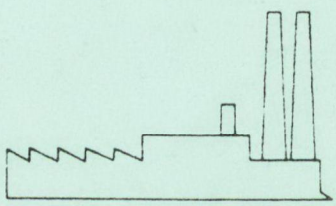
US EPA

Study of the Pulp & Paper Industry in Region IV



Water Management Division

Facilities Performance Branch

September 1986

STUDY DIRECTORS

John T. Marlar
Gil Wallace

STUDY MANAGER

Curt Fehn

PRINCIPAL AUTHOR

Kenneth Kwan

CONTRIBUTING AUTHORS

Curt Fehn
Larry Brannen
Phil Vorsatz
John Schoolfield
Jim Wang

CLERICAL SUPPORT

Harriet Brothers
Linda Kidd

TABLE OF CONTENTS

APPENDIX

PULP AND PAPER INDUSTRY STUDY

I. INTRODUCTION

A. Purpose

Increased responsibility and flexibility in implementing NPDES programs by the states which have been delegated this authority has indicated a need to determine whether these programs are being implemented consistently. The purpose of this study is to evaluate the permitting of waste discharges and the compliance with these permits for one particular industry. The pulp and paper industry was selected for evaluation because it is of major economic importance to the Southeast, it is large enough to provide a suitable cross-section for determining trends in data, and it is represented in each Region IV State. Additionally, Best Practicable Control Technology Currently Available (BPT) requirements have been promulgated for this industry and compliance tracking and enforcement of these permits should be straightforward.

At the moment, seven States in Region IV have been delegated the NPDES program and EPA is implementing the program in one State. The Kentucky program was delegated at the end of 1983. All State agencies seek to follow the Federal statutes, regulations and policies. However, the NPDES program is complex and allows room for judgement in decision-making. Therefore, this study attempts to determine whether agencies involved are consistent in implementing the NPDES program and how closely the statutes, regulations, and policies are followed.

B. Methodology

As a part of this study, on-site inspections were conducted at each of the 56 major pulp and paper facilities in Region IV with the exception of 1 mill in South Carolina where a telephone survey was conducted. Specifically, those facilities selected were in the Standard Industrial Classification (SIC) Codes of 2611 (Pulp Mills), 2621 (Paper Mills, Except Building Paper Mills), and 2631 (Paperboard Mills). These mills are distributed geographically as indicated.

State	Number of Facilities
Alabama	15
Florida	6
Georgia	10
Kentucky	3
Mississippi	5
North Carolina	7
South Carolina	6
Tennessee	4
TOTAL, REGION IV	56

In addition to the site inspections, files relative to these mills were audited at each of the respective state agencies or at the EPA Regional Office.

Data were collected on three separate forms of which two were specifically designed for the study. These forms included a File Review Checklist (Appendix A), an on-site Technical Inspection Report (Appendix B), and a standard EPA NPDES Compliance Inspection Report (Appendix C). Investigators were from the Facilities Performance Branch of the Water Management Division (WMD), the Engineering Support Branch of the Environmental Services Division (ESD), and respective State agencies in Region IV. The study was coordinated, and the report prepared by the Facilities Performance Branch of the Water Management Division. As many Compliance Sampling Inspections (CSI's) and Performance Audit Inspections (PAI's) were performed as possible. The ESD chose PAI's based on Discharge Monitoring Report quality assurance data. All work was coordinated with the state agencies and, where a CSI or PAI was not performed, a joint Compliance Evaluation Inspection (CEI) with the appropriate state agency was conducted, if possible.

For each facility, a permit file audit was made of how effluent limits were determined and also the technical basis of these limits. The procedures involved in issuing the permit were examined including the fact sheet, draft permit, public notice, and the administrative record supporting differences between the draft and final permit.

Also, for each facility, a compliance file audit was made verifying the existence of operational procedures to receive, track, review, and evaluate all reports submitted by the individual permittees. Of particular importance in these procedures were basic elements such as the existence of a comprehensive and accurate review of all compliance materials relating to the NPDES permit; maintenance of complete and current record files; an adequate procedure of tracking compliance information; submittal of complete and accurate Quarterly Noncompliance Reports; an adequate compliance inspection program; and consistent enforcement actions.

Following the permit and compliance file audit, an on-site inspection was conducted at each facility. This inspection included such things as a comparison of actual operating conditions to the information supplied on the permit application, the procedures used in monitoring the waste discharges, sampling procedures, laboratory procedures, record keeping at the facility, and reporting procedures to the responsible agency. The efficiency of the treatment systems and the use of Best Management Practices (BMP's) were also examined.

Finally, information on file at EPA was compared with information available in the State files. This review included whether the PCS inventory coincided with the State's inventory, whether the State's technical review criteria were appropriate to screen DMR's and whether EPA's list of facilities in significant noncompliance was accurate.

II. CONCLUSIONS AND RECOMMENDATIONS

Pulp and Paper Industry

1. Pulp and paper mills are a major component of industry in the Southeast. The most commonly found mills produce bleach kraft products, and most mills in this study employ 500 or more people.

2. The pulp and paper industry is a heavy water user. Surface water use ranges from 3.5 to 60 million gallons per day (MGD), groundwater use ranges from 0.83 to 75 MGD, and municipal water use ranges from 1.4 to 11 MGD.

3. Of the eight product subcategories studied, mills producing dissolving sulfite pulp (K) and fine bleached kraft (I) products have the highest influent loading to the treatment system.

Wastewater Treatment Systems

4. All mills employ some type of wastewater treatment system for BOD and TSS removal. These systems basically consist of pretreatment, primary treatment and biological treatment. Additional treatment processes beyond biological treatment were not found except for a few mills that use polymers to improve settleability of the suspended solids. Biological treatment commonly used in the pulp and paper industry are: aerated stabilization basins (ASB), oxidation basins (OB), and the activated sludge process (AS). Aerated stabilization basins are the predominant type of biological treatment.

Performance of Treatment System

5. Comparison of BPT design criteria to the operating parameters for the 38 ASB's revealed the following results: 24 (63%) operate at a detention time under the recommended period of 13 days; 30 (79%) operate at a BOD loading rate over 1.13 lbs/BOD/1000 cu ft./day; and 14 (34%) operate at a aeration organic loading over 42 lbs BOD/hp/day.

6. Temperature changes were found to have an impact on the efficiency of biological treatment systems. Comparison of summer to winter values give an overall improvement in removal rate of 21% in BOD during the summer. As might be expected, treatment systems with shorter detention times are less affected by temperature changes. These effects are found in all Region IV states although seasonal temperature impact is not as great in Florida since temperature variation is less.

7. Statistical analysis of various treatment system's performance with BPT design criteria and operational parameters results in a very low correlation. None of the five operational parameters studied were found to have a significant impact on treatment efficiency. A single operational parameter apparently cannot be used to characterize the variability of treatment performance for the activated sludge, aerated stabilization basin, and oxidation pond process.

Compliance Rates

The compliance of wastewater treatment plants is analyzed in three ways: any permit violation, a significant violation, and a violation of a Best Practicable Control Technology Currently Available (BPT) limit.

8. Any Permit Violation:

Overall permit compliance considering monthly average BOD and TSS violations, of Region IV pulp and paper mills is calculated to be 82% for the two year study period. Three of the eight Region IV states have permit compliance rates less than 80% (Alabama, North Carolina, Tennessee). This is a poor performance for such a large industry. At present, the States rarely take formal enforcement actions against permit violations until the violations become significant (i.e., covered under the definition of significant noncompliance). The effect of this policy on the construction and operation of waste treatment facilities is to use as a compliance base 140% of permit limits for BOD and TSS as opposed to the permit limits themselves. EPA should ensure that States address all permit violations in keeping with their Enforcement Management System.

9. Significant Violation:

Using EPA's definition of significant noncompliance, the pulp and paper industry taken as a whole, has a better compliance rate than the average for all major industries in Region IV based on Quarterly Noncompliance Reports (QNCRs) submitted to EPA. In all, the percent of those not in significant noncompliance was 94% for the pulp and paper industry and 92% for all major industries. Only six mills (11%) had instances of significant noncompliance during the two year study period. No mills were in significant noncompliance during the study period in three states.

10. Violation of Best Practicable Control Technology Currently Available (BPT) Limit:

A comparison of facility performance to BPT limits when calculated using the highest annual average production figures between 1979 and 1983 show that 19 of 56 mills studied (35%) did not consistently meet monthly BPT limits for BOD and TSS. Further analysis of operational data for the 13 aerated stabilization basin treatment facilities revealed at least 8 (62%) operate their treatment system at a higher BOD loading rate than the recommended range for BPT design on an annual average basis. It appears that as pulp and paper mills have expanded production, the wastewater treatment plants have not been redesigned

to produce a discharge meeting BPT guideline requirements. Thus, there is a significant portion of the industry that will need to make improvements in its wastewater treatment plants. In some cases, this will occur when present permit limits are tightened (see no. 17). Also States must ensure that all permit violations are addressed (see No. 8).

11. Despite the inability of some individual mills (35%) to meet monthly BPT guideline limits as discussed previously, the annual average performance of mills in most subcategories is well within the range required to meet BPT limits on an annual basis. However, additional treatment capacity may be needed to handle the peak monthly variations.

12. Based upon observation of monthly BOD and TSS violations over a 24 month period, oxidation ponds appear to be far superior in their ability to meet permit limits than the mechanical treatment systems studied. Statistical analysis of the five mechanical treatment systems utilizing the Chi-Squared (X^2) Test indicated a probability of no significant difference among them in their ability to meet permit limits at 5% signficance level.

13. Of the fifty-six pulp and paper mill in the survey, there are only two that currently have limits for color. They are Bowater Carolina (SC) and Bowater Southern Paper (TN). The color limit for these facilities basically consist of flow control release.

14. Current control for color abatement includes such approaches as ultra-filtration and massive lime treatment. Unfortunately, none of these methods have enjoyed full scale operational success in Region IV, due to either operational reliability problems or expected high costs developed from demonstration projects or treatability studies. To minimize the aesthetic concerns of effluent color, mills in Region IV often rely on holding ponds to control their discharge. Another approach is internal load control. Newly constructed mills using an oxygen delignification process prior to the bleaching sequence has showed a pronounced improvement in effluent color as compared to a more conventional bleaching line.

Summary of On-Site Inspection

15. All mills effectively have portions of a Best Management Practices Plan (BMP), even though it was not referred to as such. Mills use various procedures for spill control and chemical recovery. The vast majority have high level alarms, conductivity probes in U-drains, diking around fuel tanks, and curbing around chemical process areas.

16. Field inspection data for this study was reported on EPA's four page NPDES Compliance Inspection Report (Form 3560-3). Inspection results at each mill indicate that thirty-nine of the fifty-five mills are in compliance with all of the items examined. Of the sixteen mills where one or more of the items are unsatisfactory, eight have problems

with sampling, four have flow monitoring problems, three have incomplete or incorrect recordkeeping systems, and one has a laboratory deficiency. Of the ten mills where sampling was conducted, two of the facilities also exceeded permit limits. These problems constitute permit violations. The States and EPA must follow with enforcement actions to assure that these violations are corrected.

NPDES Permit Program

Results from yearly EPA audits of NPDES permits in Region IV show that virtually all of the required permit issuance procedures are presently being implemented. The quality of the permits region wide continues to advance as procedures are further clarified and as EPA and the states gain experience in their respective roles. A survey of 56 pulp and paper mill permits issued from 1979 through 1983, however, found that some permits did not appear to follow guideline requirements for obtaining mill production rates, and many files lacked proper certification for non-use of chlorophenolic-containing biocides.

17. Twenty-one (38%) of 56 pulp and paper mills surveyed in Region IV (issued 1979 through 1983) were found to have one or more limits more lenient than required by EPA BPT regulations. Sixteen (29%) of the 56 mill permits surveyed were found to contain one or more limits significantly more lenient (greater than 3%) than required by regulations. Two of these were a result of the use of seasonal limits, which take into account the seasonal "high flow" and "low flow" periods of the receiving waters. Five of these 16 permits,

however, listed production rates based on plant design capacity or maximum production, and were considered not issued according to guidelines. One resulted from a change in mill production levels, and the remaining 8 of the 16 permits did not contain proper documentation to support the production rates or limits they contained. The EPA regulations on this matter are inconsistent and leave room for interpretation. The Agency has attempted to eliminate the resulting confusion by issuing a memorandum stating its policy as to what may be considered appropriate in determining a mill's "annual average" production rate. For the 16 facilities with significantly more lenient limits, the States and EPA should reopen these permits and, if the current limits can not be supported, reissue the permit. Also, EPA should undertake regulatory revisions to eliminate confusion and inconsistencies between requirements.

18. Twenty (36%) of 56 pulp and paper mill permits surveyed (issued 1979 through 1983) were found not to have limits for pentachlorophenol and trichlorophenol, and also did not have present in the permit file a certification of non-use of chlorophenolic-containing biocides. The guidelines require mills which do not have these limits to certify that they do not use chlorophenolic-containing biocides. EPA and the States should contact the facilities involved and obtain the necessary certifications.

19. Twenty-nine facility permits (52%) of the 56 studied are believed to have permit limits adequate to protect water quality standards. Through program activities not directly connected with this study, EPA has identified 10 of the 56 (18%) facilities included in this

study as having inadequate effluent limitations to maintain instream water quality standards. Program actions to correct this situation are underway. Seventeen facility permits (30%) of the 56 facilities studied have not received a comprehensive review to deterine if water quality standards are protected. A review of these permits will be scheduled in the normal course of State and EPA program implementation.

NPDES Compliance Program

20. The NPDES permit requires that the permittee notify the regulatory agencies and submit a noncompliance report for each instance of noncompliance. However, only half of the 164 permit violations are known or properly documented. Of the 56 mills listed, a total of 15 mills (27%) have some deficiencies in this area of noncompliance reporting. For mills with SNC violations, the noncompliance reporting records are even worst. Written records of noncompliance reports were submitted to Region IV states and EPA only 33% of the time for SNC violations. Of the 6 mills with significant violations, only one properly notified the state of its noncompliance by written notice. This report is a regulatory requirement. EPA and the States must work to improve compliance with the notification requirement. EPA should increase its overview activities to assure compliance with all Clean Water Act requirements.

21. With few exceptions, state data management systems are found to be complete and current and adequate to provide proper surveillance.

22. States are required to submit quarterly noncompliance reports to EPA describing violations at major facilities. These reports, which are made public and used to monitor trends in the effectiveness of the NPDES program, include only major discharges and only facilities in significant violation of their permit, as discussed above, as opposed to any permit violation. Based on the file review at each NPDES state office and EPA, six pulp and paper mills were found to be in significant noncompliance at some point during the study period. These six mills should have been reported on the QNCR for all instances of significant noncompliance; however, NPDES states reported mills in significant noncompliance on an average of only 44% of the time that these reports were required to be made. Because of the importance of this report to Congress, the public, and EPA, and the small number of facilities involved, immediate efforts should be made by the States to assure its accuracy. EPA needs to increase its overview activities to assure compliance with all Clean Water Act requirements.

23. EPA believes an inspection should be made at each major facility at least once in each twelve month period. Correlations between the number of inspections performed and the number of pulp and paper mills in the study revealed that enough inspections are made to cover each facility on the average of once eight months. However, since some mills are inspected more frequently, not all mills are inspected annually. In approximately half of the Region IV states, all mills are not receiving yearly inspections. Each state

should re-evaluate its strategy and priority for conducting routine and special inspections. Each facility should be inspected every year. Where States are unable or unwilling to make this yearly inspection, EPA should conduct the inspection.

24. In the past five Discharge Monitoring Report Quality Assurance (DMR QA) studies (1980-1985), the pulp and paper industry performance (success rate) was higher than other Region IV industries and the national average in all studies except one. The degree of improvement in performance from Study 1 (82.1% success rate) to Study 5 (85.8% success rate) was not very significant with small increases in performance from study to study. The percentage of mills reporting a 100% success rate for Study 5 (58.5%) indicates that further improvement is needed.

25. EPA and delegated states response to non-significant violations are within the framework of the Enforcement Response Guide (ERG) as detailed in EPA's Enforcement Management System (EMS). These minor and isolated violations are enforced uniformly and consistently among the states in Region IV.

26. Of the 6 mills in significant non-compliance, two were in this category with short duration (lasting one quarter). No enforcement actions were taken by the states or EPA because each company notified the regulatory agency of the problem and permit violations ceased quickly.

27. Four mills in four separate states were found to have significant violations with long duration (lasting two quarters or more). Delegated states took only informal actions which proved to be ineffective in limiting these violations. Using the criteria in EPA's Enforcement Management System, state enforcement response was found to be inadequate in these four cases. States must take forceful enforcement action more quickly in these cases. EPA should increase its overview of state enforcement activities to ensure that appropriate action is taken in a timely manner.

28. Since the study period, EPA policy has required, and the states have agreed, that formal action should be taken against all facilities who are in significant noncompliance with their permit for two consecutive quarters (this includes violations of less than six months duration). Of the four states with mills in significant noncompliance for two consecutive quarters or more, only one took a formal enforcement action. This record will improve as the new policy continues to be implemented. EPA must assure, through independent enforcement actions if necessary, that formal actions are taken on a timely basis.

29. Considering the timeliness of actions, when taken, EPA and delegated state have an adequate record. Most informal actions were acted upon within 30 days. Formal actions were acted upon within 60 days.

III. DISCUSSION OF THE PULP AND PAPER INDUSTRY IN REGION IV

A. General Background Information

1. Process and Product Subcategories

In order to establish effluent limitations, new source performance standards, and pretreatment standards, the EPA has categorized the pulp, paper and paperboard, and the builders' paper and board mills point source categories into three segments: Integrated, Nonintegrated, and Secondary fibers. These three segments have been subcategorized further by manufacturing process and product as follows:

Integrated Segment

Dissolving Kraft (F)

Market Bleached Kraft (G)

BCT (Board, Coarse, and Tissue) Bleached Kraft (H)

Fine Bleached Kraft (I)

Soda (P)

Unbleached Kraft (A)
- Linerboard
- Bag and Other Products

Semi-Chemical (B)

Unbleached Kraft and Semi-Chemical (V)

Unbleached Kraft-Neutral Sulfite Semi-Chemical (Cross-Recovery) (D)

Dissolving Sulfite Pulp (K)
- Nitration
- Viscose
- Cellophane
- Acetate

Papergrade Sulfite (Blow Pit Wash) (J)

Papergrade Sulfite (Drum Wash) (U)

Groundwood-Thermo-Mechanical (M)

Groundwood-Coarse, Molded, and News Papers (N)

Groundwood-Fine Papers (O)

Groundwood-Chemi-Mechanical (L)

Nonintegrated Segment

Nonintegrated-Fine Papers (R)
- Wood Fiber Furnish
- Cotton Fiber Furnish

Nonintegrated-Tissue Papers (S)

Nonintegrated-Lightweight Papers (X)
- Lightweight Papers
- Lightweight Electrical Papers

Nonintegrated-Filter and Nonwoven Papers (Y)

Nonintegrated-Paperboard (Z)

Secondary Fibers

Deink (Q)
- Fine Papers
- Tissue Papers
- Newsprint

Tissue from Wastepaper (T)

Paperboard from Wastepaper (E)
- Corrugating Medium Furnish
- Noncorrugating Medium Furnish

Wastepaper-Molded Products (W)

Builders' Paper and Roofing Felt

2. Type of Mills Surveyed

The mills surveyed represents a wide range of product subcategories. Of the fifty-six mills located in EPA Region IV, those producing kraft products are the most common. Table 1 lists the distribution of production rates for 1983 in annual air dried tons/day by EPA subcategory. As shown in this table, eighteen mills are involved totally or partially in the production of unbleached kraft products. The next most common types of mill are those producing BCT bleached kraft products (16) and market bleached kraft pulp (13). There are two mills in Region IV which are not included in the preceding subcategorization scheme. One of the mills produces cotton linter pulp for use in the production of currency papers and the other produces builder's paper.

3. Age of Mills

The majority of the mills in Region IV have been built since 1949. Six of the mills are more than fifty years old and only three are ten years old or less. The age distribution of the mills in Region IV is shown in Figure 1.

4. Employment

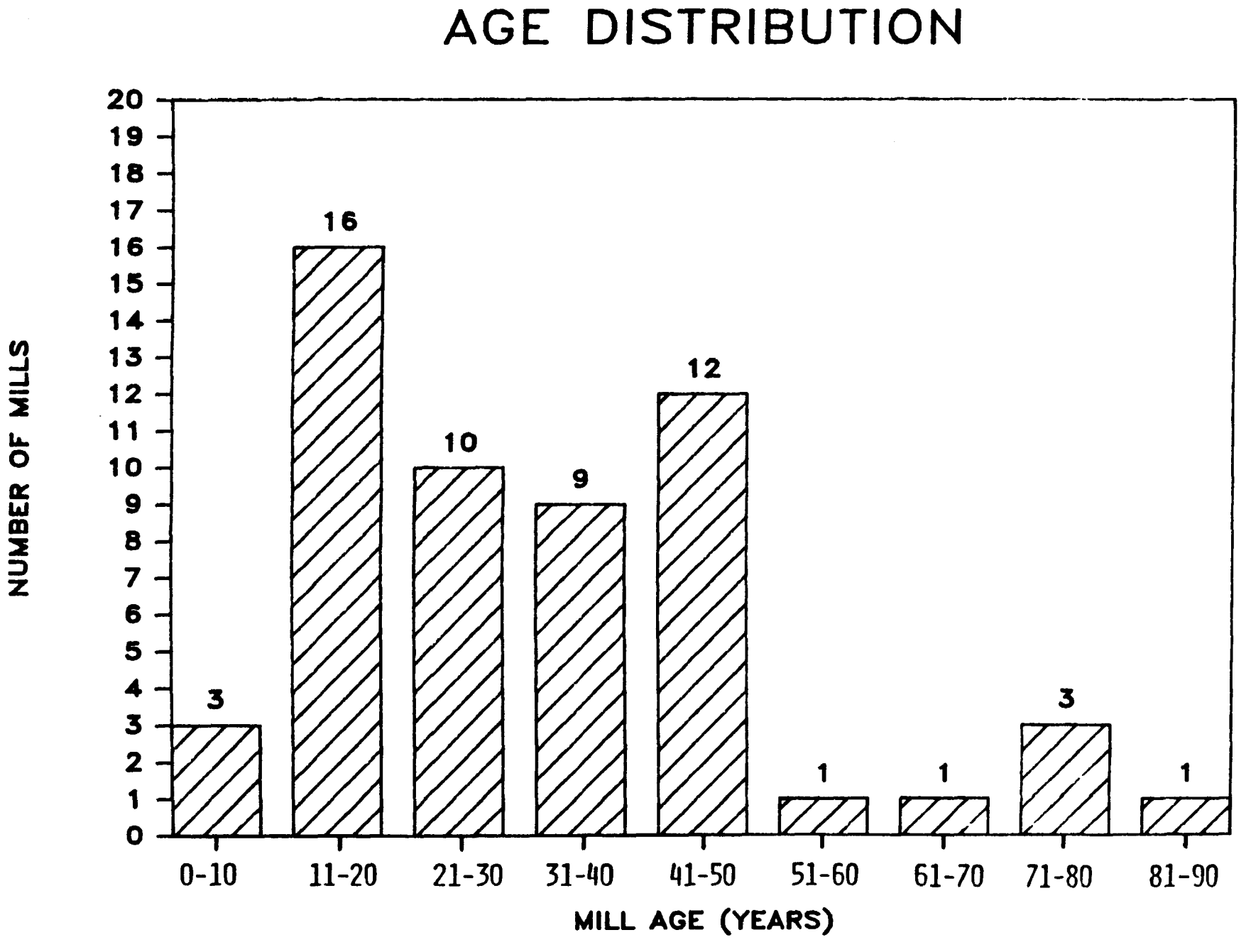
The number of people employed at the mills is generally high, with employment ranging from 90 to 3500. Of the forty-eight mills reporting their employment, twenty-one employ a thousand or more people and thirty-five employ five hundred or more people.

TABLE 1

1983 PRODUCTION PROFILE OF PULP AND PAPER MILLS IN REGION IV BY PRODUCT SUBCATEGORY (ANNUAL AIR DRIED TONS / DAY)

MILL NAME	LOC	A	B	D	E	F	G	H	I	K	L	M	N	O	P	Q	R	S	T	X	BUILDERS PAPER	COTTON LINTER PULP	TOTAL
ALTON BOX BOARD	FL	791																					791.0
CONTAINER CORP	FL			1997																			1997.0
ITT	FL									500													500.0
ST. REGIS PAPER (CHAMP. INT'L)	FL	817.3						276.1															1093.4
BUCKEYE CELLULOSE CORP	FL					1319																	1319.0
OWENS ILL	FL	1000																					1000.0
KIMBERLY-CLARK	SC																	150.6	109				259.6
STONE CONTAINER	SC	1350																					1350.0
BOWATER CAROLINA	SC						676	237	181			142	404	39.1									1679.1
INTERNATIONAL PAPER	SC			270				130															400.0
WESTVACO CORP	SC	2562																					2562.0
SONOCO PRODUCTS	SC		118		734																		852.0
INTERNATIONAL PAPER VIC	MS	1507																					1507.0
ST. REGIS PAPER (GA.-PACIFIC)	MS	1593																					1593.0
INTERNATIONAL PAPER NAT	MS					736	497																1233.0
JACKSON CO PORT AUTH(INT'L P.)	MS							861.7															861.7
WEYERHAEUSER CO	MS											355					355						710.0
BOWATER SOUTHERN PAPER	TN							723.2			243.9	628.4	665.2										2260.7
MEAD CORP	TN														378		275						653.0
INLAND CONTAINER	TN		535																				535.0
TENN RIVER PULP&PAPER	TN	1633.8			133.7																		1767.5
ALABAMA KRAFT, GA KRAFT	AL	1181																					1181.0
CHAMPION PAPER	AL								1359.3														1359.3
GOLD BOND BUILDING	AL																				198.7		198.7
GULF STATES PAPER	AL						90	597								32							719.0
HOGGEHILL PAPER	AL						1016.5																1016.5
KIMBERLY-CLARK	AL						553	404				107	775										1839.0
UNION CAMP	AL	2167																					2167.0
ALABAMA RIVER PULP CO	AL						1074																1074.0
ALLIED PAPER, S MILL	AL								605														605.0
CONTAINER CORP	AL	566						632															1198.0
DIXIE NORTHERN (JAMES RIVER)	AL							1010															1010.0
MACMILLAN BLOEDEL	AL	1141		467	230																		1838.0
MEAD CORP	AL		957.5																				957.5
MOBILE WATER SERVICE IP	AL	705						526	254			54	204										1743.0
SCOTT PAPER, MOBILE MILL	AL							978.2	946.4														1924.6
STONE CONTAINER CORP	GA	915																					915.0
CONTINENTAL FOREST(FEDERAL P.)	GA						100	1132					350					30					1612.0
INTERSTATE PAPER CORP	GA	551																					551.0
SOUTHEAST PAPER MFG	GA											26.4				501.8							528.2
UNION CAMP	GA			2879	64																		2943.0
BRUNSWICK PULP&PAPER	GA						1337	416															1753.0
GEORGIA KRAFT	GA	1941																					1941.0
GILMAN PAPER	GA	586						599															1185.0
GREAT SOUTHERN PAPER	GA			2353																			2353.0
ITT RAYONIER	GA					660	913																1573.0
WESTVACO FINE PAPERS	KY								747														747.0
WILLAMETTE IND NEW MILL	KY			358																			358.0
WILLAMETTE IND W KRAFT	KY						603																603.0
ALPHA CELLULOSE	NC																					132.6	132.6
FEDERAL PAPER BOARD	NC						1020	964															1984.0
MEYERHAEUSER NB	NC						799																799.0
MEYERHAEUSER PL	NC			616	345		381		874														2216.0
CHAMPION PAPERS	NC							698	1021														1719.0
HOERNER WALDORF-CHAMP INT'L	NC	1035			70																		1105.0
OLIN CORP (ECUSTA CORP)	NC								86								107			117			310.0

FIGURE 1


AGE DISTRIBUTION
NUMBER OF MILLS
20
19
18
17
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1
0
3
16
10
9
12
1
1
3
1
0-10
11-20
21-30
31-40
41-50
51-60
61-70
71-80
81-90
MILL AGE (YEARS)

5. Production

As shown in Table 1 the major products produced in 1983 by the mills observed during this study were unbleached kraft products (22,242 tons/day), BCT bleached kraft products (10184 tons/day), market bleached kraft pulp (9060 tons/day), unbleached kraft-neutral sulfite semi-chemical (Cross Recovery)(9140 tons/day); and fine bleached kraft (6274 tons/day). The remaining products produced by mills are included in the following subcategories: semi-chemical (1611 tons/day); dissolving kraft (2715 tons/day); dissolving sulfite pulp (500 tons/day); paperboard from wastepaper (1577 tons/day); groundwood chemi-mechanical (244 tons/day); groundwood thermo-mechanical (1313 tons/day); groundwood CMN papers (2398 tons/day); groundwood fine paper (39.1 tons/day); soda (378 tons/day); Deink (534 tons/day); non-integrated fine papers (737 tons/day); nonintegrated tissue papers (181 tons/day); tissue from wastepaper (109 tons/day); non-integrated lightweight papers (117 tons/day); builders paper (199 tons/day); and cotton linter pulp (133 tons/day).

6. Water Use

A majority of the mills surveyed used surface water sources for at least part of their process water needs. Only eighteen mills utilized ground water sources, and four of these also utilized surface water or municipal water. Surface water use ranged from 3.5 to 60 MGD, ground water use ranged from 0.83 to 75 MGD, and municipal water use ranged from 1.4 to 11 MGD. Table 2 lists the average daily water use of each mill surveyed.

TABLE 2

WATERUSE DATA FOR REGION IV MILLS

MILL NAME	STATE	PRODUCT SUBCATEGORY	AGE (YEARS)	AVERAGE WATER USE (MGD)	WATER + SOURCE
WESTVACO CORP	SC	A	48	20.0	S
GEORGIA KRAFT	GA	A	31	23.0	S
ST. REGIS PAPER (GA.-PACIFIC)	MS	A	17	20.0	S
ALABAMA KRAFT, GA KRAFT	AL	A	19	24.0	S
STONE CONTAINER CORP	GA	A	37	13.0	S
UNION CAMP	AL	A	18	21.0	S
STONE CONTAINER	SC	A	22	15.0	S
INTERSTATE PAPER CORP	GA	A	17	9.0	G
OWENS ILL	FL	A	31	12.0	G
INTERNATIONAL PAPER VIC	MS	A	18	29.0	S
MACMILLAN BLOEDEL	AL	A/D/E	17	20.0	S
ALTON BOX BOARD	FL	A/E	46	8.0	G
TENN RIVER PULP&PAPER	TN	A/E	24	24.0	S
HOERNER WALDORF-CHAMPION INT'L	NC	A/E	76	28.0	S
ST. REGIS PAPER (CHAMP. INT'L)	FL	A/H	44	24.0	G
MOBILE WATER SERVICE (INTERNATIONAL PAPER)	AL	A/H/I/N/M	56	34.8	S
INLAND CONTAINER	TN	B	15	3.5	S
MEAD CORP	AL	B	11	3.8	S
GOLD BOND BUILDING	AL	Builders Paper	29	0.8	G
ALPHA CELLULOSE	NC	Cotton Linter Pulp	17	1.4	M
CONTAINER CORP	FL	D	47	42.0	G
WILLAMETTE IND MED MILL	KY	D	18	2.7	G
GREAT SOUTHERN PAPER	GA	D	21	25.0	S
UNION CAMP	GA	D/E	50	27.0 11.0	G M
INTERNATIONAL PAPER	SC	D/H	48	NO DATA AVAILABLE	
SONOCO PRODUCTS	SC	E/B	86	NO DATA AVAILABLE	
BUCKEYE CELLULOSE CORP	FL	F	31	54.0	G

TABLE 2 (CONT'D)

WATERUSE DATA FOR REGION IV MILLS

MILL NAME	STATE	PRODUCT SUBCATEGORY	AGE (YEARS)	AVERAGE WATER USE (MGD)	WATER # SOURCE
INTERNATIONAL PAPER NAT	MS	F/G	36	36.8	G
ALABAMA RIVER PULP CO	AL	G	7	23.0	S
WILLAMETTE IND W KRAFT	KY	G	16	8.5	G
WEYERHAEUSER NB	NC	G	17	31.0	S
HAMMERMILL PAPER	AL	G	19	25.0	S
BRUNSWICK PULP&PAPER	GA	G/H	47	49.4	G
				24.2	S
ITT RAYONIER	GA	G/F	31	75.0	G
BOWATER CAROLINA	SC	G/N/H/I/M/O	26	37.0	S
				0.1	G
JACKSON CO PORT AUTH IP	MS	H	72	16.9	G
DIXIE NORTHERN INC (JAMES RIVER CORP)	AL	H	27	45.0	S
GILMAN PAPER	GA	H/A	44	30.0	G
				7.0	S
CONTAINER CORP	AL	H/A	28	25.0	S
FEDERAL PAPER BOARD	NC	H/G	34	43.0	S
GULF STATES PAPER	AL	H/G/Q	28	21.4	S
SCOTT PAPER, MOBILE MILL	AL	H/I	46	60.0	S
BOWATER SOUTHERN PAPER	TN	H/N/M/L	32	45.0	S
CONTINENTAL FOREST IND (FEDERAL PAPER BOARD)	GA	H/N/G/S	25	55.7	S
CHAMPION PAPER	AL	I	14	54.0	S
ALLIED PAPER, S MILL	AL	I	21	17.3	S
WESTVACO FINE PAPERS	KY	I	15	22.6	S
WEYERHAEUSER - PL	NC	I/D/G/E	48	62.5	S
CHAMPION PAPERS	NC	I/H/G	79	45.0	S

TABLE 2 (CONT'D)

WATERUSE DATA FOR REGION IV MILLS

MILL NAME	STATE	PRODUCT SUBCATEGORY	AGE (YEARS)	AVERAGE WATER USE (MGD)	WATER # SOURCE
ITT	FL	K	47	25.0	G
WEYERHAEUSER CO	MS	M/R	3	6.2	G
KIMBERLY-CLARK	AL	M/G/H/N	36	60.0	S
MEAD CORP	TN	P/R	68	12.0	S
SOUTHEAST PAPER MFG	GA	Q/M	6	6.0	S
KIMBERLY-CLARK	SC	S/T	17	4.0	S
OLIN CORP (ECUSTA CORP)	NC	X/R/I	46	24.5	S

#
G - GROUNDWATER
S - SURFACE WATER
M - MUNICIPAL WATER

B. Basic Pulp and Paper Industry Processes

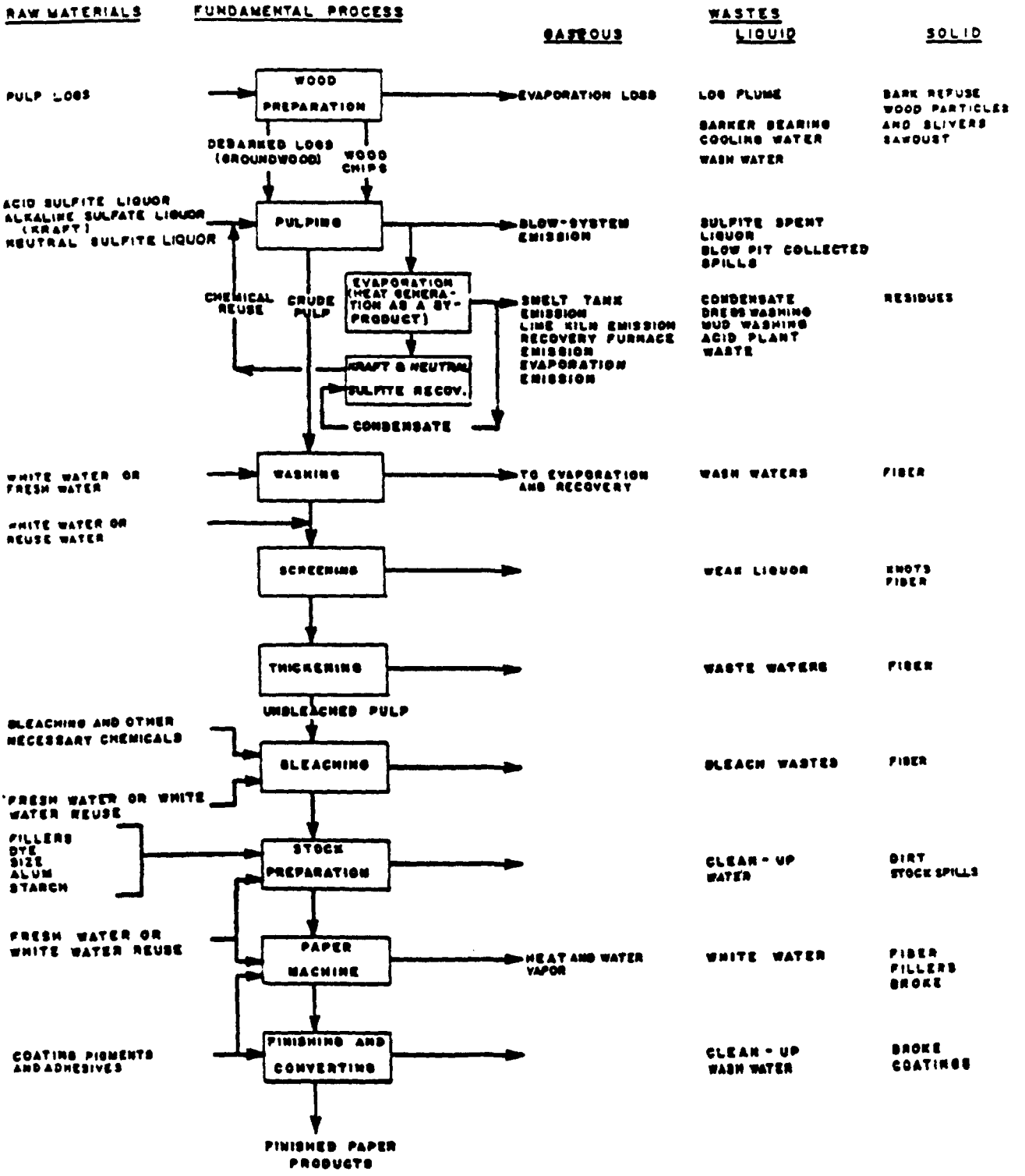
As indicated by the number of process and product subcategories, the pulp and paper industry is made up of many different types of production facilities. Therefore a wide variety of production processes exist within the industry. However, for the purposes of this report, a general description of the basic mill processes will be presented in order to acquaint the reader with basic mill operations and the sources of wastewater in the industry. Following are summary descriptions of each of the nine fundamental processes identified in Figure 2 .

Wood Preparation - operations which prepare the wood for the pulping digester, including debarking, chipping, chip screening, and disposal of bark and wood wastes. Wastewaters resulting from these operations include log flume blowdown and barker bearing cooling water.

Pulping - process by which wood fibers are softened, loosened, and separated by mechanical and chemical processes. Wastewaters produced in the process include wash waters, condensate, chemical by-products and residues, and blow pit collected spills. A high percentage of these waste products are recovered.

Screening - process by which foreign matter such as dirt, slivers, knots, grit, bark, sand, and uncooked chips are removed from the pulp. Wastewater produced in this step is characteristically a weak liquor with high solids content resulting from the recycling of white water or other recycled waters prior to the screening operations.

FIGURE 2
GENERAL FLOW SHEET
PULPING AND PAPERMAKING PROCESS



Washing - process by which fine pulp resulting from screening operations is washed with white water or fresh water to remove fine particles of bark, sand, grit and other small solids. Wastewaters include white or fresh waters with high solids content.

Thickening - process by which purified pulp is dewatered. Wastewaters are similar to those produced by washing operations.

Bleaching - process by which color is removed from pulp following the thickening process. These bleaching processes consist of a sequence of stages which can be varied depending on the type of pulp and the degree of bleaching desired. The stages are identified by the chemical used in the stage and consist of chlorination (C), alkaline extraction (E), sodium hypochlorite (H), and chlorine dioxide (D). Two of the most common kraft bleaching processes used today are the CEDED and CEHDED sequences. Wastewaters consist of diluted solutions of these chemicals and white water, which are used to wash the pulp between bleaching stages. These wastes are typically caustic and their disposal is one of the most difficult waste disposal problems for kraft mills.[1]

Stock Preparation - includes a number of processes involving repulping and blending of pulps, addition of chemicals and fillers, and mechanical treatment, all of which are directed at preparing pulp for the paper machines. Wastewaters produced during this process consist of cleanup waters and dilute solutions of the chemicals used in the process.

[1]The Basic Technology of the Pulp and Paper Industry and Its Waste Reduction Practices, EPS 6-WP-74-3; p. 77; Canadian Water Pollution Control Directorate; August, 1974.

Paper Machine - the mechanical system used to convert the pulp suspension into paper. Wastewaters collected during this stage are high in fiber content and are collected in "Saveall" collection pits, then recycled.

Finishing and Converting - these operations prepare the paper for shipment and include surface finish improvement, sizing of rolls, cutting of sheet paper and off-machine coating. These operations produce little wastewater except for clean-up water.

C. Characteristics of Pulp and Paper Waste

The following sections present information on the wastewater production and wastewater characteristics of pulp and paper mills in Region IV. Sources of information to characterize flow, mill age, influent, and effluent data are based upon EPA's On-Site Technical Inspection Report (see Appendix B) and Discharge Monitoring Report (DMR) from State regulatory agencies and EPA.

1. Wastewater Production

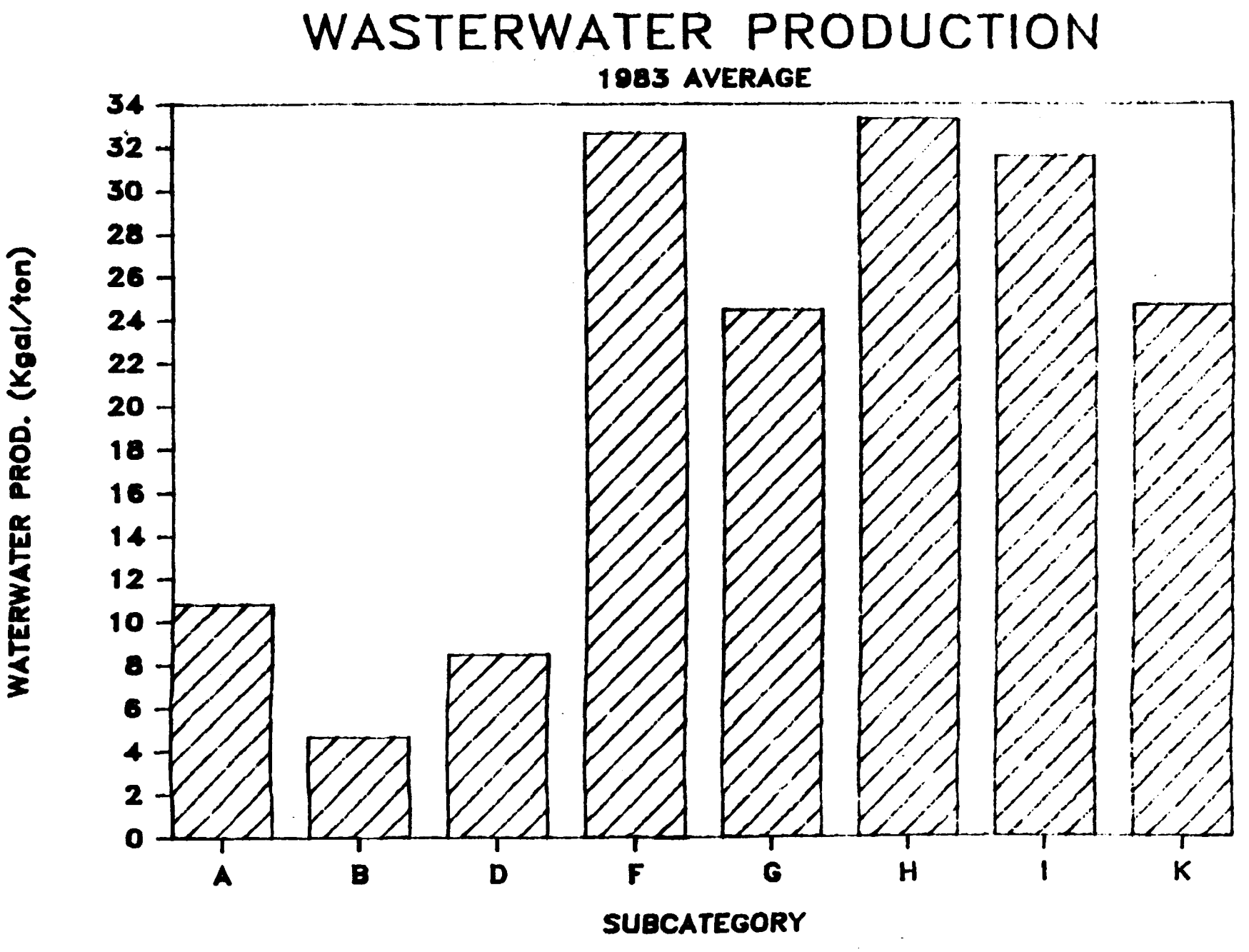
In order to evaluate the effect of product subcategory on wastewater volume, EPA identified a total of 26 mills that produce only one product ("primary mill"). This criteria was established to ensure that the selected mills would be representative of the normal manufacturir processes and product grouping. Table 3 presents available survey data on wastewater volume and production for "primary mills" in the following subcategory: unbleached kraft (A); semi-chemical (B); unbleached kraft-neutral sulfite semi-chemical (D); dissolving kraft (F); market bleached kraft (G); BCT bleached kraft (H); fine bleached kraft (I); and dissolving sulfite pulp (K). Figure 3 shows the ratio of wastewater volume to production against the eight product subcategories listed. The highest ratio of wastewater volume to production was observed in the BCT bleached kraft (H) subcategory, while the lowest ratio was observed in the semi-chemical subcategory (B).

TABLE 3

WASTEWATER PRODUCTION
(1983 Average)

Product Subcategory	No. of Mills	Total Wastewater Volume (mgd)	Total Production (tons/day)	Wastewater Volume/ Production (1,000 gal/ton)
A	10	162	14967	10.82
B	2	6.99	1493	4.68
D	3	41.6	4908	8.48
F	1	43.06	1319	32.65
G	4	85.4	3493	24.45
H	2	62.4	1872	33.32
I	3	91.9	2911	31.57
K	1	12.32	500	24.64

FIGURE 3


WASTERWATER PRODUCTION
1983 AVERAGE
WATERWATER PROD. (Kgal/ton)
34
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
A
B
D
F
G
H
I
K
SUBCATEGORY

2. Wastewater Production vs Mill Age

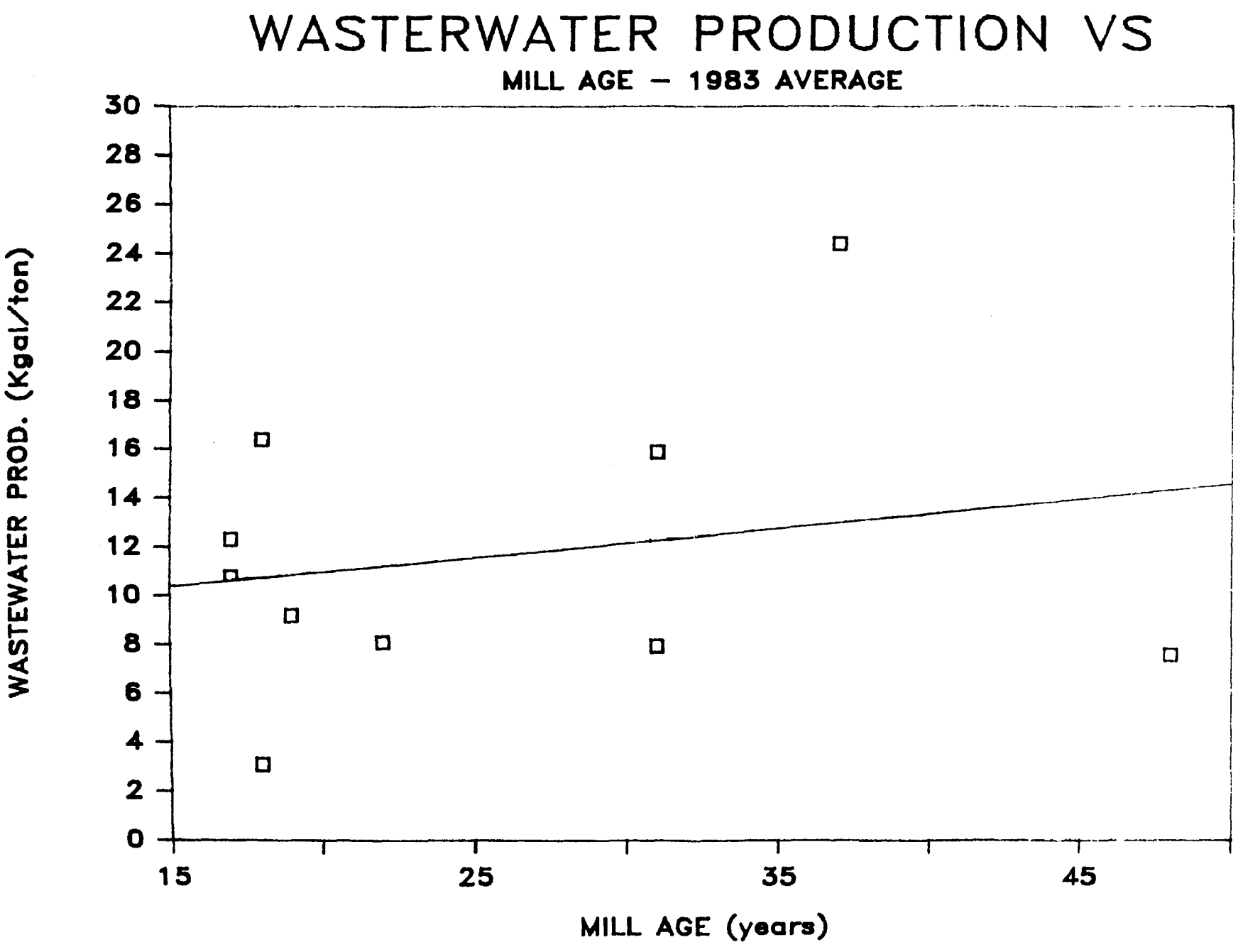
Unbleached kraft (A) products have been shown to be the most significant effort of the pulp and paper industry in the southeast during 1983. Therefore, it is appropriate to analyze wastewater production with mill age for unbleached kraft mills. For the other seven subcategories, EPA was unable to determine a correlation of wastewater production with mill age because of the limited number of mills that could be used for statistical analysis. Table 4 lists the name, age, and wastewater production for each mill under the unbleached kraft product subcategory. By using the average mill age of 26 years as a reference point, wastewater production for mills under 26 years is 9.96 Kgal/ton, whereas wastewater production for mills over 26 years is 13.94 Kgal/ton. Figure 4 illustrates the relationship of wastewater production to mill age by the use of linear regression analysis. The resulting correlation coefficient between these two variables is 0.2. This figure indicates a low correlation between wastewater production and mill age. Causes for the low correlation may be partly explained by the fact that some older mills have continually upgraded and modernized their production facilities to remain competitive with newer mills using the latest technologies. A typical case of mill upgrading, rebuilding, modernizing and expanding is Georgia Kraft (wastewater production = 7.94 Kgal/ton). A review of survey data indicated at least three major and extensive improvement programs were undertaken between 1962 and 1979. Therefore, the age of the mill is not a good parameter for statistical analysis. Evaluation of the age of equipments may offer more insight into the effectiveness of water reuse and internal process control.

