Please print or type with ELITE type (12 characters per inch) in the unshaded areas only

Form Approved OMB No. 2050-0028. Expires 9-30-88
GSA No. 0246-EPA-OT

United States Environmental Protection Agency
Washington, DC 20460

EPA Notification of Hazardous Waste Activity

Please refer to the *Instructions for Filing Notification* before completing this form. The information requested here is required by law *(Section 3010 of the Resource Conservation and Recovery Act).*

For Official Use Only

Comments

C
C

Installation's EPA ID Number	T/A	C	Approved	Date Received (yr. mo. day)	
C F M S D 0 0 8 1 8 8 7 2 4		1			Copiah

I. Name of Installation

KUHLMAN CORPORATION

II. Installation Mailing Address

Street or P.O. Box

C 3: 198 PORTER STREET

City or Town	State	ZIP Code
C 4: CRYSTAL SPRINGS	MS	39059

III. Location of Installation

Street or Route Number

C 5: SAME

City or Town	State	ZIP Code
C 6:		

IV. Installation Contact

Name and Title *(last, first, and job title)*	Phone Number *(area code and number)*
C 2: SCHLANGEN J. MGR. MFG.	601 892 4661

V. Ownership

A. Name of Installation's Legal Owner	B. Type of Ownership *(enter code)*
C R: KUHLMAN CORPORATION	P

VI. Type of Regulated Waste Activity *(Mark 'X' in the appropriate boxes. Refer to instructions.)*

A. Hazardous Waste Activity

- [X] 1a. Generator
- [ ] 1b. Less than 1,000 kg/mo.
- [ ] 2. Transporter
- [ ] 3. Treater/Storer/Disposer
- [ ] 4. Underground Injection
- [ ] 5. Market or Burn Hazardous Waste Fuel *(enter 'X' and mark appropriate boxes below)*
  - [ ] a. Generator Marketing to Burner
  - [ ] b. Other Marketer
  - [ ] c. Burner

B. Used Oil Fuel Activities

- [ ] 6. Off-Specification Used Oil Fuel *(enter 'X' and mark appropriate boxes below)*
  - [ ] a. Generator Marketing to Burner
  - [ ] b. Other Marketer
  - [ ] c. Burner
- [ ] 7. Specification Used Oil Fuel Marketer *(or On site Burner)* Who First Claims the Oil Meets the Specification

VII. Waste Fuel Burning: Type of Combustion Device *(enter 'X' in all appropriate boxes to indicate type of combustion device(s) in which hazardous waste fuel or off-specification used oil fuel is burned. See instructions for definitions of combustion devices.)*

- [ ] A. Utility Boiler
- [ ] B. Industrial Boiler
- [ ] C. Industrial Furnace

VIII. Mode of Transportation *(transporters only — enter 'X' in the appropriate box(es))*

- [ ] A. Air
- [ ] B. Rail
- [ ] C. Highway
- [ ] D. Water
- [ ] E. Other *(specify)*

IX. First or Subsequent Notification

Mark 'X' in the appropriate box to indicate whether this is your installation's first notification of hazardous waste activity or a subsequent notification. If this is not your first notification, enter your installation's EPA ID Number in the space provided below.

- [ ] A. First Notification
- [X] B. Subsequent Notification *(complete item C)*

C. Installation's EPA ID Number: M S D 0 0 8 1 8 8 7 2 4

EPA Form 8700-12 (Rev. 11-85) Previous edition is obsolete.

Continue on reverse

Reference 4

ID — For Official Use Only		
C W		T/A C 1

X. Description of Hazardous Wastes *(continued from front)*

A. Hazardous Wastes from Nonspecific Sources. Enter the four-digit number from 40 *CFR* Part 261.31 for each listed hazardous waste from nonspecific sources your installation handles. Use additional sheets if necessary.

1	2	3	4	5	6
F 0 0 2	F 0 0 3				
7	**8**	**9**	**10**	**11**	**12**

B. Hazardous Wastes from Specific Sources. Enter the four-digit number from 40 *CFR* Part 261.32 for each listed hazardous waste from specific sources your installation handles. Use additional sheets if necessary.

13	14	15	16	17	18
19	**20**	**21**	**22**	**23**	**24**
25	**26**	**27**	**28**	**29**	**30**

C. Commercial Chemical Product Hazardous Wastes. Enter the four-digit number from 40 *CFR* Part 261.33 for each chemical substance your installation handles which may be a hazardous waste. Use additional sheets if necessary.

31	32	33	34	35	36
U 2 3 9					
37	**38**	**39**	**40**	**41**	**42**
43	**44**	**45**	**46**	**47**	**48**

D. Listed Infectious Wastes. Enter the four-digit number from 40 *CFR* Part 261.34 for each hazardous waste from hospitals, veterinary hospitals, or medical and research laboratories your installation handles. Use additional sheets if necessary.

49	50	51	52	53	54

E. Characteristics of Nonlisted Hazardous Wastes. Mark 'X' in the boxes corresponding to the characteristics of nonlisted hazardous wastes your installation handles. *(See 40 CFR Parts 261.21 — 261.24)*

- [X] 1. Ignitable *(D001)*
- [ ] 2. Corrosive *(D002)*
- [X] 3. Reactive *(D003)*
- [X] 4. Toxic *(D000)*

XI. Certification

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

Signature	Name and Official Title *(type or print)*	Date Signed
J.M. Schlangen	J.M. SCHLANGEN, MGR.-MFG. PROCESS	02-27-90

EPA Form 8700-12 (Rev. 11-85) Reverse

Please print or type with ELITE type (12 characters/inch) in the unshaded areas only.

Form Approved OMB No. 2000-0098
No. 0246-EPA-OT Expiration Date 12/31/86

EPA U.S. ENVIRONMENTAL PROTECTION AGENCY

NOTIFICATION OF HAZARDOUS WASTE ACTIVITY

INSTALLATION'S EPA I.D. NO.

I. NAME OF INSTALLATION

II. INSTALLATION MAILING ADDRESS

III. LOCATION OF INSTALLATION

KUHLMAN
Power & Specialty Division

INSTRUCTIONS: If you received a preprinted label, affix it in the space at left. If any of the information on the label is incorrect, draw a line through it and supply the correct information in the appropriate section below. If the label is complete and correct, leave Items I, II, and III below blank. If you did not receive a preprinted label, complete all items. "Installation" means a single site where hazardous waste is generated, treated, stored and/or disposed of, or a transporter's principal place of business. Please refer to the INSTRUCTIONS FOR FILING NOTIFICATION before completing this form. The information requested herein is required by law (*Section 3010 of the Resource Conservation and Recovery Act*).

DETACH

FOR OFFICIAL USE ONLY

COMMENTS

C

INSTALLATION'S EPA I.D. NUMBER	APPROVED	DATE RECEIVED (yr., mo., & day)
F MSD008188724 T/A C 1		

I. NAME OF INSTALLATION

KUHLMAN CORPORATION POWER DIVISION

II. INSTALLATION MAILING ADDRESS

STREET OR P.O. BOX

3 198 PORTER STREET

CITY OR TOWN	ST.	ZIP CODE
4 CRYSTAL SPRINGS	MS	39059

III. LOCATION OF INSTALLATION

STREET OR ROUTE NUMBER

5 198 PORTER STREET

CITY OR TOWN	ST.	ZIP CODE
6 CRYSTAL SPRINGS	MS	39059

IV. INSTALLATION CONTACT

NAME AND TITLE (last, first, & job title)	PHONE NO. (area code & no.)
2 GLENN H HAVENS SAFETY DIRECTOR	601 892-4661

V. OWNERSHIP

DETACH

A. NAME OF INSTALLATION'S LEGAL OWNER

8 KUHLMAN CORPORATION

B. TYPE OF OWNERSHIP (enter the appropriate letter into box)

F = FEDERAL
M = NON-FEDERAL

☐

VI. TYPE OF HAZARDOUS WASTE ACTIVITY (*enter "X" in the appropriate box(es)*)

- ☒ A. GENERATION
- ☒ B. TRANSPORTATION (*complete item VII*)
- ☐ C. TREAT/STORE/DISPOSE
- ☐ D. UNDERGROUND INJECTION

VII. MODE OF TRANSPORTATION (*transporters only – enter "X" in the appropriate box(es)*)

- ☐ A. AIR
- ☐ B. RAIL
- ☒ C. HIGHWAY
- ☐ D. WATER
- ☐ E. OTHER (specify):

VIII. FIRST OR SUBSEQUENT NOTIFICATION

Mark "X" in the appropriate box to indicate whether this is your installation's first notification of hazardous waste activity or a subsequent notification. If this is not your first notification, enter your installation's EPA I.D. Number in the space provided below.

- ☐ A. FIRST NOTIFICATION
- ☒ B. SUBSEQUENT NOTIFICATION (*complete item C*)

C. INSTALLATION'S EPA I.D. NO.

MSD008188724

IX. DESCRIPTION OF HAZARDOUS WASTES

Please go to the reverse of this form and provide the requested information.

FOR OFFICIAL USE ONLY

IX. DESCRIPTION OF HAZARDOUS WASTES *(continued from front)*

A. HAZARDOUS WASTES FROM NON-SPECIFIC SOURCES. Enter the four-digit number from 40 CFR Part 261.31 for each listed hazardous waste from non-specific sources your installation handles. Use additional sheets if necessary.

1	2	3	4	5	6
F003					

7	8	9	10	11	12

B. HAZARDOUS WASTES FROM SPECIFIC SOURCES. Enter the four-digit number from 40 CFR Part 261.32 for each listed hazardous waste from specific industrial sources your installation handles. Use additional sheets if necessary.

13	14	15	16	17	18

19	20	21	22	23	24

25	26	27	28	29	30

C. COMMERCIAL CHEMICAL PRODUCT HAZARDOUS WASTES. Enter the four-digit number from 40 CFR Part 261.33 for each chemical substance your installation handles which may be a hazardous waste. Use additional sheets if necessary.

31	32	33	34	35	36

37	38	39	40	41	42

43	44	45	46	47	48

D. LISTED INFECTIOUS WASTES. Enter the four-digit number from 40 CFR Part 261.34 for each listed hazardous waste from hospitals, veterinary hospitals, medical and research laboratories your installation handles. Use additional sheets if necessary.

49	50	51	52	53	54

E. CHARACTERISTICS OF NON-LISTED HAZARDOUS WASTES. Mark "X" in the boxes corresponding to the characteristics of non-listed hazardous wastes your installation handles. *(See 40 CFR Parts 261.21 – 261.24.)*

- [X] 1. IGNITABLE (D001)
- [ ] 2. CORROSIVE (D002)
- [ ] 3. REACTIVE (D003)
- [ ] 4. TOXIC (D000)

X. CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

SIGNATURE	NAME & OFFICIAL TITLE *(type or print)*	DATE SIGNED
Glenn H. Havens	Glenn H. Havens, Safety Director	11/26/85

EPA Form 8700-12 (6-85) REVERSE

Tel: (601) 892-4661
Fax: (601) 892-6406 (Adm.)
(601) 892-6416 (Mktg.)
(601) 892-6483 (Purch.)

KUHLMAN ELECTRIC CORPORATION

101 Porter Street, Crystal Springs, Mississippi 39059

Distribution Transformers
Instrument Transformers
Power Transformers

April 07, 1994

Mr. Johnny Beason
Mississippi Dept. of Environmental Quality
Office of Pollution Control
Route 10, Box 295
Jackson, MS 39208

Dear Mr. Beason:

Here is the stormwater outfall analysis report that you requested concerning the complaint reported to you and noted by you during your March 10, 1994 visit.

Sincerely,

Sherman Blaylock
Facility Manager

Quality Control / Quality Assurance Summary

E P S — EPS Analytical Services, Inc.
5360 I-55 North
Jackson, MS 39211
601/956-1400 Office
601/956-0513 Fax

QA/QC:
Manager:
Facil ID:

Report #: 3832
Date: 04/04/94
Page #: 1

Acct #: 4090
Client: KUHLMAN CORP
Address: 198 PORTER STREET
City: CRYSTAL SPRINGS, MS 39059-
Contact: LEON GREEN
Phone: 601/892-4661 Fax: 601/892-6483

Contract Descrip: STORMWATER OUTFALL ANALYSIS
Project Location: CRYSTAL SPRINGS,MS
Contract Number : 94.K4090.70
Contract PO: 34481
Expiration Date: 01/01/95

Analyte	Method	Holding Time	Surrogate Recovery	Mtx Spk Recovery	Blank	Batch Number
VOLATILES, TCLP	SW846 METHOD 8240	A	A	A	A	5196
SILVER, FLAME AA	SW846 METHOD 7760	A	N/A	A	A	4799
ARSENIC, FURNACE AA	SW846 METHOD 7060	A	N/A	A	A	4877
BARIUM, FLAME AA	SW846 METHOD 7080	A	N/A	A	A	4853
CADMIUM, FLAME AA	SW846 METHOD 7130	A	N/A	A	A	4794
CHROMIUM, FLAME AA	SW846 METHOD 7190	A	N/A	A	A	4789
MERCURY, COLD VAPOR AA	SW846 METHOD 7470	A	N/A	A	A	4934
OIL AND GREASE, TOTAL RECOVERABLE	SW846 METHOD 9071	A	N/A	A	A	5339
LEAD, FURNACE AA	SW846 METHOD 7421	A	N/A	A	A	4884
SELENIUM, FURNACE AA	SW846 METHOD 7740	A	N/A	A	A	4881

Note	Note Description
A	Requirements set by method were met.
N/A	Not Applicable

Analytical Report

E EPS Analytical Services, Inc. 601/956-1400 Office
P 5360 I-55 North 601/956-0513 Fax
S Jackson, MS 39211

QA/QC: COLEMAN, J
Manager: JOHNSTON, H
Facil ID:

Report #: 3832
Date: 04/04/94
Page #: 2

Lab #:10906.00 Client Ref #:
Sample Description
STORMWATER OUTFALL

Sample Collected by: NA
Coll. Ending Date: 03/10/94
Coll. Ending Time: 13:35

Receipt Date: 03/11/94
Sample Type: GRAB
Sample Matrix: WATER

Analyte	Units	Amount	Lmt of Detect	Hold Time	Analyst	Prep Date	Test Date	Test Time	Batch Number	Lab Note	Analyst's Note
VOLATILES, TCLP	ppm	screen	screen	A	TKW	03/21/94	03/22/94	11:14	5196	A	
Surr: 4-BROMOFLUOROBENZENE		60% A									
Surr: 1,2-DICHLOROETHANE-d4		93% A									
Cmpd: 1,1-DICHLOROETHYLENE		ND	0.01								
Cmpd: 1,2-DICHLOROETHANE		ND	0.01								
Cmpd: 1,4-DICHLOROBENZENE		0.138	0.01								
Cmpd: BENZENE		ND	0.005								
Cmpd: CARBON TETRACHLORIDE		ND	0.01								
Cmpd: CHLOROBENZENE		ND	0.01								
Cmpd: CHLOROFORM		ND	0.01								
Cmpd: METHYL ETHYL KETONE		ND	0.2								
Cmpd: TETRACHLOROETHYLENE		ND	0.01								
Cmpd: TRICHLOROETHYLENE		ND	0.01								
Cmpd: VINYL CHLORIDE		ND	0.01								
SILVER, FLAME AA	ppm	ND	0.02	A	BSC	N/A	03/15/94	14:30	4799		
ARSENIC, FURNACE AA	ppm	ND	0.003	A	BSC	N/A	03/15/94	19:00	4877		
BARIUM, FLAME AA	ppm	ND	3	A	BSC	N/A	03/16/94	12:00	4853		
CADMIUM, FLAME AA	ppm	ND	0.01	A	BSC	N/A	03/15/94	13:20	4794		
CHROMIUM, FLAME AA	ppm	ND	0.02	A	BSC	N/A	03/15/94	11:00	4789		
MERCURY, COLD VAPOR AA	ppm	ND	0.0005	A	BSC	N/A	03/17/94	16:30	4934		

Note	Note Description	Note	Note Description
A	Requirements set by method were met.	ND	NOT DETECTED

Analytical Report

E P S	EPS Analytical Services, Inc. 5360 I-55 North Jackson, MS 39211	601/956-1400 Office 601/956-0513 Fax	QA/QC: COLEMAN, J Manager: JOHNSTON, H Facil ID:	Report #: 3832 Date: 04/04/94 Page #: 3

Lab #:10906.00 Client Ref #:
Sample Description
STORMWATER OUTFALL

Sample Collected by: NA
Coll. Ending Date: 03/10/94
Coll. Ending Time: 13:35

Receipt Date: 03/11/94
Sample Type: GRAB
Sample Matrix: WATER

Analyte	Units	Amount	Lmt of Detect	Hold Time	Ana-lyst	Prep Date	Test Date	Test Time	Batch Number	Lab Note	Analyst's Note
OIL AND GREASE, TOTAL RECOVERABLE	ppm	6.9	0.2	A	TAL	N/A	04/04/94	12:00	5339		
LEAD, FURNACE AA	ppm	ND	0.002	A	BSC	N/A	03/16/94	15:30	4884		
SELENIUM, FURNACE AA	ppm	ND	0.005	A	BSC	N/A	03/16/94	10:00	4881		

Note	Note Description	Note	Note Description
A	Requirements set by method were met.	ND	NOT DETECTED

Quality Control / Quality Assurance Report

E P S	EPS Analytical Services, Inc. 5360 I-55 North Jackson, MS 39211	601/956-1400 Office 601/956-0513 Fax	
QA/QC: COLEMAN, J	Manager: JOHNSTON, H	Facil ID:	
Report #: 3832	Date: 04/04/94	Page #: 4	

Analyte: CHROMIUM, FLAME AA
Units: ppm
Analyst: BRIAN CASTLEBERRY

Preparation Date: N/A
Test Began Date & Time: 03/15/94 @ 09:20
Test Ended Date & Time: 03/15/94 @ 11:00

Batch Number: 4789
Book/Page: 126/73

	Sample		Replicate		Matrix Spike		Mtx % Recovry		Blank	
	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD
Log Number:	10906		10906		10906		10906		BLANK	
Sample Matrix:	WATER		WATER		WATER		WATER		WATER	
Sample Type:	GRAB		GRAB		GRAB		GRAB		GRAB	
Amount/Limit of Detection:	ND	0.02	ND	0.02	1.00		101%		ND	0.02
Quality Control Summary Notes:							A		A	

Note	Note Description	Note	Note Description
A	Requirements set by method were met.	ND	NOT DETECTED

Quality Control / Quality Assurance Report

E EPS Analytical Services, Inc.
P 5360 I-55 North
S Jackson, MS 39211

601/956-1400 Office
601/956-0513 Fax

QA/QC: COLEMAN, J
Manager: JOHNSTON, H
Facil ID:

Report #: 3832
Date: 04/04/94
Page #: 5

Analyte: CADMIUM, FLAME AA
Units: ppm
Analyst: BRIAN CASTLEBERRY

Preparation Date: N/A
Test Began Date & Time: 03/15/94 @ 12:45
Test Ended Date & Time: 03/15/94 @ 13:20

Batch Number: 4794
Book/Page: 126/78

	{—Sample—}		{—Replicate—}		{—Matrix Spike—}		{-Mtx % Recovry-}		{—Blank—}	
	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD
Log Number:	10906		10906		10906		10906		BLANK	
Sample Matrix:	WATER		WATER		WATER		WATER		WATER	
Sample Type:	GRAB		GRAB		GRAB		GRAB		GRAB	
Amount/Limit of Detection:	ND	0.01	ND	0.01	0.40		98%		ND	0.01
Quality Control Summary Notes:							A		A	

Note	Note Description	Note	Note Description
A	Requirements set by method were met.	ND	NOT DETECTED

Quality Control / Quality Assurance Report

E P S	EPS Analytical Services, Inc. 5360 I-55 North Jackson, MS 39211	601/956-1400 Office 601/956-0513 Fax	QA/QC: COLEMAN, J Manager: JOHNSTON, H Facil ID:
			Report #: 3832 Date: 04/04/94 Page #: 6

Analyte: SILVER, FLAME AA
Units: ppm
Analyst: BRIAN CASTLEBERRY

Preparation Date: N/A
Test Began Date & Time: 03/15/94 @ 13:20
Test Ended Date & Time: 03/15/94 @ 14:30

Batch Number: 4799
Book/Page: 126/82

	Sample		Replicate		Matrix Spike		Mtx % Recovry		Blank	
	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD
Log Number:	10906		10906		10906		10906		BLANK	
Sample Matrix:	WATER		WATER		WATER		WATER		WATER	
Sample Type:	GRAB		GRAB		GRAB		GRAB		GRAB	
Amount/Limit of Detection:	ND	0.02	ND	0.02	0.40		108%		ND	0.02
Quality Control Summary Notes:							A		A	

Note	Note Description	Note	Note Description
A	Requirements set by method were met.	ND	NOT DETECTED

Quality Control / Quality Assurance Report

E P S	EPS Analytical Services, Inc. 5360 I-55 North Jackson, MS 39211	601/956-1400 Office 601/956-0513 Fax	QA/QC: COLEMAN, J Manager: JOHNSTON, H Facil ID:
Report #: 3832 Date: 04/04/94 Page #: 7			

Analyte: BARIUM, FLAME AA
Units: ppm
Analyst: BRIAN CASTLEBERRY

Preparation Date: N/A
Test Began Date & Time: 03/16/94 @ 11:15
Test Ended Date & Time: 03/16/94 @ 12:00

Batch Number: 4853
Book/Page: 126/91

	Sample		Replicate		Matrix Spike		Mtx % Recovry		Blank	
	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD
Log Number:	10906		10906		10906		10906		BLANK	
Sample Matrix:	WATER		WATER		WATER		WATER		WATER	
Sample Type:	GRAB		GRAB		GRAB		GRAB		GRAB	
Amount/Limit of Detection:	ND	3	ND	3	40		105%		ND	3
Quality Control Summary Notes:							A		A	

Note	Note Description	Note	Note Description
A	Requirements set by method were met.	ND	NOT DETECTED

Quality Control / Quality Assurance Report

E EPS Analytical Services, Inc. 601/956-1400 office
P 5360 I-55 North 601/956-0513 Fax
S Jackson, MS 39211

QA/QC: COLEMAN, J
Manager: JOHNSTON, H
Facil ID:

Report #: 3832
Date: 04/04/94
Page #: 8

Analyte: ARSENIC, FURNACE AA
Units: ppm
Analyst: BRIAN CASTLEBERRY

Preparation Date: N/A
Test Began Date & Time: 03/15/94 @ 16:30
Test Ended Date & Time: 03/15/94 @ 19:00

Batch Number: 4877
Book/Page: 30/180

	Sample		Replicate		Matrix Spike		Mtx % Recovry		Blank	
	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD
Log Number:	10906		10906		10906		10906		BLANK	
Sample Matrix:	WATER		WATER		WATER		WATER		WATER	
Sample Type:	GRAB		GRAB		GRAB		GRAB		GRAB	
Amount/Limit of Detection:	ND	0.003	ND	0.003	0.100		103%		ND	0.003
Quality Control Summary Notes:							A		A	

Note	Note Description
A	Requirements set by method were met.
ND	NOT DETECTED

Quality Control / Quality Assurance Report

E EPS Analytical Services, Inc. P 5360 I-55 North S Jackson, MS 39211	601/956-1400 Office 601/956-0513 Fax	QA/QC: COLEMAN, J Manager: JOHNSTON, H Facil ID:	Report #: 3832 Date: 04/04/94 Page #: 9

Analyte: SELENIUM, FURNACE AA Units: ppm Analyst: BRIAN CASTLEBERRY	Preparation Date: N/A Test Began Date & Time: 03/16/94 @ 07:45 Test Ended Date & Time: 03/16/94 @ 10:00	Batch Number: 4881 Book/Page: 30/184

	{——Sample——}		{——Replicate——}		{—Matrix Spike—}		{-Mtx % Recovry-}		{——Blank——}	
	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD
Log Number:	10906		10906		10906		10906		BLANK	
Sample Matrix:	WATER		WATER		WATER		WATER		WATER	
Sample Type:	GRAB		GRAB		GRAB		GRAB		GRAB	
Amount/Limit of Detection:	ND	0.005	ND	0.005	0.100		100%		ND	0.005
Quality Control Summary Notes:							A		A	

Note	Note Description	Note	Note Description
A	Requirements set by method were met.	ND	NOT DETECTED

Quality Control / Quality Assurance Report

E EPS Analytical Services, Inc.
P 5360 I-55 North
S Jackson, MS 39211

601/956-1400 Office
601/956-0513 Fax

QA/QC: COLEMAN, J
Manager: JOHNSTON, H
Facil ID:

Report #: 3832
Date: 04/04/94
Page #: 10

Analyte: LEAD, FURNACE AA
Units: ppm
Analyst: BRIAN CASTLEBERRY

Preparation Date: N/A
Test Began Date & Time: 03/16/94 @ 12:00
Test Ended Date & Time: 03/16/94 @ 15:30

Batch Number: 4884
Book/Page: 30/187

	Sample		Replicate		Matrix Spike		Mtx % Recovry		Blank	
	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD
Log Number:	10906		10906		10906		10906		BLANK	
Sample Matrix:	WATER		WATER		WATER		WATER		WATER	
Sample Type:	GRAB		GRAB		GRAB		GRAB		GRAB	
Amount/Limit of Detection:	ND	0.002	0.002	0.002	0.100		109%		ND	0.002
Quality Control Summary Notes:							A		A	

Note	Note Description
A	Requirements set by method were met.

Note	Note Description
ND	NOT DETECTED

Quality Control / Quality Assurance Report

E EPS Analytical Services, Inc. 601/956-1400 Office
P 5360 I-55 North 601/956-0513 Fax
S Jackson, MS 39211

QA/QC: COLEMAN, J
Manager: JOHNSTON, H
Facil ID:

Report #: 3832
Date: 04/04/94
Page #: 11

Analyte: MERCURY, COLD VAPOR AA
Units: ppm
Analyst: BRIAN CASTLEBERRY

Preparation Date: N/A
Test Began Date & Time: 03/17/94 @ 14:00
Test Ended Date & Time: 03/17/94 @ 16:30

Batch Number: 4934
Book/Page: 15/98

	{——Sample——}		{——Replicate——}		{—Matrix Spike—}		{-Mtx % Recovry-}		{——Blank——}	
	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD
Log Number:	10906		10906		10906		10906		BLANK	
Sample Matrix:	WATER		WATER		WATER		WATER		WATER	
Sample Type:	GRAB		GRAB		GRAB		GRAB		GRAB	
Amount/Limit of Detection:	ND	0.0005	ND	0.0005	0.0050		96%		ND	0.0005
Quality Control Summary Notes:							A		A	

Note	Note Description
A	Requirements set by method were met.

