A
PRELIMINARY ASSESSMENT REASSESSMENT (PAR)
REPORT FOR
HERCULES, INCORPORATED
HATTIESBURG, MISSISSIPPI
MSD008182081

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December 15, 1989

This Preliminary Assessment Reassessment (PAR) Report Includes:

1. Introduction
2. Background
3. Station Description
4. Sampling History
5. Waste Sources/Quantity/Hazardous Substances
6. Geology/Hydrology
7. The Aquifer of Concern
8. Precipitation
9. Surface Water
10. Environmental Concern
11. Conclusions and Recommendations
12. Appendix
    (a) HRS II Checklist
    (b) References

Introduction

The following report is a preliminary assessment reassessment (PAR) of Hercules, Incorporated in Hattiesburg, Forrest County, Mississippi. The original preliminary assessment was performed by the State in November, 1979.

County Code:	035
Congressional District:	05
Coordinates:	Latitude 31° 20' 20"
	Longitude 89° 18' 25"
Location:	NE1/4 SW1/4 S04 T4N R13W
Directions to Site:	Hercules, Incorporated may be reached by traveling north on Main Street through the City of Hattiesburg. Turn left at the intersection of Main Street and Seventh Street. Travel approximately one-half (0.5) of a mile on Seventh Street. Hercules, Incorporated is adjacent to Seventh Street on the right side.
Contact Official:	Preston W. Kirkendall Plant Manager Hercules, Incorporated P. O. Box 1937 W. Seventh Street Hattiesburg, MS 39401 Telephone: 601/545-3450
Cooperate Headquarters:	Hercules, Incorporated Hercules Plaza 1313 N. Market Street Wilmington, DE 19894

Background

The Hercules facility produces a diverse line of industrial chemicals using rosins from pine tree stumps and paper mill by-products (tall oil). Some of the products manufactured at the facility are modified resins, polyamides, ketene dimer, crude tall oil wax emulsions, synthetic rubber, and Delnav, an agricultural pesticide. Over 250 products are produced at the facility. The facility began operation in 1923 and is presently an active facility (Reference 11 and 13).

In 1980, pursuant to RCRA, Hercules filed notification for on-site generation, treatment, and storage of spent sulfuric acid from a rosin polymerization operation. In 1983, the Mississippi Bureau of Pollution Control (BPC) determined that the spent sulfuric acid was exempt from

the RCRA hazardous waste regulations because it was being reused in the wastewater treatment system for elementary neutralization. As a result of this determination, interim status for storage and treatment of spent sulfuric acid in tanks and in a surface impoundment was withdrawn and Hercules reverted to the status of an occasional generator. In 1986, Hercules submitted a subsequent RCRA notification as a marketer and burner of hazardous waste boiler fuel (References 13 and 18).

The above mentioned wastewater treatment system treats contaminated water from all sources throughout the plant. Hercules currently has an NPDES permit for discharge of the treated wastewater into the Bowie River. Hercules also has an Air Pollution Control Permit for the operation of air emissions equipment at the facility (Reference 20).

Prior to 1980, in response to a Congressional subcommittee request for information from major chemical companies concerning waste disposal, Hercules voluntarily completed a survey form in which they identified disposal of various wastes from their process operations in a landfill on site. The landfill was referred to as the "Back Forty" landfill. This voluntary survey form later served as notification under the CERCLA program for on-site disposal of potentially hazardous substances. This landfill is not regulated under the RCRA program (Reference 17).

Station Description

The Hercules facility is approximately 200 acres in size. The facility consists of a complex chemical operation that involves wood grinding, shredding, extraction, fractionation, refining, distillation and processing of rosins from pine tree stumps. Common facilities at the site include the office, laboratory, shops, powerhouse, central loading and packaging facilities, and the railroad (Reference 11).

The facility is located on the north side of the City of Hattiesburg. The entire facility is fenced in and is not accessible to non-employees. This facility is surrounded by residential areas (References 8 and 11).

An area approximately forty acres in size on the north side of the facility, referred to as the Back Forty, has been used in the past for disposal of various wastes, including process wastes, boiler ash, and wastewater treatment sludge from the previously mentioned surface impoundment. The type of disposal of the process wastes has been primarily by landfill. The sludge has been disposed of in open shallow pits. The boiler ash has been disposed of by landfill and waste piles.