TABLE 4

WASTERWATER PRODUCTION VS MILL AGE

MILL NAME	STATE	PRODUCT SUBCATEGORY	AGE (YEARS)	WASTEWATER PRODUCTION (KGAL/TON)
ST. REGIS PAPER (GA.-PACIFIC)	MS	A	17	12.30
INTERSTATE PAPER CORP	GA	A	17	10.75
UNION CAMP	AL	A	18	16.39
INTERNATIONAL PAPER VIC	MS	A	18	3.07
ALABAMA KRAFT, GA KRAFT	AL	A	19	9.18
STONE CONTAINER	SC	A	22	8.09
OWENS ILL	FL	A	31	15.87
GEORGIA KRAFT	GA	A	31	7.94
STONE CONTAINER CORP	GA	A	37	24.37
WESTVACO CORP	SC	A	48	7.56
		AVERAGE	26	

FIGURE 4


WASTERWATER PRODUCTION VS
MILL AGE – 1983 AVERAGE
WASTEWATER PROD. (Kgal/ton)
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
15
25
35
45
MILL AGE (years)

3. Influent and Effluent Waste Characteristics

Table 5 presents survey data on the influent and effluent waste characteristics of BOD and TSS at mills representing the eight product subcategories. The influent values were the average of twelve monthly sampling results taken by mill personnel at points prior to primary clarification. For cases where sampling results were taken after primary clarification, the influent values were multiplied by a known factor. This factor is based upon the performance of primary clarifiers treating wastewater from various subcategories of the pulp and paper industry. Removal rates through the primary clarifier can range from 10% to 35% for BOD and 66% to 85% for TSS depending on the subcategory. EPA's clarifier performance data came mainly from literature[1] and experts from EPA's Effluent Guideline Division in Washington, D.C. Figures 5 to 8 are presented to demonstrate the effects of the eight product subcategories on influent and effluent waste loading. Influent BOD and TSS values for Dissolving Sulfite Pulp (K) and Fine Bleached Kraft (I) subcategories were much higher than the other subcategories. This is due to the fact that their final products required a higher percentage of Alpha-Cellulose than the others. As result, more waste products such as lignin, dissolved solids, and other impurities are taken out in their process and discharged to the waste treatment plant.

[1]State-of-the-Art Review of Pulp and Paper Waste Treatment, EPA-R2-73-184; P.39 and P.42; Environmental Protection Technology Series; April 1973.

TABLE 5

INFLUENT AND EFFLUENT WASTE CHARACTERISTICS BY PRODUCT SUBCATEGORY

PRODUCT SUBCATEGORY	NO. OF MILLS	AVG. FLOW (1000GAL/TON)	ANNUAL AVERAGE - 1983 INFLUNT (LBS/DAY) BOD	TSS	EFFLUNT (LBS/DAY) BOD	TSS
A	10	16.20	32.85	73.42	2.91	3.34
B	2	5.02	65.09	66.98	6.50	13.42
D	3	7.94	34.41	53.82	3.58	4.71
F	1	35.98	51.41	132.15	6.15	12.04
G	4	24.48	68.50	77.52	8.00	9.34
H	2	32.39	83.77	81.06	6.70	8.08
I	3	31.01	119.78	211.85	4.83	4.91
K	1	24.65	136.39	229.99	36.27	21.75

FIGURE 5

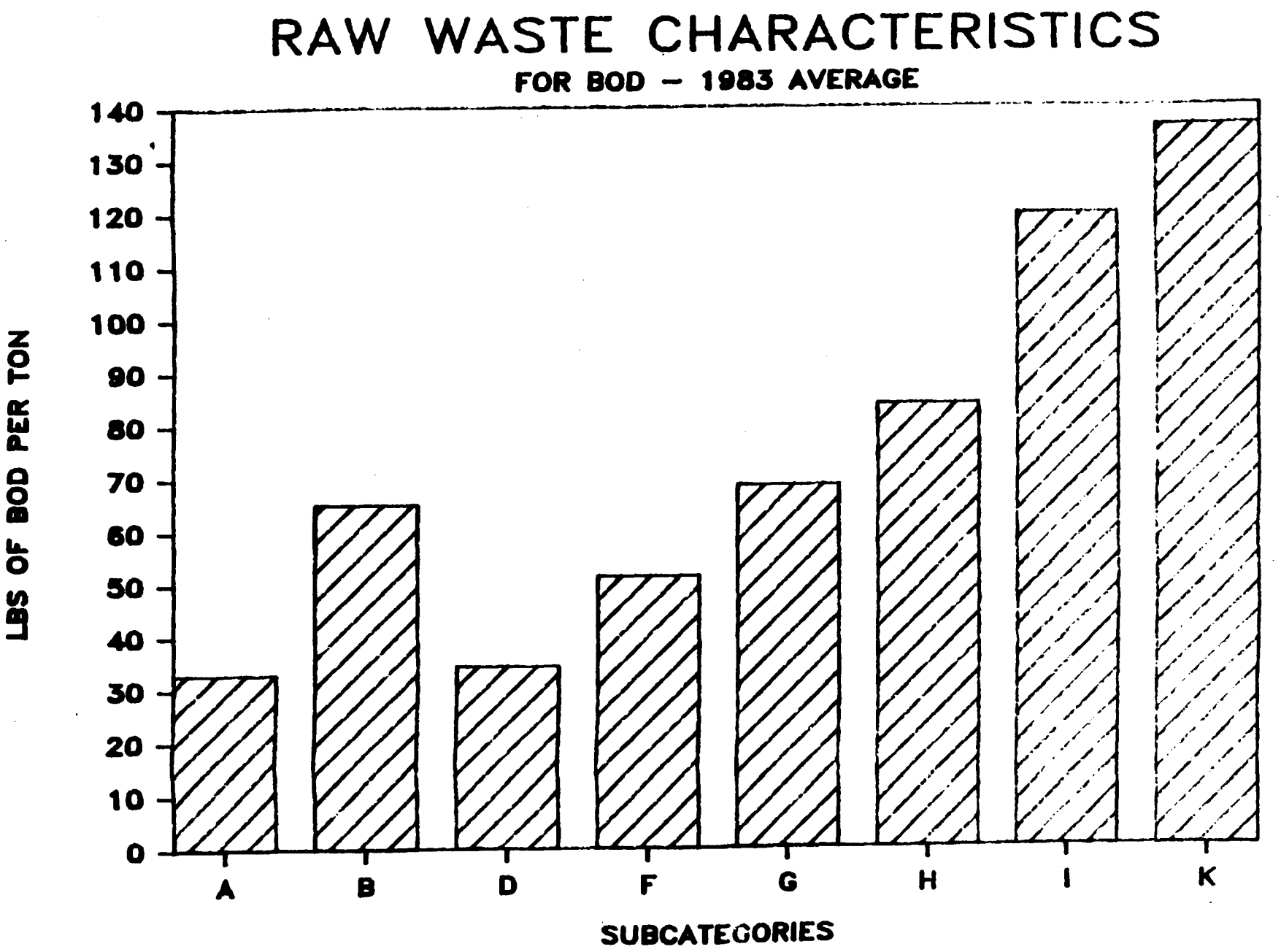

RAW WASTE CHARACTERISTICS
FOR BOD – 1983 AVERAGE
LBS OF BOD PER TON
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0
A
B
D
F
G
H
I
K
SUBCATEGORIES

FIGURE 6

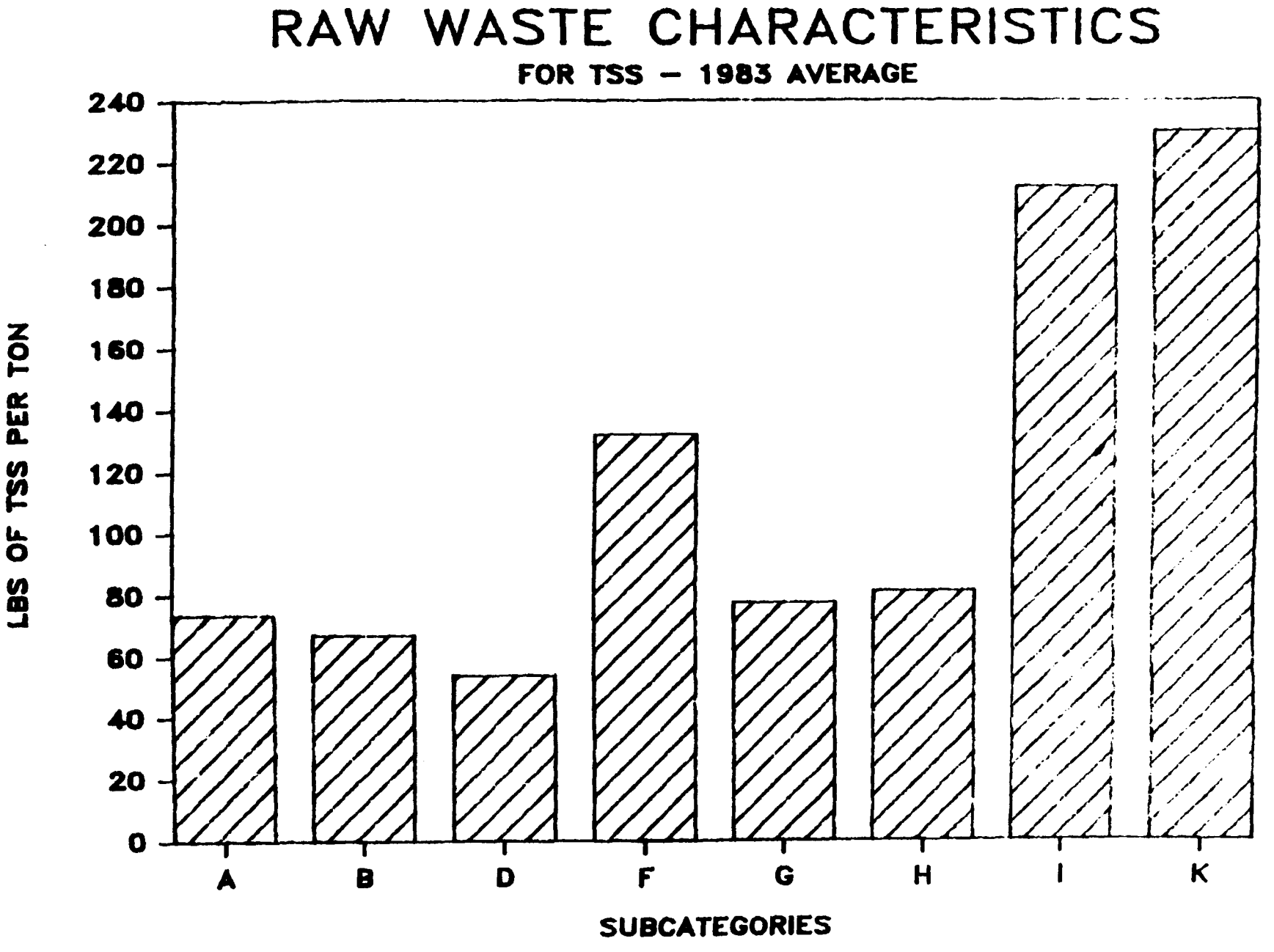

RAW WASTE CHARACTERISTICS
FOR TSS – 1983 AVERAGE
LBS OF TSS PER TON
240
220
200
180
160
140
120
100
80
60
40
20
0
A
B
D
F
G
H
I
K
SUBCATEGORIES

FIGURE 7

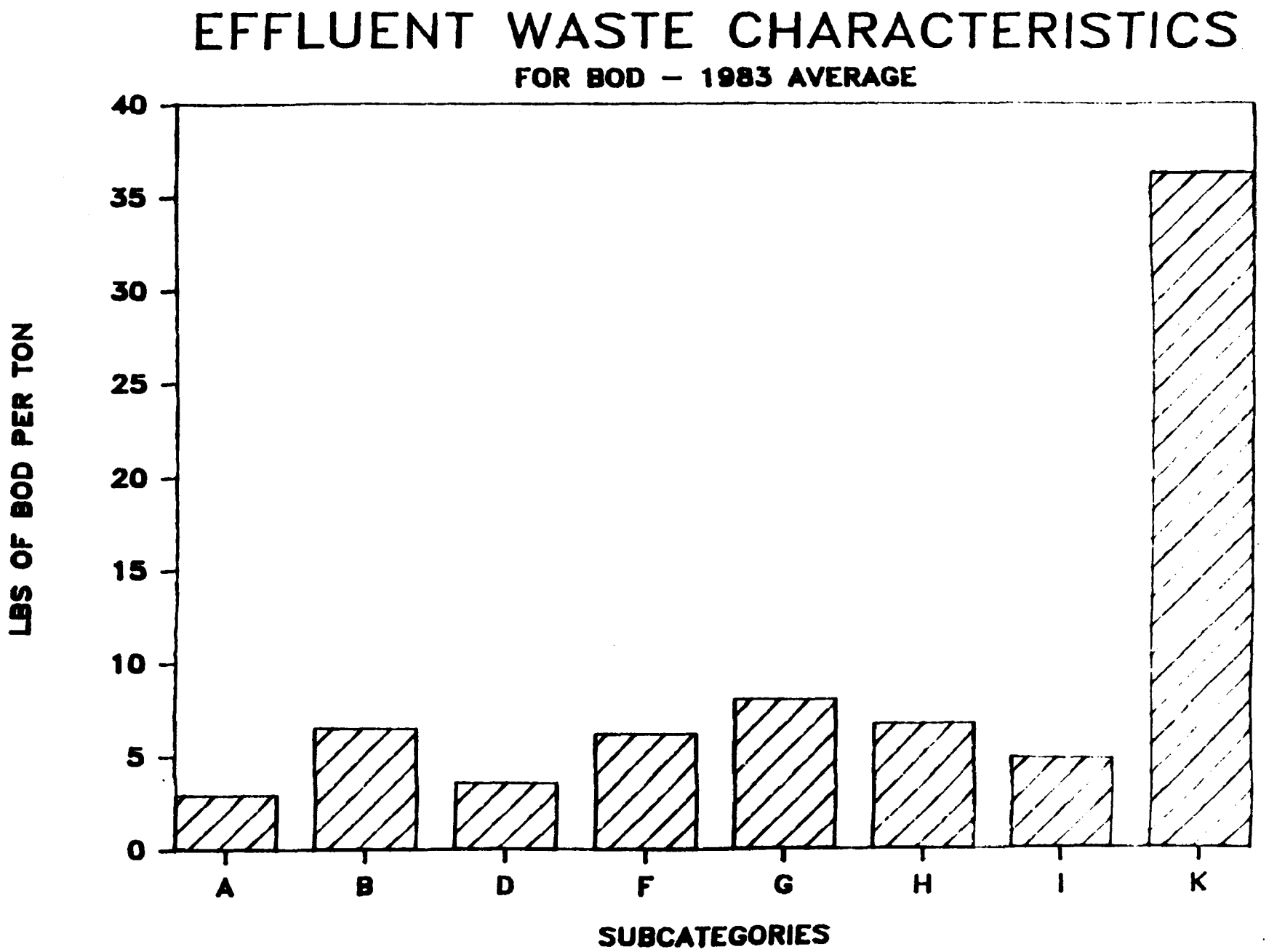
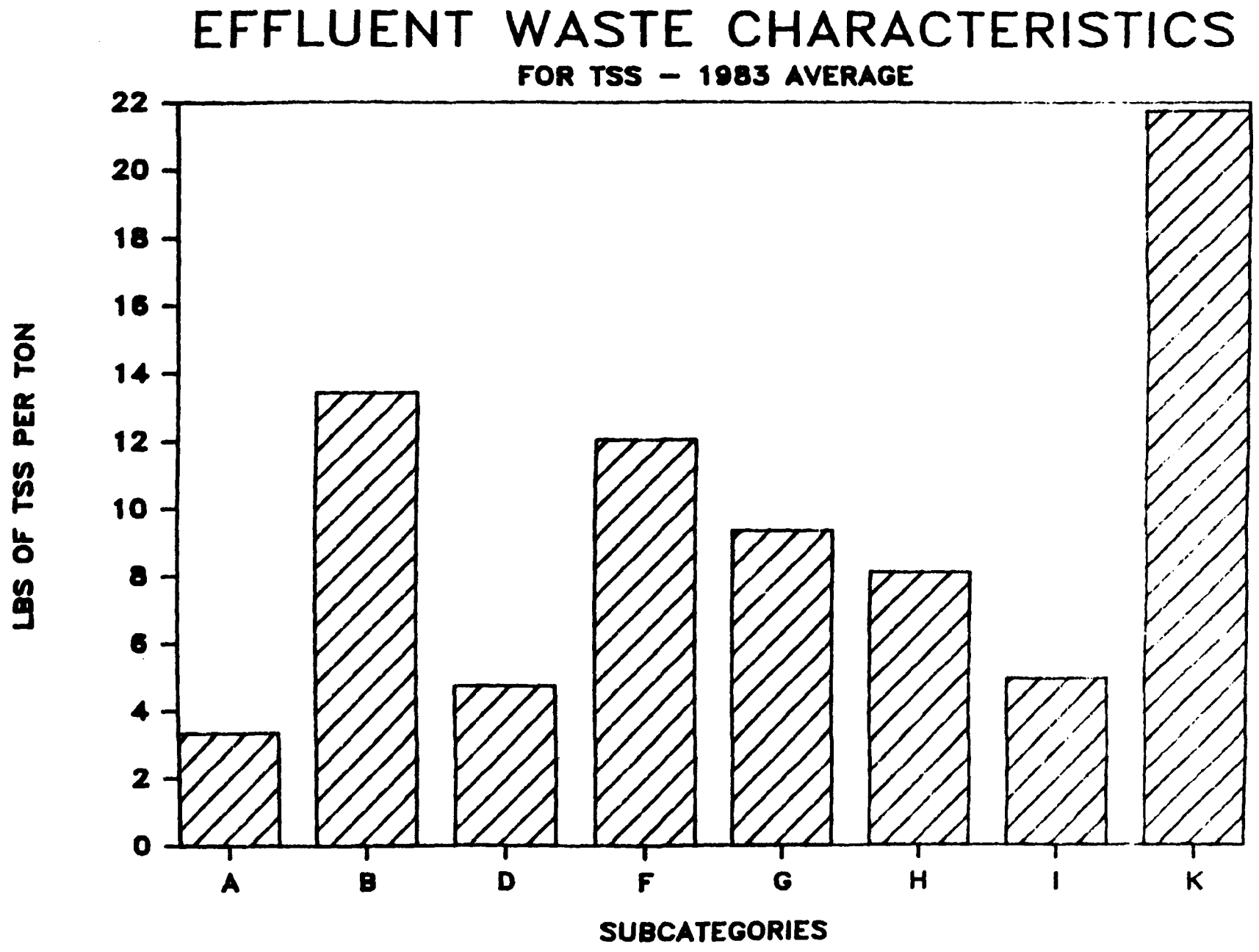

EFFLUENT WASTE CHARACTERISTICS
FOR BOD – 1983 AVERAGE
LBS OF BOD PER TON
40
35
30
25
20
15
10
5
0
A
B
D
F
G
H
I
K
SUBCATEGORIES

FIGURE 8


EFFLUENT WASTE CHARACTERISTICS
FOR TSS – 1983 AVERAGE
LBS OF TSS PER TON
22
20
18
16
14
12
10
8
6
4
2
0
A
B
D
F
G
H
I
K
SUBCATEGORIES

4. Influent and Effluent Waste Characteristics vs Mill Age

Efforts to correlate waste characteristics with mill age were also found to be inconsistent. There appears to be no relationship between these two variables through linear regression analysis. There are many external factors that can affect influent and effluent loading other than age of the mills. Some of these factors may include raw materials, filler, coating, spills, liquor losses, temperature variation and size of treatment system.

D. Wastewater Treatment Systems Commonly Employed

All fifty-six (56) mills evaluated in this study employ some type of wastewater treatment systems for BOD and TSS removal. These systems basically consist of pretreatment, primary treatment and biological treatment. Additional treatment processes (i.e., filtration, carbon adsorption, chemical coagulation) beyond biological treatment was not found except for a few mills that use polymers to improve the settleability of the suspended solids. This section presents a general survey of the treatment systems employed.

Pretreatment

The study gathered information on the type of pretreatment systems employed by Region IV mills. Table 6 summarizes the result of this survey. A total of 23 mills (41%) reported the use of nutrient addition on a continuous or seasonal basis. These additions are usually made in the form of ammonia and phosphoric acid. They are generally used during low temperature conditions and for biological treatment systems with low detention time. Efforts to correlate nutrient addition to mill subcategory were spotty and no meaningful trends could be extracted. pH adjustment was practiced in 14 mills (25%) and is not a common pretreatment practice. In addition, some mills have been able to utilize the neutralizing capacities of their acidic and alkaline waste component for pH control. Flow equalization and/or the use of a

TABLE 6

PRETREATMENT OF MILL WASTEWATER PRIOR TO TREATMENT

	No. of Mills Practicing
Nutrient Addition	23
pH Adjustment	14
Cooling Tower	3
Flow Equalization Basin	1

cooling tower are rare practices among the pulp and paper mills in Region IV. Flow equalization is used to equalize the hydraulic loading to the treatment system, and cooling towers are used to pre-cool the influent wastewater temperature from around 110°F to below 100°F. Pre-cooling of wastewater is used mainly on a seasonal basis. When used, both flow equalization and cooling towers are found predominantly with the activated sludge treatment systems.

Primary Treatment

In the primary treatment unit the settleable suspended solids can be removed by sedimentation, flotation, or filtration. Sedimentation is the most widely used. Sedimentation can be accomplished in mechanical clarifiers with sludge removal or sedimentation lagoons. Our study found that forty-seven (47) mills use mechanical clarifiers and eight (8) mills use sedimentation lagoons. One (1) mill uses hydrasieves for primary treatment. The trend in this industry is strongly toward the mechanical clarifier. They have been found to be effective in removing 66% to 85% of TSS and 10% to 35% of BOD from the effluent prior to biological treatment.

Biological Treatment

Biological treatment commonly used for BOD and TSS removal are: aerated stabilization basins (ASB's), oxidation ponds, and the activated sludge (AS) process. ASB remains the most widely applied type of biological treatment in Region IV. Table 7 presents the breakdown of the treatment systems employed by the pulp and paper industry. Forty-one mills operate ASB's. Three mills have ASB's in series with the AS process. Five mills operate oxidation ponds. A total of seven mills operate the activated sludge process, of these, two are extended aeration, three are pure oxygen and two are air activated sludge plants.

To improve final effluent quality, most of the biological treatment process had additional settling following aeration. For the 41 ASB processes, 29 have settling ponds, 3 have mechanical clarifiers plus settling ponds, and 9 have no additional basins following aeration. For the 3 ASB/AS processes, 1 has a mechanical clarifier, and 2 have mechanical clarifiers plus settling ponds. For the 7 AS processes, all have mechanical clarifiers, of which 3 add polymers when needed to improve settleability of the suspended solids in the final clarifiers.

TABLE 7

TREATMENT SYSTEMS EMPLOYED BY THE
PULP AND PAPER INDUSTRY

Type of Treatment	No. of Mills Using
AS (Conventional)	2
AS (Extended Aeration)	2
AS (Pure O_2)	3
AS/ASB	3
ASB	41
Oxidation Pond	5
REGION IV TOTAL	56

Final Sludge Disposal

Table 8 summarizes the type of sludge disposal methods utilized throughout the industry. Landfill of sludge remains the most widely used form of final disposal. A total of 25 mills reported the use of landfill. Sludge lagooning is the second most frequent method (13 mills). Among other methods utilized are: incineration (6 mills); land application (4 mills); and recycle (1 mill).

E. Comparison of EPA BPT Design Criteria to Design Criteria Used by the Industry

In the "Development Document for Effluent Limitations Guidelines and Standards for the Pulp, Paper and Paperboard", EPA provides the BPT design criteria for aerated stabilization basins, extended aeration and conventional activated sludge systems. In this section, a comparison of EPA design criteria to design criteria used by the mills will be made in regard to primary clarification, equalization, aeration basins and secondary clarification.

Primary Clarification

Table 9 shows for primary clarification the overflow rates for the 40 mills range from 294 gpd/sq ft to 1049 gpd/sq ft with an average of 500 gpd/sq ft; whereas the BPT criteria is 600 gpd/sq ft. Among the eight states there is no significant variation in the overflow rate used by the mills as shown in Table 10 .

TABLE 8

FINAL SLUDGE DISPOSAL PRACTICES USED BY
THE PULP AND PAPER INDUSTRY

	No. of Mills Using
Landfill	25
Land Application	4
Sludge Lagoon	13
Incineration in Power Boilers	6
Recycle Back to Process	1

Activated Sludge

There are two mills with conventional activated sludge plants. For primary clarification, the overflow rates for these plants are compatible with the BPT criteria as shown in Table 9 . Flow equalization basins which are included in the BPT design are not available at these plants. The hydaulic detention time in the aeration basin is 5% lower than the BPT criteria at one mill and 40% lower at the other mill, as a result, their organic loadings are much higher than the BPT criteria as shown in Table 9 . The aeration capacities are close to the BPT criteria. The overflow rates of the final clarifiers are about 30% higher than the BPT criteria.

Extended Aeration

There are two mills with extended aeration plants. Only one mill uses a mechanical clarifier for primary treatment, and the overflow rate is 14% higher than the BPT criteria. Flow equalization, which is included in the BPT design is not available at these two plants. The hydraulic detention time in the aeration basin is 500% higher than the BPT criteria at one mill and 20% lower at the other. However, the organic loadings for these two plants are approximately the same and they are within the range of BPT criteria as shown in Table 9 . In terms of aeration capacity, both plants have lower capacities than the BPT criteria. The overflow rate of the final clarifier is 45% lower than the BPT critiera at one mill and 9% lower at the other mill.

Aerated Stabilization Basin

The hydaulic detention times in the aeration basins range from 1 to 24 days with an average of 10 days; whereas the BPT criteria is 13 days. Table 10 shows that those mills in Mississippi, North Carolina, South Carolina and Tennessee have longer detention times than those in Alabama, Florida, Georgia and Kentucky.

The organic loadings in the aeration basins range from 0.2 to 7.9 lb BOD/d/1000 cf with an average of 2.4 lb BOD/d/1000 cf; whereas the BPT criteria is 1.13 lb BOD/d/1000 cf. The high organic loadings are probably due to the small aeration basin sizes used by the mills. Table 10 shows that mills in Mississippi, North Carolina, South Carolina have low organic loadings (which are about the same as BPT), and they have relatively long detention times or large aeration basins.

The aeration capacities range from 11 to 68 lbs BOD/HP with an average of 42 lbs BOD/HP; whereas the BPT criteria is 33.7 lbs BOD/HP. Among the eight states, there is no significant variation in the aeration capacity used by the mills. Table 10 shows that mills in Mississippi have the lowest average aeration capacity.

The detention times in the settling basins range from 0.4 to 100 days with an average of 17 days; whereas the BPT criteria is 1 day. It should be recognized that in addition to settling of suspended solids, the long detention times also provide additional BOD removal and/or storage capabilities for the mill effluents. Among the eight states, the detention times vary significantly. Table 10 shows that mills in Florida, Georgia, and Kentucky generally have the lower detention times.

TABLE 9

A COMPARISON OF BPT DESIGN CRITERIA TO CRITERIA USED AT MILLS

Activated Sludge	BPT Design Average	Actual Mill Average	Actual Mill Minimum	Actual Mill Maximum
Primary clarification (gpd/sq ft)	600	528	456	600
Equalization (hours)	12	-	-	-
Aeration Basin				
. Detention Time (hours)	8	6.2	4.8	7.6
. Organic Loading (lb BOD_5/d/1000 cf)	50	83	76	90
Aeration (lb BOD_5/HP)	41.8	47	38	56
Secondary clarification (gpd/sq ft)	500	625	600	650
Extended Aeration				
Primary clarification (gpd/sq ft)	600	685	685*	685*
Equalization (hours)	12	-	-	-
Aeration Basin				
. Detention Time (hours)	30	84	24	144
. Organic Loading (lb BOD_5/d/1000 cf)	18.75 - 37.5	16.2	14.1	18.4
Aeration (lb BOD_5/HP)	41.8	28	26	30
Secondary clarification (gpd/sq ft)	500	365	274	456
Aerated Stabilization Basin				
Primary clarification (gpd/sq ft)	600	500	294	1049
Aeration Basin				
. Detention Time (days)	13	10	1	24
. Organic Loading (lb BOD_5/d/1000 cf)	1.13	2.4	0.2	7.9
Aeration				
. Organic Loading (lb BOD_5/HP)	33.7	42	11	68
Settling (days)	1	17	0.4	100

A.C. - 2 plants
Extended Aeration - 2 plants
ASB - 41 plants

TABLE 10

A COMPARISON OF BPT DESIGN CRITERIA TO AN AVERAGE OF THE DESIGN CRITERIA USED AT MILLS BY STATES

Aerated Stabilization Basin	BPT Design Criteria	AL Avg.	FL Avg.	GA Avg.	KY Avg.	MS Avg.	NC Avg.	SC Avg.	TN Avg.
Number of Mills		12	3	8	3	3	5	2*	4
Primary clarification (gpd/sq ft)	600	511	407*	495	1049*	471	468	560	777
Aeration Basin									
. Detention Time (days)	13	9.5	6.1	7.9	7.3	10.6	12.6	14	11
. Organic Loading (lb BOD_5/d/1000 cf)	1.13	2.3	3.3	2.8	2.9	1.08	1.66	1.8	3.6
Aeration									
. Organic Loading (lb BOD_5/HP)	33.7	49	41	46	41	32	39	43	50
Settling (days)	1	25	1*	5.0	6.8	17**	12.8	53	18

*1 mill
**2 mills

IV. Performance Evaluation of Existing Treatment Systems

A. Effect of Operating Parameters on Treatment Performance

In the previous section, design criteria for various treatment systems were discussed. This section will examine the sizing of these treatment systems and determine the actual operating parameters. The operational parameters will then be compared with BPT design criteria to determine if the treatment systems were operating within BPT guideline. Also, the study will attempt to identify and qualify which operational parameters would have a significant impact on treatment performance.

To initiate the data analysis, survey data on flow, aeration volume, aeration horse power, final settling volume, influent loading, and effluent discharge were collected. These data were then used to calculate actual operational parameters, which consist of aeration detention time, BOD loading rate, aeration organic loading, aeration mixing, and final settling. The following pages of this section will discuss the effects of these parameters for the various type of treatment systems used by the pulp and paper industry.

Activated Sludge Process

Table 11 summarizes the calculated operational parameters for each modification of the activated sludge process. Listed in the Table are the recommended BPT design criteria, actual operational parameters and the relationship of these parameters to the removal of BOD and TSS.

TABLE 11

ACTUAL PLANT OPERATIONAL PARAMETERS FOR REGION IV PULP AND PAPER MILLS

MILL NAME	STATE	TREATMENT TYPE	FLOW (mg/d)	INF BOD (lbs/d)	AERATION VOLUME (mil gal)	TOTAL AERATION (HP)	AERATION DETENTION TIME	DPT DESIGN	BOD LOADING (lbs BOD/1000 cf/d)	DPT DESIGN	AERATION ORG LOADING (lbs BOD/HP/d)	DPT DESIGN	AERATION MIXING (HP/1000 cf)	DPT DESIGN	FINAL SETTLING SETTLING	% REMOVAL BOD	% REMOVAL TSS
WESTVACO CORP	SC	ORG	19.37	48687	6.52	2000	8.08 hrs	8 hrs	55.86	50	24.34	41.8	2.294	none	FC	95	95
CHAMPION PAPERS	NC	ORG	44.71	134191	11.40	2500	6.12 hrs		101.17		61.68		1.640		FC	97	96
INTERNATIONAL PAPER INT	MS	ERG	37.19	93121	43.00	4000	27.75 hrs	30 hrs	16.20	10-37.5	23.28	41.8	0.696	none	FC	78	75
ALPHA CELLULOSE	NC	ORG	1.14	11939	8.90	350	187.83 hrs		10.05		21.36		0.471		FC	97	70
ALABAMA RIVER PULP CO	AL	AS/Pure O2	23.04	78650	3.60	630	3.75 hrs	none	163.30	none	121.06	none	1.351	none	FC	92	67
ALTON BOX BOARD	FL	AS/Pure O2	5.47	16351	1.41	400	6.19 hrs		87.80		41.38		2.122		FC	75	58
CONTAINER CORP	FL	AS/Pure O2	17.04	69467	2.61	885	3.68 hrs		199.09		78.49		2.536		FC	94	94
SCOTT PAPER, MOBILE MILL	AL	AS/ASB	99.53	113155	306.85	3965	5.15 days	none	2.76	none	37.66	none	0.073	none	FC	89	91
CHAMPION PAPER	AL	AS/ASB	54.00	326598	376.00	4550	6.98 days		6.48		71.78		0.090		FC+HP	98	99
GEORGIA KRAFT	GA	AS/ASB	15.41	49898	31.85	1200	2.07 days		11.72		41.57		0.282		FC+SP+HP	94	70
BUCKEYE CELLULOSE CORP	FL	ASB	43.06	61535	537.00	8000	12.49 days	13 days	0.86	1.13	30.16	42	0.028	none	NONE	88	91
SOUTHEAST PAPER MFG	GA	ASB	6.67	28184	26.07	900	3.91 days		8.09		31.32		0.258		NONE	98	100
MEAD CORP	AL	ASB	3.67	30498	93.00	900	25.36 days		4.06		56.10		0.072		NONE	90	86
ITT RAYONIER	GA	ASB	53.95	125229	914.28	3825	16.95 days		1.02		38.83		0.026		NONE	87	74
ITT	FL	ASB	12.32	68196	130.17	2100	10.56 days		3.92		32.47		0.121		NONE	73	91
MOBILE WATER SERVICE (INT'I P)	AL	ASB	32.07		300.00	2925	9.35 days		0.00				0.073		NONE		
JACKSON CO PORT AUTH IP	MS	ASB	17.78	51170	230.40	1725	12.96 days		1.66		29.66		0.056		NONE	91	79
WILLAMETTE IND W KRAFT	KY	ASB	9.48		133.02	800	14.04 days		0.00				0.045		NONE		
OLIN CORP (RESORTA CORP)	NC	ASB	24.63	41663	260.66	1100	10.59 days		1.20		37.88		0.032		NONE	93	97
GILMAN PAPER	GA	ASB	36.88	30299	193.54	1000	5.25 days		1.94		27.94		0.070		NONE	87	97
MEAD CORP	TN	ASB	10.19	25510	70.00	825	6.87 days		2.73		30.92		0.088		NONE	87	93
UNION CAMP	GA	ASB	28.81	94276	340.00	2700	11.80 days		2.07		34.92		0.059		NONE	82	90
TENN RIVER PULP&PAPER	TN	ASB	21.25	49312	250.00	2775	11.76 days		1.49		17.99		0.083		SP	96	95
KIMBERLY-CLARK	AL	ASB	35.88	79916	450.00	1737	12.20 days		1.33		46.01		0.029		SP	84	89
GREAT SOUTHERN PAPER	GA	ASB	22.17	79363	275.00	1750	12.41 days		2.16		45.46		0.048		SP	87	88
ST. REGIS PAPER (CHAMP INT'L)	FL	ASB	24.78	45831	115.21	1400	4.65 days		2.98		32.74		0.091		SP	91	98
HOOKERMILL PAPER	AL	ASB	25.20	51758	395.00	1800	15.67 days		0.98		28.75		0.034		SP	76	89
WEYERHAEUSER CO	MS	ASB	3.28	12284	89.00	760	27.14 days		1.03		16.16		0.064		SP	96	99
ST. REGIS PAPER (GA. PACIFIC)	MS	ASB	19.39	43251	435.00	1540	23.23 days		0.71		28.08		0.025		SP	87	96
CONTINENTAL FOREST(FED. PAPER)	GA	ASB	25.22	131029	364.93	2900	14.47 days		2.69		45.18		0.059		SP	89	86
DIXIE NORTHERN (INNER RIVER)	AL	ASB	44.60	109248	394.90	2535	8.85 days		2.07		43.10		0.048		SP	92	94
HOERNER WALDORF-CHAMP INT'L	NC	ASB	18.93	60070	106.35	900	5.63 days		4.22		66.74		0.063		SP	93	95
MACMILLAN BLOEDEL	AL	ASB	15.96	72616	94.00	900	5.89 days		5.78		80.68		0.072		SP	91	92
FEDERAL PAPER BOARD	NC	ASB	40.75	123810	480.00	4320	11.78 days		1.93		28.66		0.067		SP	93	94
BRUNSWICK PULP&PAPER	GA	ASB	48.50	105860	344.08	2775	7.09 days		2.30		38.15		0.060		SP	86	76
ALABAMA KRAFT, GA KRAFT	AL	ASB	10.85	37325	202.99	480	18.71 days		1.38		77.76		0.018		SP	89	99
WEYERHAEUSER NB	NC	ASB	27.69	62608	346.00	1680	12.49 days		1.35		37.27		0.036		SP	94	95
INLAND CONTAINER	TN	ASB	3.32	41430	50.00	800	15.05 days		6.20		51.79		0.120		SP	90	77
GOLD BOND BUILDING	AL	ASB	0.91			160	0.00 days		ERR				ERR		SP		
BOWATER SOUTHERN PAPER	TN	ASB	40.67	99341	445.48	1700	10.95 days		1.67		58.44		0.029		SP	88	79
INTERNATIONAL PAPER	SC	ASB	16.91	39393	303.00	3975	17.92 days		0.97		9.91		0.098		SP	93	95
WEYERHAEUSER FL	NC	ASB	42.27	110265	1100.65	2850	26.04 days		0.75		38.69		0.019		SP	89	91
GULF STATES PAPER	AL	ASB	18.18	53156	264.00	1200	14.53 days		1.51		44.30		0.034		SP	89	95
BOWATER CAROLINA	SC	ASB	57.38	173035	410.54	1600	7.16 days		3.15		108.15		0.029		SP	95	92
SONOCO PRODUCTS	SC	ASB	3.48	41095	42.50	1000	12.23 days		7.23		41.10		0.176		SP	96	92
WESTVACO FINE PAPERS	KY	ASB	19.78	61135	303.00	1500	15.32 days		1.51		40.76		0.037		SP	94	94
ALLIED PAPER, S MILL	AL	ASB	18.11	38590	279.56	1200	15.44 days		1.03		32.16		0.042		SP	93	94
WILLAMETTE IND NED MILL	KY	ASB	2.36	13341	19.16	320	8.11 days		5.21		41.69		0.125		SP	87	88

TABLE 11 (CONT'D)

ACTUAL PLANT OPERATIONAL PARAMETERS FOR REGION IV PULP AND PAPER MILLS

MILL NAME	STATE	TREATMENT TYPE	FLOW (mg/d)	INF BOD (lbs/d)	AERATION VOLUME (mil gal)	TOTAL AERATION (HP)	AERATION RETENTION TIME	BPT DESIGN	BOD LOADING (lbs BOD/1000 cf/d)	BPT DESIGN	AERATION ORG LOADING (lbs BOD/HP/d)	BPT DESIGN	AERATION MIXING (HP/1000 cf)	BPT DESIGN	FINAL SETTLING SETTLING	% REMOVAL BOD	% REMOVAL TSS
STONE CONTAINER CORP	GA	ASB	22.30	30510	152.50	1100	6.84 days		1.50		27.74		0.054		SP	83	
UNION CAMP	AL	ASB	35.52	153450	113.00	824	3.18 days		10.16		186.23		0.055		SP	95	97
CONTAINER CORP	AL	ASB	33.32	53664	71.68	980	2.15 days		5.60		54.76		0.102		SP	91	94
INTERNATIONAL PAPER VIC	MS	OXID POND	4.63	11590	164.40 ac		125.40 days	none	70.50	lbs/ac/day	none	NA		NA	SP	60	92
OWENS ILL	FL	OXID POND	15.87	70687	774.90 ac		127.24 days		91.22	lbs/ac/day					SP	95	68
KIMBERLY-CLARK	SC	OXID POND	6.02	2380	460.00 ac		199.34 days		5.17	lbs/ac/day					SP	92	90
INTERSTATE PAPER CORP	GA	OXID POND	5.92	7871	650.00 ac		157.38 days		12.11	lbs/ac/day					SP	93	97
STONE CONTAINER	SC	OXID POND	12.54	42411	1475.00 ac		268.35 days		28.75	lbs/ac/day					SP	92	90

All values reported are based upon annual average data for 1983. As indicated in this Table, there are only a limited number of activated sludge treatment systems in use by the pulp and paper industry in Region IV. Therefore, BPT and statistical analysis of the data with respect to treatment performance were not made.

Aerated Stabilization Basin

Table 11 also summarizes the operational data for the aerated stabilization basin (ASB) process employed by Region IV mills. The study initially was made on 41 ASB's. However, 3 mills with ASB's have no influent data and were excluded from this study. Comparison of BPT design criteria to the operational data for the 38 ASB's revealed the following results: 24 (63%) operate at a detention time under the recommended period of 13 days: 30 (79%) operate at a BOD loading rate over 1.13 lbs BOD/1000 cu ft./day; and 14 (34%) operate at an aeration organic loading over 42 lbs BOD/hp/day. The impact of this on permit and BPT compliance will be discussed in later sections.

Further studies were then made on each of the operational parameters to determine which parameters would have a more significant impact on ASB performance.

Table 11 presents the range of aeration detention time and its relationship to removal of BOD and TSS. A review of

the data gives no indication of a critical time where treatment performance either increases or decreases. Overall BOD and TSS removal are slightly higher for mills operating below BPT design of 13 days (90% and 92%) than above 13 days (89% and 90%). The effect of aeration detention time on BOD removal rate is shown in Figure 9. No apparent relationship between these two variables was observed.

The relationship between loading rate and BOD removals are shown in Figure 10. BOD removal rate at all loading ranges followed a highly disperse pattern. The lack of correlation indicated a low linear relationship between these two variables. For the 31 ASB's, the correlation coefficient between loading rate and BOD removal were calculated to be 0.2.

The correlation analysis between aeration organic loading and BOD removal is shown in Figure 11. BOD removal followed similar patterns to other operational parameters discussed early. The figure shows a high distribution of BOD removal rate in all ranges of aeration organic loading. Statistical analysis of these two variables indicated a low correlation coefficent where no apparent relationship exists.

The results of aeration mixing to BOD removal is shown in Figure 12. Overall BOD removal is slightly higher as aeration mixing capacity increases. As a result, aeration mixing does not appear to have a significant impact on ASB performance.

FIGURE 9

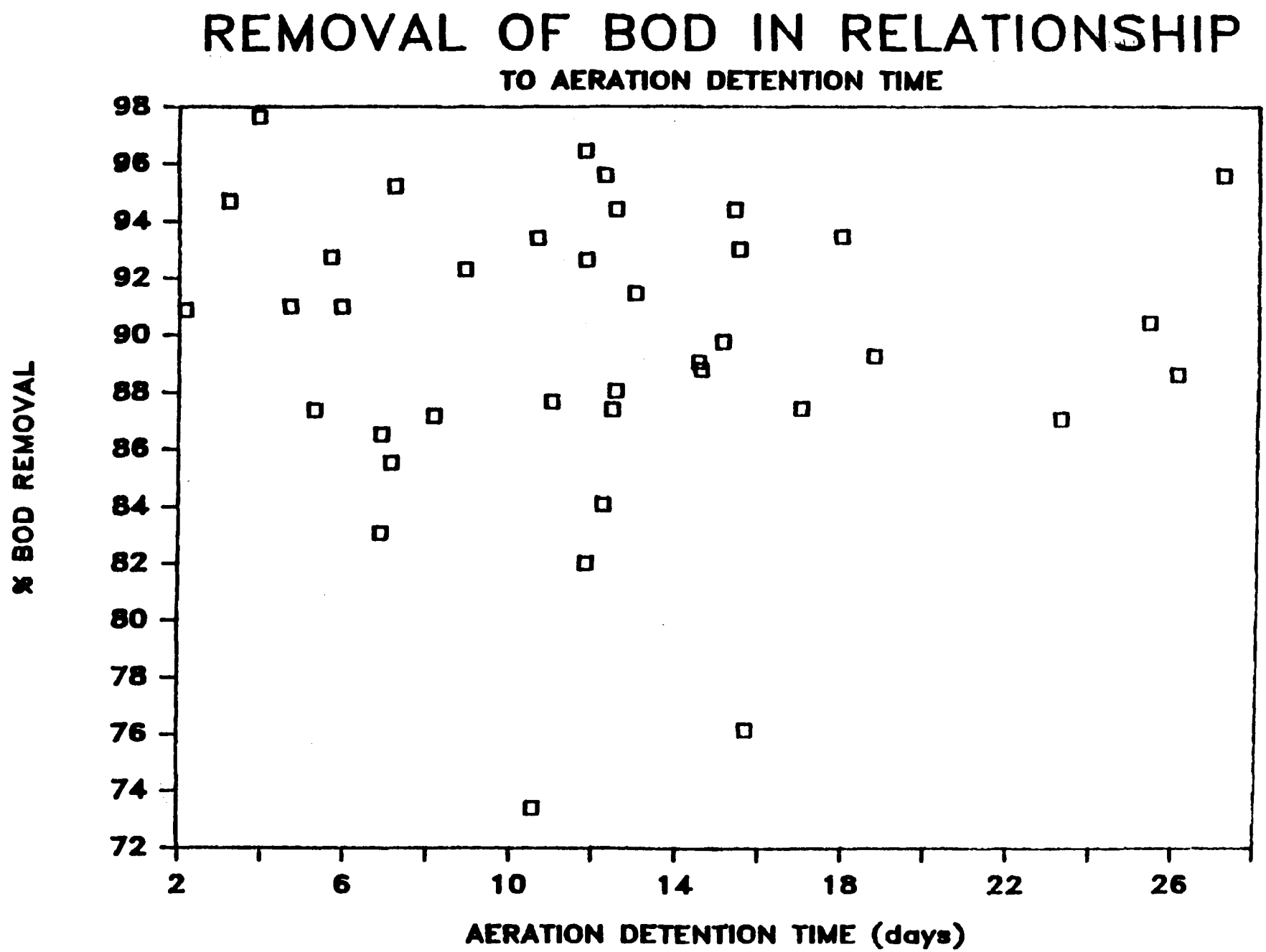

REMOVAL OF BOD IN RELATIONSHIP
TO AERATION DETENTION TIME
% BOD REMOVAL
98
96
94
92
90
88
86
84
82
80
78
76
74
72
2
6
10
14
18
22
26
AERATION DETENTION TIME (days)

FIGURE 10

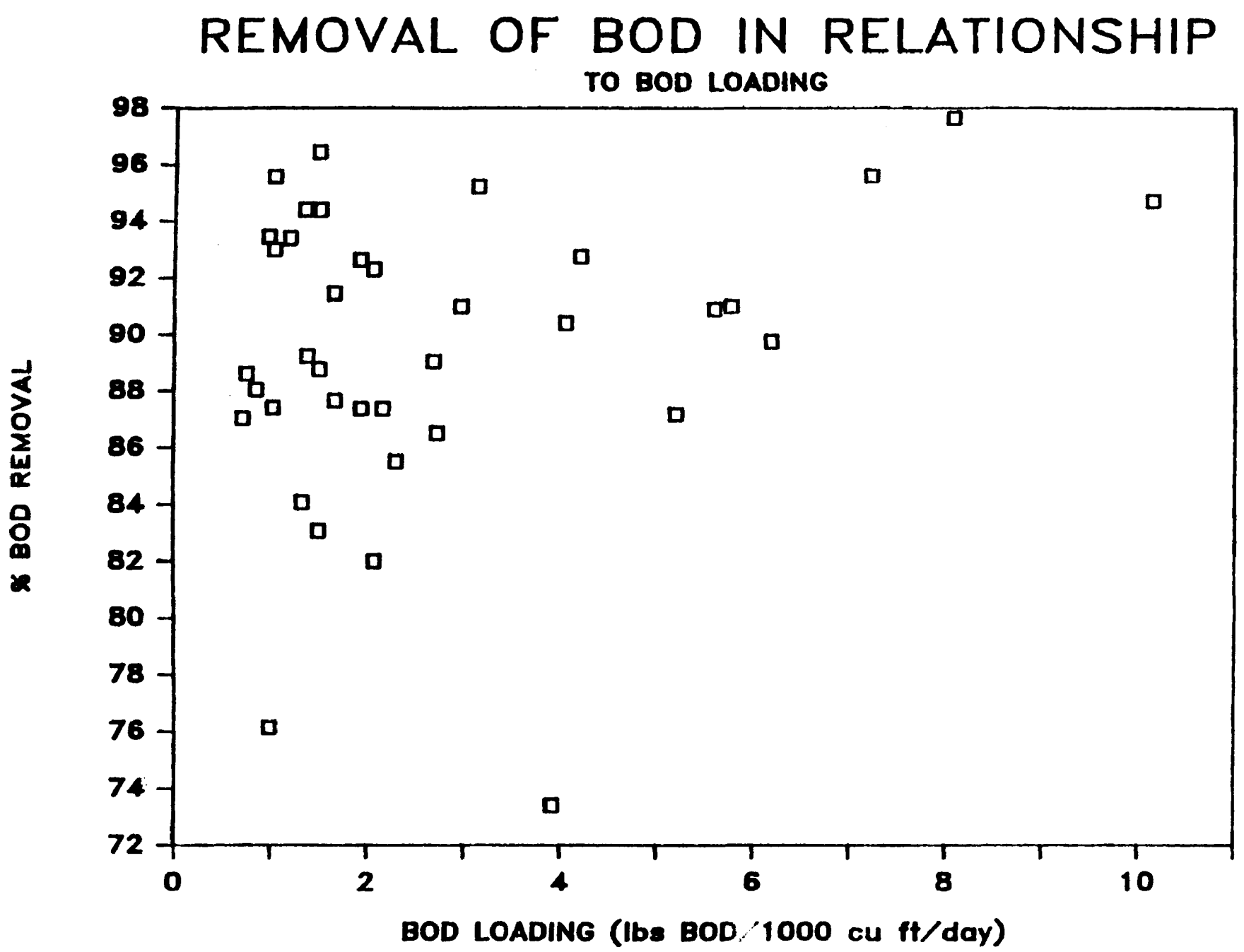

REMOVAL OF BOD IN RELATIONSHIP
TO BOD LOADING
% BOD REMOVAL
98
96
94
92
90
88
86
84
82
80
78
76
74
72
0
2
4
6
8
10
BOD LOADING (lbs BOD/1000 cu ft/day)