Note	Note Description
ND	NOT DETECTED

Quality Control / Quality Assurance Report

E EPS Analytical Services, Inc. 601/956-1400 Office
P 5360 I-55 North 601/956-0513 Fax
S Jackson, MS 39211

QA/QC: COLEMAN, J
Manager: JOHNSTON, H
Facil ID:

Report #: 3832
Date: 04/04/94
Page #: 12

Analyte: VOLATILES, TCLP
Units: ppm
Analyst: TENNIE WHITE

Preparation Date: 03/21/94
Test Began Date & Time: 03/21/94 @ 08:00
Test Ended Date & Time: 03/22/94 @ 11:14

Batch Number: 5196
Book/Page: 1/117

	Sample		Replicate		Matrix Spike		Mtx % Recovry		Blank	
	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD
Log Number:	10724		10724		10724		10724		BLANK	
Sample Matrix:	WATER		WATER		WATER		WATER		WATER	
Sample Type:	GRAB		GRAB		GRAB		GRAB		GRAB	
Screen Compound Amount/Limit of Detection:										
Surr: 4-BROMOFLUOROBENZENE	97%		93%		0.100		62%		83%	
Surr: 1,2-DICHLOROETHANE-d4	93%		91%		0.100		62%		89%	
Cmpd: 1,1-DICHLOROETHYLENE	ND	0.01	ND	0.01	0.10		52%		ND	0.01
Cmpd: 1,2-DICHLOROETHANE	ND	0.01	ND	0.01	0.10		90%		ND	0.01
Cmpd: 1,4-DICHLOROBENZENE	ND	0.01	ND	0.01	0.10		90%		ND	0.01
Cmpd: BENZENE	ND	0.005	ND	0.005	0.10		80%		ND	0.005
Cmpd: CARBON TETRACHLORIDE	ND	0.01	ND	0.01	0.10		87%		ND	0.01
Cmpd: CHLOROBENZENE	ND	0.01	ND	0.01	0.10		86%		ND	0.01
Cmpd: CHLOROFORM	ND	0.01	ND	0.01	0.10		99%		ND	0.01
Cmpd: METHYL ETHYL KETONE	ND	0.2	ND	0.2	0.10		54%		ND	0.2
Cmpd: TETRACHLOROETHYLENE	ND	0.01	ND	0.01	0.10		85%		ND	0.01
Cmpd: TRICHLOROETHYLENE	ND	0.01	ND	0.01	0.10		64%		ND	0.01
Cmpd: VINYL CHLORIDE	ND	0.01	ND	0.01	0.10		93%		ND	0.01
Quality Control Summary Notes:							A		A	

Note	Note Description	Note	Note Description
A	Requirements set by method were met.	ND	NOT DETECTED

Quality Control / Quality Assurance Report

E P S	EPS Analytical Services, Inc. 5360 I-55 North Jackson, MS 39211	601/956-1400 Office 601/956-0513 Fax	QA/QC: COLEMAN, J Manager: JOHNSTON, H Facil ID:	Report #: 3832 Date: 04/04/94 Page #: 13

Analyte: OIL AND GREASE, TOTAL RECOVERABLE
Units: ppm
Analyst: TARA LEWIS

Preparation Date: N/A
Test Began Date & Time: 04/03/94 @ 18:00
Test Ended Date & Time: 04/04/94 @ 12:00

Batch Number: 5339
Book/Page: 57/6

	{—Sample—}		{—Replicate—}		{—Matrix Spike—}		{—Mtx % Recovry—}		{—Blank—}	
	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD	Amount	LOD
Log Number:	LAB#1		LAB#1 REP		LAB#1 SPK		LAB#1 REC		BLANK	
Sample Matrix:	WATER		WATER		WATER		WATER		WATER	
Sample Type:	GRAB		GRAB		GRAB		GRAB		GRAB	
Amount/Limit of Detection:	17.8	0.1	17.9	0.1	106		92%		ND	0.1
Quality Control Summary Notes:							A		A	

Note	Note Description	Note	Note Description
A	Requirements set by method were met.	ND	NOT DETECTED

RCRA INSPECTION REPORT

1. Inspector and Author of Report

John M. Lister

2. Facility Information

Kuhlman Electric Company
198 Porter Street
Crystal Springs, Mississippi 39059
(601) 892-4661
MSD008188724

3. Responsible Company Official

Jim Schlangen, Manager, Manufacturing Process
Sherman Blaylock, Safety

4. Inspection Participants

Jim Schlangen - Kuhlman
Sherman Blaylock - Kuhlman
John M. Lister - Bureau of Pollution Control

5. Date and Time of Inspections

September 2, 1987
9:00 a.m.

6. Applicable Regulations

MHWMR 262.34

7. Purpose of Inspection

The purpose of this inspection was to perform a routine generator inspection as well as determine past and present disposal practices.

8. Facility Description

This facility manufactures large 3-phase power and substation transfer transformers. Transformers are built on a work-order basis rather than mass assembled.

9. Findings

It was found that the following conditions existed:

1) In the empty drum (maintenance barrels) storage area evidence of spillage of paint was observed. This paint was identified as grey color ANSI-70. Material Safety Data Sheets (MSDS) for this material identified it as non-hazardous.

2) Evidence of run-off from this area was observed leading to a ditch on the east side of the property.

3) The ground in and alongside the ditch was stained black and dead vegetation was observed.

4) No labelling with the words "Hazardous Waste" or identification was on the accumulation drums in 2 spray booth areas.

5) Bungs were open on accumulation drums in 3 spray booth areas.

6) Two drums containing 3-5 gallons of material assumed to be hazardous waste material were found to be without labels and with the lids unsecured.

7) Degreasing of materials occurs by hand washing with mineral spirits. The mineral spirits drain into a sump area which is emptied into containers and sent to Enterprise Recovery Systems for recycling.

8) The vacuum pressure vessels in which the transformers are treated operates by first drawing any moisture out of the material by heat and pressure. Transformer oil is then added to the system and impregnated into the transformer coils under heat and pressure. Any excess material is drained into a sump, pumped to a storage tank and reused. This is a completely closed system.

9) Six drums of waste were in the hazardous waste storage area. No problems were noted in the storage area.

10) The facility was able to demonstrate they are a small quantity generator by the following documentation for the six drums on site. Therefore a contingency plan and personnel training plan is not required:

Date of Accum.	Amount	Date of Accum.	Amount
7-14	359 lbs.	8-15	440 lbs.
7-14	565 lbs.	8-18	485 lbs.
7-28	415 lbs.	8-25	470 lbs.
	1339 lbs. total		1395 lbs. total

10. Conclusions

The facility was informed that if their generation were over 2200 pounds/month then a full contingency/personnel training plan would be required. The following class I violations were noted during my inspection:

1) Two drums of 3-5 gallons of waste, which was assumed to be waste, were found to have the lids unsecured. The bung on the accumulation drum in each of the 3 spray booth areas were open in violation of MHWMR 262.34 (a)(1) and MHWMR 265.173(a).

2) Two accumulations drums were found to be without the words "Hazardous Waste" as required by MHWMR 262.34(a)(3).

11. Signed

Inspector

12. Approval

cc: Mr. James H. Scarbrough, EPA

Khulman Electric - Crystal Springs, Mississippi

1) When did plant operations begin? The manufacturing operations began at this plant in 1951. Prior to this, the facility was owned by a transformer manufacturer which was in operation for approximately one year.

2) Did Khulman always have the same manufacturing process? The manufacturing process consists of producing special order transformers on an individual basis and has remained the same since beginning operations in 1951.

3) Did Khulman ever use PCBs? PCBs were used in manufacturing operations from 1951 to approximately 1974. PCBs are no longer used in the transformers. Some PCB containing capacitors are in use in the plant and are replaced on an individual basis as needed. Disposal is by Ensco in Arkansas.

4) Did Khulman have any kind of degreasing operations or use solvents for any other purpose?

   The present degreasing operation consists of washing metal parts with mineral spirits, which are collected into a sump, emptied periodically into 55 gallon drums and sent to ERS for recycling. Xylene and mineral spirits are used as solvents for painting operations. Trichloroethane is used on rags for wipedown of individual parts. A past practice involved using trichloroethane as a cutting oil for the cold shearing of transformer cores. The process involved wiping the shears and the core with trichloroethane which then evaporated. The last barrels of this material were sent to ERS on October 23, 1986. This operation was stopped approximately 3-4 months prior to this date.

5) What wastes were disposed of in the past and what was done with seconds? The past waste streams included old paint and thinner, mineral spirits and recycleable metals. Also included were three barrels of trichloroethane which was sent to ERS for recycling. Seconds and unuseable materials are sent back to the vendor or disposed of. Approximately 90-95% of this material is returned to vendor.

6) Where were these wastes disposed and are there any records of this? One manifest of waste sent to Enterprise Recovery Systems in 1983. No records prior to 1983 exist. MHWMR requires the generator to only keep manifest for three years.

7) What wastes are disposed of now and are there any records of this? The present waste streams consist of old paint, thinner, and mineral spirits. These wastes are sent to ERS for recycling. Manifests for these shipments were on record.

8) Does Khulman now or have they ever had a septic tank on site? No - sewerage is supplied by the City of Crystal Springs.

9) Does Khulman discharge to the sewer or POTW and do they have a permit to do so? The only waste discharged to the Crystal Springs treatment plant is sewerage from the restroom facilities. No industrial discharges exist.

10) Does Khulman have an NPDES permit? No.

11) Are there any abandoned or active onsite water wells? No. Water is supplied by the City of Crystal Springs and has been supplied since beginning operations in 1951.

JML:dmh

SPECIAL WASTE SURVEY FORM

MISSISSIPPI STATE BOARD OF HEALTH

M.S.B.H. Use	
Class	
S. I. C.	3612
Ad. info. re.	

Please Type or Print:

1. County in which industry is located: Copiah
2. Name of industry: Kuhlman Electric Company
3. Address of industry: 198 Porter Street, Crystal Springs, Miss. 39059
4. Product(s) manufactured: Medium Power and Special Transformers
5. Person completing form: (a) Name Bernard J. Rekcer

   (b) Title Plant Engineer (c) Organization A.I.P.E.
6. Volume of waste generated (express in cubic feet and include solids or sludge from wastewater treatment or air pollution control equipment, and all other solid wastes and liquid wastes being disposed of on land.)

   (a) Average daily 300 "Est." (b) Maximum daily 450 "Est."
7. Normal periods of operation of the industry: (a) Hours/day 16

   (b) Days/week 5 (c) Weeks/month 4 (d) Months/year 12
8. Composition of the waste Solids - Wood, Food Waste, Paper, Cardboard
9. Other characteristics (a) Percent water "N/A" (b) Specific gravity "N/A"

   (c) Solubility in water (ambient air temperature range) "N/A"
10. Present disposal site: (a) Owner City of Crystal Springs

    (b) Location Highway 27 - 2½ miles east of old Highway 51
11. Distance to present disposal site: 3 miles.
12. Annual disposal cost: $13,500.00 .
13. Is any portion of the waste treated before disposal? ☐ yes ☒ no
    If yes, describe this process in Item No. 15.
14. Is any portion of the waste salvaged or recycled? ☐ yes ☒ no
    If yes, describe this operation in Item No. 15.
15. (A) On an attached sheet, briefly describe the raw materials utilized, the manufacturing process, (B) the source and composition of any solids resulting from air pollution control and wastewater treatment processes, and the source and composition of any other solid wastes generated. Attach any chemical analyses, if available, of any wastes whose final disposition is land disposal.

SPECIAL WASTE SURVEY

15. (A) Raw materials used in our manufacturing process are steel plate, aluminum and copper strip and wire, paper insulation in several thicknesses, and mineral oil.

(B) Our manufacturing process consists of shearing, forming and welding of steel plates to make the transformer tanks and cabinets. The core of the transformers are made by winding steel strip on forms or stacking of sheared lengths. The coils are constructed of aluminum or copper strip and wire, also paper insulating materials in several thicknesses.

(C) We have no solids resulting from air or water pollution control processes, or any generated by other sources.

federal register

Friday
December 14, 1990

Part II

Environmental Protection Agency

40 CFR Part 300
Hazard Ranking System; Final Rule

REFERENCE 1

SUPERFUND CHEMICAL DATA MATRIX

9 March 1993

REFERENCE 2

Sites," OSWER Directive 9345.1-08). If during any stage of the PA investigation you come across information that leads you to believe the site might be eligible for RCRA Subtitle C corrective action, notify your Regional EPA site assessment contact, who will discuss the situation with representatives of the RCRA program and decide whether to proceed with CERCLA investigative activities.

Table 2-1
RCRA Eligibility Checklist

1. Has the facility treated, stored, or disposed any RCRA hazardous waste for any period of time since November 19, 1980? (If the facility or site is a known "protective filer," check no.)

   ☒ Yes ☐ No

   IF THE ANSWER TO QUESTION 1 IS "NO", STOP; SITE IS NOT ELIGIBLE FOR RCRA RESPONSE.
   IF YES, CONTINUE WITH CHECKLIST.

2. Does the facility currently have a RCRA Part B Operating Permit or a post-closure permit?

   ☐ Yes ☒ No

3. Did the facility file a Part A Permit Application? ☐ Yes ☒ No

   If yes,

   - Does the facility currently have interim RCRA status? ☐ Yes ☐ No
   - Did the facility convert its status from TSF to "Generator" or "Non-handler"?

     ☐ Yes ☐ No

   If no,

   - Is the facility a "Non- or Late Filer"? ☐ Yes ☐ No

IF ANSWERS TO ALL QUESTIONS IN PARTS 2 AND 3 ARE "NO," THE SITE IS NOT ELIGIBLE FOR RCRA RESPONSE. IF THE ANSWER TO ANY QUESTION IS "YES," DISCUSS THE SITE WITH YOUR EPA SITE ASSESSMENT CONTACT.

2.2.2 CERCLA Petroleum Exclusion

CERCLA authorized Federal response to releases or threatened releases of "hazardous substances" and "pollutants and contaminants." CERCLA excludes "petroleum, including crude oil or any fraction thereof" from the definition of these terms. However, CERCLA does not define the specific types of petroleum products excluded,

ENDANGERED AND THREATENED SPECIES

U.S. FISH AND WILDLIFE SERVICE

REGION 4 - ATLANTA

REFERENCE 13

Federally Listed Species by State

MISSISSIPPI

(E=Endangered; T=Threatened; CH=Critical Habitat determined)

Mammals	General Distribution
Panther, Florida (*Felis concolor coryi*) - E	Entire state
Whale, right (*Eubalaena glacialis*) - E	Coastal waters
Whale, finback (*Balaenoptera physalus*) - E	Coastal waters
Whale, humpback (*Megaptera novaeangliae*) - E	Coastal waters
Whale, sei (*Balaenoptera borealis*) - E	Coastal waters
Whale, sperm (*Physeter catodon*) - E	Coastal waters

Birds

Crane, Mississippi sandhill (*Grus canadensis pulla*) - E,CH	Southern Jackson County
Eagle, bald (*Haliaeetus leucocephalus*) - E	Entire state
Falcon, Arctic peregrine (*Falco peregrinus tundrius*) - T	Entire state
Pelican, brown (*Pelecanus occidentalis*) - E	Coast
Plover, piping (*Charadrius melodus*) - T	Coast
Tern, least (*Sterna antillarum*); interior population - E	Mississippi River
Warbler, Bachman's (*Vermivora bachmanii*) - E	Entire state
Woodpecker, ivory-billed (*Campephilus principalis*) - E	West, South, East Central
Woodpecker, red-cockaded (*Picoides* (=*Dendrocopos*) *borealis*) - E	Entire state

Reptiles

Alligator, American (*Alligator mississippiensis*) - T (S/A)*	South and West
Snake, eastern indigo (*Drymarchon corais couperi*) - T	South
Tortoise, gopher (*Gopherus polyphemus*) - T	Lower Gulf Coastal Plain (14 counties)
Turtle, Kemp's (Atlantic) ridley (*Lepidochelys kempii*) - E	Coastal waters
Turtle, green (*Chelonia mydas*) - T	Coastal waters

MISSISSIPPI (cont'd)

	General Distribution
Turtle, hawksbill (*Eretmochelys imbricata*) - E	Coastal waters
Turtle, loggerhead (*Caretta caretta*) - T	Coastal waters
Turtle, ringed sawback (*Graptemys oculifera*) - T	Pearl River

Fishes

Darter, bayou (*Etheostoma rubrum*) - T	Bayou Pierre drainage

Mollusks

Mussel, Curtus' (*Pleurobema curtum*) - E	East Fork Tombigbee River
Mussel, Judge Tait's (*Pleurobema taitianum*) - E	East Fork Tombigbee River and Buttahatchie River
Mussel, penitent (*Epioblasma* [=*Dysnomia*] *penita*) - E	East Fork Tombigbee River.

Plants

Lindera melissifolia (Pondberry) - E	Sharkey and Sunflower Counties

*Alligators are biologically neither endangered nor threatened. For law enforcement purposes they are classified as "Threatened due to Similarity of Appearance." Alligator hunting is regulated in accordance with State law.

U.S Fish and Wildlife Service
Vicksburg Office

SPECIES LIST BY COUNTY

E - Endangered Species
T - Threatened Species
P - Proposed Species
C - Candidate Species
CA - Conservation Agreement
CH - Critical Habitat

MISSISSIPPI

Amite	E - Red-cockaded woodpecker (Picoides borealis)
Bolivar	E - Pondberry
Claiborne	T - Bayou darter (Etheostoma rubrum)
Clark	C - Yellowblotched sawback - Graptemys flavimaculata
Copiah	T - Bayou darter (Etheostoma rubrum) T - Ringed sawback turtle (Graptemys oculifera)
Covington	T - Gopher tortoise (Gopherus polyphemus)
Forrest	E - Red-cockaded woodpecker (Picoides borealis) T - Gopher tortoise (Gopherus polyphemus) C - Yellowblotched sawback - Graptemys flavimaculata
Franklin	E - Red-cockaded woodpecker (Picoides borealis)
George	E - Red-cockaded woodpecker (Picoides borealis) T - Gopher tortoise (Gopherus polyphemus) C - Maureen's symnocthebius minute moss beetle C - Yellowblotched sawback - Graptemys flavimaculata
Greene	E - Red-cockaded woodpecker (Picoides borealis) T - Gopher tortoise (Gopherus polyphemus) C - Yellowblotched sawback - Graptemys flavimaculata
Hancock	E - Brown pelican (Pelecanus occidentalis) T - Gopher tortoise (Gopherus polyphemus)
Harrison	E - Red-cockaded woodpecker (Picoides borealis) E - Bald eagle (Haliaeetus leucocephalus) E - Eastern indigo snake (Drymarchon corais couperi) E - Brown pelican (Pelecanus occidentalis) T - Gopher tortoise (Gopherus polyphemus)
Hinds	T - Bayou darter (Etheostoma rubrum) T - Ringed sawback turtle (Graptemys oculifera)
Itawamba	E - Curtus' mussel (Pleurobema curtum) E - Penitent shell mussel (Epioblasma penita) E - Judge Tait's mussel (Pleurobema taitianum) C - Southern clubshell Pleurobema decisum
Jackson	E - Brown pelican (Pelecanus occidentalis) E - Red-cockaded woodpecker (Picoides borealis) E - Mississippi sandhill crane (CH) (Grus canadensis pulla) T - Gopher tortoise (Gopherus polyphemus) C - Yellowblotched sawback - Graptemys flavimaculata

Jasper	E - Red-cockaded woodpecker (Picoides borealis)
Jones	E - Red-cockaded woodpecker (Picoides borealis) T - Gopher tortoise (Gopherus polyphemus) C - Yellowblotched sawback - Graptemys flavimaculata
Lawrence	T - Ringed sawback turtle (Graptemys oculifera)
Lamar	T - Gopher tortoise (Gopherus polyphemus)
Leake	T - Ringed sawback turtle (Graptemys oculifera)
Lowndes	E - Judge Tait's mussel (Pleurobema taitianum) E - Penitent shell mussel (Pleurobema penita)
Madison	T - Ringed sawback turtle (Graptemys oculifera)
Marion	T - Ringed sawback turtle (Graptemys oculifera) T - Gopher tortoise (Gopherus polyphemus)
Monroe	E - Curtus' mussel (Pleurobema curtum) E - Penitent shell mussel (Epioblasma penita) E - Judge Tait's mussel (Pleurobema taitianum) C - Southern clubshell Pleurobema decisum
Neshoba	T - Ringed sawback turtle (Graptemys oculifera)
Noxubee	E - Red-cockaded woodpecker (Picoides borealis)
Oktibbeha	E - Red-cockaded woodpecker (Picoides borealis)
Pearl River	T - Ringed sawback turtle (Graptemys oculifera) T - Gopher tortoise (Gopherus polyphemus)
Perry	E - Red-cockaded woodpecker (Picoides borealis) T - Gopher tortoise (Gopherus polyphemus) C - Yellowblotched sawback - Graptemys flavimaculata
Rankin	T - Ringed sawback turtle (Graptemys oculifera)
Scott	E - Red-cockaded woodpecker (Picoides borealis) T - Ringed sawback turtle (Graptemys oculifera)
Simpson	T - Ringed sawback turtle (Graptemys oculifera)
Smith	E - Red-cockaded woodpecker (Picoides borealis)
Stone	E - Red-cockaded woodpecker (Picoides borealis) E - Eastern indigo snake (Drymarchon corais couperi) T - Gopher tortoise (Gopherus polyphemus)
Sharkey	E - Pondberry (Lindera melissifolia)
Sunflower	E - Pondberry (Lindera melissifolia)

Wayne	E - Red-cockaded woodpecker (*Picoides borealis*) T - Gopher tortoise (*Gopherus polyphemus*) C - Yellowblotched sawback - *Graptemys flavimaculata*
Wilkinson	E - Red-cockaded woodpecker (*Picoides borealis*)
Winston	E - Red-cockaded woodpecker (*Picoides borealis*)

Household, Family

[For definitions of terms and meanings of symbols, see text]

State County Place and [In Selected States] County Subdivision	Persons per— Household	Persons per— Family
The State	2.75	3.27
COUNTY		
Adams County	2.64	3.18
Alcorn County	2.52	3.02
Amite County	2.76	3.30
Attala County	2.63	3.20
Benton County	2.82	3.32
Bolivar County	3.02	3.64
Calhoun County	2.60	3.10
Carroll County	2.75	3.24
Chickasaw County	2.77	3.28
Choctaw County	2.76	3.26
Claiborne County	2.82	3.48
Clarke County	2.71	3.20
Clay County	2.83	3.37
Coahoma County	2.93	3.60
Copiah County	2.83	3.36
Covington County	2.84	3.35
DeSoto County	2.81	3.23
Forrest County	2.54	3.15
Franklin County	2.69	3.22
George County	2.86	3.29
Greene County	2.90	3.35
Grenada County	2.75	3.25
Hancock County	2.64	3.11
Harrison County	2.63	3.17
Hinds County	2.70	3.28
Holmes County	2.97	3.61
Humphreys County	3.07	3.67
Issaquena County	3.02	3.57
Itawamba County	2.59	3.02
Jackson County	2.82	3.25
Jasper County	2.85	3.34
Jefferson County	3.07	3.67
Jefferson Davis County	2.91	3.43
Jones County	2.65	3.17
Kemper County	2.77	3.37
Lafayette County	2.47	3.08
Lamar County	2.78	3.21
Lauderdale County	2.59	3.15
Lawrence County	2.74	3.28
Leake County	2.69	3.22
Lee County	2.63	3.14
Leflore County	2.82	3.47
Lincoln County	2.68	3.20
Lowndes County	2.71	3.23
Madison County	2.74	3.34
Marion County	2.75	3.27
Marshall County	2.93	3.41
Monroe County	2.72	3.22
Montgomery County	2.70	3.25
Neshoba County	2.77	3.22
Newton County	2.68	3.15
Noxubee County	3.04	3.63
Oktibbeha County	2.58	3.18
Panola County	2.91	3.44
Pearl River County	2.77	3.21
Perry County	2.84	3.32
Pike County	2.70	3.27
Pontotoc County	2.63	3.11
Prentiss County	2.62	3.08
Quitman County	2.95	3.58
Rankin County	2.82	3.21
Scott County	2.82	3.31
Sharkey County	3.18	3.92
Simpson County	2.78	3.28
Smith County	2.78	3.25
Stone County	2.75	3.25
Sunflower County	3.05	3.71
Tallahatchie County	3.01	3.60
Tate County	2.92	3.35
Tippah County	2.65	3.14
Tishomingo County	2.48	2.93
Tunica County	3.22	3.84
Union County	2.62	3.09
Walthall County	2.86	3.38
Warren County	2.72	3.28
Washington County	2.96	3.54
Wayne County	2.83	3.31
Webster County	2.63	3.17
Wilkinson County	2.83	3.38
Winston County	2.73	3.27
Yalobusha County	2.59	3.20
Yazoo County	2.86	3.45

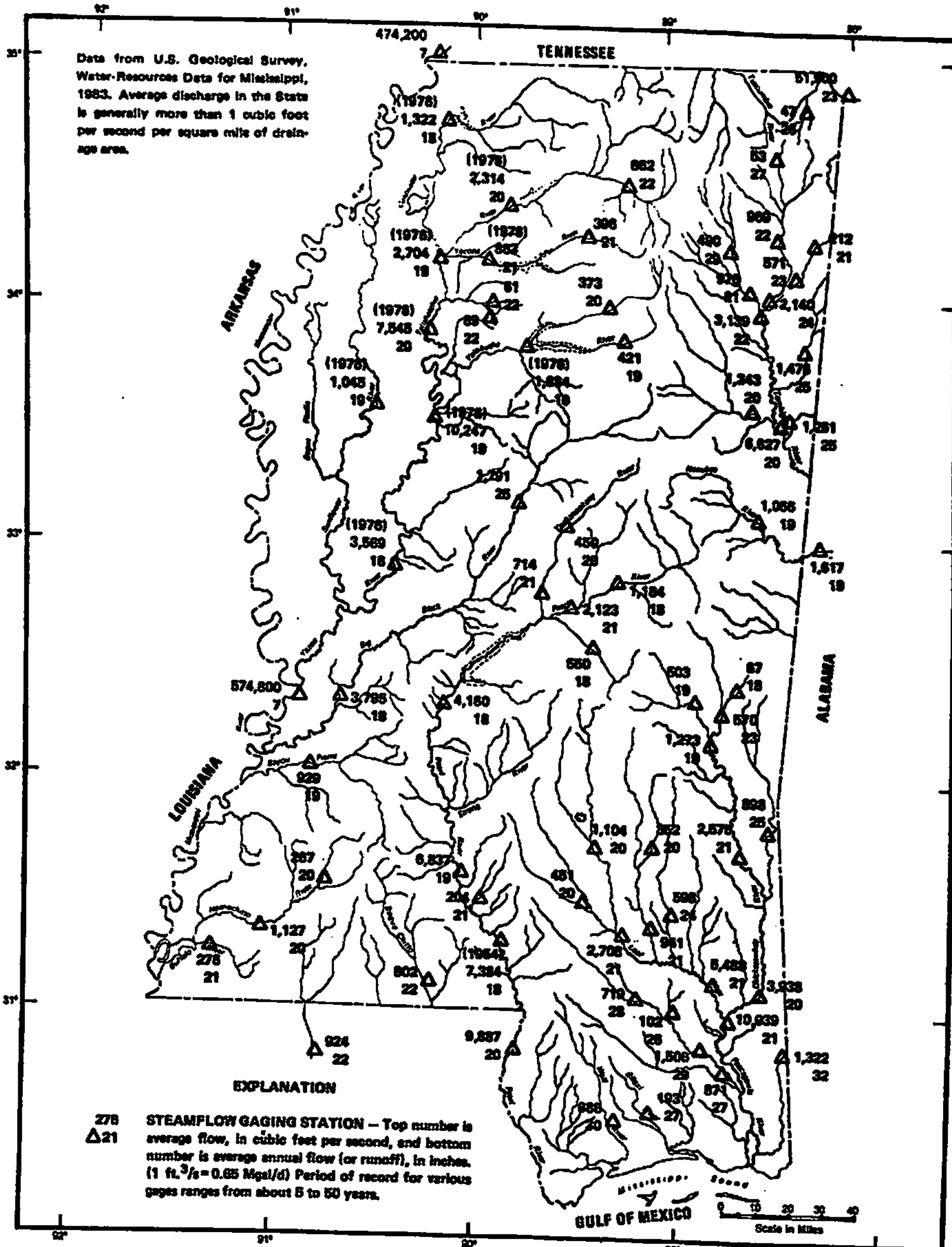
U.S. Department of Commerce, Proof Copy of table generated for 1990, CPH-1, Summary population and housing characteristics, issued by Bureau of Census (April 1992)

SOURCES FOR WATER SUPPLIES IN MISSISSIPPI

by B. E. Wasson
Hydrologist
U.S. Geological Survey

A COOPERATIVE STUDY SPONSORED BY THE
U. S. GEOLOGICAL SURVEY
and the
Mississippi Research and Development Center
JACKSON, MISSISSIPPI
REVISED 1986

REFERENCE 9



- Average flow at selected streamgaging sites in cubic feet per second and in inches per year for periods of record through 1983 water year. (If end of record for station is earlier than 1983, the date is shown in parentheses.)

United States
Department of
Agriculture

Soil
Conservation
Service

Nov. 1984

In Cooperation with
United States Department of
Agriculture, Forest Service,
and Mississippi Agricultural
and Forestry
Experiment Station

Soil Survey of Copiah County Mississippi

Reference 12

Figure 5.—Corn growing on Oaklimeter silt loam.

hazard. A high water table is perched above the fragipan and is 1 1/2 to 3 feet below the surface during winter and early in spring. The surface layer is friable and easily tilled throughout a fairly wide range of moisture content, but it usually crusts and packs after hard rains.

Included in mapping are small areas of well drained Ariel soils and somewhat poorly drained Bude and Calloway soils. Ariel soils are in small areas of flood plains; Bude and Calloway soils are in small depressional areas.