Based on site visits in 1979 and 1981 by the BPC, containment of the waste is thought to be unsound. Specifically, the landfill was not adequately covered in 1979, and ponding and unsound diking was observed at a sludge disposal pit in 1981. Further, it is unlikely that either the landfill or the sludge pits have a liner or a leachate collection system.

Sampling History

In July, 1981, samples were collected at Hercules by EPA Region IV and the BPC. Specifically, a sample of the influent to the wastewater surface impoundment and a sample of wastewater treatment sludge from the Back Forty sludge disposal pit were collected and analyzed for oil and grease, total metals, and Delnav, a pesticide.

Barium, cadmium, and silver were detected in the influent sample at low (below one ppm) levels. Arsenic, barium, and lead were detected in the sludge sample at low (below one ppm) levels. Delnav was not detected in either sample at a detection level of 0.1 ppm (Reference 23).

In March of 1983, samples from groundwater monitoring wells at the Hercules site were collected by the BPC. Groundwater samples were collected from the South well near the surface impoundment and the North well near the Back Forty sludge pits. Waste samples were collected from a sludge pit and a boiler ash pile. The groundwater samples were analyzed for phenol and total metals. The test results indicated that the shallow groundwater quality was acceptable. The waste samples were analyzed for the EP Toxicity (metals) characteristic. The test results indicated that the sludge and ash were not classified as hazardous under the Mississippi RCRA regulations. However, the groundwater and waste analyses were very limited in scope and did not include a full scan of priority pollutants (See References 21 and 22).

Waste Sources/Quantity/Hazardous Substances

According to the previously mentioned survey forms that Hercules submitted to a Congressional subcommittee, 347,100 tons of process wastes have been disposed of at the site. The process wastes consists of heavy metals (iron, manganese, magnesium, zinc, cadmium, copper, chromium (trivalent)), pesticides, halogenated aliphatics, resins, elastomers, solvents, oil sludges, esters and ethers, alcohols, ketones and aldehydes, salts, and mercaptans (Reference 17).

The hazardous substances of concern are manganese, cadmium, and chromium. These substances have a severe toxicity and are highly persistent. The physical states of the hazardous substances at the time of disposal were solids, liquids, and sludges (Reference 14).

Geology/Hydrology

The geological formations below the site area in descending order are as follows: Hattiesburg Formation, Catahoula Sandstone, Vicksburg Group (Undifferentiated) and Yazoo Clay.

Fresh-water aquifers in the study area are mostly beds of sand or zones of sandy beds. The beds dip gently to the southwest and contain fresh water as much as 40 miles from the outcrops and as much as 3,000 feet below land surface (Reference 2).

Prediction of aquifer thickness and lithology is difficult because of the lenticular bedding of most units. Lithologic changes occur in short distances and individual sands, which are irregular and thicken or thin in short distances, are difficult to trace, especially along the dip of the beds (Study area - Reference 2).

At Hattiesburg, the Hattiesburg Formation consists of thick beds of massive clays - 150 or 200 feet thick - which contain some lime but very little sand. Geophysical logs from area water wells indicate that the clay layer extends to a depth of approximately 215 feet below the land surface. A sand layer approximately 30 feet in thickness, however, occurs in the clay layer at a depth of approximately 65 feet below the land surface. Wells in the vicinity of Hattiesburg show that the clay bed is underlain by interbedded sands and clays with the sands increasing in prominence and becoming gravelly toward the base (Reference 1 and 4). Four Forrest County aquifer tests of the Hattiesburg Formation show hydraulic conductivities ranging from 96 to 180 ft/d (Reference 6).

Separating the Hattiesburg from the underlying Catahoula is extremely difficult. To avoid confusion both of these units are referred as the Miocene Aquifer System. The aquifer system is composed of numerous interbedded layers of sand and clay (sand beds in the miocene are characteristically lens-shaped or wedge-shaped). Because of the interbedded nature, the formations cannot be reliably separated and correlated either on the surface or in the subsurface (References 2, 5, and 7).

Recharge to the Miocene Aquifer is from rainfall directly on the outcrop and leakage between aquifer units of the Miocene Aquifer System. Ten Forrest County aquifer tests of the Catahoula Sandstone, which is the lower unit the of Miocene Aquifer System, show hydraulic conductivities ranging from 18 to 170 ft/d. Hydraulic conductivities average 95 ft/d for the Miocene Aquifer System. Lithologic data and other published information indicates that the Miocene Aquifer System extends to a depth of approximately 1150 feet below the land surface (Reference 6 and 7).

