

Discordant Dialogue: Discursive Differences at Defense Depot Memphis, Tennessee**Andrea Perkins****Professor Houghton****2010 Rhodes Institute for Regional Studies****July 30, 2010**

“The EPA moves their mouths but they don’t do much else,” said Doris Bradshaw, a long-time resident of the neighborhood adjacent to the former Memphis Defense Depot (DDMT).¹ She and many others in her community believe that the EPA and other government agencies are intentionally failing to communicate information about the Depot and that the EPA is allowing her neighborhood to be poisoned.² In spite of these claims of sub-par communication, there has been a sizeable amount of interaction between government agencies and the activist group, Defense Depot Memphis Tennessee – Concerned Citizens Committee (DDMT-CCC), which Doris and her husband, Kenneth, founded in 1996.³ Since the site was listed on the National Priorities List in 1992, the EPA and other government agencies have “moved their mouths” fairly regularly; according to the EPA website, communication and interaction between officials in charge of clean-up and the local community is essential to the remediation process.⁴ The EPA’s “Superfund Community Handbook” states: “The foundation of Superfund’s community involvement program is the belief that members of the the public affected by a Superfund site have a right to know what the Agency is doing in their community

¹ Doris Bradshaw, Interview by author, Memphis, TN, June 15, 2010.

² Ibid.

³ Ibid.

⁴ U.S. Environmental Protection Agency, “Superfund Community Involvement,” EPA, <http://www.epa.gov/superfund/community/index.htm> (accessed July 1, 2010).

and to have a say in the decision-making process.⁵ DDMT-CCC too has been vocal, expressing concerns about the clean-up process and about the Depot itself. Despite regular communication between the two parties, DDMT-CCC remains unconvinced that the Depot is truly clean and officials in charge of remediation are un-swayed by Doris Bradshaw's arguments that the site has negatively impacted the health of her neighborhood.

This may seem like a simple case of government negligence and disinterest in a low-income, minority neighborhood; but the communicative disconnect witnessed at the Memphis Depot highlights a deeper issue: channels of communication between Superfund and community groups are broken. Under the current modes of communication, agency officials and community members are unable to communicate in a manner understandable by the other party. A double-sided language barrier seems to exist, leaving both parties incapable of meaningfully addressing issues surrounding Superfund clean-up. This paper focuses specifically on interactions between Defense Depot Memphis Tennessee and the activist group, DDMT-CCC during the years 1996-2000. It is acknowledged that DDMT-CCC may not be representative of every person (or even a majority of persons) living adjacent to the Depot.⁶ Interactions between the Defense Depot and DDMT-CCC serve as a case study for examining the communication process at Superfund sites.

Historical Background of the Defense Depot Memphis, Tennessee

⁵ U.S. Environmental Protection Agency, *Superfund Community Involvement Handbook*, Office of Emergency and Remedial Response and U.S. Environmental Protection Agency, 2005, http://www.epa.gov/superfund/community/cag/pdfs/ci_handbook.pdf (accessed July 17, 2010).

⁶ Though DDMT-CCC is an organized, activist group allegedly composed of residents around the Depot, the ideas expressed by the group seem to be the sole product of Doris Bradshaw. Based upon interviews and publicly recorded Q&A sessions, Bradshaw is the leader and mouth-piece for the group. Therefore, when this paper states that DDMT-CCC expresses a view, it should be understood that the opinion expressed is that of Doris Bradshaw.

Defense Depot Memphis, Tennessee (DDMT) is a 642-acre lot located in south-central Memphis.⁷ It stands in a “mixed residential, commercial and industrial” area and is “approximately 5 miles east of the Mississippi River... just northeast of the Interstate 240 – Interstate 55 junction [and] one mile northwest of the Memphis International Airport” (see Figure 1).⁸ The lot is comprised of two sections: the main facility, bordered by Dunn Road to the north; Airways Boulevard to the east; Ball Road to the south; and Perry Road to the west, and an adjacent undeveloped, 64-acre field called Dunn Field which is bounded by “the Illinois Central Gulf Railroad and Person Avenue to the north, Hays Road to the east, and Dunn Avenue to the South. Dunn Field is partially bounded to the west by: (1) Kyle Street; (2) Memphis Light Gas and Water (MLGW) powerline corridor (which bisects Dunn Field); (3) undeveloped property; and (4) a commercial trucking facility.”⁹ The Depot is bordered on the west, south and east by residential areas.

This site was selected by the Department of Defense (DOD) in 1941 because of its access to “railroad and highway facilities” and its proximity to the city.¹⁰ Prior to purchase by the U.S.

⁷ U.S. Environmental Protection Agency, *Record of Decision for Interim Remedial Action of the Groundwater at Dunn Field (OU-1) at the Defense Distribution Depot Memphis, Tennessee*, CH2M Hill, Inc., April 1996, <http://www.epa.gov/superfund/sites/rods/fulltext/r0496278.pdf> (accessed July 13, 2010).

⁸ Defense Logistics Agency, *Memphis Depot Dunn Field Five-Year Review*, January 2003, U.S. Army Engineering and Support Center, <http://www.epa.gov/superfund/sites/fiveyear/f03-04030.pdf> (accessed June 20, 2010) and Defense Logistics Agency, *Second Five-Year Review: Defense Depot Memphis, Tennessee, engineering-environmental Management, Inc.*, December 2007, <http://www.epa.gov/superfund/sites/fiveyear/f2008040002646.pdf> (accessed June 21, 2010), 6.

⁹ Tennessee Department of Transportation Long Range Planning Division in cooperation with the U.S. Department of Transportation Federal Highway Administration, *City and Vicinity Map Memphis, Tenn. Southwest*, 2002, <http://www.tdot.state.tn.us/maps/city/MemphisSW.pdf> (accessed July 18, 2010) and Defense Logistics Agency, *Memphis Depot Dunn Field Five-Year Review*, 1.2.1.

¹⁰ John, Waddell, “Long-Idle Park Field May Be Chosen Site for Big Army Depot,” *The Commercial Appeal*, March 22, 1941.

Army, the Depot site was used to farm cotton.¹¹ Land for the Depot was acquired in sections with the first section, about 500 acres, purchased in 1941 from the Goodman Brothers.¹² This tract of land comprises the majority of the Main Installation. In 1942, an additional 141.1 acres was purchased from Nellie Flanagan.¹³

Construction began in 1941 and was completed in 1942.¹⁴ The Depot opened the following month, in June of 1942.¹⁵ From its opening in 1942 until its closure in 1997, the Depot served as a storage and distribution center for the Department of Defense.¹⁶ Medicine, food, clothes, petroleum products and weaponry were shipped from the Depot to military bases across the country.¹⁷ The Depot was a major installation: “approximately 4 million line items were received and shipped by the Depot annually” and “in-stock inventory at the facility was worth more than \$1 billion.”¹⁸ For a brief period during World War II, the site served as an internment camp for approximately 800 German Prisoners of War as well as “performed supply missions for the Signal and Ordnance Corps.”¹⁹ After 1963, the Depot primarily served as a distribution center for the Defense Logistics Agency (DLA) receiving “a variety of materials including hazardous substances; textile products; food products; electronic equipment; construction materials; and industrial, medical and general supplies.”²⁰ In addition to distribution, the main facility served as a storage and maintenance site.²¹ There were several

¹¹ Defense Logistics Agency, *Second Five-Year Review*, 6.

¹² “Airways Chosen for Big Supply Depot by War Department,” *The Commercial Appeal*, May 18, 1941.

¹³ “Papers Are Recorded on Purchase by the Army,” *The Commercial Appeal*, October 4, 1942.

¹⁴ Agency for Toxic Substance & Disease Registry, *Public Health Assessment*, 1995, viii.

¹⁵ *Ibid.*, viii

¹⁶ Defense Logistics Agency, *Memphis Depot Dunn Field Five Year Review*, 1.3.1.

¹⁷ *Ibid.*, 1.3.1.

¹⁸ *Ibid.*, 1.3.1.

¹⁹ Defense Logistics Agency, *Second Five-Year Review*, 6.

²⁰ *Ibid.*, 6.

²¹ Agency for Toxic Substances & Disease Registry, *Public Health Assessment (1999)*, Superfund Site Assessment Branch Division of Health Assessment and Consultation Agency for

warehouses on site as well as sand-blasting and painting facilities and a PCB dipping vat for wood-treatment and preservation (see Figure 2 and 2.1 for DDMT layout).²² Most of the warehouses were bermed and had concrete lined floors to reduce the chance of contaminant escape should storage containers leak or spill.²³ The facility was also used to repair gas masks, train men and, occasionally, dispose of leaking chemicals and solvents.²⁴

Dunn Field was the primary site of disposal (see Figure 3 for disposal sites). The first reported disposal occurred in July 1946, when several cars in a train hauling WWII German mustard gas bombs leaked en route to an Arkansas proving ground.²⁵ The 29 mustard gas bombs were emptied into a pit of bleach in Dunn Field and the casings were buried elsewhere in the field.²⁶ Chemical Agent Identification Sets (CAIS) were also reportedly buried in Dunn Field in the 1950s.²⁷ CAIS were small glass ampoules filled with “diluted mustard, lewisite (a vesicant

Toxic Substances and Disease Registry,

<http://www.atsdr.cdc.gov/HAC/pha/PHA.asp?docid=1364&pg=0> (accessed July 1, 2010).

²²Gross, J.M., et al., *Installation Assessment of Defense Depot Memphis, Memphis Tennessee, Report #191*, Chemical Systems Laboratory

<http://www.adminrec.com/documents/adminrec/memphis/cd2/DATA/7/00/multi.pdf> (accessed July 8, 2010), 3, and Agency for Toxic Substance & Disease Registry, *Public Health Assessment* (1995).