FIGURE 11

REMOVAL OF BOD IN RELATIONSHIP

TO AERATION ORGANIC LOADING

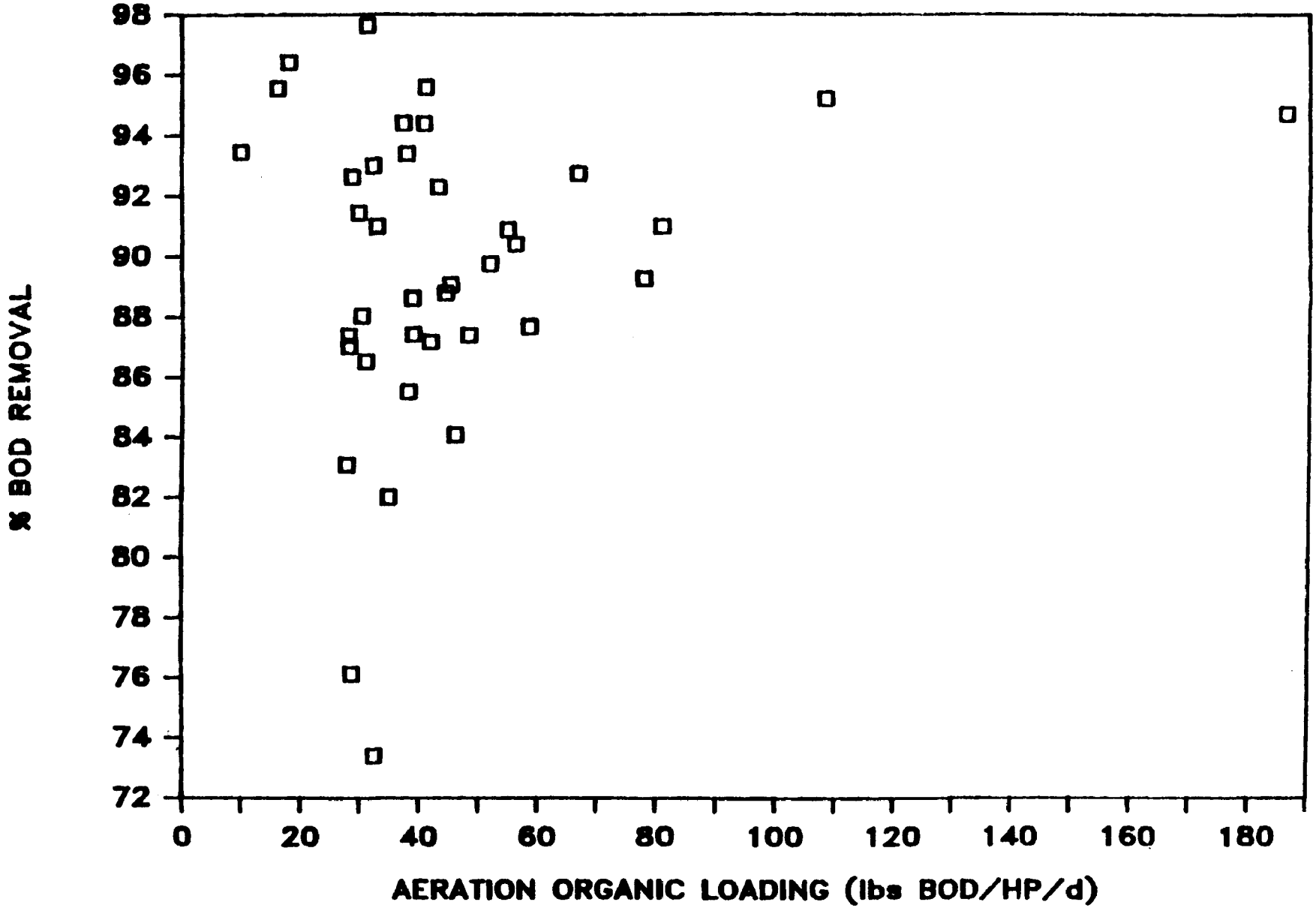
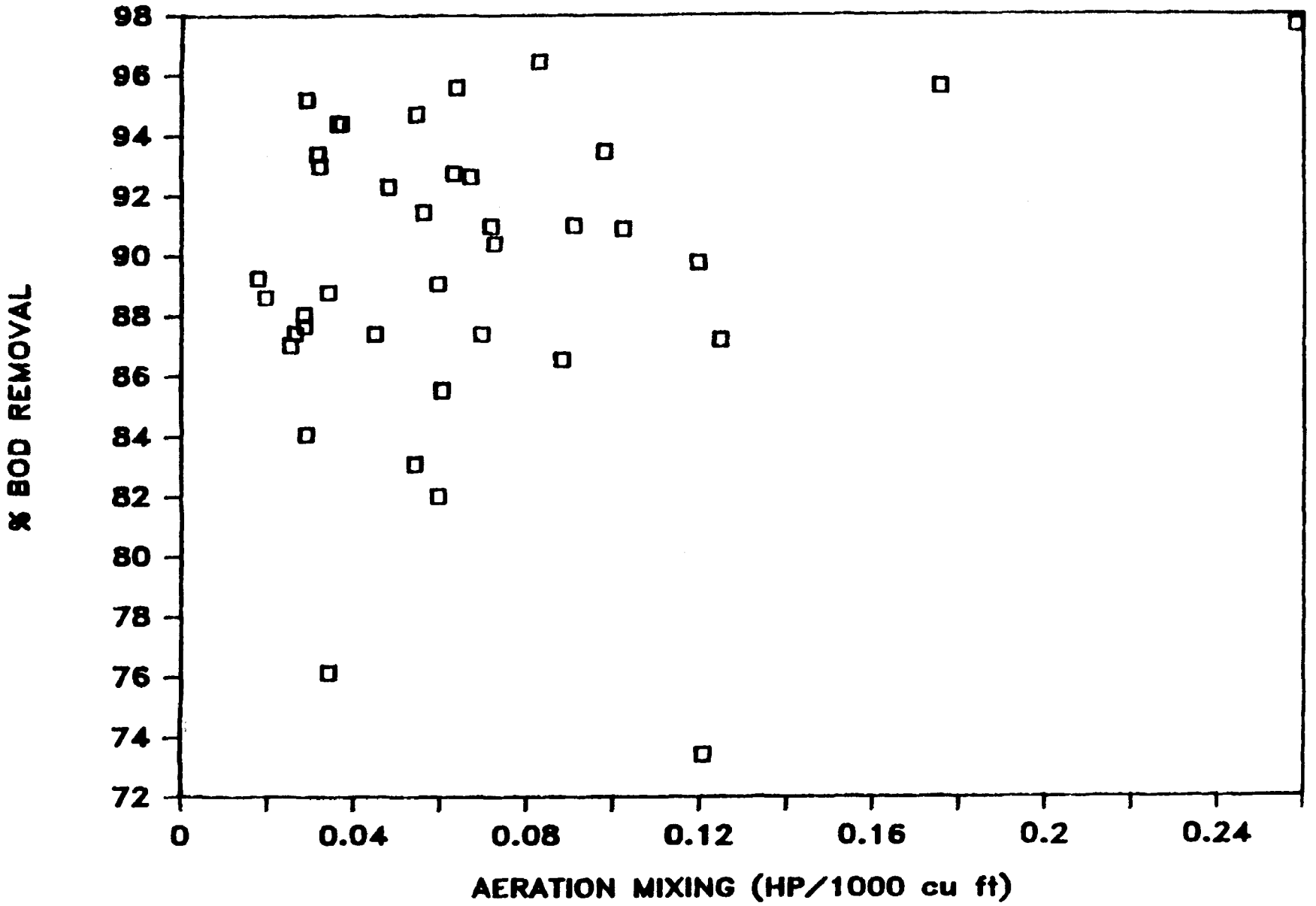


FIGURE 12

REMOVAL OF BOD IN RELATIONSHIP

TO AERATION MIXING



Finally, an analysis was made on the impact of the type of final settling upon BOD and TSS removal efficiency. Two types of final settling are used with the ASB process. They are final clarifier (FC) and settling pond (SP). Mills with area designated for settling in the ASB and with no additional treatment following the ASB were considered to have no final settling for this analysis. A review of BOD and TSS data in Table 11 shows that mills with final clarifiers following the ASB generally achieved the highest treatment efficiency (BOD = 92% and TSS = 92%) than with settling ponds (BOD = 90% and TSS = 92%) or with no settling process following the ASB (BOD = 86% and TSS = 89%).

Oxidation Pond

The impact of BOD loading rate to the removal of BOD and TSS for the oxidation pond process are presented in Table 11. Since BPT design criteria were not available for this process, typical design ranges (20 to 50 lbs BOD/acre/day) compiled by Eckenfelder[1] were used for performance evaluation. At loading rates under 50 lbs BOD/acre/day, overall BOD and TSS removal are higher (92% and 98% respectively) than at loading rate above 50 lbs BOD/acres/day (BOD = 78% and TSS = 80%).

[1]Proceedings of Seminars on Water Pollution Abatement Technology in the Pulp and Paper Industry, EPS 3-WP-76-4; P. 69; Canadian Water Pollution Control Directorate; March, 1976.

Conclusion

Statistical analysis of various treatment systems performance with BPT design and operational parameters results in a very low correlation. None of the five operational parameters were found to have a significant impact, if any, on treatment efficiency. It appears that a single operational parameter apparently cannot be used to characterize the variability of treatment performance for the three types of treatment systems studied. A multiple regression analysis of operational parameters which was not performed in this study may explain some of the BOD and TSS variations. Also, in defining plant performance other factors can contribute to treatment variations. These factors may be a result of human factors, operational and maintenance procedures, sampling procedures, analytical techniques, and measurement errors. Data on discharge monitoring report quality assurance programs (Section VI.B.1) revealed that only 58.5% of mills submitted acceptable data for all parameters required by their permit in Study 5. The percentage of acceptable data (success rate) is only 85.8% for Region IV mills. Also, according to Standard Methods (16th Edition) the coefficient of variation of TSS measurement can range from 0.76% to 33% depending on the concentration of suspended matter in the sample. For BOD, the coefficient of variation can range from 15% to 33%[1]. Therefore, the precision and accuracy of these tests may have a more significant impact on the treatment results since most BOD and TSS treatment performance data fall within a range of 10% (approximately 84% to 94% removal rate).

[1]Methods of Chemical Analysis of Water and Waste, 83 Edition, EPA 660-4-79-020.

B. Impact of Temperature and Geographical Location on Treatment System Performance

Impact of Temperature

The impact of temperature on biological treatment system performance has been demonstrated in many studies. As noted in these studies, a temperature decrease tends to cause a significant increase in both the BOD and TSS levels in the effluent. This phenomenon is mainly due to the decrease in biological activity and the increase of viscosity of water resulting from a temperature reduction which affects the settleability of solids.

For this study, treatment system performance was calculated for both summer and winter conditions to determine the effect of this phenomenon on Region IV pulp and paper mills. Effluent BOD and TSS data for winter months and corresponding summer months were compared with the "average" performance. Summer months were arbitrarily determined to be the months of July through September, and winter months were arbitrarily determined to be the months of January through March. The "average" performance was determined by averaging the monthly performance of each mill over a 24 month period from January 1982 to December 1983. Table 12 summarizes the winter and summer variation over the "average" effluent values for each type of treatment system. Considerably better BOD performances were experienced in the summer months for activated sludge + aerated stabilization basin (AS + ASB), aerated stabilization

TABLE 12

IMPACT OF TEMPERATURE ON TREATMENT SYSTEM PERFORMANCE

Treatment System	BOD			TSS		
	Summer*	Winter*	Overall Variation	Summer*	Winter*	Overall Variation
CAS	- 9%	+ 2%	11%	-10%	+ 4%	14%
EAS	+12%	+17%	5%	-12%	+25%	37%
OAS	+ 7%	+ 8%	1%	+16%	+15%	1%
AS + ASB	-21%	+ 8%	29%	-16%	+ 3%	19%
ASB	-23%	+28%	51%	-14%	+15%	29%
OP	-10%	+20%	30%	+31%	-10%	41%
Overall	- 7%	+14%	21%	- 1%	+ 9%	10%

*Percent variation from average effluent values:

(-): Percent decrease in effluent values from average
(+): Percent increase in effluent values from average

basin (ASB), and the oxidation pond (OP) treatment system. All these treatment systems produce a lower percentage of BOD discharge compared to the "average". The percent decrease in BOD of the "average" effluent value ranges from 10% for OP to 23% for ASB during the summer months. Looking at the winter data, the level of BOD in the effluent increased considerably. The percentage increases in BOD discharge over the average effluent value for AS + ASB, ASB, and OP are 8%, 28%, and 20% respectively. The overall temperature effect in BOD performance from summer to winter conditions are a decrease of 29% for AS + ASB, 51% for ASB, and 30% for OP. For other treatment systems such as conventional activated sludge (CAS), extended activated sludge (EAS) and oxygen activated sludge (OAS), the summer and corresponding winter BOD variations over the "average" are not as apparent as the other treatment systems discussed previously. CAS, EAS and OAS all have a shorter detention time and are not affected by temperature changes as much. The overall temperature variation in BOD performance from summer to winter conditions are a decrease of 3% in CAS, 5% for EAS and 1% for OAS. With regard to the TSS, the performance data failed to show any consistent or significant temperature related trend for the six types of treatment systems listed. As a result, the temperature effect on TSS performance did not warrant any definite conclusions.

It can be concluded, however, that temperature does have a bearing on BOD performance for most treatment systems used by the pulp and paper industry in Region IV. For CAS's, EAS's and OAS's, the variations were minimal due to their short detention time (0.1-8 days) and small surface area. For AS + ASB's, ASB's and OP's, the variations were more pronounced because of their long detention time (1-268 days) and large surface area.

Impact of Geographical Location

Removal rates for each type of treatment system located throughout Region IV were evaluated to determine the difference in treatment performance among the states. Of the six treatment systems evaluated, however, only the aerated stabilization basin (ASB) has a sufficient data base of mills in each state. Performance data for the remaining treatment systems were not sufficient to warrant any further analysis. The study investigated average monthly influent and effluent values over a span of two years for each ASB. Removal rates obtained for 41 ASB's are shown in Table 13. The performance of ASB's are fairly consistent among the states. Average removal of BOD ranges from 83 percent in Florida to 95 percent in South Carolina, and average removal of TSS ranges from 88 percent in Tennessee to 95 percent in North Carolina. BOD and TSS data in Table 13 are plotted in Figures 13 and 14, respectively. As shown from these graphs, there are no states that have an overall advantage in BOD and TSS performance. It appears that geographical location has a minimum impact on ASB treatment system performance in Region IV states.

Next, the study evaluated for each state the changes in effluent quality due to seasonal variation. Again, only the ASB treatment system was considered because of the large data base of mills. Figures 15 to 22 show the seasonal changes in monthly BOD over a period of 24 months for each state. As indicated from these Figures, seasonal temperature variations

TABLE 13

AERATED STABILIZATION BASIN (ASB) PERFORMANCE
IN REGION IV STATES

	Percent Removal		
STATES	BOD	TSS	No. of ASB
AL	91	94	12
FL	83	94	3
GA	87	92	8
KY	90	89	3
MS	90	94	3
NC	92	95	5
SC	95	93	3
TN	90	88	4

FIGURE 13

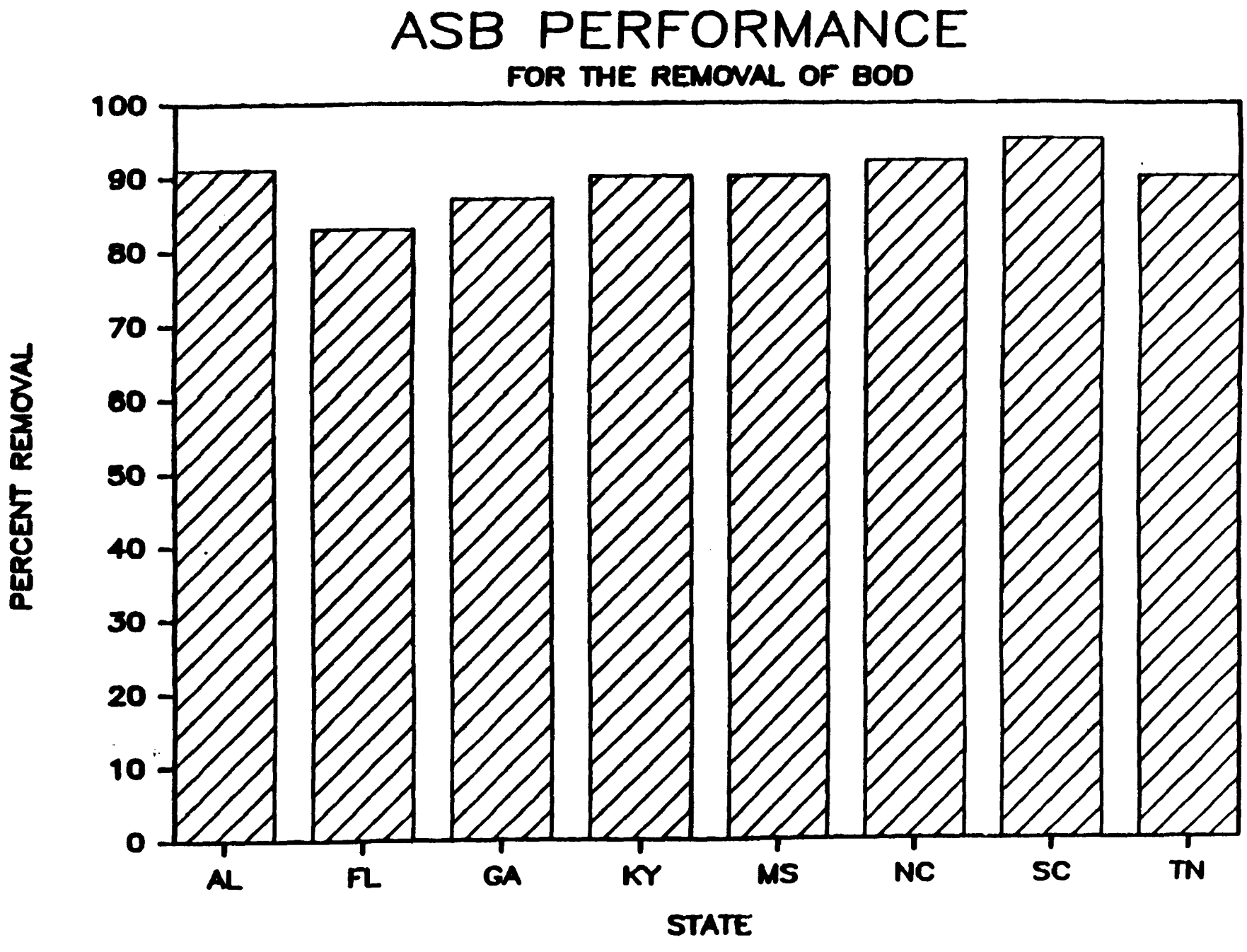
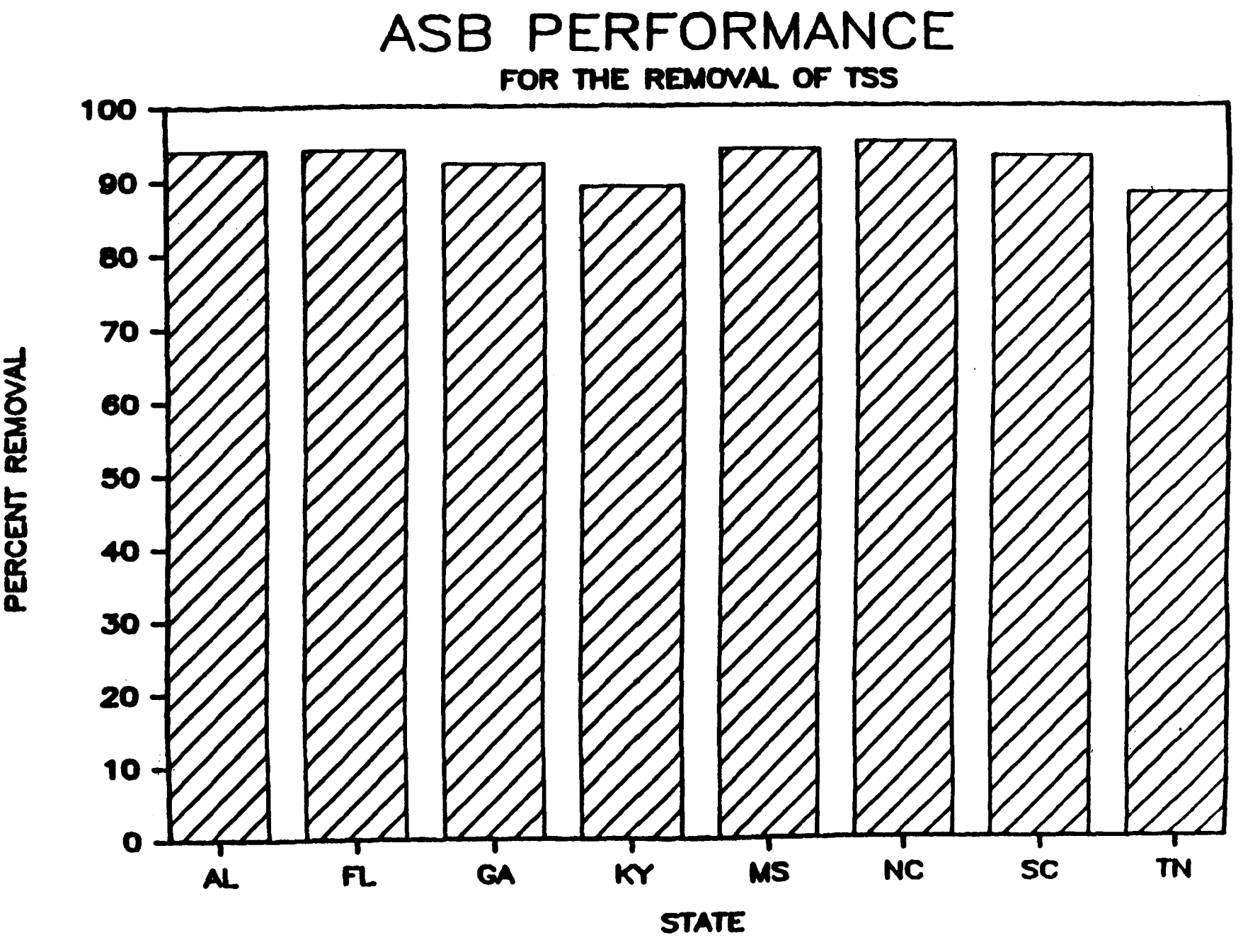

ASB PERFORMANCE
FOR THE REMOVAL OF BOD
PERCENT REMOVAL
100
90
80
70
60
50
40
30
20
10
0
AL
FL
GA
KY
MS
NC
SC
TN
STATE

FIGURE 14


ASB PERFORMANCE
FOR THE REMOVAL OF TSS
PERCENT REMOVAL
100
90
80
70
60
50
40
30
20
10
0
AL
FL
GA
KY
MS
NC
SC
TN
STATE

have a significant bearing on effluent BOD discharge in the states of Alabama, Georgia, Kentucky, Mississippi, North Carolina, South Carolina and Tennessee. These seven states have the highest effluent BOD discharged during January to March as monthly effluent BOD tends to go up considerably during the colder months and down during the warmer months. The only state where seasonal temperature does not cause the BOD discharge level to vary between summer and winter period is Florida. This is probably due to the fact that seasonal temperature variation is less. With regard to effluent TSS quality, Figures 23 to 30 illustrate the effect of seasonal temperature variations in ASB performance for each state. As shown from these Figures, the monthly effluent TSS discharge was randomly distributed throughout the year for all states. The lack of consistent and significant temperature related trends indicates that seasonal temperature variation has little impact upon effluent TSS quality in Region IV states.

FIGURE 15

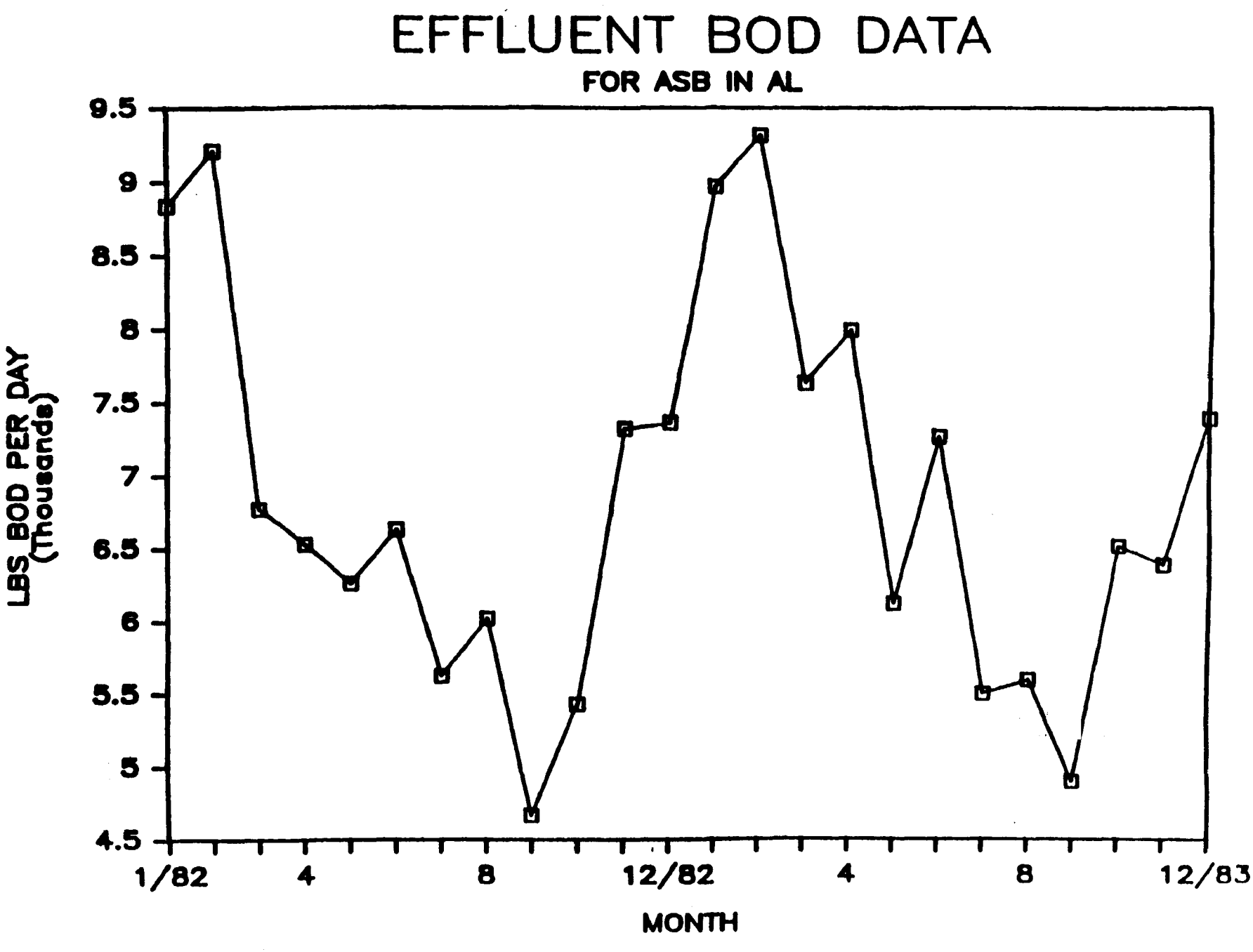

EFFLUENT BOD DATA
FOR ASB IN AL
LBS BOD PER DAY (Thousands)
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
1/82
4
8
12/82
4
8
12/83
MONTH

FIGURE 16

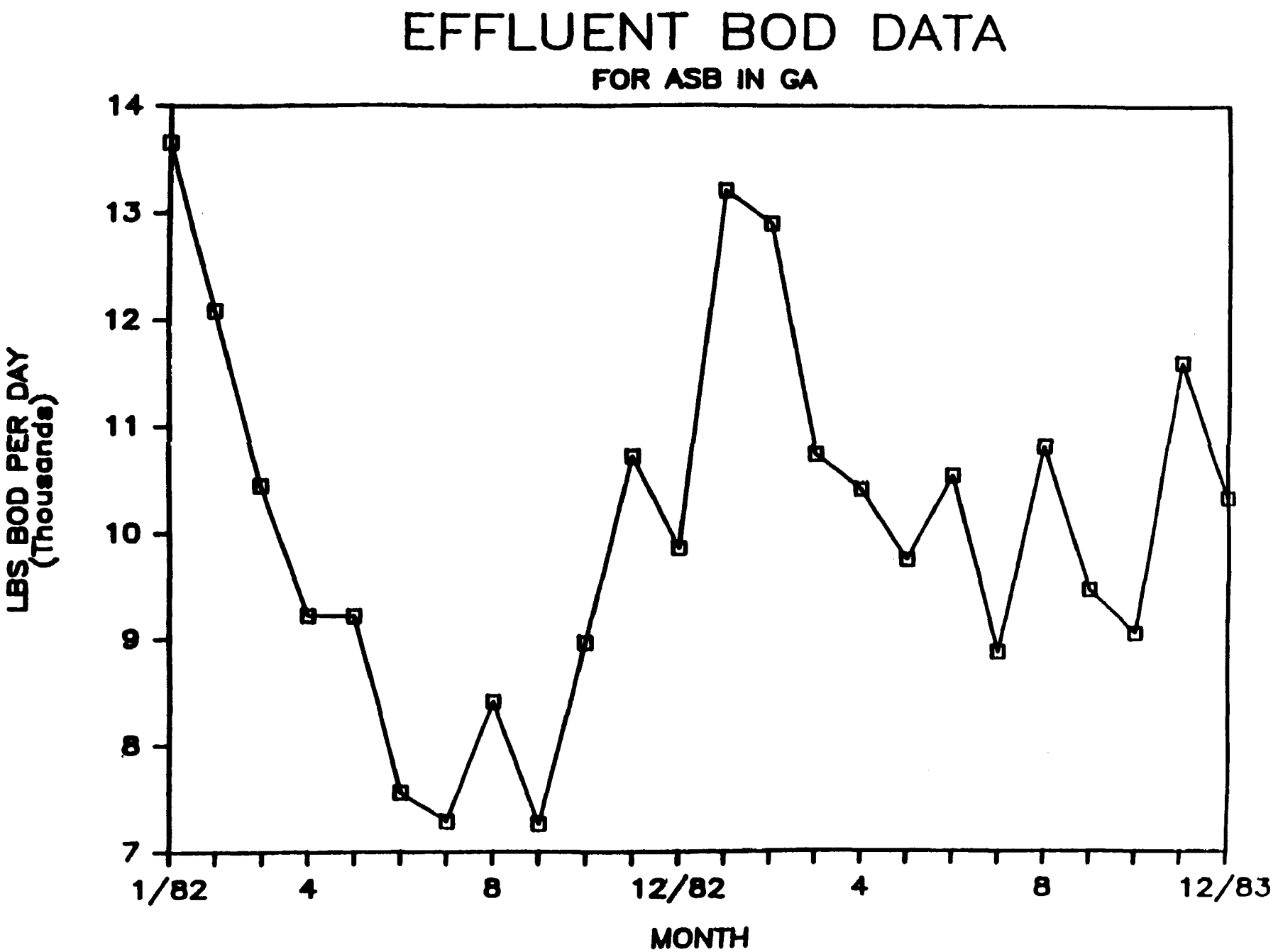

EFFLUENT BOD DATA
FOR ASB IN GA
LBS BOD PER DAY (Thousands)
14
13
12
11
10
9
8
7
1/82
4
8
12/82
4
8
12/83
MONTH

FIGURE 17

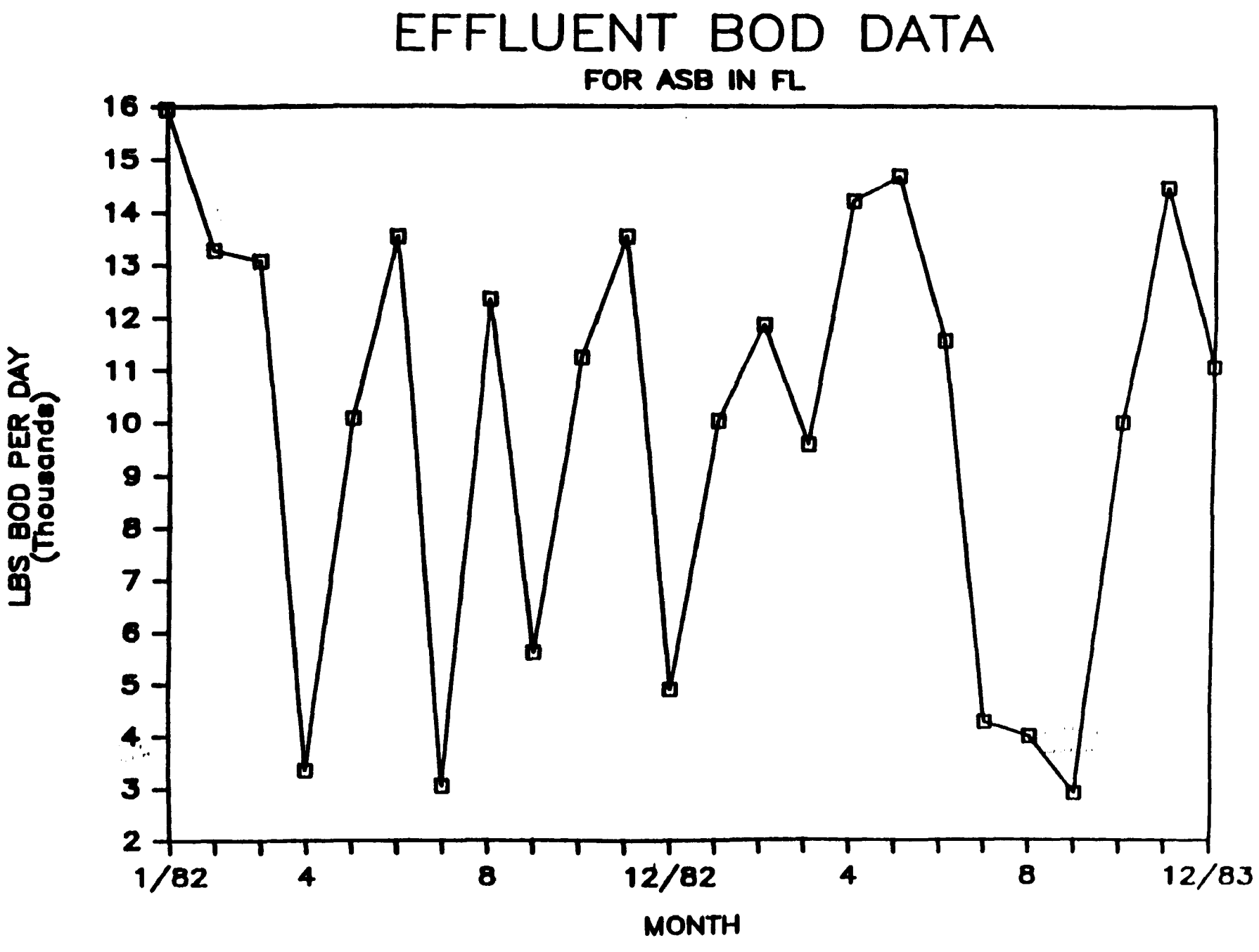

EFFLUENT BOD DATA
FOR ASB IN FL
LBS BOD PER DAY (Thousands)
16
15
14
13
12
11
10
9
8
7
6
5
4
3
2
1/82
4
8
12/82
4
8
12/83
MONTH