Underlying the Miocene Aquifer is the Vicksburg Group (Undifferentiated) which is generally composed of limestone beds alternating with thin beds of limy sand and clay. Lithologic data indicates that the Vicksburg Group (Undifferentiated) extends to a depth of approximately 1300 feet below the land surface (Reference 2).

The Aquifer of Concern

The Hattiesburg Formation and the Catahoula Sandstone are considered as a single hydraulic unit, referred to as the Miocene Aquifer System. These aquifers constitute the aquifer of concern (AOC).

The first water bearing unit of the AOC occurs in the surficial aquifer (Hattiesburg Formation) at a depth of approximately 65 feet below the land surface. The unsaturated zone consists primarily of clay and has an average hydraulic conductivity of approximately 1×10^{-6} cm/s (Reference 1 and 4).

U.S.G.S. identifies ten (10) public water supply wells for the City of Hattiesburg in the AOC within the three-mile radius of the site. All of these wells occur in the lower unit (Catahoula Sandstone) of the AOC. These wells are located and identified as #D004, #D005, #D006, #B002, #B003, #B023, #B017, #B001, #B005, #B007 on the U.S.G.S. water wells printout. There is no indication of the depth at which these wells are screened; however, the depth of these wells range approximately 419 feet below the land surface (#B001) to approximately 678 feet below the land surface (#D005) (Reference 3).

The Mississippi State Department of Health, Division of Water Supply, identified two additional public water supply wells for the City of Hattiesburg in the AOC. One of these wells (not identified on the U.S.G.S. printout) is located within the three-mile radius of the site.

The other well is located and identified as U.S.G.S. #D007 (City of Hattiesburg). This well is located between the three- and four-mile radius of the site. The City of Hattiesburg wells (12) supply an estimated population of 55,100 (Reference 3 and 12).

There are also numerous private wells occurring in both units of the AOC within the three-mile radius. No other drinking water source is presently available (Reference 3 and 12).

The nearest well in the AOC is a private well located approximately 3400 feet south of the site. This well is located and identified as U.S.G.S. #D049 on the topographic map (Reference 8) and the water well printout (Reference 3). There is no indication of the depth at which this well is screened; however, the well extends to a depth of approximately 576 feet below the land surface (Reference 3).

Precipitation

The climate of southeastern Mississippi is humid and semitropical. Average annual rainfall is approximately 60 inches. Average annual runoff from the numerous streams in the area is approximately 20 inches. The remainder of the precipitation seeps into the ground or is dissipated by evapotransporation.

The mean annual lake evaporation for the area is approximately 46 inches. The net annual precipitation of the area is about 14 inches. The one-year, twenty-four-hour rainfall is approximately 4 inches (References 2 and 14).

Surface Water

The site and surrounding area is flat with a slight gradient to the east northeast. The facility slope and intervening terrain is less than 1% (Reference 8).

The nearest perennial surface water is identified on the topographic map as Greens Creek. Greens Creek runs adjacent to the "Back Forty" and flows in an easterly northeasterly direction before its entrance into the Bowie River. Greens Creek intersects the Bowie River approximately 2800 stream feet from the site. From this intersection the Bowie River flows in a southeasterly direction for approximately 9,600 stream feet before its entrance into the Leaf River (Reference 8).

The three-mile migration pathway ends in the Leaf River approximately 3,450 stream feet south of the intersection of the Bowie River with the Leaf River (Reference 8).

The Mississippi Bureau of Land and Water Resources indicates one surface water intake along the three-mile migration pathway at the intersection of Greens Creek with the Bowie River. The water is used by Hercules, Incorporated for industrial purposes (References 8 and 9).

Environmental Concerns

There are no critical habitats of federal endangered species or national wildlife refuges within one mile of the site along the surface water migration pathway (Reference 15).

Topographic maps of the Hercules, Incorporated site and the surrounding area indicate no wetlands along the migration pathway (Reference 8).

Conclusions and Recommendations

A site screening investigation is recommended on a high priority basis.