PCB dip tank vats were used from 1960s until 1985, according to the ATSDR’s 1995 *Public Health Assessment*. The *Installation Assessment*, states that the “224-cubic meter (m³) dipping vat “is open and observed to be full...” According to this report, the “vat has received little use since the late 1960s...also reported that the vat has not been cleaned or dumped since construction in 1952.”

²³ Gross, J.M., et al., *Installation Assessment of Defense Depot Memphis*, and Agency for Toxic Substance & Disease Registry, *Public Health Assessment* (1995).

²⁴ Agency for Toxic Substances & Disease Registry, *Public Health Assessment* (2000), Superfund Site Assessment Branch Division of Health Assessment and Consultation Agency for Toxic Substances and Disease Registry,

<http://www.atsdr.cdc.gov/HAC/pha/PHA.asp?docid=1365&pg=0> (accessed July 1, 2010).

²⁵ Tom Charlier, “WWII Mustard Gas Pit to be Dug Up,” *The Commercial Appeal*, February 15, 1995, and Defense Logistics Agency, *Memphis Defense Depot Dunn Field Five-Year Review*, 1.3.1.

²⁶ Agency for Toxic Substances & Disease Registry, *Public Health Assessment* (1999), and *Ibid.*

²⁷ Defense Logistics Agency, *Memphis Defense Depot Dunn Field Five-Year Review*, 1.3.1.

chemical agent), chloropicrin, and phosgene.²⁸ Additionally, “Chemical Warfare Material (CWM) disposal pits were located in the Disposal Area section of Dunn Field and the Stockpile Area portions of Dunn Field... the remains of destroyed (burned or detonated) explosive ordinance... Decontaminating Agent Non-Corrosive ...chlorinated lime, super tropical bleach (STB) and calcium hypochlorite (HTH)” were also disposed of at Dunn Field.²⁹ Many other chemicals and solvents such as “paints/thinners, petroleum/oil/lubricants (POL), acids, herbicides, mixed chemicals, and medical waste” were buried at Dunn Field.³⁰

Understanding the site’s hydrology is important to fully understanding site clean-up and the health complaints raised by community members. Dunn Field sits atop the Fluvial Aquifer and the confined Memphis Sands Aquifer, the drinking water source for the City of Memphis.³¹ The Fluvial Aquifer is shallow and unconfined and is separated from the Memphis Sands Aquifer by a silt and clay layer, called the Jackson Formation/Upper Claiborne (see Figure 4 and 4.1).³² Materials buried in Dunn Field have infiltrated and contaminated the shallow Fluvial Aquifer; it is contaminated with “arsenic, lead, chromium, nickel, tetrachloroethene, and trichloroethene according to tests conducted in 1989 by the DOD.”³³ However, according to the

²⁸ Ibid., 1.3.1.

²⁹ Ibid., 1.3.1.

³⁰ Ibid., 1.3.1.

I read a newspaper article in conflict with the above list: a DDMT official stated that chemicals buried were such that could be found at any hardware store and that officials would be hard pressed to call them hazardous.

³¹ U.S. Environmental Protection Agency, *Record of Decision for Interim Remedial Action of the Groundwater at Dunn Field*, and Agency for Toxic Substances & Disease Registry, *Public Health Assessment* (1999).

³² Ibid., 2.5.2.

³³ Federal Register Notice, *NPL Site Narrative for Memphis Defense Depot (DLA)*, October 14, 1992, and U. S. Environmental Protection Agency, *Record of Decision for Interim Remedial Action of the Groundwater at Dunn Field*, 2.5.2.

This aquifer is recharged by “rainfall infiltration and lateral groundwater inflow. It is not a source of public drinking water (EPA, *Record of Decision*, 1996). ATSDR *Public Health Assessment*

NPL site listing in 1992, this contamination has not reached the Memphis Sands.³⁴ Dunn Field is also located 1 to 2 miles west of the Allen Well Field, the site of Memphis Light Gas and Water municipal extraction wells.³⁵ Wells located at Allen Well Field pump municipal drinking water from the Memphis Sands.

Because of surface water runoff from the Depot and the proximity of DDMT to the Memphis Sands, DDMT was “proposed for placement on the National Priorities List in August 1991” and was placed on the NPL “by publication in the *Federal Register*... on October 14, 1992.”³⁶ The NPL is a list of sites known to pose a risk of releasing hazardous pollutants; this list helps EPA determine which sites need clean-up.³⁷ The Hazard Ranking System (HRS) is an essential component of the listing process. HRS “is the principal mechanism EPA uses to place uncontrolled waste sites on the National Priorities List (NPL). It is a numerically based screening system that uses information from... preliminary assessment and the site inspection - to assess the relative potential of sites to pose a threat to human health or the environment.”³⁸ While helpful in determining which sites to place on the NPL list, the HRS does not factor into EPA decisions concerning prioritization of sites for clean-up.³⁹ In the early 1990s, EPA tested the site and ranked it on HRS; the Depot scored 58.06.⁴⁰ Despite its listing in 1992, closure of DDMT was

(1999 and 2000) state that the well poses no risk to public health because residents around the Depot were connected to city water in 1953. Dunn Field was reportedly not used as a hazardous-material dumping site until 1955.

³⁴ Federal Register Notice, *NPL Site Narrative*, 1992.

³⁵ U.S. Environmental Protection Agency, *Record of Decision for Interim Remedial Action of the Groundwater at Dunn Field*, 2.5.2.

³⁶ Agency for Toxic Substances & Disease Registry, *Public Health Assessment* (1999), Agency for Toxic Substances & Disease Registry (2000), and Logistics Agency, *Memphis Defense Depot Dunn Field Five-Year Review*, 1.3.2.

³⁷ U. S. Environmental Protection Agency, “National Priorities List,” EPA, <http://www.epa.gov/superfund/sites/npl/index.htm> (accessed July 18, 2010).

³⁸ U.S. Environmental Protection Agency, “Introduction to the Hazard Ranking System (HRS),” EPA, http://www.epa.gov/superfund/programs/npl_hrs/hrsint.htm (accessed July 18, 2010).

³⁹ *Ibid.*

⁴⁰ Defense Logistics Agency, *Memphis Defense Depot Dunn Field Five-Year Review*, 1.3.2.

not discussed until 1995 when the Depot was placed on the DOD's list of sites for Base Realignment and Closure (BRAC).⁴¹ DDMT did not close until September 1997 and the first clean-up actions were not taken until January 29, 1998 - six years after DDMT was placed on the NPL and several months after the distribution center was closed.⁴² Since 1998, the site has undergone clean-up and redevelopment through EPA and the Depot Redevelopment Corporation. The U.S. EPA is sub-divided into 10 regions, each corresponding to a geographical section of the United States. DDMT falls under the jurisdiction of Region 4.⁴³ Site clean-up has been undertaken by the DLA and overseen by EPA Region 4 and the Tennessee Department of Environmental Conservation (TDEC); particular attention has been paid to Dunn Field.⁴⁴ Figure 5 details the steps of Superfund remediation.⁴⁵

Communication Efforts by the Concerned Party

EPA policy attempts to institute communication with the communities who live near Superfund Sites. According to the EPA website, community involvement requires that EPA:

1. Encourage and enable community members to get involved.
2. Listen carefully to what the community is saying.
3. Take the time needed to deal with community concerns.
4. Change planned actions where community comments or concerns have merit.
5. Keep the community well informed of ongoing and planned activities.

⁴¹ Defense Logistics Agency, *Second Five-Year Review*, 6.

⁴² U.S. Environmental Protection Agency, "Superfund Site Progress Profile Memphis Defense Depot (DLA)," EPA, <http://cfpub.epa.gov/supercpad/cursites/csinfo.cfm?id=0404159> (accessed July 21, 2010) and "After Symbolic Revolt Falls Short, House Cements '95 Base Closings," *Commercial Appeal*, September 9, 1995.

⁴³ U.S. Environmental Protection Agency, "Superfund Sites Where You Live," EPA, <http://www.epa.gov/superfund/sites/index.htm> (accessed June 10, 2010).

EPA Region 4 is comprised of the 8 states of the mid-South and the Southeast: Kentucky, Tennessee, Mississippi, Alabama, Georgia, Florida, South Carolina and North Carolina.

⁴⁴ Defense Logistics Agency, *Second Five-Year Review*, 1.

⁴⁵ John A. Hird, "Figure 1.2," *Superfund: The Political Economy of Environmental Risk*, (Baltimore: The Johns Hopkins University Press, 1994), 15.

6. Explain to the community what EPA has done and why.⁴⁶

But how involved are communities actually able to be? To date, DLA, EPA Region 4, ATSDR and TDEC have established communication with the Depot community. Community information meetings to discuss concerns, site evaluations and clean-up procedures were held regularly; the Restoration Advisory Board (RAB) - comprised of experts, executives in charge of site clean-up and community representatives - was established; and newsletters issued by EPA Region 4 and/or DLA were sent to local residents updating them on remediation efforts and alerting them to any set-backs or newly discovered hazards.⁴⁷ Both print and media news sources have been utilized to alert residents to public meetings and other general information pertaining to site remediation.⁴⁸ ATSDR has helped establish the Greater Memphis Environmental Justice Work Group.⁴⁹ Additionally, documents surrounding site evaluations and Superfund decisions are a part of the public domain and can be accessed online at the ATSDR or EPA website or at selected public libraries.⁵⁰ In spite of communication efforts, local community activist, Doris Bradshaw, counters that her neighborhood's voice has been dismissed – their concerns have gone unanswered and they have been unable to meaningfully participate in site remediation. Bradshaw states that her people are experiencing negative effects from past Depot activities and that, despite EPA reports, the Depot is not – and never can be – clean.⁵¹ When the Depot was built in 1942, the area was a mixed white and black community, says

⁴⁶ U. S. Environmental Protection Agency, "Superfund Community Involvement," EPA, <http://www.epa.gov/superfund/community/index.htm> (accessed July 19, 2010).

