 0- to 0.25-mile, 1,978.495 persons; 0.25- to 0.5-mile, 0 persons; 0.5- to 1-mile, 7,913.98 persons; 1- to 2-miles, 3,956.99 persons; 2- to 3-miles, 0 persons; 3- to 4-miles, 0 persons (Refs. 3; 22, pp. 1-5; 24, p. 1; 35, p. 1). All municipal wells in Mississippi are located in designated Wellhead Protection Areas(WPA); however, no source associated with the site is within a WPA (Refs. 22, pp. 1-5; 34, p. 9).

No documented private wells that draw water from the Sparta Aquifer are located within the 4-mile TDL of the Red Panther property

3.3.1 NEAREST WELL

The nearest well completed in the Sparta Aquifer, Well 140002-4, is owned by the Clarksdale Public Utilities and is located within 0 to 0.25-mile distance category, south of the Red Panther sources (Refs. 3; 22, pp. 1-5).

Level of Contamination (I, II, or potential): Potential

Nearest Well Factor Value (Sparta Aquifer): 20
(Ref. 1, Table 3-11)

3.3.2 POPULATION

3.3.2.1 Level of Contamination

3.3.2.2 Level I Concentrations

No Level I wells have been documented within the 4-mile TDL of the property.

Population Served by Level I Wells: 0

Level I Concentration Factor Value: 0

3.3.2.3 Level II Concentrations

No Level II wells have been documented within the 4-mile TDL of the property.

Population Served by Level II Wells: 0

Level II Concentrations Factor Value: 0

3.3.2.4 Potential Contamination

An observed release of site-attributable constituents has been documented in the surficial aquifer beneath the facility (See Section 3.1.1 of this Documentation Record). No municipal wells completed in the interconnected Mississippi River Valley Alluvial Aquifer and Sparta Sands aquifer have indicated elevated levels of site-attributable constituents (See Section 3.1.1 of this Documentation Record). The municipal wells completed in the Sparta aquifer within the 4-mile TDL of the sources at the site are all owned by the Clarksdale Public Utilities and are distributed as follows: 0- to 0.25-mile, 1 well; 0.25- to 0.5-mile, 0 wells; 0.5- to 1-mile, 4 wells; 1- to 2-miles, 2 wells; 2- to 3-miles, 0 wells; 3- to 4-miles, 0 wells (Refs. 3; 22, pp. 1-5; 24, p. 1). According to the U.S. Census Bureau, the average number of persons per household in Coahoma County based on the 2005 to 2009 Census estimates is 2.69 (Ref. 24, p. 1). Clarksdale Public Utilities serves a total of 7,355 connections; therefore, the total population served by the 10 wells in the Clarksdale Public Utilities system is approximately 19,784.95 persons (Refs. 22, pp. 1-5; 24, p. 1; 35, p. 1). Therefore, the population served by wells completed in the Sparta aquifer within the 4-mile TDL of the property are distributed as follows: 0- to 0.25-mile, 1,978.495 persons; 0.25- to 0.5-mile, 0 persons; 0.5- to 1-mile, 7,913.98 persons; 1- to 2-miles, 3,956.99 persons; 2- to 3-miles, 0 persons; 3- to 4-miles, 0 persons (Refs. 3; 22, pp. 1-5; 24, p. 1; 35, p. 1; Figures 2 to 4 of this HRS documentation record).

Municipal Wells within 4 Miles of the Red Panther Sources

Distance Category (miles)	Number of Municipal Wells (Sparta Aquifer)	Well ID	Population per Distance Ring	Distance Weighted Population Value	References
0 - 0.25	1	140002-4	1,978.495	1,633	1, Table 3-12; 3; 22, pp. 1-5; 24, p. 1; 35 p. 1; Figures 2 to 4 of the HRS documentation record
0.25 - 0.5	0		0	0	
0.5 - 1	4	140002-1 140002-5 140002-6 140002-7	7,913.98	1,669	
1 - 2	2	140002-2 140002-8	3,956.99	939	
2 - 3	0		0	0	
3 - 4	0		0	0	

Sum of Distance-Weighted Population Values: 1,633 + 1,669 + 939 = 4,241

(as applied to Reference 1 Section 3.3.2.4) = 4,241 ÷ 10 = 424.1

Potential Contamination Factor Value: 424.1

3.3.3 RESOURCES

Resources were not scored.

Resources Factor Value: 0

3.3.4 WELLHEAD PROTECTION AREA

All municipal wells in Mississippi are located within wellhead protection areas (WPA) (Refs. 22, pp. 1-5; 34, p. 9). No source lies above or within a WPA. Therefore, a factor value of 5 was assigned for WPA.

Wellhead Protection Area Factor Value: 5

5.0 SOIL EXPOSURE PATHWAY

The Soil Exposure Pathway is being scored based on two areas of observed contamination (AOCs), AOC A (located on the Red Panther property) and AOC B (located in the residential area surrounding the Red Panther property) (see Figures 3 and 4 of this Documentation Record). The targets associated with the Soil Exposure Pathway include Level I and Level II populations residing in single family dwellings in the area surrounding the Red Panther property (Refs. 18, pp. 49-77; 40, pp. 28-31, 50-87, 89-180).

5.0.1 GENERAL CONSIDERATIONS

Letter by which this AOC is to be identified: A
Name of area: Red Panther property (Source 1)

Location and description of area (with reference to a map of the site):
The Red Panther property is located at 1201 Normandy Avenue in Clarksdale, Coahoma County, Mississippi (Refs. 3; 4, p. 4). The geographic coordinates of the property are 34° 11' 14.67"North latitude and 90° 33' 41.85" West longitude as calculated from the north corner of the office and labs building on the property (Ref. 3). The former Red Panther facility is comprised of approximately 6.5 acres (Refs. 5, p. 4; 6, p. 8; 7, p. 2). All of the samples listed below, except DGC-15, DGC-16, and DGC-17 were collected from within 200 feet of a workplace area (Ref. 17, pp. 184, 186-187). See Figure 1 of this Documentation Record for the location of the Red Panther Property.

Background Concentrations

Sample ID	Sample Medium	Depth	Date	Reference
SN-01-SS	Soil	0-3 inches	8/10/05	18, pp. 40-41, 166

Sample ID	Hazardous Substance	Concentration (ug/kg)	Sample Quantitation Limit (ug/kg)	Reference
SN-01-SS	Heptachlor epoxide	1.8U	1.8	18, pp. 85, 125, 166; 43, p. 93; 45
	Endosulfan II	3.5U	3.5	
	4,4'-DDD	3.5U	3.5	
	Endrin	3.5U	3.5	
	Dieldrin	3.5U	3.5	
	4,4-DDE	15	3.5	
	Toxaphene	180U	180	
	Gamma-chlordane	1.8U	1.8	
	Alpha-chlordane	1.8U	1.8	
	Arsenic	20,000	1,000*	

Notes:
ug/kg - Micrograms per kilogram
U - Constituent analyzed for but not detected above reporting limit.
DDD - 4,4'-dichloro-2,2-bis(p-chlorophenyl)ethylene
DDE - 4,4'-dichloro-2,2-bis(p-chlorophenyl)ethane
* - Contract Required Quantitation Limit (CRQL) (Ref. 43, p. 93)

Contaminated Samples

Area Letter: A

Sample ID	Sample Medium	Depth (inches bgs)	Date	Reference
BGC-1	Soil	24	5/11/05	17, pp. 184, 203, 209
BGC-15	Soil	24	6/20/05	17, pp. 184, 205, 212
CGC-2	Soil	24	5/11/05	17, pp. 186, 203, 213
DGC-1	Soil	24	5/24/05	17, pp. 187, 201, 214
DGC-15	Soil	24	6/6/05	17, pp. 187, 202, 215
DGC-16	Soil	24	6/2/05	17, pp. 187, 208, 216
DGC-17	Soil	24	6/6/05	17, pp. 187, 202, 217

The composite surface soil samples listed below were collected during the Phase II Soil Removal activities conducted at Red Panther by URS and Newfields on behalf of Red Panther (Ref. 17, pp. 22-25, 184, 186-187). All surface soil samples were collected from 2 feet bls (Ref. 17, pp. 20-25, 184, 186-187). No background surface soil sample was collected; however, the samples listed were collected as confirmation samples after removal activities at the property based on the requirements of the 2001 Administrative Order on Consent (Ref. 17, pp. 7-8, 20-25, 184, 186-187). All constituents listed in this section were included in the 2001 Administrative Order on Consent and agreed by the performing PRP to be remediated (Ref. 7, pp. 1, 3-7, 48).