REFERENCES

1. Mississippi State Geological Survey, Bulletin 44, Forrest County Mineral Resources, Mississippi University, 1941, pp. 24, 35-58.

2. Water for Industrial Development in Forrest, Greene, Jones, Perry, and Wayne Counties, Mississippi, Water Resources Division, U.S. Geological Survey, 1966, pp. 2, 3, 6, 38, 40, 41, 42, 43, 4, 5, 7, 9, 39, 44, 45, 54, 55, 58, 59, 62, 63.

3. Printout from U.S. Geological Survey Data Base of all Wells within a Three-mile Radius and Four-mile Radius of Hercules, Incorporated.

4. Geophysical Logs of Water Wells Near Hercules, Incorporated, Hattiesburg, Mississippi from the Mississippi Bureau of Geology.

5. Shows, Thad N., Water Resources of Mississippi, Bulletin 113, Mississippi Geological, Economic, and Topographic Survey, Jackson, Mississippi, 1970, pp. 114, 115.

6. Results of Aquifer Tests in Mississippi, U.S. Geological Survey Water Resources Division, Bulletin 71-2, pp. 10, 22, 1971.

7. Gandl, L. A., Characterization of Aquifers Designated as Potential Drinking - Water Sources in Mississippi, U.S. Geological Survey, Water Resources Investigations, Open-File Report 81-550, Jackson, Mississippi, 1982, pp. 15-20.

8. Topographic Maps of Hercules, Incorporated:
   Mississippi Quadrangle 7.5 Minute Series;
   Caterville, Mississippi Quadrangle 7.5 Minute Series;
   Hattiesburg SW, Mississippi Quadrangle 7.5 Minute Series;
   Eastabuchie Quadrangle 7.5 Minute Series.

9. Information on Groundwater and Surface Water Use from the Mississippi Bureau of Land and Water Resources, Jackson, Mississippi.

10. EPA HWDMS List of RCRA Hazardous Waste Generators

11. Locations, Sketch Maps, and Information on Hercules, Incorporated, from the Mississippi Bureau of Pollution Control, Hazardous Waste Division (BPC, HWD) Files.

12. Information on Public Water Supply Wells in Hattiesburg, Mississippi, From Water Supply Division, Mississippi State Department of Health.

13. Hercules, Incorporated, RCRA Notification Forms 8700-12, 3510-1, and 3510-3, from BPC, HWD Files.

14. EPA HRS Guidance Manual

15. U.S. Fish and Wildlife Service, Vicksburg Office, Species List; and U.S. Fish and Wildlife Service, Jackson Office, Topographic Maps Indicating Sensitive Environments.

16. Drillers Logs of Water Wells Near Hercules, Incorporated from the Mississippi Bureau of Land and Water Resources.

17. Waste Management Survey, Forms A and B, Completed by Hercules, Inc., from the BPC, HWD Files.

18. Letters from BPC, HWD Files, Concerning Removal of Hercules, Inc. from RCRA Interim Status.

19. State of Mississippi Water Pollution Control NPDES Permit, Issued to Hercules, Incorporated on September 24, 1986; Expires September 28, 1991.

20. State of Mississippi Air Pollution Control Permit, Issued to Hercules, Incorporated on March 24, 1987; Expires April 1, 1990.

21. Sampling Results from Groundwater Monitoring Wells at Hercules, Incorporated, March 1983, from BPC, HWD Files.

22. Letter to Hercules, Incorporated from BPC, HWD, June 22, 1983, Concerning Results of Analyses of Groundwater Samples and Waste Samples from Hercules, Incorporated.

23. Letter and Sampling Results to Hercules, Incorporated from BPC, HWD, August 25, 1981, Concerning Waste Samples Collected at Hercules, Inc., on July 9, 1981.

24. Integrated Risk Information System (IRIS).

APPENDIX

APPENDIX A

RECONNAISSANCE CHECKLIST FOR HRS2 CONCERNS

Instructions: Obtain as much "up front" information as possible prior to conducting fieldwork. Complete the form in as much detail as you can, providing attachments as necessary. Cite the source for all information obtained.

Site Name: Hercules Incorporated

City, County, State: Hattiesburg, Forrest, Mississippi

EPA ID No.: MSD008182081

Person responsible for form: Michael T. Slack,
Mississippi Bureau of Pollution Control
Jackson, MS 39289

Date: December 15, 1989

Air Pathway

Describe any potential air emission source onsite: There are no known air emission sources on site other than the facility's normal process operations.