FIGURE 18

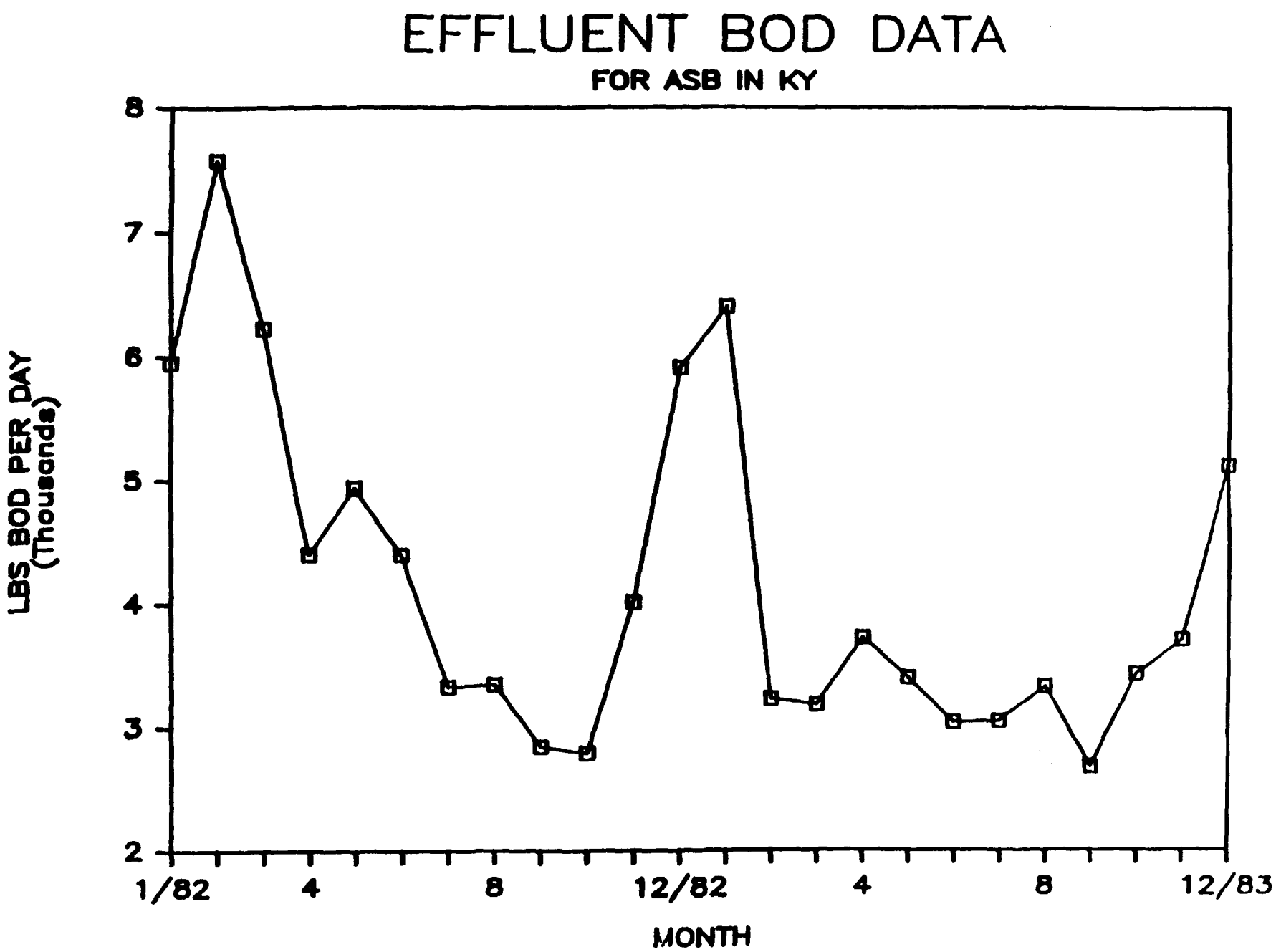

EFFLUENT BOD DATA
FOR ASB IN KY
LBS BOD PER DAY (Thousands)
8
7
6
5
4
3
2
1/82
4
8
12/82
4
8
12/83
MONTH

FIGURE 19

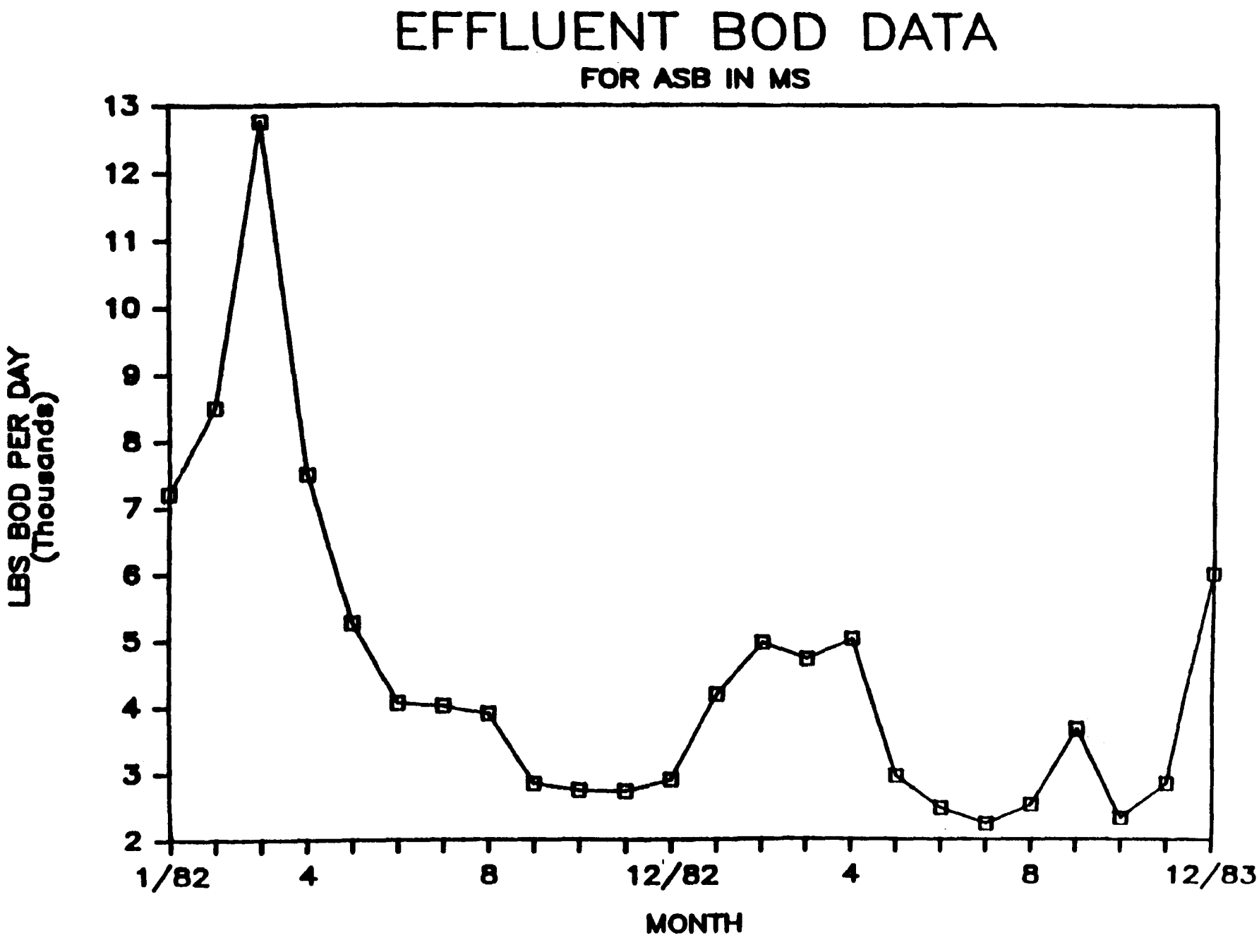

EFFLUENT BOD DATA
FOR ASB IN MS
LBS BOD PER DAY (Thousands)
13
12
11
10
9
8
7
6
5
4
3
2
1/82
4
8
12/82
4
8
12/83
MONTH

FIGURE 20

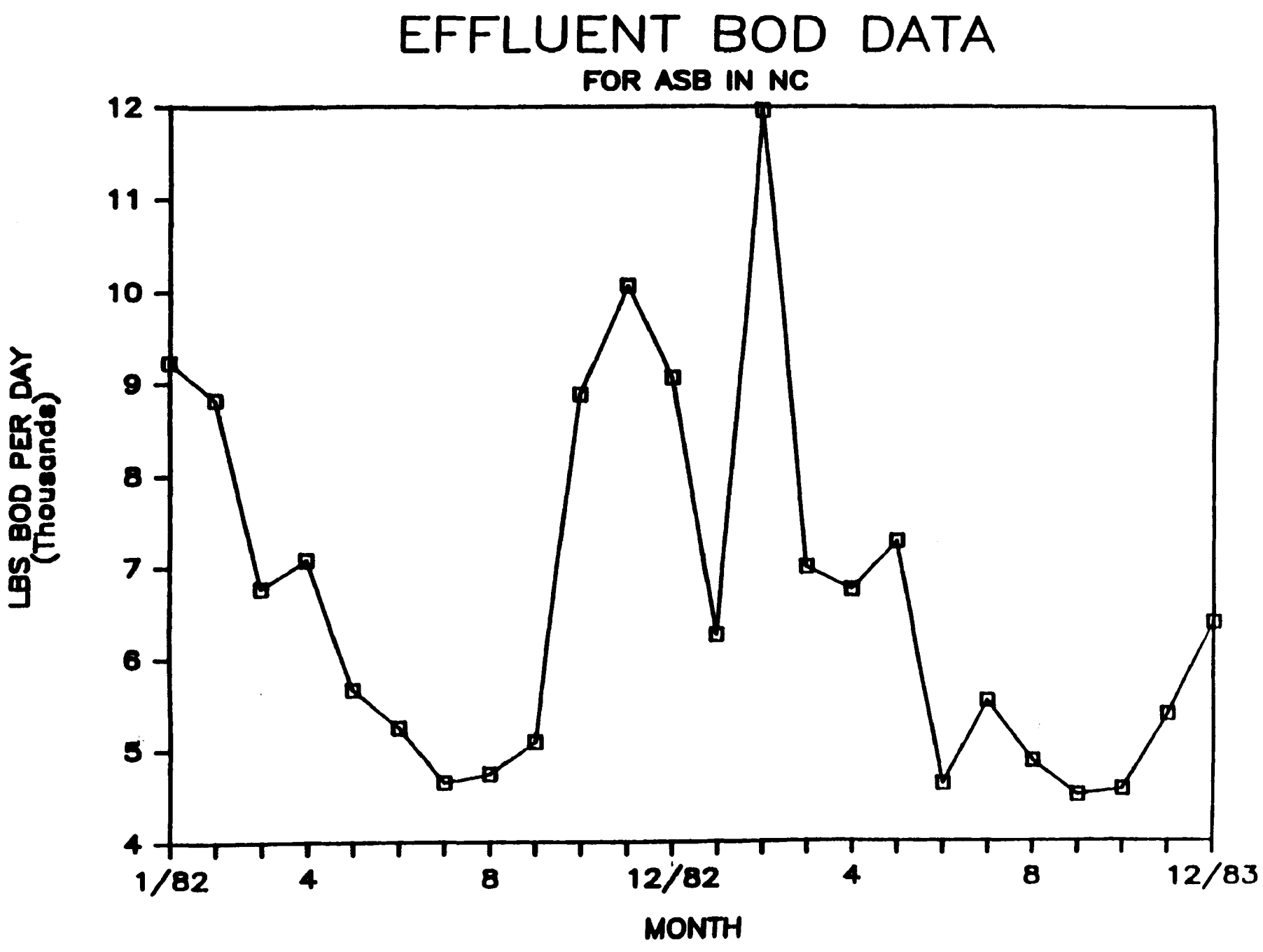

EFFLUENT BOD DATA
FOR ASB IN NC
LBS BOD PER DAY (Thousands)
12
11
10
9
8
7
6
5
4
1/82
4
8
12/82
4
8
12/83
MONTH

FIGURE 21

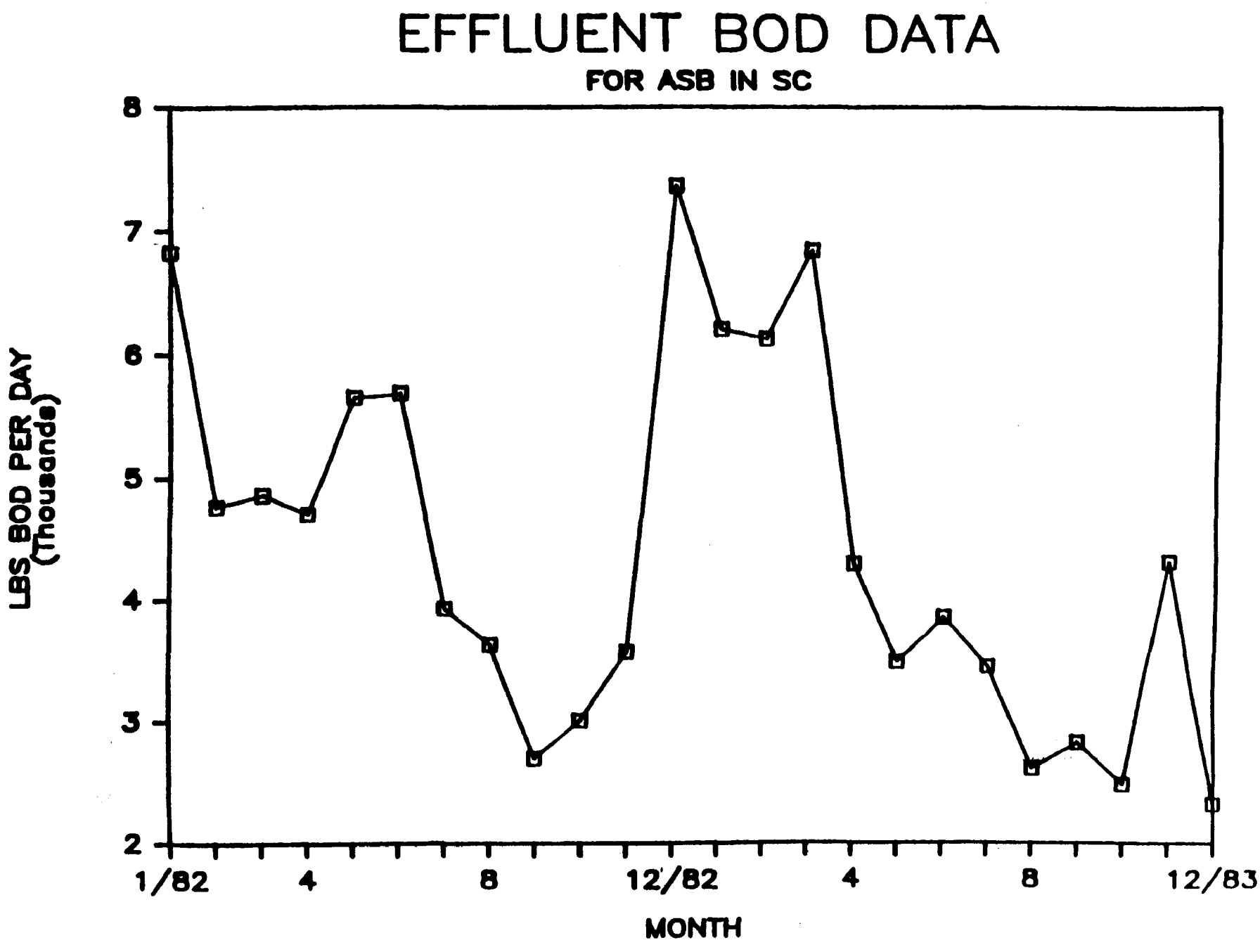

EFFLUENT BOD DATA
FOR ASB IN SC
LBS BOD PER DAY (Thousands)
8
7
6
5
4
3
2
1/82
4
8
12/82
4
8
12/83
MONTH

FIGURE 22

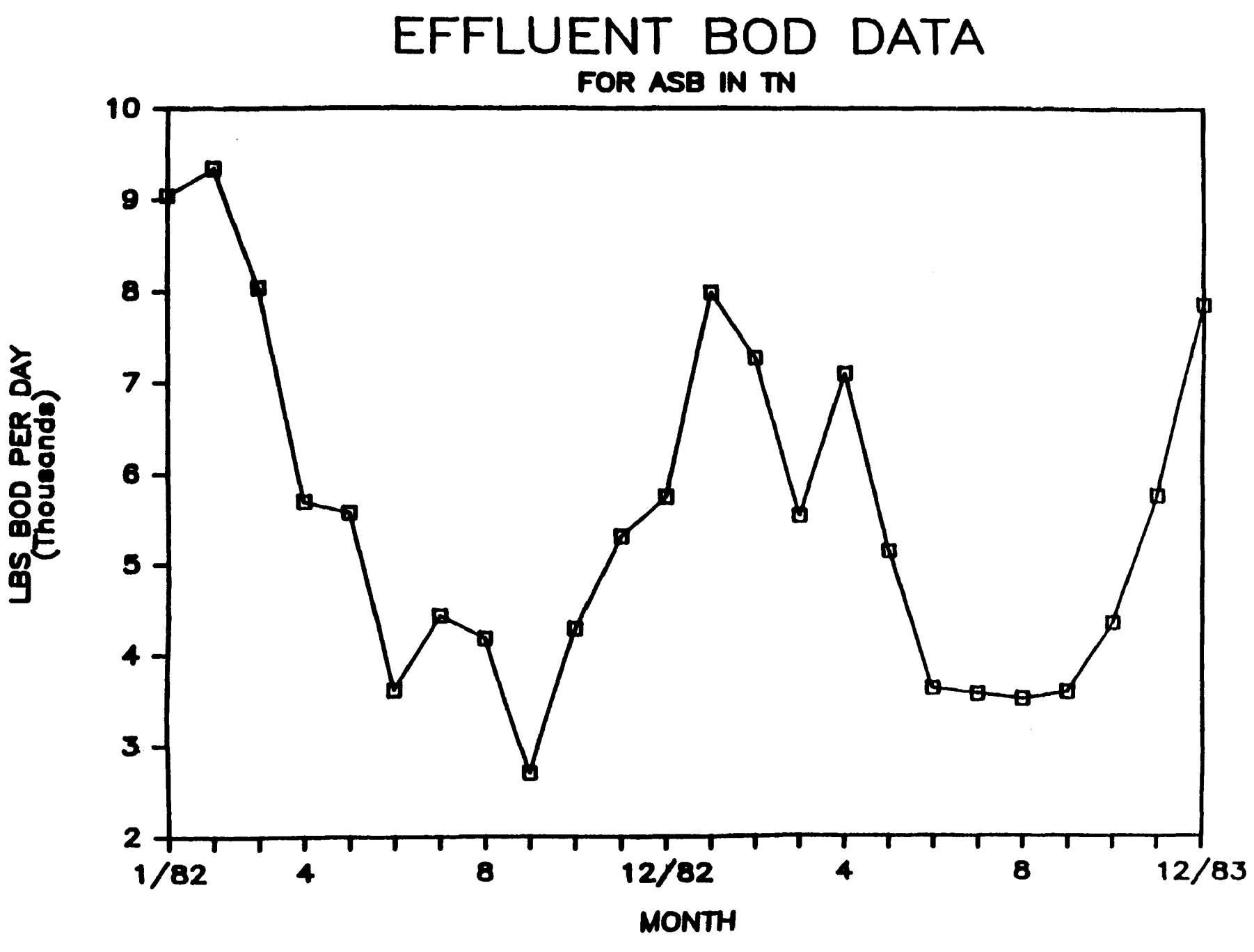

EFFLUENT BOD DATA
FOR ASB IN TN
LBS BOD PER DAY (Thousands)
10
9
8
7
6
5
4
3
2
1/82
4
8
12/82
4
8
12/83
MONTH

FIGURE 23

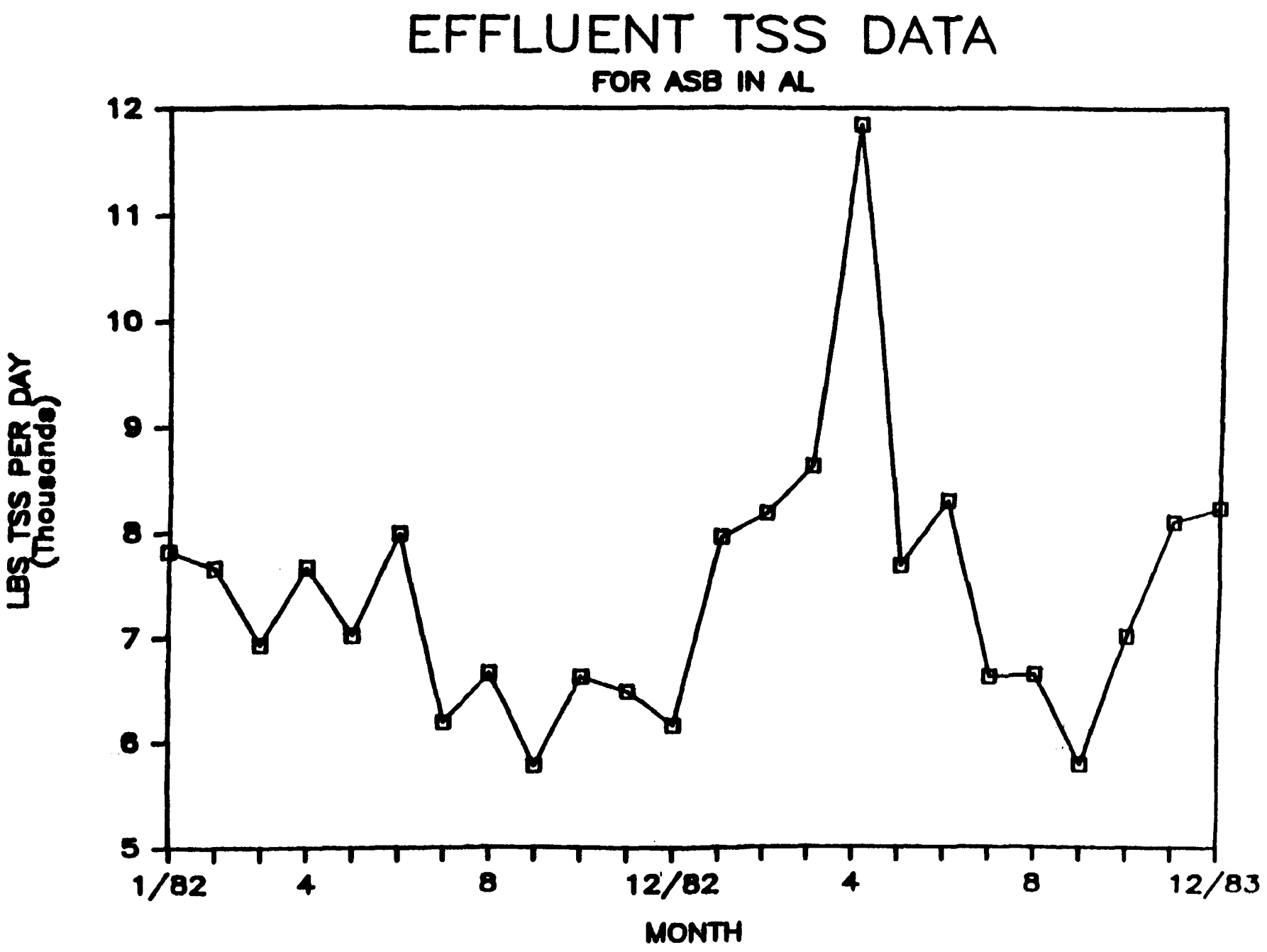

EFFLUENT TSS DATA
FOR ASB IN AL
LBS TSS PER DAY (Thousands)
12
11
10
9
8
7
6
5
1/82
4
8
12/82
4
8
12/83
MONTH

FIGURE 24

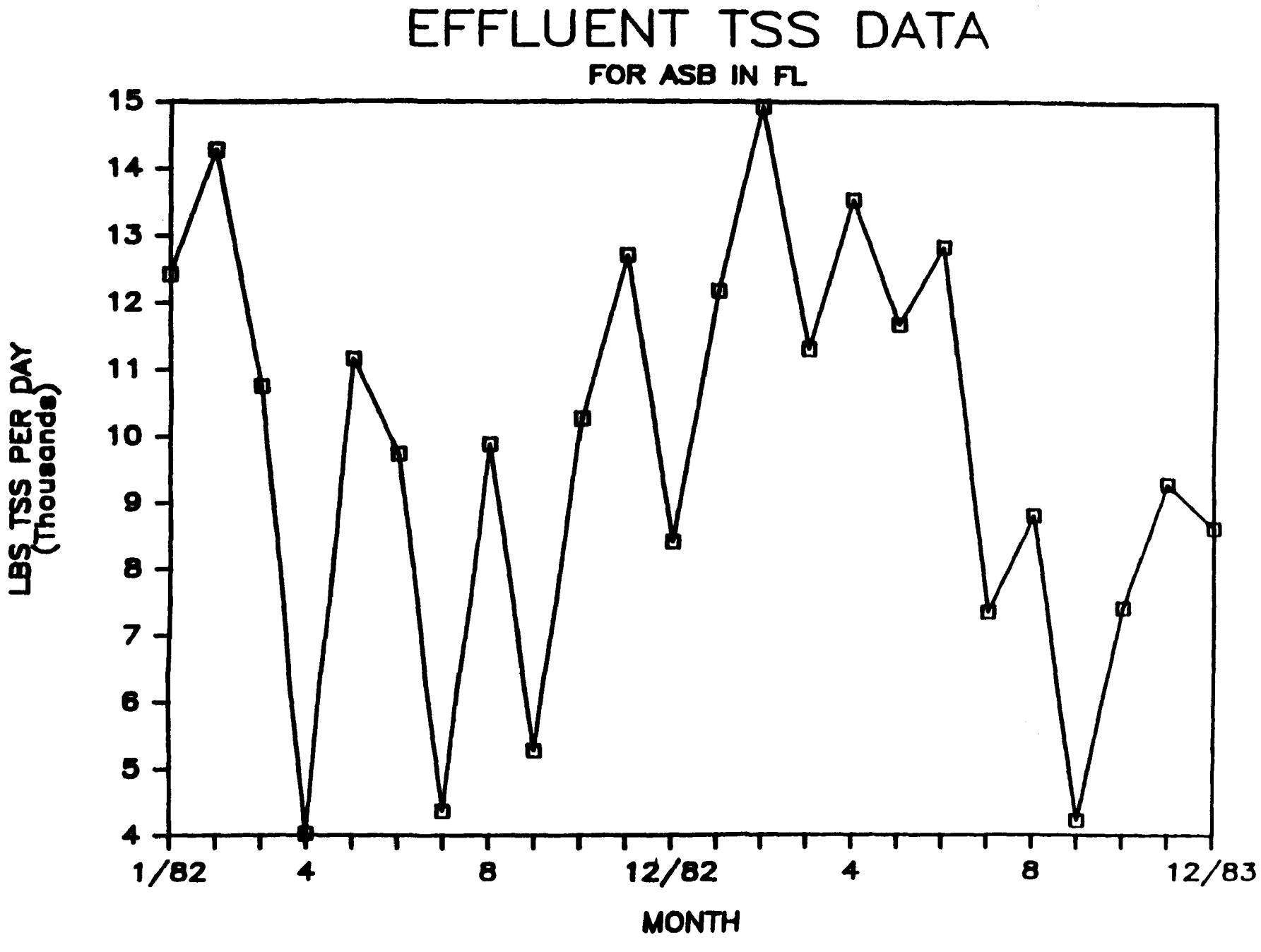

EFFLUENT TSS DATA
FOR ASB IN FL
LBS TSS PER DAY (Thousands)
15
14
13
12
11
10
9
8
7
6
5
4
1/82
4
8
12/82
4
8
12/83
MONTH

FIGURE 25

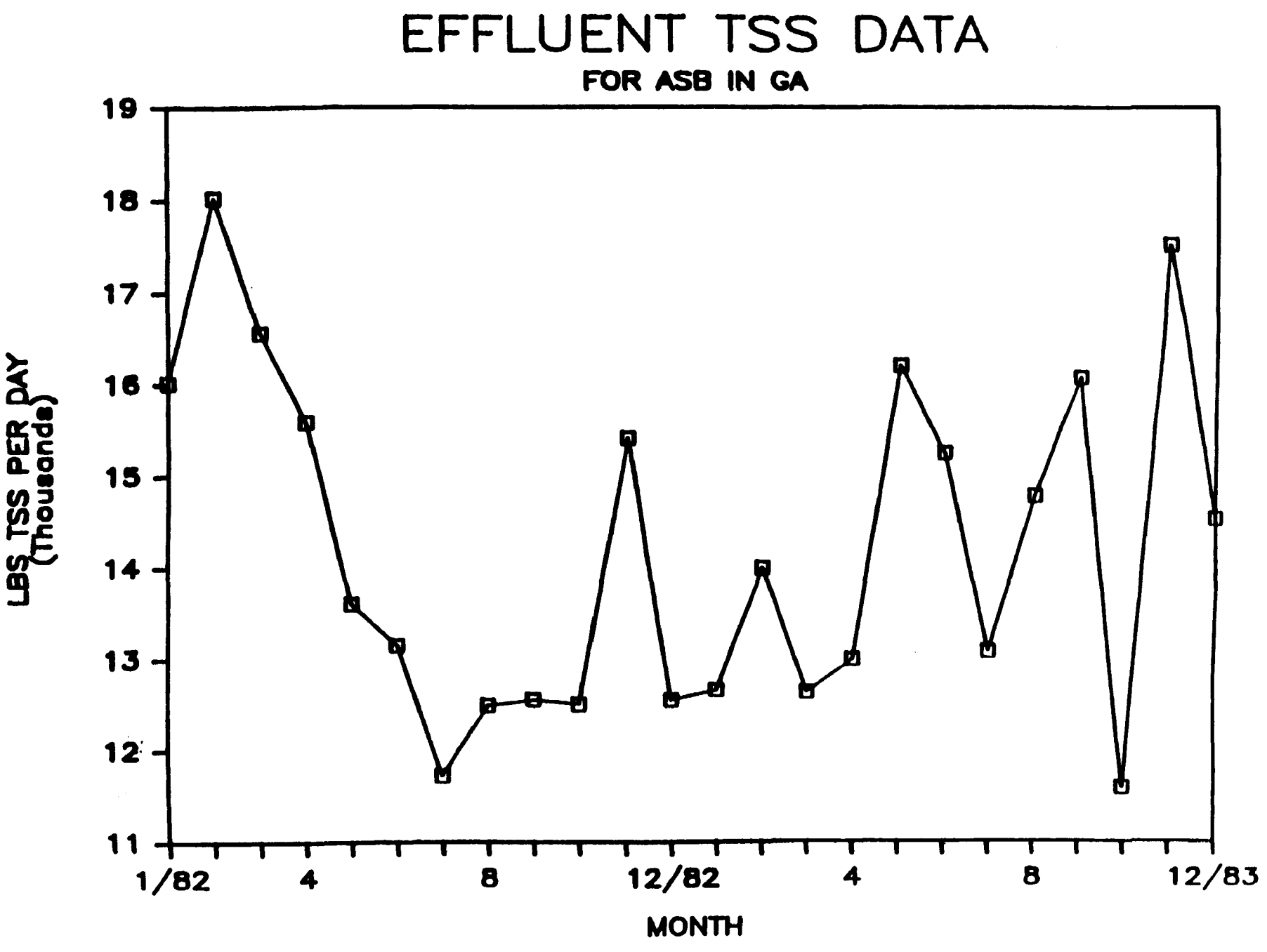

EFFLUENT TSS DATA
FOR ASB IN GA
LBS TSS PER DAY (Thousands)
19
18
17
16
15
14
13
12
11
1/82
4
8
12/82
4
8
12/83
MONTH

FIGURE 26

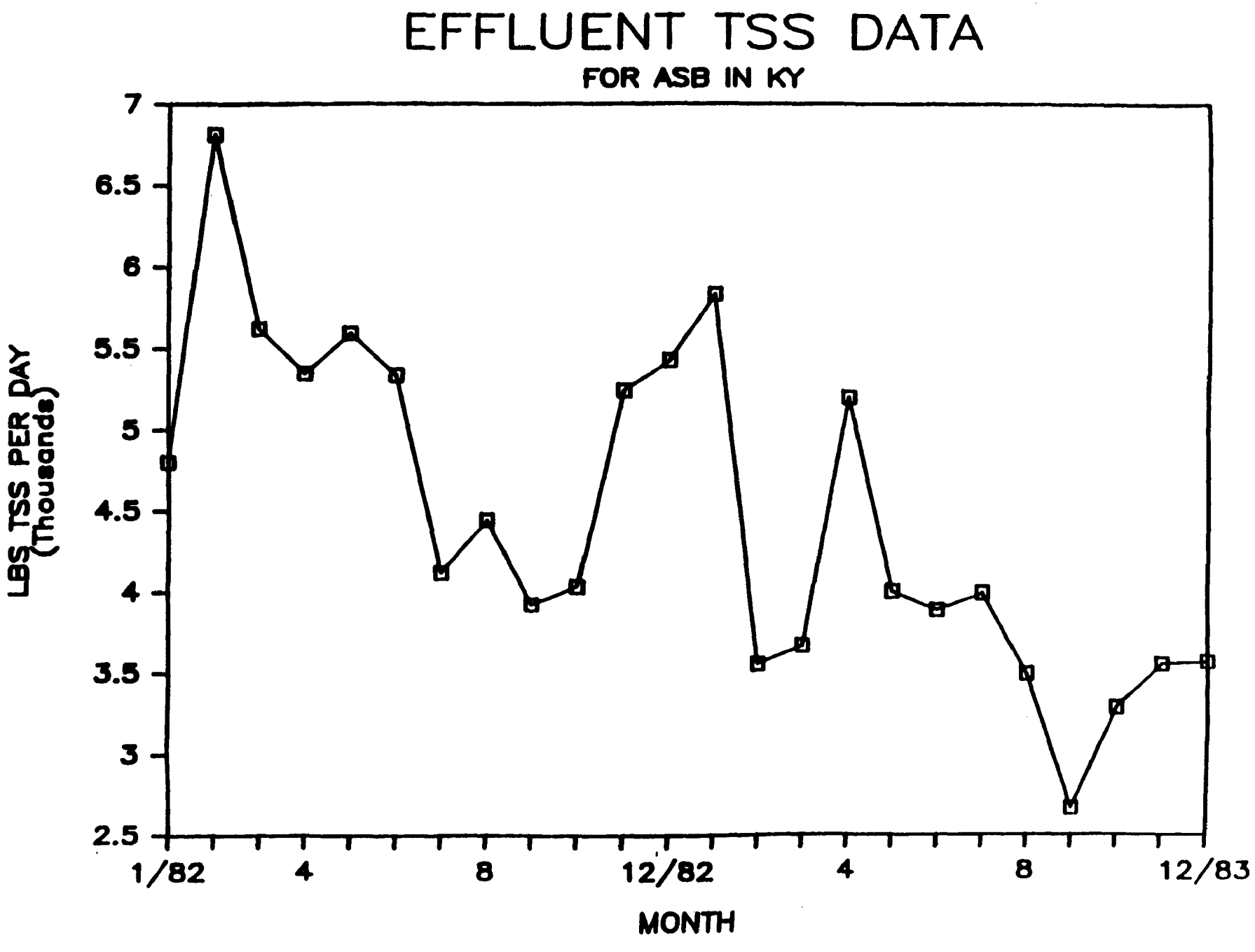

EFFLUENT TSS DATA
FOR ASB IN KY
LBS TSS PER DAY (Thousands)
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
1/82
4
8
12/82
4
8
12/83
MONTH

FIGURE 27

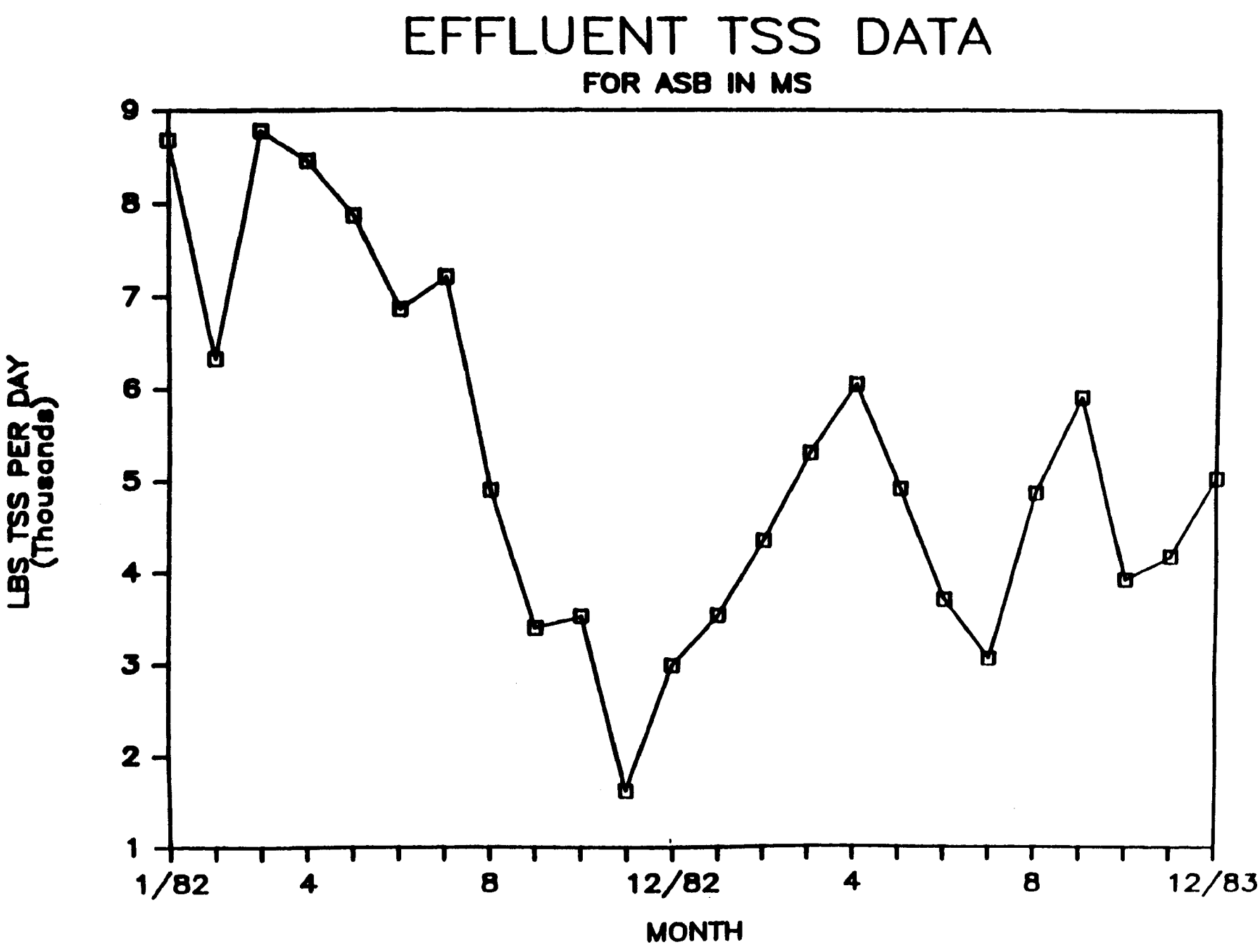

EFFLUENT TSS DATA
FOR ASB IN MS
LBS TSS PER DAY (Thousands)
9
8
7
6
5
4
3
2
1
1/82
4
8
12/82
4
8
12/83
MONTH

FIGURE 28

EFFLUENT TSS DATA

FOR ASB IN NC

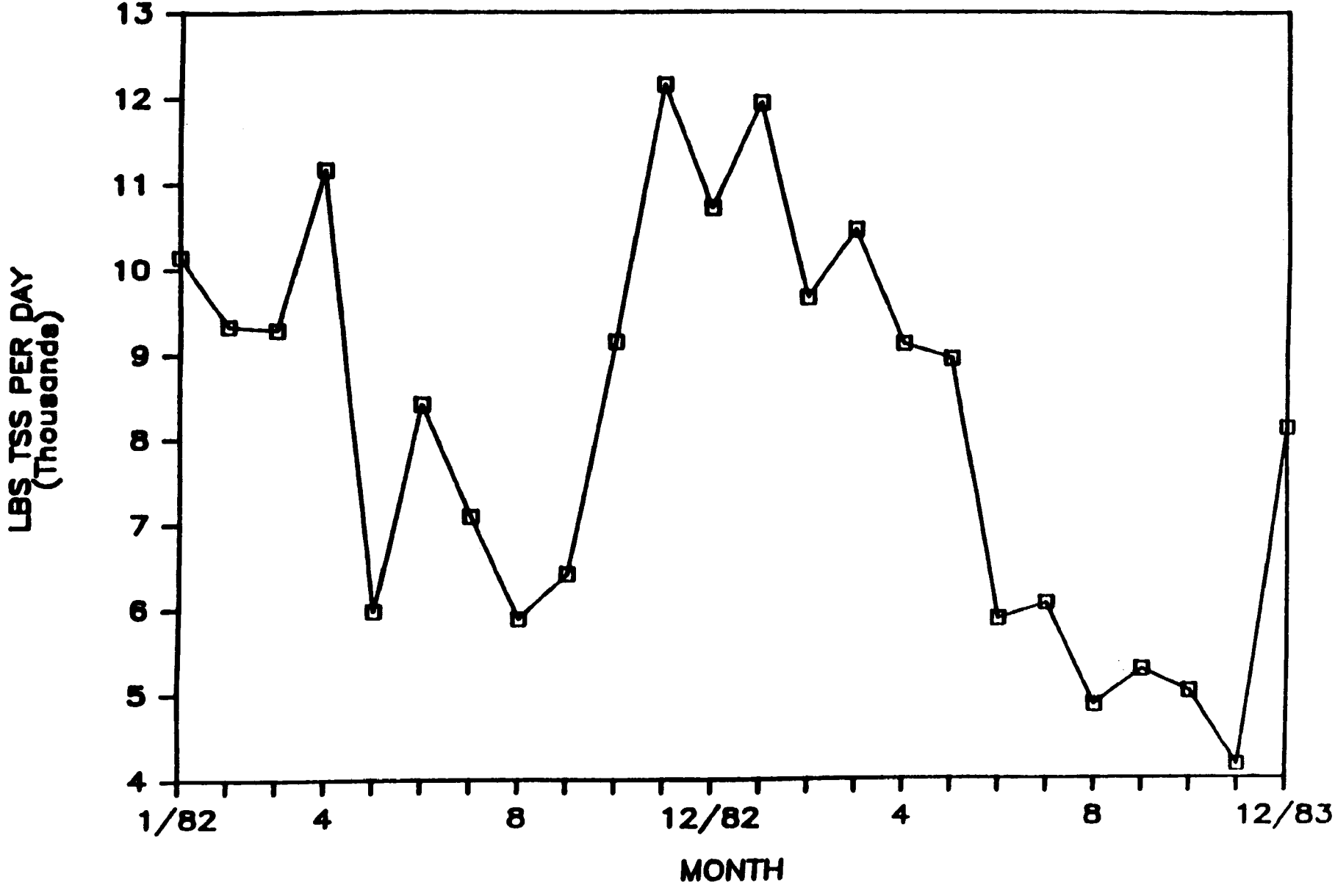


FIGURE 29

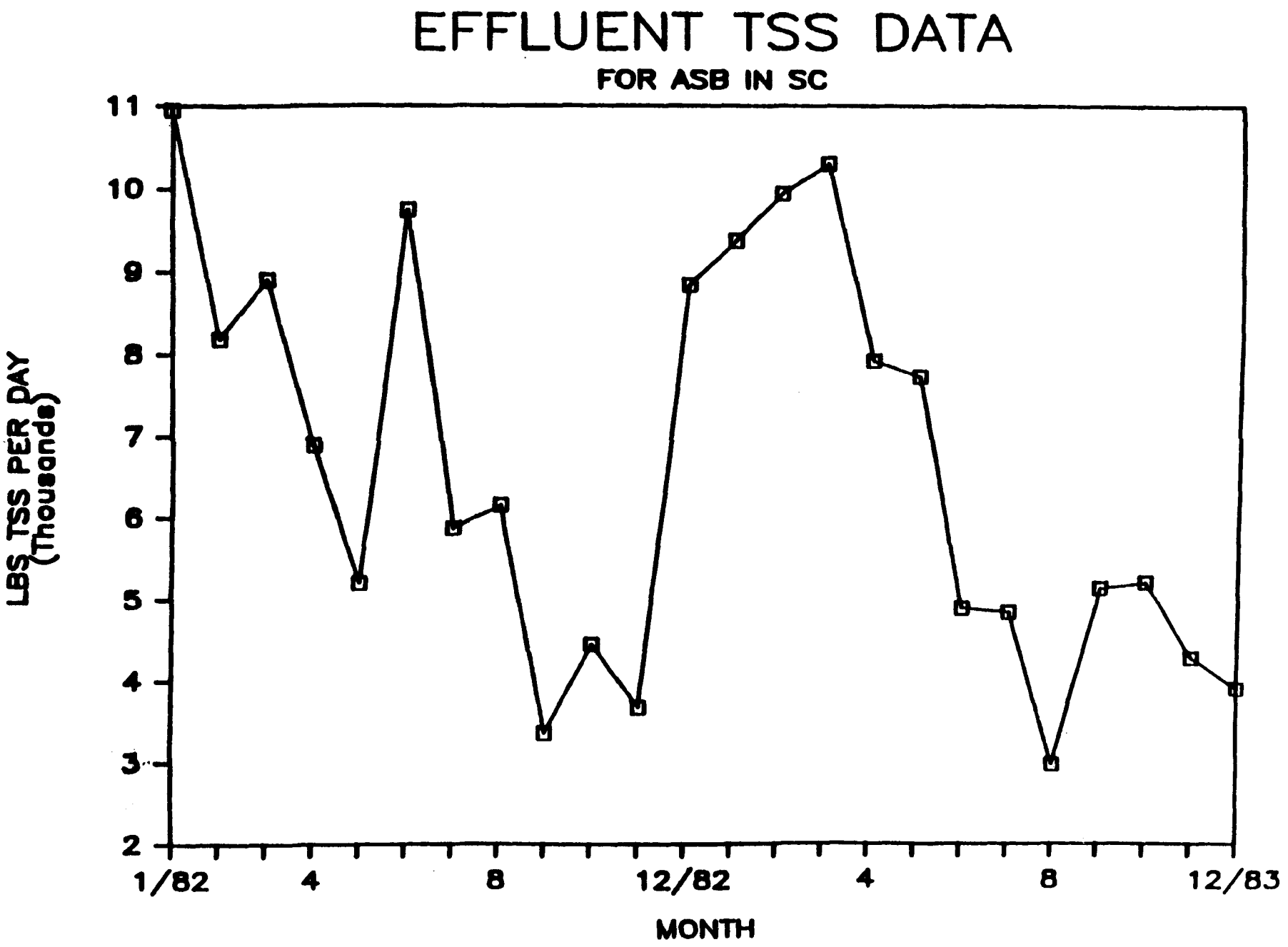
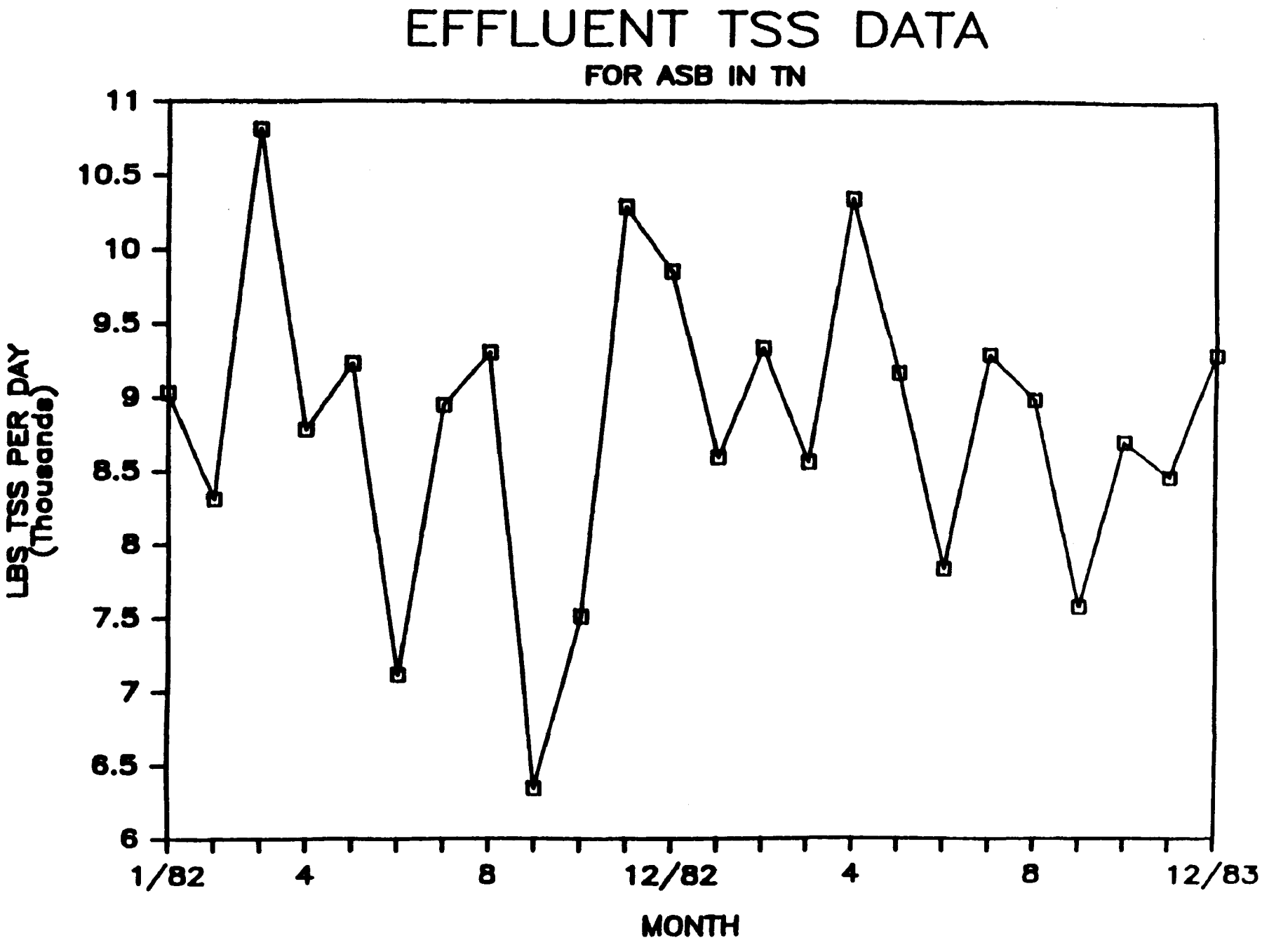

EFFLUENT TSS DATA
FOR ASB IN SC
LBS TSS PER DAY (Thousands)
11
10
9
8
7
6
5
4
3
2
1/82
4
8
12/82
4
8
12/83
MONTH

FIGURE 30


EFFLUENT TSS DATA
FOR ASB IN TN
LBS TSS PER DAY (Thousands)
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
1/82
4
8
12/82
4
8
12/83
MONTH

C. Compliance Rates for Pulp and Paper Facilities

A discussion of compliance rates can take many forms. Three methods are used for the purposes of this report: any permit violation, a significant violation, and a violation of a Best Practicable Control Technology Currently Available (BPT) limit.

The NPDES permit stipulates the "self monitoring" requirements that are the responsibility of the discharger. Typically, this portion of the permit lists each regulated constituent, gives a minimum or maximum level for the constituent, and describes an applicable monitoring and reporting frequency. Any violation of a permit limit, monitoring frequency, or reporting frequency is a permit violation and makes the facility owner and/or operator liable for civil fines up to $10,000 per day or criminal fines up to $25,000 per day. Therefore, individual violations are viewed as important.

Significant violations of the permit are used in the NPDES program to provide consistent information on the compliance status of permitted facilities and to evaluate changes in compliance status. A facility with significant violations is defined as being in "significant noncompliance" (SNC) if it meets the criteria of the definition listed in Appendix D. The definition of SNC is used as part of the administrative procedure for screening NPDES self-monitoring data and reporting instances of noncompliance which are of major concern to a regulatory agency.

It is important to note that any violation of an NPDES permit is a violation of the Clean Water Act (CWA) for which the permittee is strictly liable. The designation of a significant violation indicates that a violation is of sufficient magnitude and/or duration to be considered among the regulatory agency's priorities for regulatory review and response. An agency's decision as to what enforcement action, if any, should be taken in such cases is based on an analysis of all of the facts and relevant legal provisions involved in any particular case.

Finally, a discussion of compliance with BPT limits is important because all facilities are required by statute to meet BPT guideline requirements. Permit values are calculated from plant production levels with the use of nationally promulgated effluent guidelines. This study will compare actual mill performance with performance required by BPT guidelines.

1. Industry Performance Compared with Permit Limits

This section discusses compliance in terms of strictly meeting absolute permit limits. Discharge Monitoring Report (DMR) data for all 56 mills were analyzed to determine the number of mills with permit violations and the frequency of violations. Table 14 summarizes all instances of permit violations for the pulp and paper industry in Region IV. Listed in this Table are the permit limits in effect

TABLE 14

NPDES PERMIT COMPLIANCE FOR REGION IV PULP AND PAPER MILLS

MILL NAME	STATE	NPDES PERMIT LIMITS MONTHLY AVG (LBS/DAY) BOD	TSS	STUDY PERIOD : 1/82 - 12/82 NO. OF MONTHS DATA	NO. OF TIMES MONTHLY AVG. PERMIT LIMITS WERE EXCEEDED BOD	TSS	PERCENT OF TIME IN COMPLIANCE BOD	TSS	TOTAL	NPDES PERMIT COMPLIANCE
ALTON BOX BOARD	FL	5310	10631	21	0	0	100	100	100	IN-COMP
CONTAINER CORP	FL	11560	21250	22	0	1	100	95	98	NON-COMP
ITT	FL	31500	23000	24	2	1	92	96	94	NON-COMP
ST. REGIS PAPER(CHAMP INT'L)	FL	5100	13000	24	4	0	83	100	92	NON-COMP
BUCKEYE CELLULOSE CORP	FL	13200	25000	22	0	0	100	100	100	IN-COMP
OWENS ILL	FL	5156	10760	24	0	0	100	100	100	IN-COMP
KIMBERLY-CLARK	SC	3625	2900	24	0	0	100	100	100	IN-COMP
STONE CONTAINER	SC	11200	24000	23	0	0	100	100	100	IN-COMP
BOWATER CAROLINA	SC	20733	40529	23	0	0	100	100	100	IN-COMP
INTERNATIONAL PAPER	SC	19142 11565	31882	24	0	0	100	100	100	IN-COMP
WESTVACO CORP	SC	13014	27888	24	0	0	100	100	100	IN-COMP
SONOCO PRODUCTS	SC	2723	5102	24	1	0	96	100	98	NON-COMP
INTERNATIONAL PAPER VIC	MS	8422	18048	21	0	0	100	100	100	IN-COMP
ST. REGIS PAPER (GA-PACIFIC)	MS	9950 7280	22320	24	4	0	83	100	92	NON-COMP
INTERNATIONAL PAPER NAT	MS	27493	47395	24	1	0	96	100	98	NON-COMP
JACKSON CO PORT AUTH IP	MS	6600 4655	18000	24	1	0	96	100	98	NON-COMP
WEYERHAEUSER CO	MS	2130	3124	17	0	0	100	100	100	IN-COMP
BOWATER SOUTHERN PAPER	TN	25839	43510	24	0	0	100	100	100	IN-COMP
MEAD CORP	TN	4800 3500	13000	24	1	0	96	100	98	NON-COMP
INLAND CONTAINER	TN	4400	6600	24	11	16	54	33	44	NON-COMP
TENN RIVER PULP&PAPER	TN	8700	18500	24	0	0	100	100	100	IN-COMP
ALABAMA KRAFT,BA KRAFT	AL	6636 4200	13800	23	1	0	96	100	98	NON-COMP
CHAMPION PAPER	AL	12422	21576	24	2	2	92	92	92	NON-COMP
GOLD BOND BUILDING	AL	385	385	23	7	21	70	9	39	NON-COMP
GULF STATES PAPER	AL	11216 10216	19439 18439	24	1	0	96	100	98	NON-COMP
HAMMERMILL PAPER	AL	17710	36000	24	0	1	100	96	98	NON-COMP
KIMBERLY-CLARK	AL	71(mg/l)	125(mg/l)	23	2	1	91	96	93	NON-COMP
UNION CORP	AL	11771	21649	24	0	0	100	100	100	IN-COMP
ALABAMA RIVER PULP CO	AL	7800	15000	23	3	2	87	91	89	NON-COMP
ALLIED PAPER,S MILL	AL	7150	7108	24	0	1	100	96	98	NON-COMP
CONTAINER CORP	AL	6060 4850	11000	20	3	2	85	90	88	NON-COMP
DIXIE NORTHERN (JAMES RIVER)	AL	16000	11000	21	0	0	100	100	100	IN-COMP
MACMILLAN BLOEDEL	AL	8358	17112	23	0	0	100	100	100	IN-COMP
MEAD CORP	AL	8284 6784	10020 7020	24	0	0	100	100	100	IN-COMP

TABLE 14 (CONT'D)

NPDES PERMIT COMPLIANCE FOR REGION IV PULP AND PAPER MILLS

MILL NAME	STATE	NPDES PERMIT LIMITS MONTHLY AVG (LBS/DAY) BOD	TSS	NO. OF MONTHS DATA	NO. OF TIMES MONTHLY AVG. PERMIT LIMITS WERE EXCEEDED BOD	TSS	PERCENT OF TIME IN COMPLIANCE BOD	TSS	TOTAL	NPDES PERMIT COMPLIANCE
				STUDY PERIOD : 1/82 - 12/83						
MOBILE WATER SERVICE(INT'L P)	AL	14726	26909	24	4	0	83	100	92	NON-COMP
SCOTT PAPER, MOBILE MILL	AL	22177	38463	24	0	2	100	92	96	NON-COMP
STONE CONTAINER CORP	GA	6700	10700	22	4	2	82	91	86	NON-COMP
CONTINENTAL FOREST(FED. PAPER)	GA	27181	45982	24	0	0	100	100	100	IN-COMP
INTERSTATE PAPER CORP	GA	1100 800	2054	24	0	0	100	100	100	IN-COMP
SOUTHEAST PAPER MFG	GA	3000	3565	24	0	0	100	100	100	IN-COMP
UNION CAMP	GA	25000	40400	24	0	0	100	100	100	IN-COMP
BRUNSWICK PULP&PAPER	GA	19440 15500	39300	24	3	10	88	58	73	NON-COMP
GEORGIA KRAFT	GA	10528 5076	24624	24	0	0	100	100	100	IN-COMP
GILMAN PAPER	GA	12000	24000	24	1	0	96	100	98	NON-COMP
GREAT SOUTHERN PAPER	GA	19360	22700	24	0	0	100	100	100	IN-COMP
ITT RAYONIER	GA	30000 22300	42010	24	0	0	100	100	100	IN-COMP
WESTVACO FINE PAPERS	KY	8800	8000	21	0	0	100	100	100	IN-COMP
WILLAMETTE IND MED MILL	KY	4045 2545	3850	24	0	0	100	100	100	IN-COMP
WILLAMETTE IND W KRAFT	KY	10626 6601	13668 6452	24	6	4	75	83	79	NON-COMP
ALPHA CELLULOSE	NC	332	335	21	3	2	86	90	88	NON-COMP
FEDERAL PAPER BOARD	NC	5000	42700	24	24	0	0	100	50	NON-COMP
WEYERHAEUSER NB	NC	3500	8250	23	2	3	91	87	89	NON-COMP
WEYERHAEUSER FL	NC	2294	41139	24	1	0	96	100	98	NON-COMP
CHAMPION PAPERS	NC	8094	45445	24	1	0	96	100	98	NON-COMP
HOERNER WALDORF - CHAMP INT'L	NC	6720	14400	24	0	0	100	100	100	IN-COMP
OLIN CORP (ECUSTA CORP)	NC	6517 4587	13601 10963	24	0	0	100	100	100	IN-COMP
				TOTAL :	93	71				

TOTAL NO. OF MILLS : 56

TOTAL NO. OF MILLS IN-COMP : 27

TOTAL NO. OF MILLS IN NON-COMP : 29

at the time of the study and the number of monthly average BOD and TSS violations. Region IV mills have a total of 164 permit violations. There are slightly more BOD related violations (93) than TSS related violations (71). Of a total of 56 mills, 29 mills had exceeded their permit for at least one month during the 24 month study period. The compliance analysis of these 29 mills on a quarterly review basis are shown in Table 15. The Table lists the number and the percentage of mills with permit violation in any given fiscal year quarter. For this study, a mill is considered to be in noncompliance for the entire quarter if monthly permit limits are exceeded for any one month or more. The violation frequency ranges from a low of 5 mills in 3rd quarter FY'82 to a high of 16 mills in 2nd quarter FY'82. The average permit compliance rate for the eight quarterly periods was calculated to be 82% for the pulp and paper industry. This rate is derived by averaging the number of mills not meeting permit limits at a particular quarter to the total number of quarters studied. Data on permit compliance for Region IV states are shown in Figure 31. As indicated in this Figure, permit compliance rates were below the regional average for mills located in Alabama, North Carolina, and Tennessee.

The 29 mills with permit violations were further analyzed to determine the extent and causes of noncompliance. Figure 32 shows the number of monthly average BOD and TSS violations by each fiscal year quarter. For BOD, the highest quarter of exceedance occurred during the 2nd quarter (January to March) and the lowest occurred during the 4th quarter (July to September) of each year.