Sample ID	Date Collected	RL (mg/kg)	Hazardous Substance	Hazardous Substance Concentration (mg/kg)	Background Concentration (SN-01-SS) (mg/kg)	References
BGC-1	5/11/05					17, pp. 184, 203, 209; 18, pp. 125, 166; 26, p. 1; 27, p. 1
		3	Toxaphene	3.5	0.18	
BGC-15	6/20/05	2	Arsenic	420	20	17, pp. 184, 205, 212; 18, pp. 85, 125, 166; 26, p. 1; 27, p. 1
		0.1	Dieldrin	2.6	0.0035U	
		3	Toxaphene	7.4	0.18	
CGC-2	5/11/05	2	Arsenic	210	20	17, pp. 186, 203, 213; 18, pp. 85, 125, 166; 26, p. 1; 27, p. 1
		0.1	Dieldrin	0.89	0.0035U	
		3	Toxaphene	7.0	0.18	

Sample ID	Date Collected	RL (mg/kg)	Hazardous Substance	Hazardous Substance Concentration (mg/kg)	Background Concentration (SN-01-SS) (mg/kg)	References
DGC-1	5/24/05	0.1	Dieldrin	0.54	0.0035U	17, pp. 187, 201, 214; 18, pp. 125, 166; 26, p. 1; 27, p. 1
		3	Toxaphene	7.5	0.18	
DGC-15	6/6/05	0.1	Dieldrin	11	0.0035U	17, pp. 187, 202, 215; 18, pp. 125, 166; 26, p. 1; 27, p. 1
		3	Toxaphene	14	0.18U	
DGC-16	6/2/05	0.1	Dieldrin	2.9	0.0035U	17, pp. 187, 208, 216; 18, pp. 125, 166; 26, p. 1; 27, p. 1
		3	Toxaphene	220	0.18U	
DGC-17	6/6/05	0.1	Dieldrin	0.83	0.0035U	17, pp. 187, 202, 217; 18, pp. 125, 166; 26, p. 1; 27, p. 1
		3	Toxaphene	3.1	0.18U	

Notes:
mg/kg - Milligrams per kilogram
RL - Reporting Limit

5.1.2.2 AREA HAZARDOUS WASTE QUANTITY

Hazardous Constituent Quantity

Insufficient data is available to calculate the hazardous constituent quantity.

Hazardous Constituent Quantity Value (S): Not Scored

Hazardous Wastestream Quantity

Insufficient data is available to calculate the hazardous wastestream quantity.

Hazardous Wastestream Quantity Value (W): Not Scored

Volume

This tier cannot be used for contaminated soil.

Volume Value (V): Not scored

Area

The area of observed contamination is formed by a perimeter of composite confirmation sample locations CGC-2, BGC-1, BGC-15, DGC-1, DGC-15, DGC-16, and DGC-17 collected during the Phase II Soil Removal by URS and Newfields for Red Panther (Ref. 17, pp. 184, 186-187). Removal activities were conducted by the PRP; insufficient sampling has been performed to determine the extent of contaminated soil remaining. Therefore, the area of observed contamination for AOC A was determined to be >0 ft^2 (Ref. 17, pp. 184, 186-187).

Equation for hazardous waste quantity evaluation for the contaminated soil is A/34,000. Therefore, >0 ft^2 /34,000 = >0

Area Assigned Value: >0

Area Hazardous Waste Quantity Value

Area Hazardous Waste Quantity Value: >0

Letter by which this AOC is to be identified: B

Name of AOC: Area Surrounding Red Panther (Source 2)

Location and description of area (with reference to a map of the site):
AOC B (Source 2) consists of contaminated soil in the area to the north, south, east, and west of the Red Panther facility (Ref. 3). The area north, east, and south of the facility is a mix of commercial and industrial properties, with residential properties farther east (Refs. 3; 40, p. 7). The 18th Street Neighborhood is located west of the Red Panther property and consists of single family dwellings on approximately 0.25 acre lots (Refs. 3; 18, p. 4, 13; 31). According to a 1935 USGS Quadrangle map and a 1938 aerial photograph, this area has been historically used as a residential neighborhood. The area has not been used for agricultural purposes, at least since 1935 (Ref. 40, p. 7). See Figures 3 and 4 of this Documentation Record for the location of Source 2.

Elevated concentrations of pesticides in Area B are a result of air deposition from the Red Panther facility during facility operations (Refs. 40, p. 20; 46, pp. 2, 5, 7, 21, 22). A citizen complaint of dead vegetation, including evergreen trees, tomato and pepper plants, and shrubs resulted in an inspection by the Mississippi Department of Air and Water Pollution Control in 1975 (Ref. 32, p. 1). The inspector noted highly dusty conditions inside the plant and open doors during product formulation (Ref. 32, pp. 1-2). Residents had historically been financially reimbursed by the Riverside Chemical Company for damage to gardens (Ref. 32, p. 2).

The Removal Assessment of the 18th Street Neighborhood was conducted in August 2005 by Weston for EPA to characterize the nature and extent of contaminated soil on residential properties in the neighborhood (Ref. 18, p. 4). Composite samples using three to five aliquots per sample collected from 30 residential properties in the neighborhood indicated the presence of contaminated soil at a depth of less than 1 foot bgs on several of the properties sampled (Ref. 18, pp. 7, 9, 16-21, 29-47, 85-117, 125-157, 159-171). The background sample (SN-01-SS) was collected from the B.F. McLaurin Park as a reference to determine what direct impact Red Panther operations might have had on the soils in the nearby neighborhood (Ref. 18, pp. 7, 40-41). All samples collected during the investigation were analyzed for pesticides, aluminum, arsenic, iron, and other metals (Ref. 18, pp. 16-22, 78-171). Soil samples were elevated above background concentrations for pesticides, including dieldrin; toxaphene; 4,4'-DDD; alpha-chlordane; gamma-chlordane; endosulfan sulfate; and endrin (Ref. 18, pp. 16-22). No metals were detected at elevated concentrations in any samples (Ref. 18, pp. 78-171).

From June 29 to July 1, 2010, OTIE conducted an ADS on behalf of EPA in the area of the former Red Panther facility (Refs. 40, pp. 5, 14, 182-287; 41, pp. 1, 5). The purpose of the ADS was to evaluate the presence of pesticides in the surface soils surrounding the former Red Panther facility (Ref. 40, p. 5). Field investigation activities included the collection of surface soil samples in every direction from the facility to determine if contaminant concentrations previously identified in the residential neighborhood to the west of the facility (18th Street Neighborhood) were a result of the pesticide formulation activities at the facility or if the presence of the agricultural fields nearby contributed to the pesticide contamination (Ref. 40, p. 5). A total of 81 nine-point composite surface soil samples were collected from 73 locations in a ¼-mile area surrounding the facility, including 8 duplicate samples (Refs. 40, pp. 14-18; 41, pp. 31-32). Four background composite samples, including one duplicate, were collected north and northeast of the facility from areas 0.7- to 1.1-mile distant from the facility to ensure an adequate background for comparison purposes (Refs. 40, pp. 15, 19-20; 41, pp. 31-32). The 73 composite soil samples were collected

in a grid pattern with 300-foot centers in all directions from the facility. At each 300-foot center, composite soil samples were collected from the 0- to 3-inch bgs interval; each sample consisted of nine aliquots within a 25-by-25 foot sampling sub-grid (Ref. 40, p. 15). All aliquots of the composite were collected from within the respective property boundary and, for residential grids, less than 200 feet from the residential structure (Ref. 40, p. 15; 42, p. 1). Each 25-by-25 foot grid was approximately 300 feet apart. The background samples were collected in the same manner from three residential properties located in neighborhoods of approximately the same age as the 18th Street Neighborhood (Ref. 40, pp. 15-16).

Elevated concentrations of 4,4'-DDD; 4,4'-DDE; 4,4'-DDT; aldrin; alpha-BHC; beta-BHC; delta-BHC; dieldrin; endosulfan sulfate; endrin; endrin aldehyde; lindane; gamma-chlordane; heptachlor; heptachlor epoxide; and toxaphene were detected in the composite surface soil samples when compared to the highest concentration of the pesticide in all background samples (Ref. 40, pp. 35-48, 88-180). Although pesticide constituents were detected in the background samples, toxaphene was not detected in any of the background samples (Ref. 40, pp. 18-20, 35). Higher concentrations of DDT, DDD, and DDE were detected in areas closer to the facility (Ref. 40, pp. 18-20, 28-30, 35-48). Toxaphene was identified in eight samples collected near the facility, with concentrations increasing closer to the facility (Ref. 40, pp. 19-20, 30, 35-48). Modeling of the toxaphene contaminant concentrations suggests the facility is the source of toxaphene (Ref. 40, pp. 19-20, 30). Dieldrin was identified in half of the samples collected, generally in higher concentrations nearest the facility and declining to non-detect concentrations in the outlying samples (Ref. 40, pp. 19-20, 35-48). The highest dieldrin concentration (3,800 ug/kg) was identified in the sample collected closest to the facility (Ref. 40, pp. 19-20, 31, 35-48). According to the ADS, the absence of dieldrin in samples adjacent to agricultural fields and the presence of higher concentrations near the facility indicate that Red Panther is the source of an increase in dieldrin contamination in the area (Ref. 40, pp. 19-20, 31, 35-48). In general, the ADS concluded that the higher contaminant concentrations near the facility resulted from historic Red Panther facility activities (Ref. 40, p. 20-21, 31, 35-48).

Contaminants associated with AOC B include 4,4'-DDD; 4,4'-DDE; 4,4'-DDT; aldrin; alpha-BHC; alpha-chlordane; beta-BHC; delta-BHC; dieldrin; endosulfan sulfate; endrin; endrin aldehyde; gamma chlordane; lindane; heptachlor; heptachlor epoxide; and toxaphene (Refs. 18, pp. 16-21, 29-47, 85-117, 125-157, 159-171; 40, pp. 89-180).

-Background samples

One background sample was collected during the 2005 Weston Removal Assessment (Ref. 18, pp. 4, 7). The background surface soil sample was collected from BF McLaurin Park located on Sunflower Avenue, near 6th Street, approximately 0.5 mile north of the 18th Street Neighborhood (Ref. 18, pp. 7, 40-41, 49). The background sample was a composite sample collected between 0 and 12 inches bgs (Ref. 18, pp. 29-47).