Most areas of this Providence soil are used for crops and pasture. A small acreage is in woodland. This soil is well suited to cotton, corn, soybeans, and small grains. Proper row arrangement, grassed waterways, and surface field ditches help control erosion and wetness on cultivated fields. Returning crop residue to the soil increases soil fertility, improves tilth, and reduces crusting.

This soil is well suited to grasses and legumes for hay and pasture. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth. Management concerns include proper stocking, controlled grazing, and weed and brush control.

This soil is well suited to cherrybark oak, southern red oak, loblolly pine, shortleaf pine, sweetgum, water oak, and white oak. Woodland management limitations are slight.

This soil is moderately limited for most urban uses because of wetness and the shrink-swell potential. For local roads and streets, low strength is a severe limitation. Proper design and construction will help overcome these limitations. The moderately slow permeability of the fragipan and wetness severely limit the use of this soil as septic tank absorption fields.

This Providence soil is in capability subclass IIw and in woodland suitability group 2o7.

PrB2—Providence silt loam, 2 to 5 percent slopes, eroded. This moderately well drained, gently sloping soil, which has a fragipan, formed in a mantle of silty material and underlying loamy sediment on uplands and stream terraces.

Typically, the surface layer is dark grayish brown silt loam about 6 inches thick. The upper part of the subsoil to a depth of about 25 inches is strong brown silty clay loam. The middle part, to a depth of about 46 inches, is a strong brown silt loam fragipan that has yellowish brown and pale brown mottles. The lower part of the subsoil to a depth of 70 inches is a mottled, yellowish red and yellowish brown clay loam fragipan.

In most places, part of the original surface layer has been removed by erosion, and tillage has mixed topsoil and subsoil together. In some places, all of the plow layer is the original topsoil, and in other places, the plow layer is essentially in the subsoil. Some areas have a few rills and shallow gullies.

This soil ranges from very strongly acid to medium acid throughout except where the surface layer has been limed. Permeability is moderate above the fragipan and moderately slow in the fragipan. Available water capacity is moderate. Runoff is medium, and the erosion hazard is moderate. A high water table is perched above the fragipan and is 1 1/2 to 3 feet below the surface during winter and early in spring. The surface layer is friable and easily tilled throughout a fairly wide range of moisture content, but it usually crusts and packs after hard rains.

Included in mapping are small areas of somewhat poorly drained Bude soils and moderately well drained Grenada and Kolin soils. Bude and Grenada soils are in lower depressional areas; Kolin soils are on positions on the landscape similar to those of this Providence soil.

Most areas of this Providence soil are used for crops and pasture. A small acreage is in woodland. This soil is well suited to cotton, corn, soybeans, and small grains. Conservation tillage, grassed waterways, and contour farming help control erosion on cultivated fields. Returning crop residue to the soil increases soil fertility, improves soil tilth, and reduces crusting.

This soil is well suited to grasses and legumes for hay and pasture. The use of this soil for hay and pasture is also effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth. Management concerns include proper stocking, controlled grazing, and weed and brush control.

This soil is well suited to cherrybark oak, southern red oak, loblolly pine, shortleaf pine, sweetgum, water oak, and white oak. Woodland management limitations are slight.

This soil is moderately limited for most urban uses because of wetness and the shrink-swell potential. For local roads and streets, low strength is a severe limitation. Proper design and construction will help overcome these limitations. The moderately slow permeability of the fragipan and wetness severely limit the use of this soil as septic tank absorption fields.

This Providence soil is in capability subclass IIe and in woodland suitability group 2o7.

PrC2—Providence silt loam, 5 to 8 percent slopes, eroded. This moderately well drained, sloping, eroded soil, which has a fragipan, formed in a mantle of silty material and underlying loamy sediment on uplands.

Typically, the surface layer is brown silt loam about 7 inches thick. The upper part of the subsoil, to a depth of about 25 inches, is strong brown silty clay loam. The middle part, to a depth of 38 inches, is a strong brown silt loam fragipan mottled with light grayish brown and yellowish brown. The lower part of the subsoil to a depth of 72 inches is a mottled, yellowish red, gray, and strong brown clay loam fragipan.

In most places, part of the original surface layer has been removed by erosion, and tillage has mixed topsoil and subsoil together. In some places, all of the plow layer is the original topsoil, and in other places, the plow layer is essentially in the subsoil. Some areas have a few rills and shallow gullies.

This soil ranges from very strongly acid to medium acid throughout except where the surface has been limed. Permeability is moderate above the fragipan and moderately slow in the fragipan. Available water capacity is moderate. Runoff is medium, and erosion is a moderate hazard. A high water table is perched above the fragipan and is 1 1/2 to 3 feet below the surface during the winter and early in spring. The surface layer is friable and easily tilled throughout a fairly wide range of moisture content, but it usually crusts and packs after hard rains.

Included in mapping are small areas of moderately well drained Kolin and Lax soils. These soils are on positions similar to those of this Providence soil.

Most areas of this Providence soil are used for crops and pasture. A small acreage is in woodland. This soil is suited to cotton, corn, soybeans, and small grains. Conservation tillage, grassed waterways, terracing, and contour farming help control erosion on cultivated fields (fig. 6, 7). Returning crop residue to the soil increases soil fertility, improves soil tilth, and reduces crusting.

This soil is well suited to grasses and legumes for hay and pasture. The use of this soil for hay and pasture is effective in controlling erosion. Overgrazing or grazing when the soil is too wet causes surface compaction and poor tilth. Management concerns include proper stocking, controlled grazing, and weed and brush control.

This soil is well suited to cherrybark oak, southern red oak, loblolly pine, shortleaf pine, sweetgum, water oak, and white oak. Woodland management limitations are slight.

This soil is moderately limited for most urban uses because of wetness, the shrink-swell potential, and steepness of slope. For local roads and streets, low strength is a severe limitation. Proper design and construction will help overcome these limitations. The moderately slow permeability of the fragipan and wetness severely limit the use of this soil as septic tank absorption fields.

This Providence soil is in capability subclass IIIe and in woodland suitability group 2o7.

SOIL LEGEND

The first letter, always a capital, is the initial letter of the soil name. The second letter is a capital if the mapping unit is broadly defined 1/; otherwise, it is a small letter. The third letter, if used, is always a capital and shows the slope. Symbols without slope letters are those of nearly level soils or broadly defined mapping units. A final number of 2 in the symbol shows that the soil is eroded, and a final number of 3 shows that it is severely eroded. Symbols without erosion numbers 2 or 3 are those of soils that are slightly eroded or broadly defined units 1/.

1/ The composition of these units is more variable than that of others in the survey area, but has been controlled well enough to be interpreted for the expected use of the soils.

SYMBOL	NAME
Ae	Ariel silt loam
Ar	Arkabutla silt loam
Br	Bruno sandy loam
BuA	Bude silt loam, 0 to 2 percent slopes
CaA	Cahaba sandy loam, 0 to 2 percent slopes
CaB	Cahaba sandy loam, 2 to 5 percent slopes
CoA	Calloway silt loam, 0 to 2 percent slopes
CuA	Columbus silt loam, 0 to 2 percent slopes
Gb	Gillsburg silt loam
GrA	Grenada silt loam, 0 to 2 percent slopes
Gu	Guyton silt loam
KoB2	Kolin silt loam, 2 to 5 percent slopes, eroded
KoC2	Kolin silt loam, 5 to 8 percent slopes, eroded
LaB	Latonia loamy sand, 0 to 5 percent slopes
LbB2	Lax silt loam, 2 to 5 percent slopes, eroded
LoA	Loring silt loam, 0 to 2 percent slopes
LoB2	Loring silt loam, 2 to 5 percent slopes, eroded
LoC2	Loring silt loam, 5 to 8 percent slopes, eroded
LoD2	Loring silt loam, 8 to 12 percent slopes, eroded
LoD3	Loring silt loam, 5 to 12 percent slopes, severely eroded
LrD	Lorman fine sandy loam, 8 to 12 percent slopes
LrE	Lorman fine sandy loam, 12 to 35 percent slopes
LS	Lorman-Smithdale association, hilly
MeB2	Memphis silt loam, 2 to 5 percent slopes, eroded
MeC2	Memphis silt loam, 5 to 8 percent slopes, eroded
Ok	Oaklimeter silt loam
PrA	Providence silt loam, 0 to 2 percent slopes
PrB2	Providence silt loam, 2 to 5 percent slopes, eroded
PrC2	Providence silt loam, 5 to 8 percent slopes, eroded
PrC3	Providence silt loam, 5 to 12 percent slopes, severely eroded
SaE	Saffell gravelly sandy loam, 12 to 17 percent slopes
SaF	Saffell gravelly sandy loam, 17 to 40 percent slopes
SF	Saffell-Smithdale association, hilly
SmD	Smithdale sandy loam, 8 to 12 percent slopes
SmE	Smithdale sandy loam, 12 to 17 percent slopes
SmF	Smithdale sandy loam, 17 to 40 percent slopes
SMF3	Smithdale sandy loam, 17 to 40 percent slopes, severely eroded
ST	Smithdale-Lexington association, hilly
Ud	Udorthents, gravelly
Ve	Velda very fine sandy loam

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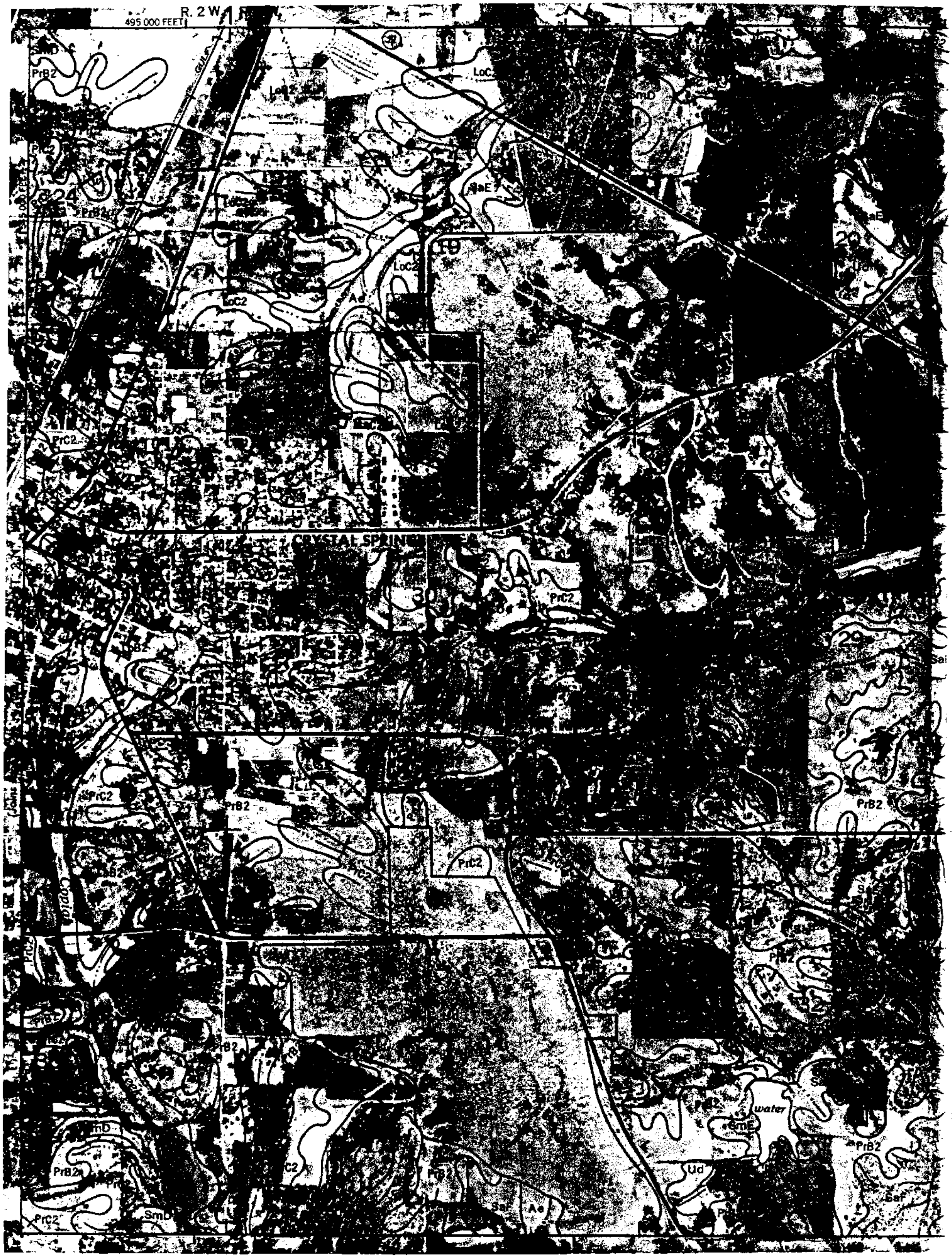
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating



shown, are approximately positioned.

Copiah County
Geology and Mineral Resources

ALVIN R. BICKER, JR.

THAD N. SHOWS
THEO H. DINKINS, JR.
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BULLETIN 110

MISSISSIPPI GEOLOGICAL, ECONOMIC AND
TOPOGRAPHICAL SURVEY

WILLIAM HALSELL MOORE
DIRECTOR AND STATE GEOLOGIST

JACKSON, MISSISSIPPI

1969

PRICE $2.00

Reference 19

species of palm wood, in the Miocene sediments of Adams County. This fossil flora is undoubtedly from the Hattiesburg formation.

CITRONELLE FORMATION

The Citronelle formation was named by Matson[23] for exposures at Citronelle, Mobile County, Alabama. He proposed the name as a replacement for a portion of the deposits formerly classified as Drift, Orange Sand and Lafayette. Matson felt that the older names included deposits that were older and younger than those of the Citronelle. The term Citronelle has been an acceptable formation name since Matson proposed it. The age of the formation, however, has been the subject of much debate. It is not the purpose of this report to review the arguments as to a Pliocene or Pleistocene age for the formation. The writer favors an early Pleistocene age and hereby assigns the Citronelle to that period for this report.

Citronelle deposits cover approximately thirty per cent of the surface of Copiah County. The formation originally covered the entire surface of the County. Subsequent erosion has since removed the formation from many areas, leaving the upland plains and divides capped by the formation.

Figure 11.—Cross-bedded Citronelle sand and gravel. Location at gravel pit in SE¼, SE¼, sec. 31, T. 2 N., R. 1 W. March 1968.

The formation is predominantly sandy with local lenses or layers of clay and gravel. Where present the gravels are usually concentrated near the base of the formation and decrease generally upward through the section. Exceptions are found, however, most notably in the deposits near Crystal Springs which are being heavily mined. At this locality gravels occur throughout the formation. This condition undoubtedly exists at other localities within the County and suggests that at the time of deposition these areas were in the vicinity of principal drainage.

Figure 12.—Quartz boulder in Citronelle deposits. Location near center of sec. 29, T. 2 N., R. 3 W. July 1968.

The colors of the Citronelle deposits in Copiah County are varying shades of red. In exposures which have not been subjected to much weathering or affected by circulation of iron rich ground water the colors are lighter shades of red and a distinctive pink. Consequently, where the formation consists chiefly of sand weathering has been more effective and the circulation of ground water greater causing the formation to be a deeper shade of red. The predominance of darker colors of orange and red led to the early designation of the formation as the "Orange sand."

Gravel found within the formation is generally composed of chert with smaller percentages of quartz. The pebbles exhibit varying degrees of roundess from sub-angular to well-rounded. The pebble material is a poorly sorted aggregate that ranges from granule size to cobble size with frequent occurrences of material that is of boulder size. This boulder size material sometimes appears to be erratic as some boulders are sandstone. The chert gravel contains many fragments of corals, crinoid stems and other remains which indicate a Paleozoic origin.

Thickness of the Citronelle formation in Copiah County varies from a few feet to a maximum of approximately one hundred feet. Generally, the thickness is governed by the topography of the eroded Citronelle surface. Local variations may occur, however, due to the unconformable contact of the formation with the underlying Miocene. The thickest section is found along the divide between the Pearl River and Bayou Pierre drainage basins where surface elevations approach 500 feet above sea level. Comparable thicknesses should be found in the southwest portion of the County where similar surface elevations exist.

As noted above the contact of the Citronelle formation with subjacent strata is unconformable. In the northern and central part of the County the Citronelle overlies the Catahoula. Southward the formation rests on strata of Hattiesburg age. Generally, the contact is sharp where the Citronelle overlies clays of either the Catahoula or Hattiesburg formations. At some localities difficulty in identifying the contact may arise where the Citronelle overlies sands of Miocene age. In these areas microscopic examination of the sands is necessary to identify the age of the material. Generally, the Miocene sands can be identified as being more sub-angular, having a different clay mineral association and a greater heavy mineral grain concentration.

In localities where the Citronelle overlies clay, ferruginous sandstone or siltstone can be observed in the basal part of the formation at or near the contact. On surface outcrops the material was observed in the form of layers a few inches thick. Water well drillers report numerous occurrences of iron rock or iron stone within the basal zone. Some of these reports show thicknesses of the iron rock to reach a maximum of four feet. These ferruginous concentrations are not limited to the Citronelle formation. The author found similar material in the basal section of other terrace deposits in Copiah and surrounding counties.

The Citronelle formation is overlain by loess and loessal soils. In the southwestern part of the County four to six feet of highly weathered loess can be found overlying the Citronelle. The contact is unconformable and is easily identified on a fresh exposure. Several good exposures were observed in recently excavated road cuts along State Highway 547 in sec. 11, T. 9 N., R. 5 E. Eastward the loess becomes thinner and weathering has reduced the silt to residual soils locally called brown loam.

The base of the Citronelle formation is found at elevations ranging from approximately 375 feet to 430 feet above sea level. The lower elevations are found in the northeast part of the County in the vicinity of Crystal Springs and the higher elevations are found near the southern boundary of the County. This suggests northward inclination of the base of the Citronelle. On a structure map constructed with the base of the Citronelle as a datum, Doering[24] shows an embayment in the Pearl River Valley which could account for the lower elevations near Crystal Springs. In the western part of the County sufficient contacts were not observed to ascertain accurately the inclination of the base. Observations made indicate the base to be nearly level in this area of Copiah County. The writer suggests that the northward flow of Bayou Pierre possibly indicates post depositional uplift near the southern border of Copiah County which raised the base of the Citronelle from an original southward inclination to its present near horizontal position.

PRE-LOESS TERRACE DEPOSITS

Sand and gravel deposits not mapped as Citronelle or as recent alluvial deposits are designated as pre-loess terrace deposits. Moore[25] mapped a number of these deposits in Hinds County and introduced the term of pre-loess terrace deposit. The writer used the same term for similar deposits in Claiborne County. Criteria for designation of these deposits as pre-loess terraces in these two adjoining counties was based mainly on elevations of the deposits. In Copiah County elevations alone cannot be used to distinguish the deposits from the Citronelle formations of the Eocene series suggests highly tilted beds associated with faulting.

ECONOMIC GEOLOGY

GENERAL STATEMENT

One of the primary purposes of the investigation of the geology and mineral resources of Copiah County was to locate and report mineral deposits of known or probable economic

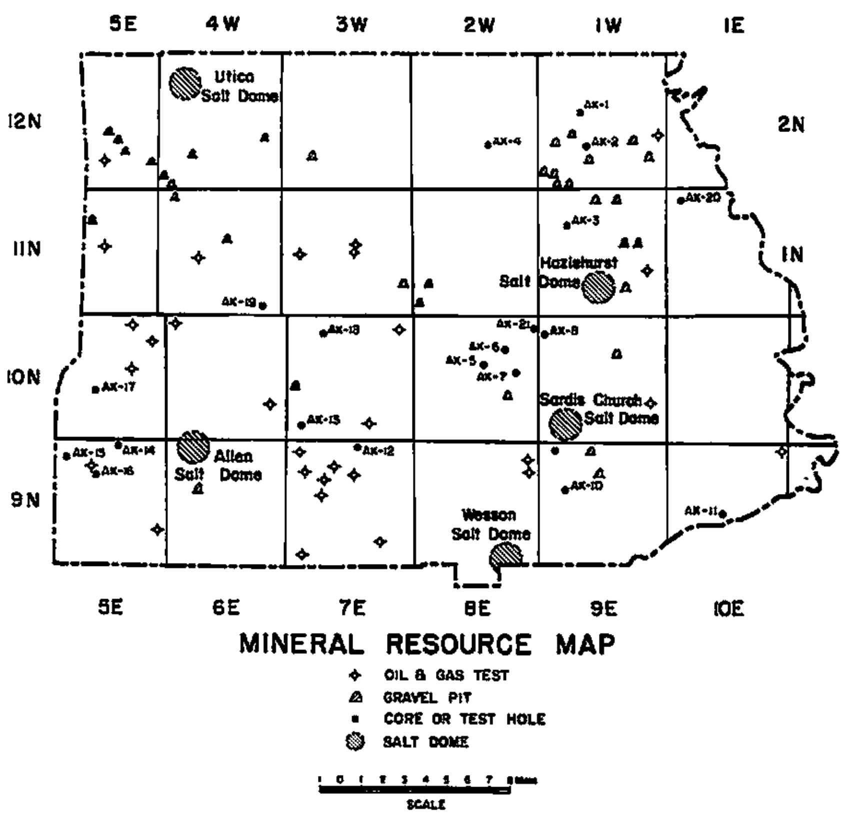


Figure 21.—Mineral Resource Map.

value. Selection of samples to be tested was limited to areas where outcrops indicated favorable material. Other factors such as accessibility, thickness and overburden were additional criteria observed in sample selection. Nineteen samples of clay were selected for chemical and ceramic testing.

CORE HOLE AND TEST HOLE RECORDS

The following are descriptions of cuttings and cores from tests drilled during the field investigations of the mineral resources of Copiah County. The prefix AK is the code designation for Copiah County in the Survey's County Sample Index System. The prefix aids in the permanent indexing and identification of all material secured and tested in the course of geological and mineral investigation.

Location of each test and core hole was accomplished with the aid of topographic maps where available. Approximate footage noted in the location descriptions was scaled from the topographic maps using an engineer's scale. Elevations noted are ground elevations at the drill site, these elevations were interpreted directly from the topographic map or secured with the aid of a Paulin Altimeter.

The purpose for drilling each test is stated in the heading of each hole along with information concerning the availability of an electrical log. All thicknesses and depths are in feet.

AK-1

Location: Approximately 1100 feet west of the east line and 2100 feet north of the south line of Sec.17, T.2N., R.1W.

Elevation: 410 feet (topographic map) Date: June 14, 1967

Purpose: Drilled to 370 feet for stratigraphic information. No electrical log available.

Thickness	Depth	Description
		Citronelle formation
30	30	Sand, red, fine-grained, abundant unsorted chert gravel.
11	41	Sand, red, fine-grained, some gravel, abundant multi-colored clay.
		Catahoula formation
19	60	Silt, light gray-green, micaceous, clayey.
10	70	Clay, gray-green, slightly silty, plastic.
30	100	Clay, light gray-green, very silty, scattered limonitic staining.
20	120	Silt, light-gray, slightly sandy.
20	140	Silt, light-gray, becoming clayey, with scattered large quartz grains.
20	160	Clay, light-gray, very silty.
40	200	Clay, light-gray, mottled, silty, scattered pyrite nodules.
10	210	Silt, light-gray, slightly sandy.
10	220	Sand, fine-grained, some red-brown silty clay.
20	240	Silt, light-gray to brown with some fine-grained sand.
20	260	Silt, light-gray to green.
10	270	Sand, very fine- to fine-grained, micaceous.
10	280	Silt, light-gray to tan, sandy.
10	290	Clay, light gray-green, very silty, sandy.
10	300	Sand, fine- to medium-grained.
20	320	Silt, light-gray, slightly sandy.
10	330	Sand, very fine- to fine-grained.
10	340	Silt, light-gray, sandy.
10	350	Sand, very fine- to fine-grained, kaolinitic.
20	370	Sand, fine- to medium-grained.

AK-2

Location: In pasture near center of NW/4, Sec.28, T.2N., R.1W.

Elevation: 355 feet (topographic map) Date: June 27, 1967

Purpose: Drilled to 610 feet for stratigraphic information. Electrical log to total depth.

Thickness	Depth	Description
		Alluvium
11	11	Sand, fine- to coarse-grained, abundant gravel.
		Catahoula formation
19	30	Silt, light-yellow to light-gray, clayey.
20	50	Silt, light-gray.
30	80	Clay, gray-green, very silty, micaceous.
10	90	Silt, light-gray, micaceous.
10	100	Sand, light-gray, fine-grained, silty.
26	126	Sand, medium- to coarse-grained.
16	142	Silt, light-gray, slightly sandy.
18	160	Sand, fine- to medium-grained with streaks of light-gray silt.
18	178	Silt, light-gray, sandy.
35	213	Clay, light gray-green, slightly silty.
15	228	Sand, fine-grained, silty.
38	266	Clay, light-gray, silty.
34	300	Sand, medium- to coarse-grained.
36	336	Silt, light-gray, slightly silty.
14	350	Sand, fine-grained, silty.
12	362	Silt, light-gray, sandy.
13	375	Sand, fine- to coarse-grained, silty, micaceous, pyrite, some glauconite.
27	402	Silt, light-gray, sandy.
28	430	Clay, light-gray, silty, micaceous.
40	470	Clay, gray to brown, silty, slightly sandy.
26	496	Silt, light-gray.
26	522	Clay, light-gray, silty.
		Vicksburg group (Bucatunna clay)
70	592	Clay, light to medium-gray, carbonaceous.
		Vicksburg group (Byram marl)
18	610	Marl, light gray-green, fossiliferous, glauconitic.

AK-3

Location: In pasture on flood plain of Little Copiah Creek. Approximately 2400 feet from west line and 700 feet from south line of Sec.8, T.1N., R.1W.

Elevation: 365 feet (topographic map) Date: July 7, 1967

Purpose: Drilled to 650 feet for stratigraphic information. Electrical log to total depth.

Thickness	Depth	Description
		Alluvium
10	10	Sand, coarse-grained, unsorted chert gravel, tan silt.
10	20	Clay, gray to yellow, silty, sandy.
		Catahoula formation
46	66	Sand, fine- to medium-grained, slight iron staining.
10	76	Clay, light-gray, silty.
20	96	Sand, fine- to medium-grained, some kaolinitic material.
84	180	Clay, light-gray, silty, micaceous, with scattered multi-colored clay.
10	190	Silt, light-gray, sandy.
22	212	Sand, fine- to very coarse-grained, angular to sub-angular, poorly sorted.

18	230	Silt, light-gray, sandy, micaceous.
6	236	Sand, coarse-grained.
28	264	Clay, light-gray, silty.
14	278	Silt, light-gray.
6	284	Sand, fine- to medium-grained, silty.
26	310	Silt, light-gray to green, slightly sandy.
16	326	Sand, fine- to medium-grained.
34	360	Silt, light-gray, slightly clayey.
14	374	Clay, light-gray to green, silty, sandy.
10	384	Sand, very fine-grained, silty.
46	430	Clay, light-gray, silty.
12	442	Silt, light-gray, pyritic.
32	474	Clay, light-gray to green, pyritic, micaceous.
6	480	Sand, fine- to medium-grained, abundant pyrite.
34	514	Clay, light-green to gray, micaceous, silty.
28	542	Silt, light-gray, sandy, micaceous.
24	566	Clay, light-gray, sandy, silty.
16	582	Silt, light-gray, sandy.
18	600	Sand, fine- to medium-grained.
10	610	Clay, light-gray, silty.
30	640	Sand, very fine- to fine-grained, silty.
10	650	Clay, light-gray, silty, micaceous.

AK-4

Location: In pasture 1200 feet west of paved road. Approximately 2300 feet west of the east line and 400 feet south of the north line of Sec.27, T.2N., R.2W.

Elevation: 342 feet (topographic map) Date: August 1, 1967

Purpose: Drilled to a total depth of 530 feet for stratigraphic information. Electrical log to 366 feet.

Thickness	Depth	Description
		Alluvium
10	10	Silt, tan, very sandy.
20	30	Sand, coarse-grained, silty, clayey, abundant gravel.
		Catahoula formation
18	48	Clay, light-gray, silty, slightly sandy.
32	80	Clay, light-gray to tan, slightly silty.
12	92	Clay, light-gray to tan, very silty.
10	102	Silt, light-gray, sandy.
38	140	Sand, very fine- to fine-grained, silty.
90	230	Silt, light-gray, micaceous, sandy.
86	316	Sand, fine-grained, silty, some kaolinitic material, rare glauconite.
50	366	Clay, light-gray to yellow, slightly silty.
14	380	Silt, light-gray, slightly sandy, micaceous.
10	390	Sand, fine- to coarse-grained, pyrite.
20	410	Clay, gray to green, silty, sandy.
10	420	Sand, fine-grained, silty, clayey.
10	430	Clay, gray, silty, sandy.
30	460	Sand, fine- to medium-grained slightly silty, rare glauconite.
70	530	Sand, very coarse-grained, thin stringers of clay.