TABLE 15

NUMBER OF MILLS NOT IN PERMIT COMPLIANCE

STATE	NO. OF MILLS	2QFY82	3QFY82	4QFY82	1QFY83	2QFY83	3QFY83	4QFY83	1QFY84
ALABAMA	15	6	1	3	3	4	5	2	3
FLORIDA	6	2	0	0	0	1	1	0	2
GEORGIA	10	2	0	1	1	2	1	2	2
KENTUCKY	3	1	0	1	1	1	0	0	0
MISSISSIPPI	5	1	1	1	0	1	0	1	0
NORTH CAROLINA	7	2	2	1	4	2	2	2	2
SOUTH CAROLINA	6	0	0	0	0	1	0	0	0
TENNESSEE	4	2	1	0	1	1	1	1	1
TOTALS	56	16	5	7	10	13	10	8	10

PERCENTAGE OF MILLS IN PERMIT COMPLIANCE

STATE	NO. OF MILLS	2QFY82	3QFY82	4QFY82	1QFY83	2QFY83	3QFY83	4QFY83	1QFY84	OVERALL
ALABAMA	15	60%	93%	80%	80%	73%	67%	87%	80%	78%
FLORIDA	6	67%	100%	100%	100%	83%	83%	100%	67%	88%
GEORGIA	10	80%	100%	90%	90%	80%	90%	80%	80%	86%
KENTUCKY	3	67%	100%	67%	67%	67%	100%	100%	100%	83%
MISSISSIPPI	5	80%	80%	80%	100%	80%	100%	80%	100%	88%
NORTH CAROLINA	7	71%	71%	86%	43%	71%	71%	71%	71%	70%
SOUTH CAROLINA	6	100%	100%	100%	100%	83%	100%	100%	100%	98%
TENNESSEE	4	50%	75%	100%	75%	75%	75%	75%	75%	75%
TOTALS	56	71%	91%	88%	82%	77%	82%	86%	82%	82%

FIGURE 31

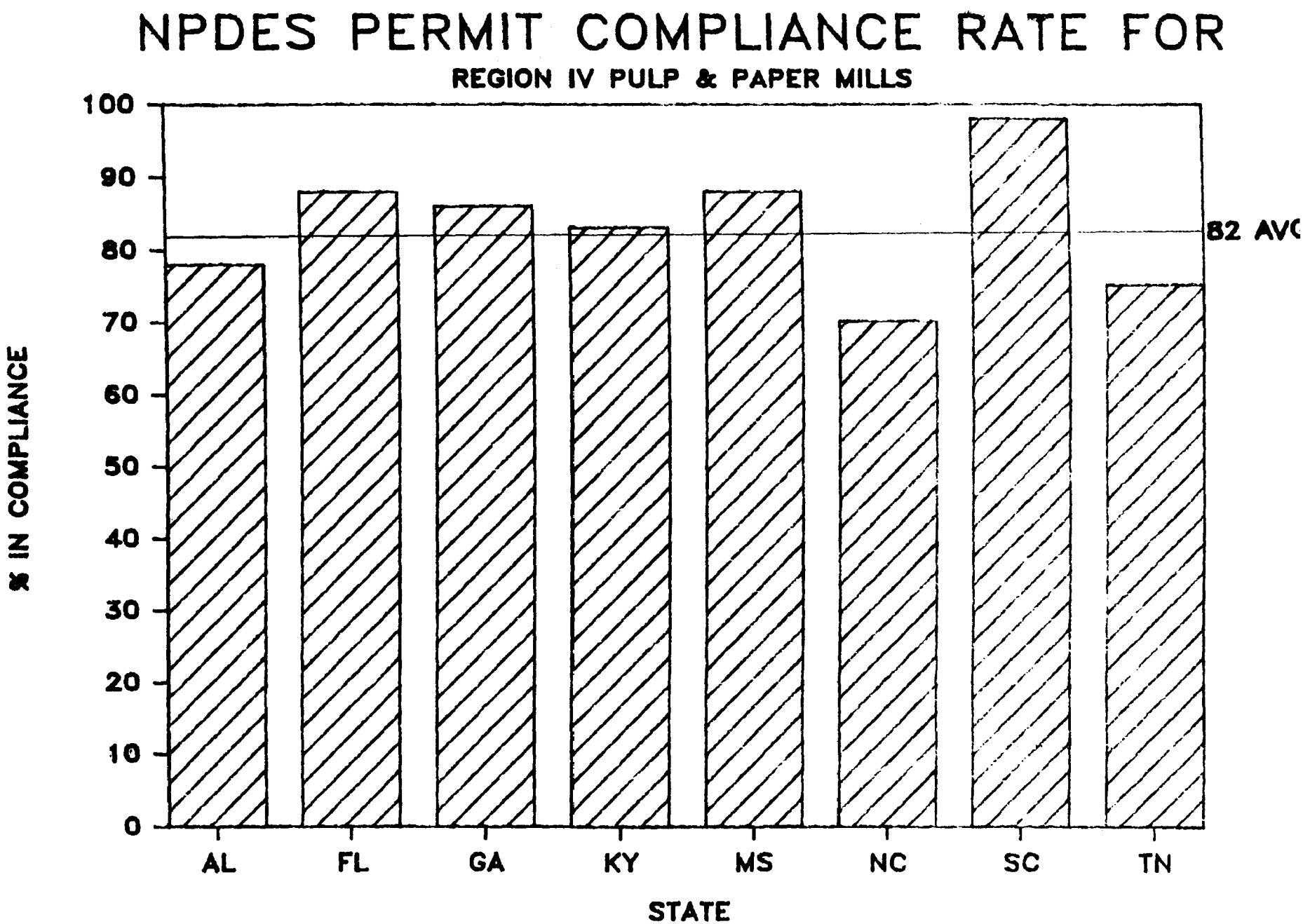
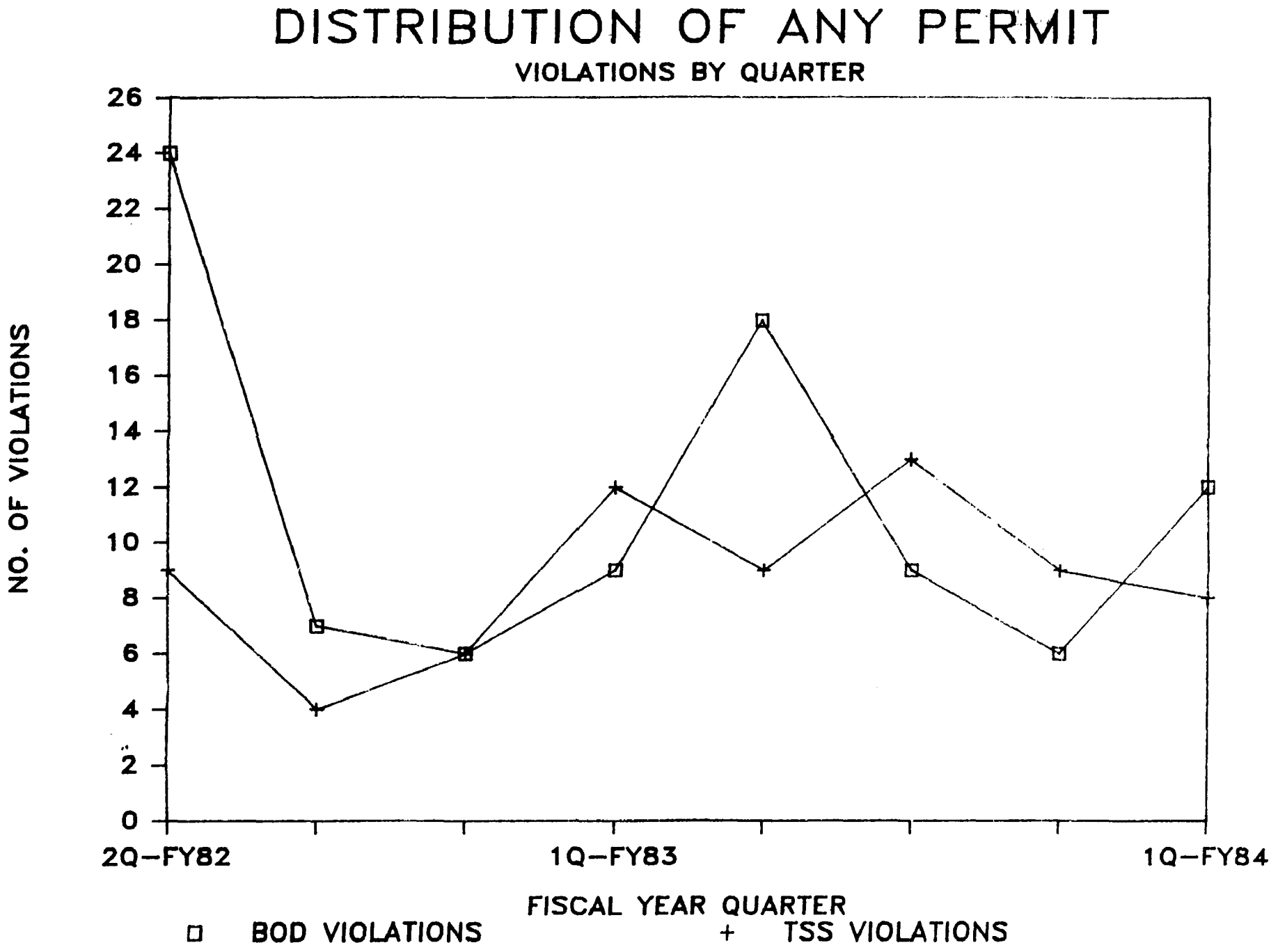

NPDES PERMIT COMPLIANCE RATE FOR
REGION IV PULP & PAPER MILLS
100
90
80
70
60
50
40
30
20
10
0
% IN COMPLIANCE
82 AVG
AL
FL
GA
KY
MS
NC
SC
TN
STATE

FIGURE 32


DISTRIBUTION OF ANY PERMIT
VIOLATIONS BY QUARTER
NO. OF VIOLATIONS
26
24
22
20
18
16
14
12
10
8
6
4
2
0
2Q-FY82
1Q-FY83
1Q-FY84
FISCAL YEAR QUARTER
BOD VIOLATIONS
TSS VIOLATIONS

They corresponded favorably with the results of the seasonal temperature impact discussed in Section IV(B). For TSS, the Figure failed to show any trend. The randomness of TSS violations over the study period indicated little dependence on the seasonal temperature variation.

The causes of noncompliance were found to vary considerably. For this study, EPA reviewed delegated state's files and identified all written notices of noncompliance for each mill. Each instance of noncompliance was grouped together in three general categories. Those that are treatment plant related, mill process related, or unknown.

The three categories are then divided into the following subcategories:

1. Treatment Plant Related:

   (a) Adverse weather (cold temperature, freezing conditions, heavy rainfall, and wind).

   (b) Treatment plant problems (malfunction of aerators, hydaulic or organic overloading, clarifier problems, pump failure, etc.).

   (c) Maintenance or upgrading of treatment plant (cleaning of ponds, replacing aerators, upgrading or repairing plant, etc.).

2. Mill Process Related:

   (a) High liquor losses or spills (high water loss, organic and chemical losses from bleach plant, evaporator problems, recovery boiler problems, overflow of process chemicals, leakage from storage tanks, etc.).

   (b) Production process or start-up problems (changing grade or final product, increased production, adding new process units, etc.).

3. Unknown:

   (a) No information in file.
   (b) Problems officially listed as unknown.

As Table 16 demonstrates, the most frequently known problems responsible for 18.3% of the monthly average BOD and TSS violations were associated with adverse weather or cold temperature. This was followed by treatment plant problems with 9%, production process or startup problems with 8%, high liquor losses or spills with 6.7%, maintenance or upgrading of plant with 5.5%, and power failures with 2.5%. The breakdown between the three general categories are 32.8% for the treatment plant related, 17.2% for the mill process related and 50% for the unknown category. Because only 50% of the permit violations are known and/or properly documented, a greater emphasis is needed by the mills to document the cause and effect relationship in treatment plant operations. Of those not known or documented in the files, 70% occurred at four facilities experiencing extended violations.

In conclusion, the treatment system performance of Region IV mills based on meeting absolute permits limit needs to improve. Reasons for permit violations are both treatment plant related (32.8%) and mill process related (17.2%). It appears that a combination of improved treatment and internal modification will be required to consistently meet permit guideline requirements. At present, little attention is paid by the States and EPA to the enforcement of permit violations until the violations become significant (i.e., covered under the definition of significant noncompliance). The effect of this policy on the construction and operation of

TABLE 16

MAJOR CAUSES OF MONTHLY BOD AND TSS VIOLATIONS FOR REGION IV PULP & PAPER MILLS

STATE	TOTAL NO. OF MILLS	MILLS WITH NPDES PERMIT VIOLATIONS	MILL NAME	TOTAL NO. OF BOD & TSS VIOLATIONS	TREATMENT PLANT RELATED: ADVERSE WEATHER OR COLD TEMP.	TREATMENT PLANT RELATED: TREATMENT PLANT PROBLEMS	TREATMENT PLANT RELATED: MAINTENANCE OR UPGRADING OF PLANT	MILL PROCESS RELATED: HIGH LIQUOR LOSSES OR SPILLS	MILL PROCESS RELATED: PRODUCTION PROCESS OR STARTUP PROBLEMS	MILL PROCESS RELATED: POWER FAILURE	NOT DOCUMENTED OR CAUSES UNKNOWN
FL	6	3	CONTAINER CORP	1		1					
			ITT	3				1	1	1	
			ST. REGIS PAPER (CHAMP. INT'L)	4	3			1			
SC	6	1	SONOCO PRODUCTS	1							1
MS	5	3	ST. REGIS PAPER (GA.-PACIFIC)	4	2	2					
			INTERNATIONAL PAPER MAT	1				1			
			JACKSON CO PORT AUTH (INT'L P.)	1				1			
TN	4	2	MEAD CORP	1	1						
			INLAND CONTAINER	27	11	6	4	1			5
AL	15	11	ALABAMA KRAFT, GA KRAFT	1				1			
			CHAMPION PAPER	4			4				
			GOLD BOND BUILDING	28					8		20
			GULF STATES PAPER	1				1			
			HAMMERMILL PAPER	1							1
			KIMBERLY-CLARK	3	2	1					
			ALABAMA RIVER PULP CO	5				1	2	2	
			ALLIED PAPER, S MILL	1	1						
			CONTAINER CORP	5	4						1
			MOBILE WATER SERVICE, IP	4	1			1	1		1
			SCOTT PAPER, MOBILE MILL	2	1						1
GA	10	3	STONE CONTAINER CORP	6		1		1			4
			BRUNSWICK PULP & PAPER	13	2	3	1		1		6
			GILMAN PAPER	1							1
KY	3	1	WILLAMETTE IND W KRAFT	10	3						7
NC	7	5	ALAMA CELLULOSE	5		1					4
			FEDERAL PAPER BOARD	24	1			1			22
			WEYERHAEUSER NB	5	1						4
			WEYERHAEUSER FL	1							1
			CHAMPION PAPERS	1						1	
TOTAL	56	29 (52 %)	TOTAL	164	33 (20.1 %)	15 (9 %)	9 (5.5 %)	11 (6.7 %)	13 (8 %)	4 (2.5 %)	79 (48.1 %)

waste treatment facilities is to use as a compliance base 140% of permit limits for BOD and TSS as opposed to the permit limits themselves. EPA should ensure that States address all permit violations in keeping with their Enforcement Management System.

2. Industry Performance Compared with Definition of Significant Noncompliance

The definition of significant noncompliance (SNC) plays an important role in the regulatory agencies' enforcement evaluation procedure. It is used as a screening tool to identify all instances of noncompliance that are of major concern to enforcement officials. It is also used for all reporting of noncompliance in the NPDES program to EPA, the public, and Congress. EPA defines SNC as violations that exceed the Technical Review Criteria (TRC) over a review period of 3 to 6 months. For BOD and TSS, the TRC is 40% over the permit limit. Facilities that have discharges over the TRC range would be considered in SNC. In some cases, a facility will constantly violate the monthly permit limit but not exceed the TRC. These chronic violations would be considered SNC if monthly permit limits were exceeded by 4 months in 6 months.

Based on these criteria, the study revealed that 6 of 29 mills that exceeded their permit limits were considered to be in SNC. Table 17 presents the mills that met EPA's definition of SNC. The Table lists the permit limits, the total number of permit violations, the number of times permit violations were significant, and the quarters the mills were in SNC. Mills that meet EPA's definition of SNC are noted as being in non-compliance with the definition for this analysis. No mills were in significant noncompliance

TABLE 17

COMPLIANCE STATUS OF REGION IV PULP AND PAPER MILLS USING EPA'S DEFINITION OF SIGNIFICANT NONCOMPLIANCE (SNC)

MILL NAME	STATE	NPDES PERMIT LIMITS MONTHLY AVG (LBS/DAY) BOD	TSS	STUDY PERIOD: 2nd QUARTER FISCAL YEAR 82 TO 1st QUARTER FISCAL YEAR 84 (1/82 - 12/83) NO. OF MONTHS DATA	TOTAL NUMBER OF MONTHLY AVERAGE PERMIT VIOLATIONS BOD	TSS	NO. OF TIMES PERMIT VIOLATIONS WERE IN SNC BOD	TSS	NO. OF QUARTERS IN SNC	QUARTERS IN SNC	NO. OF CONSECUTIVE QUARTERS IN SNC	MEET EPA'S DEFINITION OF SNC	COMPLIANCE STATUS	
ALTON BOX BOARD	FL	5310	10631	21	0	0	0	0	0		0	NO	IN-COMP	
CONTAINER CORP	FL	11560	21250	22	0	1	0	0	0		0	NO	IN-COMP	
ITT	FL	31500	23000	24	2	1	0	0	0		0	NO	IN-COMP	
ST. REGIS PAPER(CHAMP INT'L)	FL	5100	13000	24	4	0	0	0	0		0	NO	IN-COMP	
BUCKEYE CELLULOSE CORP	FL	13200	25000	22	0	0	0	0	0		0	NO	IN-COMP	
OWENS ILL	FL	5156	10760	24	0	0	0	0	0		0	NO	IN-COMP	
												FL TOTAL:	6	IN-COMP: 6 NON-COMP: 0
KIMBERLY-CLARK	SC	3623	2900	24	0	0	0	0	0		0	NO	IN-COMP	
STONE CONTAINER	SC	11200	24000	23	0	0	0	0	0		0	NO	IN-COMP	
BOWATER CAROLINA	SC	20733	40529	23	0	0	0	0	0		0	NO	IN-COMP	
INTERNATIONAL PAPER	SC	19142 11565	31882	24	0	0	0	0	0		0	NO	IN-COMP	
WESTVACO CORP	SC	13014	27888	24	0	0	0	0	0		0	NO	IN-COMP	
SONOCO PRODUCTS	SC	2723	5102	24	1	0	0	0	0		0	NO	IN-COMP	
												SC TOTAL:	6	IN-COMP: 6 NON-COMP: 0
INTERNATIONAL PAPER VIC	MS	8422	18048	21	0	0	0	0	0		0	NO	IN-COMP	
ST. REGIS PAPER (GA-PACIFIC)	MS	9950 7280	22320	24	4	0	1	0	0		0	NO	IN-COMP	
INTERNATIONAL PAPER NAT	MS	27493	47395	24	1	0	0	0	0		0	NO	IN-COMP	
JACKSON CO PORT AUTH IP	MS	6600 4635	18000	24	1	0	0	0	0		0	NO	IN-COMP	
MEYERHAEUSER CO	MS	2130	3124	17	0	0	0	0	0		0	NO	IN-COMP	
												MS TOTAL:	5	IN-COMP: 5 NON-COMP: 0
BOWATER SOUTHERN PAPER	TN	25839	43510	24	0	0	0	0	0		0	NO	IN-COMP	
MEAD CORP	TN	4800 3500	13000	24	1	0	0	0	0		0	NO	IN-COMP	
INLAND CONTAINER	TN	4400	6600	24	11	16	2	14	6	3QFY82 & 1QFY83-1QFY84	5	YES	NON-COMP	
TENN RIVER PULP&PAPER	TN	8700	18500	24	0	0	0	0	0		0	NO	IN-COMP	
												TN TOTAL:	4	IN-COMP: 3 NON-COMP: 1
ALABAMA KRAFT,BA KRAFT	AL	6636 4200	13800	23	1	0	0	0	0		0	NO	IN-COMP	
CHAMPION PAPER	AL	12422	21576	24	2	2	2	1	1	3QFY83	0	YES	NON-COMP	
GOLD BOND BUILDING	AL	585	585	23	7	21	4	16	8	2QFY82 - 1QFY84	8	YES	NON-COMP	
GULF STATES PAPER	AL	11216 10216	19439 18439	24	1	0	0	0	0		0	NO	IN-COMP	
HAMMERMILL PAPER	AL	17710	35080	24	0	1	0	0	0		0	NO	IN-COMP	
KIMBERLY-CLARK	AL	71(mg/l)	125(mg/l)	23	2	1	0	0	0		0	NO	IN-COMP	
UNION CAMP	AL	11771	21649	24	0	0	0	0	0		0	NO	IN-COMP	
ALABAMA RIVER PULP CO	AL	7200	15000	23	3	2	1	0	0		0	NO	IN COMP	
ALLIED PAPER,S MILL	AL	7150	7108	24	0	1	0	0	0		0	NO	IN COMP	
CONTAINER CORP	AL	6060 4850	11000	20	3	2	1	0	0		0	NO	IN COMP	
DIXIE NORTHERN (JAMES RIVER)	AL	16000	11000	21	0	0	0	0	0		0	NO	IN COMP	
MACMILLAN BLOEDEL	AL	8358	17112	23	0	0	0	0	0		0	NO	IN COMP	
MEAD CORP	AL	8284 6784	10020 7020	24	0	0	0	0	0		0	NO	IN COMP	

TABLE 17 (CONT'D)

TABLE 17 (CONT'D)

COMPLIANCE STATUS OF REGION IV PULP AND PAPER MILLS USING EPA'S DEFINITION OF SIGNIFICANT NONCOMPLIANCE (SNC)

MILL NAME	STATE	NPDES PERMIT LIMITS MONTHLY AVG (LBS/DAY) BOD	TSS	STUDY PERIOD: 2nd QUARTER FISCAL YEAR 82 TO 1st QUARTER FISCAL YEAR 84 (1/82 - 12/83) NO. OF MONTHS DATA	TOTAL NUMBER OF MONTHLY AVERAGE PERMIT VIOLATIONS BOD	TSS	NO. OF TIMES PERMIT VIOLATIONS WERE IN SNC BOD	TSS	NO. OF QUARTERS IN SNC	QUARTERS IN SNC	NO. OF CONSECUTIVE QUARTERS IN SNC	MEET EPA'S DEFINITION OF SNC	COMPLIANCE STATUS	
MOBILE WATER SERVICE(INT'L P)	AL	14726	26909	24	4	0	1	0	0		0	NO	IN-COMP	
SCOTT PAPER,MOBILE MILL	AL	22177	38463	24	0	2	0	0	0		0	NO	IN-COMP	
												AL TOTAL :	15	IN-COMP : 13
														NON-COMP : 2
STONE CONTAINER CORP	GA	6700	10700	22	4	2	1	0	0		0	NO	IN-COMP	
CONTINENTAL FOREST(FED. PAPER)	GA	27181	45982	24	0	0	0	0	0		0	NO	IN-COMP	
INTERSTATE PAPER CORP	GA	1100 800	2054	24	0	0	0	0	0		0	NO	IN-COMP	
SOUTHEAST PAPER MFG	GA	3000	3563	24	0	0	0	0	0		0	NO	IN-COMP	
UNION CORP	GA	25000	40400	24	0	0	0	0	0		0	NO	IN-COMP	
BRUNSWICK PULP&PAPER	GA	19440 15500	39300	24	3	10	1	2	3	2Q-3QFY83 & 1QFY84	2	YES	NON-COMP	
GEORGIA KRAFT	GA	10528 5076	24624	24	0	0	0	0	0		0	NO	IN-COMP	
GILMAN PAPER	GA	12000	24000	24	1	0	0	0	0		0	NO	IN-COMP	
GREAT SOUTHERN PAPER	GA	19360	22700	24	0	0	0	0	0		0	NO	IN-COMP	
ITT RAYONIER	GA	30000 22300	42010	24	0	0	0	0	0		0	NO	IN-COMP	
												GA TOTAL :	10	IN-COMP : 9
														NON-COMP : 1
WESTVACO FINE PAPERS	KY	8800	8000	21	0	0	0	0	0		0	NO	IN-COMP	
WILLAMETTE IND MED MILL	KY	4045 2545	3850	24	0	0	0	0	0		0	NO	IN-COMP	
WILLAMETTE IND W KRAFT	KY	10626 6601	13668 6452	24	6	4	1	1	1	2QFY83	0	YES	NON-COMP	
												KY TOTAL :	3	IN-COMP : 2
														NON-COMP : 1
ALPHA CELLULOSE	NC	332	355	21	3	2	0	0	0		0	NO	IN-COMP	
FEDERAL PAPER BOARD	NC	5000	42700	24	24	0	19	0	8	2QFY82 - 1QFY84	8	YES	NON-COMP	
MEYERHAEUSER MB	NC	3500	8250	23	2	3	1	0	0		0	NO	IN-COMP	
MEYERHAEUSER PL	NC	2294	41139	24	1	0	1	0	0		0	NO	IN-COMP	
CHAMPION PAPERS	NC	8094	45445	24	1	0	0	0	0		0	NO	IN-COMP	
HOERNER WALDORF - CHAMP INT'L	NC	6720	14400	24	0	0	0	0	0		0	NO	IN-COMP	
OLIN CORP (ECUSTA CORP)	NC	6517 4587	13601 10963	24	0	0	0	0	0		0	NO	IN-COMP	
												NC TOTAL :	7	IN-COMP : 6
														NON-COMP : 1

during the study period in Florida, Mississippi, and South Carolina. The 6 mills with instances of significant noncompliance during these 8 fiscal year quarters are as follows:

Champion Paper	Alabama
Gold Bond Building Products	Alabama
Brunswick Pulp & Paper	Georgia
Federal Paper Board	North Carolina
Inland Container	Tennessee
Willamette Ind. (W. Kraft)	Kentucky

Table 18 presents data on the percentage of pulp and paper mills not in significant noncompliance over a span of eight fiscal year quarters from 2nd quarter 1982 to 1st quarter 1984. Also, presented is similar data on all major industrial facilities in EPA Region IV. The quarterly significant noncompliance rate for this analysis is based on the number of mills not meeting EPA's definition of noncompliance divided by the total number of mills. By this measure, the pulp and paper industry has excellent SNC compliance rates. The overall compliance rate for this industry is 94% versus 91% for all major industries. Of the eight quarters studied, Figure 33 shows the pulp and paper industry met or exceeded overall EPA Region IV compliance rates in six quarters. Data on SNC compliance for each state are taken from Table 18 and are plotted on Figure 34 through Figure 41. These graphs compare the SNC compliance rate of the pulp and paper industry with the other major industries by each Region IV state. With the exception of North Carolina and Tennessee, most states have a higher SNC compliance for pulp and paper industry than the other major industries.

TABLE 18

QUARTERLY COMPLIANCE RATE OF THE PULP AND PAPER INDUSTRY WITH MAJOR INDUSTRIAL FACILITIES IN REGION IV

PULP AND PAPER INDUSTRY
% NOT IN SIGNIFICANT NONCOMPLIANCE

STATE	NO. OF MILLS	2QFY82	3QFY82	4QFY82	1QFY83	2QFY83	3QFY83	4QFY83	1QFY84	OVERALL
ALABAMA	15	93	93	93	93	93	87	93	93	92
FLORIDA	6	100	100	100	100	100	100	100	100	100
GEORGIA	10	100	100	100	100	90	90	100	90	96
KENTUCKY	3	100	100	100	67	100	100	100	100	96
MISSISSIPPI	5	100	100	100	100	100	100	100	100	100
NORTH CAROLINA	7	86	86	86	86	86	86	86	86	86
SOUTH CAROLINA	6	100	100	100	100	100	100	100	100	100
TENNESSEE	4	100	75	100	75	75	75	75	75	81
	56	96	95	96	93	93	91	95	93	94

MAJOR INDUSTRIAL FACILITIES
% NOT IN SIGNIFICANT NONCOMPLIANCE

STATE	NO. OF FACILITIES	2QFY82	3QFY82	4QFY82	1QFY83	2QFY83	3QFY83	4QFY83	1QFY84	OVERALL
ALABAMA	122	92	88	91	94	96	95	90	90	92
FLORIDA	115	87	90	97	97	96	98	94	98	95
GEORGIA	62	91	92	91	94	91	94	92	92	92
KENTUCKY	179	77	86	92	82	90	91	96	98	89
MISSISSIPPI	40	80	87	90	90	90	92	85	87	88
NORTH CAROLINA	127	95	94	97	97	96	96	92	94	95
SOUTH CAROLINA	110	94	91	93	92	92	92	96	97	93
TENNESSEE	75	65	91	92	93	85	85	87	85	85
	838	86	90	93	92	93	93	93	94	92

FIGURE 33

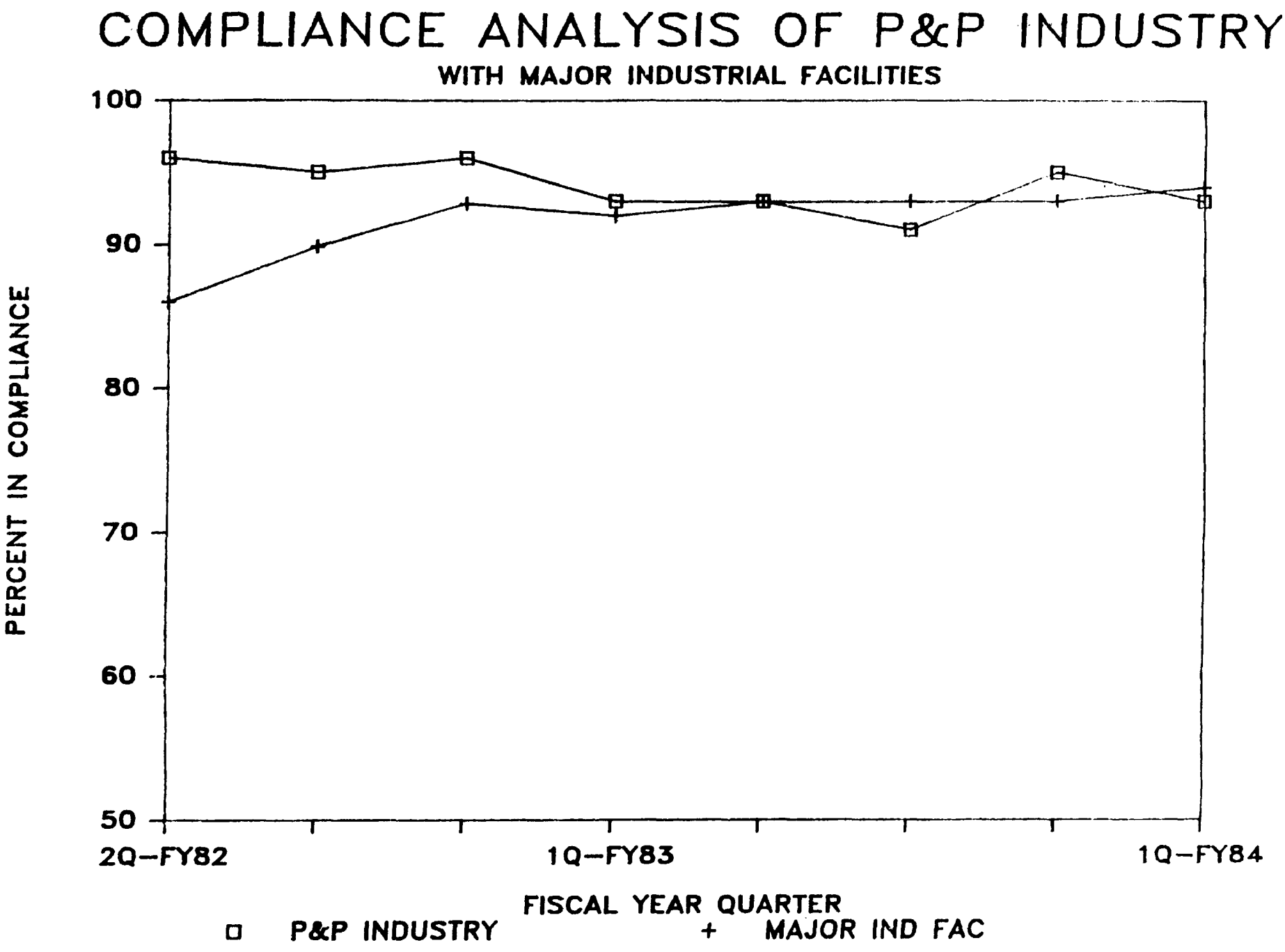

COMPLIANCE ANALYSIS OF P&P INDUSTRY
WITH MAJOR INDUSTRIAL FACILITIES
100
90
80
70
60
50
PERCENT IN COMPLIANCE
2Q-FY82
1Q-FY83
1Q-FY84
FISCAL YEAR QUARTER
P&P INDUSTRY
MAJOR IND FAC

FIGURE 34

COMPLIANCE ANALYSIS – ALABAMA

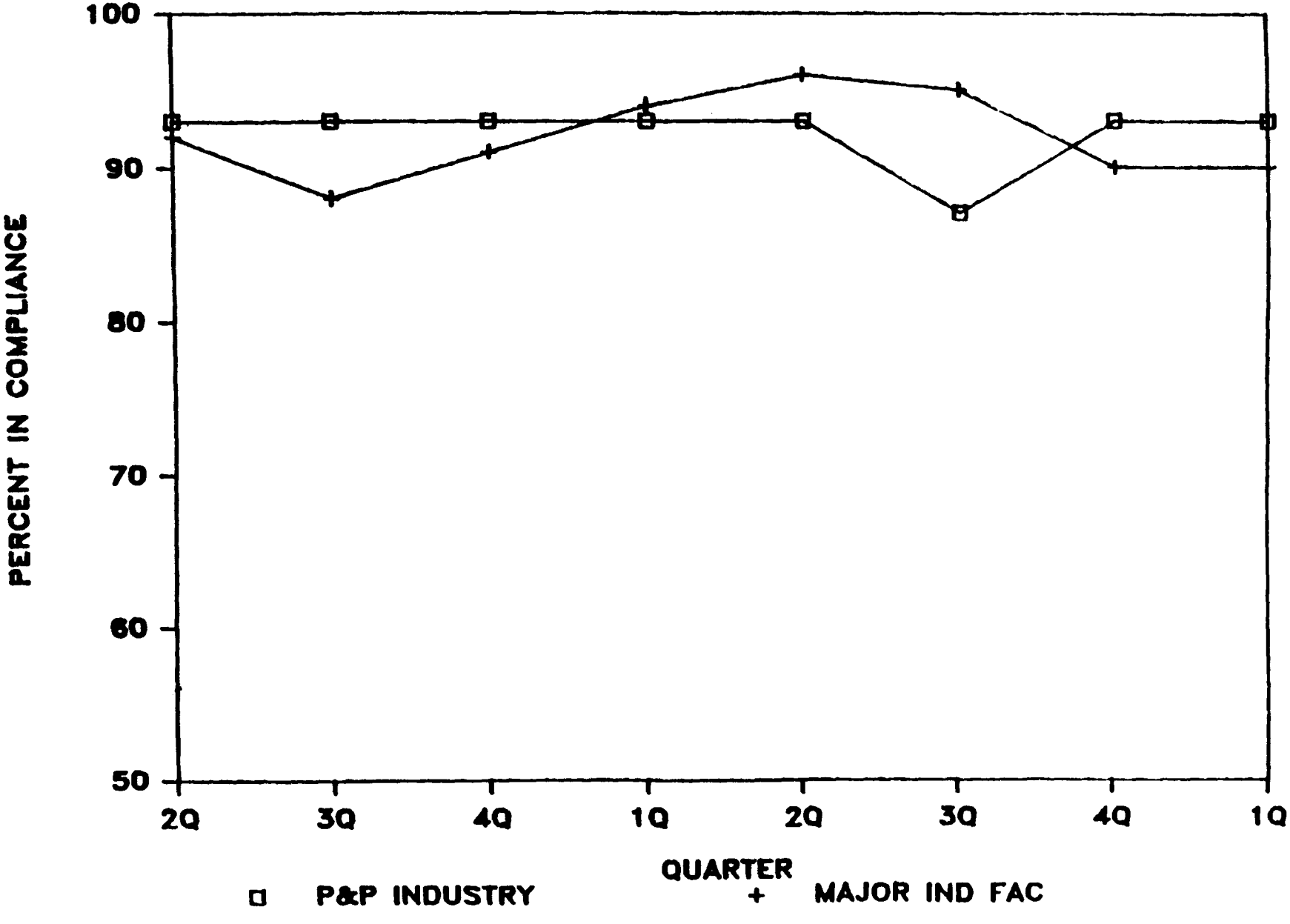


FIGURE 35

COMPLIANCE ANALYSIS – FLORIDA

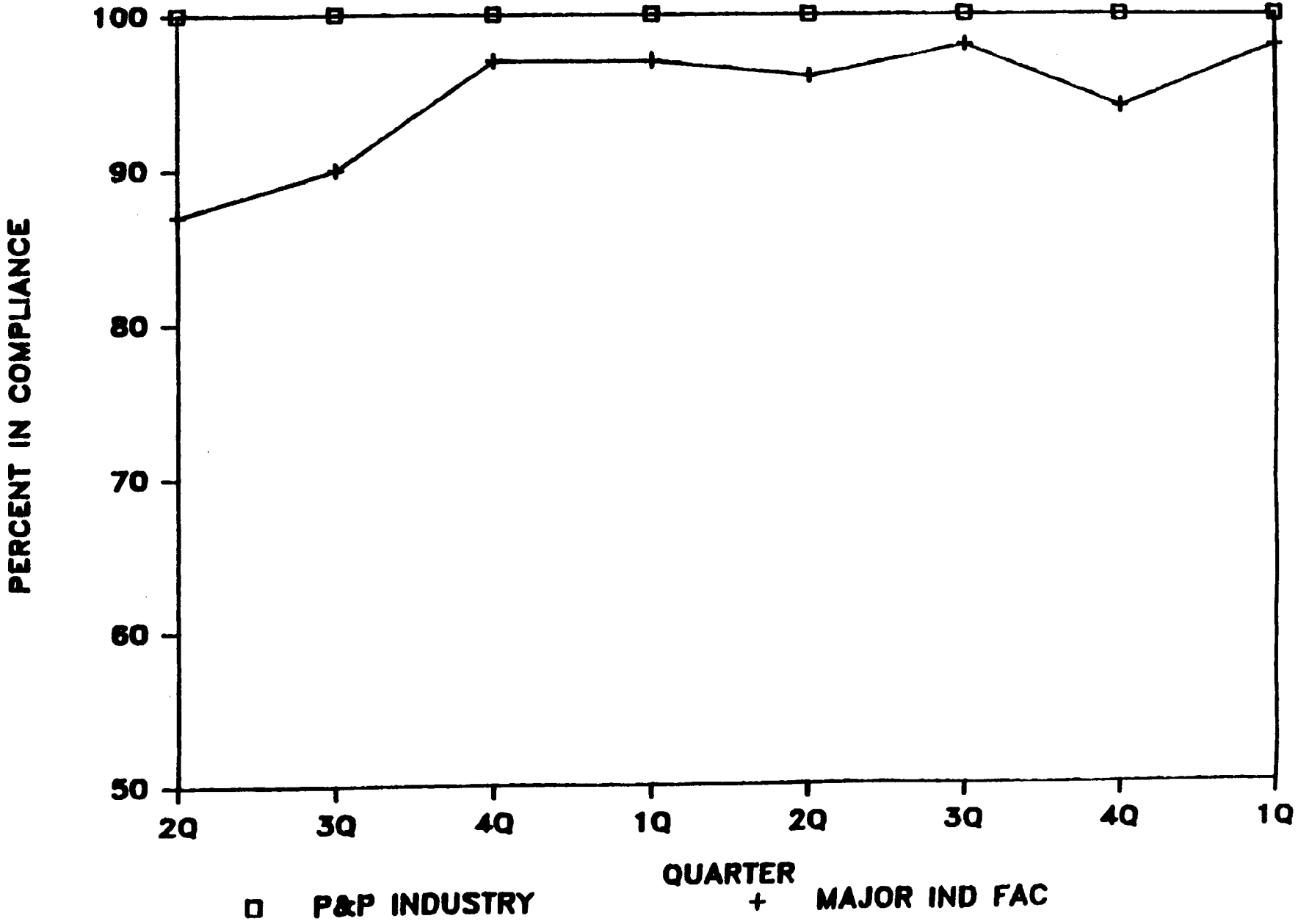


FIGURE 36

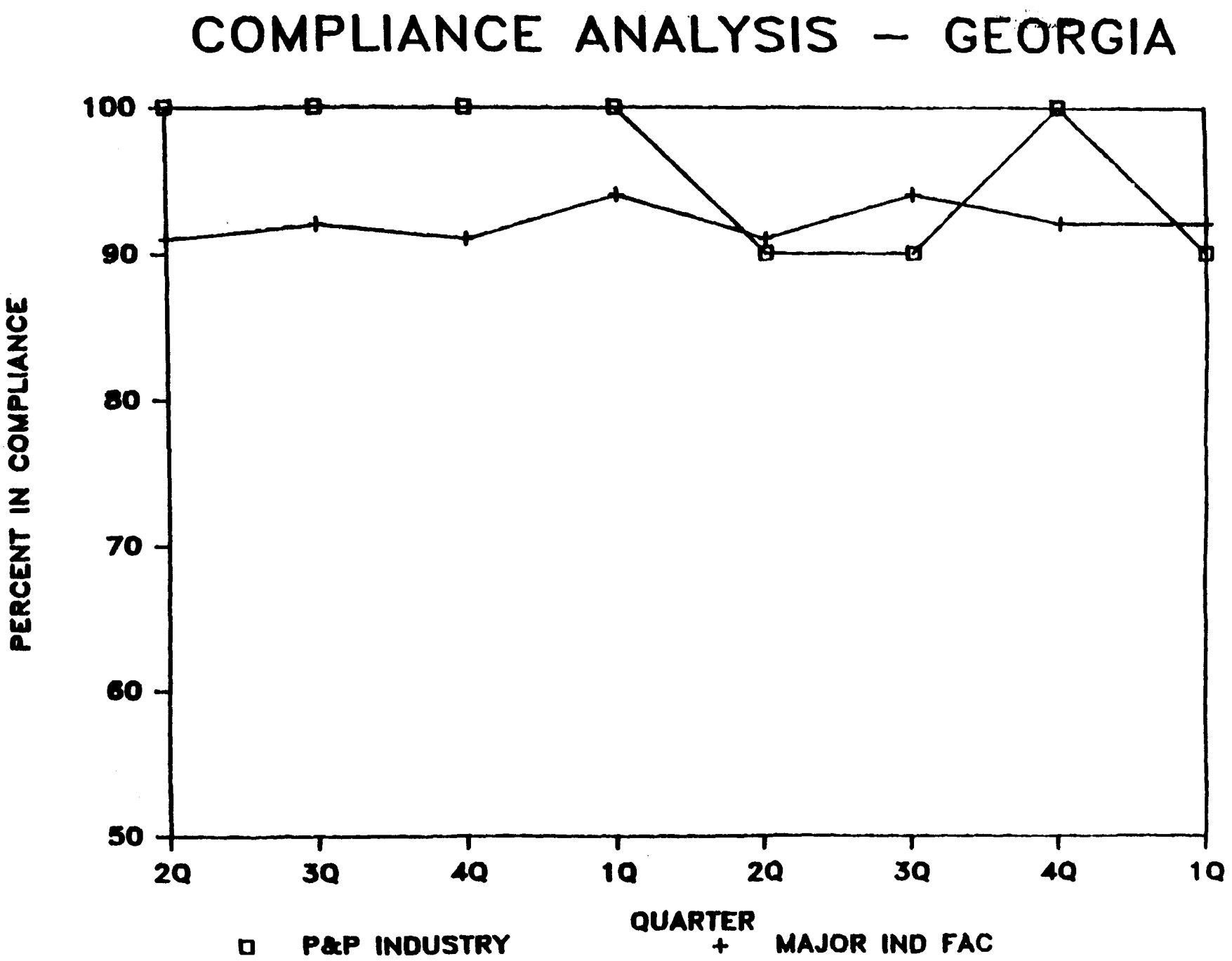

COMPLIANCE ANALYSIS – GEORGIA
100
90
80
70
60
50
PERCENT IN COMPLIANCE
2Q
3Q
4Q
1Q
2Q
3Q
4Q
1Q
QUARTER
P&P INDUSTRY
MAJOR IND FAC

FIGURE 37

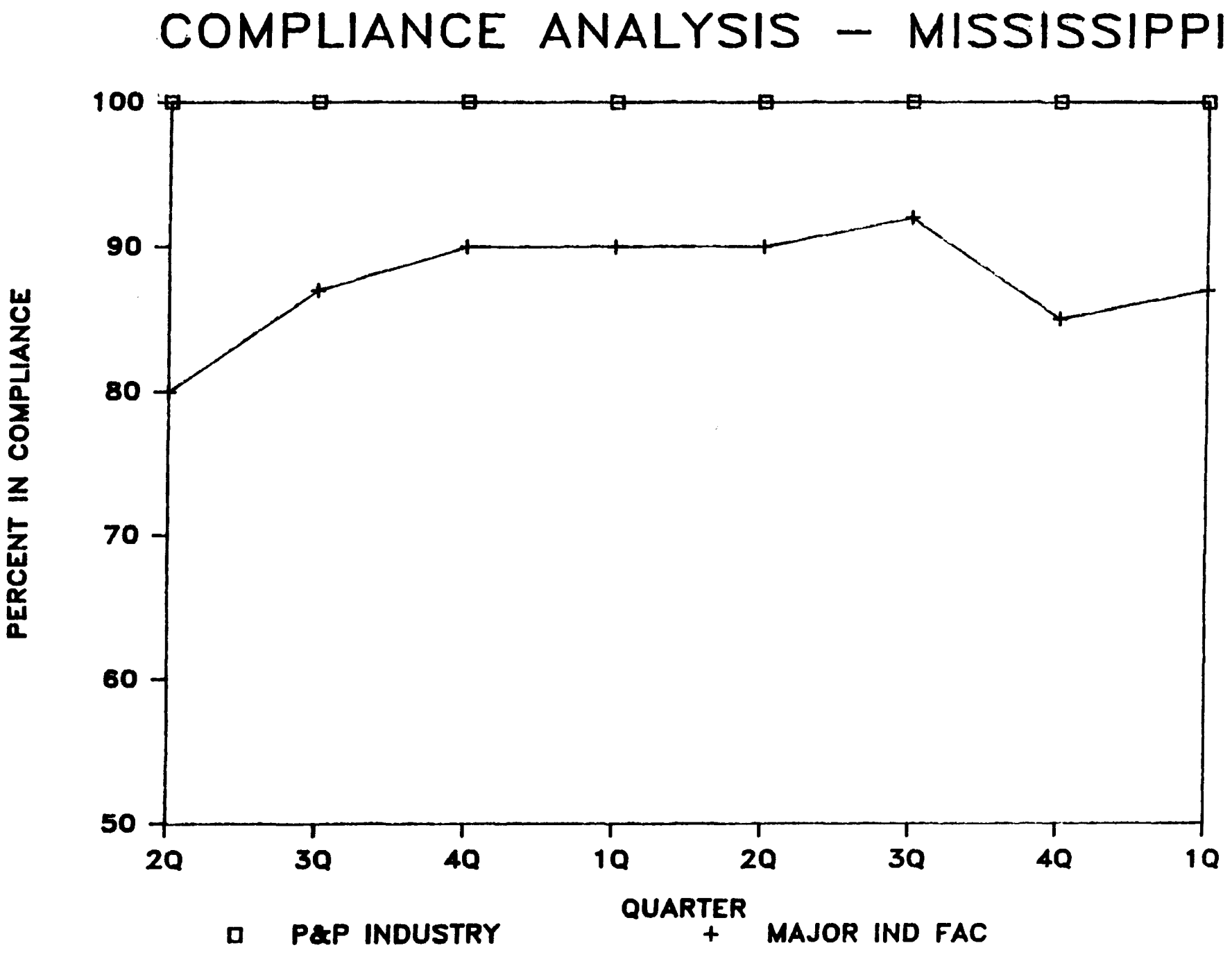

COMPLIANCE ANALYSIS – MISSISSIPPI
PERCENT IN COMPLIANCE
100
90
80
70
60
50
2Q
3Q
4Q
1Q
2Q
3Q
4Q
1Q
QUARTER
P&P INDUSTRY
MAJOR IND FAC

FIGURE 38

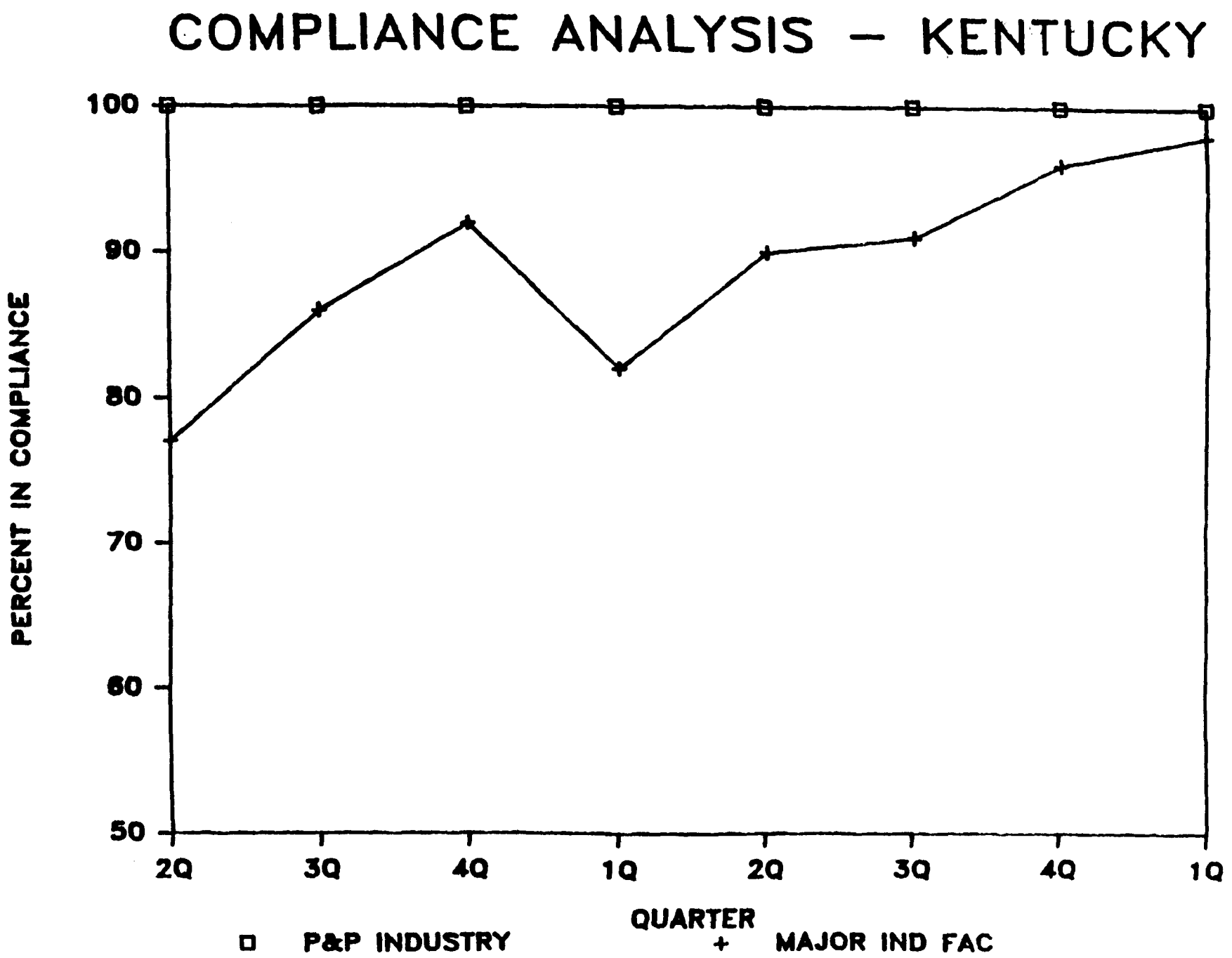

COMPLIANCE ANALYSIS – KENTUCKY
100
90
80
70
60
50
PERCENT IN COMPLIANCE
2Q
3Q
4Q
1Q
2Q
3Q
4Q
1Q
QUARTER
P&P INDUSTRY
MAJOR IND FAC