The four background composite surface soil samples collected during the 2010 ADS, including one duplicate, were collected from residential properties located 0.7- to 1.1-mile distant from the facility to ensure an adequate background for comparison purposes (Ref. 40, pp. 14-15; 41, pp. 31-32). All samples were collected in accordance with the guidance presented in the EPA-approved site-specific QAPP/SSP and in accordance with the EPA SESD FBQSTP (Refs. 40, pp. 6, 14; 41). Each aliquot of the composite was collected from the same property, within 200 feet of the home (Ref. 40, p. 15). The neighborhoods selected for the background samples were of approximately the same age as the 18th Street Neighborhood; the background composite soil samples consisted of similar soil types (Ref. 40, pp. 14-15). Soil contamination in the area is largely a result of air deposition of particulates from the Red Panther facility. There is no one prevailing wind direction in the area (Ref. 40, p. 17). In addition, some pesticide presence in the background is to be expected due to use on agricultural fields in the area (Ref. 40, pp. 19-20).

Sample ID	Sample Medium	Depth	Date	Reference
SN-01-SS	Soil	0-3 inches	8/10/05	18, pp. 40-41, 85, 125, 162, 166
RP-CS-01 RP-CS-77 (duplicate)	Soil	0-3 inches	6/29/10	40, pp. 15-16, 25, 33, 194, 210, 295, 297
RP-CS-02	Soil	0-3 inches	7/1/10	40, pp. 15-16, 25, 33, 194, 230, 288
RP-CS-03	Soil	0-3 inches	7/1/10	40, pp. 15-16, 25, 33, 194, 229, 288

Sample ID	Hazardous Substance	Concentration (ug/kg)	Sample Quantitation Limit (ug/kg)	Reference
SN-01-SS	Heptachlor epoxide	1.8U	1.8	18, pp. 125, 166
	Endosulfan II	3.5U	3.5	
	4,4'-DDD	3.5U	3.5	
	Endrin	3.5U	3.5	
	Dieldrin	3.5U	3.5	
	4,4-DDE	15	3.5	
	Toxaphene	180U	180	
	Gamma-chlordane	1.8U	1.8	
	Alpha-chlordane	1.8U	1.8	

Notes:
ug/kg - Micrograms per kilogram
U - Constituent analyzed for but was not detected at or above

reporting limit.
DDD - 4,4'-dichloro-2,2-bis(p-chlorophenyl)ethylene
DDE - 4,4'-dichloro-2,2-bis(p-chlorophenyl)ethane

The highest hazardous substance concentration or highest sample quantitation limit of a substance if it is not detected in background samples RP-CS-01 and its duplicate RP-CS-77, RP-CS-02 or RP-CS-03 is listed below as the background level.

Sample ID	Hazardous Substance	Concentration (ug/kg)	Minimum Reporting Limit (ug/kg)[a]	Reference
RP-CS-77	4,4'-DDD	34	10	40, pp. 91, 94, 97
RP-CS-77	4,4'-DDE	22	5.1	40, pp. 91, 94, 97
RP-CS-77	4,4'-DDT	34	13	40, pp. 91, 94, 97
RP-CS-03	Aldrin	3.1U	3.1	40, pp. 92, 94, 160
RP-CS-03	Alpha-BHC	1.6U	1.6	40, pp. 92, 94, 160
RP-CS-03	Beta-BHC	3.1U	3.1	40, pp. 92, 94, 160
RP-CS-03	Dieldrin	52	7.8	40, pp. 92, 94, 160
RP-CS-02	Endosulfan sulfate	7.9U	7.9	40, pp. 91, 94, 159
RP-CS-01	Endrin	29U, D-4	29	40, pp. 91, 94, 96
RP-CS-02	Endrin aldehyde	7.9U	7.9	40, pp. 91, 94, 159
RP-CS-77	Gamma-chlordane	27	5.1	40, pp. 91, 94, 97
RP-CS-01	Heptachlor	2.4	0.76	40, pp. 91, 96
RP-CS-03	Heptachlor epoxide	3.2	3.1	40, PP. 92, 94, 160
RP-CS-01	Toxaphene	350U, D-4	350	40, pp. 91, 94, 96

Notes:
a - Minimum reporting limit is equivalent to the Sample Quantitation limit (Ref. 45).
D-4 - MRL elevated due to interference.
J - Constituent was detected, value is an estimate.
ug/kg - Micrograms per kilogram
U - Constituent was analyzed for but was not detected at or above the reporting limit.

The concentrations for background samples are also presented in the same table with the contaminated samples.

Contaminated Samples

The composite surface soil samples listed below were collected by Weston for EPA during the Removal Assessment conducted at the 18th Street Neighborhood and by OTIE for EPA during the Air Deposition Study (Ref. 18, pp. 1-171; 41).

For the 2005 Weston Removal Assessment, all composite surface soil samples were collected between 0 to 12 inches bgs from locations within 200 feet of the residences or play grounds located on the properties (see Figure 3)(Refs. 18, pp. 29-47). Generally, the soil samples were comprised of light brown sandy silt (Ref. 18, pp. 29-31). For the 2010 OTIE ADS, the composite surface soil samples listed below were collected by OTIE from locations in a ¼-mile area surrounding the Red Panther facility (Ref. 40, pp. 14, 15, 18). All composite surface soil samples were collected from 0-to 3-inches bgs and were comprised of a nine aliquots collected from a 25-by-25 foot grid (Ref. 40, pp. 14-15). The centers of the 25-foot grids were located 300 feet apart (Ref. 40, pp. 14-15). All aliquots of the individual sample were collected from within the legal property boundary and, in the case of residential samples, within 200 feet of the building (Ref. 40, pp. 14-15). See Figures 3 and 4 of this Documentation Record for sample locations.

Sample ID	Hazardous Substance	Hazardous Substance Concentration (ug/kg)	Contract Required Quantitation Limit (ug/kg)	Background Concentration (ug/kg)	References
SN-03-SS	4,4-DDE	58	3.3	15	18, pp. 127, 162; 44, p. 3
SN-04-SS	4,4-DDE	58	3.3	15	18, pp. 128, 166; 44, p. 3
SN-05-SS	4,4-DDE	78	3.3	15	18, pp. 129, 166; 44, p. 3
	Dieldrin	42	3.3	3.5U	
SN-06-SS	4,4-DDE	190	3.3	15	18, pp. 130, 166; 44, p. 3
	Dieldrin	58	3.3	3.5U	
SN-07-SS	4,4-DDE	540	3.3	15	18, pp. 131, 166; 44, p. 3
	Dieldrin	200	3.3	3.5U	
	Alpha Chlordane	5.2	1.7	1.8U	
SN-08-SS	4,4-DDE	500	3.3	15	18, pp. 132, 166; 44, p. 3
	4,4-DDD	64	3.3	3.5U	
	Dieldrin	360	3.3	3.5U	
	Endosulfan II	570	3.3	3.5U	
SN-11-SS	4,4-DDE	160	3.3	15	18, pp. 136, 166-167; 44, p. 3
	4,4-DDD	19	3.3	3.5U	

Sample ID	Hazardous Substance	Hazardous Substance Concentration (ug/kg)	Contract Required Quantitation Limit (ug/kg)	Background Concentration (ug/kg)	References
	Dieldrin	77	3.3	3.5U	
	Alpha Chlordane	100	1.7	1.8U	
	Gamma Chlordane	110	1.7	1.8U	
SN-12-SS	4,4-DDE	170	3.3	15	18, pp. 137, 167; 44, p. 3
	Toxaphene	4,500	170	180U	
SN-13-SS	4,4-DDE	320	3.3	15	18, pp. 138, 167; 44, p. 3
	Alpha Chlordane	53	1.7	1.8U	
	Gamma Chlordane	44	1.7	1.8U	
SN-14-SS	4,4-DDE	170	3.3	15	18, pp. 139, 167; 44, p. 3
SN-16-SS	4,4-DDE	73	3.3	15	18, pp. 141, 167; 44, p. 3
SN-18-SS	4,4-DDE	280	3.3	15	18, pp. 143, 167; 44, p. 3
	4,4-DDD	19	3.3	3.5U	
	Gamma Chlordane	29	1.7	1.8U	
	Endrin	7.2	3.3	3.5U	
SN-19-SS	Gamma Chlordane	62J* (6.2)	1.7	1.8U	18, pp. 144, 167; 44, p.3
SN-20-SS	Dieldrin	10	3.3	3.5U	18, pp. 146, 168, 170; 44, p. 3
SN-21-SS	4,4-DDE	270	3.3	15	18, pp. 147, 168, 170; 44, p. 3
	4,4-DDD	20	3.3	3.5U	
	Dieldrin	380	3.3	3.5U	
	Heptachlor Epoxide	4.6	1.7	1.8U	
	Alpha Chlordane	6.1	1.7	1.8U	
SN-24-SS	4,4-DDE	150	3.3	15	18, pp. 150, 168, 170; 44, p. 3
	Toxaphene	4,700	170	180U	
SN-25-SS	4,4-DDE	82	3.3	15	18, pp. 151, 168, 170; 44, p. 3
	Toxaphene	1,900	170	180U	