AK-5

Location: In pasture in NW/4 of SE/4 of NE/4 of Sec.15, T.10N., R.8E.

Elevation: 390 feet (topographic map) Date: August 4, 1967

Purpose: Drilled to 400 feet for stratigraphic information. Electrical log to 398 feet.

Thickness	Depth	Description
		Hattiesburg formation?
10	10	Clay, light-gray to tan, very silty, slightly sandy.

discharge of water-table aquifers. Aquifers in the Citronelle, terrace and alluvium deposits generally are classed as water-table aquifers.

Artesian aquifers are confined by impermeable beds, usually clay, and the water in wells will rise above the top of the water-bearing material. Artesian conditions are present throughout Copiah County and usually occur at deeper depths than the water-table aquifers. The majority of wells in Copiah County are completed in artesian aquifers even though the water level does not reach the surface. Some people have the idea that artesian aquifers are restricted to those that flow. This is not the case. Artesian wells located in the deeper stream valleys usually have a water level above the surface and thereby flow.

Water quality changes as the water moves down the dip from the outcrop to areas of discharge. Dissolved solids content usually increases down the dip due to more mineral matter being dissolved by the water and the type of the water changes from calcium to sodium bicarbonate. The deeper water is usually softer because the calcium and magnesium content (which indicates hardness) has been decreased by ionic exchange for sodium. The pH of the water generally increases down the dip and iron concentrations are reduced. Also, generally water color increases down the dip and most of the deeper aquifers contain highly colored water.

Ground-water temperature, except in shallow water-table wells, does not vary with seasonal changes in air temperature. Water of a constant temperature is advantageous for most cooling purposes. The temperature of shallow ground water is about 64° F. which corresponds to the mean annual air temperature. The geothermal gradient in Copiah County is 1° F. increase in temperature for about every 75-80 feet of depth. To make accurate water temperature measurements, the water temperature should be measured in a large capacity well that has been operating a sufficient time for the temperature to equalize in the well.

DEPTH, LITHOLOGY AND THICKNESS OF AQUIFERS

Fresh-water (less than 1000 parts per million dissolved solids) aquifers are available in Copiah County to depths of 2400 feet below sea level. The base of fresh water is from less than 400 feet to slightly more than 2400 feet below sea level (fig. 1). Most of the County is underlain by fresh-water aquifers to about 2000 feet below sea level (table 1). The shallowest fresh water occurs in the extreme southwestern part of the County located in Township 9 and 10 North, Range 5 East; Township 9 North, Range 6 and 7 East and over some salt domes. All of the known water wells are shallower than the base of fresh water. The majority of the thicker sands are present at shallow depths and probably would not exceed 1000 feet anywhere in the County.

A test well (J28) for the town of Hazlehurst completed in the Kosciusko formation (Sparta) at a depth of 2575 feet is the deepest known water well in the County. The major supply

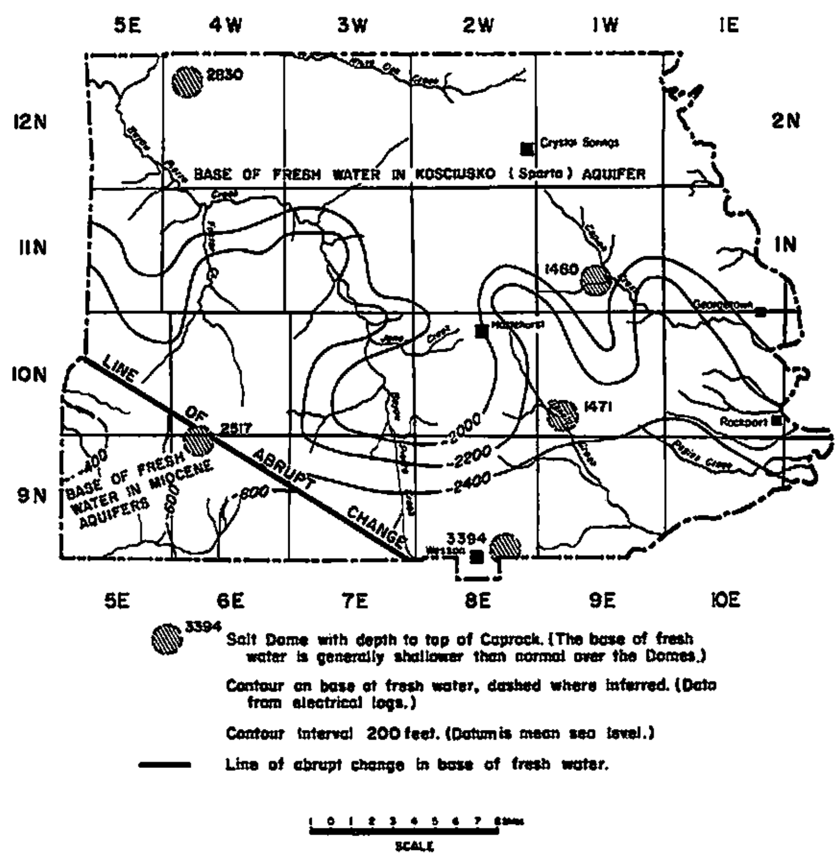


Figure 1.—Configuration of the base of the fresh-water in Copiah County.

Table 1.—Stratigraphic column and water resources in Copiah County, Mississippi.

SYSTEM	SERIES	GROUP	STRATIGRAPHIC UNIT	THICKNESS	WATER BEARING CHARACTERISTICS
QUATERNARY	RECENT		Alluvium	0-80	Not an important aquifer, except for shallow domestic wells in the larger stream valleys. The deposits appear thicker in the Bayou Pierre and Pearl River Valleys.
	PLEISTOCENE		Loess	0-8	Not an aquifer.
			Terrace	0-80	Not an important aquifer, except for shallow domestic wells.
			Citronelle formation	0-100	An important aquifer in the vicinity of Crystal Springs. Most of the shallow industrial and municipal wells in the Crystal Springs area are completed in the Citronelle aquifer. The water from the Citronelle is typically acidic and contains low dissolved solids.
TERTIARY	MIOCENE		Hattiesburg	0-400	An important source of water in Copiah County. Most of the large wells in the County, except for the wells in the vicinity of Crystal Springs, are completed in the Miocene deposits. The water quality is generally suitable for most purposes with minor treatment. The water usually contains low dissolved solids, low iron content and is slightly acidic.
			Catahoula formation	500-900	
	OLIGOCENE	VICKSBURG	Undifferentiated	80-100	Not an aquifer.
			Forest Hill	80-100	Generally not an aquifer. A potential aquifer in the northeastern corner of Copiah County near the Hinds County boundary. The water from the Forest Hill is highly colored in Copiah County.
	EOCENE	JACKSON	Yazoo clay	400-500	Not an aquifer.
			Moodys Branch	15-20	Not an aquifer.
			Cockfield	100-500	Not an important aquifer. Small domestic wells are possible in the Cockfield aquifer near the Hinds-Copiah boundary. Water from the Cockfield is highly colored in Copiah County.
			Cook Mountain	350-400	Not an aquifer.
			Kosciusko (Sparta)	400-600	Not an important aquifer. Colored water and low permeabilities are typical of the Sparta sand throughout most of Copiah County. The aquifer may be a potential source for industrial water in the northern half of Copiah County.

wells (fig. 2) in the County range in depths from about 100 to 400 feet in depth (table 2). The aquifers which are mostly beds of sand and gravel or zones of sand dip gently to the southwest at about 40 feet per mile.

Prediction of aquifer thickness and lithology is difficult due to the lenticular character of the Miocene and Citronelle deposits which are the principal aquifers for Copiah County. Lithologic changes occur in short distances and individual sand beds are hard to trace, especially along the dip of the beds. Fresh-water sands, as indicated on electrical logs, range in thickness from a few inches to two hundred thirty-five feet. The Miocene deposits in Copiah County are found from the surface to about 1400 feet in the vicinity of Wesson. Test drilling is recommended to determine the depth, thickness and character

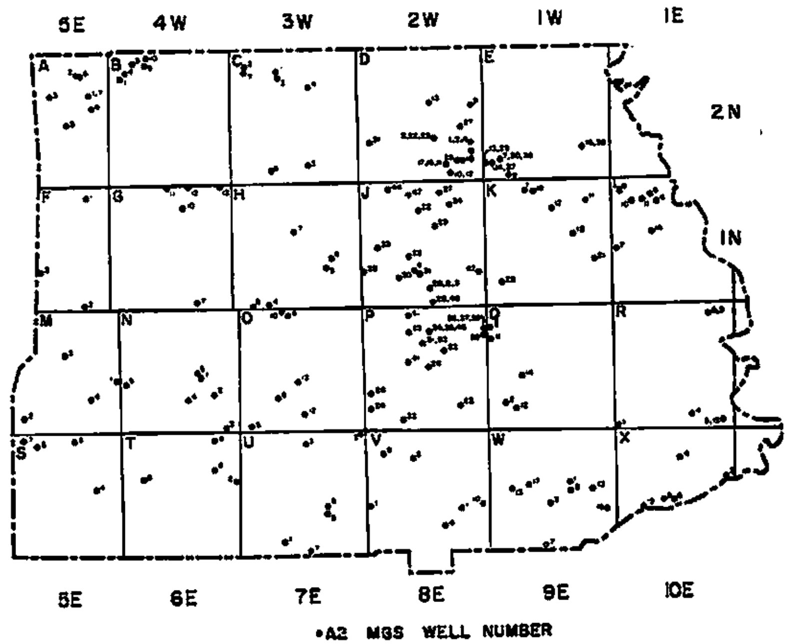


Figure 2.—Location of selected wells in Copiah County, Mississippi.

of aquifers underlying a particular site because of the lenticular nature of the beds.

WATER-BEARING UNITS

The principal water-bearing beds in Copiah County are the Miocene age beds of the Hattiesburg and Catahoula formations (tables 1 and 2). The Citronelle formation contains fresh water, but most of the unit is present at high elevations (plus 400 feet) and the base of the formation usually is near the water level. The alluvium and terrace deposits contain local aquifers in which small domestic wells are completed. The alluvium along the Pearl River contains aquifers which could furnish water to small wells in that area.

The older Kosciusko (Sparta) and Cockfield aquifers are not utilized in Copiah County. A deep test, 2798 feet deep, for the town of Hazlehurst, tested the Kosciusko aquifer (Sparta). The water in the Kosciusko was highly colored and the aquifer has a low transmissibility.

Table 2.—Records of selected wells in Copiah County.

Well No.: Numbers correspond to those on well-location maps, geologic sections, chemical-analysis tables, and pumping test tables.

Method of Lift: A, Air Lift; C, Cylinder; F, Natural Flow; J, Jet; N, None; P, Pitcher; T, Turbine; S, Submersible; B, Bucket.

Alluvium and Terrace Deposits

Alluvial deposits underlie most all of the major streams in the area (see Geologic Map). Thicknesses of these deposits are from a few feet along the smaller stream valleys to about 50-70 feet in the Pearl River and Bayou Pierre valleys. Alluvial deposits are composed of sand, silt, clay, gravel and mixtures of these. Local, shallow, domestic wells are screened in the alluvial aquifers, but generally the deposits are not continuous enough for large wells in Copiah County. In specific locations, the alluvium may contain fairly large bodies of sand which could furnish several large wells. Test drilling should be initiated to determine the presence, thickness and areal extent before any plans are made for completing large wells in the alluvium. Most water in the alluvium is under water table conditions and the water level fluctuates with precipitation.

Terrace deposits cover a large portion of Copiah County (see Geologic Map). These deposits cap most of the hills and frequently the hillsides, masking a large percentage of the bed rock outcrops. Thicknesses of the terrace deposits are from 10-30 feet. The terrace deposits contain sand, sandy clay, clay, gravel and mixtures of these. This is similar to the composition of the alluvial deposits. Local, domestic wells are completed in the terrace aquifers, but generally the terraces will not supply large wells.

Citronelle Formation

The Citronelle deposits occur typically at high elevations, above 400 feet, and cover a large portion of Copiah County (see Geologic Map). The Citronelle is composed primarily of gravel and sand with scattered clay lenses. The thicknesses of the Citronelle deposits are from 20 to 80 feet, but the Citronelle is usually missing in the valleys due to erosion. Large wells, 250-700 gpm, are completed near the base of the Citronelle in the vicinity of Crystal Springs.

The water level in the Citronelle is generally low in the vicinity of Crystal Springs, therefore, large yielding wells have to be screened in a zone that will yield a large amount of water to the wells without excessive drawdown. The town of Crystal Springs, the various gravel mining operations and a large vegetable canning plant, all in the northern part of the County, have wells completed in the Citronelle aquifer.

Miocene Deposits

The Hattiesburg and Catahoula deposits of Miocene age have the potential for supplying large amounts of water in Copiah County (table 1). The majority of the wells in the middle and southern part of the County are completed in these aquifers. The Miocene deposits (Hattiesburg and Catahoula undifferentiated) are composed of sand, sandy clay, clay and occasionally gravel. The sand beds are typically lenticular in outline and are not continuous in any large area. Most of the sand is fine-grained to medium-grained with most sand being slightly fine-grained. Thicknesses of the individual sand beds are from 6-270 feet.

Test drilling is recommended to determine the thickness and extent of Miocene aquifers before wells and well fields are planned for a particular location. Generally, the aquifers thicken and thin every few miles across the County.

The wells for the town of Hazlehurst and several rural water supply wells are completed in Miocene aquifers. The town of Wesson's water supply is from a series of springs a few miles east of town. Large wells are possible in the Wesson area and test drilling should prove the presence of thick sands in that general area. An electrical log on the Wesson Dome located one-half mile east of town indicated the following sand intervals below land surface: 382-480; 730-785; 835-855 and 1230-1258.

Test Drilling

The Mississippi Geological Survey drilled a total of nine test holes in the ground-water investigation of Copiah County (fig. 3). Most of the drilling was in the vicinity of Crystal Springs and Hazlehurst because of the heavy pumpage in these areas. The holes were drilled, electrically logged, and the drill cuttings placed in the State's sample library for additional study.

Four test holes were drilled in the vicinity of Crystal Springs for the purpose of locating Miocene aquifers which could be used for additional industrial or municipal supply. Results of the tests revealed several aquifers of varying thickness which could possibly be used as a source for water supplies. The

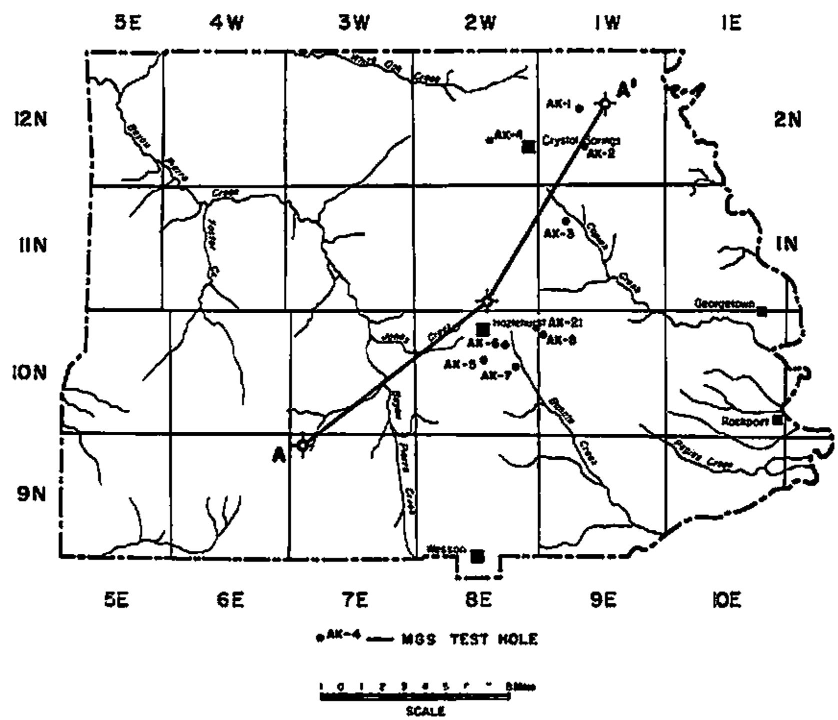


Figure 3.—Location of test holes drilled by Mississippi Geological Survey in the ground-water investigation and location of cross-section A-A'.

following table is a list of the wells with elevations above sea level, well depth, and the sand intervals picked from electrical logs (one drillers log—AK-1).

Well No.	Elevation	Well Depth	Sand Intervals
(AK-1)*	410	370	210-220 260-270 290-300 320-330 340-370
E35 (AK-2)	355	610	60-70 77-126 142-150 153-160 213-228 264-292 336-351 362-375 394-402
K28 (AK-3)	265	650	16-64 79-95 180-186 188-212 220-224 230-237 264-284 310-326 374-384 582-600
D26 (AK-4)	342	530	5-12 16-29 101-140 148-158 231-259 261-315 (366-380 380-390 410-420 430-530)*

* Drillers Log

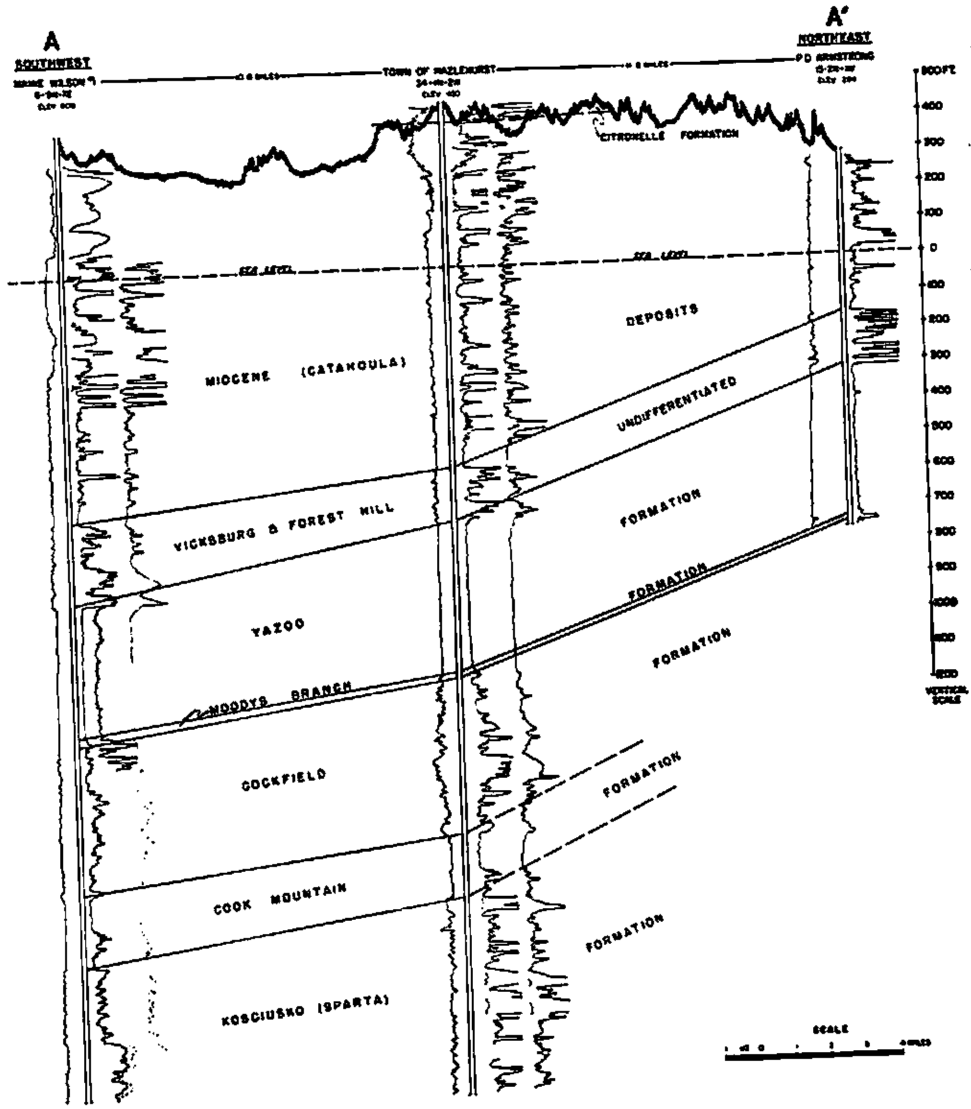


Figure 6.—Geologic cross-section A-A'.

southeast of Crystal Springs containing 10-20 feet of water was abandoned in the spring of 1968. The pit was completely dry in about two weeks as the water had percolated through the gravel base, emptying the pit.

The aquifers several miles to tl Geologic Map). T the surface rechai is probably replen. to the north. Soı are recharged ma

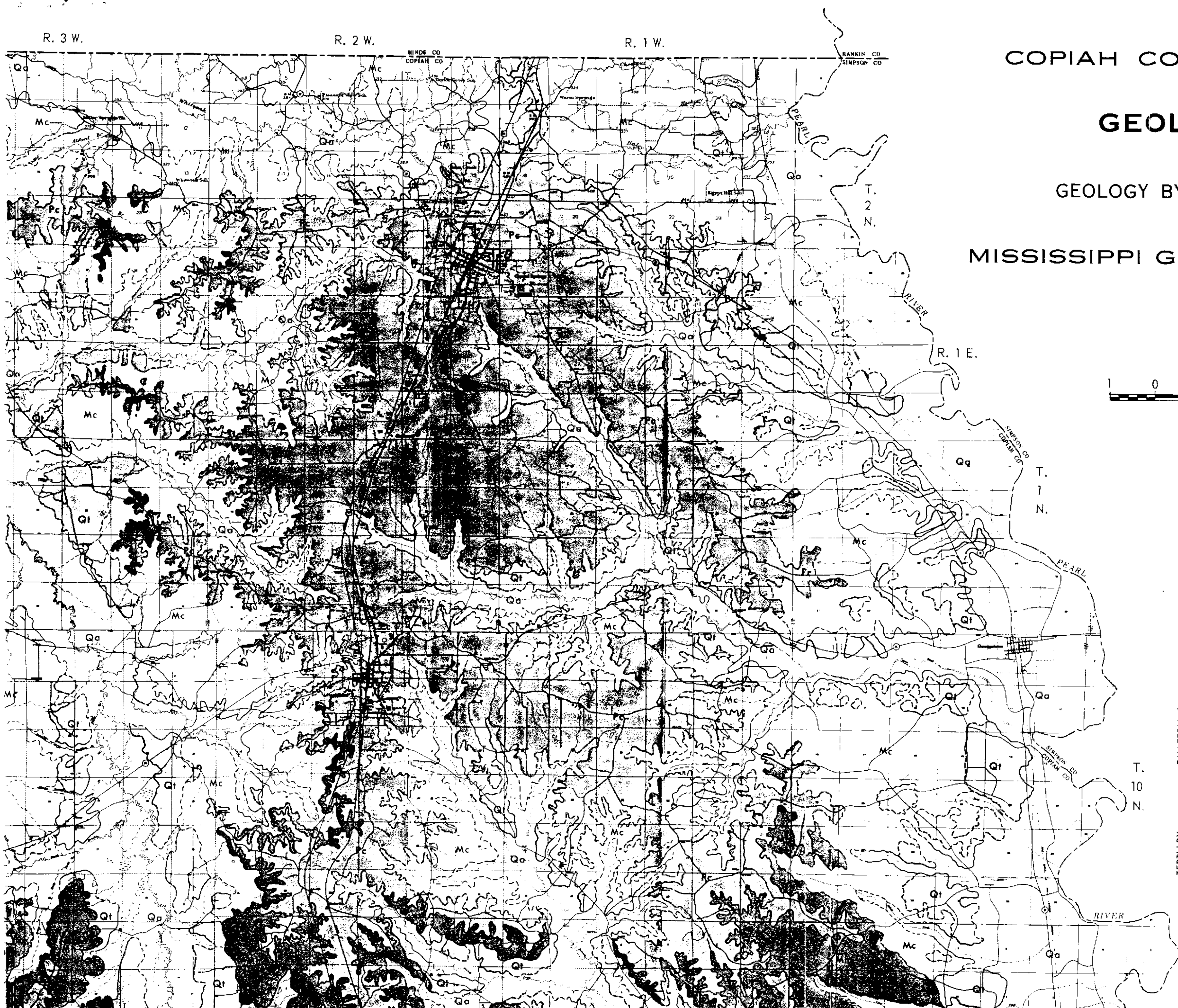
The movemen year, and local dr the water levels alluvium and occ affected by rainf precipitation.

Generally, grı moves down the ı Recharge is also ı movement betwe tions.

Heavy pumpi level which in t steeper gradient toward the wells cost per unit vı designing wells minimized by sp: with economy. P drawals among w level decline.

The chemica ly by the minera by the length of the quality of g: environment of ı from shallow aqı away is less miı aquifers where ı

Time of con fects the amour



COPIAH COUNTY, MISSISSIPPI

GEOLOGIC MAP

GEOLOGY BY ALVIN R. BICKER, JR.

MISSISSIPPI GEOLOGICAL SURVEY

1968

SCALE

1 0 1 2 3 4 MILES

QUATERNARY

RECENT

Qa — Alluvium - fine-to coarse-grained sand; gravel of chert and quartz; silt and clay; including low terraces.

PLEISTOCENE

Qt — Pre-loess terrace deposits - fine-to coarse-grained sand; gravel; clay lenses.

Pc — Citronelle formation - gravels of chert and quartz; fine-to coarse-grained sand; clay lenses.

TERTIARY

MIOCENE

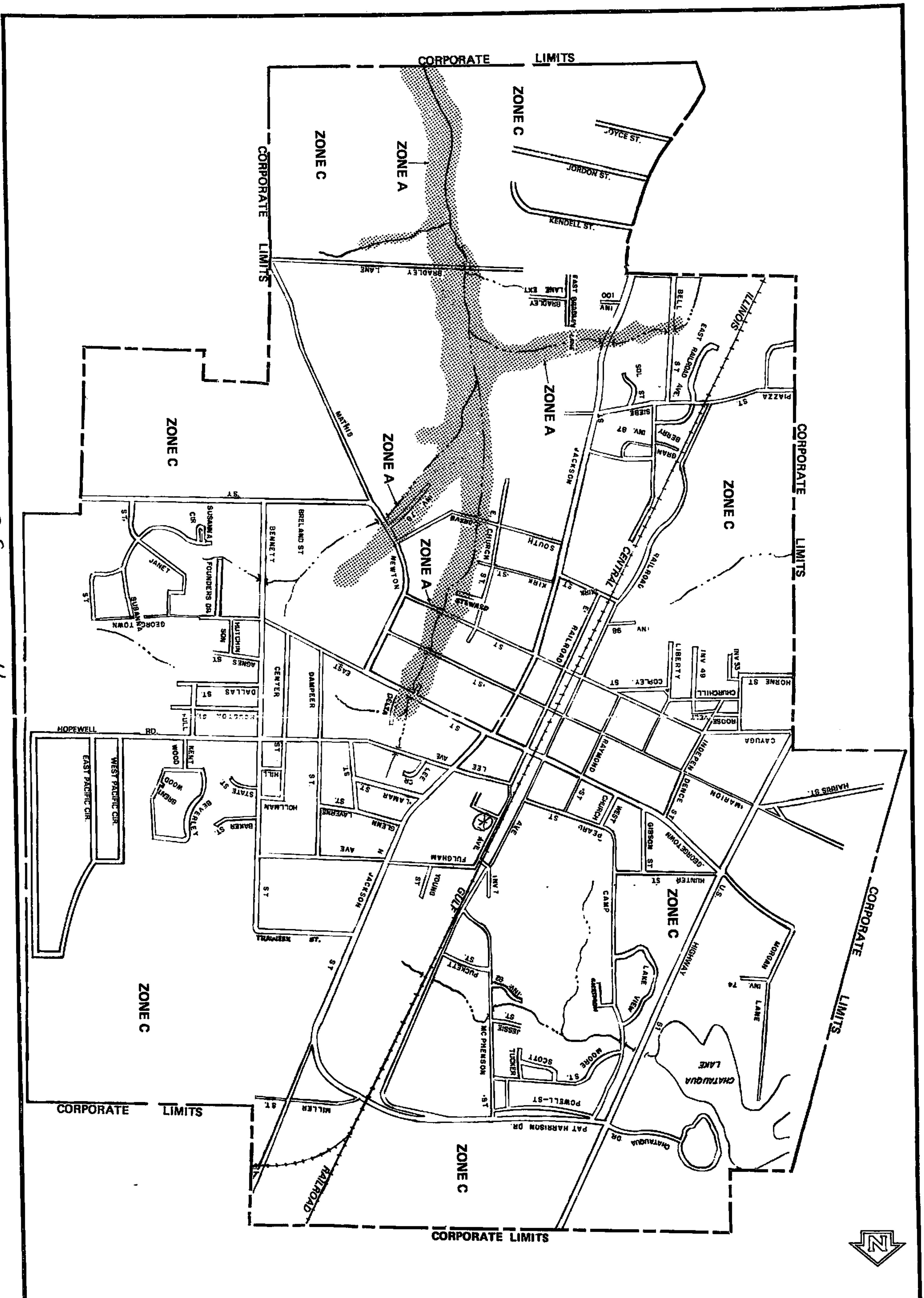
Mh — Hattiesburg - sandy silty clay.