FIGURE 39

COMPLIANCE ANALYSIS – NORTH CAROLINA

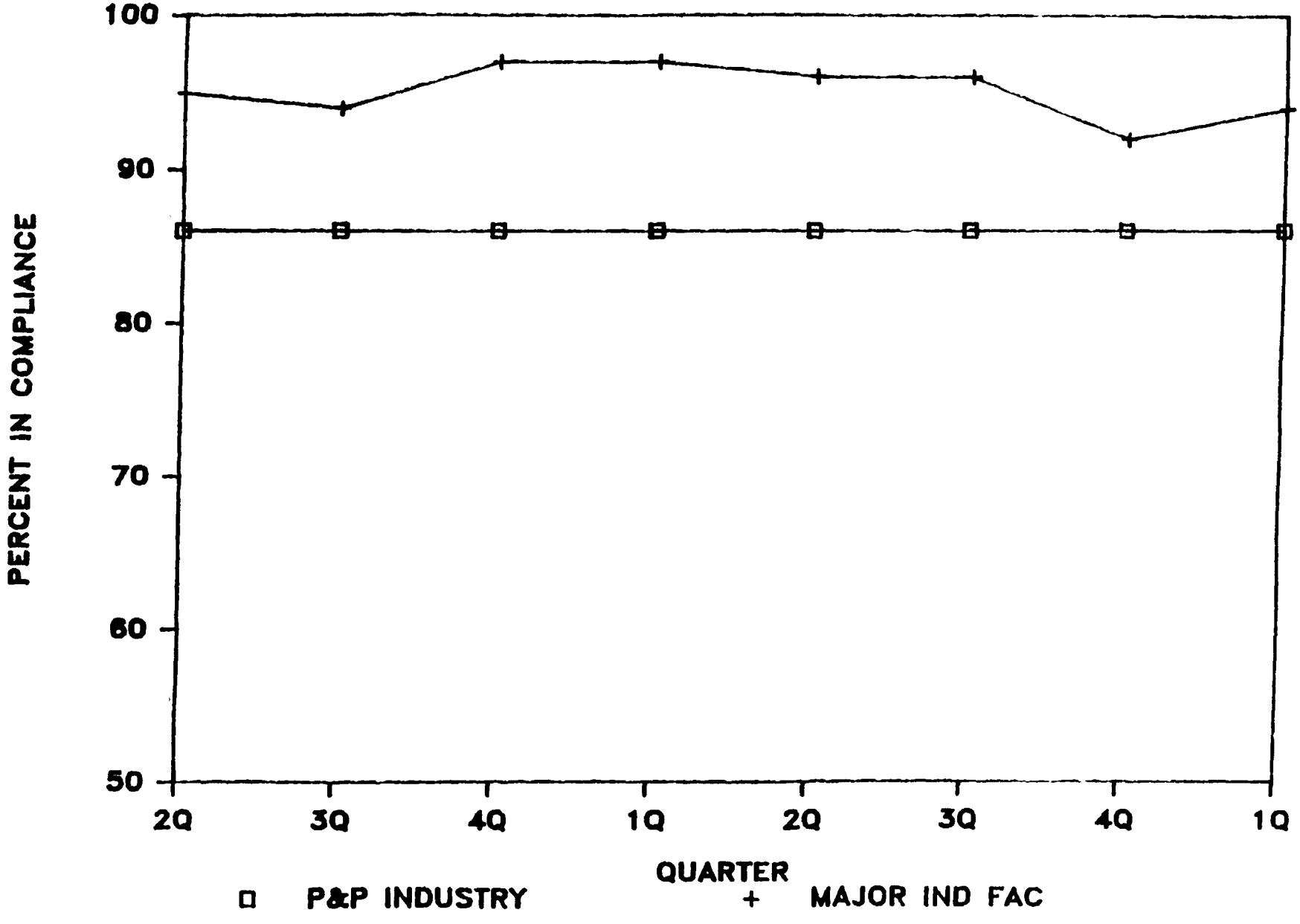


FIGURE 40

COMPLIANCE ANALYSIS – SOUTH CAROLINA

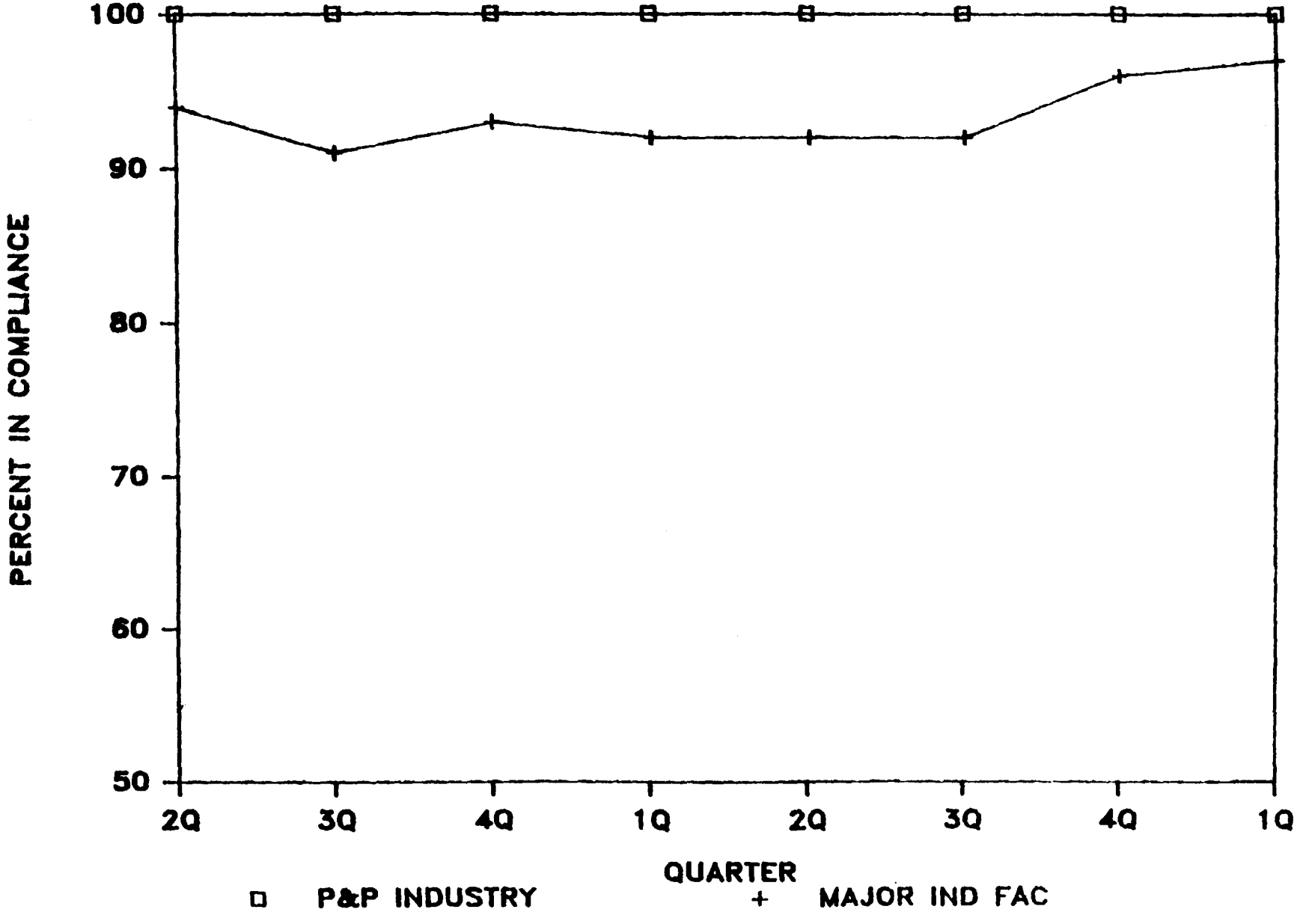
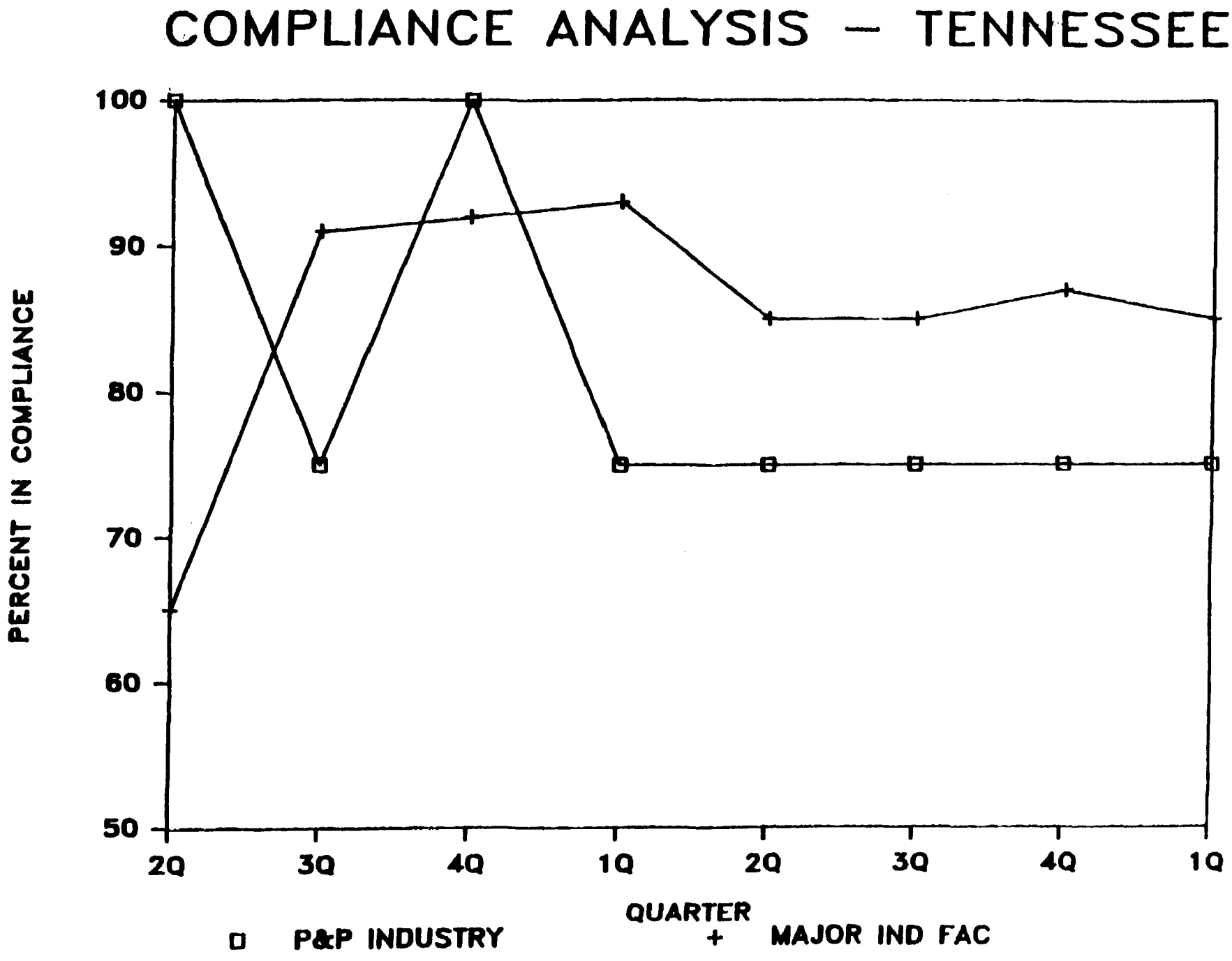
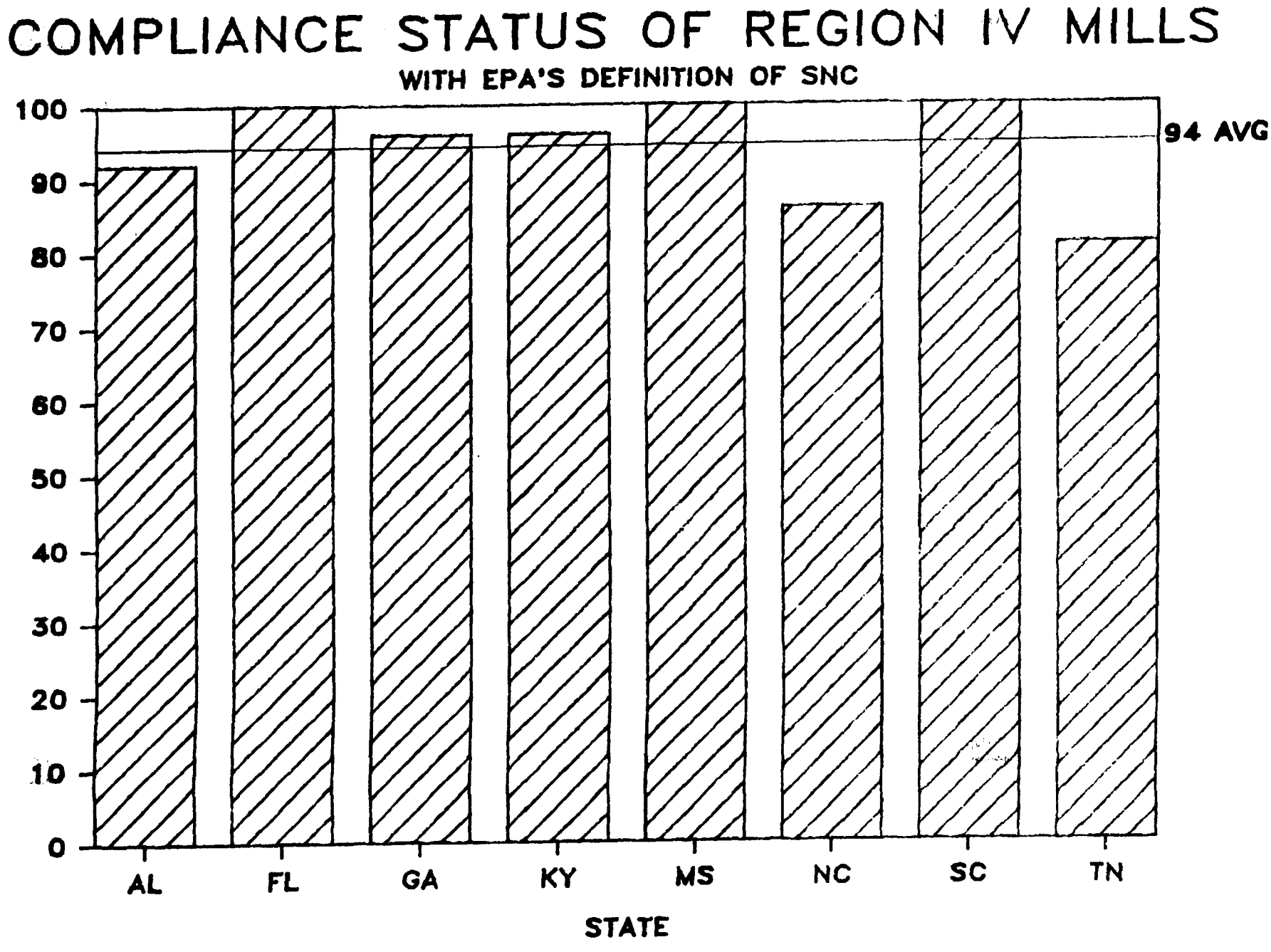


FIGURE 41


COMPLIANCE ANALYSIS – TENNESSEE
PERCENT IN COMPLIANCE
100
90
80
70
60
50
2Q
3Q
4Q
1Q
2Q
3Q
4Q
1Q
QUARTER
P&P INDUSTRY
MAJOR IND FAC

To summarize SNC compliance, compliance rates from Table 18 are plotted on Figure 42. The Figure illustrates the compliance status of Region IV states using EPA's definition of SNC. Three states have compliance rates below the regional average of 94%. These states are Alabama, North Carolina, and Tennessee with percentage of mills not in SNC shown as 92%, 86%, and 81% respectively.

FIGURE 42


COMPLIANCE STATUS OF REGION IV MILLS
WITH EPA'S DEFINITION OF SNC
100
90
80
70
60
50
40
30
20
10
0
% NOT IN SNC
94 AVG
AL
FL
GA
KY
MS
NC
SC
TN
STATE

3. Industrial Performance Compared with Best Practicable Control Technology Currently Available (BPT) Limits

On May 25, 1974 (Phase I) and on January 6, 1977 (Phase II), EPA published final effluent guidelines for the pulp and paper industry (40 CFR Parts 430 and 431). The guidelines require all subcategories of the industry to incorporate Best Practicable Control Technology Currently Available (BPT) treatment levels for discharge into surface waters. The BPT limits are based on the average of the best existing performance of the treatment system within the industry or subcategory. This average is not determined on a broad range of values, but upon performance levels achieved by exemplary plants of various sizes, ages, and treatment units. In setting the monthly permit limits under the BPT guideline, EPA gathered data on long term average performance levels for these mills for each product subcategory. EPA then determined performance relationship between maximum month levels and long term average levels. The resulting ratio between maximum month and long term average (variability factors) were then applied to the long term average data to determine the monthly average BOD and TSS limits. These limits represent BPT performance, and are values that should rarely be exceeded by the mill. By statistical analysis, EPA defined this value as the 99th percentile probability of occurrence. The 99th percentile represents a pollutant discharge level between which 99 percent of all pollutant discharge values fall.

For this analysis, the 99th percentile will be used to determine conformance with BPT limits by the pulp and paper industry in Region IV. By using the monthly average data from the discharge

monitoring report (DMR), a mill is considered to be out of conformance with BPT if that mill exceeded BPT limits more than once in 100 months. Therefore, any monthly BOD or TSS violations over the 24 month study period by the Region IV mills would be considered as nonconformance with BPT guideline limits under this criteria.

The study obtained actual production figures from each mill as part of the data gathering effort for the On-Site Technical Inspection Report (See Appendix B). The highest 12 consecutive months of production were collected for a 5-year period from 1979 through 1983. This production figure (expressed in air dried ton/day) was multiplied by the mass discharge limitation (expressed in pound/1000 pound of product) listed in the effluent limitation guidelines to establish a BPT limit in pounds of pollutants per day. EPA compared the resulting BPT limits to the effluent discharge in the Discharge Monitoring Reports (DMRs). Table 19 presents a listing of the 56 surveyed mills showing the number of times the EPA calculated BPT limits were exceeded by Region IV mills. Mills with discharges that exceeded these limits were noted as not meeting BPT guideline limits in the Table. Of a total of 56 mills studied, 19 mills (35%) did not conform to BPT limits and 1 mill was not evaluated. This mill was not evaluated for conformance with BPT because no guidelines were available for the cotton linter pulp subcategory. There were more mills that failed to conform to BPT limits for BOD (16) than for TSS (9). These figures are not surprising since some mills have higher organic loading to the treatment system than the recommended range for BPT. Comparison of the 13 mills

TABLE 19

ASSESSMENT OF COMPLIANCE WITH BEST PRACTICABLE CONTROL TECHNOLOGY CURRENTLY AVAILABLE (BPT) LIMITS FOR REGION IV PULP AND PAPER MILLS

MILL NAME	STATE	HIGH '79-'83 PRODUCTION (ADT/D)	PRODUCTION BY PRODUCT SUBCATEGORY	HIGH '79-'83 PROD BASED BPT LIMITS BOD	TSS	NO. OF MONTHS DATA	NO. OF TIMES MONTHLY AVG. BPT LIMITS WERE EXCEEDED BOD	TSS	Discharge Meets BPT Limits BOD	TSS	Both
ALTON BOX BOARD	FL	791.00	A: 791.0	4430	9492	21	9	1	NO	NO	NO
CONTAINER CORP	FL	1997.00	D:1997.0	15976	24963	22	0	0	YES	YES	YES
ITT	FL	492.00	K: 492.0	27000	23000	24	5	1	NO	NO	NO
ST. REGIS PAPER (CHAMP. INT'L CORP)	FL	1093.40	A: 817.3 H: 276.1	8498	16931	24	0	0	YES	YES	YES
BUCKEYE CELLULOSE CORP	FL	1319.00	F:1319.0	32316	52892	22	0	0	YES	YES	YES
OWENS ILL	FL	1000.00	A:1000.0	5600	12000	24	0	0	YES	YES	YES
KIMBERLY-CLARK	SC	259.60	S: 150.6 T: 109.0	3431	3512	24	0	0	YES	YES	YES
STONE CONTAINER	SC	1550.00	A:1550.0	8680	18600	23	0	0	YES	YES	YES
BOWATER CAROLINA	SC	1679.00	G: 676.0 H: 237.0 I: 181.0 N: 142.0 N: 404.0 O: 39.0	21524	40982	23	0	0	YES	YES	YES
INTERNATIONAL PAPER	SC	1720.00	D:1363.0 H: 357.0	16152	31875	24	0	0	YES	YES	YES
WESTVACO CORP	SC	2548.00	A:2548.0	14347	30744	24	0	0	YES	YES	YES
SONOCO PRODUCTS	SC	852.00	B: 118.0 E: 734.0	5137	8051	24	0	0	YES	YES	YES
INTERNATIONAL PAPER VIC	MS	1507.00	A:1507.0	8439	18084	21	0	0	YES	YES	YES
ST. REGIS PAPER (BA.-PACIFIC CORP)	MS	1679.30	A:1679.3	9404	20152	24	4	0	NO	YES	NO
INTERNATIONAL PAPER NAT	MS	1233.00	F: 736.0 G: 497.0	26748	47589	24	2	1	NO	NO	NO
JACKSON CO PORT AUTH IP	MS	861.30	H: 861.3	12236	22231	24	0	0	YES	YES	YES
MEYERHAEUSER CO	MS	710.00	N: 355.0 R: 355.0	3124	4899	17	0	0	YES	YES	YES
BOWATER SOUTHERN PAPER	TN	2850.70	H: 723.2 L: 243.9 N: 628.4 N: 665.2	26351	45405	24	0	0	YES	YES	YES
MEAD CORP	TN	663.00	P: 376.0 R: 287.0	7706	13824	24	0	0	YES	YES	YES
INLAND CONTAINER	TN	535.00	B: 535.0	4280	5350	24	11	20	NO	NO	NO
TENN RIVER PULP&PAPER	TN	1767.50	A:1633.8 E: 133.7	9350	20275	24	0	0	YES	YES	YES
ALABAMA KRAFT, BA KRAFT	AL	1181.00	A:2171.0	6614	14172	23	1	0	NO	YES	NO
CHAMPION PAPER	AL	1359.30	I:1359.3	17152	37111	24	2	0	NO	YES	NO
GOLD BOND BUILDING	AL	204.00	Builders Paper	1192	1192	23	3	4	NO	NO	NO
GULF STATES PAPER	AL	719.00	H: 597.0 G: 90.0 O: 32.0	10859	20122	24	0	0	YES	YES	YES
HAMMERMILL PAPER	AL	1016.50	B:1016.5	16773	34561	24	0	0	YES	YES	YES
KIMBERLY-CLARK	AL	1839.00	N: 738.9 B: 629.2 N: 393.3 N: 106.9	23312	44771	23	1	1	NO	NO	NO
UNION CAMP	AL	2173.00	A:2173.0	12168	26052	24	0	0	YES	YES	YES
ALABAMA RIVER PULP CO	AL	1074.00	B:1074.0	17291	35227	23	0	0	YES	YES	YES
ALLIED PAPER, S MILL	AL	631.00	I: 631.0	7194	15564	24	0	0	YES	YES	YES
CONTAINER CORP	AL	1198.00	A: 566.0 H: 632.0	12460	23982	20	1	0	NO	YES	NO
DIXIE NORTHERN INC	AL	1019.00	H:1019.0	14979	26058	21	0	0	YES	YES	YES

TABLE 19 (CONT'D)

ASSESSMENT OF COMPLIANCE WITH BEST PRACTICABLE CONTROL TECHNOLOGY CURRENTLY AVAILABLE (BPT) LIMITS FOR REGION IV PULP AND PAPER MILLS

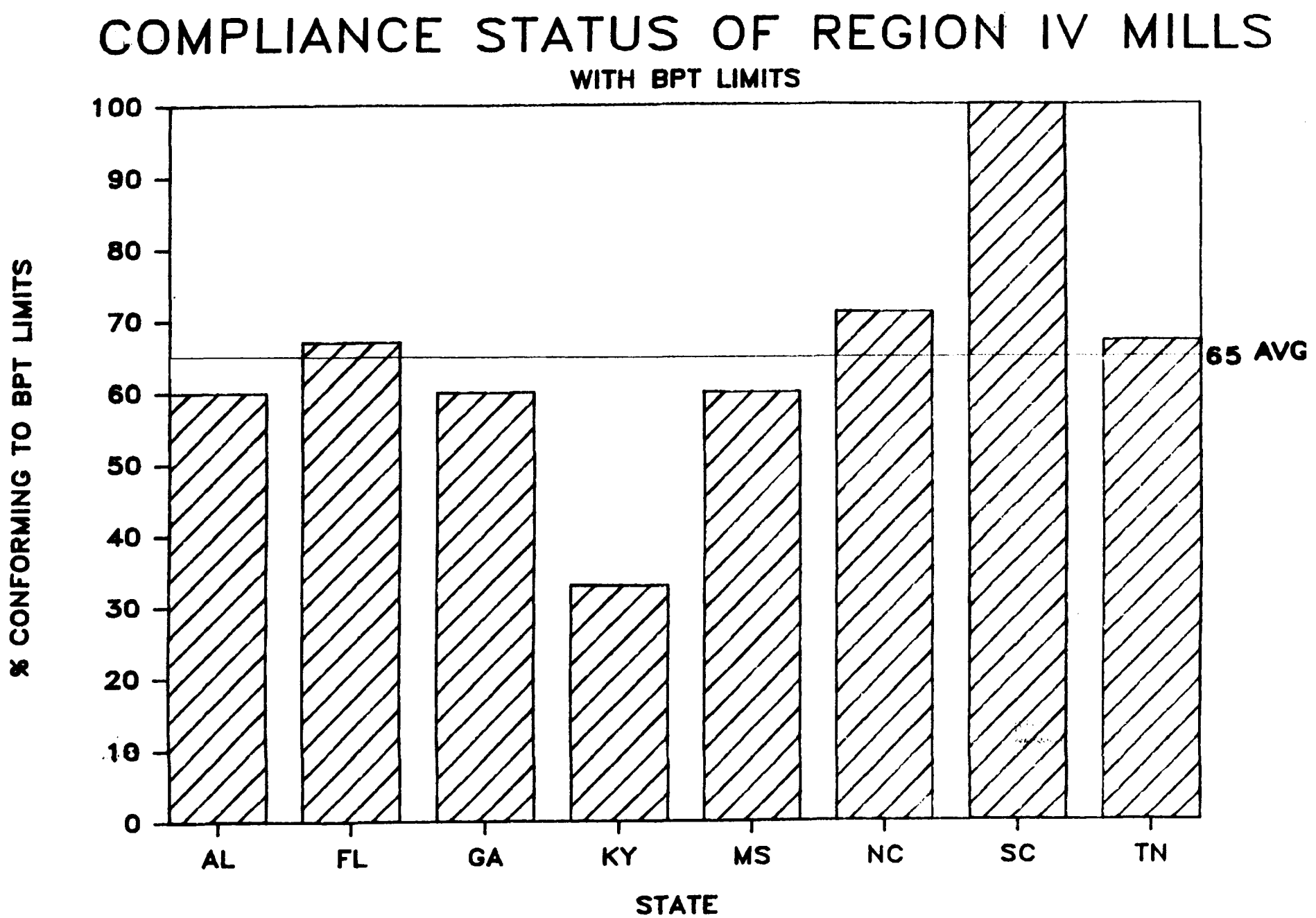
MILL NAME	STATE	HIGH '79-'83 PRODUCTION (ADT/D)	PRODUCTION BY PRODUCT SUBCATEGORY	HIGH '79-'83 PROD BASED BPT LIMITS BOD	TSS	NO. OF MONTHS DATA	NO. OF TIMES MONTHLY AVG. BPT LIMITS WERE EXCEEDED BOD	TSS	Discharge Meets BPT Limits BOD	TSS	Both
(JAMES RIVER CORP.)											
MACMILLAN BLOEDEL	AL	1838.00	A:1141.0 D: 467.0 E: 230.0	11091	20588	23	0	0	YES	YES	YES
MEAD CORP	AL	957.50	B: 938.1 E: 19.4	8330	10533	24	0	0	YES	YES	YES
MOBILE WATER SERVICE (INTERNATIONAL PAPER)	AL	1743.00	A: 705.0 H: 526.0 I: 254.0 M: 54.0 N: 204.0	16401	31773	24	4	0	NO	YES	NO
SCOTT PAPER, MOBILE MILL	AL	1924.60	H: 978.2 I: 946.4	25168	50868	24	0	0	YES	YES	YES
STONE CONTAINER CORP	GA	936.00	A: 936.0	5242	11232	23	9	0	NO	YES	NO
CONTINENTAL FOREST IND (FEDERAL PAPER BOARD)	GA	1612.00	H:1132.0 N: 100.0 N: 350.0 S: 30.0	21465	39460	24	0	0	YES	YES	YES
INTERSTATE PAPER CORP	GA	551.00	A: 551.0	3086	6612	24	0	0	YES	YES	YES
SOUTHEAST PAPER MFG	GA	528.20	N: 26.4 O: 501.8	9727	13437	24	0	0	YES	YES	YES
UNION CAMP	GA	3184.00	D:2966.0 E: 218.0 (PART 454)D: 466.0 (PART 454)C: 14.0	24906	38405	24	0	0	YES	YES	YES
BRUNSWICK PULP&PAPER	GA	1806.00	G:1427.0 H: 379.0	28357	56584	24	0	2	YES	NO	NO
GEORGIA KRAFT	GA	1991.00	A:1991.0	11130	23892	24	0	1	YES	NO	NO
GILMAN PAPER	GA	1234.00	A: 711.0 H: 523.0	12587	24296	24	0	1	YES	NO	NO
GREAT SOUTHERN PAPER	GA	2675.40	D:2675.4	21403	33443	24	0	0	YES	YES	YES
ITT RAYONIER	GA	1573.00	F: 660.0 G: 913.0	30869	56412	24	0	0	YES	YES	YES
WESTVACO FINE PAPERS	KY	747.00	I: 747.0	9711	17778	21	0	0	YES	YES	YES
WILLAMETTE IND MED MILL	KY	358.00	D: 358.0	2864	4475	24	1	0	NO	YES	NO
WILLAMETTE IND W KRAFT	KY	603.00	G: 603.0	9950	20502	24	4	0	NO	YES	NO
ALAMA CELLULOSE	NC	132.60	COTTON LINTER PULP	NO BPT GUIDELINES		21			XXX	XXX	XXX*
FEDERAL PAPER BOARD	NC	1984.00	G: 904.0 H:1080.0	30111	58327	24	0	0	YES	YES	YES
MEYERHAEUSER NB	NC	825.00	G: 825.0	13883	27060	23	0	0	YES	YES	YES
MEYERHAEUSER FL	NC	2216.00	D: 616.0 E: 345.0 G: 381.0 I: 874.0	28508	44172	24	1	0	NO	YES	NO
CHAMPION PAPERS	NC	1683.00	G: 44.0 H: 706.0 I: 933.0	22948	46470	24	0	0	YES	YES	YES
HOERNER WALDORF-CHAMP. INT'L	NC	1105.00	A:1035.0 E: 70.0	6006	12770	24	1	0	NO	YES	NO
OLIN CORP (ECUSTA CORP)	NC	398.00	I: 93.0 R: 116.0 X: 126.0 CELLO: 63.0	6432	8269	24	0	0	YES	YES	YES

TOTAL NO. OF MILLS : 56
TOTAL NO. OF MILLS CONFORMING TO BPT LIMITS : 36
TOTAL NO. OF MILLS NOT CONFORMING TO BPT LIMITS : 19
* NO BPT LIMITS : 1

with ASB process not meeting BPT limits to the operational BOD loading parameter in Table 11 showed at least 8 mills (62%) have BOD loading higher than the recommended loading of 1.13 pounds of BOD/1000 cu ft/day on an annual average basis. To improve the BPT conformance rate, some Region IV mills might need to implement additional internal control measures to reduce the amount of loading to the treatment system and/or modify treatment systems to accommodate the increased load.

The overall BPT compliance rate was calculated to be 65% (19/55) for the entire 24-month review period. A 24-month review period instead of a quarterly review period was utilized in this case because of the 99th percentile criteria (one violation in 100 months). Figure 43 illustrates the BPT compliance status for Region IV states. There are 4 states, which fall below the regional average of 65%. BPT conformance rates for these states are 60% for Alabama, 60% for Georgia, 33% for Kentucky, and 60% for Mississippi.

FIGURE 43


COMPLIANCE STATUS OF REGION IV MILLS
WITH BPT LIMITS
% CONFORMING TO BPT LIMITS
100
90
80
70
60
50
40
30
20
10
0
65 AVG
AL
FL
GA
KY
MS
NC
SC
TN
STATE

D. Performance Required to Meet BPT Limits

In light of the fact that only 65% of the mills in Region IV can conform to BPT guideline limits, the study examines the question of whether higher levels of BOD and TSS reductions are needed for this industry to meet BPT limits. Previous inflow data (Table 5) and BPT guideline limits (Table 19) were used to calculate the percentage removal necessary to meet BPT on an annual basis. The resulting BPT performance is compared with the 1983 influent and effluent performance data from Table 5 for each product subcategory. These comparisions are are summarized in Table 20. This Table lists the product subcategory, the number of mills in each respective subcategory, the actual percent removal, and the percent removal required to meet BPT limits. Again, only "primary" mills producting one product are considered. From Table 20, it can be seen that BPT guideline limits call for treatment efficiencies in the range of 52% to 90% for BOD and 46% to 89% for TSS. The average performance compared to BPT performance is illustrated in Figure 44 for BOD and Figure 45 for TSS. As shown in these Figures most mills in each subcategory can achieve the necessary reduction of BOD and TSS required to meet BPT. The only exception was TSS in the semi-chemical subcategory (B). However, this product subcategory contains only one mill, and should not be considered representative of the subcategory. In conclusion, the data showed that despite the inability of some individual mills to meet monthly BPT limits as discussed in the previous compliance section, the annual average performance of mills in most subcategories was well within the range required to meet BPT limits on an annual basis. It seems that the overall performance of mills in each subcategory as a whole is sufficient to achieve BPT guideline limits on a long term basis. However, additional treatment capacity may be needed to handle the peak monthly variations.

TABLE 20

ACTUAL PERFORMANCE COMPARED TO PERFORMANCE REQUIRED TO MEET BPT LIMITS

Sub	No. of Mills	Actual Performance		Performance Required to Meet BPT Limits	
		BOD	TSS	BOD	TSS
A	10	88	90	75	71
B	1	90	77	90	89
D	3	90	90	77	73
F	1	88	91	52	70
G	4	88	84	76	46
H	2	92	87	81	61
I	3	95	96	88	75
K	1	73	91	68	67

FIGURE 44

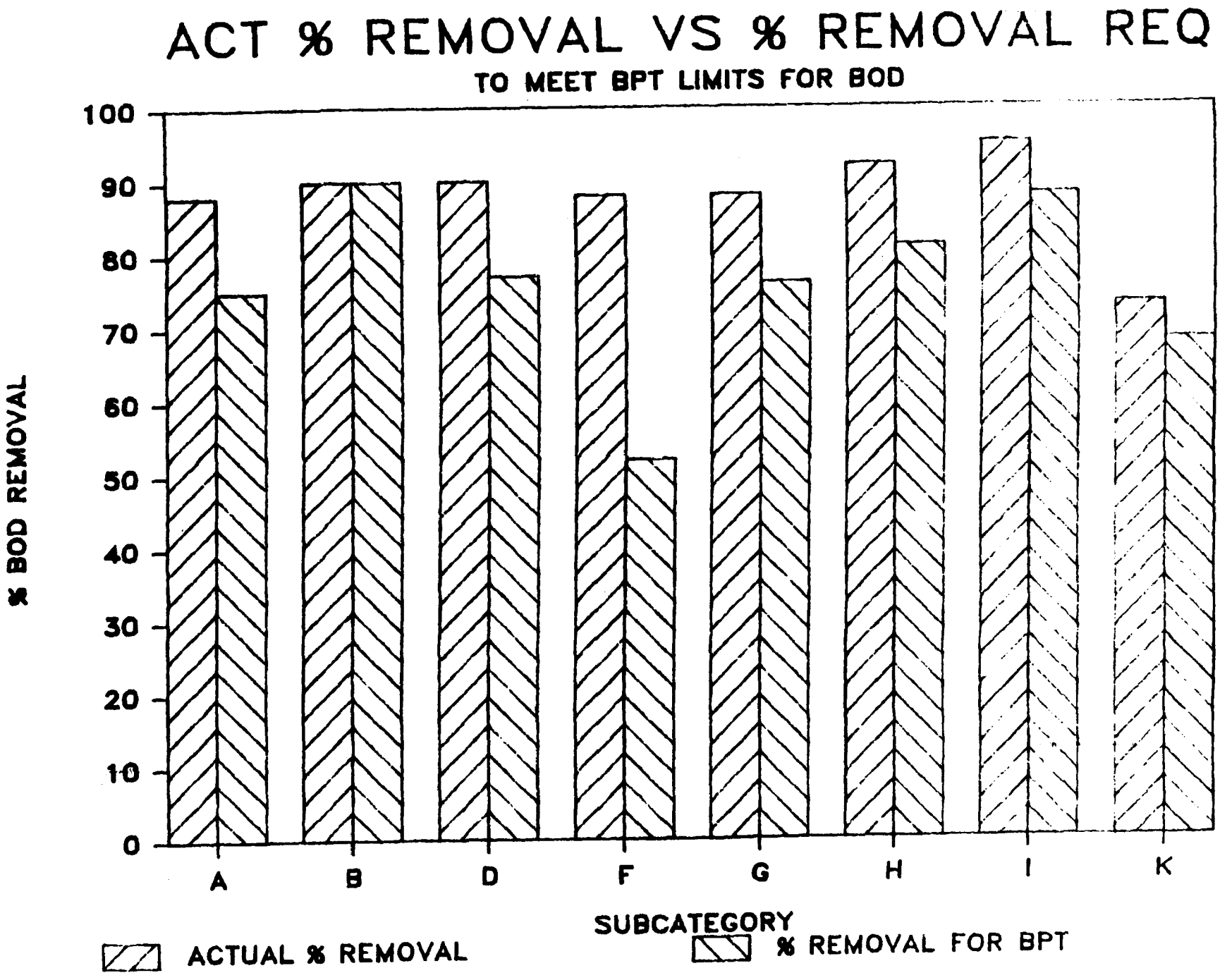
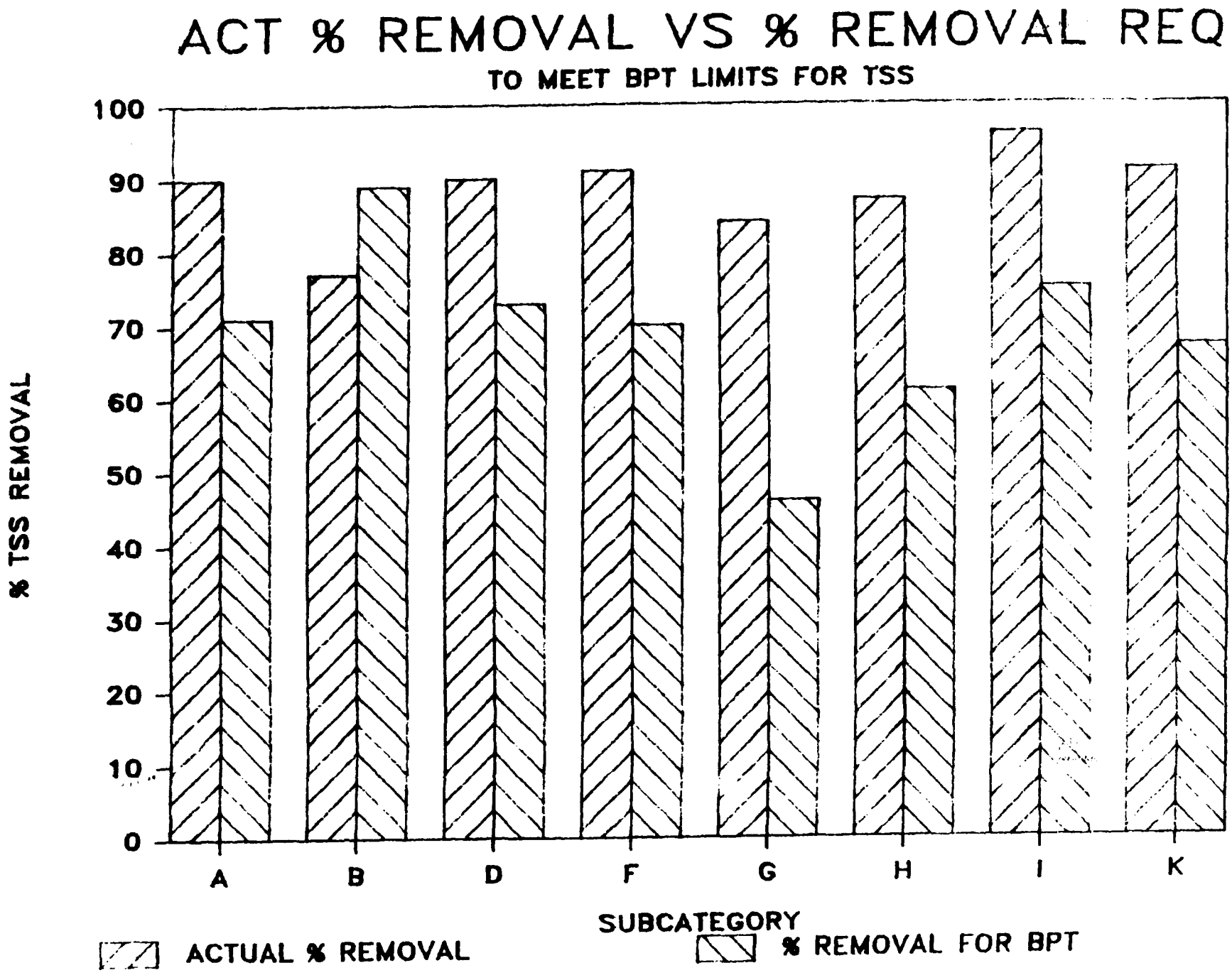

ACT % REMOVAL VS % REMOVAL REQ
TO MEET BPT LIMITS FOR BOD
% BOD REMOVAL
100
90
80
70
60
50
40
30
20
10
0
A
B
D
F
G
H
I
K
SUBCATEGORY
ACTUAL % REMOVAL
% REMOVAL FOR BPT

FIGURE 45


ACT % REMOVAL VS % REMOVAL REQ
TO MEET BPT LIMITS FOR TSS
% TSS REMOVAL
100
90
80
70
60
50
40
30
20
10
0
A
B
D
F
G
H
I
K
SUBCATEGORY
ACTUAL % REMOVAL
% REMOVAL FOR BPT

E. Effect of Various Treatment Systems on Permit Compliance

An analysis was made to compare the compliance rates of the six types of treatment systems surveyed. Data obtained from Table 14 were used for this study. The Table listed, for a 24 month period, the number of monthly violations and the percent of time in compliance for each mill. These data were then grouped together by their respective treatment system. The treatment systems studied included conventional activated sludge (CAS), extended aeration activated sludge (EAS), oxygen activated sludge (OAS), activated sludge and aerated stabilization basin (AS + ASB), aerated stabilization basin (ASB) and oxidation pond (OP). For this study EPA calculated a treatment compliance ratio by dividing the number of monthly violations by the total number of monthly data. These ratios were converted to percentages and are displayed in Table 21. Examination of these results in Table 21 show that mills using OP achieved the highest permit compliance rate with 100% compliance for both BOD and TSS. Oxidation ponds were the most reliable treatment system because they are quite large (Region IV range: 164 to 1475 acres) and are obviously effective in equalizing any changes in waste loading from the mills. Figures 46 and 47 demonstrate the TSS and BOD compliance rate for each treatment system. To determine the significance of the observed data, statistical analysis using the Chi-Squared (X^2) Test was performed. The test is used for assessing the significance of an observed difference between each category of treatment system. This is done with the usual tentative assumption that there is no significant difference between them, and the probability of this being the case is then calculated to find out if this assumption is reasonable. The analysis involves comparing the observed number with

the expected number. The expected number is calculated by simple proportions. These proportionate calculations give the expected number of monthly violations and non-violations for each category of treatment system. The expected numbers are then used for determining the value of X^2. The results of the Discharge Monitoring Report (DMR) data for each category of treatment system are put into a table as follows:

	Violations	Non-violations	Total
CAS	1	95	96
EAS	6	84	90
CAS	6	126	132
AS + ASB	6	158	144
ASB	145	1769	1914
	164	2212	2376

In our earlier observation, it is obvious that difference in performance between OP (zero violations) and other mechanical treatment systems appear to be significant. It will not distort the purpose of this analysis if the OP system is taken out of the analysis. As a result, the X^2 Test will focus on determining whether there is a significant difference between the five mechanical treatment systems utilized by the pulp and paper industry. A computer program was developed to perform the analysis of the data. The resulting value for the X^2 is calculated to be 9.31. The X^2 table shows that with four degrees of freedom the value of X^2 indicates a probability of no significant difference between the five treatment systems is greater that 5%. Therefore, difference is not proven at the 5% level of significance since the analysis was not able to reject the null hypothesis of no difference among the five categories of mechanical treatment systems in their ability meet permit limits.

TABLE 21

TREATMENT SYSTEM COMPLIANCE RATES OF THE PULP AND PAPER INDUSTRY IN REGION IV

		Percent in Compliance		
		BOD	TSS	OVERALL
Conventional Activated Sludge	(CAS)	98	100	99
Extended Aeration Activated Sludge	(EAS)	91	88	90
Oxygen Activated Sludge	(OAS)	96	97	97
Activated Sludge + Aerated Stabilization Basin	(AS + ASB)	97	94	96
Aerated Stabilization Basin	(ASB)	92	94	93
Oxidation Pond	(OP)	100	100	100

FIGURE 46

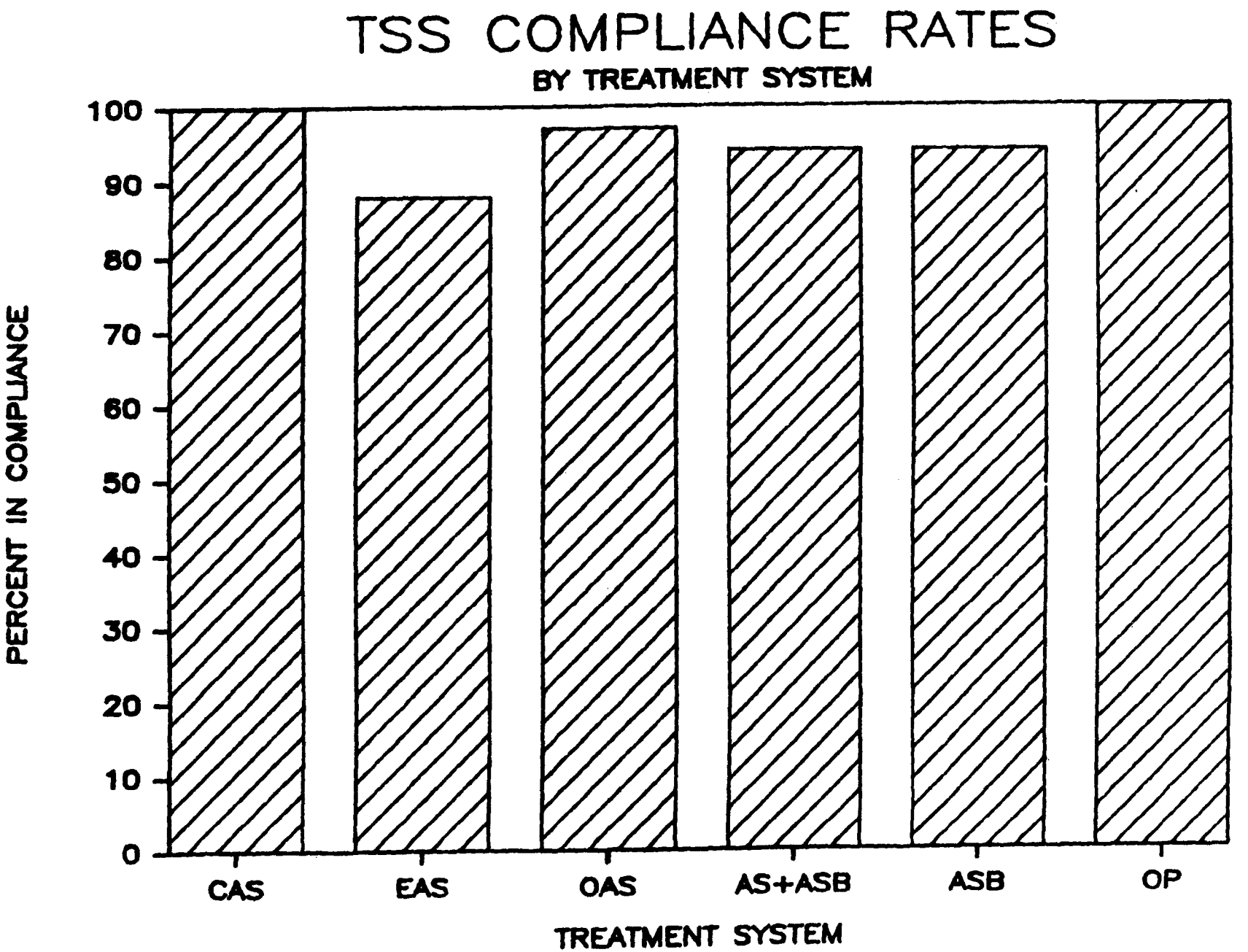
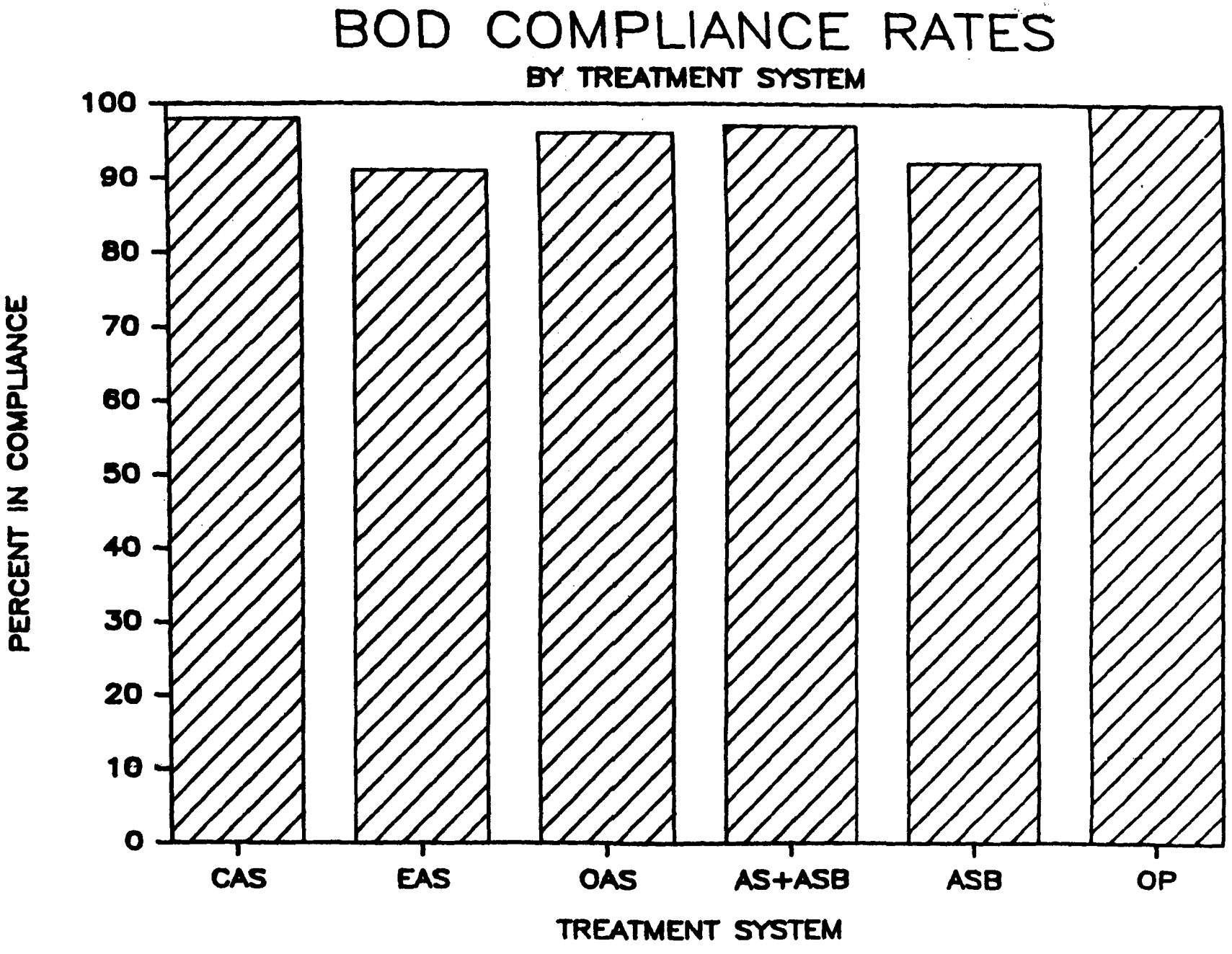

TSS COMPLIANCE RATES
BY TREATMENT SYSTEM
PERCENT IN COMPLIANCE
100
90
80
70
60
50
40
30
20
10
0
CAS
EAS
OAS
AS+ASB
ASB
OP
TREATMENT SYSTEM

FIGURE 47


BOD COMPLIANCE RATES
BY TREATMENT SYSTEM
PERCENT IN COMPLIANCE
100
90
80
70
60
50
40
30
20
10
0
CAS
EAS
OAS
AS+ASB
ASB
OP
TREATMENT SYSTEM

F. Current Control for Color Removal

Of the fifty-six pulp and paper mills in the survey, there are two that currently have limits for color. They are Bowater Carolina (SC) and Bowater Southern Paper (TN). One other mill, Champion International Papers (NC), will have color limits added to their permit upon issuance by EPA, Region IV. In addition to these, the state of Georgia is the only state in our Region to incorporate monitoring requirements for color on most of their pulp and paper permits.