Sample ID	Hazardous Substance	Hazardous Substance Concentration (ug/kg)	Contract Required Quantitation Limit (ug/kg)	Background Concentration (ug/kg)	References
	Gamma Chlordane	7.2	1.7	1.8U	
SN-26-SS	4,4-DDE	180	3.3	15	18, pp. 152, 168, 170; 44, p. 3
	Endosulfan II	12	3.3	3.5U	
	Toxaphene	810	170	180U	
SN-27-SS	4,4-DDE	110	3.3	15	18, pp. 153, 168, 170; 44, p. 3
	4,4-DDD	7.2	3.3	3.5U	
SN-29-SS	4,4-DDE	90	3.3	25	18, pp. 155, 169, 171; 44, p. 3
	Dieldrin	36	3.3	3.5U	
	Alpha Chlordane	3.5	1.7	1.8U	
SN-30-SS	4,4-DDE	250	3.3	15	18, pp. 156, 169, 171; 44, p. 3
	Dieldrin	42	3.3	3.5U	
	Alpha Chlordane	6.6	1.7	1.8U	
SN-31-SS	4,4-DDE	130	3.3	15	18, pp. 157, 169, 171; 44, p. 3
	Dieldrin	32	3.3	3.5U	
RP-CS-05	4,4'-DDD	220	95	34	40, pp. 91-92, 96-97, 99, 159, 160; 44, p. 3
	4,4'-DDE	220	48	22	
	4,4'-DDT	310	120	34	
	Aldrin	12	4.8	3.1U	
	Dieldrin	230	48	52	
	Gamma-chlordane	530	48	27	
	Heptachlor	210	36	2.4	
	Heptachlor epoxide	290	48	3.2	
RP-CS-06	Dieldrin	160	4.5	7.9U	40, pp. 91-92, 96-97, 100, 159, 160
RP-CS-08	Endrin aldehyde	11	7.8	7.9U	40, pp. 91-92, 96-97,, 159, 160
RP-CS-09	4,4'-DDE	84	7.7	22	40, pp. 91-92, 96-97, 159, 160-161
RP-CS-11	4,4'-DDE	94	7.4	22	40, pp. 91-

Sample ID	Hazardous Substance	Hazardous Substance Concentration (ug/kg)	Contract Required Quantitation Limit (ug/kg)	Background Concentration (ug/kg)	References
	4,4'-DDT	110	19	34	92, 94, 96-97, 130, 159, 160
RP-CS-12	Alpha-BHC	3.4	1.7	1.6U	40, pp. 91-92, 96-97, 131, 159, 160
RP-CS-18	Aldrin	34	4.7	3.1U	40, pp. 91-92, 96-97, 104, 159, 160
	Dieldrin	840	93	52	
RP-CS-19	4,4'-DDE	68	4.7	22	40, pp. 91-92, 96-97, 105, 159, 160
RP-CS-20	Endrin aldehyde	8	7.6	7.9U	40, pp. 91-92, 96-97, 135, 159, 160
RP-CS-23	4,4'-DDE	82	7.7	22	40, pp. 91-92, 96-97, 159, 160, 164
RP-CS-24	4,4'-DDD	120	15	34	40, pp. 91-92, 96-97, 159, 160, 165
	4,4'-DDE	260	76	22	
	4,4'-DDT	240	19	34	
	Dieldrin	2200	380	52	
	Toxaphene	5300	1500	350U	
RP-CS-28	4,4'-DDE	110	42	22	40, pp. 91-92, 96-97, 106, 159, 160
RP-CS-29	4,4'-DDE	99	8.8	22	40, pp. 91-92, 96-97, 107, 159, 160
RP-CS-32	4,4'-DDT	110	12	34	40, pp. 91-92, 96-97, 111, 159, 160
RP-CS-38	4,4'-DDT	330	120	34	40, pp. 91-92, 96-97, 114, 159, 160
	Heptachlor epoxide	51	4.7	3.2	
RP-CS-39	4,4'-DDT	130	13	34	40, pp. 91-92, 96-97, 115, 159, 160
RP-CS-47	4,4'-DDT	170	27	34	40, pp. 91-92, 96-97, 117, 159, 160
	Beta-BHC	9.7	1.1	3.1U	
RP-CS-50	4,4'-DDE	90	9.6	22	40, pp. 91-92, 96-97, 120, 159, 160
RP-CS-57	4,4'-DDE	88	9.6	22	40, pp. 91-92, 96-97,

Sample ID	Hazardous Substance	Hazardous Substance Concentration (ug/kg)	Contract Required Quantitation Limit (ug/kg)	Background Concentration (ug/kg)	References
					122, 159, 160
RP-CS-60	4,4'-DDE	180	19	22	40, pp. 91-92, 96-97, 125, 159, 160
	4,4'-DDT	280	48	34	
RP-CS-61	4,4'-DDE	1100	140	22	40, pp. 91-92, 93, 96-97, 116, 159, 160, 171
	4,4'-DDT	950	180	34	
	Beta-BHC	56	7.2	3.1U	
	Dieldrin	3800	360	52	
	Endosulfan sulfate	80	18	7.9U	
	Endrin	110	14	29U	
	Toxaphene	5900	2900	350U	
RP-CS-62	4,4'-DDD	80	16	34	40, pp. 91-92, 96-97, 159, 160, 172
	4,4'-DDE	390	79	22	
	4,4'-DDT	140	20	34	
	Dieldrin	1700	320	52	
	Toxaphene	2400	790	350U	
RP-CS-66	4,4'-DDT	120	16	34	40, pp. 91-92, 96-97, 159, 156, 160
RP-CS-75	4,4'-DDE	87	7.2	22	40, pp. 91-92, 94, 96-97, 159, 160 180
	Dieldrin	210	29	52	

Notes:
ug/kg - Micrograms per kilogram
U - Constituent was analyzed for but not detected above the reporting limit.
J - Constituent was detected, value is an estimate
* - Identification of analyte is acceptable; bias unknown. Value adjusted (62/10 = 6.2J) (Ref. 33, pp. 8, 17).

5.1.2.2 AREA HAZARDOUS WASTE QUANTITY

Hazardous Constituent Quantity

Insufficient data is available to calculate the hazardous constituent quantity.

Hazardous Constituent Quantity Value (S): Not Scored

Hazardous Wastestream Quantity

Insufficient data is available to calculate the hazardous wastestream quantity.

Hazardous Wastestream Quantity Value (W): Not Scored

Volume

This tier cannot be used for contaminated soil.

Volume Value (V): Not scored

2.4.2.1.4 Area

All soil samples were collected within the legal property boundaries of each property; soil contamination between the samples was inferred unless sampling data indicated no presence of significant levels of contamination. The area of soil contamination was estimated to be >0 ft^2.

Equation for hazardous waste quantity evaluation for the contaminated soil is A/34,000. Therefore, >0 ft^2 /34,000 = >0

Area Assigned Value: >0
Reference: 1, Table 2-5

Area Hazardous Waste Quantity Value

Area Hazardous Waste Quantity Value: >0
Reference: 1, Section 2.4.2.2

Attribution:

Red Panther operated as a pesticide formulation plant between 1949 and 1996 formulating liquid and dry herbicide, insecticide, and fungicide products (Refs. 4, p. 4; 5, p. 3; 6, p. 8; 7, p. 2). Chemicals used in the formulation process included toxaphene; aldrin; arsenic; 4,4'-DDT; methyl parathion; chlorpyrifos; 2,4-D; malathion; carbaryl; diazinon; methoxychlor; DSMA; MSMA; chlorothalonil; and parathion (Refs. 6, p. 8; 7, p. 3; 9, p. 2). Air permits allowing for the operation of emission equipment and emit air contaminants for the formulation of pesticides and herbicides were issued to Red Panther from 1979 through 1991 (Ref. 46, pp. 1-46). Four stacks were part of the manufacturing process, with heights between 20 and 30 feet (Ref. 46, p. 29). According to air permit records, arsenic; 2,4-D; methanol; xylene; and ethylene glycol were emitted at the facility from the four stacks (Ref. 46, pp. 28-31, 42). Wastewater and solvents containing pesticide and solvent residues were generated from equipment cleaning (Refs. 5, p. 3; 6, p. 8). Prior to obtaining interim status, wastewater containing pesticide and solvent residues were generated during equipment cleaning at the facility and discharged either directly to a drainage ditch or into an underground septic tank and drain field on the facility property (Refs. 5, p. 5; 6, pp. 8-9). Contamination on the Red Panther property is also believed

to have originated from numerous spills during loading and unloading operations, contaminated wastewater releases, from spills and leaking underground piping in the tank farm area, and poor housekeeping practices during production including allowing the doors to the stack house to remain open during processing activities (Refs. 9, p. 2; 32, pp. 1, 2).

There is no prevailing wind direction data for the area of the facility (Ref. 40, p. 18). Wind direction data from 1961 to 1990 in Memphis indicates widely varying wind direction throughout the year with slightly dominant wind directions varying from month to month (Refs. 40, p. 18; 47, pp. 1-15).

The Mississippi Department of Air and Water Pollution Control Commission filed a Report of Field Investigation on May 6, 1975 (Ref. 32, p. 1). The report was a result of a citizen complaint of dead vegetation from the actions of the Riverside Chemical Company (Ref. 32, p. 1). The inspector visited the residence and noted dead plant life including evergreen trees, tomato and pepper plants, and shrubs (Ref. 32, p. 1). After visiting the residence, the inspector visited the chemical plant (the current Red Panther property) and noted baghouse dust collectors; however, he also observed highly dusty conditions inside the plant and open doors during product formulation, which led him to determine that compounds could be escaping the plant through the open doors (Ref. 32, pp. 1-2). The inspector collected samples of the dead vegetation at the residence for analysis and noted dead vegetation in additional areas adjacent to the facility (Ref. 32, p. 2). The inspector noted in his report that residents had been financially reimbursed by Riverside Chemical Company in 1974 for a damaged garden (Ref. 32, p. 1).