⁴⁷ Agency for Toxic Substances & Disease Registry, *Public Health Assessment (2000)*.

⁴⁸ Agency for Toxic Substances & Disease Registry, *Public Health Assessment (2000)*.

⁴⁹ *Ibid.*

⁵⁰ See <http://www.adminrec.com/DLA.asp> for EPA's public documents and "Depot-CCC Letter to Depot Concerning Request for Files Relating to Pollution, Hazardous Waste, and Environmental Violations", (EPA Public Documents), August 20, 1996, <http://www.adminrec.com/documents/adminrec/memphis/cd2/DATA/4/18/multi.pdf> (accessed July 8, 2010).

⁵¹ Doris Bradshaw, June 15, 2010.

Bradshaw.⁵² Today, the neighborhood is 97 percent African-American and has an average annual income below the Shelby County average.⁵³ Doris Bradshaw claims that her neighborhood is facing both an environmental injustice and environmental racism. According to her account, the neighborhoods around the Depot were “red-lined” or restricted to only black residents and she blames the Depot for the general poor state of her neighborhood.⁵⁴ Bradshaw also asserts that the Depot is the source of the area’s high rate of cancer; nearly every household, according to Bradshaw, has at least one member with cancer and there is a high instance of reproductive cancers.⁵⁵

Bradshaw is personally connected to this fight and has mobilized her community as if interactions between DDMT, DLA and EPA truly are battles. “The death of a loved one” motivated Bradshaw to confront DDMT according to Andrea Simpson’s article in *The Environmental Justice Reader*.⁵⁶ In 1996 Bradshaw’s grandmother, a woman who reportedly

⁵² Ibid.

⁵³ *The Sourcebook Zip Code Demographics 2000*, 15th Edition, (Omaha, NE: CACI Marketing Systems, 2000), 302-B.

⁵⁴ Doris Bradshaw, June 15, 2010.

No evidence has been found to confirm Bradshaw’s claims of “red-lining.”

⁵⁵ Ibid. and “Meeting Minutes, Public Comment Period, 18 Sep 96” (EPA public documents), <http://www.adminrec.com/documents/adminrec/memphis/cd2/DATA/0/19/multi.pdf> (accessed July 21, 2010).

ATSDR’s *Public Health Assessment (2000)*, states that “two preliminary evaluations of cancer mortality have already been done by the Tennessee Department of Health (TDH) and ATSDR” and did not find significantly higher rates of cancer for the population living around the Depot. According to the reports, cancer incidence was “near or below the rates expected from Shelby County and the State of Tennessee.”

⁵⁶ Bunyan Bryant and Elaine Hockman, “A Brief Comparison of the Civil Rights Movement and the Environmental Justice Movement,” *Power, Justice, and the Environment: A Critical Appraisal of the Environmental Justice Movement*, David Naguib Pellow and Robert J. Brulle, eds., (Cambridge: The MIT Press, 2005), 27, and Andrea Simpson, “Who Hears Their Cry? African American Women and Their Fight for Environmental Justice in Memphis, Tennessee,”

regularly ate freshly, grown healthful foods, died of cancer.⁵⁷ Bradshaw sees a correlation between her grandmother's dietary habits and the cancer; she claims that pollutants from the Depot have contaminated the soil and are affecting her community through the food they grow.⁵⁸ Bradshaw is adamant that her story is heard and has constructed a highly-organized neighborhood activist group, the DDMT-CCC, of which she and her husband, Kenneth, are the leaders. She has organized her neighborhood into blocs, with one member from each block serving as "bloc-leader" or representative for his/her bloc during DDMT-CCC meetings.⁵⁹ The group has attended informational meetings with Depot representatives as well as staged protests.⁶⁰ Such tactics, have become mainstays in the struggle for EJ, and are reminiscent of the Civil Rights Movement (CRM) of the 1960s.⁶¹ CRM is indeed a pivotal influence on today's EJ.⁶² EJ borrows from the activism of the 60s and "is a dynamic social movement" for equal rights, representation, and the right to a safe and healthy living environment.⁶³ While the terms environmental justice and environmental injustice are generally used in connection with minority or low-income neighborhoods, they are not exclusive to these segments of society. The EPA's website defines EJ as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies."⁶⁴ Environmental racism, defined

The Environmental Justice Reader: Politics, Poetics and Pedagogy, Joni Adamson, Mei Mei Evans and Rachel Stein, eds., (Tuscon, AZ: The University of Arizona Press), 85.

⁵⁷ Ibid.

⁵⁸ Doris Bradshaw, June 15, 2010.

⁵⁹ Doris Bradshaw, June 15, 2010.

⁶⁰ Action News 5, 1999, WMC-TV, VHS, (Memphis, TN: Media Source).

⁶¹ Bryant and Hockman, "A Brief Comparison," 31 -32.

⁶² Ibid., 27.

⁶³ Robert D. Bullard, ed., *Confronting Environmental Racism: Voices from the Grassroots*, (Boston: South End Press, 1993), 8, 27.

⁶⁴ U.S. Environmental Protection Agency, "Environmental Justice," EPA, <http://www.epa.gov/environmentaljustice/> (accessed July 18, 2010).

by Robert Bullard as “racial discrimination in environmental policymaking,” is also a component of the EJ movement.⁶⁵ EJ and environmental racism are linked because communities of color are more likely to have hazardous waste sites built in their neighborhoods; however, an environmental injustice can occur without an instance of environmental racism.⁶⁶ These peoples are less able to preemptively fight against hazards or – as is the case with DDMT-CCC – are unable to enter dialogue about remediation. Women are increasingly playing an active role in the EJ movement; as documented in the Sierra Club book, *Unequal Protection: Environmental Justice & Communities of Color*, “spurred by the threat that toxic wastes pose to family health and community survival, female grass-roots activists have assumed the leadership of community environmental struggles.”⁶⁷ Today as with CRM, “women perform the lion’s share of the work” and women, like Bradshaw, are stepping onto the front lines of the struggle for environmental justice.⁶⁸ Doris Bradshaw sees her struggle with DDMT as a fight for EJ and took the initiative to organize and educate her community.⁶⁹ She reported that the first goal of DDMT-CCC was to ensure that even the youngest child knew of the hazards posed by the Depot.⁷⁰ Her mission was later redirected to gaining access to information about the Depot and the materials that were stored and disposed there, and to fighting for a health clinic with doctors who specialize in

⁶⁵ Bullard, *Confronting Environmental Racism*, 3.

⁶⁶ *Ibid.*, 10.

⁶⁷ Celene Kraus, “Women of Color on the Front Line,” *Unequal Protection: Environmental Justice & Communities of Color*, Robert D. Bullard, ed., (San Francisco: Sierra Club Books, 1994), 256.

⁶⁸ Bryant and Hockman, “A Brief Comparison,” 28.

⁶⁹ Doris Bradshaw’s opinion that her neighborhood is facing an environmental injustice and racism are reflected in her tactics. Simply because she sees her neighborhood as fighting for EJ and has adopted EJ tactics, does not necessarily mean that DDMT is an example of environmental injustice or environmental racism.

⁷⁰ Doris Bradshaw, June 15, 2010.

This can alternately be seen as the mis-education of her community as many of Bradshaw’s claims seem to be a product of her interpretation of the situation.

environmentally-induced diseases.⁷¹ Bradshaw's interaction with DDMT has been strained; she has reportedly made little progress with her demands. As Bradshaw sees it, information has intentionally been withheld and the government has abandoned her community.⁷²

Based upon recent studies, the site poses no risk to human health; however, regular site inspections (five-year reviews) will continue as "hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure."⁷³ DDMT is currently in the final stages of remediation and will soon be delisted from the EPA's Superfund website.⁷⁴ When DDMT was slated for closure in 1995, "the City of Memphis and County of Shelby established the Memphis Depot Redevelopment Agency, now the Depot Redevelopment Corporation (DRC)" and in 1997 approved plans for redevelopment under the *Memphis Depot Redevelopment Plan*.⁷⁵ The Depot is currently cited for light industrial usage and after clean-up is complete "all of the DDMT property is to be transferred for re-use."⁷⁶ The DRC has renamed the property the Memphis Depot Business Park and hopes to draw out-of-city and -state businesses to reinvigorate the site and city revenues.⁷⁷ In a 1999 T.V. interview, a member of the DRC expressed the hope to see 5,000 people working at the Depot Park within the next five years.⁷⁸ The dichotomy between EPA claims and those of the community is a true problem. Despite EPA's confidence that the site has been remediated and is

⁷¹ Ibid., and "Depot-CCC Letter to Depot Concerning Request for Files Relating to Pollution, Hazardous Waste, and Environmental Violations," (EPA Public Documents), July 20, 1996, <http://www.adminrec.com/documents/adminrec/memphis/cd2/DATA/0/18/multi.pdf> (accessed July 17, 2010).

⁷² Doris Bradshaw, June 15, 2010.

⁷³ Defense Logistics Agency, *Second Five-Year Review: Defense Depot Memphis*, 2 and Agency for Toxic Substances & Disease Register, *Public Health Assessment* (1999).

⁷⁴ U.S. Environmental Protection Agency, "Superfund Sites," *Region 4: Superfund*, EPA, <http://www.epa.gov/region4/waste/npl/index.htm#TN> (accessed July 17, 2010).

⁷⁵ Defense Logistics Agency, *Second Five-Year Review*, 7.

⁷⁶ Ibid., 7.

⁷⁷ Fox 13, June 21, 1999, WHBQ-TV, VHS, (Memphis, TN: Media Source).