Current control for color abatement includes such approaches as ultra-filtration and massive lime treatment. Unfortunately, none of these methods have enjoyed full scale operational success in Region IV, due to either operational reliability problems or expected high costs developed from demonstration projects or treatability studies. To minimize the aesthetic concerns of effluent color, mills in Region IV often rely on holding ponds to control their discharge. Wastewater effluent is diverted to holding ponds during low flow conditions (typically summer months) and slowly discharged from the holding pond during high river flow conditions (typically winter-spring months). The additional discharges during winter-spring are compensated by higher stream flows and dilution factors. This operational strategy requires a large amount of land since storage time can range for 30 to 100 days. Another approach is internal load control. Newly constructed

mills using an oxygen delignification process prior to bleaching sequence has showed a pronounced improvement in effluent color as compared to a more conventional bleaching line. A list of mills with their controls for removal of color are discussed below:

Bowater Carolina (SC):

The mill utilizes a holding pond with storage time ranging from 2 to 100 days. The holding pond minimizes the color increase in the Catawba River by diverting a portion of treated effluent flow during low flow conditions and discharging the collected wastewater from the pond during high flow conditions.

Bowater Southern Paper (TN):

This mill also utilizes a holding pond with storage time of approximately 31 days to control color. In 1984, the apparent color limit was revised from an average of 12 standard platinum cobalt color units to 33 based on an additional water quality study. Prior to that time, the company could not consistently meet a limit of delta change in background color of no more than 12 units downstream without restricting their discharge to a point where their ponds filled up.

Champion International Paper (NC):

The company has performed several studies directed at employing the ultrafiltration process. This process is similar to reverse osmosis.

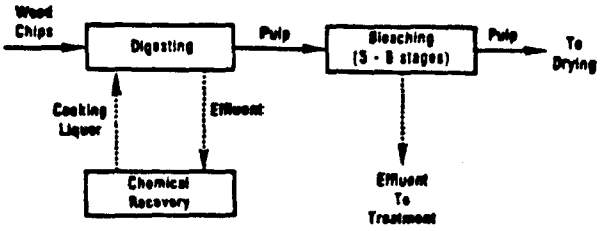
The colored stream from the bleaching stage (major source of the total mill color load) is passed over membrane filters with tiny molecular size openings. However, results of the pilot study in 1985 revealed the process to be less efficient than expected (72% removal efficiency) and capable of operating at only 75% of design flow when optimized. The failure of this process to meet expected effluent color values was due in part to a finding that the anticipated portion of total mill color was not concentrated in the pine bleaching. Additional load was found to be contributed by the caustic extract filtrate from the hardwood bleachery. A full scale plant would have a capital cost of $47 million to construct and $10 million in annual operating expenses. Almost half of this annual cost is tied to utilities charges associated with separating, evaporating and incinerating the color concentrate. This process is considered by the company to be economically infeasible for full-scale application.

Buckeye Cellulose Corp (GA):

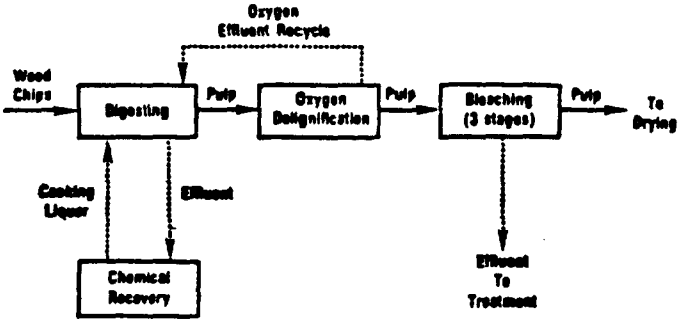
This is a new mill not included in our study. Color control consists of both internal load control and a holding pond. For internal load control, the company utilizes a kraft oxygen delignification process. This process reduces the lignin content in the pulp prior to the bleaching stage. As a result, more color wastes are recycled back to the recovery process. Also, the process modified the remaining lignin so that less color is produced in the subsequent bleaching stages. Study has shown that the performance of this mill with the kraft oxygen

process and holding pond to be the best in terms of effluent color for the bleached kraft industry. Average effluent color was 75% below a typical bleached kraft mill. However, the oxygen delignification stage may degrade the finished product strength to an unacceptable level. For a new mill, this process can still be a viable approach if there is a need to reduce color and if product quality allows.

CONVENTIONAL KRAFT PROCESS



FLINT RIVER KRAFT-OXYGEN PROCESS



Union Camp (SC):

This is also a new bleached kraft mill not included in our study. The facility has a controlled release color limit. Effluent discharge is regulated to prevent a color change of not more than 40 color units after mixing in the Wateree River. The holding pond has a storage time of approximately 60 days with a surface area of 200 acres. For internal color control, the mill utilized oxygen bleaching.

Interstate Paper Corp. (GA):

In 1968, the company, under an EPA grant, developed a full scale color removal process. This process employs lime treatment typically exceeding 1,000 ppm. The principle advantage with this approach is that lime is used extensively in the pulping process and is thus readily available at the plant. Operating experience of this process have shown to reduce color from 1,200 ppm APHA color unit to 125 ppm (90% removal). However, the operation of this treatment process was very difficult to maintain due to the corrosive property and clotting ability of the lime. The process produces a voluminous sludge with poor settling and dewatering characteristics. Calcium hydroxide in solution tends to overflow from the clarifier into the oxidation pond and reacts with atomsphere CO_2 to form a calcium carbonate precipitate. This precipitation reduced the surface area of the pond from 680 acres to 560 acres during the life of the project. The lime treatment process was later discontinued in 1974 when the permits were modified to monitor for color only (no limits).

V. SUMMARY OF ON-SITE INSPECTIONS

All field investigations at the 55 pulp and paper mills were done concurrently with NPDES activities. Fifteen were performance audit inspections, ten were compliance sampling inspections and thirty were compliance evaluation inspections. The NPDES inspections at all facilities included a review of monitoring records, sampling methods, flow measuring practices and laboratory procedures. For the compliance sampling inspections, samples were collected and permit limitations were examined.

At each of the mills, information was requested concerning best management practices, spill control, water conservation, chemical recovery and common operational problems with the wastewater treatment system.

Most mills acknowledged having partial controls on water conservation or reuse. A "yes" (see attached list) response indicated at least partial practice, and in some cases, 100 percent. Therefore, in the discussion below, the significance of an affirmative response should be remembered. Table 22 summarized the results of the on-site inspections.

TABLE 22

SUMMARY OF ON-SITE INSPECTION RESULTS

MILL NAME	NPDES NUMBER	SPILL CONTROL	WATER CONSERVATION	CHEMICAL RECOVERY	BMP	COMMON OPERATIONAL PROBLEMS WITH WASTEWATER TREATMENT SYSTEMS	EPA-FORM 3560-3
ALABAMA KRAFT, GA KRAFT	AL0000817	YES	YES	YES	NO	COLD WEATHER	UNSAT-SAMPL.
ALABAMA RIVER PULP CO	AL0025968	YES	YES	YES	NO	FOAM ON OCCASION	SATISFACTORY
ALLIED PAPER, S MILL	AL0002755	YES	YES	YES	NO		UNSAT-SAMPL.
ALPHA CELLULOSE	NC0005321	YES	YES	N/A	NO		UNSAT-RECORDS
ALTON BOX BOARD	FL0000892	YES	YES	YES	NO		SATISFACTORY
BOWATER CAROLINA	SC0001015	YES	YES	YES	NO		SATISFACTORY
BOWATER SOUTHERN PAPER	TN0002356	YES	YES	YES	NO		SATISFACTORY
BRUNSWICK PULP&PAPER	GA0003654	YES	YES	YES	NO	AERATOR MAINTENANCE	SATISFACTORY
BUCKEYE CELLULOSE CORP	FL0000876	YES	YES	YES	NO	FOAM & MAINTENANCE OF AERATORS	SATISFACTORY
CHAMPION PAPER	AL0000396	YES	YES	YES	NO		SATISFACTORY
CHAMPION PAPERS	NC0000272	YES	YES	YES	YES		SATISFACTORY
CONTAINER CORP	AL0002682	YES	YES	YES & NO	NO		SATISFACTORY
CONTAINER CORP	FL0001104	YES	YES	YES	YES		SATISFACTORY
CONTINENTAL FOREST (FEDERAL P.)	GA0002801	YES	YES	YES	NO		SATISFACTORY
DIXIE NORTHERN (JAMES RIVER)	AL0003301	YES	YES	YES	YES	LOW TEMPS. IN WINTER/OCCASIONAL pH	UNSAT-SAMPL.
FEDERAL PAPER BOARD	NC0003298	YES	YES	YES	NO	AERATOR MAINTENANCE	UNSAT-EFF LIM.
GEORGIA KRAFT	GA0001104	YES	YES	YES	NO	FOAM CONTROL IN DRY WEATHER	SATISFACTORY
GILMAN PAPER	GA0001953	YES	YES	YES	NO	AERATORS	SATISFACTORY
GOLD BOND BUILDING	AL0003930	YES	N/A	N/A	NO	AERATORS	UNSAT-SAMPL.
GREAT SOUTHERN PAPER	GA0001201	YES	YES	YES	NO		SATISFACTORY
GULF STATES PAPER	AL0002828	YES	YES	YES	NO	AERATOR HEADER/NOZZLES	SATISFACTORY
HAMMERMILL PAPER	AL0003018	YES	YES	YES	NO	LIMITED TO 4-HR. DISCHARGE/DAY IN SUMM.	SATISFACTORY
HOERNER WALDORF CHAMPION	NC0000752	YES	YES	YES	YES	ODORS FROM SLUDGE LAGOON	UNSAT-LAB
INLAND CONTAINER	TN0002763	YES	YES	YES	NO	SOLIDS/THERMAL INVERSIONS/POND SIZE	UNSAT-EFF LIM.
INTERNATIONAL PAPER	SC0000868		YES	YES	NO		UNSAT-SAMPL.
INTERNATIONAL PAPER NAT	MS0000213	YES	YES	YES	NO		SATISFACTORY
INTERNATIONAL PAPER VIC	MS0000191	YES	YES	YES	NO		SATISFACTORY
INTERSTATE PAPER CORP	GA0003590	YES	YES	YES	NO	LOW D.O. FROM BOD OVERLOADING	SATISFACTORY
ITT	FL0000701	YES	YES	YES	NO		SATISFACTORY
ITT RAYONIER	GA0003620	YES	YES	YES	NO	SOME EFFICIENCY PROBLEMS IN COLD WEATHER	SATISFACTORY
JACKSON CO PORT AUTH (INT'L P.)	MS0002674				NO	FOAM	SATISFACTORY
KIMBERLY-CLARK	AL0003158	YES	YES	YES	NO	AERATOR NOZZLE PLUGGAGE/TIPOVER OF AERAT.	UNS-AE/FLO/SAM
KIMBERLY-CLARK	SC0000582	YES	YES	N/A	NO		UNSAT-FLOW
MACMILLAN BLOEDEL	AL0002674	YES	YES	YES	NO		UNSAT-SAMPL.
MEAD CORP	AL0022314	YES	YES	YES	NO		SATISFACTORY
MEAD CORP	TN0001643	YES	YES	YES	NO		SATISFACTORY
MOBILE WATER SERVICE IP	AL0002780	YES	YES	YES	NO		SATISFACTORY
OLIN CORP (ECUSTA CORP)	NC0000078	YES	YES	YES			SATISFACTORY
OMENS ILL	FL0000281				NO	FLOODING FROM RAIN	SATISFACTORY
SCOTT PAPER, MOBILE MILL	AL0002801	YES	YES	YES	YES	AERATOR DOWN TIME	SATISFACTORY
SONOCO PRODUCTS	SC0003042	NOT INSPECTED					
SOUTHEAST PAPER MFG	GA0032620	YES	YES	N/A	NO	HYDROLIC OVERLOAD OF SEC. CLARIFIER	SATISFACTORY
STONE CONTAINER	SC0000876	YES	YES	YES	NO	FLOODING	SATISFACTORY
STONE CONTAINER CORP	GA0002798	YES	YES	YES	NO	POTENTIAL SPILLS - LIQUOR ETC.	UNSAT. RECORD
ST. REGIS PAPER (CHAMP. INT'L)	FL0002526	YES	YES	NO	NO	MAINTENANCE OF AERATORS	SATISFACTORY
ST. REGIS PAPER (GA.-PACIFIC)	MS0002941	YES	YES	YES	NO		SATISFACTORY
TENNESSEE RIVER P & P	TN0002232	YES	YES	YES	NO	AERATOR MAINTENANCE	SATISFACTORY
UNION CAMP	AL0003115	YES	YES	YES	NO	FOAM	UNSAT-SAMPL.
UNION CAMP	GA0001988	YES	YES	YES	NO	LOW PLANT EFFICIENCY IN COLD WEATHER	SATISFACTORY
WESTVACO CORP	SC0001759	YES	YES	YES	YES	SOLIDS RETENTION	SATISFACTORY
WESTVACO FINE PAPERS	KY0000086	YES	YES	YES	YES	AERATOR MAINTENANCE	SATISFACTORY
WEYERHAEUSER NB	NC0003191	YES	YES	YES	YES	WEED CONTROL ON DIKES	SATISFACTORY
WEYERHAEUSER PL	NC0000680	YES	YES	YES	NO		SATISFACTORY
WEYERHAEUSER CO	MS0036412	YES	YES	NO	NO		UNSAT-FLOW
WILLAMETTE IND MED MILL	KY0001708	YES			NO	AERATOR MAINTENANCE	SATISFACTORY
WILLAMETTE IND W KRAFT	KY0001716	YES			NO	AERATOR MAINTENANCE	SATISFACTORY

A. Best Management Practices

Eight of the 55 facilities were required by the permit to have a best management practices (BMP) plan; seven actually had a plan; one was in the process of preparing a plan. However, all mills effectively had portions of a BMP, even though it was not referred to as such by facility personnel. These are discussed in the following sections on spill controls, water conservation and recovery capacities.

B. Spill Control

Spill control information requested, included utilization of:

1. Spill collection tanks or sumps
2. Level or flow alarms for warning
3. Conductivity probes in U-drains
4. Diking around fuel and chemical plants
5. Curbing and drainage of chemical process areas

Of the 55 mills visited, 38 had some methods of spill collection, 40 had alarm systems, 34 used conductivity probes, 46 had the fuel/chemical storage tanks diked and 46 provided curbing/drainage in chemical process areas. Eight mills did not respond to all these questions (depending on the question); the remaining mills had negative responses.

C. Water Conservation

Water conservation information requested included:

1. Keeping washdown hoses and water valves closed except when needed
2. Use of surface condensers instead of direct contact condensers
3. Minimization of pump seal water loss
4. Reuse of whitewater
5. Reuse of process condensate
6. Reuse of steam condensate

Water conservation practices, concerning using washdown hoses and leaving valves open only when necessary, were answered affirmatively by 30 of the 55 mills; two mills answered negatively; one indicated that they attempted to conserve; 22 did not respond. Surface condensers are used either exclusively or along with other condensers in 39 mills; 2 mills don't use them; 13 mills did not respond.

The minimizing of pump seal water losses was practiced in 40 of the mills; one mill stated this was not practiced; the remaining mills had no response (14).

Whitewater, process condensate and steam condensate reuse was practiced in 46, 43, and 47 mills, respectively. Information was not obtained from about 6 mills. Reuse in the remaining mills was either not done for one or more of the reuse categories, was not applicable, or was partially practiced.

D. Chemical Recovery

Chemical recovery included the recovery boiler and evaporator capacities. About 38 mills stated they had adequate capacity; 3 had inadequate capacities while 14 either did not respond or indicated that they were marginally or partially adequate.

E. Common Operational Problems

Thirty-one of the mills discussed their most common operational problems with the wastewater treatment systems. Aerator maintenance was acknowledge by 13 of the mills as their primary problem. Foaming was mentioned by 5 facilities; cold weather was indicated by 4; remaining problems were flooding, hydraulic and organic overloading, solids retention and weed control.

F. NPDES Inspection Results

During the field inspections, the EPA NPDES Compliance Inspection Report was completed for each facility (see Appendix C). This report covers such items as Records and Reports, Permit Verification, Operation and Maintenance, Compliance Schedules, Self-Monitoring Program and Effluent/ Receiving Water Observations. An evaluation of the mill's NPDES programs indicated 39 were in compliance with the items examined. Of the 16 mills where one or more of the items were unsatisfactory, 8 had problems with sampling, 4 had flow measuring problems, 3 had incomplete or incorrect recordkeeping sytems, and 1 had laboratory deficiencies. Of the 10 mills where sampling was conducted, 2 of the facilities also exceeded permit limits. These problems constitute permit violations. The states and EPA must follow with enforcement actions where appropriate to assure that these violations are corrected.

VI. EVALUATION OF STATE NPDES PROGRAMS

A. NPDES Permit Program

In November 1972, Congress passed water pollution control legislation featuring the NPDES permit program as the centerpiece of a national water pollution control effort. The first round of NPDES permits were issued between 1972 and 1976, and focused on "traditional" pollutants such as BOD, TSS, pH, oil and grease. Amendments to the 1972 legislation (Clean Water Act of 1977) emphasized controlling toxic discharges, and the "second round" of permitting began in 1977.

The majority of the early major industrial permits were based on "best professional judgement" (BPJ) because regulations prescribing nationally uniform effluent limitations were generally unavailable. The NPDES program evolved and improved as permitting procedures were developed and clarified. Permit quality continues to advance as EPA gains experience in its role and better guidance is available for the states. The pulp and paper study reviewed permit procedures and permit quality as they apply to the pulp and paper industry.

1. Permit Procedures

a. Background

The first step in processing an NPDES permit is a thorough review of the permit application. The application may be for a new discharge or for renewal of a current permit. If the application is complete and accurate, the next step is the preparation of a draft permit. The draft permit, at a minimum, must contain effluent limitations, monitoring requirements, and standard conditions. Special conditions may also be appropriate.

Limits for conventional pollutants must at least require the application of the best practicable control technology (BPT) currently available[1]. Conventional pollutants include such parameters as biochemical oxygen demand (BOD), total suspended solids (TSS), fecal coliform, pH, oil and grease. BPT represents the average of the best existing waste treatment performance within each industry category or subcategory.

[1]The Clean Water Act also requires attainment of best conventional pollutant control technology (BCT) by July 1, 1984. EPA, however, has not promulgated effluent guidelines for BCT. Generally, for the pulp and paper industry, Region IV has determined that BCT equals BPT plus Best Management Practices, plus biomonitoring where appropriate, plus a reopener clause for promulgated BCT limitations.

Limits for nonconventional and toxic pollutants must at least require the application of the best available technology (BAT) economically achievable (except for publicly owned treatment works). Toxic pollutants include heavy metals and certain man-made organic compounds. Nonconventional pollutants include those that are not classifed under the conventional and toxic pollutant categories, and include such parameters as chemical oxygen demand (COD) and color.

New dischargers must meet new source performance standards (NSPS), which are generally more stringent than BPT and BAT based limits. EPA has developed effluent guideline requirements for achieving NSPS, BPT, and BAT for the majority of the pulp and paper industrial categories and subcategories. Effluent guideline requirements for the pulp and paper industry, are published in the Federal Register, 40 CFR, Part 430.

In the absence of promulgated effluent guidelines, a permit can also be written using best professional judgement (BPJ). In this instance, the permit writer determines on a case-by-case basis, after consideration of all reasonably available and pertinent data, what limitations are necessary to achieve BPT and BAT, or NSPS.

The draft must also include any more stringent limitations required by state law or required to meet the water quality standards of the receiving waters. For major dischargers a fact sheet should be included to document and detail the principle facts that establish the basis for the limits and special conditions contained in the draft permit.

After the draft permit has been prepared, a copy is sent to the applicant and a public notice is published. A minimum of thirty (30) days is allowed for comments and questions from the public and the applicant. If no significant comments or objections are submitted, the final permit may then be issued after the close of the public notice period and after receipt of state certification (for permits issued by EPA). NPDES permits are issued for a period of 5 years or less, and upon expiration of the permit a new permit must be issued if the discharge is to continue.

b. Evaluation

An examination of the pulp and paper mill permits in Region IV was conducted as part of the pulp and paper mill study. This study looked at mill permits issued during the five year period from 1979 through 1983, and found some omissions and inconsistancies in the permits issued at that time. These "short comings" can in some cases be linked to specific permit procedures that were misinterpreted or were not followed. Two common problem areas were identified and are explained below.

1. The methods used to determine some production rates were inappropriate or, in some instances, no basis or rationale was presented to support the production rate given. This is significant because the production rate is used to calculate effluent guidelines-based limits, with higher production rates resulting in less stringent limits.

2. A number of mill permits were found not to have limits on chlorophenolic-containing biocides, and the permit files also did not contain a letter certifying that they do not employ these biocides. Regulations state that only those mills that certify non-use of chlorophenolic-containing biocides are not required to have these limits.

These problem areas are discussed in more detail in the following section on permit quality.

Because the pulp and paper study examined mill permits issued during the 1979-1983 period, yearly advances in the NPDES program implemented after 1983 were not seen in those permits, and improvements achieved during that period were evident in some of the permits but not in the earlier ones of that period. EPA conducts yearly audits to evaluate how well the states in Region IV are progressing in implementing their NPDES program. These audits show that although specific procedures may vary from state to state, virtually all of the required procedures are presently being implemented and the states are continuing to improve the quality of their NPDES permits.

2. Permit Quality

The review of the NPDES permit program required an assessment of permit quality. Permit quality is generally viewed in terms of how effectively a permit regulates the discharge of pollutants and protects water quality. The primary mechanism for controlling and regulating these discharges is the permit limits. The NPDES permits for 56 pulp and paper mills in EPA Region IV were evaluated to determine whether the limits for these mills were set consistantly across the Region and according to guidelines. The methods used to derive the limits in each permit were examined, and permits that appeared inadequate or incorrectly issued were identified.

a. Background

Permit limits for pulp and paper mills are normally calculated using effluent limitations guidelines where it has been determined that the water quality standards will not be contravened. Effluent limitations guidelines are expressed in terms of allowable pollutant discharge rate per unit of production rate. The estimated long term annual

average production rate that is expected during the term of the permit is multiplied by the appropriate guideline to calculate the permit limits (i.e., the higher the production rate, the more waste can be discharged). Effluent guidelines for the pulp, paper and paperboard point source category are published in the Code of Federal Regulations, Part 430. These regulations specify BPT limits for BOD and TSS discharges, BAT limits on pentachlorophenols and trichlorophenols for mills that employ chlorophenolic-containing biocides, and new source performance standards (NSPS) for new dischargers.

Many pulp and paper mill permits, however, were originally written using best professional judgement (BPJ), or were negotiated through enforcement conferences, because effluent guidelines for their industrial subsegment had not yet been developed. The majority of these permits have been readjusted and improved over the years due to promulgation of effluent guidelines and the development of water quality based limits for many mills. In cases where BPJ based limits were more stringent than required by effluent guidelines or water quality standards, the "anti-backsliding rule" (40 CFR 122.44(l)), was invoked. This rule prevents any relaxation of BPJ based limits to less stringent levels provided the mill has demonstrated that it can meet the BPJ based limits.

The majority of mill permits in Region IV are based primarily on the effluent guidelines, although many contained some water quality based limits. Thirty (30) of the 56 (fifty-six) permits surveyed contained one or more water quality based limits, that is, they contained additional limits supplementing (or in some cases replacing) the effluent guidelines based limits. Typical examples of water quality based limits are limits covering receiving water conditions (receiving water color, dissolved oxygen level, etc.). The survey also found 3 permits that contained BPJ based limits, and were more stringent than would otherwise be required by effluent guidelines or water quality standards.

b. Application of the Guidelines

One of the major concerns that surfaced during the course of this survey centered around the application of the effluent guidelines in developing permit limits. The effluent guidelines, developed to provide a nationally uniform set of standards, were not being applied consistantly in many cases. The primary source of this problem is a conflict in the Federal Regulations on how to properly determine the "production" of a facility.

Effluent guideline limitations are expressed in terms of an allowable pollutant discharge rate per unit of production. Production is defined in 40 CFR 430.01 Effluent Guidelines, as "annual" production based on past production practices, present trends and committed growth. 40 CFR Part 122.45(b), of the NPDES permit program regulations further states that production-based limits "shall be based not upon the designed production capacity, but rather upon a reasonable measure of actual production of the facility". The regulations, however, go on to state that "The time period of the of production shall correspond to the time period of the calculated permit limitations: for example, monthly production shall be used to calculate average monthly discharge limitations." This last statement conflicts with the production definition in 40 CFR Part 430, and has caused confusion in the proper development of effluent guidelines based limits. (A previous promulgation of Part 122.45 also stated that maximum day production shall be used to calculate maximum day discharge limitations).

In an attempt to clarify this discrepancy, EPA Headquarters provided a memorandum to all Regions on December 18, 1984, summarizing the correct procedure for calculating production based limits (Appendix E). Basically, the Headquarters memorandum clarifies that for industries such as pulp and paper, where the effluent guidelines were developed from national annual production data, the mills historical annual average production[2] should be used to calculate its permit limits.

Variability factors were included in the monthly average and daily maximum effluent guideline numbers, to account for normal flunctuations in mill production and also for normal flunctations in the performance of the wastewater treatment plant. To apply these effluent guidelines to a mill's maximum monthly or maximum daily production is, in effect, to "double count" the variability factors. One of the objectives of this study was to determine if this conflict in EPA's regulations caused a significant problem with the development of production based limits in Region IV NPDES permits.

[2]Usually a five year production history should be used to determine the apropriate production value. This single production value is then multiplied by both the daily maximum and monthly average guideline limitations to obtain the permit limitations. Where expansion or significant production increases or decreases are projected it may be appropriate to include staged or alternate permit limits in the permit.

c. Evaluation of Best Practicable Control Technology Currently Available (BPT) Permit Limits

The following method was used to screen the permits for consistency with effluent guidelines: the highest yearly production reported by each mill was determined for a five year period ranging from 1979 through 1983. The "high year production" was then used to calculate BAT and BPT limit "values" to be compared against the existing permit limits. The mill permits which contained limits that exceeded corresponding high year limit numbers were subsequently looked at more closely to determine how large the discrepancies were, and why these discrepancies exist.

Table 23 summarizes the results of this analysis. The table lists the current permit in effect at the time of the study and the calculated BPT limit "values". Twenty-one (38%) of the 56 permits showed some exceedance of the independently calculated effluent guidelines based limitations. Table 24 lists the 21 permits in order of increased percent discrepancy. Of these 21 permits, 16 contained discrepancies that were considered significant (i.e., more than a 3% difference in any permit limit for BOD or TSS).

TABLE 23

ASSESSMENT OF PERMIT QUALITY FOR REGION IV PULP AND PAPER MILLS

MILL NAME	NPDES NUMBER	PERMIT ISSUE DATE	PERMIT TYPE	PERMIT LIMITS BOD AVG	PERMIT LIMITS BOD MAX	PERMIT LIMITS TSS AVG	PERMIT LIMITS TSS MAX	High '79-'83 PRODUCTION (ADT/D)	PRODUCT SUBCATEGORY	Prod. YEAR	LOG FLUME	HIGH '79 - '83 PROD BASED BPT LIMITS BOD AVG	HIGH '79 - '83 PROD BASED BPT LIMITS BOD MAX	HIGH '79 - '83 PROD BASED BPT LIMITS TSS AVG	HIGH '79 - '83 PROD BASED BPT LIMITS TSS MAX	MEET BPT LIMITS BOD AVG	MEET BPT LIMITS BOD MAX	MEET BPT LIMITS TSS AVG	MEET BPT LIMITS TSS MAX	PERMIT MEET BPT LIMITS
ALTON BOX BOARD	FL0000892	9/27/84	EFF. L.	4430	8859	9492	18984	791.00	A: 791.0	1983	NO	4430	8859	9492	18984	YES	YES	YES	YES	YES
CONTAINER CORP	FL0001104	3/2/83	BPJ	11360	23120	21250	42500	1997.00	B:1997.0	1983	NO	15976	31952	24963	49925	YES	YES	YES	YES	YES
ITT	FL0000701	9/24/84	EFF. L.	27000	47250	23000	42710	492.00	N: 492.0	5/79-4/80	YES	27000	47250	23000	42710	YES	YES	YES	YES	YES
									acet: 241.0											
									vinc: 162.4											
									cell: 41.8											
									nitr: 41.8											
ST. REGIS PAPER (CHAMP. INT'L. CORP.)	FL0002526	1/3/83	BPJ	5100	7650	13000	30000	1093.40	A: 817.3	1983	NO	8498	16692	16931	32868	YES	YES	YES	YES	YES
									N: 276.1											
BUCKEYE CELLULOSE CORP	FL0000876	6/25/84	MB L.	13200	19800	25000	50000	1319.00	F:1319.0	1983	NO	32316	62257	52892	98397	YES	YES	YES	YES	YES
OWENS ILL	FL0000281	9/28/84	MB L.	5550	11100	10760	16140	1000.00	A:1000.0	1983	NO	5600	11200	12000	24000	YES	YES	YES	YES	YES
KIMBERLY-CLARK	SC0000582	1/12/84	EFF. L.	3390	6320	3350	6540	259.60	S: 150.6	1983	NO	3431	6421	3512	6804	YES	YES	YES	YES	YES
									T: 109.0											
STONE CONTAINER	SC0000876	7/28/83	EFF. L.	11200	22400	24000	48000	1550.00	A:1550.0	1983	NO	8680	17360	18600	37200	NO	NO	NO	NO	NO
BOWATER CAROLINA	SC0010456	5/20/77	MB L.	20733	39812	40529	75293	1679.00	G: 676.0	1983	YES	21524	40749	40382	76109	YES	YES	YES	YES	YES
									N: 237.0											
									I: 181.0											
									N: 142.0											
									N: 404.0											
									O: 39.0											
INTERNATIONAL PAPER	SC0000868	12/13/81	MB L.	11363	17348	31882	61996	1720.00	B:1363.0	1979	YES	16152	26748	31875	52104	NO	NO	NO	NO	NO
				19142	37709				N: 357.0											
WESTVACO CORP	SC0001759	6/24/83	EFF. L.	13014	26029	27888	55776	2362.00	A:2362.0	1983		14347	28694	30744	61488	YES	YES	YES	YES	YES
SONOCO PRODUCTS	SC0003042	1/4/84	MB L.	1450	2900	5102	9145	852.00	B: 118.0	1983	NO	5137	10127	8051	13019	YES	YES	YES	YES	YES
				2723	4250				E: 734.0											
INTERNATIONAL PAPER VIC	NB0000191	8/2/82	EFF. L.	8422	16844	18048	36096	1507.00	A:1507.0	1983	NO	8439	16878	18084	36168	YES	YES	YES	YES	YES
ST. REGIS PAPER (BA.-PACIFIC CORP)	NB0002941	12/31/81	MB L.	7280	14560	22320	44640	1679.30	A:1679.3	1980	NO	9404	18808	20152	40304	NO	NO	NO	NO	NO
				9950	19900															
INTERNATIONAL PAPER MAT	NB0000213	8/2/82	EFF. L.	27493	52805	47395	88057	1233.00	F: 736.0	1983	YES	26748	51377	47589	88401	NO	NO	YES	YES	NO
									G: 497.0											
JACKSON CO PORT AUTH IP	NB0000674	1/17/83	MB L.	4635	9025	18000	36000	861.30	N: 861.3	1983	NO	12236	23524	22231	41362	YES	YES	YES	YES	YES
				6600	13200															
MEYERHAEUSER CO	NB0036412	10/1/80	MB L.	2130	3692	3124	5254	710.00	N: 355.0	1983	NO	3124	5751	4899	7952	YES	YES	YES	YES	YES
									N: 355.0											
BOWATER SOUTHERN PAPER	TN0002356	5/1/84	MB L.	26132	----	45479	50000	2260.70	N: 723.2	1983	YES	26351	51179	45405	84394	YES	YES	NO	YES	NO
									L: 243.9											
									N: 628.4											
									N: 665.2											
MEAD CORP	TN0001643	8/1/82	MB L.	3500	6000	13000	26000	663.00	P: 376.0	1982	YES	7706	14867	13224	25400	YES	YES	YES	NO	NO
				4800	7200				R: 287.0											
INLAND CONTAINER	TN0002763	5/1/84	EFF. L.	5488	10976	6860	13720	535.00	B: 535.0	1983	NO	4280	8560	5350	10700	NO	NO	NO	NO	NO
TENN RIVER PULP&PAPER	TN0002232	10/1/83	MB L.	9000	18000	19000	38000	1767.50	A:1633.8	1983	NO	9550	19101	20275	40548	YES	YES	YES	YES	YES
									E: 133.7											
ALABAMA KRAFT, GA KRAFT	AL0000817	12/26/79	MB L.	4200	8400	13800	27600	1181.00	A:1181.0	1983	NO	6614	13227	14172	28344	NO	NO	YES	YES	NO
				6636	13373															
CHAMPION PAPER	AL0000396	4/22/82	EFF. L.	12422	22389	21576	40949	1309.30	I:1309.3	1983	NO	17152	33057	37111	69077	YES	YES	YES	YES	YES
GOLD BOND BUILDING	AL0003930	8/13/84	MB L.	585	875	585	1170	204.00	Builders Paper	1979	NO	1192	1987	1192	1987	YES	YES	YES	YES	YES
GULF STATES PAPER	AL0002828	7/17/81	MB L.	10216	19615	18439	34112	719.00	N: 597.0	1983	YES	10858	20837	20122	37358	NO	NO	YES	YES	NO
				11216	21535	19439	35962		G: 90.0											
									O: 32.0											
HAMMERMILL PAPER	AL0003218	3/1/82	MB L.	17710	33990	36080	66880	1016.50	G:1016.5	1983	YES	16773	32223	34561	64141	NO	NO	NO	NO	NO
KIMBERLY-CLARK	AL0003158	12/15/83	MB L.	22998	43462	41609	77433	1839.00	N: 738.9	1981	YES	23312	44497	44771	82625	YES	YES	YES	YES	YES
									G: 629.2											
									N: 395.3											
									N: 106.9											

TABLE 23 (CONT'D)

ASSESSMENT OF PERMIT QUALITY FOR REGION IV PULP AND PAPER MILLS

MILL NAME	NPDES NUMBER	PERMIT ISSUE DATE	PERMIT TYPE	PERMIT LIMITS BOD AVG	PERMIT LIMITS BOD MAX	PERMIT LIMITS TSS AVG	PERMIT LIMITS TSS MAX	High '79-'83 PRODUCTION (ADT/D)	PRODUCT SUBCATEGORY	Prod. YEAR	LOG FILING	HIGH '79 - '83 PROD BASED BPT LIMITS BOD AVG	HIGH '79 - '83 PROD BASED BPT LIMITS BOD MAX	HIGH '79 - '83 PROD BASED BPT LIMITS TSS AVG	HIGH '79 - '83 PROD BASED BPT LIMITS TSS MAX	MEET BPT LIMITS BOD AVG	MEET BPT LIMITS BOD MAX	MEET BPT LIMITS TSS AVG	MEET BPT LIMITS TSS MAX	PERMIT MEET BPT LIMITS
UNION CAMP	AL0003115	4/1/82	MD L.	11771	19942	21649	41648	2173.00	A:2173.0	1982	NO	12168	24336	26076	52152	YES	YES	YES	YES	YES
ALABAMA RIVER PULP CO	AL0029068	8/19/81	EFF. L.	7200	15600	15000	26400	1074.00	G:1074.0	1983	NO	17291	33187	35227	65299	YES	YES	YES	YES	YES
ALLIED PAPER,S MILL	AL0002755	8/30/82	MD L.	7150	11379	7108	13758	631.00	I: 631.0	1982	YES	7194	13863	15364	28969	YES	YES	YES	YES	YES
CONTAINER CORP	AL0002682	9/3/82	MD L.	4850	10000	11000	17000	1198.00	A: 566.0	1983	YES	12460	24162	23982	45500	YES	YES	YES	YES	YES
				6060	10000				H: 632.0											
DIXIE NORTHERN INC (JAMES RIVER CORP)	AL0003301	10/6/78	EFF. L.	16000	20000	11000	22000	1019.00	H:1019.0	1982	YES	14979	27573	26058	48480	NO	YES	YES	YES	NO
MACMILLAN BLOEDEL	AL0002674	6/25/84	MD L.	8358	16717	17112	34224	1838.00	A:1141.0	1983	NO	11091	22046	20588	41083	YES	YES	YES	YES	YES
									B: 467.0											
									E: 230.0											
MEAD CORP	AL0022314	3/21/84	MD L.	6784	12368	7020	13840	957.50	D: 957.5	1983	NO	8330	16660	10533	21066	YES	YES	YES	YES	YES
				8284	16586	10020	20040													
MOBILE WATER SERVICE (INTERNATIONAL PAPER)	AL0002780	6/1/83	MD L.	14726	28308	26909	51158	1743.00	A: 705.0	1983	NO	16401	31826	31773	60301	YES	YES	YES	YES	YES
									H: 526.0											
									I: 254.0											
									N: 54.0											
									N: 204.0											
SCOTT PAPER,MOBILE MILL	AL0002801	7/15/83	EFF. L.	24851	47650	48930	91089	1924.60	H: 978.2	1979	YES	25168	48974	50268	93502	YES	YES	YES	YES	YES
									I: 946.4											
STONE CONTAINER CORP	GA0002798	11/30/82	EFF. L.	6700	13400	10700	21400	936.00	A: 936.0	1981	NO	5242	10483	11232	22464	NO	NO	YES	YES	NO
CONTINENTAL FOREST IND (FED. PAPER BOARD)	GA0002801	11/30/82	EFF. L.	27181	52035	45982	89641	1612.00	H:1132.0	1983	YES	21465	41166	39460	73331	NO	NO	NO	NO	NO
									B: 100.0											
									N: 350.0											
									S: 30.0											
INTERSTATE PAPER CORP	GA0003590	11/30/82	MD L.	800	1600	2054	4107	551.00	A: 551.0	1983	NO	3086	6171	6612	13224	YES	YES	YES	YES	YES
				1100	2200															
SOUTHEAST PAPER MFG	GA0032620	11/30/82	BPJ	3000	4630	3565	6637	528.20	N: 26.4	1983	NO	9727	18725	13437	24958	YES	YES	YES	YES	YES
									B: 501.8											
UNION CAMP	GA0001988	11/30/82	EFF. L.	25000	50000	40400	80800	3184.00	D:2966.0	1980	NO	24906	49750	38405	77026	NO	NO	NO	NO	NO
									E: 218.0											
								(PART 454)	B:466.0											
								(PART 454)	C: 14.0											
BRUNSWICK PULP&PAPER	GA0003654	12/30/82	MD L.	13500	35000	39300	78600	1806.00	G:1427.0	7/81-6/82	NO	28357	54441	56584	104954	YES	YES	YES	YES	YES
				19440	40000				H: 379.0											
GEORGIA KRAFT	GA0001104	11/30/82	MD L.	5076	10152	24624	49248	1991.00	A:1991.0	6/83-5/84	NO	11150	22300	23892	47789	YES	YES	NO	NO	NO
				10528	21056															
GILMAN PAPER	GA0001953	12/1/83	EFF. L.	12000	24000	24000	45000	1234.00	A: 711.0	1980	YES	12587	24290	24296	46148	YES	YES	YES	YES	YES
									H: 523.0											
GREAT SOUTHERN PAPER	GA0001201	11/30/82	EFF. L.	19360	54208	22700	63560	2675.40	D:2675.4	5/83-4/84	NO	21403	42806	33443	66885	YES	NO	YES	YES	NO
ITT RAYONIER	GA0003620	12/30/82	MD L.	22300	33450	42010	77600	1573.00	F: 660.0	1983	NO	30869	59364	56412	104746	YES	YES	YES	YES	YES
				30000	45000				G: 913.0											
WESTVACO FINE PAPERS	KY0000086	1/25/83	BPJ	8800	13200	8000	16000	747.00	I: 747.0	1983	NO	9711	15836	17778	33092	YES	YES	YES	YES	YES
WILLAMETTE IND NED MILL	KY0001708	11/7/84	EFF. L.	2545	5090	3850	7700	358.00	D: 358.0	1983	NO	2864	5728	4475	8950	NO	NO	YES	YES	NO
				4045	8090															
WILLAMETTE IND W KRAFT	KY0001716	11/7/84	EFF. L.	10626	20394	14652	27602	603.00	G: 603.0	1983	NO	9350	19115	20502	38049	NO	NO	YES	YES	NO
ALPHA CELLULOSE	NC0005321	5/1/84	EFF. L.	332	664	355	710	132.60	Cotton Linter Pulp	1983		NO BPT LIMITS FOR THIS SUB.				---	---	---	---	--
FEDERAL PAPER BOARD	NC0003298	10/11/84	MD L.	7000	28000	67618	251080	1984.00	G: 964.0	1983	YES	30111	57835	58327	112338	YES	YES	NO	NO	NO
									H:1020.0											
WEYERHAEUSER NB	NC0003191	3/14/79	MD L.	5760	12500	8250	26700	825.00	G: 825.0	1979	NO	13283	25493	27060	50160	YES	YES	YES	YES	YES
				7425	16000															
WEYERHAEUSER PL	NC0000680	6/29/81	MD L.	18000	36000	41139	78232	2216.00	D: 616.0	1983	NO	22608	44091	44172	83631	YES	YES	YES	YES	YES
				22000	44000				E: 345.0											
									G: 381.0											
									I: 874.0											
CHAMPION PAPERS	NC0000272	6/19/81	MD L.	8094	12141	45445	84687	1683.00	G: 46.0	1979	YES	22948	44056	46470	86457	YES	YES	YES	YES	YES
									H: 745.0											

TABLE 23 (CONT'D)

ASSESSMENT OF PERMIT QUALITY FOR REGION IV PULP AND PAPER MILLS

MILL NAME	NPDES NUMBER	PERMIT ISSUE DATE	PERMIT TYPE	PERMIT LIMITS BOD AVG	PERMIT LIMITS BOD MAX	PERMIT LIMITS TSS AVG	PERMIT LIMITS TSS MAX	High '79-'83 PRODUCTION (ADT/D)	PRODUCT SUBCATEGORY	Prod. YEAR	LOG FLUMS	HIGH '79 - '83 PROD BASED BPT LIMITS BOD AVG	HIGH '79 - '83 PROD BASED BPT LIMITS BOD MAX	HIGH '79 - '83 PROD BASED BPT LIMITS TSS AVG	HIGH '79 - '83 PROD BASED BPT LIMITS TSS MAX	MEET BPT LIMITS BOD AVG	MEET BPT LIMITS BOD MAX	MEET BPT LIMITS TSS AVG	MEET BPT LIMITS TSS MAX	PERMIT MEET BPT LIMITS
									I: 985.0 N: ----											
HOERNER WALDORF-CHAMP INT'L CORP	NC0000752	12/5/83	EFF. L.	6852	13703	14582	29164	1105.00	A:1035.0 E: 70.0	1983	NO	6006	12012	12770	25540	NO	NO	NO	NO	NO
OLIN CORP	NC0000078	10/14/83	MB L.	4587 9174	9174 18348	13601	26116	398.00	I: 93.0 N: 116.0 X: 126.0 Calle: 63.0	1981	YES	6432	12190	8269	15782	NO	NO	NO	NO	NO

TOTAL NO. OF REGION IV PULP & PAPER PERMITS :	56
TOTAL NO. OF PERMITS MEETING BPT LIMITS :	34
TOTAL NO. OF PERMITS NOT MEETING BPT LIMITS :	21
TOTAL NO. OF PERMITS WITH NO BPT GUIDELINES :	1

TABLE 24

Table of Pulp and Paper Mill Permits Where Effluent Limits Exceed BPT Effluent Guidelines, Using the Annual Average Production Definition in 40 CFR 430

		% Permit Limits Exceed BPT Calculations			
		BOD		TSS	
Mill Name	State	Avg	Max	Avg	Max
Bowater Southern	Tennessee	-	-	-	0.16%
AL Kraft, GA Kraft	Alabama	0.33%	1.10%	-	-
Mead Corp.	Tennessee	-	-	-	2.3%
Int'l Paper, Natchez	Mississippi	2.7%	2.7%	-	-
Georgia Kraft	Georgia	-	-	3.0%	3.0%
3%					
Gulf States Paper	Alabama	3.2%	3.2%	-	-
Hammermill Paper	Alabama	5.3%	5.2%	4.2%	4.1%
Union Camp	Georgia	0.38%	0.5%	4.9%	4.7%
Dixie Northern (James River)	Alabama	6.4%	-	-	-
Williamette, Ind. W. Kraft	Kentucky	6.4%	6.3%	-	-
St. Regis (GA Pacific)	Mississippi	5.5%	5.5%	9.7%	9.7%
10%					
Hoerner Waldorf, Champion Int'l	North Carolina	12.4%	12.4%	12.4%	12.4%
Continental Forest (Fed. P)	Georgia	21.0%	21.0%	14.2%	14.4%
Great Southern Paper	Georgia	-	21.0%	-	-
Stone Container	Georgia	21.8%	21.8%	-	-
Inland Container	Tennessee	22.0%	22.0%	22.0%	22.0%
Stone Container	South Carolina	22.5%	22.5%	22.5%	22.5%
Federal Paper	North Carolina	-	-	-	29.0%
International Paper	South Carolina	15.6%	29.0 %	<0.1%	16.0%
Williamette Ind., Med.	Kentucky	29.2%	29.2%	-	-
Olin (Ecusta Corp.)	North Carolina	29.0%	33.6%	39.2%	39.6%

Total: 21
Total where difference is judged significant (>3%): 16

The permit files for the 21 permits that showed exceedance of the independently calculated limitations were examined to determine the cause of the discrepancies. The discrepancies were generally found to be production related in origin, although two resulted from the use of seasonal limits. The discrepancies and the production rates used in permit development are summarized in Table 25.

TABLE 25

Summary of Production Data, Bases for Production in Permit, and Cause of Discrepancy

State	Mill Name	High '79-'83 Annual Production Reported By Mill for this Study (air-dried ton/day)	Production Rate Used in Permit (air-dried ton/day)	Bases for Production Rate in Permit Development	Cause of Permit Discrepancy with BPT Guidelines
AL	AL Kraft, GA Kraft	A = 1181	A = 1200	Not Documented Permit Application (12/22/80)	Discrepancy Insignificant
	Gulf States Paper	H = 597 G = 90 Q = 32	H = 627 G = 25 Q = 75	Not Documented Permit Rationale (5/28/81)	Seasonal Limits
	Hammermill Paper	G = 1017	G = 1100	Not Documented Permit Application (9/24/81)	Higher Production Basis, Unknown Source
	Dixie Northern (James River Corp)	H = 1019	H = 1131	Not Documented Permit Application (3/30/81)	Higher Production Basis, Unknown Source
GA	Georgia Kraft	A = 1991	A = 2052	One Month Maximum Permit Application (8/5/82)	Different Weighing of Production Among Subcategories
	Union Camp	D = 2966 E = 218 (Part 454) D = 466 (Part 454) G = 14	D = 2997 E = 177 (Part 454) D = 466 (Part 454) G = 14	One Month Maximum Company Letter (10/12/82)	Higher Production Basis, Source Unknown
	Continental Forest Ind. (Federal Paper Board)	H = 1132 G = 100 N = 350 S = 30	Total = 2290	Not Documented Fact Sheet (9/2/81)	Unable to Determine Non-Continuous Discharge Based Limits May Contribute, Permit May be Based on Increased Production.

TABLE 25 (CONT'D)

Summary of Production Data, Bases for Production in Permit, and Cause of Discrepancy

State	Mill Name	High '79-'83 Annual Production Reported By mill for this Study (air-dried ton/day)	Production Rate Used in Permit (air-dried ton/day)	Bases for Production Rate in Permit Development	Cause of Permit Discrepancy With BPT Guidelines
GA	Great Southern Paper	D = 2675.4	D = 2420	Previous Permit Permit Rational (9/30/82)	Unable to Determine Non-Continuous Discharge Based Limits May Contribute
	Stone Container	A = 936	A = 919	Not Documented Permit Rational (9/29/82)	Unable to Determine
KY	Willamette Ind. W. Kraft	G = 603	G = 660	One Month Maximum Fact Sheet (8/17/82)	Use of Max. Month Production Basis
	Willamette Ind. Med. Mill	D = 358	D = 380	Plant Capacity Co. Letter (11/22/78)	Use of design capacity and other unknown factors.
MS	International Paper Natchez	F = 737 G = 490	F = 905 G = 284	Not Documented Fact Sheet (No date)	Discrepancy Insignificant
	St. Regis (GA Pacific)	A = 1679.3	A = 1843	Not Documented Permit Rational (10/16/81)	Higher Production Basis Source Unknown Seasonal Limits May Contribute

Table 25 (CONT'D)

Summary of Production Data, Bases for Production in Permit, and Cause of Discrepancy

State	Mill Name	High '79-'83 Annual Production Reported By Mill for this Study (air-dried ton/day)	Production Rate Used in Permit (air-dried ton/day)	Bases for Production Rate in Permit Development	Cause of Permit Discrepancy with BPT Guidelines
NC	Hoerner Waldorf Champion Int'l	A = 1035 E = 70	A = 1186 E = 70	One Month Maximum Permit Rational (12/19/83)	Use of Max. Month Production Basis
	Federal Paper Board	G = 964 H = 1020	G = 500 H = 1000	Not Documented Fact Sheet (5/3/78)	Unable to Determine (48-Hr Limit Used in Lieu of Daily Max.)
	Olin (Ecusta Corp)	Z = 93 R = 116 X = 126 Cellophane = 63	Z = 171 R = 235 X = 215 Cellophane = 63	Plant Capacity Fact Sheet (8/18/83)	Use of Design Capacity for Production
SC	Stone Container	A = 1550	A = 2000	Plant Capacity Fact Sheet (7/20/83)	Use of Design Capacity for Production
	International Paper	D = 1363 H = 357	D = 2006	Not Documented Fact Sheet (Updated)	Unable to Determine
TN	Bowater Southern	H = 723.2 L = 243.9 M = 628.4 N = 665.2	H = 791 L = 253 M = 654 N = 881	Not Documented Permit Retional (3/27/83)	Discrepancy Insignificant
	Mead Corp.	P = 376 R = 287	P = 432 R = 355	One Day Maximum Permit Application (3/16/81)	Discrepancy Insignificant
	Inland Container	B = 535	B = 686	Plant Capacity Permit Rational (2/83)	Use of Design Capacity for Production

Sixteen (16) of the permits contained discrepancies that were considered significant (>3%). Of these, the discrepancies in 10 were production related. Four of the permits with production related discrepancies did not document the basis for production. Two permits contained seasonal limits which allowed discharges to exceed guidelines during the seasonal "high-flow" months of the receiving waters, but these were in turn compensated for by more stringent or even "zero discharge" limits during the seasonal "low-flow" months. (The "annual average" of the seasonal limits do meet guideline levels.) Four of the older permit files did not contain adequate documentation to explain how the limits were developed. The results can be summarized as follows:

Cause of Discrepancy	No. of Facilities
- Production related:	
Design Capacity Production Used for Permit	3
Monthly Maximum Production Used for Permit	2
Unknown Production Basis for Permit	4
Caused by Changes in Production Levels (Among Multiple Product Categories)	1
- Seasonal Limits or Non-Continuous Discharges:	
Permit Allows Monthly or Daily Exceedances Over Effluent Guideline Limits, Compensated by More Stringent Than Guidelines Limits at Other Times	2
- Unknown:	
Unknown, not production related	2
Unknown, possibly production related	2

The discharge monitoring data for the 16 mills with significant discrepancies was reviewed to examine whether these mills could have met the more stringent EPA calculated BPT values during the study period, or whether additional treatment was needed. This review showed that 7 of the 16 mills can meet the more stringent values. They are listed as follows:

AL	Gulf States Paper Hammermill Paper Dixie Northern Inc. (James River Corp.)
GA	Continental Forest Ind. (Federal Paper Board) Union Camp
NC	Federal Paper Board
SC	Stone Container

Poor documentation was more evident in the older permit files of the study period, while the more recently renewed permits were much better documented. In recent years EPA's state overview program has stressed the importance of proper documentation for NPDES permits.

d. Evaluation of Best Available Technology Economically Achievable (BAT) Permit Requirements and Use of Best Management Practices Plans

Federal regulations require mills where chlorophenolic-containing biocides are used shall be subject to pentachlorophenol and trichlorophenol limitations. Mills not using chlorophenolic-containing biocides must certify to the permit-issuing authority that they are not using these biocides. Of the 56 pulp and paper mill permits that were surveyed, 10 contained limits for pentachlorophenol and trichlorophenol, and 32 contained a certification letter stating that these biocides were not used at these mills. The remaining 14 permits did not contain limits for pentachlorophenol and trichlorophenol, and also did not have present a letter certifying non-use of chlorophenolic-containing biocides. Listed below are mills that do not appear to meet the BAT requirement regarding chlorophenolic-containing biocides at the time of file review.