Mc — Catahoula - sandy silty clays; siltstone; sands with some indurated sandstone.

Observed contact

Approximate or inferred contact

Reference 11



MAP 01

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF CRYSTAL SPRINGS, MS

COPIAH COUNTY

APPROXIMATE SCALE

1000 0 1000 2000 3000 FEET

FLOOD INSURANCE RATE MAP

COMMUNITY NUMBER 280044

MARCH 18, 1986

AQUIFER CODE EXPLANATION

112MRVA	Mississippi River alluvial aquifer
121CRNL	Citronelle Formation
121GRMF	Graham Ferry Formation
122MOCN	Miocene Series, undifferentiated
122PCGL	Pascagoula Formation
122HBRG	Hattiesburg Formation
122CTHL	Catahoula Formation
122CTHLU	Catahoula Formation, Upper
122CTHLM	Catahoula Formation, Middle
122CTHLL	Catahoula Formation, Lower
123WSBR	Waynesboro Sand
123VKBG	Vicksburg Group
123FRHL	Forest Hill Sand
124CCKF	Cockfield Formation
124SPRT	Sparta Sand
124TLLT	Tallahatta Formation
124MUWX	Meridian-Upper Wilcox aquifer
124TSCM	Tuscahoma Formation
124WLCXM	Middle Wilcox aquifer
124WLCXL	Lower Wilcox aquifer
211RPLY	Ripley Formation
211COFF	Coffee Sand
211EUTW	Eutaw Formation
211MCSN	McShan Formation
211GORD	Gordo Formation
211MSSV	Massive Sand
300PLZC	Paleozoic rocks

A - Air conditioning
B - Bottling
C - Commercial
D - Dewater
E - Power
F - Fire
H - Domestic

I - Irrigation
J - Industrial (cooling)
K - Mining
M - Medicinal
N - Industrial
P - Public supply
Q - Aquaculture

R - Recreation
S - Stock
T - Institutional
U - Unused
Y - Desalination
Z - Other (explain in remarks)

Data Sheet Report Summary
Mississippi State Department of Health
Division of Water Supply

PWS ID	Name of System	Wells	Connections	Consecutive
** County Code: 14 Coahoma County				
0140001	BOBO UTILITIES	1	61	N
0140002	CLARKSDALE LIGHT & WATER DEPT	11	6500	N
0140003	TOWN OF COAHOMA	1	150	N
0140004	TOWN OF FRIARS POINT	2	530	N
0140005	TOWN OF LULA	2	400	N
0140006	FARRELL WATER ASSOCIATION	1	74	N
0140007	GREEN ACRES W/A-NORTH	1	179	N
0140008	TOWN OF JONESTOWN	2	350	N
0140009	LURAND WATER ASSOCIATION	1	74	N
0140010	TOWN OF LYON	2	180	N
0140011	RENA LARA WATER ASSOCIATION	2	134	N
0140012	MOORE BAYOU WATER ASSOCIATION	1	343	N
0140013	GREEN ACRES W/A-SOUTH	1	116	N
0140016	OAKHURST FARMS	1	20	N
0140021	WILLIAM'S MISS FARMS	1	18	N
0140022	WILLIAM'S MISS FARMS	1	15	N
0140023	INDIAN MOUND SUBDIVISION	1	24	N
0140024	CARR MASCOT PLANTATION, INC	1	21	N
0140025	KYLE & WILLIAMS SUBDIVISION	1	13	N
0140026	KYLE & WILLIAMS PLANTATION	1	12	N
0140027	BELLMONT DEVELOPMENT CORP	1	15	N
0140028	STOVALL FARMS PLANTATION	1	9	N
0140033	COAHOMA JR COLLEGE	1	20	N
0140045	PINE GROVE WATER ASSOCIATION	1	100	N
0140046	DAVENPORT WATER ASSOCIATION	0	34	Y
0140047	WATER ASSOCIATION OF MOON LAKE	0	234	Y
** County Code: 15 Copiah County				
0150001	COPIAH WATER ASSN INC	2	405	N
0150002	COPIAH WATER ASSN INC	1	732	Y
0150003	CRYSTAL SPRINGS WATER SERVICE	5	2300	N
0150004	COPIAH W/A INC	1	467	N
0150005	TOWN OF GEORGETOWN	2	165	N
0150006	HARMONY RIDGE WATER ASSN	2	405	N
0150007	TOWN OF HAZLEHURST	8	1983	N
0150009	COPIAH NEW ZION WATER ASSN	3	904	N
0150010	NORTHEAST COPIAH WATER ASSN	2	703	N
0150011	TOWN OF WESSON	2	400	N
0150020	COPIAH W/A-BAYOU PIERRE #2	0	135	Y
** County Code: 16 Covington County				
0160001	COLD SPRINGS W/A	2	220	N
0160002	CITY OF COLLINS	2	1035	N
0160003	TOWN OF MOUNT OLIVE	2	393	N
0160004	NORTH COVINGTON W/A - NORTH	1	401	N
0160005	SALEM WATER ASSOCIATION	1	240	N
0160006	TOWN OF SEMINARY	2	140	N
0160007	SANFORD WATER ASSOCIATION	1	85	N

Reference 6

STATE OF MISSISSIPPI

DEPARTMENT OF ENVIRONMENTAL QUALITY

JAMES I. PALMER, JR.
EXECUTIVE DIRECTOR

May 24, 1995

Mr. Brian Farrier
Site Investigation and
Support Branch
Waste Management Division
U. S. EPA - Region IV
345 Courtland Street, N. E.
Atlanta, Georgia 30365

RE. Preliminary Assessment (PA) Report
Kuhlman Electric Corporation
MSD008188724
Crystal Springs, Copiah County, Mississippi

Dear Brian:

Enclosed is the referenced report. Please contact me if you have any questions.

Sincerely,

Phillip Weathersby
CERCLA Section, Chief

PW:BG

Enclosure

OFFICE OF POLLUTION CONTROL, P. O. BOX 10385, JACKSON, MS 39289-0385, (601) 961-5171

PRELIMINARY ASSESSMENT (PA) REPORT
KUHLMAN ELECTRIC CORPORATION
MSD008188724
CRYSTAL SPRINGS, COPIAH COUNTY, MISSISSIPPI

MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF POLLUTION CONTROL
HAZARDOUS WASTE DIVISION
P. O. BOX 10385
JACKSON, MISSISSIPPI 39289-0385

May 24, 1995

PREPARED BY:

Bill Gilliland

APPROVED BY:

Phillip Weathersby

TABLE OF CONTENTS

Introduction

The Mississippi Department of Environmental Quality, Office of Pollution Control (MS OPC), has conducted a Preliminary Assessment (PA) of the Kuhlman Electric Corporation facility located in Crystal Springs, Copiah County, Mississippi. The PA was performed under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). Location of the facility is Latitude 31° 59' 24" North, Longitude 90° 21' 22" West; NW 1/4, NE 1/4, Section 25, Township 2 North, Range 2 West, Copiah County, Mississippi (Reference 3).

Background

Kuhlman Electric Corporation is an active transformer manufacturing facility. The facility began operations in 1950. In 1951 Kuhlman purchased the facility. The same manufacturing process of producing special order transformers has been utilized since Kuhlman began operations at this plant in 1951. This process consist of shearing, forming, and welding of steel plates to make the transformer tanks and cabinets. The tanks and cabinets are cleaned and painted. The core of the transformers are made by winding steel strips on forms or stacking of sheared lengths. The coils are constructed of aluminum or copper strip and wire, also paper insulating materials in several thicknesses are used (Reference 4).

Regulatory History and Waste Characteristics

The facility is a large quantity generator of hazardous waste. Hazardous waste listed on their Notification of Hazardous Waste Activity form are F002 and F003. The plant ships its waste to Enterprise Recovery Systems for disposal (Reference 4). Note: PCBs were used in the manufacturing process from 1951 to approximately 1974. PCBs are no longer used in the transformers. Some PCB containing capacitors are in use in the plant and are replaced on an individual basis as required. Disposal of these capacitors is by ENSCO in Arkansas (Reference 4).

The plant does not have a Pretreatment Permit or a National Pollutant Discharge Elimination System Permit (Reference 16).

Groundwater Pathway

Mississippi is located in the Gulf Coastal Plain of North America. The state is divided into twelve physiographic provinces. Crystal Springs is in the Piney Woods province which is characterized by gentle rolling hills with some relatively high ridges.

The facility is on materials of the Citronelle formation which, at this location, is about 80 feet in thickness. The Citronelle formation is comprised of chiefly sand and silty sand in the upper part with sandy gravel being present in the lower part of the formation. Underlying these deposits are the sands, silts, and clays of the Catahoula formation. The Catahoula formation has a thickness of approximately 500 feet in the study area. The Catahoula is underlain by the clays, marls, and limestones of the Vicksburg Group. In descending order and underlying the Vicksburg Group are the Forest Hill, Yazoo, Moodys Branch, Cockfield, Cook Mountain, and Sparta formations. The formations having sufficient sands to produce water and serve as aquifers are, in descending order, the Citronelle, Catahoula, Forest Hill, Cockfield, and Sparta formations. In the study area the Sparta aquifer is the lowermost unit containing fresh water. The base of fresh water is about 2100 feet below sea level (References 18 and 19).

Although the above mentioned aquifers are present in the study area only the Citronelle and Catahoula aquifers are utilized, exception one domestic well in the Cockfield. The nearest well, a public well, is located approximately 3500 feet south of the facility. The Citronelle and Catahoula aquifers are interconnected and are treated as a single aquifer in this report. The estimated population served by wells within the four-mile radius is given below (References 3, 4, 5, 6, and 7).

Distance Miles	Home Wells	Public Wells	Public Well Connections	Total Population
0 - 1/4	0	0	0	0
1/4 - 1/2	0	0	0	0
1/2 - 1	1	6	1506	4262
1 - 2	15	5	1356	3880
2 - 3	26	0	0	74
3 - 4	23	0	0	65

The total estimated population served by water wells located within a four-mile radius of the plant is 8281.

Climate and Soils

Annual precipitation for the Crystal Springs, Copiah County area is 55 inches (Reference 8). Mean annual lake evaporation is about 44 inches; thus, the resultant net precipitation is 11 inches (Reference 15).

Based on the soil survey map of Copiah County, the predominant soil at the facility is the Providence Silt Loam. The Providence silt loam, slope 2 to 5 percent, is a moderately well drained, gently sloping soil, which has a fragipan, formed in a mantle of silty material and underlying loamy sediment on uplands and stream terraces (Reference 12).

Surface Water Pathway

The facility is located on the upland deposits, sand, of the Citronelle formation. Water flows northwest for approximately 3500 feet prior to encountering perennial water, Chautauqua Lake, the uppermost limit of Clear Creek. Clear Creek flows into White Oak Creek. The 15-mile surface water pathway ends while in White Oak Creek. There are no wetlands indicated on the topographic maps along the surface water pathway (Reference 3).

There are no endangered or threatened aquatic species known to inhabit the waters of White Oak Creek or its tributaries (References 13 and 14).

There are no drinking water intakes located along the 15-mile surface water pathway (Reference 17). The facility is located above the 500 year flood zone (Reference 11).

Soil Pathway

The facility is located in the town of Crystal Springs, population 5643, 1990 census. The surrounding area is mainly one of a residential nature comprised largely of single family dwellings. The estimated population within one mile of the facility is given below (References 3, 4, and 7).

Distance, Mile	Houses, Estimated	Population, Estimated
0 - 1/4	135	382
1/4 - 1/2	468	1324
1/2 - 1	663	1876

The total estimated population within one mile of the facility 3582. There is no school or daycare center within 200 feet of the facility.

There are no endangered or threatened terrestrial species listed specifically for Copiah County, although several species are listed for the entire state. These include the Florida panther, Bald eagle, Bachman's warbler, and the Red-cockaded woodpecker (References 13 and 14).

Conclusions

The MS OPC concludes that no further action is warranted for this facility under the CERCLA program.

REFERENCES

1. Environmental Protection Agency, 40 CFR Part 300, Hazard Ranking System: Final Rule, Federal Register, Vol. 55, Friday, December 14, 1990.

2. Superfund Chemical Data Matrix (SCDM), U. S. EPA.

3. Topographic Maps of the Kuhlman Electric Corporation Area, Crystal Springs, Copiah County, Mississippi.

   Crystal Springs, MS Quadrangle - 7.5 Minute Series
   Terry, MS Quadrangle - 7.5 Minute Series
   Dabney Crossroads, MS Quadrangle - 7.5 Minute Series
   Gallman, MS Quadrangle - 7.5 Minute Series

4. Information from the MS OPC Hazardous Waste Division files on Kuhlman Electric Corporation, Crystal Springs, Copiah County, Mississippi.

5. Printout from U. S. Geological Survey Data Base of Wells Within the Kuhlman Electric Corporation, Crystal Springs, Copiah County, Mississippi Study Area.

6. Information on Public Water Supply Wells in Copiah County, Mississippi, from the Water Supply Division, Mississippi State Department of Health, Division of Water Supply.

7. Average Population per Household, Copiah County, Mississippi, April 1990 Census.

8. Mean Annual Precipitation Map, 1951-1980, Tishomingo County Geology and Mineral Resources, by Robert K. Merrill, Mississippi Bureau of Geology, p. 13.

9. Average Flow at Selected Streamgaging Sites, Sources for Water Supplies in Mississippi, by B. E. Wasson, U. S. Geological Survey, Revised 1986, p. 7.

10. Two-Year, 24-Hour Rainfall Map, "Rainfall Frequency Atlas of the United States," by David M. Hershfield, U. S. Department of Commerce, Technical Paper No. 40, 1961.

11. Flood Insurance Rate Map, 1986, Crystal Springs, Copiah County, Mississippi, Map No. 280044.

12. United States Department of Agriculture, Soil Survey of Copiah County, Mississippi, 1984, pp. 27 and 28, Soil Legend, and Plates 12 and 13 (in part).

13. U. S. Fish and Wildlife Service:

    Vicksburg Office, Species List by County;
    Jackson Office, Topographic Maps Indicating Sensitive Environments;
    Region IV - Atlanta, "Endangered and Threatened Species."

14. "Endangered Species of Mississippi, 1992," Mississippi Department of Wildlife, Fisheries and Parks, Museum of Natural Science.

15. Average Annual Lake Evaporation Map, "Evaporation Maps for the United States," by M. A. Kohler, T. J. Nordenson, and D. R. Baker, U. S. Department of Commerce, Weather Bureau, Technical Paper No. 37, Plate 1.

16. Information from the MS OPC Industrial Wastewater Control Branch files, Kuhlman Electric Corporation, Crystal Springs, Mississippi Facility.

17. Information on groundwater and surface water use from the Mississippi Office of Land and Water Resources, Jackson, Mississippi.

18. Water for Industrial Development in Copiah and Simpson Counties, Mississippi, 1972: U. S. Geological Survey, Water Resources Division, pp. 3, 5-7, 30-32, 34, and 37-39.

19. Copiah County Geology and Mineral Resources, 1969: by Bicker, Alvin R., Jr., Thad N. Shows, Theo H. Dinkins, Jr., and Thomas E. McCutcheon, Mississippi Geological, Economic and Topographical Survey, pp. 32-35, 45, 54-56, 67-70, 77-79, and 88, and Geologic Map (in part).

Endangered Species
OF MISSISSIPPI

MUSSELS

Federal Status

Alabama Moccasinshell (*Medionidus acutissimus*) ....Threatened (Proposed)
Black clubshell (*Pleurobema curtum*) ....Endangered
Inflated Heelsplitter (*Potamilus inflatus*) ....Threatened
Orange-nacre Mucket (*Lampsilis perovalis*) ....Threatened (Proposed)
Ovate Clubshell (*Pleurobema perovatum*) ....Endangered (Proposed)
Southern Clubshell (*Pleurobema decisum*) ....Endangered (Proposed)
Southern Combshell (*Epioblasma penita*)..........................Endangered
Southern Pink Pigtoe (*Pleurobema taitianum*).....................Endangered
Southern Round Pigtoe (*Pleurobema marshalli*)....................Endangered
Stirrupshell (*Quadrula stapes*) ....Endangered

INSECT

American Burying Beetle (*Nicrophorus americanus*) ....Endangered

FISH

Southern Redbelly Dace[1] (*Phoxinus erythrogaster*) ....None
Bayou Darter (*Etheostoma rubrum*) ....Threatened
Crystal Darter (*Crystallaria asprella*)........................Candidate, Category 2
Frecklebelly Madtom (*Noturus munitus*)....................Candidate, Category 2
Alabama Sturgeon (*Scaphirhynchus suttkusi*) ....Candidate, Category 1
Gulf Sturgeon (*Acipenser oxyrhynchus desotoi*) ....Threatened
Pallid Sturgeon (*Scaphirhynchus albus*)..............................Endangered

AMPHIBIANS

Dusky Gopher Frog (*Rana capito sevosa*) ....Candidate, Category 1
Cave Salamander (*Eurycea lucifuga*) ....None
Green Salamander (*Aneides aeneus*) ....Candidate Category 2
Spring Salamander (*Gyrinophilus porphyriticus*) ....None

REPTILES

Black Pine Snake (*Pituophis melanoleucus lodingi*)...............Candidate Category 2
Eastern Indigo Snake (*Drymarchon corais couperi*) ....Threatened
Rainbow Snake (*Farancia erytrogramma*)..................................None
Southern Hognose Snake (*Heterodon simus*) ....None
An Undescribed Redbelly Turtle (*Pseudemys sp.*)...........................None
Black-knobbed Sawback (*Graptemys nigrinoda*).............................None
Ringed Sawback (*Graptemys oculifera*).................................Threatened
Yellow-blotched Sawback (*Graptemys flavimaculata*).....................Threatened
Gopher Tortoise (*Gopherus polyphemus*) ....Threatened
Atlantic Ridley (*Lepidochelys kempi*) ....Endangered
Green Turtle (*Chelonia mydas*)..Threatened
Hawksbill Turtle (*Eretmochelys imbricata*) ....Endangered
Loggerhead Turtle (*Caretta caretta*) ....Threatened
Leatherback Turtle (*Dermochelys coriacea*) ....Endangered

Reference 14

BIRDS

Mississippi Sandhill Crane (*Grus canadensis pulla*)	Endangered
Bald Eagle (*Haliaeetus leucocephalus*)	Endangered
Peregrine Falcon (*Falco peregrinus*)	Endangered
Brown Pelican (*Pelecanus occidentalis*)	Endangered
Piping Plover (*Charadrius melodus*)	Threatened
Snowy Plover (*Charadrius alexandrinus*)	Candidate, Category 2
Wood Stork (*Mycteria americana*)	None
Least Tern[2] (*Sterna antillarum*)	Endangered
Bachman's Warbler (*Vermivora bachmanii*)	Endangered
Ivory-billed woodpecker (*Campephilus principalis*)	Endangered
Red-cockaded Woodpecker (*Picoides borealis*)	Endangered
Bewick's Wren (*Thryomanes bewickii*)	None

MAMMALS

Gray Bat (*Myotis grisescens*)	Endangered
Indiana Bat (*Myotis sodalis*)	Endangered
Black Bear (*Ursus americanus*)	Threatened
West Indian Manatee (*Trichechus manatus*)	Endangered
Florida Panther (*Felis concolor coryi*)	Endangered
Whales, Order Cetacea, excluding Family Delphinidae	

PLANT

Pondberry Spicebush (*Lindera melissifolia*)
Price's Potato Bean (*Apios priceana*)

[1]West Mississippi disjunct population
[2]Interior population nesting along the Mississippi River

Endangered Species of Mississippi
Miss. Department of Wildlife, Fisheries & Parks
Museum of Natural Science
111 North Jefferson Street
Jackson, MS 39201
(601) 354-7303

Funded in part by:
US Fish and Wildlife Service

EPA in cooperation with Mississippi Department of Agriculture and Commerce, Bureau of Plant Industry

Printed on Recycled Paper
1992

U.S. DEPARTMENT OF COMMERCE
FREDERICK H. MUELLER, *Secretary*

WEATHER BUREAU
F. W. REICHELDERFER, *Chief*

TECHNICAL PAPER NO. 37

Evaporation Maps for the United States

M. A. KOHLER, T. J. NORDENSON, and D. R. BAKER
Hydrologic Services Division

WASHINGTON, D.C.
1959

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. - Price 65 cents

REFERENCE 15

325189 O-59 (Face Blank p. 14) No. 2

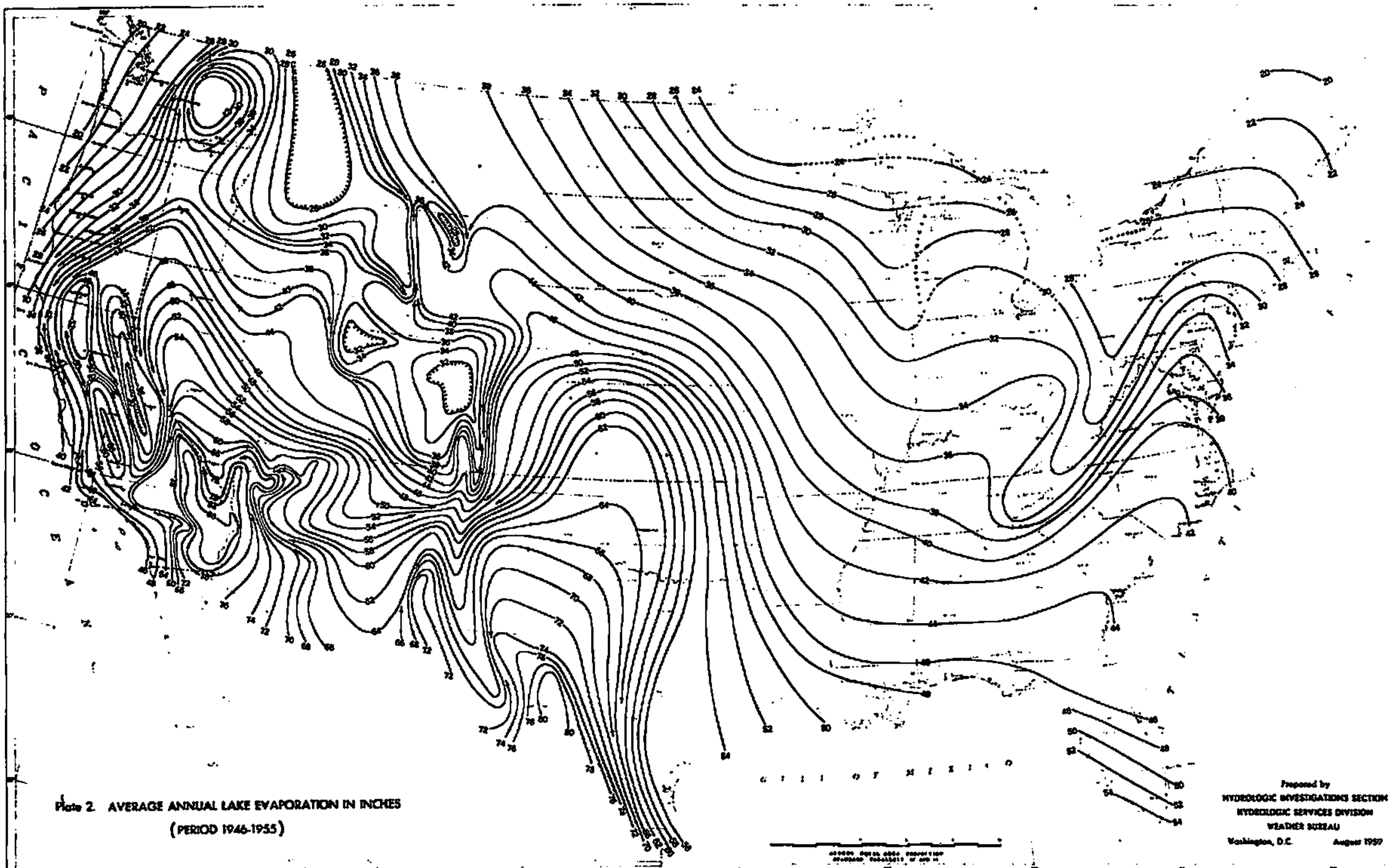
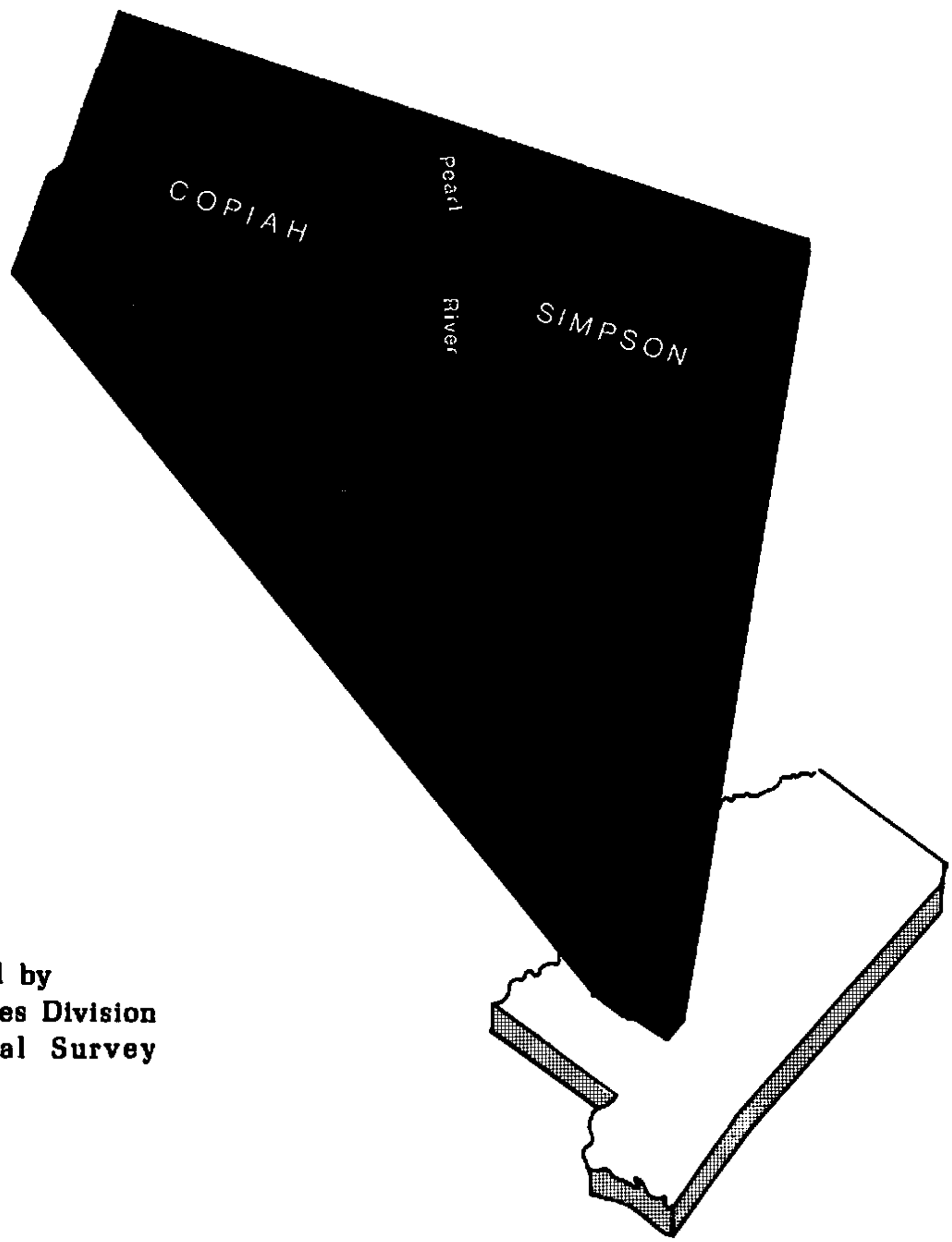


Plate 2. AVERAGE ANNUAL LAKE EVAPORATION IN INCHES
(PERIOD 1946-1955)

WATER FOR INDUSTRIAL DEVELOPMENT IN COPIAH AND SIMPSON COUNTIES, MISSISSIPPI

By

Roy Newcome, Jr., E. J. Tharpe, and W. T. Oakley



Prepared by
Water Resources Division
U. S. Geological Survey
1972

Topography and Drainage

Copiah and Simpson Counties lie in the Gulf Coastal Plain physiographic province and occupy an area of moderate topographic relief. Elevations range from 140 feet above sea level in the Bayou Pierre alluvial plain at the Copiah-Claiborne County boundary to more than 600 feet near Magee in southeastern Simpson County. Topographic maps of the U. S. Geological Survey in the 7½-minute and 15-minute series are available for parts of the study area (fig. 2). In addition, the area is included on the Hattiesburg, Jackson, Meridian, and Natchez sheets of the 1:250,000-scale series of maps of the eastern United States.