Identify any sensitive environments within 4 miles: Hercules Incorporated, is located on the North side of the city of Hattiesburg. The entire facility is surrounded by residential and commercial areas.

Identify the maximally exposed individual (nearest residence or regularly occupied building workers do count): The nearest residence is located approximately 200 feet west of the facility.

Groundwater Pathway

Identify any areas of karst terrain: N/A

Identify additional population due to consideration of wells completed in overlying aquifers to the AOC: The Hattiesburg Formation and the Catahoula Sandstone are the aquifer units of concern. Together they are referred to as the Miocene Aquifer. The surficial unit, the Hattiesburg Formation, contains numerous private wells.

Do significant targets exist between 3 and 4 miles from the site? Yes. There are two (2) public water supply wells of the Central Water Association in the AOC between 3 and 4 miles from the site. These two wells serve an estimated population of 1,235. There are also a number of private wells in the AOC between 3 and 4 miles.

Is the AOC a sole source aquifer according to Safe Drinking Water Act: (i.e. is the site located in Dade, Broward, Volusia, Putnam, or Flager County, Florida)
No

Surface Water Pathway

Are there intakes located on the extended 15-mile migration pathway? The migration pathway begins onsite at Greens Creek. Greens Creek flows for approximately 2,800 stream feet from the site before its entrance into the Bowie River. From this intersection the Bowie River flows in a southeasterly direction for approximately 9,600 feet before its entrance into the Leaf River. The 15-mile migration pathway ends in the Leaf River approximately 12.5 stream miles southeast of the intersection of the Bowie River and the Leaf River.

The Mississippi Bureau of Land and Water Resources, Jackson, Mississippi, indicates four surface water intakes along the 15-mile migration pathway. Two of the intakes supply water to livestock (amount unknown). These two intakes are located approximately 14.5 stream miles from the site. The remaining intakes (2) are used by Hercules for industrial purposes.

Are there recreational areas, sensitive environments, or human food chain targets (fisheries) along the extended pathway? There are a number of residential areas located along the Bowie River and the Leaf River. The Bowie River and the Leaf River are used for recreational and industrial purposes.

There is no indication on the topo maps of wetlands along the extended migration pathway.

The U.S. Fish and Wildlife Service identifies a Federal endangered species, red-cockaded wookpecker (numerous colonies), located at the outermost limits of the extended migration pathway (approximately 15 stream miles from the site). Other sensitive environments listed in Table 2-18 of the proposed Revised HRS Manual but not shown on the topo maps were not addressed.

Onsite Exposure Pathway

Is there waste or contaminated soil onsite at 2 feet below land surface or higher?
Yes

Is the site accessible to non-employees (workers do <u>not</u> count)?

No, the entire facility is fenced in.

Are there residences, schools, or daycare centers onsite or in close proximity?

None on site, but the facility is surrounded by residential areas and schools.

Are there barriers to travel (e.g., a river) within one mile?

Yes. The Bowie River is a barrier, and is located north of the site.

APPENDIX B

A
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The nearest well in the AOC is a private well located approximately 3400 feet south of the site. This well is located and identified as U.S.G.S. #D049 on the topographic map (Reference 8) and the water well printout (Reference 3). There is no indication of the depth at which this well is screened; however, the well extends to a depth of approximately 576 feet below the land surface (Reference 3).

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The climate of southeastern Mississippi is humid and semitropical. Average annual rainfall is approximately 60 inches. Average annual runoff from the numerous streams in the area is approximately 20 inches. The remainder of the precipitation seeps into the ground or is dissipated by evapotransporation.

The mean annual lake evaporation for the area is approximately 46 inches. The net annual precipitation of the area is about 14 inches. The one-year, twenty-four-hour rainfall is approximately 4 inches (References 2 and 14).

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The site and surrounding area is flat with a slight gradient to the east northeast. The facility slope and intervening terrain is less than 1% (Reference 8).

The nearest perennial surface water is identified on the topographic map as Greens Creek. Greens Creek runs adjacent to the "Back Forty" and flows in an easterly northeasterly direction before its entrance into the Bowie River. Greens Creek intersects the Bowie River approximately 2800 stream feet from the site. From this intersection the Bowie River flows in a southeasterly direction for approximately 9,600 stream feet before its entrance into the Leaf River (Reference 8).