⁷⁸ Ibid.

ready for Delisting, citizens surrounding the Depot remain concerned for their health.

Community's continued concern implies that site remediation is not at an end – sites should not be delisted while the neighboring population still has questions – and highlights communication flaws in the Superfund program.

Reasons for Ineffective Communication About the Superfund Process

The frustration felt by Bradshaw is due in large part to failed communication. Both the DLA and Bradshaw are at a communicative impasse. DLA and EPA Region 4 have failed to gain the trust and support of the community; therefore, DDMT-CCC remains fearful that their health is at risk. On the other hand, DDMT-CCC has been unable to persuade DLA/EPA Region 4 that there are health concerns and the need for restitution. There are several reasons for ineffectual communication, including DDMT-CCC's methods, differing methods of communication/language, and institutional barriers to community involvement: (1) communities do not truly participate in discussions as legal barriers prevent communities from having a voice in the decision-making process; and (2) there only exists a one-way channel of communication

The current communication model is one reason communication is ineffective. Communication is mainly one-way; DDMT to Depot neighborhood in the form of pamphlets and/or newsletters. These types of communication are informative and uphold the EPA standard of “keeping the community well informed...” but do little else.⁷⁹ They do not, and are not, intended to spark interaction. They are only meant to update. However, one-way communication limits the community's participation by reducing its role from an active participating in the decision-making` process to a mere receiver of information. Another issue is that newsletters or pamphlets, generally, provide basic information about clean-up methods and

⁷⁹ U.S. Environmental Protection Agency, “Superfund Community Involvement.”

are not intended to share technical information. An example: in a newsletter distributed to the Depot community on December 28, 1995, the neighborhood was informed that wells were to be placed around the neighborhood in order to test water quality and “determine normal groundwater conditions surrounding the Depot installation.”⁸⁰ The public notice included descriptions of the stages of the installation and testing process accompanied by photographs of the rig which would install the wells and a street-view sketch of how the wells would look once they were installed.⁸¹ This message clearly wished to introduce unfamiliar proceedings to the public to reduce fear and alarm. Other messages are similar and are written to familiarize the public with the technical procedures (i.e. well drilling, soil removal) involved in clean-up. The Public’s knowledge is limited by the fact that most DDMT/community communication is in the form of newsletters. While informative and important, pamphlets and newsletters are not indicative of the discussions going on between politicians and experts. They are watered-down, simplified messages which rarely correlate to official reports and therefore can serve as a barrier between the community and clean-up.

Public information sessions are another forum for communication. DLA held regular public information sessions and monthly RAB meetings at DDMT. The public was invited to ask questions and voice their concerns at these events. These meetings, however, further serve to limit communication. While questions were welcome at these sessions, decisions about remediation were made prior to the community sessions. Information sessions become proclamations of decisions instead of discussions. The community is given a voice but no power as communication after a decision has been made denies local activists and community members

⁸⁰ “Depot Letter to Resident Concerning Groundwater Testing Project,” (EPA Public Documents), December 28, 1995.
<http://www.adminrec.com/documents/adminrec/memphis/cd2/DATA/3/14/multi.pdf> (accessed July 17, 2010).

⁸¹ Ibid.

true say in the remediation process. Another flaw is that public information sessions force the public to communicate through limited channels and at specified times. Information sessions may not be accessible to the community. Efforts are made by EPA (and in this case, DLA) to ensure that the public is aware of meetings and information sessions: dates and times of meetings are broadcast on local T.V. news stations as well as via ads in the local paper; however, According to Doris Bradshaw in a statement at a Public Information session in 1996, announcements giving the date and time of public meetings are not reaching the community.⁸² She states, “the agency has done a very, very poor job of contacting people of color...” and claims that official flyers detailing meetings are confusing to residents.⁸³ She says that the people in her neighborhood do not know what they are and so discard them; additionally she claims that ads in the newspaper are not attention-grabbing enough and “no one ever pays attention to it.”⁸⁴ Bradshaw thinks the DLA has done too little to reach “people of color” but residents’ reaction to public announcements seem to suggest that the community surrounding DDMT is not concerned with Depot-happenings or interested in becoming a part of a dialogue surrounding clean-up. Bradshaw, however, argues that her community is being overlooked; that the agency, should try to contact the neighborhood through its established channels of communication: the PTA and the churches.⁸⁵ This interaction highlights a key issue in communication between the community and DDMT. Superfund follows broad public channels of communication such as newspapers yet it seems many poor communities are not responsive to that type of announcement. This presents a large problem with communication: there cannot be

⁸² Agency for Toxic Substances and Disease Registry, *Public Health Assessment (2000)* and “Meeting Minutes, Public Comment Period, 18 Sep 96” (EPA Public Documents), September 18, 1996, <http://www.adminrec.com/documents/adminrec/memphis/cd2/DATA/0/19/multi.pdf> (accessed 18 July 2010).

⁸³ “Meeting Minutes, Public Comment Period, 18 Sep 96.”

⁸⁴ Ibid.

⁸⁵ Ibid.

dialogue if the community does not come to public sessions. This scenario also presents several questions: is general public communication (T.V. and newspaper) a sufficient means of communication? Should the government be required to follow community-specific channels of communication? And, is Superfund being negligent if it does not?

Another barrier to communication is discursive; this is the most complex issue which possibly makes it the most difficult to overcome. EPA and the DLA are focused on official and scientific documents (i.e. documents detailing measurable amounts of contaminants or statistical analysis of risk /disease). The general public does not communicate in this way nor do they have documented evidence for their claims. This creates a barrier to communication. Community activist groups, such as DDMT-CCC, are unable to present their concerns in language which is acceptable in the legal and political arena. For example, DDMT-CCC states that their neighborhood is suffering from cancer yet only cite personal stories such as, “my daughter and I both had to have a hysterectomy” and Kenneth Bradshaw’s comments at a 1996 public comment session:

Now, our community is really very contaminated. We’ve got dioxins that is above New York State levels – whatever that means – because we don’t have a state level for dioxins in Tennessee.... And we’ve got a lot of complicated poisons that – some of them, I can’t hardly pronounce too good...

as evidence for their claims.⁸⁶ However, EPA Superfund is focused on scientifically documented evidence; personal claims of this nature, while they may be true, do not hold weight in a legal setting. These claims are discredited because they have no official backing. Communities such as DDMT residents need statistics in order to verify and give validity to their health claims. The EPA’s desire for scientifically documented health risks, therefore, frequently places the burden

⁸⁶ “Meeting Minutes, Public Comment Period, 18 Sep 96” (EPA Public Documents), September 18, 1996.

of proof on the Superfund communities; they must first prove that their community is actually suffering from adverse health effects and secondly that the Superfund site is the cause of these illnesses. Another problem, at this site specifically, is that community claims of high cancer rates conflict with official reports. According to two studies cited in ATSDR's 2000 *Public Health Assessment*, the area around the Depot does not have a higher rate of cancer than that of Shelby County or the State of Tennessee.⁸⁷ This fact reduces the credibility of the community and gives them no leg to stand on legally. DDMT-CCC would have to disprove the surveys conducted by Tennessee Department of Health and the ATSDR by conducting (i.e. paying for) for their own study.⁸⁸ The burden of proof truly would fall on the community, which most likely does not collectively have the financial ability to fund a health assessment.⁸⁹ This situation places communities in a disadvantaged situation; they have no choice but to accept Superfund funded studies as accurate. Additionally, because community concerns are not backed by scientific or professional evidence, complaints are not viewed as legitimate and are generally glossed over leaving the community feeling betrayed and neglected.⁹⁰ Focus on scientific and technical documentation extends further than simply EPA/community interactions. The very nature and language of documents surrounding Superfund sites can be a barrier to a community's understanding and participation in discussion.

The method of government communication also blocks communities from being engaged in discussions with EPA officials. Most of the documents surrounding Superfund sites are exchanges between experts and officials or are inter- and intra- governmental; these documents

⁸⁷ Agency for Toxic Substances and Disease Registry, *Public Health Assessment (2000)*.

⁸⁸ Their study would have to be official and come from a credible source or it would be no better than their own personal claims.

⁸⁹ *The Sourcebook Zip Code Demographics 2000*, 302-B.

⁹⁰ This is not to say that community concerns are always dismissed. In response to DDMT-CCC concerns, the ATSDR re-reported on the DDMT in 1998, published 1999. Their original Public Health Assessment was conducted in 1995.

use technical and legal jargon which can prevent communities from understanding the discourse surrounding the site. Documents include site evaluations, remediation plans and intergovernmental letters, which make up a majority the documents concerning Superfund sites, are not meant for public consumption. While these documents are available to the public via the EPA website, they are not truly accessible in any other regard. For one, technical documents need interpretation from hydrologists and epidemiologists, to give a few examples.⁹¹ The general public is unable to interpret the technical jargon and the scientific (data) information. Therefore, technical language is an added barrier to members of communities facing environmental injustice. This issue is further compounded by the fact that waste sites are generally located in low-income, minority neighborhoods; and for many, English is not their first language.⁹² The technical nature of documents can serve as a literal means of keeping information from the public. This barrier has been recognized by the EPA and it has established a fund through which communities can apply for financial aid to hire document interpreters. This option was presented to the Depot community in 1993; Colonial Michael Rust writes to a concerned community member there is a “Technical Assistance Grant (TAG) program. Neighborhood groups may obtain these grants to hire assistance in deciphering the analytical reports from which clean-up designs are made.”⁹³ The very language of this letter admits that reports need deciphering and are not accessible to the general public. The TAG program, which allows for allotments of up to \$50,000 per Superfund site, is seemingly responsive to the indecipherable nature of government paperwork. In many cases, however, aid through this program may not be obtainable for a community. The main reason for this is that: “the group is

⁹¹ “Superfund Technical Assistance Grants.”