Drainage in the two counties involves three major basins (fig. 3). The central part of the area is drained by the Pearl River, the southeastern part of Simpson County is drained by the tributaries of the Pascagoula River, and the western part of Copiah County is drained by Bayou Pierre and the Homochitto River, both of which empty into the Mississippi River.

Geology

Geologic formations of hydrologic importance in the project area range in age from Eocene to Holocene (table 1), but only those of Miocene age and younger are exposed (fig. 4). The beds are sedimentary in origin and consist largely of clay, sand, and gravel. Beds of Miocene age and older dip southwesterly at 30 to 50 feet per mile, except in the western part of Copiah County where salt domes locally distort the structure. The formations thicken toward the west. Contour maps of the Sparta Sand and the Miocene beds are used to illustrate the subsurface structure (fig. 5) because these units comprise the main aquifer systems underlying all or most of the two-county area.

A highly dissected blanket deposit of sand and gravel forming the Citronelle Formation of Pliocene age occupies irregular upland areas in east-central and southwestern Copiah County and covers most of the southeastern half of Simpson County. Gravel in the lower part of these deposits has been mined at many sites and there are a few major mining operations at present. Springs are common at the base of the Citronelle and act as drains for the ground water in these deposits.

Pleistocene terrace deposits have been mapped in scattered areas of Copiah County (Bicker, 1969), and they probably occur also in Simpson County. These deposits are very difficult to differentiate from the Citronelle Formation, and the two are mapped and described as a single unit, Citronelle Formation, in this report.

The major stream valleys are underlain by substantial thicknesses of alluvium.

Development

The total population of the two counties was 44,426 in 1970; Copiah 24,479 and Simpson 19,947. Five municipalities are incorporated and their populations, according to the 1970 census, are: Crystal Springs, 4,281; Hazlehurst, 4,238; Magee, 2,900; Mendenhall, 2,329; and Wesson, 1,238.

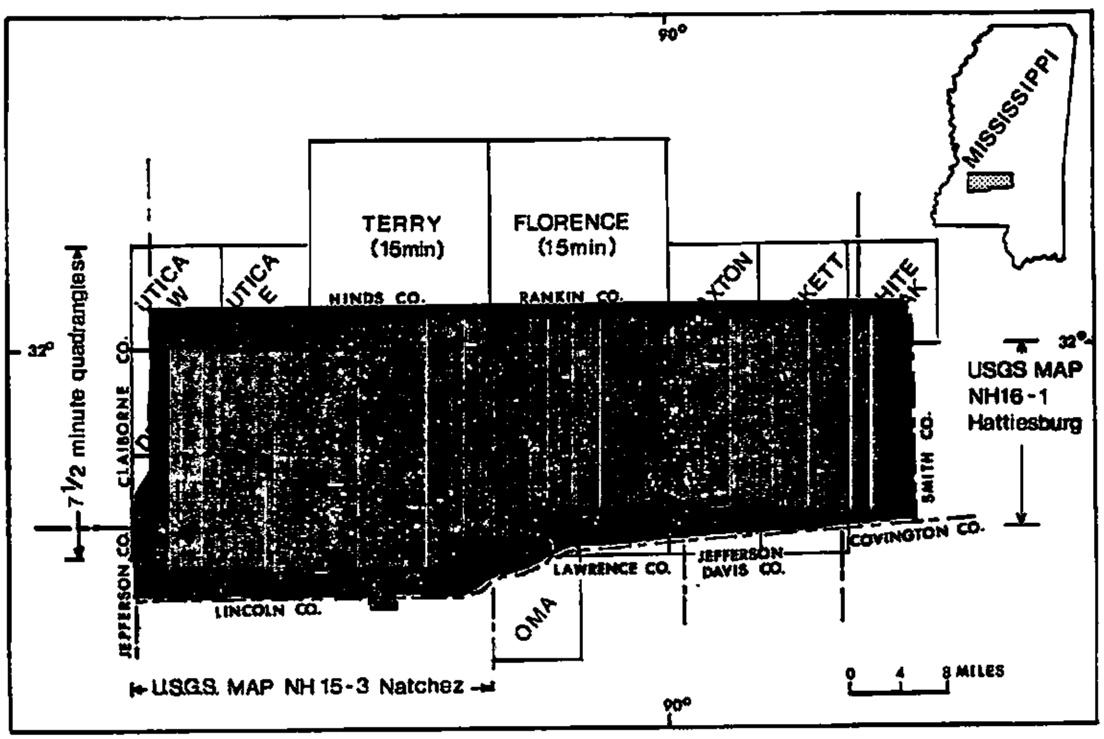


Figure 2. Topographic-map coverage for Copiah and Simpson Counties.

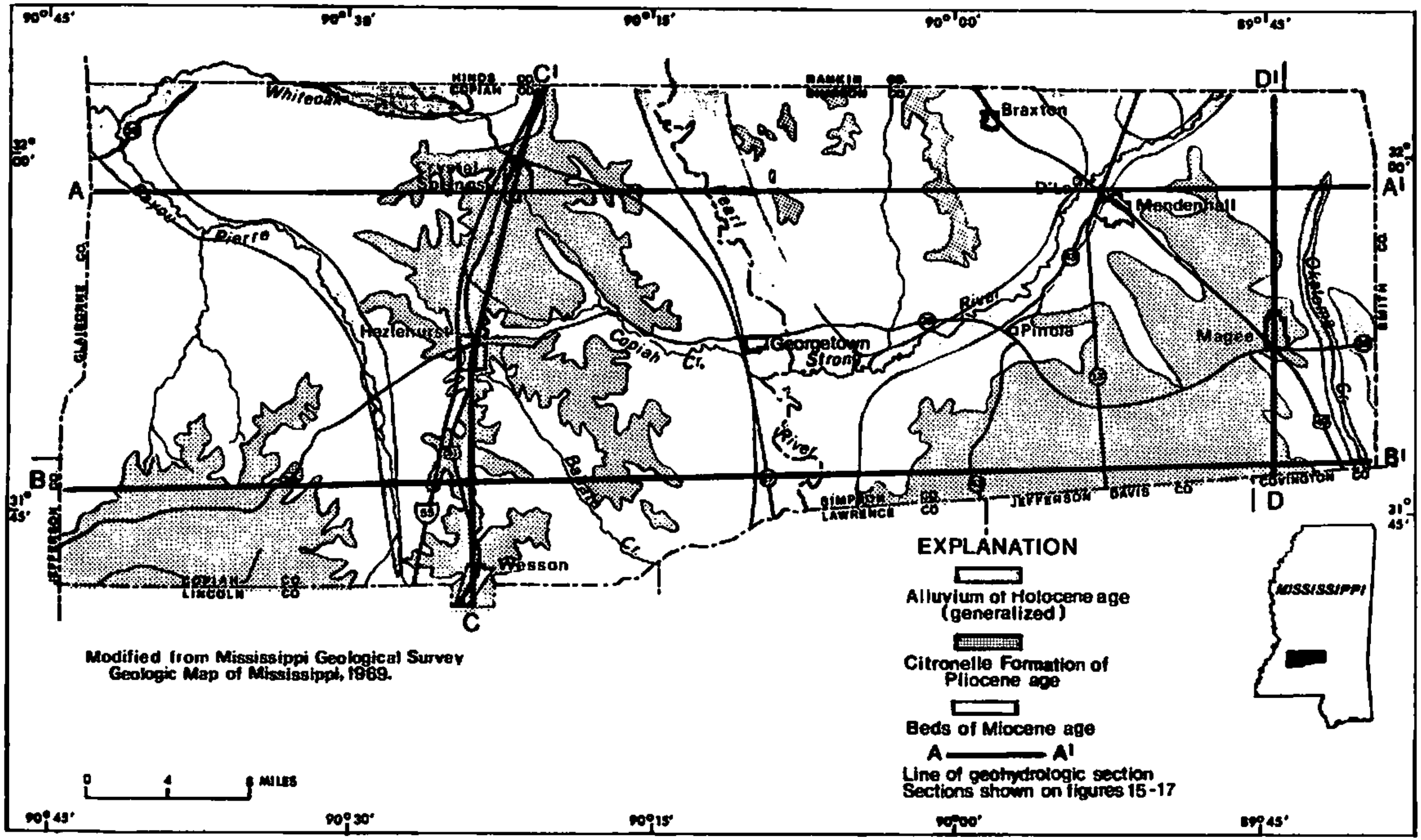


Figure 4. Areal geology in Copiah and Simpson Counties.

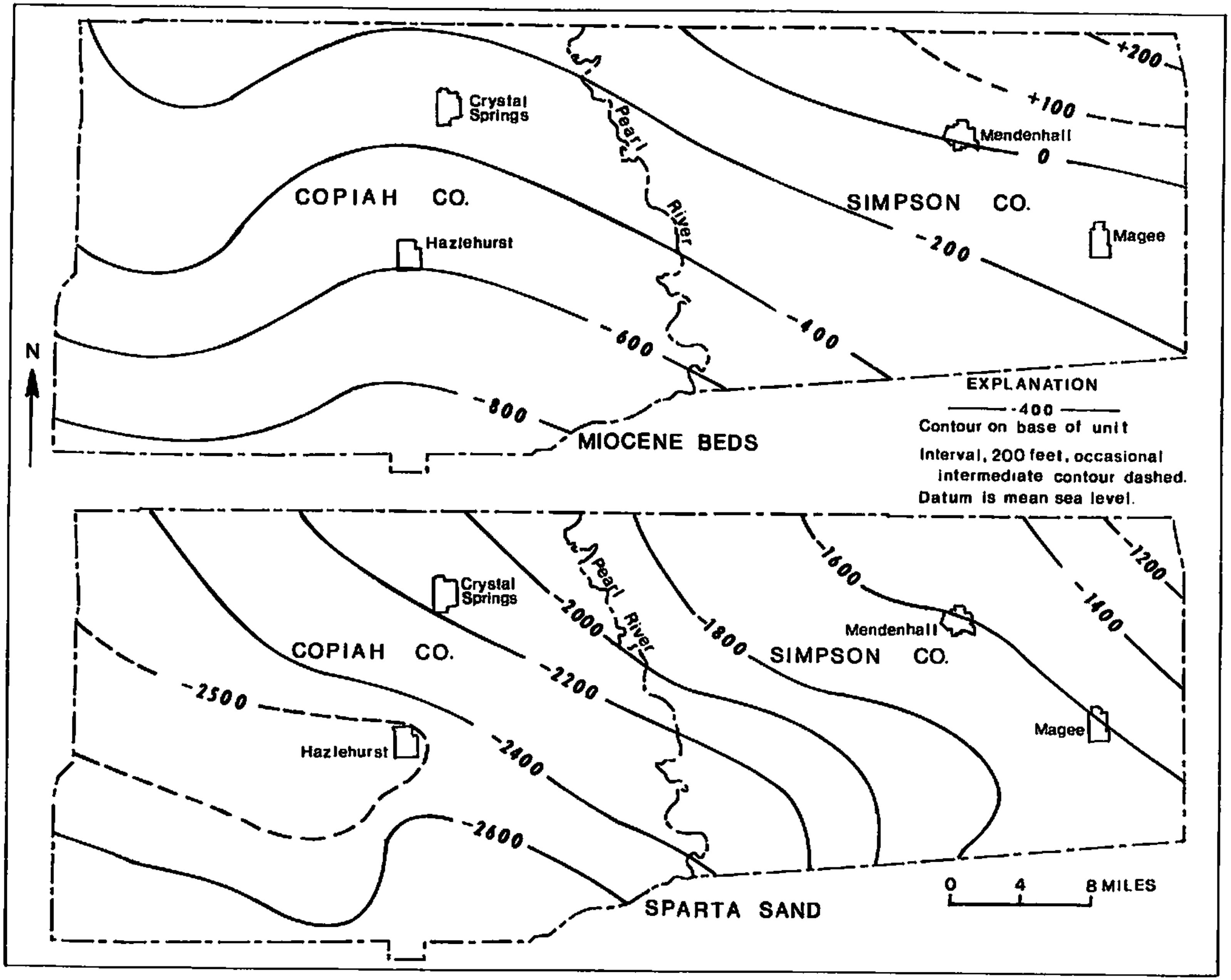


Figure 5. Contours on the base of two major aquifer systems in Copiah and Simpson Counties.

Table 1.—Stratigraphic column for the fresh-water section in Copiah and Simpson Counties

<table>
<tr><th>System</th><th>Series</th><th colspan="2">Stratigraphic unit</th><th>Thickness (ft)[a]</th><th>Water-bearing features</th></tr>
<tr><td rowspan="2">Quaternary</td><td>Holocene</td><td></td><td>Alluvium</td><td>0-80</td><td>Potential source of moderate supplies where sand accumulations are 20 feet or more.</td></tr>
<tr><td>Pleistocene</td><td></td><td>Terrace deposits</td><td rowspan="2">0-215</td><td rowspan="2">Not differentiated. Thick beds of sand. Water levels deep in many places. Supplies several towns and rural water systems. Main source of springs.</td></tr>
<tr><td rowspan="16">Tertiary</td><td>Pliocene</td><td></td><td>Citronelle Fm</td></tr>
<tr><td>Miocene</td><td></td><td>Undifferentiated</td><td>200-1300</td><td>Top eroded. Thickness depends on location. Contains many sand beds, some more than 100 feet thick. Source of most water supplies throughout area.</td></tr>
<tr><td rowspan="2">Oligocene</td><td>Vicksburg Group</td><td>Undifferentiated</td><td>70-150</td><td>Not an aquifer. Limestone and clay.</td></tr>
<tr><td></td><td>Forest Hill Sand</td><td>50-185</td><td>Source of small supplies.</td></tr>
<tr><td rowspan="11">Eocene</td><td rowspan="2">Jackson Group</td><td>Yazoo Clay</td><td>250-450</td><td rowspan="2">Not aquifers. Clay and marl.</td></tr>
<tr><td>Moodys Branch Fm</td><td>10-30</td></tr>
<tr><td rowspan="8">Claiborne Group</td><td>Cockfield Fm</td><td>225-525</td><td>Capable of moderate yields. Water may be colored.</td></tr>
<tr><td>Cook Mountain Fm</td><td>150-250</td><td>Not an aquifer.. Chiefly clay.</td></tr>
<tr><td>Sparta Sand</td><td>325-700</td><td>Capable of large yields. Water is colored.</td></tr>
<tr><td>Zilpha Clay</td><td rowspan="3">550-600</td><td rowspan="3">Not aquifers; except for lower 200 feet, more or less (the Meridian Sand Member of the Tallahatta). Water probably colored. No wells in Meridian.</td></tr>
<tr><td>Winona Sand</td></tr>
<tr><td>Tallahatta Fm
Meridian Sand Mbr</td></tr>
<tr><td>Wilcox Group</td><td>Undifferentiated</td><td>100-250</td><td>Fresh water only in northeast corner of Simpson County and only in upper 250 feet of unit. Difficult to differentiate from overlying Meridian Sand. No wells in aquifer.</td></tr>
</table>

[a] Thicknesses given compose usual range. Any formation below Citronelle may be thinned or missing over salt domes. Only the fresh-water-bearing part of the units is considered.

GROUND-WATER RESOURCES

The Fresh-Water Section

The fresh-water section extends to depths of 1,500-2,500 feet below sea level in most of the two-county area (fig. 14). Exceptions are southwestern Copiah County and the vicinities of some of the salt domes. Because of thick beds of clay separating the major aquifer systems, there are two abrupt elevation changes in the base of the fresh-water section. In northeastern Simpson County fresh water occurs in the Wilcox Group, but southwest of a line through the Magee and Mendenhall areas the deepest fresh water is in the next higher major aquifer system, the Sparta Sand. The Sparta contains fresh water everywhere in the two counties except in southwestern Copiah County where the deepest fresh water is in beds of Miocene age 2,000 feet higher. The Cockfield Formation contains saline water (more than 1,000 milligrams of dissolved solids per liter of water) in much of the area in which the aquifer systems above and below it contain fresh water.

Geohydrologic sections (figs. 15-17) illustrate the subsurface features along the four lines indicated on the geologic map (fig. 4).

Aquifer and Well Hydraulics[1]

The hydraulic characteristic that serves as the basic control on water movement in an aquifer is permeability. Permeability determines the quantity of water that can flow through each unit of an aquifer's cross-sectional area under unit hydraulic gradient. The volume of water released from storage in the aquifer for each unit of decline of head in the aquifer is indicated by the storage coefficient. Storage coefficients for water-table aquifers may be 1,000 times as great as those for artesian aquifers.

The total quantity of water that moves through an aquifer depends on permeability, aquifer thickness, and hydraulic gradient. Under the artesian conditions commonly met in industrial and municipal water-supply development in Mississippi, transmissibility (permeability times aquifer thickness) is the most important property in determining the maximum amount of water a well can produce per unit of drawdown of the water level. The graph in figure 18 illustrates the relation between drawdown and aquifer transmissibility for idealized conditions. In constructing the graph it is assumed that artesian conditions prevail and that wells are fully efficient.

For a high-production well to be operated most economically it is necessary that it be efficient—that is, the pumping level in the well should be as near as possible to the artesian pressure surface in the aquifer outside the well. This efficiency is attained by properly selecting well-screen openings and gravel-pack material and by removing all drilling mud during well development. The geohydrologic sections (figs. 15-17) indicate the predicted production for wells that might be constructed in aquifers selected on the basis of thickness determined from electric-log data. These production values were calculated using an artesian storage coefficient, average values for permeability, and well efficiencies of 50 to 75 percent.

An important factor to be considered in the development of industrial and other large water supplies is the effect that wells have on each other, because interference between wells adds to the cost of producing water. Interference effects can be minimized or avoided altogether by utilizing different aquifers. However, not everywhere are two or more suitable aquifers available at reasonable depths, and procedures for water treatment are not always amenable to multiple sources of supply. Accordingly, where more than one well is completed in an aquifer they should be spaced as far apart as possible, consistent with economical distribution and treatment.

When an aquifer's hydraulic characteristics are known or can be reasonably estimated, it is possible to calculate the effect wells have on each other at various times and distances. The graph in figure 19 relates pumping rate, distance, and drawdown effect for selected values of transmissibility and pumping periods of 1 to 1,000 days. The graphs in figures 18 and 19 are based on the assumption that no hydraulic boundaries exist in the area of influence of the wells. Abrupt thickening or thinning of the aquifer, for example, could cause an increase or decrease in the rate of drawdown, the amount of change being influenced by the distance of the hydrologic boundary from the wells.

For an example of the use of the two graphs, assume that three similarly constructed and developed wells located in a triangle and equally spaced at 900 feet are pumped together at 1,000 gpm each for 100 days. What will be the drawdown in each well if they are all fully efficient and are screened in an aquifer having a transmissibility of 50,000 gpd per ft? Figure 18 shows that each well would have 55 feet of drawdown owing to its own pumping. In addition, each well would have 40 feet of drawdown (2x20) because of the discharge of the other two wells. Thus, each of the three wells would have 95 feet of drawdown. This drawdown plus the depth to the static, or nonpumping, water level would be the pumping level. Any deviation from full (100 percent) well efficiency would increase the drawdown in the affected well that proportional amount of the well's own drawdown. Well efficiency does not affect the aquifer or other wells in the aquifer.

[1] As of 1972, the official U. S. Geological Survey terminology for aquifer hydraulic characteristics includes hydraulic conductivity and transmissivity, which are equivalent to the coefficients of permeability and transmissibility, respectively. For purposes of continuity the older terms are used in this report.

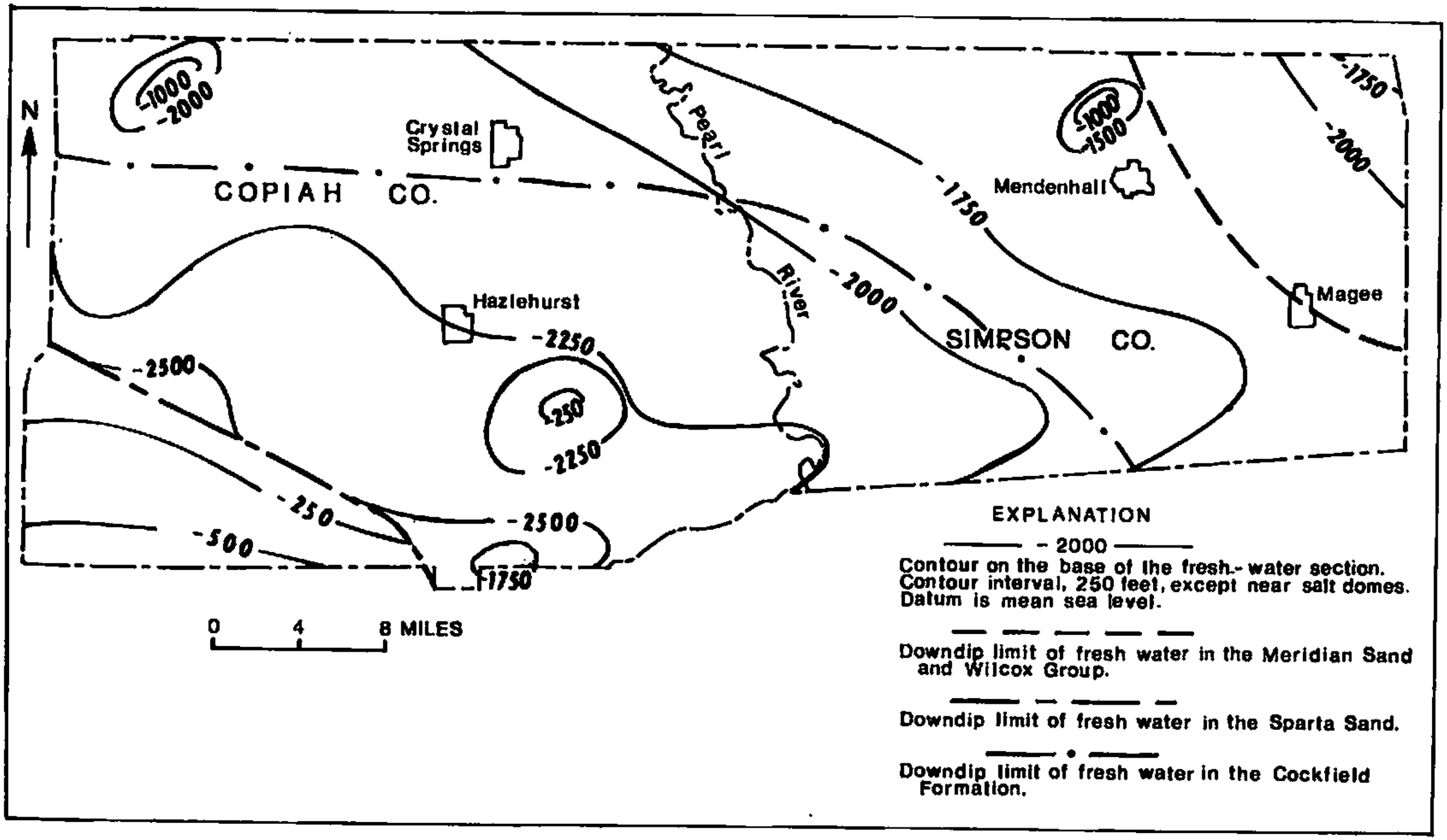


Figure 14. Contours on the base of the fresh-water section in Copiah and Simpson Counties.

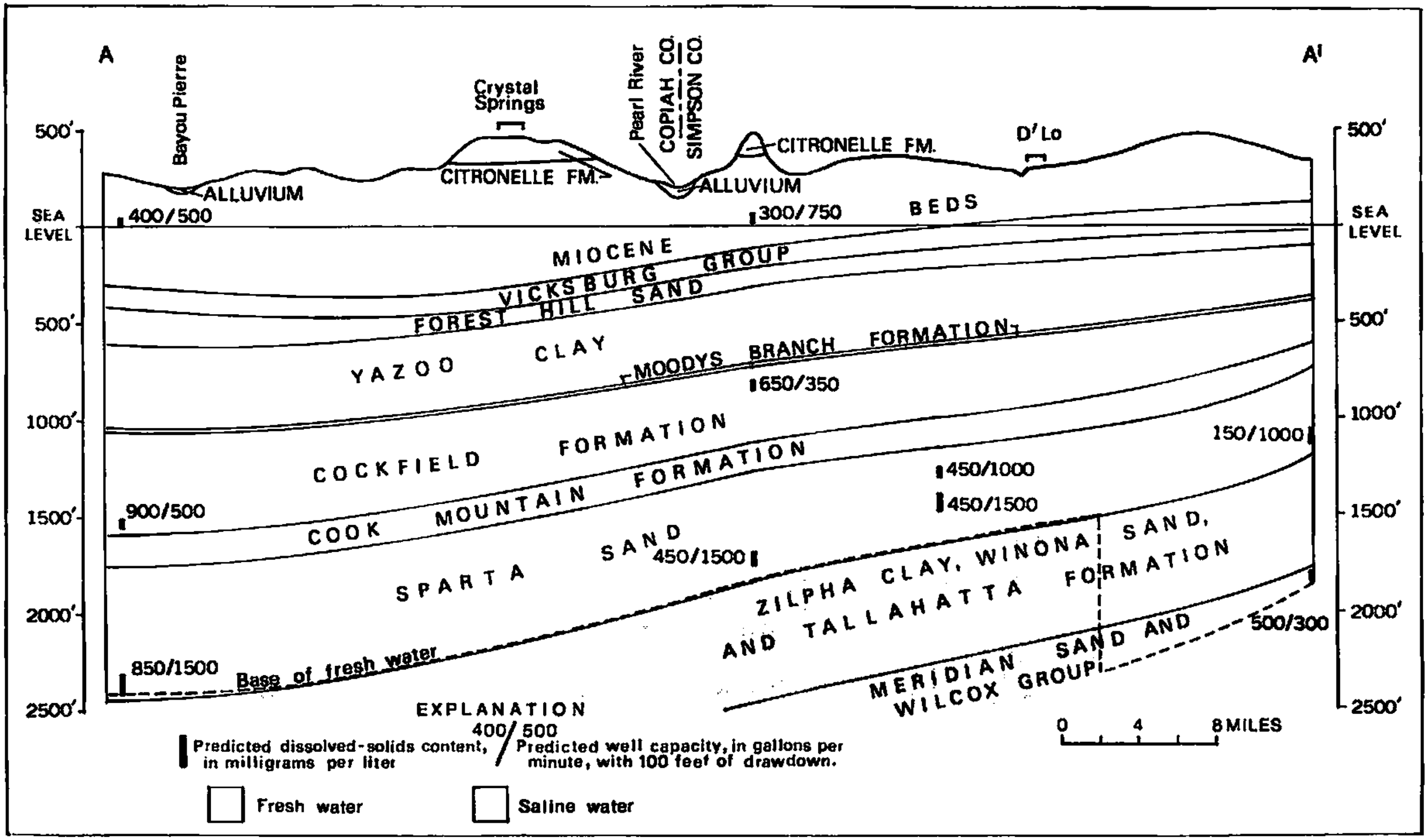


Figure 15. Geohydrologic section across northern Copiah and Simpson Counties.