The three-mile migration pathway ends in the Leaf River approximately 3,450 stream feet south of the intersection of the Bowie River with the Leaf River (Reference 8).

The Mississippi Bureau of Land and Water Resources indicates one surface water intake along the three-mile migration pathway at the intersection of Greens Creek with the Bowie River. The water is used by Hercules, Incorporated for industrial purposes (References 8 and 9).

Environmental Concerns

There are no critical habitats of federal endangered species or national wildlife refuges within one mile of the site along the surface water migration pathway (Reference 15).

Topographic maps of the Hercules, Incorporated site and the surrounding area indicate no wetlands along the migration pathway (Reference 8).

Conclusions and Recommendations

A site screening investigation is recommended on a high priority basis.

REFERENCES

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24. Integrated Risk Information System (IRIS).

A
PRELIMINARY ASSESSMENT REASSESSMENT (PAR)
REPORT FOR
HERCULES, INCORPORATED
HATTIESBURG, MISSISSIPPI
MSD008182081

PREPARED FOR:

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REVIEWED AND EDITED BY:

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December 15, 1989

This Preliminary Assessment Reassessment (PAR) Report Includes:

1. Introduction
2. Background
3. Station Description
4. Sampling History
5. Waste Sources/Quantity/Hazardous Substances
6. Geology/Hydrology
7. The Aquifer of Concern
8. Precipitation
9. Surface Water
10. Environmental Concern
11. Conclusions and Recommendations
12. Appendix
    (a) HRS 1I Checklist
    (b) References

Introduction

The following report is a preliminary assessment reassessment (PAR) of Hercules, Incorporated in Hattiesburg, Forrest County, Mississippi. The original preliminary assessment was performed by the State in November, 1979.

County Code:	035
Congressional District:	05
Coordinates:	Latitude 31° 20' 20"
	Longitude 89° 18' 25"
Location:	NE1/4 SW1/4 S04 T4N R13W
Directions to Site:	Hercules, Incorporated may be reached by traveling north on Main Street through the City of Hattiesburg. Turn left at the intersection of Main Street and Seventh Street. Travel approximately one-half (0.5) of a mile on Seventh Street. Hercules, Incorporated is adjacent to Seventh Street on the right side.
Contact Official:	Preston W. Kirkendall Plant Manager Hercules, Incorporated P. O. Box 1937 W. Seventh Street Hattiesburg, MS 39401 Telephone: 601/545-3450
Cooperate Headquarters:	Hercules, Incorporated Hercules Plaza 1313 N. Market Street Wilmington, DE 19894

Background

The Hercules facility produces a diverse line of industrial chemicals using rosins from pine tree stumps and paper mill by-products (tall oil). Some of the products manufactured at the facility are modified resins, polyamides, ketene dimer, crude tall oil wax emulsions, synthetic rubber, and Delnav, an agricultural pesticide. Over 250 products are produced at the facility. The facility began operation in 1923 and is presently an active facility (Reference 11 and 13).

In 1980, pursuant to RCRA, Hercules filed notification for on-site generation, treatment, and storage of spent sulfuric acid from a rosin polymerization operation. In 1983, the Mississippi Bureau of Pollution Control (BPC) determined that the spent sulfuric acid was exempt from

the RCRA hazardous waste regulations because it was being reused in the wastewater treatment system for elementary neutralization. As a result of this determination, interim status for storage and treatment of spent sulfuric acid in tanks and in a surface impoundment was withdrawn and Hercules reverted to the status of an occasional generator. In 1986, Hercules submitted a subsequent RCRA notification as a marketer and burner of hazardous waste boiler fuel (References 13 and 18).

The above mentioned wastewater treatment system treats contaminated water from all sources throughout the plant. Hercules currently has an NPDES permit for discharge of the treated wastewater into the Bowie River. Hercules also has an Air Pollution Control Permit for the operation of air emissions equipment at the facility (Reference 20).

Prior to 1980, in response to a Congressional subcommittee request for information from major chemical companies concerning waste disposal, Hercules voluntarily completed a survey form in which they identified disposal of various wastes from their process operations in a landfill on site. The landfill was referred to as the "Back Forty" landfill. This voluntary survey form later served as notification under the CERCLA program for on-site disposal of potentially hazardous substances. This landfill is not regulated under the RCRA program (Reference 17).