⁹² Robert D. Bullard, ed., *Confronting Environmental Racism*, 18-19.

⁹³ “EPA Superfund Technical Assistance Grants,” September 1993, <http://www.adminrec.com/documents/adminrec/memphis/cd2/DATA/9/03/multi.pdf> (accessed 18 July 2010), 4.

required to contribute matching funds, whether in cash or donated services or supplies, equal to 20 percent of the total project costs.”⁹⁴ This is simply not an option for many communities as Robert Bullard states in *Confronting Environmentally Racism: Voices from the Grassroots*, most Superfund sites are located in the poorest, least enfranchised communities.⁹⁵ Other hindrances toward receiving a TAG grant is that: “any group applying for a TAG must be non-profit and incorporated (formed a legal corporation) or working toward incorporation under applicable state laws”. Each group must “establish an accounting system and keep appropriate records... prepare and submit quarterly progress reports to the EPA”⁹⁶ Such requirements could have the potential to slow if not completely impede application and receipt of TAG funds. This fund is supposed to be a means of incorporating the public – and specifically low-income, minority peoples – and allowing communities to have a voice in decision-making discussions. However, application and approval could be a lengthy process and it is unlikely that decisions regarding Superfund sites will wait for communities to organize a legal corporation and apply for TAG funding. Most likely, decisions will be made or will be well underway by the time a community is able to comply with application demands. While this program may assist some communities, it seems that TAG could be a means of disenfranchisement.

Yet another reason for ineffective communication is the general differences in communication style. EPA adheres to a formal and rigid form of communication while DDMT-CCC’s voice is colloquial and emotional. They are fighting for their health and the health of their community. This communication difference may be yet another reason for ineffective communication and why DDMT-CCC’s concerns have not been given the consideration Doris Bradshaw desired. First, the manner in which DDMT-CCC has communicated may have been a

⁹⁴ “Superfund Technical Assistance Grants,” September 1993, 2.

⁹⁵ Bullard, *Confronting Environmental Racism: Voices from the Grassroots*, 18.

⁹⁶ “Superfund Technical Assistance Grants,” September 1993, 2 & 4.

detriment to its cause. DDMT-CCC have been abrasive in communications. According to EPA's public documents the first communication made by DDMT-CCC was to Representative Lois DeBerry. In this letter the Bradshaw's refers to Chris Cartman, Jeff Kellam, and Jordan English as the "incompetent trio" and accuses them of telling lies.⁹⁷ The foundation for communication was not well set; the Bradshaws were clearly angry and were already convinced that the government/agency officials were deceiving them and allowing them to be harmed by Depot contaminants.⁹⁸ This is obvious from another letter sent in July of 1996 in which the Bradshaws state:

Defense Depot Memphis Tennessee-Concerned Citizens Committee is a non-profit grassroots organization devoted to fighting against environmental injustice wreaked upon black communities by white corporations and military facilities and to protecting the environment and public health from toxic hazards.⁹⁹

This comment makes it clear that Doris and Kenneth Bradshaw did not initiate communication with DDMT with the hope of open communication. This letter suggests that they expected resistance from officials and also that they were already set in their opinion of DDMT and those in charge of remediation. The Bradshaws intended from the beginning to prove that their neighborhood was suffering from an environmental injustice. Communication could not be effective as DDMT-CCC was not interested in discussion but bent on convincing DDMT and EPA officials that DDMT was a hazardous polluter which had destroyed the health of the community and that the surrounding community was being treated unfairly.

⁹⁷ "Depot-CCC Letter to Representative Concerning Environmental Injustices at Depot," (EPA Public Documents), July 18, 1996, <http://www.adminrec.com/documents/adminrec/memphis/cd2/DATA/7/17/multi.pdf> (accessed July 18, 2010).

⁹⁸ Ibid.

⁹⁹ "Depot-CCC Letter to Depot Concerning Request for Poison Signs," (EPA Public Documents), July 18, 1996, <http://www.adminrec.com/documents/adminrec/memphis/cd2/DATA/8/17/multi.pdf> (accessed 16 July 2010).

Differing perceptions of risk also cause a disconnect when communication takes place between members of the EPA or the scientific community and the DDMT-CCC. According to John Hird, author of *Superfund: The Political Economy of Environmental Risk*, the Superfund program's fundamental controversy is: "the difference between the public's view of hazardous waste site risks and the perception of experts."¹⁰⁰ Briefly, scientists and experts look at risk from a contaminant in terms of margins. There is a threshold-level beneath which a contaminant is not viewed as a health threat. For example, the ATSDR measures a contaminant, lead for example, against a comparison values (CV), or the determined safe limits for a contaminant.¹⁰¹ If the lead measurement at a site is below CV standards, then it is considered to pose a negligible health risk.¹⁰² The process behind determining if a contaminant is harmful or not is understood by experts and politicians who interpret these studies; they know what the CV limits are and how they were determined. Therefore, they feel confident that no health threat is posed by a contaminant if it is below the CV standard. The process of determining risk, however, is foreign and confusing to the general public.¹⁰³ They are unsure how safe levels were determined and how data from testing are analyzed. Additionally, to the general public, any amount of a contaminant is too high for safety as according to Hird, "Americans have come to fear hazardous wastes like no other environmental problem..."¹⁰⁴ For the general public there is no level at which a hazardous substance is considered a negligible health risk. Therefore, even when communication takes place between communities and members of the EPA, it is disjointed because of the radically differing standpoints from which each party is viewing the issue(s). This miscommunication, coupled with public fear over hazardous wastes have yielded public outcry

¹⁰⁰ John A. Hird, *Superfund*, preface X.

¹⁰¹ Agency for Toxic Substances and Disease Registry, *Public Health Assessment (2000)*.

¹⁰² *Ibid.*

¹⁰³ Hird, *Superfund*, 33.

¹⁰⁴ *Ibid.*, 5.

against hazardous waste sites. This cry has most commonly rung: NIMBY, or Not In My Backyard! No community wants a hazardous waste site in or near their neighborhood. For the community surrounding the Defense Depot, however, the perceived hazard is literally in their backyard. Many can see the Depot's fences from their yards. The constant visual reminder does little to dispel fears and could actually be used as a rallying point. The fact that members of the DDMT-CCC constantly see what they perceive as blight on their community only serves to reaffirm their anger and distrust.

Another important reason for dissonance is the economic impetus for revitalizing DDMT and other Superfund sites. As it currently stands, DDMT is making a negative contribution to the economy. It does not generate revenue for the City of Memphis and is in fact costing the Federal Government money for rehabilitation. Therefore, EPA and state and local government all are focused on making the site suitable for reuse. State and local government, who has been acquiring Depot property, want to use it for revenue. Memphis has already established and enacted plans to reuse the site for light industry. The main facility, excluding the area with warehouses, has been renamed Memphis Depot Business Park.¹⁰⁵ The renaming severs ties with past uses of the land and makes it clear that local government is focused on the future uses of this site. This future-focus is further indicated by a T.V. news report on June 21, 1999 which claimed that \$4 million in improvements to the lot will be spent by city leaders to attract new businesses.¹⁰⁶ The report also contained an interview with Jim Covington, Depot Redevelopment Director who stressed the positives of the site, such as sturdy buildings and good security, as well as detailed plans to beautify and redevelop the area. Local government, at least, is determined to redevelop the Depot site and generate economic revenue. The EPA is even to some extent

¹⁰⁵ Depot Redevelopment pamphlet.

¹⁰⁶ June 21, 1999, WMC-TV, VHS, (Memphis, Tennessee: Media Source).

requested “all materials” surrounding the Depot and its contaminants.¹¹¹ In response, Dorian P Amido, Freedom of Information Act Officer, stated that all documents pertaining to DDMT are in the public domain and may be accessed; the letter additionally lists names and addresses of the libraries at which DDMT-related documents could be found. Based upon this response, the EPA has a find-it-yourself attitude about information. The information, as required by law, is open to the public and anyone can see it so long as they go to the libraries and manually gather documents. This seems reasonable however Doris Bradshaw saw this response as deliberately withholding information. Additionally, the health threat posed by the Depot has been a contended issue. As noted, Bradshaw says past Depot activities have contaminated her neighborhood’s water and soil. ATSDR health assessments address these concerns but also qualify and dismiss them. The ATSDR 1995 and 1999 reports claim, that the DDMT “...site is no apparent public health hazard from 1989 to the present for persons living around DDMT and that exposure pathways since 1989 have been insufficient to cause risk to humans because the facility is and reportedly always has been fenced “and because all residents around the site were connected to the Memphis public water supply by 1953.”¹¹² This response answers the question of health concerns, but not fully and may be a main reason DDMT-CCC feels that their concerns are being dismissed or not taken seriously. Possibly the main reason that DDMT-CCC feels they are being neglected is that EPA and ATSDR do not have the ability to give direct responses as information is missing or inconclusive prior to 1989.¹¹³ ATSDR states multiple times in its 1999 and 2000 reports that “the public health hazard of DDMT was indeterminate before 1989

¹¹¹ “Depot Letter to Depot-CCC Concerning Request for Files Relating to Pollution, Hazardous Waste, and Environmental Violations,” (EPA Public Documents), August 20,, 1996, <http://www.adminrec.com/documents/adminrec/memphis/cd2/DATA/4/18/multi.pdf> (accessed July 15, 2010).

¹¹² Agency for Toxic Substances & Disease Registry, *Public Health Assessment (1999)*.