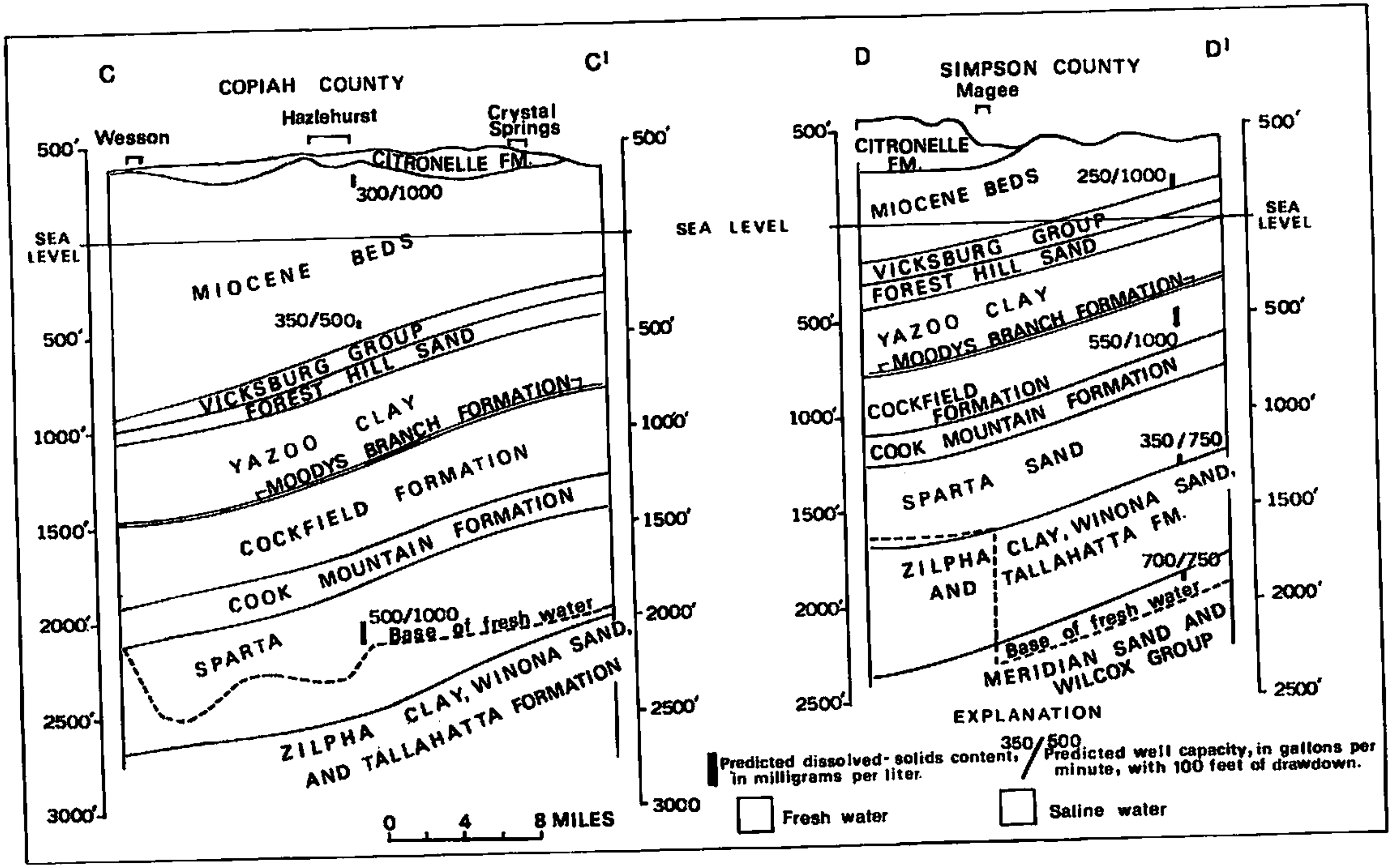


Figure 17. Geohydrologic sections from south to north in Copiah and Simpson Counties.

Description of Aquifers

Wilcox Group and Meridian Sand

The oldest aquifer system containing fresh water in the two-county area comprises the upper part of the Wilcox Group and the Meridian Sand, and only in northeastern Simpson County is this aquifer fresh-water bearing. Here the Meridian Sand, which is generally undifferentiated from the upper beds of the Wilcox, has its top 1,500 to 2,000 feet below sea level. Although no water wells have penetrated to these units in northeastern Simpson County, the few electric logs of oil tests available in this area indicate that several fresh-water sand beds of substantial thickness are present.

The permeability of the Wilcox and Meridian aquifers — or aquifer system — has been determined by pumping tests at many places in Mississippi and generally ranges from 100 to 1,000 gpd per sq ft (gallons per day per square foot). The average permeability for this artesian aquifer system is about 400 gpd per sq ft (Newcome, 1971, p. 6). Assuming this permeability and an aquifer thickness of 20 feet, a 6- to 12-inch well could produce as much as 400 gpm (gallons per minute) with a drawdown of 100 feet. Thicker aquifers should provide correspondingly more water to wells.

Water levels in wells completed in this aquifer system probably will be about 250 feet above sea level in northeastern Simpson County, or generally 100 to 200 feet below ground level.

The water, where it is indicated by electric logs to be fresh, contains 500-1,000 mg/l of dissolved solids. Its pH should be 7.0 or greater, and the iron content probably is low. Perhaps the greatest deterrent to use of this water is its color, which almost certainly will be high. In Hinds, Rankin, and Scott Counties the color averages 80 units and it is likely to be that high or higher in the project area. Color of this magnitude makes water unsuitable for public water supplies and most industrial water uses.

Sparta Sand

Because of its areal extent, thickness, and substantial proportion of sand, the Sparta ranks as the second largest potential source of groundwater supplies, being exceeded only by the Miocene beds. The Sparta is fresh-water bearing except in the southwest corner of the project area and over some of the salt domes. See section C-C' in fig. 17.)

The top of the Sparta is about 600 feet below sea level at the northeast corner of Simpson County, and here the formation is slightly more than 400 feet thick. As it dips southwestward the top of the unit reaches a depth of 2,800 feet below sea level at the southwest corner of Copiah County where its thickness is 700 feet. (See fig. 5 for configuration of the base of the Sparta.)

Aquifers in the Sparta generally range in thickness from 10 to 200 feet. A grouping of 109 sand intervals on electric logs throughout the project area gave the breakdown shown below.

Several of the aquifers, especially the thicker ones, can be traced for some distance in the subsurface; but their thickness is variable, and some of them alternately thin and thicken.

No conclusive values are available for hydraulic characteristics of the Sparta in the two counties. However, pumping tests in counties to the north and east indicate an average permeability of 500 gpd per sq ft. Based on this permeability, some of the Sparta aquifers could yield 1,000 gpm or more to wells (figs. 15-17). An important consideration in designing wells in the Sparta is the deep pumping level that probably would be required. The only wells completed in the Sparta in the two counties have static water levels about 300 feet below ground level. These wells are at Okatoma and Hazlehurst where surface elevations are high (455 and 530 feet above sea level, respectively), but even at lower elevations of the water level will be fairly deep.

Water in the Sparta is of generally good quality, being least mineralized in the eastern part of the project area and becoming increasingly mineralized toward the west. It is very soft. At Hazlehurst the dissolved-solids content is less than 500 mg/l, but the water is highly colored. Its color at Okatoma on the east edge of Simpson County is less pronounced than at Hazlehurst but is still well above the recommended upper limit of 15 for public supplies. Some industrial processes can use water having considerable color.

Cockfield Formation

The Cockfield contains fresh water in the northern part of Copiah County and in all of Simpson County except the southwestern part (fig. 14). The top of the unit ranges from 250 feet below sea level in the east to 1,500 feet in the west. It thickens westwardly from 225 to 525 feet.

Besides being a thinner formation than the Sparta, the Cockfield is less sandy and the individual sand beds are thinner. The average permeability of Cockfield aquifers in which major wells have been developed in Mississippi is about the same as that of the Sparta aquifers, but a high proportion of Cockfield sand is much less permeable and this gives the unit a generally lower

Aquifer thickness (ft)	10-20	21-40	41-60	61-80	81-100	101-150	151-200	>200
Percentage of aquifers	34	25	16	6	6	6	3	4

transmissibility. This probably accounts for the less advanced downdip extent of fresh water in the Cockfield.

Data from wells tapping the Cockfield in adjacent counties indicate that the permeability of the major Cockfield aquifers is about 350 gpd per sq ft in the two counties. Probably there are many places where 500-gpm wells can be constructed in the Cockfield, and in localities where especially thick beds are present larger production can be obtained.

The only well presently producing a significant amount of water from the Cockfield in the two counties is at Braxton near the northern border of Simpson County. The static water level at Braxton is about 210 feet above sea level. A fairly deep pumping water level can be expected in much of the area. Two flowing wells where the surface elevation is about 250 feet are recorded in the Cockfield.

Water in the Cockfield, even where it is fresh, probably is more highly mineralized than water in the deeper Sparta Sand. This is indicated by electric logs of oil tests in Copiah and Simpson Counties and by chemical analyses in counties to the north and east. Only one chemical analysis of Cockfield water (Braxton well) is available in the project area, and high color is the most apparent quality feature of this supply. Colored water is more common in the Cockfield than in most other formations in Mississippi. Color is probably substantial in Cockfield water throughout Copiah and Simpson Counties.

Forest Hill Sand

The Forest Hill Sand contains fresh water nearly everywhere in the two-county area, but the formation has little importance as a water-supply source. This unit contains one or, in places, two sand beds that are usually less than 20 feet thick but which in some localities exceed 80 feet. Water of better quality and in greater quantity can usually be obtained from the shallower Miocene aquifers; therefore, there is little necessity to develop supplies from the Forest Hill and deeper units.

Only one water supply (Georgetown) in the two counties is known to be obtained from the Forest Hill Sand. Georgetown is in a lowland about 240 feet above sea level, and the Forest Hill well has a static level a few feet above the land surface. The water is highly colored, more so than water from wells in the Sparta Sand and the Cockfield Formation.

Miocene Beds

The Miocene beds are the most important aquifers in the project area—as they are throughout southern Mississippi. The base of the Miocene is a little more than 200 feet above sea level at the northeast corner of Simpson County and it dips southwestward at an average rate of about 30 feet per mile, except in the western half of Copiah County where a flattening in the dip of deeper formations raises the Miocene beds about 300 feet (fig. 5). Thus, the Miocene base is only 850-900 feet below sea level along the southern border of Copiah County.

The Miocene section is at least 200 feet thick everywhere in the two counties and the maximum thickness is about 1,300 feet. Within the Miocene section are numerous beds of sand saturated with water of good quality. Many of the beds are thick, although their lenticularity makes correlation difficult over distances of several miles. Zones that are generally sandy are more easily traced on electric logs than are individual beds. the following thickness distribution shown in the table below.

The Miocene sand beds have the highest average permeability of all the aquifers except the overlying Citronelle Formation. Numerous pumping tests in southern Mississippi show a range in permeability from 40 to 2,600 gpd per sq ft and an average of 700. For 14 tests in Copiah and Simpson Counties, the permeability ranged from 110 to 2,000 gpd per sq ft and averaged 615. Artesian conditions existed at all the test sites and would be expected everywhere in the two counties except in the outcrops of the aquifers.

Several of the Miocene aquifers are capable of yielding considerably more than 1,000 gpm to individual wells. The criteria for high-production Miocene wells are: (1) a thick aquifer; (2) available drawdown; and (3) high well efficiency.

The Miocene aquifers are recharged by rainfall in areas where they crop out, by percolation of water through sand and gravel of the Citronelle Formation where that unit is overlying (fig. 4), and by infiltration from one sand bed to another by means of connecting sand stringers or through intervening clay. Probably all the surface recharge to the Miocene aquifers in Copiah and Simpson Counties occurs within these two counties and in the southern parts of Hinds and Rankin Counties to the north.

As water moves slowly down the dip of the Miocene beds it loses some of its artesian pressure but is able to rise in wells to within 150 feet of the land surface in most places. In highland areas the water level in a deep well may be nearly 300 feet below the surface.

Aquifer thickness (ft)	10-20	21-40	41-60	61-80	81-100	101-150	151-200	>200
Percentage of aquifers	47	26	16	6	2	3	0	0

Because there are a great many sand beds and because they crop out at various elevations or are covered by widely varying thicknesses of permeable Citronelle material, it is impossible to define a single artesian-pressure surface for the area. Rather, each aquifer has its own pressure surface and this surface may be higher or lower than the pressure surface of a shallower or deeper aquifer at the same location. Water levels in wells along the southern borders of Copiah and Simpson Counties are generally higher than along the northern borders—but land elevations are also higher in the south; consequently, water levels in the southern area are as deep as or deeper than those in the north.

Water in the Miocene beds is of good quality, generally having a dissolved-solids content of less than 300 mg/l. It is a sodium bicarbonate type and ordinarily is soft. The pH of most samples from these beds ranges between 6.0 and 8.0. Iron is a problem in many wells. Aeration and pH adjustment are used as a means of treatment in some public-supply water systems. Color is not significant in the Miocene water, in sharp contrast with the deeper aquifers.

Citronelle Formation

Many wells in Copiah and Simpson Counties produce water from the Citronelle sand and gravel beds. The geologic map (fig. 4) shows the outcrops of the Citronelle. These deposits are highly dissected and consequently are of varying thickness. Because of this dissection there is a rapid drainage of the water-bearing beds into intervening valleys; consequently, many thick deposits of sand contain water only in the bottom few feet. Water drains also into underlying sand of Miocene age. As a result, water-table conditions prevail in most of the Citronelle deposits.

Several short-duration pumping tests have been made in wells tapping the Citronelle in the two counties; but because water-table conditions were involved, none are considered reliable indicators of the hydraulic characteristics. Specific capacities (gallons per minute per foot of drawdown) of several wells indicate that a permeability of 1,000 gpd per sq ft or more is common; and elsewhere in southern Mississippi permeability values ranging from 700 to 3,000 gpd per sq ft have been recorded for this formation.

Although few Citronelle wells produce more than 500 gpm, the aquifer is capable of furnishing much greater yields in many places. Specific capacities ranging from 6.4 to 66 gpm per foot of drawdown have been recorded.

The Citronelle deposits are recharged directly by rainfall, which is distributed in one or more of three ways after it drains down to the water table. Some of it is stored in the aquifer, some replaces water that drains downward into underlying Miocene sand beds, and some drains laterally and issues as springs at the base of the formation where that contact is exposed by dissection.

More than half the water levels measured in Citronelle wells were deeper than 50 feet below land surface. Because the depth to the bottom of the aquifer is usually less than 150 feet—and the screened interval is commonly 20 feet or more—the available drawdown is not large; therefore, the construction of efficient wells is very important.

Water from the Citronelle is of excellent chemical quality but is somewhat acidic, with a pH commonly between 5.0 and 6.0. Dissolved solids are very low, ranging from 21 to 127 mg/l in the samples analyzed.

Alluvium

There has been little development of water supplies from the alluvium of Holocene age that occupies the major stream valleys. In places, especially in the Pearl River and Bayou Pierre valleys, the alluvial material may be as thick as 80 feet; however, the permeable-sand portion of the alluvium is somewhat less. The total thickness, as well as the thickness of the sand portion, is extremely variable and is impossible to predict with accuracy. Moderate supplies of water can probably be obtained where as much as 20 feet of aquifer material occurs, but the alluvium is not a promising source of industrial water supply.

Wells and Springs

The largest wells in the two counties are those supplying the communities and a few industries (table 9 and fig. 20). The discharge of none of the wells exceeds 628 gpm; however, many wells are completed in aquifers that could support much greater production.

Records of nearly 700 wells, drilled for all purposes, show a depth distribution as given in the table below. The depth distribution of 58 major wells is given for comparison.

Depth (ft)	101	101-200	201-300	301-500	501-700	701-1000	1001-1500	1500
Percentage of all wells	23	38	19	14	2	2	1	1
Percentage of major wells	9	26	26	26	5	3	2	3

LOCAL WELL NUMBER	LAND-NET LOCATION	LATITUDE (DEGREES)	LONGITUDE (DEGREES)	PRIMARY USE OF WATER	DEPTH OF WELL (FEET)	TOP OF OPEN INTERVAL (FEET)	BOTTOM OF OPEN INTERVAL (FEET)	DISCHARGE (GPM)	AQUIFER CODE	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED
~~D001 CRYSTAL SPRINGS~~	~~NWSES25T02NR02W~~	~~315858~~	~~0902142~~	~~U~~	~~101~~	~~84.00~~	~~—~~	~~102.00~~	121CRNL	68.00	06-01-55
D002 CRYSTAL SPRINGS	S25T02NR02W	315902	0902135	P	113	93.00	—	272.00	121CRNL	73.00	08-01-71
~~D003 CRYSTAL SPRINGS~~		~~315858~~	~~0902142~~		~~100~~	~~80.00~~		~~105.00~~	121CRNL	—	—
~~D004 CRYSTAL SPRINGS~~	~~NESWS25T02NR02W~~	~~315858~~	~~0903142~~	~~U~~	~~108~~	~~93.00~~			121CRNL	70.00	05-01-68
D005 CRYSTAL SPRINGS	S25T02NR02W	315858	902142	P	92.0	77.00	92.00	120.00	121CRNL	69.00	01-01-59
~~D007 CRYSTAL SPRINGS~~	~~S25T02NR02W~~	~~315858~~	~~902142~~	~~U~~	~~108~~	~~88.00~~	~~—~~	~~—~~	121CRNL	63.00	06-01-47
D008 C N THOMAS	SWNWS36T02NR02W	315802	902150	H	100	—	—	—	121CRNL	—	—
~~D009 STANDARD OIL CO~~	~~NESWS13T02NR02W~~	~~320038~~	~~902126~~	~~I~~	~~162~~	~~147.00~~	~~—~~	~~10.00~~	122CTHL	74.00	07-01-65
~~D010 MISS FED CO-OP~~	~~S35T02NR02W~~	~~315808~~	~~902249~~	~~U~~	~~242~~	~~202.00~~		~~350.00~~	122CTHL	137.00	06-01-65
~~D011 MISS FED CO-OP~~	~~SWNWS35T02NR02W~~	~~315808~~	~~902249~~	~~U~~	~~86.0~~	~~71.00~~	~~—~~	~~300.00~~	121CRNL	24.00	07-01-65
~~D012 MISS FED CO-OP~~	~~S35T02NR02W~~	~~315808~~	~~902249~~	~~U~~	~~117~~	~~97.00~~	~~—~~	~~350.00~~	121CRNL	55.00	07-01-65
D013 FRANK BRYANT	NESES15T02NR02W	315808	902248	H	412	—	—	10.00	122CTHL	86.00	11-01-65
D014 TEXICO OIL INC.	S35T02NR02W	315809	902248	H	77.0	62.00	—	35.00	121CRNL	54.00	01-01-67
D015 J C THOMPSON	NESWS14T02NR02W	320051	902221	H	122	116.00	—	400.00	122CTHL	56.00	07-01-67
D017 K N REED	SW S02T02NR02W	320204	902259	H	124	117.00	—	—	122CTHL	77.00	09-01-61
D018 GULF OIL CO.	NWSWS35T02NR02W	315815	902239	H	80.0	63.00	—	10.00	121CRNL	—	—
~~D019 MISS FED CO-OP~~	~~SWNWS35T02NR02W~~	~~315754~~	~~902257~~	~~U~~	~~90.0~~	~~70.00~~	~~—~~	~~250.00~~	121CRNL	43.00	06-01-68
~~D020 LUTHER RICE~~	~~NESES17T02NR02W~~	~~320041~~	~~902512~~	~~H~~	~~308~~	~~298.00~~	~~—~~	~~5.00~~	122CTHL	102.00	08-01-69
D021 MOZELL LITTLE	SWSES34T02NR02W	315748	902340	H	150	142.00	—	4.00	122CTHL	101.00	06-01-69
D022 CRYSTAL SPRINGS	SWSWS25T02NR02W	315845	0902200	P	111	91.00	—	259.00	122CTHL	70.00	08-01-71
D023 CRYSTAL SPRINGS	SWNWS25T02NR02W	315845	902200	P	107	87.00	—	321.00	121CRNL	66.00	08-01-71
D024 JACK CONN	S27T02NR01W	315851	902319	H	393	378.00	—	—	122CTHL	162.00	09-01-62
~~D025 COPIAH NEW ZION~~	~~S35T02NR02W~~	~~315818~~	~~902214~~	~~U~~	~~142~~	~~127.00~~	~~142.00~~	~~15.00~~	122CTHL	54.00	07-01-68
D026 RICHARD WILLIS	SWSES25T02NR02W	315845	902200	H	90.0	85.00	—	5.00	121CRNL	41.00	07-01-68
D027 J A THORNTON	NESWS33T02NR02W	315816	902429	H	100	94.00	—	5.00	121CRNL	70.00	03-01-67
D028 CHARLES BURNEY	SWSES34T02NR02W	315748	902340	H	141	136.00	—	10.00	121CRNL	93.00	08-01-67
~~D029 FRED YOUNG~~	~~NENWS09T02NR02W~~	~~320152~~	~~903425~~	~~H~~	~~52.0~~	~~47.00~~	~~—~~	~~9.00~~	121CRNL	40.00	10-01-68
~~D031 EARL MARTIN~~	~~NENES08T02NR02W~~	~~320157~~	~~902512~~	~~H~~	~~134~~	~~129.00~~			121CRNL	—	—
~~D032 COPIAH NEW ZION~~	~~NESWS23T02NR02W~~	~~315957~~	~~902221~~	~~U~~	~~127~~	~~107.00~~	~~—~~	~~30.00~~	122CTHL	52.00	01-01-66
D033 THOMAS LOCKHART	NENES14T02NR02W	320102	902205	H	161	156.00	—	5.00	122CTHL	97.00	08-01-69
D034 JAMES MORGAN	S11T02NR02W	320118	902208	H	345	330.00	—	—	122CTHL	95.00	06-01-68
D035 BEN BURNEY	S34T02NR02W	315811	902332	H	132	122.00	—	—	121CRNL	94.00	02-01-61
~~D036 MISS FED CO-OP~~	~~NW S35T02NR02W~~	~~315808~~	~~902249~~	~~U~~	~~116~~	~~106.00~~	~~—~~		121CRNL	52.00	01-01-65
D037 CECIL BURCH	SWNES21T02NR02W	315938	902436	H	180	170.00	—	15.00	122CTHL	147.00	03-01-70
D038 IRENE WILEY	NE S26T02NR02W	315913	902223	H	70.0	65.00	—	—	122CTHL	38.00	05-01-65
~~D039 H THORNTON~~	~~NE S30T02NR02W~~	~~320005~~	~~901900~~	~~H~~	~~262~~	~~252.00~~	~~—~~	~~—~~	122CTHL	172.00	09-01-61
D040 CHARLES STUCKEY	SE S15T02NR02W	320020	901658	H	152	147.00	—	—	122CTHL	92.00	08-01-60
D041 FLORA ROBBINS	SE S35T02NR02W	315745	902210	H	95.0	90.00	—	—	121CRNL	74.00	09-01-60
~~D044 E B KIMBLE~~	~~NE S05T02NR02W~~	~~320242~~	~~902517~~	~~H~~	~~96.0~~	~~91.00~~			121CRNL	61.00	07-01-63
D045 R ALTMAN	NE S26T02NR02W	315910	902218	H	65.0	60.00	—	—	122CTHL	24.00	06-01-66

Reference 3

LOCAL WELL NUMBER	LAND-NET LOCATION	LATITUDE (DEGREES)	LONGITUDE (DEGREES)	PRIMARY USE OF WATER	DEPTH OF WELL (FEET)	TOP OF OPEN INTERVAL (FEET)	BOTTOM OF OPEN INTERVAL (FEET)	DISCHARGE (GPM)	AQUIFER CODE	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED
D046 T E CARNEY	NW S12T02NR02W	320157	902143	H	132	122.00	--	10.00	121CRNL	95.00	07-01-60
D047 W A CHANDLER	S26T02NR02W	315852	902223	H	77.0	72.00	--	--	121CRNL	36.00	06-01-64
D048 JAS MORGAN	S17T02NR02W	320045	902512	H	162	152.00	--	--	122CTHL	102.00	06-01-62
D049 ERNEST WOLFE	S09T02NR02W	320139	902428	H	232	222.00	--	5.00	122CTHL	60.00	04-01-70
D050 L D HULL	SENWS26T02NR02W	315851	902218	H	83.0	78.00	--	8.00	121CRNL	40.00	04-01-70
D051 A G WOLF	SWNWS05T02NR02W	320217	902552	H	200	190.00	--	6.00	122CTHL	70.00	06-01-70
D052 ROBERT TAYLOR	SESWS26T02NR02W	315846	902237	H	110	100.00	--	6.00	122CTHL	75.00	07-01-70
D053 WILLIE BENSON	SENWS26T02NR02W	315842	902232	H	90.0	85.00	--	6.00	121CRNL	40.00	10-01-70
D055 CARRIE HICKS	NWNWS24T02NR02W	320017	0902144	H	180	180.00	200.00	4.00	122CTHL	160.00	09-20-79
D057 I C MONAURE	SENES17T02NR02W	320030	902503	H	282	148.00	--	--	122CTHL	98.00	02-01-71
D058 UNION CARBIDE	NESWS27T02NR02W	315905	902318	U	--	--	--	--	--	--	--
D060 T LOCKHART	SWNWS13T02NR02W	320028	902147	H	168	158.00	--	6.00	122CTHL	--	--
D061 MS GEOL SURVEY	NENWS27T02NR02W	315920	902330	U	530	--	--	--	--	--	--
D062 L E HOOD	SWNES21T02NR02W	315946	902423	H	175	165.00	--	15.00	122CTHL	136.00	08-01-71
D063 JACKIE GADDY	SWNWS21T02NR02W	315940	902459	H	99.0	94.00	--	10.00	122CTHL	82.00	11-01-71
D064 PAUL NORWOOD	NWNES12T02NR02W	320143	902138	H	640	630.00	--	6.00	122CTHL	100.00	11-01-71
D065 JULES BROWN	SESES05T02NR02W	320205	902516	H	98.0	93.00	--	--	--	68.00	12-01-71
D066 JOHNNY CLINE	SWNES05T02NR02W	320230	0902535	H	233	160.00			122CTHL	.00	12-01-47
D067 CRYSTAL SPRINGS	NWSWS25T02NR02W	315905	902154	U	--	--	--	--	121CRNL	--	--
D068 LUCK RICE	NESWS17T02NR02W	320042	902522	H	160	145.00	--	7.00	122CTHL	72.00	07-01-72
D069 BILL AINSWORTH	NENWS29T02NR02W	315921	902531	H	147	127.00	--	10.00	122CTHL	50.00	08-01-72
D070 CRYSTAL SPRINGS	SESES26T02NR02W	315842	902219	U	--	--	--	--	--	--	--
D071 CRYSTAL SPRINGS	SWSWS25T02NR02W	315847	902201	U	--	--	--	--	--	--	--
D072 CRAIG PYRON	NESES26T02NR02W	315852	0902209	H	500	470	500	25	123FRHL	--	--
D072 CRYSTAL SPGS	SWSWS25T02NR02W	315821	902134	U	--	--	--	--	--	--	--
D073 CRYSTAL SPGS	SWNWS25T02NR02W	315847	902142	U	--	--	--	--	--	--	--
D075 CRYSTAL SPGS	SENWS25T02NR02W	315843	902130	U	--	--	--	--	--	--	--
D076 CRYSTAL SPRINGS	SWNES25T02NR02W	315850	0902136	P	320	294.00	--	220.00	122CTHL	225.00	08-15-85
						--	--	220	--		
D077 ALLEN BARNES	SWNES13T02NR02W	320038	902142	H	160	--	--	5.00	122CTHL	44.00	05-01-73
D078 ROBERT GRAHAM	NWSWS14T02NR02W	320044	902259	H	437	427.00	--	8.00	122CTHL	100.00	05-01-73
D080 LUTHER GREEN	SENES02T02NR02W	320219	902211	H	210	200.00	--	5.00	122CTHL	120.00	09-01-73
D081 NEW ZION W A	NWNES34T02NR02W	315824	902344	U	--	--	--	--	--	--	--
D082 NEW ZION W A	NWNES34T02NR02W	315820	902350	U	--	--	--		--	--	--
D083 A L DAVIS	SWSWS12T02NR02W	320124	902141	H	125	--	--	5.00	122CTHL	55.00	06-01-74
D084 NEW ZION W A	NWNES34T02NR02W	315818	902339	-	--	--	--	--	--	--	--
D085 NEW ZION W A	NWNWS27T02NR02W	315921	902359	-	--	--	--	--	--	--	--
D086 NEW ZION W A	SWNES21T02NR02W	315938	902447	-	--	--	--		--	--	--
D087 COPIAH NEW ZION	NWNWS27T02NR02W	315919	902323	P	515	465.00	--	300.00	122CTHL	182.73	10-29-81
D088 GALE LAWLESS	SWSES34T02NR02W	315744	902338	H	100	--	--	10.00	121CRNL	70.00	11-01-74