A fire in 1985 at the facility occurred in a warehouse where 382 old fiber drums were discovered in the crawlspace beneath the warehouse (Ref. 11, p. 5). No air samples were collected during the fire; however, 95 of the drums contained trace residues of technical grade dieldrin (Ref. 11, p. 5). Contaminated water was contained on the property and later shipped to a commercial hazardous waste disposal facility (Ref. 11, p. 5).

During the 1991 SSI, a soil sample collected near the wastewater collection pit near the south tank farm indicated the presence of analytes including 1,130 parts per million (ppm) toxaphene, 245 ppm DDT, 1,650,000 ug/kg xyles, and 250,000 ug/kg ethylbenzene (Ref. 11, p. 11).

In 1999, EPA tasked Tetra Tech EM, Inc., under the START contract to conduct surface and subsurface soil sampling of the drainage ditches east of the Red Panther property, the former facility leaching field and septic tank on the north side of the property, and the rail spur in front of the loading dock that runs along the west side of the property (Ref. 13, pp. 4, 5, 13-26). Samples were analyzed for RCRA metals and pesticides (Ref. 13, p. 10). The results from the sampling event indicated that the facility was contaminated with arsenic, organochlorinated pesticides, and degradation by-products including, but not limited to, aldrin; chlordane; dieldrin; 4,4'-DDT; endrin; endosulfan II; and toxaphene (Ref. 13, pp. 10, 27-41).

On September 4, 2001, the Administrative Order on Consent for the Red Panther property between the PRPs and EPA Region 4 was finalized (Ref. 7, pp. 25-48). The Administrative Order on Consent identified four COCs for surface soil criteria and three COCs for subsurface soil criteria (Ref. 7, pp. 6-7, 21-24). The surface COCs were identified as arsenic, toxaphene, dieldrin, and total chlorinated pesticides (Ref. 7, p. 6). The subsurface COCs were identified as arsenic, toxaphene, and dieldrin (Ref. 7, p. 7). The Administrative Order on Consent required the PRPs to perform two phases of removal activities and

disposal of excavated materials under all requirements of the Administrative Order on Consent (Ref. 7, pp. 5-9). EPA subsequently submitted the Action Memorandum documenting approval of the proposed removal action (Ref. 9).

On March 18, 2003, URS submitted the Phase I Removal Action Report and the Phase I Soil Characterization Report (Refs. 6, p. 1; 15, p. 1). Based on the results, URS recommended addressing the soils exceeding performance standards and addressing disposal options for the stockpiled soils in Ditch 1 in the Phase II Work Plan (Ref. 6, p. 17). The report was approved by EPA on April 10, 2003 (Ref. 16, p. 8). During the Interim Removal, the contents of eight ASTs ranging in size from 200 gallons up to 15,000 gallons in the Tank Farm were cleaned out and the solids and/or liquids impacted with arsenic and/or pesticides were disposed of off the property (Ref. 17, p. 7). During the Phase II Removal, a total of 5,341.27 tons of arsenic-impacted soils and 200 tons of pesticide-impacted soils were removed from the AST storage area; 1,903.73 tons of hazardous pesticide-impacted soils were removed from the loading dock and railroad spur area. Additional soils were removed from the AST storage area, loading dock and railroad spur area, silo area and property ditches, but was not characterized as hazardous or pesticide-impacted soils (Ref. 17, p. 8).

Surface soil concentrations of pesticides and arsenic remain beneath the Red Panther property and sampling of nearby residences in the 18th Street Neighborhood has indicated elevated levels of pesticides in the surface soils of the residential properties (Refs. 17, pp. 7-8, 22-25, 184, 186, 187; 18, pp. 7-9, 16-19, 28-47, 120-171). Based on historical aerial photographs and Sanborn® maps, portions of the 18th Street Neighborhood (13th through 16th Street) were present as a residential area in the current location as early as 1918 and the area has remained a residential neighborhood (Refs. 28, p. 1; 29, pp. 1-10).

During the week of June 28, 2010, OTIE conducted an ADS on behalf of EPA in the area of the former Red Panther facility (Refs. 40, pp. 5, 14; 41, pp. 1, 5). The purpose of the ADS was to evaluate the presence of pesticides in the surface soils surrounding the former Red Panther facility and to identify background soil samples outside the area of the influence for the Red Panther facility (Refs. 40, p. 5; 41, pp. 24-25). Field investigation activities included the collection of surface soil samples in every direction from the facility to determine if contaminant concentrations previously identified in the residential neighborhood to the west of the facility (18th Street Neighborhood) were a result of the pesticide formulation activities at the facility or if the presence of the operation of agricultural fields in the vicinity contributed to the pesticide contamination (Ref. 40, p. 5). A total of 76 composite surface soil samples were collected in a 0.25-mile area surrounding the facility (Refs. 40, pp. 14-17; 41, pp. 31-32). Three background composite samples were collected north and northeast of the facility from areas 0.7- to 1.1-mile distant from the facility to ensure an adequate background for comparison purposes (Refs. 40, pp. 14-17; 41, pp. 31-32). Although several other pesticide constituents were detected in the background samples, toxaphene was not detected in any of the three background samples (Ref. 40, p. 18-20). Concentrations of DDT, DDD, and DDE were detected in several samples and analysis indicated a trend for increased concentrations as distance to the Red Panther facility decreased (Ref. 40, p. 18-20). Toxaphene was identified in eight samples collected near the Red Panther facility, with concentrations again increasing with decreased distance to the facility (Ref. 40, p. 20). Modeling of the toxaphene contaminant concentrations suggests the facility is the source of toxaphene (Ref. 40, p. 19). Dieldrin was identified in half of the samples collected, again in generally higher concentrations near the facility and declining to non-detect concentrations in the outlying samples (Ref. 40, p. 19). The highest dieldrin concentration (3,800 ug/kg) was identified in the sample collected closest to the Red Panther facility (Ref. 40, p. 20). The

absence of dieldrin in samples adjacent to the nearby agricultural fields combined with the presence of higher concentrations near the Red Panther facility indicates that Red Panther is the source of toxaphene and dieldrin contamination in the area (Ref. 40, pp. 19-20). In general, the ADS concluded that the higher contaminant concentrations near the facility suggest that the pesticide contamination in the vicinity is the result of historic Red Panther facility activities and not the result of legal application on nearby agricultural fields (Ref. 40, pp. 20-21).

MDEQ personnel conducted a search in the City Directories of Clarksdale, Mississippi to identify any additional businesses in the area specializing in the manufacture or distribution of pesticides, herbicides, or insecticides (Ref. 30, pp. 1-20). The City Directory search covered the years 1949, 1953, 1963, 1973, 1983, and 1996-1997 (Ref. 30, p. 1). The results of the search determined that Red Panther and the previous owners of the facility have historically been the only pesticide, insecticide, and herbicide manufacturers/distributors in the City of Clarksdale (Ref. 30, pp. 1-20).

A radial search for businesses within 2 miles of the Red Panther was conducted by EDR (Ref. 25, pp. 1-315). The EDR radial report searched multiple databases including, but not limited to, federal, state, tribal, local land records, emergency release reports, and EDR proprietary records (Ref. 25, pp. 4-6, 227-243). Additionally, properties that could not be mapped (orphaned) are listed; however, their exact location in relation to the Red Panther property is unknown (Ref. 25, p. 226). No NPL sites, Indian Reservations, DOD sites, or manufactured gas plants are located within a 2-mile radius of the Red Panther property (Ref. 25, p. 16).

The EDR report identified a USS Agri-Chemicals facility located to the northwest within the 0.25- to 0.5-mile radius of the Red Panther property (Ref. 25, pp. 12, 16, 77-78). USS Agri-Chemicals, EPA ID No. MSD000798850, is a private company listed as a RCRA-Non Generator (Ref. 25, p. 78). The facility is listed as having one waste, dimethoate, associated with the business and does not generate or transport hazardous waste (Ref. 25, p. 78). No additional information for the facility was available.

Several of the insecticides/pesticides formulated or distributed during the operational history at the Red Panther property, including toxaphene, dieldrin, and DDT are currently banned from production and use in the United States (Refs. 26, p. 1; 27, p. 1; 36, p. 2). Toxaphene was one of the most heavily used insecticides in the United States until it was banned in 1982 (Ref. 26, p. 1). Toxaphene was used to control insect pests on cotton and other crops, to control insect pests on livestock, and to kill unwanted fish species in lakes (Ref. 26, p. 1). It is a man-made mixture of over 670 chemicals that is yellow-to-amber in color and is a waxy solid that smells like turpentine (Ref. 26, p. 1). Dieldrin was widely used in the United States from the 1950s to the early 1970s (Ref. 27, p. 1). Dieldrin was used in agriculture for soil and seed treatment and in public health to control disease vectors such as mosquitoes and testes flies (Ref. 27, p. 1). Dieldrin was also used as a sheep dip and in the treatment of wood and mothproofing woolen products (Ref. 27, p. 1). Dieldrin is persistent in soil; however, environmental background levels are known to be decreasing slowly (Ref. 27, p. 1). Residual contamination may be present at waste sites from the disposal of used stocks (Ref. 27, p. 1). DDT was banned from use in the United States in 1972 (Ref. 36, p. 2). DDT was used in the 1940s and 1950s to control mosquitoes and the typhus carried by lice (Ref. 36, p. 2). It was extensively used as an agricultural insecticide after 1945 (Ref. 36, p. 2). DDT is persistent in the environment with a reported half-life of 26 days in river water to 15 years and is immobile in most soils (Ref. 36, p. 1). It breaks down in the environment into DDE and DDD, which are also persistent and have similar physical and chemical properties (Ref. 36, p. 1).