¹¹³ *Ibid.*

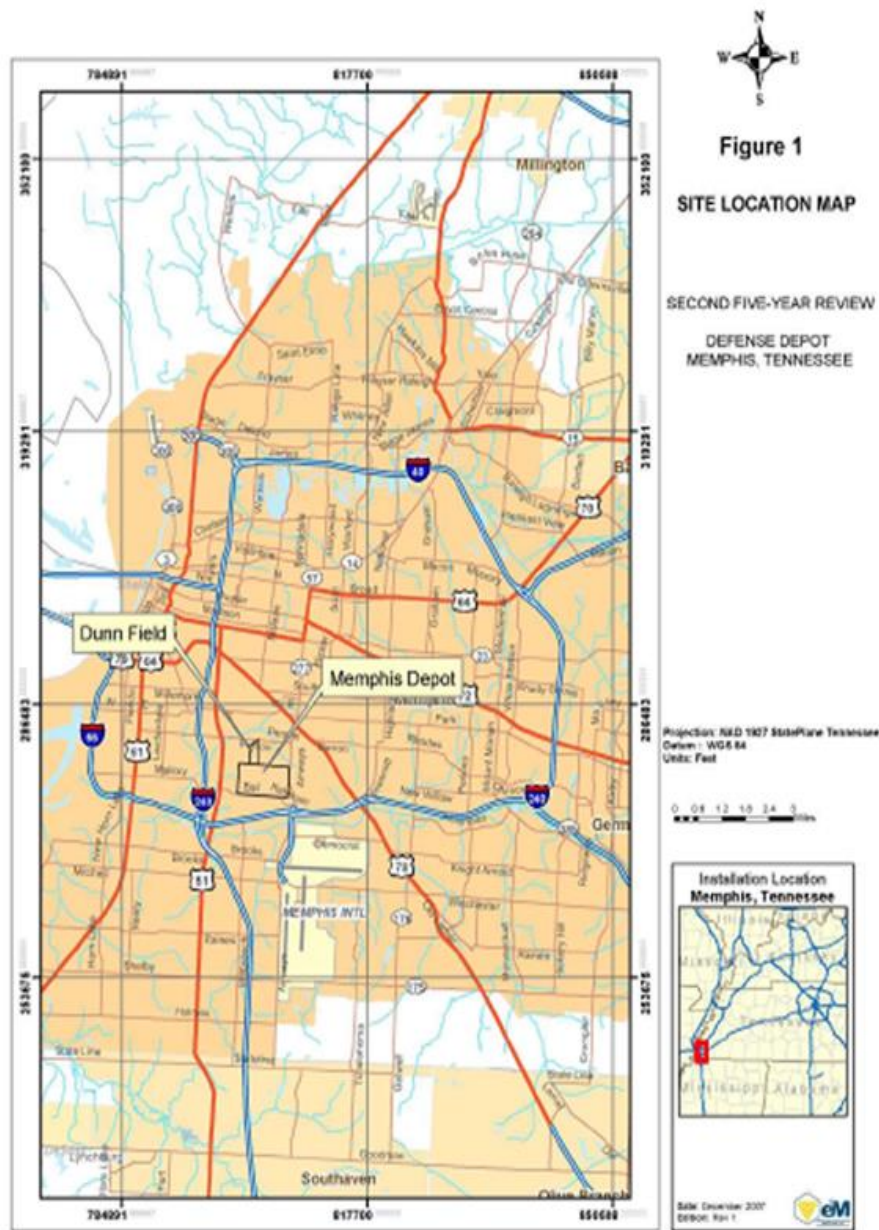
because contamination data for this time period is lacking” and that “determining whether site-related health effects could have occurred from exposure since the opening of DDMT in 1942 until 1989 is not possible.”¹¹⁴

Lack of effective communication is one of the key problems surrounding this and other Superfund sites. Local communities and government officials are unable to discuss issues on the same playing field; institutional and linguistic barriers cause them to talk past each other or to be unable to communicate about the same issues at all. Any communication on the part of one side seems dissonant or irrelevant to the other party. While this is a multifaceted problem, it should not be ignored simply because of its complexity. Communication is essential to resolving conflict and Superfund cannot be truly effective and remedial without the participation of surrounding communities. Those living near Superfund sites are the ones who are directly impacted by the site and any hazardous on the property. Their voice and concerns have to be considered during the remediation process – and not just superficially. Superfund remediation is not complete until both EPA and the community are comfortable with the site’s clean-up. Barriers of communication need to be mended so that true and open dialogue can occur between the political/scientific sphere of the EPA and the public realm of the community.

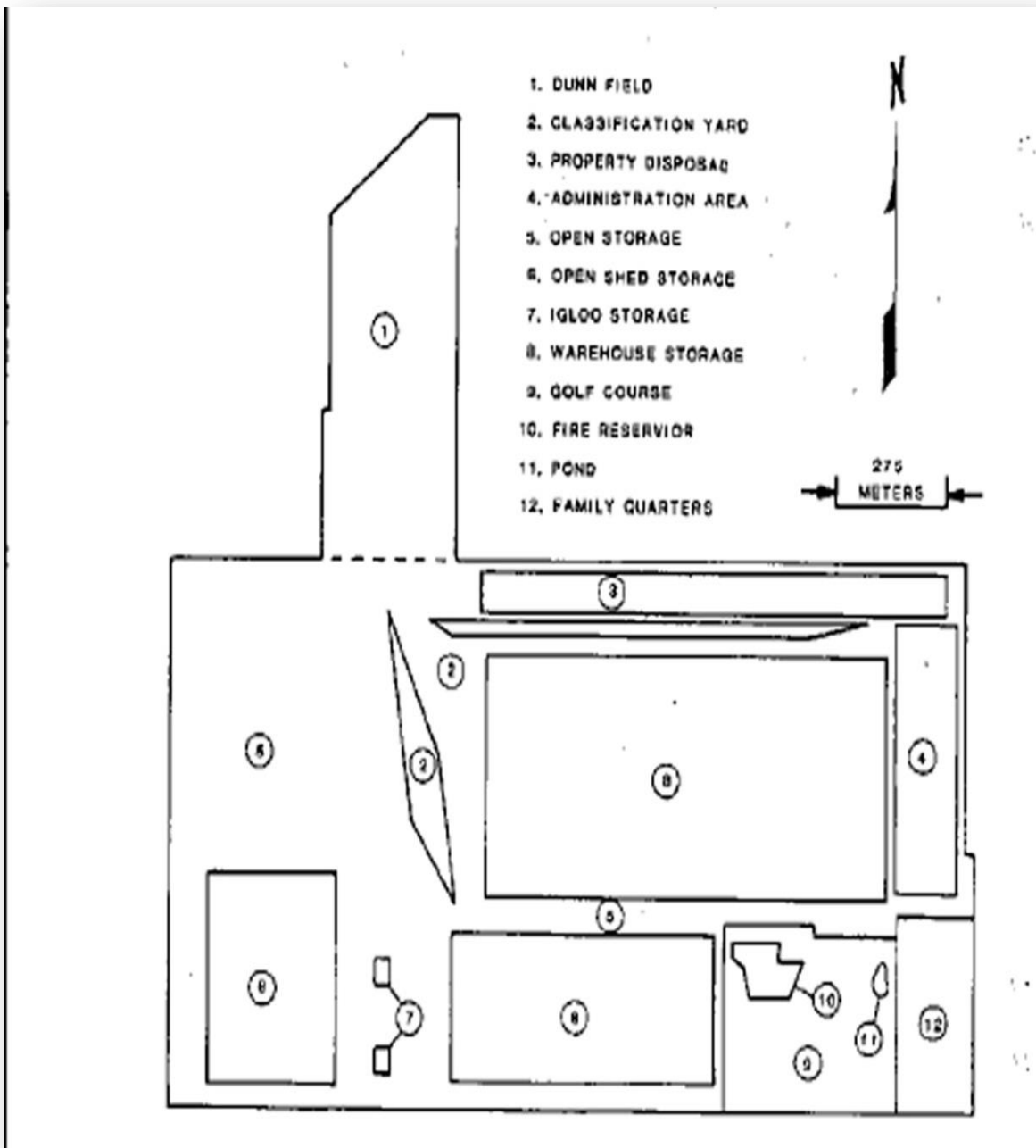
¹¹⁴ Agency for Toxic Substances & Disease Registry, *Public Health Assessment* (1999).