Station Description

The Hercules facility is approximately 200 acres in size. The facility consists of a complex chemical operation that involves wood grinding, shredding, extraction, fractionation, refining, distillation and processing of rosins from pine tree stumps. Common facilities at the site include the office, laboratory, shops, powerhouse, central loading and packaging facilities, and the railroad (Reference 11).

The facility is located on the north side of the City of Hattiesburg. The entire facility is fenced in and is not accessible to non-employees. This facility is surrounded by residential areas (References 8 and 11).

An area approximately forty acres in size on the north side of the facility, referred to as the Back Forty, has been used in the past for disposal of various wastes, including process wastes, boiler ash, and wastewater treatment sludge from the previously mentioned surface impoundment. The type of disposal of the process wastes has been primarily by landfill. The sludge has been disposed of in open shallow pits. The boiler ash has been disposed of by landfill and waste piles.

Based on site visits in 1979 and 1981 by the BPC, containment of the waste is thought to be unsound. Specifically, the landfill was not adequately covered in 1979, and ponding and unsound diking was observed at a sludge disposal pit in 1981. Further, it is unlikely that either the landfill or the sludge pits have a liner or a leachate collection system.

Sampling History

In July, 1981, samples were collected at Hercules by EPA Region IV and the BPC. Specifically, a sample of the influent to the wastewater surface impoundment and a sample of wastewater treatment sludge from the Back Forty sludge disposal pit were collected and analyzed for oil and grease, total metals, and Delnav, a pesticide.

Barium, cadmium, and silver were detected in the influent sample at low (below one ppm) levels. Arsenic, barium, and lead were detected in the sludge sample at low (below one ppm) levels. Delnav was not detected in either sample at a detection level of 0.1 ppm (Reference 23).

In March of 1983, samples from groundwater monitoring wells at the Hercules site were collected by the BPC. Groundwater samples were collected from the South well near the surface impoundment and the North well near the Back Forty sludge pits. Waste samples were collected from a sludge pit and a boiler ash pile. The groundwater samples were analyzed for phenol and total metals. The test results indicated that the shallow groundwater quality was acceptable. The waste samples were analyzed for the EP Toxicity (metals) characteristic. The test results indicated that the sludge and ash were not classified as hazardous under the Mississippi RCRA regulations. However, the groundwater and waste analyses were very limited in scope and did not include a full scan of priority pollutants (See References 21 and 22).

Waste Sources/Quantity/Hazardous Substances

According to the previously mentioned survey forms that Hercules submitted to a Congressional subcommittee, 347,100 tons of process wastes have been disposed of at the site. The process wastes consists of heavy metals (iron, manganese, magnesium, zinc, cadmium, copper, chromium (trivalent)), pesticides, halogenated aliphatics, resins, elastomers, solvents, oil sludges, esters and ethers, alcohols, ketones and aldehydes, salts, and mercaptans (Reference 17).

The hazardous substances of concern are manganese, cadmium, and chromium. These substances have a severe toxicity and are highly persistent. The physical states of the hazardous substances at the time of disposal were solids, liquids, and sludges (Reference 14).

Geology/Hydrology

The geological formations below the site area in descending order are as follows: Hattiesburg Formation, Catahoula Sandstone, Vicksburg Group (Undifferentiated) and Yazoo Clay.

Fresh-water aquifers in the study area are mostly beds of sand or zones of sandy beds. The beds dip gently to the southwest and contain fresh water as much as 40 miles from the outcrops and as much as 3,000 feet below land surface (Reference 2).

Prediction of aquifer thickness and lithology is difficult because of the lenticular bedding of most units. Lithologic changes occur in short distances and individual sands, which are irregular and thicken or thin in short distances, are difficult to trace, especially along the dip of the beds (Study area - Reference 2).

At Hattiesburg, the Hattiesburg Formation consists of thick beds of massive clays - 150 or 200 feet thick - which contain some lime but very little sand. Geophysical logs from area water wells indicate that the clay layer extends to a depth of approximately 215 feet below the land surface. A sand layer approximately 30 feet in thickness, however, occurs in the clay layer at a depth of approximately 65 feet below the land surface. Wells in the vicinity of Hattiesburg show that the clay bed is underlain by interbedded sands and clays with the sands increasing in prominence and becoming gravelly toward the base (Reference 1 and 4). Four Forrest County aquifer tests of the Hattiesburg Formation show hydraulic conductivities ranging from 96 to 180 ft/d (Reference 6).