Chlordane residues include heptachlor epoxide, heptachlor, alpha chlordane, gamma chlordane, nonachlor, photo-alpha-chlordane, and "compounds C and E" which are two isomers of chlordane (Ref. 39, p. 1). Root crops contain the highest residues of chlordane; however, they are also present in other vegetables including grains (Ref. 39, p. 1).

The documented dusty conditions at the Red Panther facility during its operational period posed the threat of airborne particulates migrating to surrounding areas and endangering the public (Ref. 9, p. 3). Additionally, the uses of these pesticides are primarily agricultural (crops and livestock) products; as such, the elevated levels of the pesticides present in AOC B are not likely a result of pesticide application because the neighborhood has consistently been residential during the operational period of the Red Panther facility (Refs. 26, p. 1; 27, p. 1; 28, p. 1; 48, p. 2). Although some residents have applied pesticides to the immediate area around the house, several other residents have stated that they have never applied pesticides, insecticides, or herbicides to their properties during their residence at the property (Ref. 18, pp. 42-44).

The collection of the three background composite soil samples during the 2010 ADS was specifically designed to obtain a baseline concentration of pesticide contamination in the area. The samples were collected outside the immediate area of influence of the Red Panther facility. Although the samples contained detectable concentrations of pesticides, the concentrations indicate levels indicative of usage of pesticides in a residential and/or agricultural setting. Pesticide concentrations in AOC B are significantly elevated when compared to the highest of all of the background concentrations (Ref. 40, pp. 14-21).

5.1 RESIDENT POPULATION THREAT
5.1.1 LIKELIHOOD OF EXPOSURE

Sample ID	Sample Date	Distance of Population/Resource from Area of Observed Contamination	Reference
SN-03-SS	8/9/05	0 feet	18, pp. 30, 162; 31
SN-04-SS	8/9/05	0 feet	18, pp. 31, 162; 31
SN-05-SS	8/9/05	0 feet	18, pp. 31, 162; 31
SN-06-SS RP-CS-60	8/10/05 6/28/10	0 feet	18, pp.32, 54, 159; 31; 40, pp. 14-15, 26, 33-34, 194, 259
SN-07-SS	8/9/05	0 feet	18, pp. 36, 159; 31
SN-08-SS	8/9/05	0 feet	18, pp. 37, 159; 31
SN-11-SS	8/9/05	0 feet	18, pp. 38, 159; 31
SN-12-SS	8/9/05	0 feet	18, pp. 38, 159; 31
SN-13-SS	8/9/05	0 feet	18, pp. 39, 159; 31
SN-14-SS	8/9/05	0 feet	18, pp. 39, 160; 31
SN-16-SS	8/9/05	0 feet	18, pp. 39, 160; 31
SN-18-SS	8/10/05	0 feet	18, pp.44, 160; 31
SN-19-SS	8/10/05	0 feet	18, pp. 44, 160; 31
SN-20-SS	8/10/05	0 feet	18, pp. 43, 160; 31
SN-21-SS	8/10/05	0 feet	18, pp. 44, 162; 31
SN-24-SS	8/10/05	0 feet	18, pp. 34, 161; 31
SN-25-SS	8/10/05	0 feet	18, pp. 43, 165; 31
SN-26-SS	8/10/05	0 feet	18, pp. 35, 161; 31
SN-27-SS	8/10/05	0 feet	18, pp. 47, 161; 31
SN-29-SS RP-CS-19	8/10/05 6/29/10	0 feet	18, pp. 46, 161; 31; 40, pp. 14-15, 26, 33-34, 194, 199
SN-30-SS	8/10/05	0 feet	18, pp. 42-43, 161; 31
SN-31-SS	8/10/05	0 feet	18, pp. 35, 161; 31
RP-CS-05	6/29/10	0 feet	40, pp. 14-15, 26, 33-34, 194, 197
RP-CS-06	6/29/10	0 feet	40, pp. 14-15, 26, 33-34, 194, 247
RP-CS-18	6/29/10	0 feet	40, pp. 14-15, 26, 33-34, 194, 248
RP-CS-29	6/29/10	0 feet	40, pp. 14-15, 26, 33-34, 194, 202
RP-CS-32	6/29/10	0 feet	40, pp. 14-15, 26, 33-34, 194, 255
RP-CS-38	6/29/10	0 feet	40, pp. 14-15, 26, 33-34, 194, 254
RP-CS-39	6/29/10	0 feet	40, pp. 14-15, 26, 33-34, 194, 204
RP-CS-47	6/29/10	0 feet	40, pp. 14-15, 26, 33-34, 194, 206
RP-CS-57	6/29/10	0 feet	40, pp. 14-15, 26, 33-34, 194, 208

Resident Population Threat Likelihood of Exposure Factor Category Value: 550

5.1.2 WASTE CHARACTERISTICS

5.1.2.1 Toxicity

Hazardous Substance	Toxicity Factor Value	Reference
4,4'-DDD	100	2, p. BI-4
4,4'-DDE	100	2, p. BI-4
4,4'-DDT	1,000	2, p. BI-4
Aldrin	10,000	2, p. BI-1
Aldrin	10,000	2, p. BI-1
Alpha-Chlordane	10,000	2, p. BI-3
Alpha-Hexachlorocyclohexane (Alpha-BHC)	10,000	2, p. BI-7
Arsenic	10,000	2, p. BI-1
Gamma-Chlordane	10	2, p. BI-3
Dieldrin	10,000	2, p. BI-5
Endrin	10,000	2, p. BI-6
Endrin aldehyde	0	2, p. BI-6
Endosulfan II	100	2, p. BI-6
Heptachlor	10,000	2, p. BI-6
Heptachlor epoxide	10,000	2, p. BI-6
Toxaphene	1,000	2, p. BI-11

Toxicity Factor Value: 10,000

5.1.2.2 Hazardous Waste Quantity

Area Letter	Source Type	Area Hazardous Waste Quantity
A	Contaminated Soil	>0
B	Contaminated Soil	>0

Sum of Values: >0

Hazardous Waste Quantity Factor Value: 10*

*The hazardous constituent quantity is not adequately established for the source. The value assigned from Table 2-6 without consideration of the removal action would be less than 100. Therefore, a value of 10 has been assigned for the Hazardous Waste Quantity value (Ref. 1, Section 2.4.2.2 and Table 2-6).

5.1.2.3 Calculation of Waste Characteristics Factor Category Value

Toxicity Factor Value: 10,000
Hazardous Waste Quantity Factor Value: 10

Toxicity Factor Value x Hazardous Waste Quantity Factor Value: 100,000

Waste Characteristics Factor Category Value: 18
(Ref. 1, Table 2-7)

5.1.3 TARGETS

Surface soil samples were collected during the August 2005 investigation of the 18th Street Neighborhood and the 2010 ADS (Refs. 18; 40). The below samples were collected during those sampling events.

Level I Concentrations

The below samples were collected during the August 2005 investigation of the 18th Street Neighborhood by Weston for EPA (Ref. 18, pp. 4-9, 16-19, 29-39, 126-157). All samples were collected as 3-, 4-, or 5-point composite samples from 0 to 6 inches bgs from the residential yards (Ref. 18, pp. 29-47). Generally, the soil samples were comprised of light brown sandy silt (Ref. 18, pp. 29-31). All aliquots of the samples were collected from within 200 feet of the residential dwelling as evidenced by the size of the properties (Ref. 18, pp. 29-47; 31). All samples were analyzed by a CLP laboratory and validated by the EPA SESD (Ref. 18, pp. 8-9, 79-175). See Figure 3 of this Documentation Record for sample locations.