Appendix

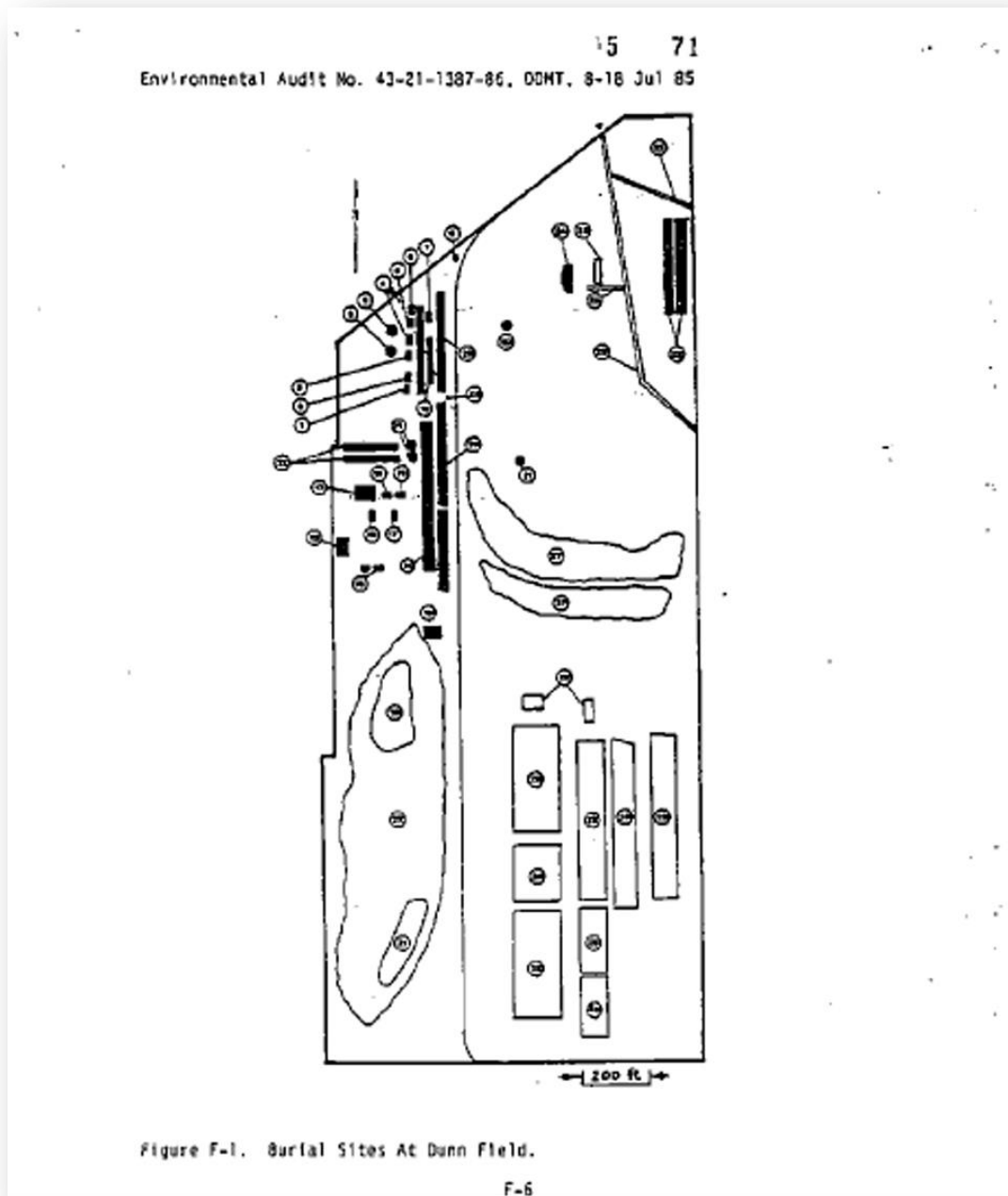
Figure 1: mapped location of the Defense Depot Memphis, TN¹¹⁵



¹¹⁵ Defense Logistics Agency, *Second Five-Year Review*.

Figure 2: Site Map of DDMT¹¹⁶

¹¹⁶ United States Army Environmental Hygiene Agency, *Water Quality Biological Study No. 32-24-0733-85: Investigation of Fire Reservoir Defense Depot Memphis, Memphis, Tennessee*, Department of Defense, March 10-14, 1986, <http://www.adminrec.com/documents/adminrec/memphis/cd2/DATA/2/01/multi.pdf> (accessed July 20, 2010).

Figure 2.1: Dunn Field including known disposal and storage sites¹¹⁷

¹¹⁷ United States Army Environmental Hygiene Agency, *Environmental Audit No. 42-21-1387-86: Defense Depot Memphis, Memphis, Tennessee*, Department of Defense, July 8-18 1985, <http://www.adminrec.com/documents/adminrec/memphis/cd2/DATA/0/01/multi.pdf> (accessed July 20, 2010).

Figure 3: Storage and Disposal map¹¹⁸

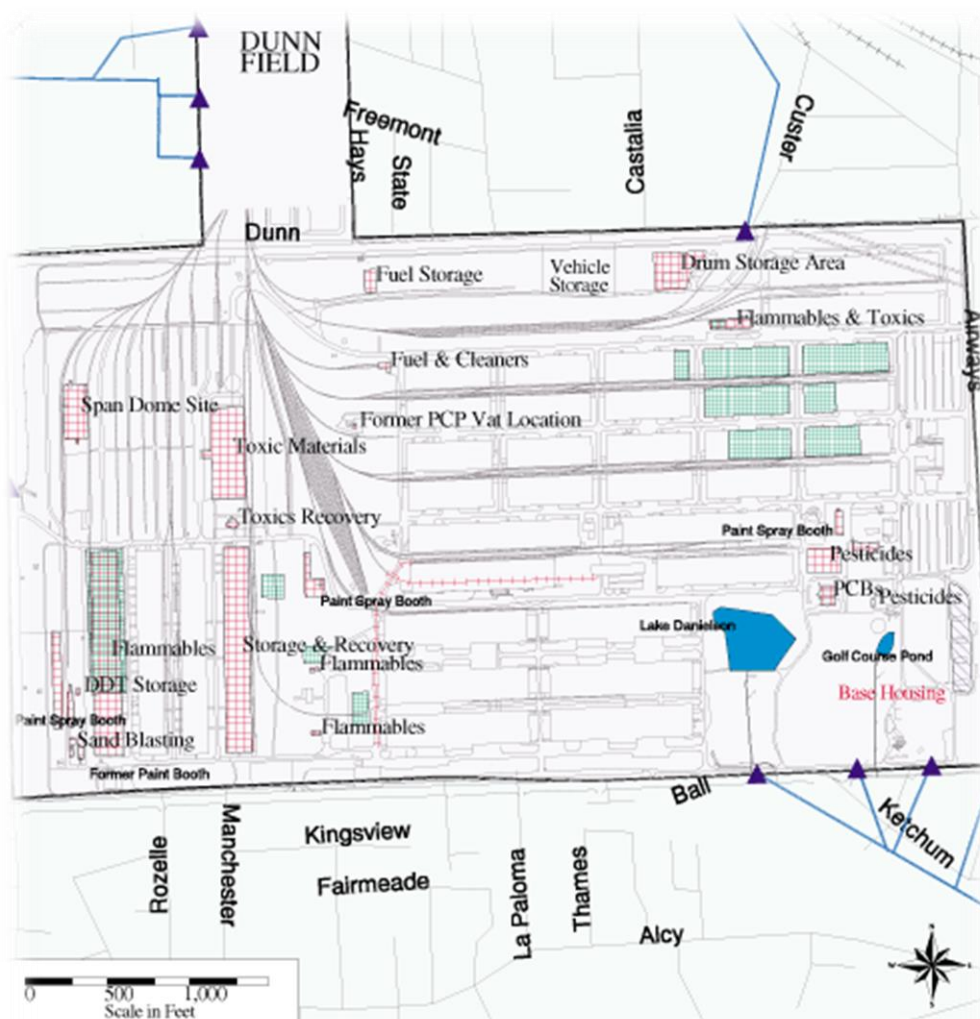


FIGURE 2
Contaminant Source Areas on the DDMT Main Facility*

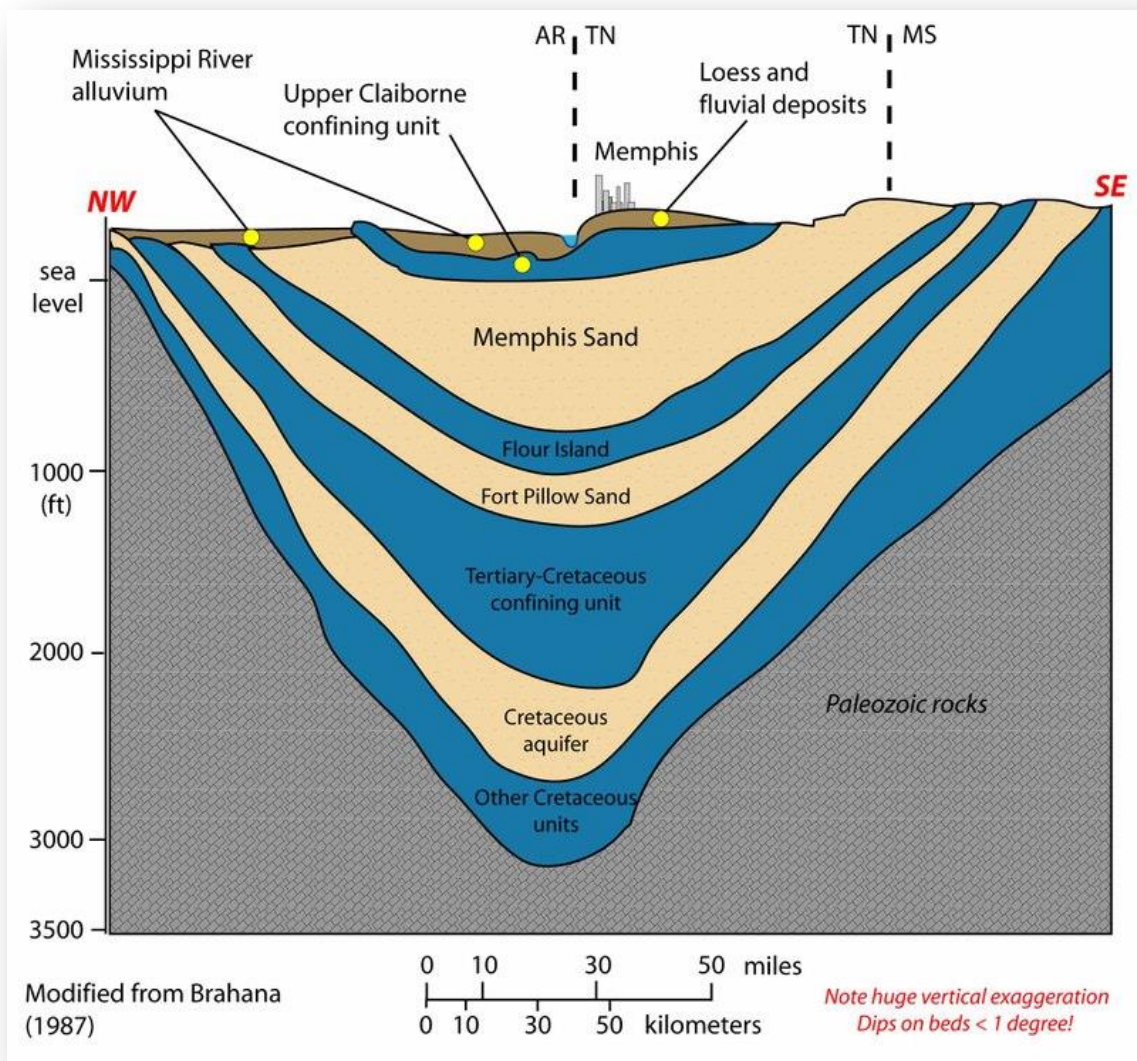
- | | |
|--|---|
| Places used by Chemical Warfare Units | Roads and Streets |
| Places where Hazardous Materials were stored or used | Open Drainage Ditches |
| Lake or Pond | Railroads |
| Existing Open Drainage Points | Tracks where 1946 Mustard Bomb Train was parked |

** Adapted from Drawing 2 in 1995 Generic RI/FS Workplan, Map M-2 from Archives Search Report, and Storage Location Map in Restoration Advisory Board Manual*

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¹¹⁸ Agency for Toxic Substances & Disease Registry, "Figure 2: Contaminant Source Areas on the DDMT Main Facility," *Public Health Assessment* (1999).