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D089 COPIAH NEW ZION	NENES27T02NR02W	315919	902309	P	515	464.00	—	350.00	122CTHL	115.00	06-01-75
D090 J B POWELL	S36T02NR02W	315758	902131	H	70.0	65.00	—	—	121CRNL	35.00	03-01-62
D092 CRYSTAL SPGS	NENES25T02NR02W	315922	0902101	—					—	—	—
D093 COPIAH NEW ZION W A	NENES28T02NR02W	315917	0902400	—	860.	830.	850.	50.	123FRHL	168.	02-07-86
D094 CRYSTAL SPGS	SESWS26T02NR02W	315844	0902227	—	—	—	—		—	—	—
D095 CRYSTAL SPGS	NESWS35T02NR02W	315804	0902232	—	—	—	—	—	—	—	—
D096 CRYSTAL SPGS	NESWS35T02NR02W	315801	0902234	U	72	52	72	65	121CRNL	20.	05-19-86
D097 CRYSTAL SPGS	SESWS35T02NR02W	315757	0902233	U	90	70	90	65	121CRNL	44.	05-21-86
D098 CRYSTAL SPRINGS	SESES22T02NR02W	315932	0902300	—					—	—	—
D099 CRYSTAL SPRINGS	SWSES22T02NR02W	315937	0902312	—	—	—	—		—	—	—
D100 CRYSTAL SPRINGS	NWSWS25T02NR02W	315855	0902144	P	128	67	107	265	121CRNL	56.7	04-15-91
D101 CRYSTAL SPRINGS	SENES35T02NR02W	315819	0902207	P	137	85	137	377	121CRNL	78.5	04-20-91
D107 KENNETH W FAIRLY	NWNES08T02NR02W	320153	0902520	H	220	200	220	10	123FRHL	—	—
E001 D LOVE LADY	NWNES19T02NR01E	320015	902030	H	1200	—	—	1.00	124CCKF	—	—
E002 RICHARD JACKSON	SWNWS09T02NR01E	320133	901843	H	137	130.00	—	—	121CRNL	35.00	11-01-62
E003 INTERNAT. PAPER	SENWS07T02NR01W	320135	902015	U	735	—	—	—	122CTHL	—	—
E004 HENRY BERRY	SESES05T01NR01W	320211	901859	H	284	—	—	—	122CTHL	—	—
E005 TROY DONAHOE	S16T02NR01W	320044	901827	H	334	324.00	—	—	122CTHL	70.00	12-01-65
E006 WILBUR PARSONS	SWNES05T02NR01W	320214	901919	H	226	—	—	—	122CTHL	—	—
E007 BLAIN SD & GRVL	NE S31T02NR01W	315824	902002	N	116	—	—	620.00	121CRNL	86.00	06-01-68
E008 BLAINE SAND INC	NWNES31T02NR01W	315828	902012	N	107				121CRNL	—	—
E009 BLAINE SAND INC	SWSWS32T02NR01W	315745	901945	U	164		—	500.00	121CRNL	7.00	03-01-66
E010 P D ARMSTRONG	SWSWS16T02NR01W	320022	901847	H	395	—	—	—	122CTHL	—	—
E011 TRAXLER GRAVEL	NWSES19T02NR01W	320001	902031	U	146			—	121CRNL	—	—
E012 GERALD D STIEGEL	NESWS34T02NR01W	315815	901700	H	78.0	73.00		—	122CTHL	50.00	06-01-66
E013 TRAXLER GRAVEL	NWSWS31T02NR01W	315816	902041	U	160	—	—	—	121CRNL	—	—
E014 BLAIN SD & GRAV	SENES31T02NR01W	315817	902026	U	132				121CRNL	65.00	05-01-68
E015 BLAIN SD & GRAV	NESWS31T02NR01W	315758	901959	U	96.0	—	—	250.00	121CRNL	84.00	06-01-68
E016 BLAIN SD & GRVL	NESES31T02NR01W	315811	902009	U	120	96.00		554.00	121CRNL	84.00	07-01-68
E017 TRAXLER GRAVEL	NWSES31T02NR01W	315805	902031	U	143	120.00	—	100.00	121CRNL	80.00	06-01-68
E018 N E COPIAH W A	NWNWS27T02NR01W	315920	0901742	U	310	270.00	—	173.00	122CTHL	197.00	12-01-68
E019 TRAXLER GRAVEL	NWSES31T02NR01W	315819	902027	U	115	—	—	—	121CRNL	—	—
E021 TRAXLER GRAVEL	NWSES31T02NR01W	315819	902027	I	140	120.00	—	—	121CRNL	80.00	06-01-67
E022 PILGRIM REST	SWSWS16T02NR01W	320020	901840	H	319	314.00	—	—	122CTHL	179.00	12-01-60
E023 P D ARMSTRONG	SWSWS16T02NR01W	320020	901840	H	258	248.00	—	—	122CTHL	42.00	02-01-62
E024 HUGHLON DEAR	SENWS07T02NR01W	320135	902015	H	405	400.00	—	—	122CTHL	134.00	08-01-63
E025 COUNTY LINE BAP	SESWS06T02NR01W	320210	902022	H	95.0	88.00	—	—	—	54.00	07-01-64
E026 MRS GUS BATTON	SENWS32T02NR01E	315807	901900	H	90.0	85.00	—	3.00	121CRNL	63.00	06-01-67
E027 MRS H GRANBERRY	NWNES10T02NR01W	320148	901724	H	110	105.00		15.00	122CTHL	51.00	07-01-67
E028 P WARRINGTON	NE S21T02NR01W	315838	901903	H	282	277.00	—	—	122CTHL	198.00	09-01-65

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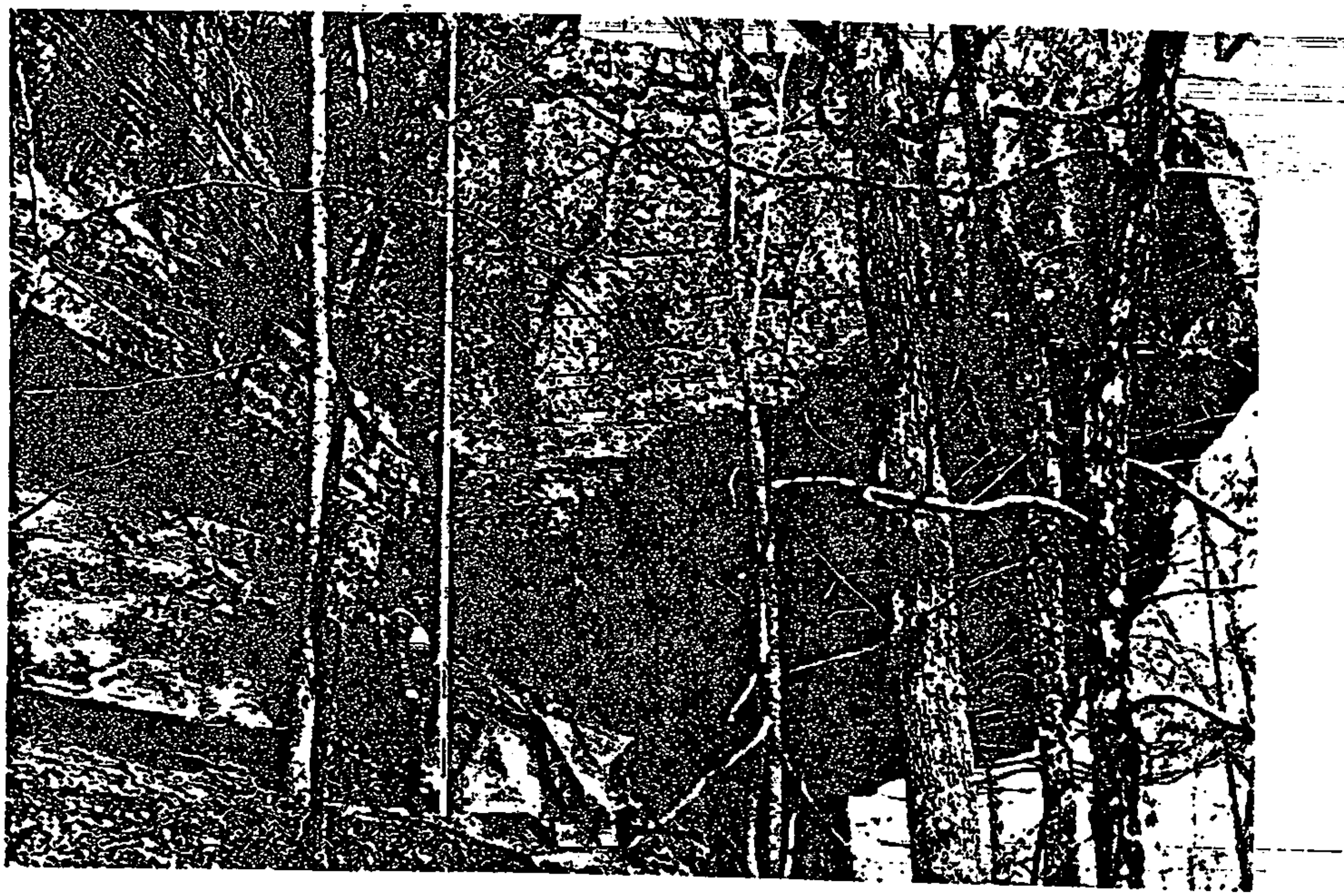
E029 CLYDE BLOCKER	S28T02NR01W	315853	901837	H	—	—	—	—	—	—	—
E032 BLAINE SD&GRAV.	SENES31T02NR01W	315750	902020	U	120				121CRNL	—	—
E033 BLAINE SD&GRAV.	SENES31T02NR01W	315750	902020	U	124	—		—	121CRNL	—	—
E034 SOU BLDS SUPPLY	SE S30T02NR01W	315839	902010	H	68.0	63.00	—	—	121CRNL	32.00	07-01-60
E035 JOHN H MOON	SW S28T02NR01W	315847	901848	H	98.0	93.00	—	—	121CRNL	76.00	12-01-61
E036 JOHNSON	NWSES03T02NR01W	320222	901737	H	220	160.00	—	3.00	122CTHL	90.00	11-01-70
E037 MSGS	NW S28T02NR01W	315900	901823	U	—				—	—	—
E039 J R BARNHART	NWSES19T02NR01W	315958	902032	S	77.0	66.00	—	30.00	122CTHL	28.00	08-01-70
E041 TRAXLER GRAVEL	NWSWS31T02NR01W	315817	902058	U	—	—	—	—	—	—	—
E042 TRAXLER GRVL CO	NWSES31T02NR01W	315800	902039	U	120	90.00		250.00	121CRNL	58.00	04-01-69
E043 TRAXLER GRAVEL	NWSES31T02NR01W	315818	902029	—	—	—			—	—	—
E044 TRAXLER GRVL CO	NENWS31T02NR01W	315823	902040	N	144	104.00	—	300.00	121CRNL	80.00	10-01-72
E045 COTTON	NESES34T02NR01W	315811	901719	H	217	207.00		9.00	122CTHL	87.00	10-01-72
E049 AMERICAN QUASAR	SESWS15T02NR01W	320024	901721	U					—	—	—
E050 N E COPIAH W A	NENWS27T02NR01W	315917	901728	U	—	—			—	—	—
E052 N E COPIAH W A	SESES17T02NR01W	320020	901906	—	—	—			—	—	—
E054 ROBERT EVANS	SWSES06T02NR01W	320211	902009	H	138	110.00	138.00	20.00	122MOCN	70.00	07-12-77
E055 LOFTIN SD GRV	SESWS32T02NR01W	315748	0901930						—	—	—
E056 DAVID ROGERS	NESES34T02NR01W	315802	901701		100	95.00			122CTHL	40.00	05-01-72
E057 H A COURTNEY	NWSES20T02NR01W	315944	901908	H	390	370.00	390.00	10.00	122MOCN	110.00	03-07-82
E058 KINGS SAND & GRVL	NENWS27T02NR01W	315914	0901904	N	310	260.00	310.00	100.00	122CTHL	171.00	06-11-82
E059 IDA MAE FRANCE	NWNES06T02NR01W	320258	902004	H	319	304.00	319.00	15.00	122CTHL	110.00	11-07-82
E061 CRYSTAL SPGS	SWSES30T02NR01W	315845	0902018						—	—	—
E062 CRYSTAL SPRINGS	SWSES30T02NR01W	315849	0902019	P	158.	138.	158.	250.	121CRNL	72.	11-21-85
E063 CRYSTAL SPGS	S30T02NR01W	315848	0902019	—	—	—			—	—	—
E064 CRYSTAL SPGS	S30T02NR01W	315911	0902020	—	—	—			—	—	—
E065 CRYSTAL SPGS	NWNES30T02NR01W	315915	0902016					—	—	—	—
E066 CRYSTAL SPGS	NWS30T02NR01W	315924	0902022	—	—				—	—	—
E067 CRYSTAL SPRINGS	SESES31T02NR01W	315752	0901957	—	—				—	—	—
E068 CRYSTAL SPRINGS	NESES31T02NR01W	315759	0901955	—					—	—	—
E069 CRYSTAL SPRINGS	SENWS29T02NR01W	315914	0901931	r	115.	95.	115.	125.	121CRNL	60.	09-01-88
E070 CRYSTAL SPRINGS	NENES31T02NR01W	315828	0901958	—	—	—			—	—	—
E071 CRYSTAL SPRINGS	SESWS29T02NR01W	315915	0901931	P	180	62	112	250	121CRNL	62.9	09-01-89
J017 ALFORD MILLER	SESWS10T01NR02W	315559	902317	H	110			—	122CTHL	80.00	09-01-57
J018 TRUCK CROP STA.	NWNWS11T01NR02W	315641	902253	U	240	210.00	—	120.00	122CTHL	180.00	09-01-57
J019 TRUCK CROP STA.	NWNES11T01NR02W	315645	902230	U	240	210.00		60.00	122CTHL	180.00	09-01-57
J022 METHODIST CAMP	NE S09T01NR02W	315640	902407	H	526	505.00		116.00	122CTHL	213.	06-01-82
						—	—	104.	—		
J027 ROLLING HILL CC	SENES03T01NR02W	315653	902307	R	158	138.00	—	200.00	121CRNL	67.00	01-01-64
J035 TRUCK CROPS STA	NW S11T01NR02W	315647	902243	I	210	169.00	—	34.00	122CTHL	108.00	04-01-68

LOCAL WELL NUMBER	LAND-NET LOCATION	LATITUDE (DEGREES)	LONGITUDE (DEGREES)	PRIMARY USE OF WATER	DEPTH OF WELL (FEET)	TOP OF OPEN INTERVAL (FEET)	BOTTOM OF OPEN INTERVAL (FEET)	DISCHARGE (GPM)	AQUIFER CODE	WATER LEVEL (FEET)	DATE WATER LEVEL MEASURED
J041 JACK FOSTER	NESWS05T01NR02W	315719	902529	H	100	95.00	—	5.00	121CRNL	79.00	02-01-67
J042 RAY FLOWERS	NESWS04T01NR02W	315719	902421	H	104	97.00	—	10.00	122CTHL	64.00	08-01-67
J043 JAMES FRANKLIN	SWNES12T01NR02W	315618	902141	H	114	109.00	—	15.00	121CRNL	66.00	12-01-68
J044 J G SINGLETARY	NWSES05T01NR02W	315719	902539	H	260				122CTHL	—	—
J047 LAKE COPIAH INC	SWNES04T01NR02W	315708	902438	I	84.0	73.00			122CTHL	32.00	02-01-64
J051 DANIEL FIELDER	SW S02T01NR02W	315705	902144	H	128	123.00	—	—	121CRNL	96.00	02-01-63
J053 LUKE LUNCHES	NENWS03T01NR02W	315748	902324	H	151	141.00	—	7.00	122CTHL	90.00	04-01-70
J057 WILLIAM SANDERS	SWNWS01T01NR02W	315707	902144	H	144	134.00	—	8.00	122CTHL	80.00	05-01-71
J059 UNION CARBIDE	SENES05T01NR02W	315707	902519	U	—	—	—	—	—	—	—
J068 COPIAH NEW ZION	NESES05T01NR02W	315708	0902502	P	356.	306.	331.	250.	122MOCN	160.	09-11-86
						346.	356.	—	—		
J069 COPIAH W A	NENES15T01NR02W	315553	0902311	P	233	185.	195.	410.	122CTHL	88.	07-23-92
						203.	233.	—	—		
K005 T M GREER	NENES09T01NR01W	315644	901753	H	127	—	—	—	121CRNL	109.00	09-01-57
K006 OTTO BELL	SWNWS04T01NR01W	315702	901845	H	80.0	—	—	—	121CRNL	—	—
K007 J B WALTERS	SENES05T01NR01W	315705	901855	H	104	—	—	4.00	121CRNL	82.00	09-01-57
K008 TROY MCMANUS	SESWS05T01NR01W	315650	901916	H	65.0	—	—	—	121CRNL	63.00	09-01-57
K010 M I STRINGER	NWSWS07T01NR01W	315633	902045	H	115	105.00	—	15.00	121CRNL	34.00	06-01-67
K011 HARMONY RIDGE		315621	0901745		208	134.00		180.00	122CTHL	—	—
K012 TRAXLER GRAVEL	SWSES04T01NR01W	315657	901825	U	170	—		—	122CTHL	—	—
K013 EDWIN VAUGHN	SWNES04T01NR01W	315704	901830	H	136	126.00	—	10.00	122CTHL	92.00	02-01-69
K017 EARL KNIGHT	S08T01NR01W	315625	901919	H	134	122.00	—	—	121CRNL	62.00	02-01-66
K019 EDWIN VAUGHN	SWNES04T01NR01W	315704	901830	H	137	127.00	—	—	120TRTR	88.00	05-01-62
K020 W H FITZAPATRIC	SWNWS06T01NR01W	315710	902052	H	111	106.00	—	10.00	121CRNL	73.00	08-01-68
K027 GATHA Z LACK	S04T01NR01W	315718	901823	H	87.0	82.00	—	5.00	121CRNL	72.00	11-01-60
K028 MS GEOL SURVEY	SWSES08T01NR01W	315600	901930	U	642	—			—	—	—
K032 HARMONY RDG W A	NENWS10T01NR01W	315639	901729	P	269	229.00	269.00	250.00	122CTHL	114.00	10-31-77
K034 GREEN BROS GRVL	SESES10T01NR01W	315602	0901700	N	190.	150.	190.	550.	122CTHL	—	—
K035 GREEN BROS GRAVEL	SESES10T01NR01W	315602	901700	N	200	160.00	200.00	550.00	122CTHL	—	—
K041 BLAIN SD & GRV	NESES06T01NR01W	315712	0901954	N	220	159	220		121CRNL	—	—

TISHOMINGO COUNTY GEOLOGY AND MINERAL RESOURCES

Robert K. Merrill
Delbert E. Gann
Stephen P. Jennings



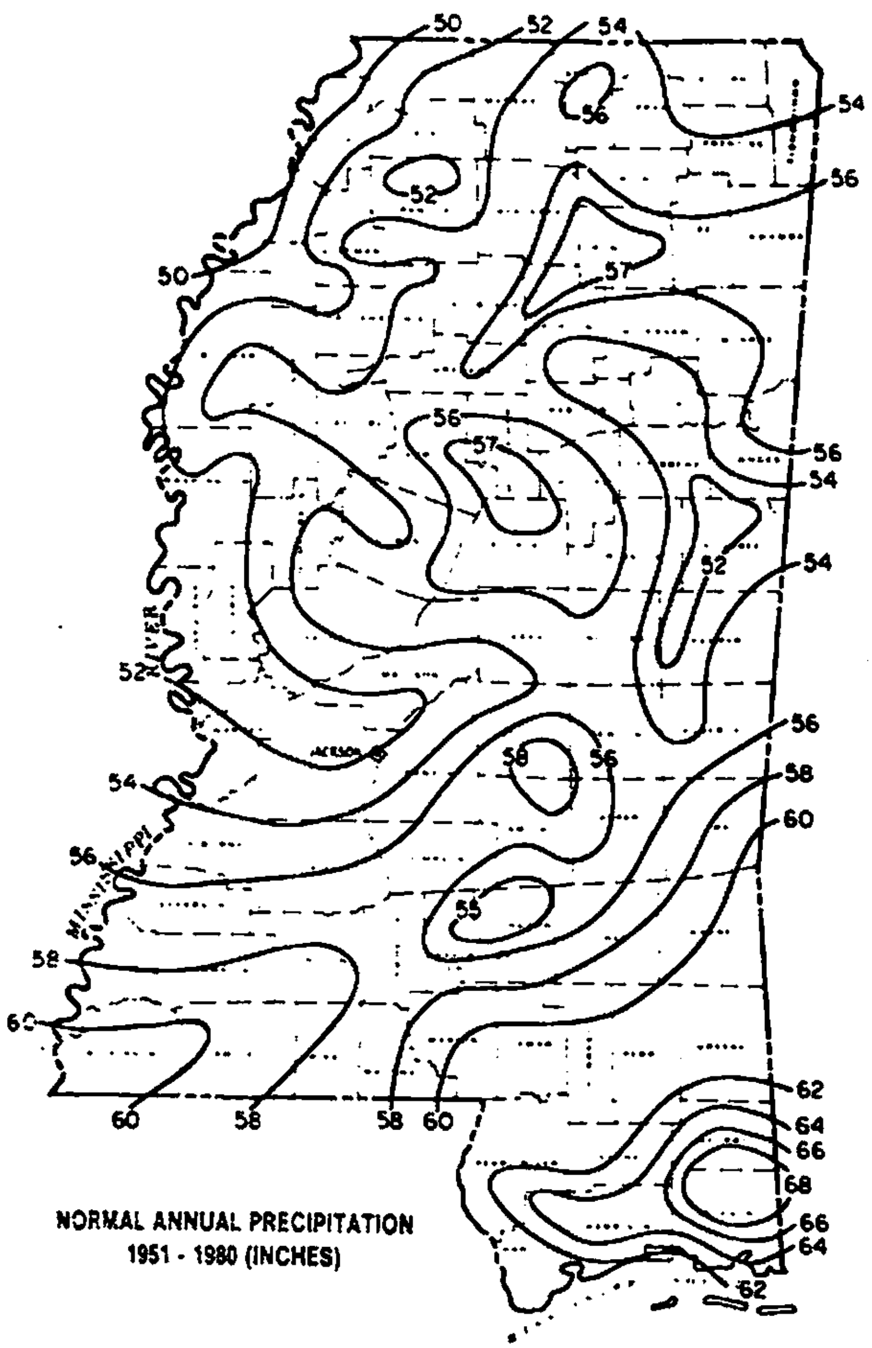
BULLETIN 127

MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES
BUREAU OF GEOLOGY

CONRAD A. GAZZIER
Bureau Director

Jackson, Mississippi
1988

REFERENCE 8



- Mean annual precipitation in inches. From U. S. Weather Bureau, Jackson, Mississippi. Based on the 30-year period 1951-1980.

TECHNICAL PAPER NO. 40

RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

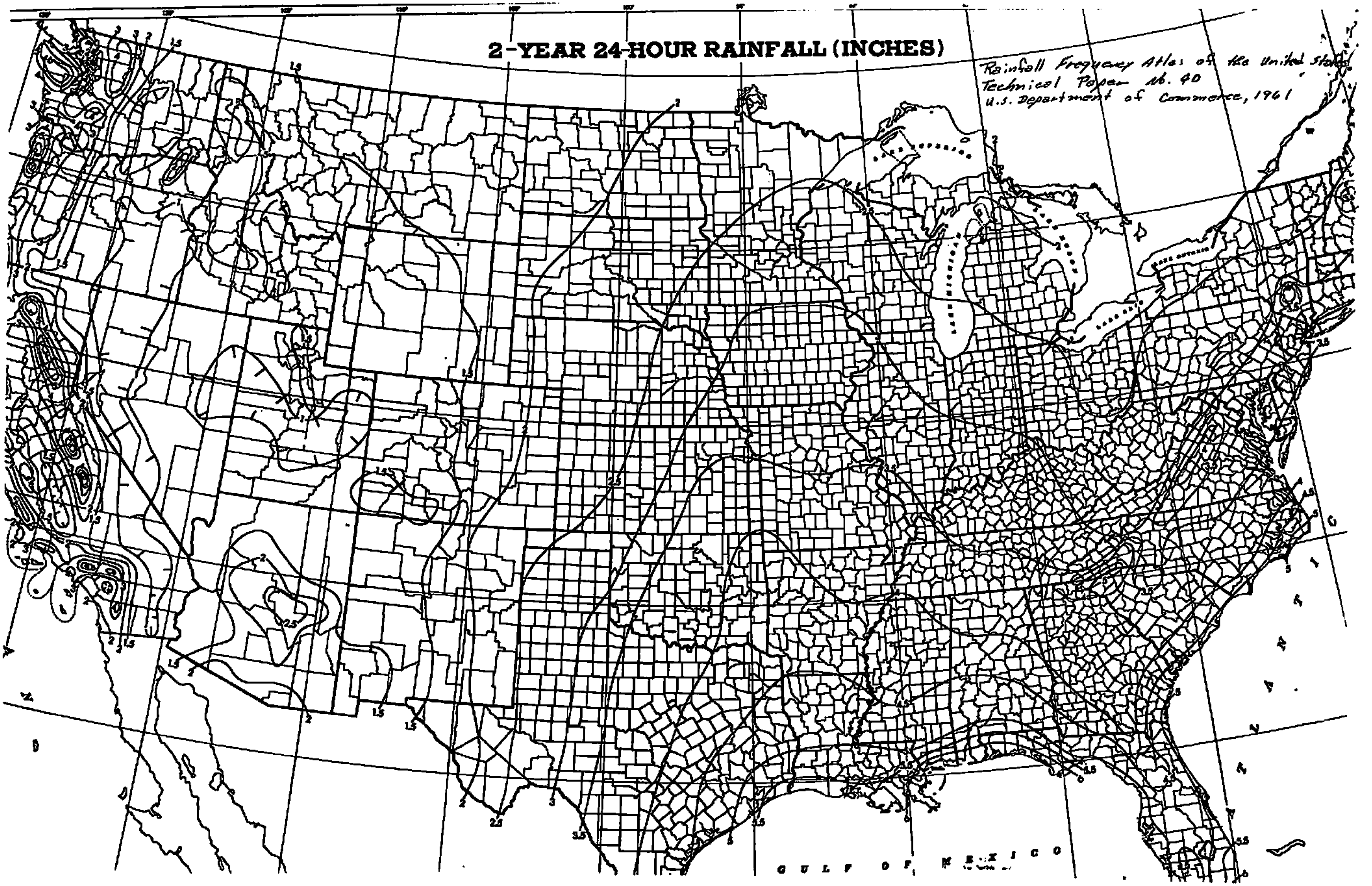
Prepared by
DAVID M. HERSHFIELD
Cooperative Studies Section, Hydrologic Services Division

for

Engineering Division, Soil Conservation Service
U.S. Department of Agriculture

REFERENCE 10

2-YEAR 24-HOUR RAINFALL (INCHES)

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SCALE 1:24 000
CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U.S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092
A FOLDER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST
ROAD CLASSIFICATION
QUADRANGLE LOCATION
GALLMAN, MISS.
N3152.5—W9022.5/7.5
1963
AMS 2947 IV NW—SERIES V845
CRYSTAL SPRINGS, MISS.
N3152.5—W9015/7.5
1963
AMS 2947 IV NE—SERIES V845
Reference 3