Sample ID: SN-05-SS
Area Letter: B
References: 2, p. BII-17; 18, pp. 125, 129, 166

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-05-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
Dieldrin	42	3.5U	40	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-06-SS
Area Letter: B
References: 2, pp. BII-17; 18, pp. 125, 130, 166

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-06-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
Dieldrin	58	3.5U	40	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-07-SS
Area Letter: B
References: 2, p. BII-17; 18, pp. 125, 131, 166

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-07-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
Dieldrin	200	3.5U	40	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-08-SS
Area Letter: B
References: 2, p. BII-17; 18, pp. 125, 132, 166

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-08-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
Dieldrin	360	3.5U	40	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-11-SS
Area Letter: B
References: 2, p. BII-17; 18, pp. 125, 136, 166-167

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-11-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
Dieldrin	77	3.5U	40	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-12-SS
Area Letter: B
References: 2, p. BII-23; 18, pp. 125, 137, 166-167

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-12-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
Toxaphene	4,500	180U	580	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-21-SS
Area Letter: B
References: 2, p. BII-17; 18, pp. 125, 147, 166, 168

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-21-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
Dieldrin	380	3.5U	40	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-24-SS
Area Letter: B
References: 2, p. BII-23; 18, pp. 125, 150, 166, 168

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-24-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
Toxaphene	4,700	180U	580	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-25-SS
Area Letter: B
References: 2, p. BII-23; 18, pp. 125, 151, 166, 168

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-25-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
Toxaphene	1,900	180U	580	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-26-SS
Area Letter: B
References: 2, p. BII-23; 18, pp. 125, 152, 166, 168

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-26-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
Toxaphene	810	180U	580	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-30-SS
Area Letter: B
References: 2, p. BII-17; 18, pp. 125, 156, 166, 169

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-30-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
Dieldrin	42	3.5U	40	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

The samples below were collected during the 2010 OTIE ADS (Ref. 40, pp. 1, 5). All of the soil samples listed below were nine-point composite surface soil samples collected from 0-to 3-inches bgs. The composite samples were collected from a 25-by-25-foot grid (Ref. 40, pp. 14-15). All aliquots of each individual sample was collected from within the legal property boundary and within 200 feet of the building (Ref. 40, pp. 14-15). The four background composite surface soil samples, including one duplicate, were collected from residential properties located 0.7- to 1.1-mile distant from the facility to ensure an adequate background for comparison purposes (Ref. 40, pp. 14-15; 41, pp. 31-32). The neighborhoods selected for the background samples were of approximately the same

age; the background composite soil samples consisted of similar soil types (Ref. 40, pp. 14-15). The highest concentration of each constituent in all four background samples was used for comparison purposes. All samples were collected in accordance with the guidance presented in the EPA-approved site-specific QAPP/SSP and in accordance with the EPA SESD FBQSTP (Refs. 40, pp. 6, 14; 41).

All samples collected during the investigation were submitted to the EPA SESD laboratory for routine TCL pesticide analytical services using EPA Method 8080 (Ref. 40, pp. 16, 89). Results were validated by EPA SESD; the data validation report is included in Reference 40. See Figure 4 of this Documentation Record for sample locations.

Sample ID: RP-CS-05
Area Letter: B
References: 2, p. BII-17; 40, pp. 27, 33, 91-92, 96-97, 99, 151, 160

Hazardous Substance	Hazardous Substance Concentration (µg/kg)	Background Concentration (µg/kg)	Benchmark Concentration (µg/kg)	Benchmark
Dieldrin	230	52	40	CRSC
Heptachlor	210	2.4	140	CRSC
Heptachlor epoxide	290	3.2	70	CRSC

Notes:
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: RP-CS-06
Area Letter: B
References: 2, p. BII-17; 40, pp. 27, 33, 91-92, 96-97, 100, 151, 160

Hazardous Substance	Hazardous Substance Concentration (µg/kg)	Background Concentration (µg/kg)	Benchmark Concentration (µg/kg)	Benchmark
Dieldrin	160	52	40	CRSC

Notes:
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: RP-CS-18
Area Letter: B
References: 2, p. BII-17; 40, pp. 27, 33, 91-92, 96-97, 104, 151, 160

Hazardous Substance	Hazardous Substance Concentration (µg/kg)	Background Concentration (µg/kg)	Benchmark Concentration (µg/kg)	Benchmark
Dieldrin	840	52	40	CRSC

Notes:
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

5.1.3.1 Resident Individual

Area Letter: B
Level of Contamination (Level I/Level II): I
Reference: 2, pp. BII-16, BII-17, BII-18, BII-24; 18, pp. 9-10, 21-44, 76-168; 40, pp. 27, 33, 91-180

Resident Individual Factor Value: 50

5.1.3.2 Resident Population

The below listed samples were collected during the August 2005 investigation of the 18th Street Neighborhood by Weston for EPA and during the 2010 ADS by OTIE for EPA (Ref. 18, pp. 4-9, 16-19, 29-39, 126-157; 40, pp. 1, 5). During the 2005 Weston investigation, a total of 30 single home properties were sampled and of those properties sampled, 11 properties were determined to contain Level I concentrations of pesticides (Refs. 2, pp. BII-17, BII-23; 18, pp. 7, 49-77, 125-171). During the 2010 ADS, samples were collected from 32 residential properties, not including three background residential locations, of those properties, three properties were determined to contain Level I concentrations of pesticides (Refs. 2, pp. BII-17, BII-23; 40, pp. 33-34, 91-180).

5.1.3.2.1 Level I Concentrations

Level I Resident Population Targets

Area Letter	Sample ID	Number of Residences	County Multiplier	Total No. of Residents	Reference
B	SN-05-SS	1	2.69	2.69	18, p. 53; 24, p. 1; 31, p. 1
B	SN-06-SS	1	2.69	2.69	18, p. 54; 24, p. 1; 31, p. 1
B	SN-07-SS	1	2.69	2.69	18, p. 55; 24, p. 1; 31, p. 1
B	SN-08-SS	1	2.69	2.69	18, p. 56; 24, p. 1; 31, p. 1
B	SN-11-SS	1	2.69	2.69	18, p. 59; 24, p. 1; 31, p. 1
B	SN-12-SS	1	2.69	2.69	18, p. 60; 24, p. 1; 31, p. 1
B	SN-21-SS	1	2.69	2.69	18, p. 68; 24, p. 1; 31, p. 1
B	SN-24-SS	1	2.69	2.69	18, p. 71; 24, p. 1; 31, p. 1
B	SN-25-SS	1	2.69	2.69	18, p. 64; 24, p. 1; 31, p. 1
B	SN-26-SS	1	2.69	2.69	18, p. 72; 24, p. 1; 31, p. 1
B	SN-30-SS	1	2.69	2.69	18, p. 76; 24, p. 1; 31, p. 1
B	RP-CS-05	1	2.69	2.69	24, p. 1; 31, p. 1; 40, p. 50
B	RP-CS-06	1	2.69	2.69	24, p. 1; 31, p. 1; 40, p. 57
B	RP-CS-18	1	2.69	2.69	24, p. 1; 31, p. 1; 40, p. 58

Sum of individuals subject to Level I concentrations: 37.66
Sum of individuals subject to Level I concentrations x 10: 376.6

Level I Concentrations Factor Value: 376.6

5.1.3.2.2 Level II Concentrations

Surface soil samples were collected during the August 2005 investigation of the 18th Street Neighborhood and the 2010 ADS (Refs. 18; 40). The below samples were collected during those sampling events.

Level II Samples

The below samples were collected during the August 2005 investigation of the 18th Street Neighborhood by Weston for EPA (Ref. 18, pp. 4-9, 16-19, 19-39, 126-157). All samples were collected as 3-, 4-, or 5-point composite samples from 0 to 6 inches bgs from the residential yards (Ref. 18, pp. 29-47). All aliquots of the samples were collected from within 200 feet of the residential dwelling as evidenced by the size of the properties (Ref. 18, pp. 29-47; 31). All samples were analyzed by a CLP laboratory and validated by the EPA SESD (Ref. 18, pp. 8-9, 79-175). Generally, the soil samples were comprised of light brown sandy silt (Ref. 18, pp. 29-31). See Figure 3 of this Documentation Record for sample locations.

Sample ID: SN-03-SS
Area Letter: B
References: 2, p. BII-16; 18, pp. 125, 127, 166

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-03-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
4,4'-DDE	58	15	1,900	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-04-SS
Area Letter: B
References: 2, p. BII-16; 18, pp. 125, 128, 166

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-04-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
4,4'-DDE	58	15	1,900	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-13-SS
Area Letter: B
References: 2, pp. BII-15, BII-16; 18, pp. 125, 138, 166-167

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-13-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
4,4'-DDE	320	15	1,900	CRSC
Gamma Chlordane/2	44	1.8U	1,800	CRSC
Alpha Chlordane/2	53	1.8U	1,800	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
U - Constituent was analyzed for but not detected
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-14-SS
Area Letter: B
References: 2, pp. BII-16; 18, pp. 125, 139, 166-167

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-14-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
4,4'-DDE	170	15	1,900	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-16-SS
Area Letter: B
References: 2, p. BII-16; 18, pp. 125, 141, 166-167

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-16-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
4,4'-DDE	73	15	1,900	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-18-SS
Area Letter: B
References: 2, pp. BII-15, BII-16, BII-18; 18, pp. 125, 143, 166-167

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-18-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
4,4'-DDE	280	15	1,900	CRSC
4,4'-DDD	19	3.5U	2,700	CRSC
Gamma Chlordane/2	29	1.8U	1,800	CRSC
Endrin	7.2	3.5U	23,000	RDSC

Notes:
SN - Street Neighborhood
SS - Surface soil
U - Constituent analyzed for but not detected
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration
RDSC - Reference Dose Screening Concentration

Sample ID: SN-19-SS
Area Letter: B
References: 2, p. BII-15; 18, pp. 125, 144, 166-167

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-19-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
Gamma Chlordane/2	6.2 J*	1.8U	1,800	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
J* - Identification of analyte is acceptable; bias unknown. Value adjusted (62/10 = 6.2J) (Ref. 33, pp. 8, 17).
U - Constituent analyzed for but not detected
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-20-SS
Area Letter: B
References: 2, p. BII-17; 18, pp. 125, 146, 166, 168

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-20-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
Dieldrin	10	3.5U	40	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
U - Constituent analyzed for but not detected
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-27-SS
Area Letter: B
References: 2, p. BII-16; 18, pp. 125, 153, 166, 168