Figure 4: Memphis Aquifer Systems¹¹⁹

¹¹⁹ http://aquadoc.typepad.com/photos/uncategorized/2008/02/01/crosssection1memphis_sand.jpg (accessed July 20, 2010).

Figure 4.1: Water Drainage at DDMT¹²⁰

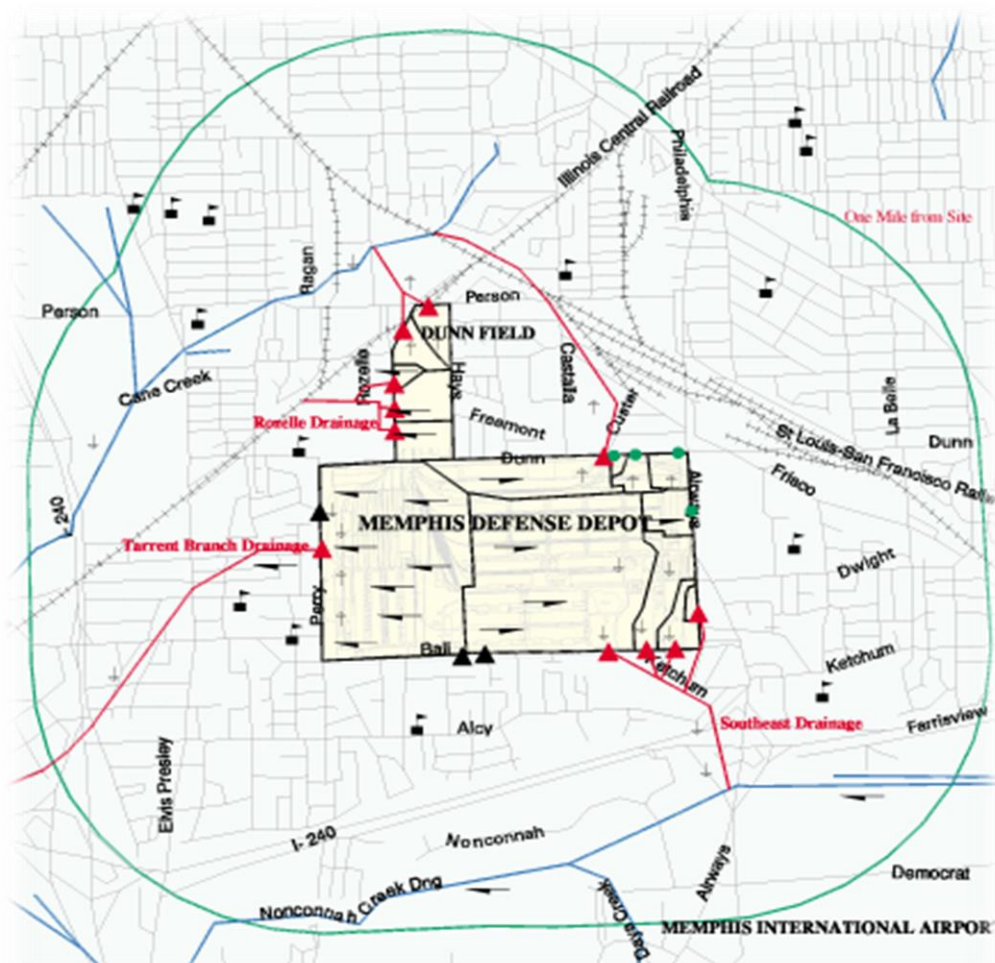
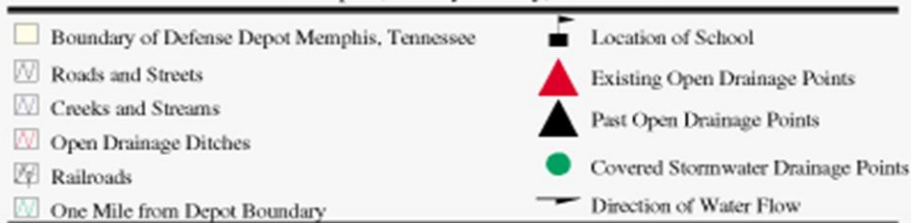
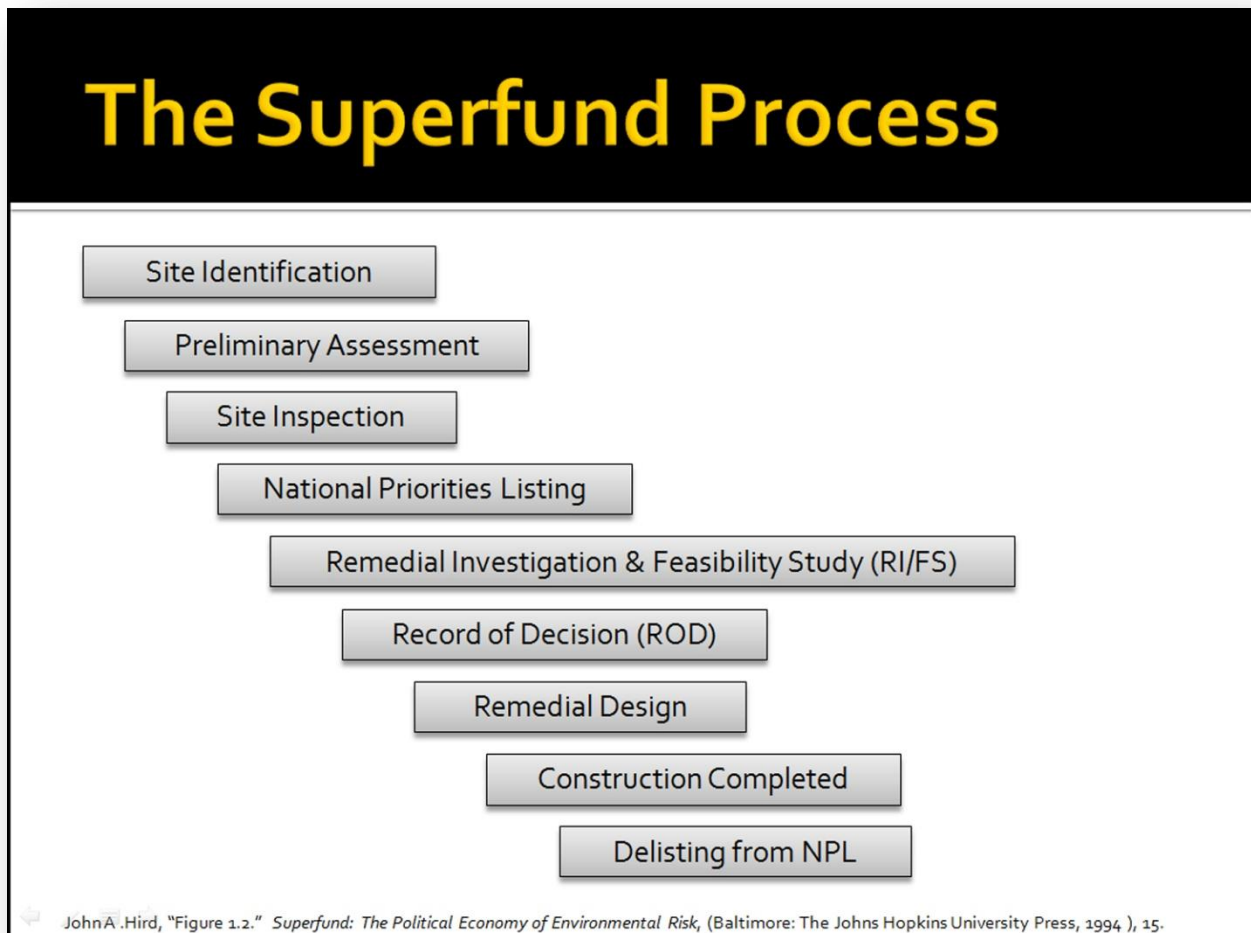


Figure 5 –Open Drainage from Memphis Defense Depot
Memphis, Shelby County, Tennessee



¹²⁰ Agency for Toxic Substances & Disease Registry, *Public Health Assessment (1999)*.

Figure 5: Steps in Site Remediation¹²¹

¹²¹ John A. Hird, "Figure 1.2." *Superfund: The Political Economy of Environmental Risk*, (Baltimore: The Johns Hopkins University Press, 1994), 15.

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