Separating the Hattiesburg from the underlying Catahoula is extremely difficult. To avoid confusion both of these units are referred as the Miocene Aquifer System. The aquifer system is composed of numerous interbedded layers of sand and clay (sand beds in the miocene are characteristically lens-shaped or wedge-shaped). Because of the interbedded nature, the formations cannot be reliably separated and correlated either on the surface or in the subsurface (References 2, 5, and 7).

Recharge to the Miocene Aquifer is from rainfall directly on the outcrop and leakage between aquifer units of the Miocene Aquifer System. Ten Forrest County aquifer tests of the Catahoula Sandstone, which is the lower unit the of Miocene Aquifer System, show hydraulic conductivities ranging from 18 to 170 ft/d. Hydraulic conductivities average 95 ft/d for the Miocene Aquifer System. Lithologic data and other published information indicates that the Miocene Aquifer System extends to a depth of approximately 1150 feet below the land surface (Reference 6 and 7).

Underlying the Miocene Aquifer is the Vicksburg Group (Undifferentiated) which is generally composed of limestone beds alternating with thin beds of limy sand and clay. Lithologic data indicates that the Vicksburg Group (Undifferentiated) extends to a depth of approximately 1300 feet below the land surface (Reference 2).

The Aquifer of Concern

The Hattiesburg Formation and the Catahoula Sandstone are considered as a single hydraulic unit, referred to as the Miocene Aquifer System. These aquifers constitute the aquifer of concern (AOC).

The first water bearing unit of the AOC occurs in the surficial aquifer (Hattiesburg Formation) at a depth of approximately 65 feet below the land surface. The unsaturated zone consists primarily of clay and has an average hydraulic conductivity of approximately 1×10^{-6} cm/s (Reference 1 and 4).

U.S.G.S. identifies ten (10) public water supply wells for the City of Hattiesburg in the AOC within the three-mile radius of the site. All of these wells occur in the lower unit (Catahoula Sandstone) of the AOC. These wells are located and identified as #D004, #D005, #D006, #B002, #B003, #B023, #B017, #B001, #B005, #B007 on the U.S.G.S. water wells printout. There is no indication of the depth at which these wells are screened; however, the depth of these wells range approximately 419 feet below the land surface (#B001) to approximately 678 feet below the land surface (#D005) (Reference 3).

The Mississippi State Department of Health, Division of Water Supply, identified two additional public water supply wells for the City of Hattiesburg in the AOC. One of these wells (not identified on the U.S.G.S. printout) is located within the three-mile radius of the site.

The other well is located and identified as U.S.G.S. #D007 (City of Hattiesburg). This well is located between the three- and four-mile radius of the site. The City of Hattiesburg wells (12) supply an estimated population of 55,100 (Reference 3 and 12).

There are also numerous private wells occurring in both units of the AOC within the three-mile radius. No other drinking water source is presently available (Reference 3 and 12).

The nearest well in the AOC is a private well located approximately 3400 feet south of the site. This well is located and identified as U.S.G.S. #D049 on the topographic map (Reference 8) and the water well printout (Reference 3). There is no indication of the depth at which this well is screened; however, the well extends to a depth of approximately 576 feet below the land surface (Reference 3).

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The climate of southeastern Mississippi is humid and semitropical. Average annual rainfall is approximately 60 inches. Average annual runoff from the numerous streams in the area is approximately 20 inches. The remainder of the precipitation seeps into the ground or is dissipated by evapotransporation.

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The site and surrounding area is flat with a slight gradient to the east northeast. The facility slope and intervening terrain is less than 1% (Reference 8).

The nearest perennial surface water is identified on the topographic map as Greens Creek. Greens Creek runs adjacent to the "Back Forty" and flows in an easterly northeasterly direction before its entrance into the Bowie River. Greens Creek intersects the Bowie River approximately 2800 stream feet from the site. From this intersection the Bowie River flows in a southeasterly direction for approximately 9,600 stream feet before its entrance into the Leaf River (Reference 8).

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