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-27-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
4,4'-DDE	110	15	1,900	CRSC
4,4'-DDD	7.2	3.5U	2,700	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
U - Constituent analyzed for but not detected
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-29-SS
Area Letter: B
References: 2, pp. BII-15, BII-16, BII-17; 18, pp. 125, 155, 166, 169

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-29-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
4,4'-DDE	90	15	1,900	CRSC
Dieldrin	36	3.5U	40	CRSC
Alpha Chlordane/2	3.5	1.8U	1,800	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
U - Constituent analyzed for but not detected
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: SN-31-SS
Area Letter: B
References: 2, pp. BII-16, BII-17; 18, pp. 125, 157, 166, 169

Hazardous Substance	Hazardous Substance Concentration (µg/kg) (SN-31-SS)	Background Concentration (µg/kg) (SN-01-SS)	Benchmark Concentration (µg/kg)	Benchmark
4,4'-DDE	130	15	1,900	CRSC
Dieldrin	32	3.5U	40	CRSC

Notes:
SN - Street Neighborhood
SS - Surface soil
U - Constituent analyzed for but not detected
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

The samples below were collected during the 2010 OTIE ADS (Ref. 40, pp. 1, 5). All of the soil samples listed below were nine-point composite surface soil samples collected from 0-to 3-inches bgs. The composite samples were collected from a 25-by-25-foot grid (Ref. 40, pp. 14-15). All aliquots of each individual sample was collected from within the legal property boundary and within 200 feet of the building (Ref. 40, pp. 14-15). The four background composite surface soil samples, including one duplicate, were collected from residential properties located 0.7- to 1.1-mile distant from the facility to ensure an adequate background for comparison purposes (Ref. 40, pp. 14-15; 41, pp. 31-32). The neighborhoods selected for the background samples were of approximately the same age; the background composite soil samples consisted of similar soil types (Ref. 40, pp. 14-15). The highest concentration of each constituent in all four background samples was used for comparison purposes. All samples were collected in accordance with the guidance presented in the EPA-approved site-specific QAPP/SSP and in accordance with the EPA SESD FBQSTP (Refs. 40, pp. 6, 14; 41).

All samples collected during the investigation were submitted to the EPA SESD laboratory for routine TCL pesticide analytical services using EPA Method 8080 (Ref. 40, pp. 16, 89). Results were validated by EPA SESD; the data validation report is included in Reference 40. See Figure 4 of this Documentation Record for sample locations.

Sample ID: RP-CS-29
Area Letter: B
References: 2, p. BII-17; 40, pp. 27, 33, 91-92, 96-97, 107, 151, 160

Hazardous Substance	Hazardous Substance Concentration (µg/kg)	Background Concentration (µg/kg)	Benchmark Concentration (µg/kg)	Benchmark
4,4-DDE	99	22	1900	CRSC

Notes:
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: RP-CS-32
Area Letter: B
References: 2, p. BII-17; 40, pp. 27, 33, 91-92, 96-97, 111, 151, 160

Hazardous Substance	Hazardous Substance Concentration (µg/kg)	Background Concentration (µg/kg)	Benchmark Concentration (µg/kg)	Benchmark
4,4-DDT	110	34	1900	CRSC

Notes:
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: RP-CS-38
Area Letter: B
References: 2, p. BII-17; 40, pp. 27, 33, 91-92, 96-97, 114, 151, 160

Hazardous Substance	Hazardous Substance Concentration (µg/kg)	Background Concentration (µg/kg)	Benchmark Concentration (µg/kg)	Benchmark
4,4-DDT	330	34	1900	CRSC
Heptachlor epoxide	51	3.2	70	CRSC

Notes:
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: RP-CS-39
Area Letter: B
References: 2, p. BII-17; 40, pp. 27, 33, 91-92, 96-97, 115, 151, 160

Hazardous Substance	Hazardous Substance Concentration (µg/kg)	Background Concentration (µg/kg)	Benchmark Concentration (µg/kg)	Benchmark
4,4-DDT	330	34	1900	CRSC

Notes:
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: RP-CS-47
Area Letter: B
References: 2, p. BII-17; 40, pp. 27, 33, 91-92, 96-97, 117, 151, 160

Hazardous Substance	Hazardous Substance Concentration (µg/kg)	Background Concentration (µg/kg)	Benchmark Concentration (µg/kg)	Benchmark
4,4-DDT	170	34	1900	CRSC

Notes:
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: RP-CS-50
Area Letter: B
References: 2, p. BII-17; 40, pp. 27, 33, 91-92, 96-97, 120, 151, 160

Hazardous Substance	Hazardous Substance Concentration (µg/kg)	Background Concentration (µg/kg)	Benchmark Concentration (µg/kg)	Benchmark
4,4-DDE	90	22	1900	CRSC

Notes:
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Sample ID: RP-CS-57
Area Letter: B
References: 2, p. BII-17; 40, pp. 27, 33, 91-92, 96-97, 122, 151, 160

Hazardous Substance	Hazardous Substance Concentration (µg/kg)	Background Concentration (µg/kg)	Benchmark Concentration (µg/kg)	Benchmark
4,4-DDE	88	22	1900	CRSC

Notes:
µg/kg - Micrograms per kilogram
CRSC - Cancer Risk Screening Concentration

Level II Resident Population Targets

The below listed samples were collected during the August 2005 investigation of the 18th Street Neighborhood by Weston for EPA and during the 2010 ADS by OTIE for EPA (Ref. 18, pp. 4-9, 16-19, 29-39, 126-157; 40, pp. 1, 5). During the 2005 investigation, a total of 30 single home properties were sampled and of those properties sampled, 11 properties were determined to contain Level II concentrations of pesticides (Refs. 2, pp. BII-15, BII-16, BII-17; 18, pp. 7, 49-77, 125-171). During the 2010 ADS, samples were collected from 32 residential properties, not including three background residential locations, of those properties, nine properties were determined to contain Level II concentrations of pesticides (Refs. 2, pp. BII-17, BII-23; 40, pp. 33-34, 91-180).

Area Letter	Sample ID	Number of Residences	County Multiplier	Total No. of Residents	Reference
B	SN-03-SS	1	2.69	2.69	18, p. 51; 24, p. 1; 31, p. 1
B	SN-04-SS	1	2.69	2.69	18, p. 52; 24, p. 1; 31, p. 1
B	SN-13-SS	1	2.69	2.69	18, p. 61; 24, p. 1; 31, p. 1
B	SN-14-SS	1	2.69	2.69	18, p. 62; 24, p. 1; 31, p. 1
B	SN-16-SS	1	2.69	2.69	18, p. 62; 24, p. 1; 31, p. 1
B	SN-18-SS	1	2.69	2.69	18, p. 62; 24, p. 1; 31, p. 1
B	SN-19-SS	1	2.69	2.69	18, p. 66; 24, p. 1; 31, p. 1
B	SN-20-SS	1	2.69	2.69	18, p. 67; 24, p. 1; 31, p. 1
B	SN-27-SS	1	2.69	2.69	18, p. 73; 24, p. 1; 31, p. 1
B	SN-29-SS	1	2.69	2.69	18, p. 75; 24, p. 1; 31, p. 1
B	SN-31-SS	1	2.69	2.69	18, p. 77; 24, p. 1; 31, p. 1
B	RP-CS-29	1	2.69	2.69	24, p. 1; 31, p. 1; 40, p. 52
B	RP-CS-32	1	2.69	2.69	24, p. 1; 31, p. 1; 40, p. 61

Area Letter	Sample ID	Number of Residences	County Multiplier	Total No. of Residents	Reference
B	RP-CS-38	1	2.69	2.69	24, p. 1; 31, p. 1; 40, p. 61
B	RP-CS-39	1	2.69	2.69	24, p. 1; 31, p. 1; 40, p. 53
B	RP-CS-47	1	2.69	2.69	24, p. 1; 31, p. 1; 40, p. 54
B	RP-CS-50	1	2.69	2.69	24, p. 1; 31, p. 1; 40, p. 62
B	RP-CS-57	1	2.69	2.69	24, p. 1; 31, p. 1; 40, p. 55

Sum of individuals subject to Level II concentrations: 2.69 x 18 = 48.42

Level II Concentrations Factor Value: 48.42

5.1.3.3 Workers

Area Letter	Number of Workers	Reference
A	1	8, p. 1

Total workers: 1

Workers Factor Value: 5
(Ref. 1, Table 5-4)

5.1.3.4 Resources

Description of Resource(s): No resources are documented on the Red Panther property (AOC A) or the surrounding area (AOC B).

Resources Factor Value: 0

5.1.3.5 Terrestrial Sensitive Environments

No Terrestrial Sensitive Environments have been documented within the vicinity of the Red Panther property.

Likelihood of exposure factor category value (LE): 550
Waste characteristics factor category value (WC): 18
Terrestrial sensitive environments value (ES): 0
Product (LE x WC x ES): 0
(LE x WC x ES)/82,500 (EC):0

If EC is >60, Value of EC:

Terrestrial Sensitive Environments Factor Value: 0

5.2 NEARBY POPULATION THREAT

The Nearby Population Threat was not scored because the Attractiveness/ Accessibility factor value is zero. The facility is physically inaccessible to the public with no signs of public recreation use, resulting in an attractiveness/accessibility factor value of zero for the property. Therefore, the threat does not significantly change the Soil Exposure Pathway score (Ref. 1, Table 5-6).