International Paper - SC
Jackson Co. Part Auth (IP) - MS
Bowater Southern Paper - TN
Stone Container Corp. - GA
Interstate Paper Corp. - GA
Southeast Paper Mfg. - GA
Continental Forest Ind.
(Federal Paper) - GA
Brunswick Pulp and Paper - GA
Great Southern Paper - GA
ITT Rayonier - GA
Westvaco Fine Papers - KY
Weyerhaeuser NB - NC
Weyerhaeuser PL - NC
Champion Papers - NC

Although not a requirement, EPA strongly recommends that major industrial permits contain provisions for a Best Management Practices (BMP) plan. BMPs are measures to prevent or mitigate pollution

related spills or accidents through better management and employee awareness, and BMPs have proven successful and cost-effective where implemented. Twenty-one of the 56 permits under review included a Best Management Practices plan. The majority of the permits reviewed from Florida, South Carolina, Alabama, and Kentucky contained BMPs, while those from Mississippi, Tennessee, Georgia, and North Carolina did not contain BMP requirements. Because of the time elapsed since our file review, this situation may have changed.

e. Evaluation of Water Quality Based Permit Requirements

Although the permitting portion of this report focused primarily on the application of effluent guidelines in the pulp and paper industry, an additional cursory review was performed regarding whether water quality standards based limitations have been adequately included in NPDES permits (primarily BOD). The information below is based on available file information and not on any new analysis or review performed during the conduct of this study.

Category 1: Permit limits appear adequate to meet Water Quality Standards (WQS) for dissolved oxygen.

Mobile Water Service	AL0002780
Scott Paper, Mobile	AL0002801
Alton Packaging	FL0000892
Georgia Kraft	GA0001104
Continental Forest (Fed. Paper)	GA0002801
Weyerhaeuser	MS0036412
Olin Corp.	NC0000078
Hoener-Waldorf	NC0000732
Weyerhaeuser	NC0003191
I.P.	SC0000868
Mead Corp.	TN0001643
Buckeye Cellulose	FL0000876

Champion	AL0000396	
Hammermill Paper	AL0003018	
Union Camp	AL0003115	
Kimberly Clark	AL0003158	
Mead Corp.	AL0022314	
AL River Pulp	AL0025968	
Westavco Fine P.	KY0000086	
Williamette Medium	KY0001708	
Williamette Kraft	KY0001716	
I.P., Vicksburg	MS0000171	
I.P., Natchez	MS0000213	
Kimberly Clark	SC0000582	
Westvaco	SC0001759	
TN River Pulp	TN0002232	
Bowaters	TN0002356	
Inland Containers	TN0002763	
Weyerhaeuser, Plymouth	NC0000680	Exp. 06/30/91

Category 2: Permit limits do not appear adequate to meet WQS for dissolved oxygen.

Subcategory A: EPA has reviewed and the permit limits have been determined not to be adequate to meet WQS.

Brunswick Paper	GA0003654

Subcategory B - EPA has reviewed, water quality problems are indicated, and additional water quality work and review to determine final limits is needed. Program activities are in progress to establish appropriate effluent limitations for these facilities.

		Expiration Date
St. Regis (Champion)	FL0002526	01/03/88
ITT, Fernandina	FL0000701	10/31/89
Owens/Illinois	FL0000281	10/31/86
Gillman Paper	GA0001953	09/30/88
Union Camp, Savannah	GA0001988	11/15/87
Stone Container	GA0002798	11/15/87
Jackson Co. Port Auth. (I.P.)	MS0002674	12/31/87
Champion	NC0000272	04/30/90
Federal Paper Board	NC0003298	12/31/87

Category 3: EPA has not reviewed recently, a full review will be scheduled as part of normal overview of permit issuance activities.

AL Kraft	AL0000817	10/01/89
MacMillan Bloedal	AL0002674	07/01/89
Container Corp.	AL0002682	09/14/87
Allied Paper	AL0002755	08/31/87
Gulf States	AL0002828	07/17/86
Dixie Northern (James River)	AL0003301	03/31/81
Gold Bond	AL0003930	08/20/89
Container Corp.	FL0001104	04/02/88
Great So. Paper	GA0001201	11/15/87
Interstate Paper	GA0003590	11/15/87
ITT Rayonier	GA0003620	12/05/87
S.E. Paper	GA0032620	11/15/87
St. Regis (GA Pacific)	MS0002941	12/31/86
Alpha Cellulose	NC0005321	04/30/89
Stone Container	SC0000876	08/31/88
Bowater Carolina	SC0001015	12/31/81
Sonoco Prod.	SC0003042	01/31/89

The above information is basically a status report of the establishment of appropriate water quality based effluent limitations by the various NPDES authorities. EPA, through either direct permit issuance or overview of state NPDES programs, has not yet completed a review of the water quality standards based effluent limitations for about half the facilities examined in this study.

f. Conclusions and Recommendations

1. Sixteen (29%) of the 56 mill permits surveyed in Region IV (issued 1979 through 1983) were found to contain one or more limits significantly more lenient (greater than 3%) than required by regulations. Two of these permits employed seasonal limits (which "average" guideline levels). Five of the permits listed production rates based on plant design capacity or maximum production, and were considered not issued according to guidelines. The remaining 9 permits did not present proper documentation to support the production or limits they contained. The regulations covering this matter, however, are not consistent and leave room for interpretation. EPA and involved State agencies should reopen the 16 permits with significant discrepancies, obtain proper documentation, and permits found not stringent enough to meet regulations should be modified to revise the limitations. In addition, EPA should initiate proceedings for amending 40 CFR Part 122.45(b) of the NPDES permit program regulations to eliminate inconsistencies in the regulations regarding the proper averaging period for determination of a facilities production.

2. Twenty (36%) of 56 pulp and paper mill permits surveyed (issued 1979 through 1983) were found not to have limits for pentachlorophenol and trichlorophenol, and also did not have present in the permit file a certification of non-use of chlorophenolic-containing biocides. The guidelines require mills which do not have these limits must certify that they do not use chlorophenolic-containing biocides. EPA and the States should contact the facilities involved and obtain the necessary certifications.

3. Twenty-nine facility permits (52%) of the 56 studied are believed to have permit limits adequate to protect water quality standards. Through program activities not directly connected with this study, EPA has identified 10 of the 18 (20%) facilities included in this study as having inadequate effluent limitations to maintain instream water quality standards. Program actions to correct this situation are underway. Seventeen facility permits (30%) of the 56 facilities studied have not received a comprehensive review to deterine if water quality standards are protected. A review of these permits will be scheduled in the normal course of State and EPA program implementation.

B. NPDES Compliance Program

1. Compliance Monitoring

Compliance monitoring is a process whereby compliance information is systematically collected, evaluated and translated into timely and appropriate enforcement response. This process is essential to maintain the overall integrity of the NPDES permit program and for identifying instances of noncompliance so that EPA and NPDES states can initiate appropriate action as needed. Compliance monitoring is comprised of four main subactivities - compliance review, data management, compliance inspection and discharge monitoring report quality assurance (DMR QA) program.

a. Compliance Review

Compliance review consists of the review of all written reports or materials relating to the status of the permittee's compliance with the NPDES permit. The review includes but is not limited to Discharge Monitoring Reports (DMR's) and noncompliance reports. These reports originated from the permittee and usually played an important role in compliance review. To determine compliance, the compliance review process starts with DMR's. The DMR's show, for a given period, a mill's actual discharge versus the permit limits. If violations are found, the violations are compared to the technical review criteria (TRC) used in the determination of

"significant noncompliance" (SNC) as discussed in Section IV.C.2. The TRC criteria focus on the magnitude of the violations. Violations that fall outside the TRC range will be given priority for subsequent enforcement action. In this study, NPDES state procedures were judged against these standard procedures. All states were found to have adequate procedures to review compliance information and to identify violations using EPA's definition of SNC.

Once a violation is identified in the DMR's, the next step in the compliance review process is to determine its causes and circumstances. The NPDES permit requires that the permittee notify the regulatory agencies and submit a noncompliance report for each instance of noncompliance. The noncompliance report must contain a description of the violation and its cause, the period of occurence, including exact dates and times; and if the violation has not been corrected, the anticipated time it is expected to continue, and steps taken or planned to reduce, eliminate, and prevent reoccurrence of the violation. For this study, EPA conducted independent reviews of compliance files in each state office and EPA. All documents relating to the noncompliance report are noted in EPA's File Review Checklist Form (Appendix A). Review of the files for 1982 and 1983 indicated these reporting requirements are not being consistently complied with by the pulp and paper mill industry in Region IV. A previous table on the causes of permit violations (Table 16) showed that only half of the 164 permit violations were known or properly documented.

Of the 56 mills listed, a total of 15 mills (27%) have some deficiencies in this area of noncompliance reporting. For mills with SNC violations, the noncompliance reporting records are even worse. Table 26 correlates the number of quarters a mill is in SNC to the number of corresponding noncompliance reports found in state and EPA files. On a regional average, written records of noncompliance reports were submitted to Region IV states and EPA only 33% of the time for SNC violations. Of the 6 mills with significant violations only 1 mill had properly notified the state or EPA of its noncompliance at all times. This mill was located in Alabama. This report is a regulatory requirement. EPA and the states must work to improve compliance with the notification requirement. EPA should increase its overview activities to assure compliance with all Clean Water Act requirements.

TABLE 26

NONCOMPLIANCE REPORTING RECORD FOR MILLS WITH FREQUENT SNC VIOLATIONS*

State	Mill Name	Number of Quarters in SNC	Number of Noncompliance Reports in File	Complete Documentation of Noncompliance Report
Alabama	Champion Paper	1	1	yes
	Gold Bond Building Products	8	2	no
Georgia	Brunswick Pulp and Paper	3	1	no
Kentucky	Willamette Industries Inc., W. Kraft	1	1	no
North Carolina	Federal Paper Board	8	3	no
Tennessee	Inland Container	6	1	no
	REGION IV TOTAL:	27	9 (33%)	

*Frequent Significant Noncompliance (SNC) Violations Means: (1) Chronic, four exceedance of monthly average effluent limit in a six month period, regardless of the magnitude of the violation;

-OR-

(2) Two exceedance of monthly average effluent limit by 40% in a six month period.

b. Data Management

Data management consists of maintaining and handling compliance materials relating to the NPDES program. It can be viewed as an organized system of various components which include the following:

1. Maintenance of complete and current records
2. Adequate system of tracking compliance information
3. Submittal of complete and accurate Quarterly Noncompliance Reports (QNCR).

Maintenance of Complete and Current Records

Region IV states maintain and update compliance records on individual permittees by means of two systems. The first system is a manual system. It consists of a separate file for each facility. The other is a computerized system called the Permit Compliance System (PCS). It is primarily used as an information system and an administrative tool for the NPDES program. All official actions by Region IV states are based on the files and not the PCS system. To evaluate the manual system, compliance files for each of the eight states in Region IV were reviewed for the study. The review focused on file content which included such items as the NPDES permit, correspondences, DMR's and inspection reports. The files, for most NPDES states, were complete, accurate, and current. Compliance materials and DMR's were well organized and in chronological order. The only exception was the State of Tennessee where DMR's were not secured in file folders and were not in chronological order.

In order to move states closer to an automated data management system, NPDES states are strongly urged to utilize the PCS directly. If the states do not use PCS directly, the state must submit necessary information in a suitable form to EPA for data enty. States who enter PCS data directly are Georgia, Kentucky, South Carolina, and Tennessee.

States who currently submit PCS data to the EPA Regional Office for data entry are Alabama, Mississippi, and North Carolina. It is the responsibility of each direct PCS user to maintain current, accurate, and complete PCS data. In the compliance program, PCS is used to store and retrieve inspection data and DMR results. Since the loading of the DMR data into PCS was just beginning to be implemented, the study concentrated only on the inspection data. A comparative review of inspection records in a state's file with the PCS printout indicated that most NPDES states have coded in all necessary inspection data. The only exception was Georgia. There were nine instances between 1982 and 1983 where inspection results in Georgia's files failed to show up in the PCS printout.

Adequate System of Tracking Compliance Information

Compliance tracking is used to record and log all instances of non-compliance. Review of the state files revealed there is no program deficiency in this area of data management. All states have adequate procedures of tracking compliance data. For most states in Region IV this process is done manually. Historical reference on all instances of noncompliance are recorded either on a violation summary report or

in a notebook system. The use of the computerized system to detect, store, and track compliance information has not been fully developed at the time of file review. Only the State of Mississippi has developed a computer system that identifies violations at all facilities. The system is presently used for their Quarterly Noncompliance Report (QNCR) submittal to EPA. Because of the time elapsed since our file review, this situation has changed. All states are presently required under the Permit Compliance System (PCS) Policy Statement to use PCS directly and to track compliance by PCS.

Submittal of a Complete and Accurate Quarterly Noncompliance Report (QNCR)

The QNCR is an important document designed to report noncompliance. EPA requires each state to prepare a QNCR which shows only the major facilities in SNC. The report summarizes the nature of violations and the enforcement activities associated with those facilities. The QNCR is generated quarterly and represents the compliance status of a facility for a review period ranging from 3 to 6 months. EPA Region IV reviews the quality of the QNCR for Federal regulation requirements and enforcement actions. This review is intended to track and evaluate the effectiveness of the state compliance record and enforcement actions. To determine the completeness and accuracy of QNCRs submitted by delegated states, EPA reviewed the DMR's in each state file and identified all pulp and paper mills in SNC during 1982 and 1983. The results revealed that some states have not properly documented all instances of significant noncompliance

(SNC) to EPA. Table 27 correlates the number of quarters a mill was in SNC to the number of times it was listed on QNCR. A total of 6 pulp and paper mills were found to meet EPA's definition of SNC at some point during the 24-month period ending December 31, 1983.

These six mills should have been listed on the QNCR for all instances of SNC. However, Alabama, Georgia, Kentucky, North Carolina and Tennessee reported mills in SNC on an average of only 44% of the times that reports were required to be made. Because of the importance of this report to Congress, the public, and EPA and the small number of facilities involved, immediate efforts should be made by the states to assure its accuracy. EPA needs to increase its overview activities to assure compliance with all Clean Water Act requirements.

TABLE 27

QNCR SUBMITTAL RECORD BY REGION IV DELEGATED STATES

State	Mill Name	Number of Quarters in SNC	Number of Times Listed on QNCR	Complete Record of All Quarters in SNC Listed On QNCR
Alabama	Champion Paper	1	0	no
	Gold Bond Building Products	8	5	no
Georgia	Brunswick Pulp and Paper	3	2	no
Kentucky	Willamette Industries Inc. (W. Kraft)	1	0	no
North Carolina	Federal Paper Board	8	1	no
Tennessee	Inland Container	6	4	no
	REGION IV TOTAL:	27	12 (44%)	

c. Compliance Inspections

Another integral part of the compliance monitoring process is compliance inspections. The NPDES program requires the regulatory agencies to conduct inspections of a permittee's facility to verify that all permit requirements are being met. Such inspections may include a Compliance Evaluation Inspection (CEI), a Compliance Sampling Inspection (CSI), or a Performance Audit Inspection (PAI). A CEI is a non-sampling inspection designed for facility record reviews and visual observations of the treatment facilities. A CSI is a sampling inspection in which a representative sample of the permittee's effluent is collected. A PAI is a quality assurance inspection designed to verify the permittee's reported data through a check of laboratory techniques and records from sample collection to final report. In addition to their respective task, both CSIs and PAIs also involve the same non-sampling tasks of the CEI.

It is the responsibility of delegated states and EPA to schedule inspections on a rotating basis for all major facilities. To determine if this requirement had been made, the study examined inspection reports for each of the fifty-six pulp and paper mills in Region IV. As shown in Table 28, NPDES states and EPA performed a total of one hundred sixty-seven inspections for 1982 and 1983. CEIs were the predominant type of inspections with one hundred and six performed. CSIs were next with forty-six inspections performed. PAIs were the least predominant type of inspection with only fifteen performed. Regulations require that an inspection be made at each major facility at least once within a

TABLE 28

INSPECTION ACTIVITIES OF REGION IV STATES
DURING 1982 AND 1983

STATE	NUMBER OF PULP & PAPER MILLS	TYPE OF INSPECTIONS			TOTAL INSPECTIONS	ANNUAL INSPECTION RATIO
		CEI	CSI	PAI		
Alabama	15	18	33	3	54	1.3
Florida	6	6	10	3	19	1.6
Georgia	10	0	20	1	21	1.1
Kentucky	3	2	3	2	7	1.2
Mississippi	5	7	14	3	24	2.4
North Carolina	7	8	11	1	20	1.4
South Carolina	6	1	14	0	15	1.3
Tennessee	4	4	1	2	7	0.9
Region IV Totals:	56	46	106	15	167	1.4

twelve month period. Correlation between the number of inspections performed to the number of pulp and paper mills (Table 28) reveals that enough inspections are made to cover each facility on average of 1.4 times per year or once every 8.6 months. This inspection rate far exceeds EPA's requirement of one inspection per twelve months for all major facilities. However, some mills are inspected more frequently than others and as a result not all mills are inspected on an annual basis. Mills not inspected in 1982 were Owens Illinois (FL), Southeast Parer (GA), Stone Container (GA), Olin (Ecusta Corp., NC), Weyerhaeuser PL (NC), and Mead (TN). Mills not inspected in 1983 were Westvaco (KY), Mead (TN), and Tennessee River Pulp and Paper (TN). Figures 48 and 49 compare inspection rates for each of the Region IV states for 1982 and 1983. In 1982, states with inspection rates of 100 percent were Alabama, Kentucky, Mississippi, and South Carolina and states with less than 100 percent were Florida (83%), Georgia (80%), North Carolina (71%) and Tennessee (75%). For 1983, the number of states with 100 percent inspection rates increased from four states to six states. Inspection rates coverage in Florida, Georgia, and North Carolina have all risen to the 100 percent level.

In conclusion, inspection activities on an regional basis were adequate with an annual inspection ratio higher than EPA's requirement of one inspection per twelve months. However, each state should re-evaluate its strategy and priority for conducting routine and special inspections. If states are unable or unwilling to make a yearly inspection, EPA should conduct the inspection.

FIGURE 48

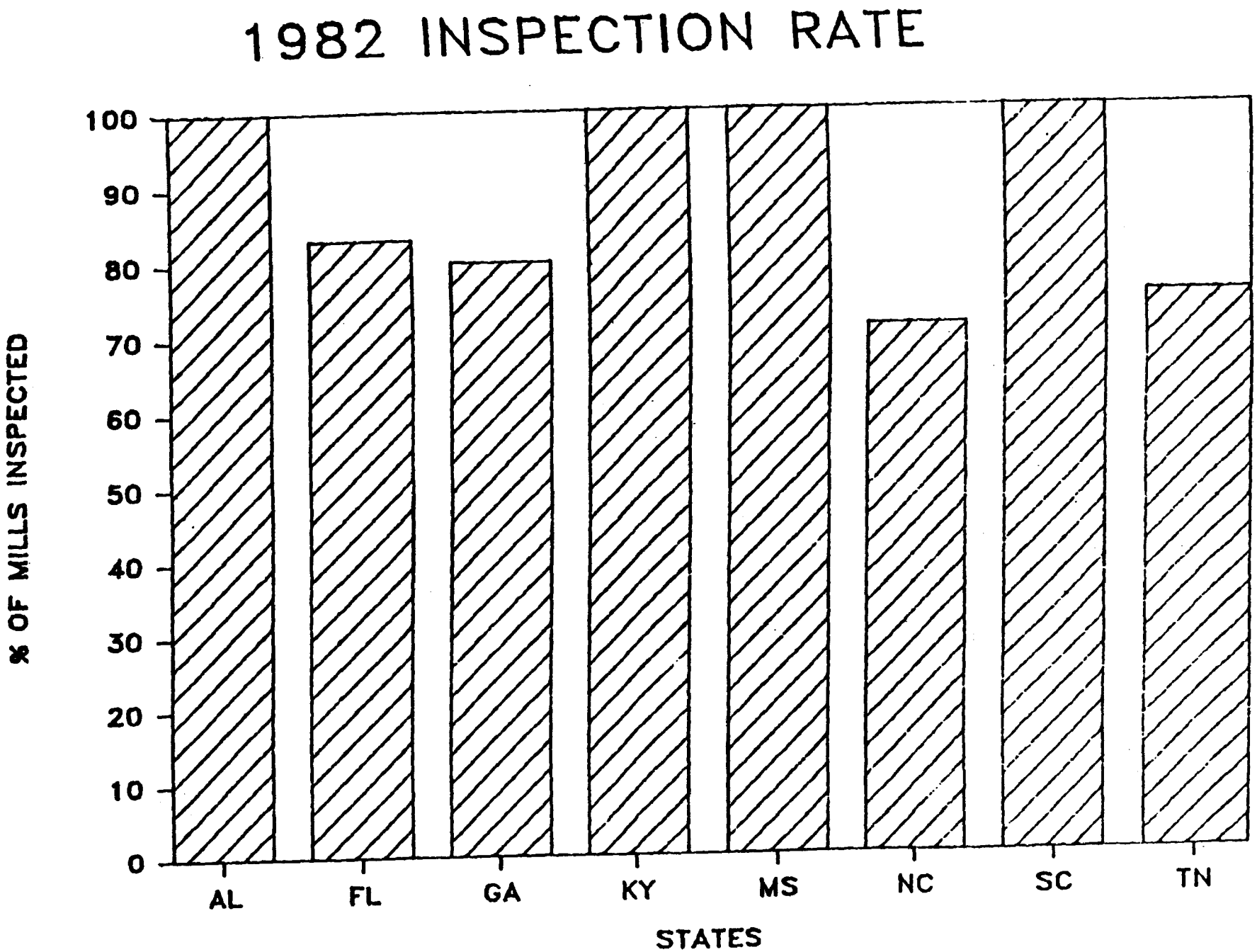
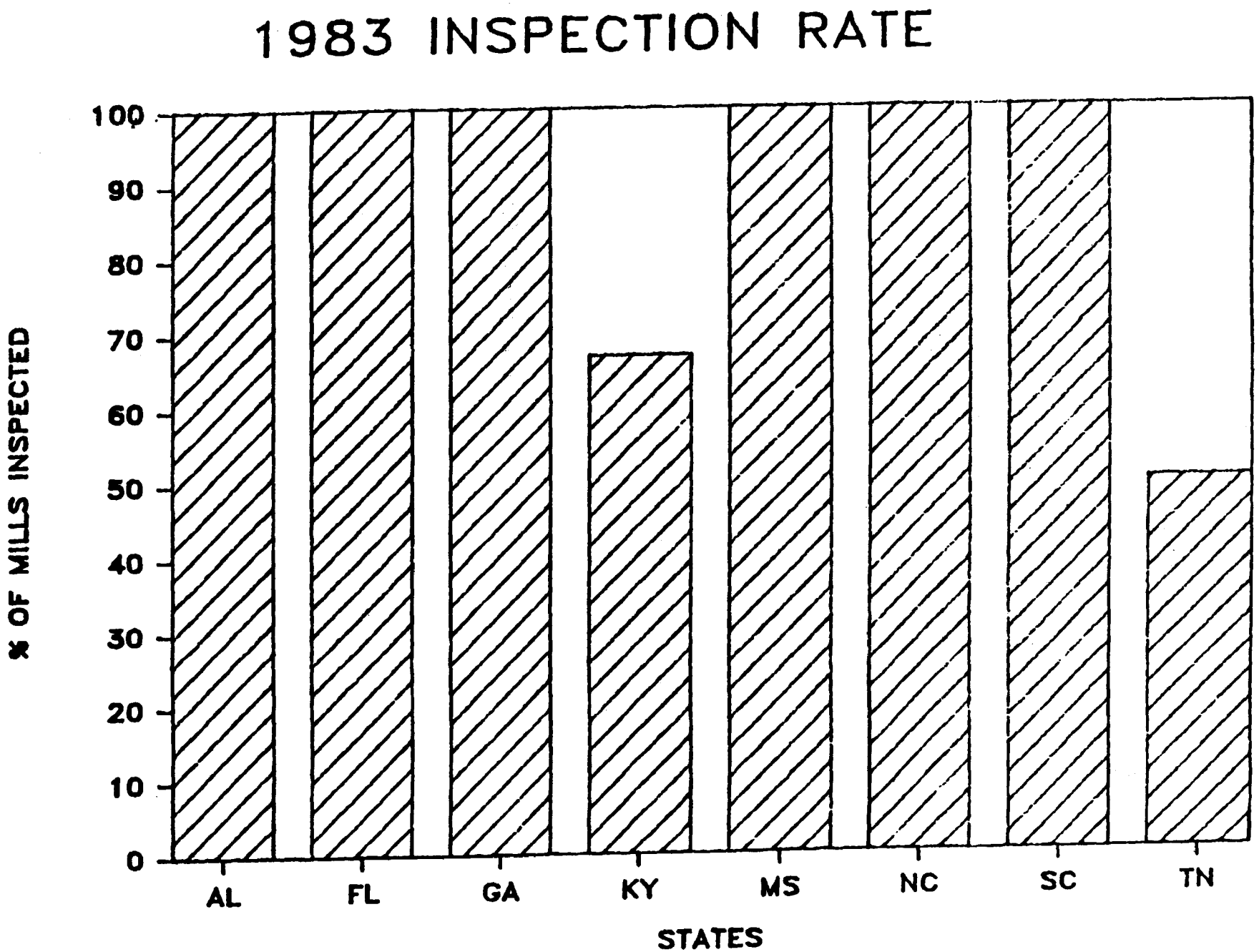

1982 INSPECTION RATE
% OF MILLS INSPECTED
100
90
80
70
60
50
40
30
20
10
0
AL
FL
GA
KY
MS
NC
SC
TN
STATES

FIGURE 49


1983 INSPECTION RATE
% OF MILLS INSPECTED
100
90
80
70
60
50
40
30
20
10
0
AL
FL
GA
KY
MS
NC
SC
TN
STATES

d. Discharge Monitoring Report Quality Assurance (DMR QA) Program

The DMR QA program is designed to assess the quality of self-monitoring data reported by the NPDES permit holders. These studies are conducted annually and are intended to include only major permittees. The program consists of mailing a set of sample concentrates that contain constituents normally analyzed by the permittees. Each permittee is instructed to have the laboratory analyze these sample concentrates on a voluntary basis. Once the samples have been analyzed, the permittee reports the analytical data to an EPA contractor for compilation. A performance report identifying reported values, true values, and data acceptability is provided to the permittee, the state program coordinator, and EPA the regional program coordinator.

When the study is completed, follow-up activities are conducted by delegated states and EPA. These activities mainly focus on permittees that either were listed as non-responding or had results less than satisfactory on any reported parameter. Many permittees initiate voluntary follow-up by troubleshooting lab procedures or checking calculations. However, delegated states and EPA follow-up activities normally include performance audit inspections (PAI's), compliance sampling inspections (CEI's), follow-up letters or telephone calls.

Table 29 summarizes the DMR QA results for Region IV pulp and paper mills. The table lists by state the performance record in the past five studies. The data in the table includes the number of samples analyzed, the percentage of samples inside acceptance limits (success rate), and the percentage of mills with 100% success rate. Four of the eight states (Florida, Tennessee, Alabama and Kentucky) showed an improvement in success rate from Study 1 to Study 5. The state of Kentucky showed the largest increase with 41% in Study 1 versus 88% in Study 5. In terms of percentage of mills submitting 100% success data, only 3 states (Florida, Tennessee, and Kentucky) showed an improvement from Study 1 to Study 5. The state of Tennessee and Kentucky showed the largest improvement. Both states increased from 0% of mills with 100% success rate in Study 1 to 100% for Tennessee and 66% for Kentucky in Study 5.

Figure 50 shows a comparision of success rate for the pulp and paper industry versus other industries in Region IV and the national DMR QA average. In all studies except one (Study 5), the pulp and paper industry performance was higher than other Region IV industries and the national average. With regard to percentage of permittees who submitted 100% success data, Figure 51 showed the pulp and paper industry performance was higher in all five studies compared to other Region IV industries and the national average.

TABLE 29

SUMMARY OF DMR QA RESULTS

MILL NAME	NPDES NUMBER	STUDY 1 # OF SAMPLES	STUDY 1 SUCCESS RATE	STUDY 1 % WITH 100%	STUDY 2 # OF SAMPLES	STUDY 2 SUCCESS RATE	STUDY 2 % WITH 100%	STUDY 3 # OF SAMPLES	STUDY 3 SUCCESS RATE	STUDY 3 % WITH 100%	STUDY 4 # OF SAMPLES	STUDY 4 SUCCESS RATE	STUDY 4 % WITH 100%	STUDY 5 # OF SAMPLES	STUDY 5 SUCCESS RATE	STUDY 5 % WITH 100%
ALTON BOX BOARD	FL0000892	3	100.0								3	66.7		4	100.0	
CONTAINER CORP	FL0001104	3	66.7		3	100.0		3	100.0		3	100.0		4	75.0	
ITT	FL0000701	3	66.7		4	75.0		3	66.7		3	100.0		6	100.0	
ST. REGIS PAPER (CHAMP. INT'L)	FL0002526	3	100.0		3	66.7		14	64.3		15	86.7		15	93.3	
BUCKEYE CELLULOSE CORP	FL0000876	3	66.7		3	100.0		3	100.0		3	100.0		3	100.0	
OWENS ILL	FL0000281	3	66.7		3	100.0		3	66.7		3	66.7		3	100.0	
	FL AVG.		77.8	33.3%		88.3	60.0%		79.5	40.0%		86.7	50.0%		94.7	66.7%
KIMBERLY-CLARK	SC0000582	3	100.0					3	66.7		3	66.7		3	66.7	
STONE CONTAINER	SC0000876	3	100.0					2	100.0		3	100.0		2	50.0	
BOWATER CAROLINA	SC0001015	3	100.0		3	100.0		3	100.0		3	66.7		3	66.7	
INTERNATIONAL PAPER	SC0000868				4	100.0		4	50.0		4	100.0		4	75.0	
WESTVACO CORP	SC0001759	5	80.0		4	75.0		4	75.0		5	100.0		4	100.0	
SONOCO PRODUCTS	SC0003042	5	100.0		5	100.0		5	80.0		4	100.0		4	100.0	
	SC AVG.		96.0	80.0%		93.8	75.0%		78.6	33.3%		88.9	66.7%		76.4	33.3%
INTERNATIONAL PAPER VIC	MS0000191	3	100.0		3	66.7		3	100.0		3	100.0		4	50.0	
ST. REGIS PAPER (GA.-PACIFIC)	MS0002941	3	100.0		3	100.0		3	100.0		3	66.7		3	100.0	
INTERNATIONAL PAPER NAT	MS0000213				3	100.0		3	100.0		3	100.0		3	100.0	
JACKSON CO PORT AUTH (INT'L P.)	MS0002674	3	100.0		3	100.0		3	100.0		3	100.0		3	100.0	
WEYERHAEUSER CO	MS0036412													6	83.3	
	MS AVG.		100.0	100.0%		91.7	75.0%		100.0	100.0%		91.7	75.0%		86.7	60.0%
BOWATER SOUTHERN PAPER	TN0002356	12	83.3		3	100.0		3	100.0		3	100.0		3	100.0	
MEAD CORP	TN0001643	5	80.0		5	80.0		5	100.0		5	80.0		5	100.0	
INLAND CONTAINER	TN0002763	4	50.0		4	75.0		4	100.0		4	100.0		4	100.0	
TENNESSEE RIVER P & P	TN0002232	4	75.0		4	75.0		4	75.0		3	100.0		3	100.0	
	TN AVG.		72.1	0.0%		82.5	25.0%		93.8	75.0%		95.0	75.0%		100.0	100.0%
ALABAMA KRAFT, GA KRAFT	AL0000817	3	0.0		3	66.7		3	66.7		3	100.0		3	66.7	
CHAMPION PAPER	AL0000396	3	100.0		3	100.0					3	33.3		3	33.3	
GOLD BOND BUILDING	AL0003930										3	100.0		4	100.0	
GULF STATES PAPER	AL0002828	3	100.0		3	100.0		3	100.0		3	100.0		3	66.7	
HAMMERMILL PAPER	AL0003018	3	100.0		3	66.7		3	66.7		3	100.0		3	100.0	
KIMBERLY-CLARK	AL0003158	4	100.0		4	100.0					4	100.0		4	100.0	
UNION CAMP	AL0003115	3	100.0		3	66.7		3	100.0		3	100.0		3	66.7	
ALABAMA RIVER PULP CO	AL0025968	3	0.0		3	100.0										
ALLIED PAPER, S MILL	AL0002755	3	100.0		3	100.0		3	100.0		3	100.0		3	100.0	
CONTAINER CORP	AL0002682	4	100.0		3	66.7		3	66.7		3	100.0		3	100.0	
DIXIE NORTHERN (JAMES RIVER)	AL0003301				3	33.3		3	100.0		3	66.7		3	100.0	
MACMILLAN BLOEDEL	AL0002674	3	66.7		3	100.0		3	100.0		3	100.0		3	100.0	
MEAD CORP	AL0022314	3	100.0		3	100.0		3	100.0		3	100.0		3	66.7	
MOBILE WATER SERVICE IP	AL0002780	3	100.0		3	33.3		3	100.0		3	33.3		3	100.0	
SCOTT PAPER, MOBILE MILL	AL0002801													4	50.0	
	AL AVG.		80.6	75.		79.5	53.8%		90.0	70.0%						

TABLE 29 (CONT'D)

SUMMARY OF DMR QA RESULTS

MILL NAME	NPDES NUMBER	STUDY 1 # OF SAMPLES	STUDY 1 SUCCESS RATE	STUDY 1 % WITH 100%	STUDY 2 # OF SAMPLES	STUDY 2 SUCCESS RATE	STUDY 2 % WITH 100%	STUDY 3 # OF SAMPLES	STUDY 3 SUCCESS RATE	STUDY 3 % WITH 100%	STUDY 4 # OF SAMPLES	STUDY 4 SUCCESS RATE	STUDY 4 % WITH 100%	STUDY 5 # OF SAMPLES	STUDY 5 SUCCESS RATE	STUDY 5 % WITH 100%
STONE CONTAINER CORP	GA0002798	3	100.0		3	100.0		3	100.0		3	100.0		3	66.7	
CONTINENTAL FOREST (FEDERAL P.)	GA0002801	3	100.0		4	75.0										
INTERSTATE PAPER CORP	GA0003590	3	66.7		3	100.0		3	100.0		3	100.0		3	100.0	
SOUTHEAST PAPER MFG	GA0032620										3	100.0		3	100.0	
UNION CAMP	GA0001988	3	100.0		3	100.0								3	100.0	
BRUNSWICK PULP&PAPER	GA0003654	3	100.0		3	100.0		3	100.0		3	100.0		3	100.0	
GEORGIA KRAFT	GA0001104	3	66.7		3	100.0		3	100.0		3	100.0		3	66.7	
GILMAN PAPER	GA0001953	4	100.0		3	100.0		3	66.7		3	66.7		3	100.0	
GREAT SOUTHERN PAPER	GA0001201	4	75.0		3	100.0		3	100.0		3	100.0		3	33.3	
ITT RAYONIER	GA0003620	2	100.0		3	100.0		3	66.7		3	100.0		3	100.0	
	GA AVG.		89.8	66.7%		97.2	88.9%		90.5	71.4%		95.8	87.5%		85.2	66.7%
WESTVACO FINE PAPERS	KY0000086	4	25.0		3	100.0		3	100.0		3	100.0		3	66.7	
WILLAMETTE IND NEO MILL	KY0001708	3	66.7		3	100.0		3	100.0					3	100.0	
WILLAMETTE IND W KRAFT	KY0001716	3	33.3		3	66.7		3	100.0		3	100.0		3	100.0	
	KY AVG.		41.7	0.0%		88.9	66.7%		100.0	100.0%		100.0	100.0%		88.9	66.7%
ALPHA CELLULOSE	NC0005321	7	57.1		7	71.4		6	100.0		6	50.0		6	100.0	
FEDERAL PAPER BOARD	NC0003298	6	50.0		5	60.0		5	100.0		5	80.0		5	80.0	
WEYERHAEUSER NB	NC0003191	3	100.0		5	60.0		4	75.0		4	75.0		4	75.0	
WEYERHAEUSER PL	NC0000680	5	100.0		5	40.0		5	100.0		5	100.0		5	80.0	
CHAMPION PAPERS	NC0000272	3	100.0		4	100.0		4	100.0		3	66.7		3	100.0	
HOERNER WALDORF CHAMPION	NC0000752													6	66.7	
OLIN CORP (ECUSTA CORP)	NC0000078	4	100.0		4	100.0		4	100.0		4	100.0				
	NC AVG.		84.5	66.7%		71.9	33.3%		95.8	83.3%		78.6	33.3%		83.6	33.3%
	REG. P&P AVG.		82.1	58.3%		85.8	60.4%		90.1	68.9%		89.2	69.4%		85.8	58.5%
	REG. IV AVG.		72.8	31.4%		79.4	41.3%		83.8	52.7%		86.9	56.8%		86.5	55.9%
	NAT. AVG.		73.9	31.7%		78.9	41.9%		82.8	49.7%		85.4	54.6%		85.5	56.0%

FIGURE 50

SUMMARY OF DMR QA RESULTS

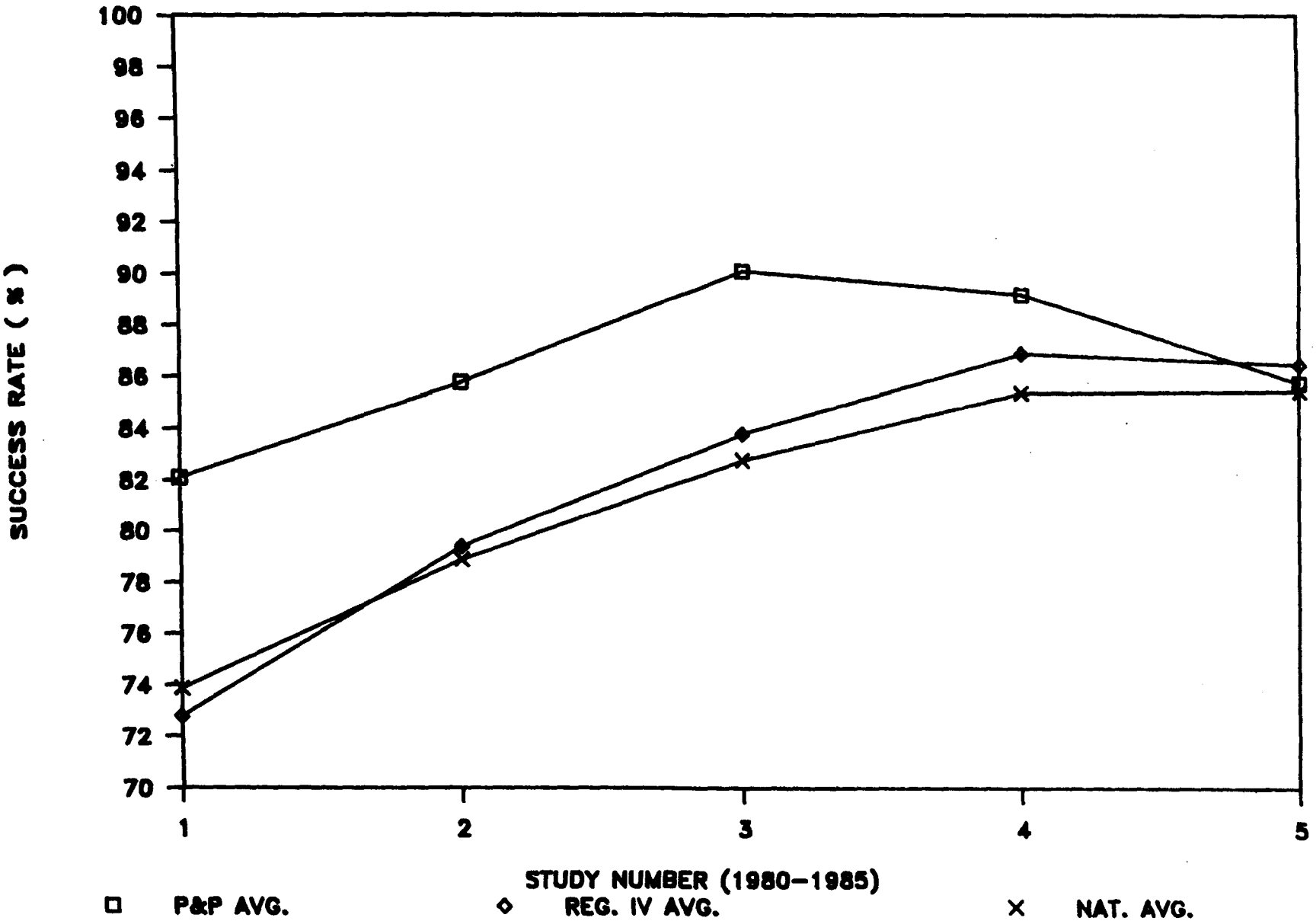
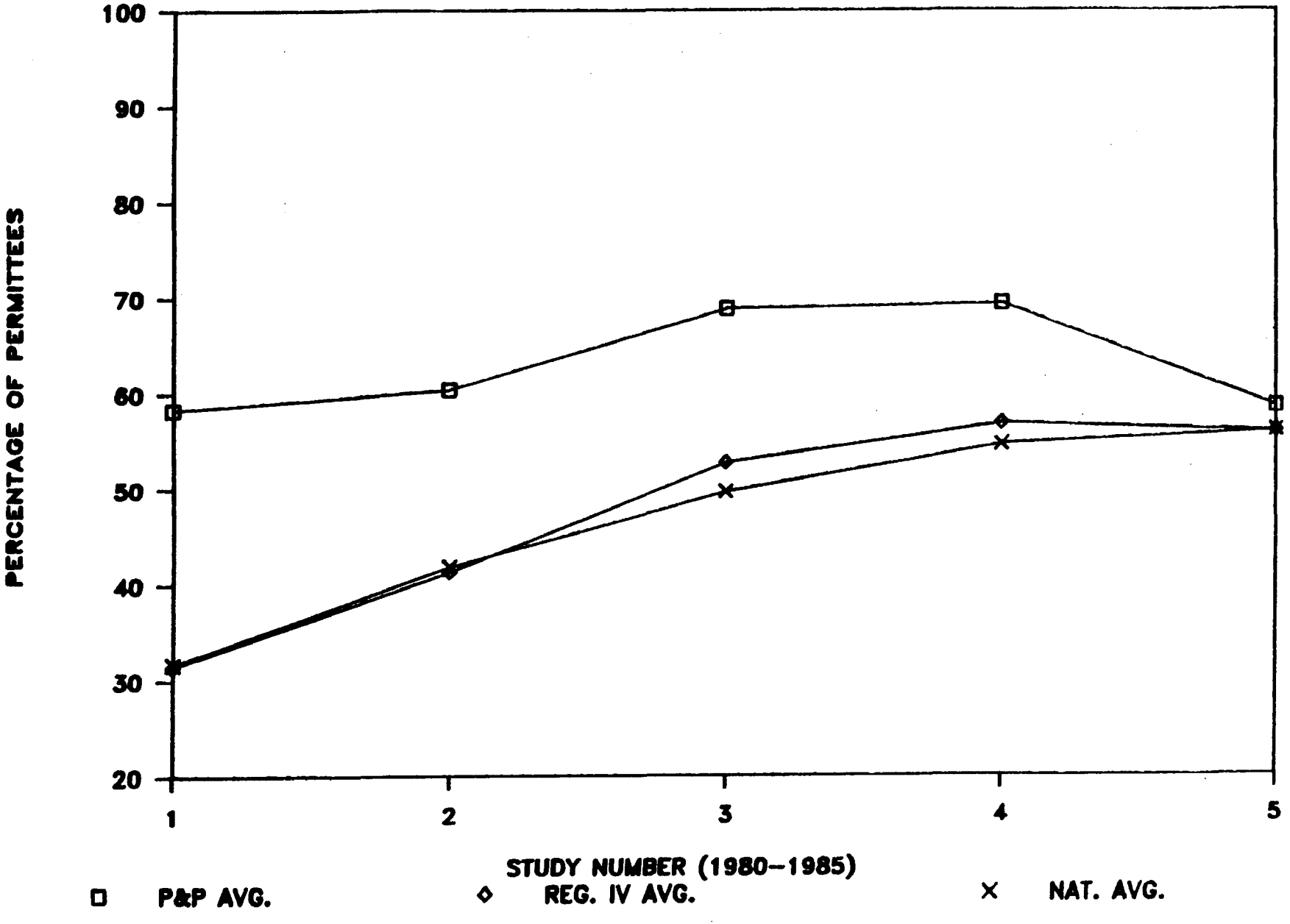


FIGURE 51

PERMITTEES WITH 100% SUCCESS RATE



In general, there is no correlation between the states regarding the DMR QA program. The results lack any significant trend among the states from study to study. The degree of improvement for Region IV pulp and paper mills shows a slight increase in success rate from Study 1 (82.1%) to Study 5 (85.8%). The improvements have been accomplished gradually with small increases. The percentage of mills reporting 100% success rate for Study 5 (58.5%) indicates that further improvement is needed.

2. Enforcement Response

a. Level of Response

The Clean Water Act, Section 309 requires EPA or delegated states to respond to NPDES permit violations by initiating timely and apprporiate enforcement response. Enforcement response involves a series of actions, starting with a phone call or warning letter and proceeding to an administrative order and judicial action.

EPA and delegated states have specific procedures for reviewing and addressing instances of noncompliance. One procedure is the use of the definition of significant noncompliance (Appendix D). The definition discussed earlier is used to highlight those dischargers that should receive priority attention for enforcement actions. The other procedure is the use of the Enforcement Management System (EMS). The regulatory agency has historically maintained an EMS which serves as a guide for enforcement officials. Within the EMS, is an Enforcement Response Guide (ERG) which directs the enforcement officials to various levels of enforcement response to violations. The guide lists three escalated levels of available enforcement response depending on the magnitude, frequency and duration of violations.

The levels of available enforcement responses are discussed below:

EPA Enforcement Response Guide

Enforcement Response	Circumstances
No Action	For facilities with non-SNC violations (violations within TRC range).
Informal Actions (Phone call, warning letters, notice of noncompliance or show cause meeting)	May be used against any violations, but generally used for facilities with SNC violations that are low in frequency or duration.
Formal Actions (Administrative Order, or Referral for judicial action)	May be used against any violations, but generally used for facilities with SNC violations that are high in frequency or duration, have potential water quality impact, or recur after informal action.

When making determinations on the levels of enforcement response, enforcement officials must consider other factors such as past violation history of the mill, promptness in correcting previous problems, and attitude. However, it is anticipated that in most cases enforcement response will be within the framework outlined in the ERG.

With the above enforcement response available, the study determined the extent to which EPA and delegated states had taken no actions, informal actions, and/or formal actons against the pulp and paper industry in Region IV. Of the 56 pulp and paper mills studied, 29 mills (52%) have instances of permit violations at one time or another during 1982 and 1983. Based upon the magnitude and duration of

the violations, these 29 mills are grouped into the following categories: those with non-SNC violations; those with SNC violations that are short in duration (lasting 1 quarter), and those with SNC violations that are long in duration (lasting 2 quarters or more).

Non-SNC Violations

Table 30 summarizes mills with non-SNC violations over the 24 month study period. The Table lists the number of monthly average BOD and TSS violations and the corresponding enforcement response for each instance of permit violation. From the Table, a total of 23 mills have at one time or another violated their NPDES permit. Delegated states and EPA took the following enforcement actions: 17 mills received no action response; 1 mill received a warning letter and a notice of noncompliance (NNC) letter; 3 mills received a NNC response; 1 mill was called to a show cause meeting; and finally 1 mill received a fine. The show cause meeting and the fine involved a mill in Georgia and a mill in Mississippi respectively. For the Georgia mill, the company had numerous permit violations in 1982 (prior to EPA's study period). The mill was issued a consent order (administrative order) with conditions that a fine be collected if permit conditions were violated any time in the near future. As a result of a violation in 1983, the company was assessed a fine. For the Mississippi mill, the company had numerous spills. Previous spills had not caused any permit violation. However, a black

TABLE 30

SUMMARY OF STATE AND EPA ENFORCEMENT ACTIVITIES FOR MILLS WITH NON-SNC VIOLATIONS

State	Mills with Non-SNC Violations	Total No. Monthly BOD & TSS Viol.	Enforcement Response for Each Monthly Instance of Permit Violation					
			No Action	Phone Call	Warning Letter	NNC	Show Cause	Fine
AL	AL Kraft, GA Kraft	1	1					
	Gulf State Paper	1	1					
	Hammermill Paper	1	1					
	Kimberly Clark	3	3					
	Alabama River Pulp Co.	5	5					
	Allied Paper, S Mill	1	1					
	Container Corp.	5	5					
	Mobile Water Service, IP	4	4					
	Scott Paper, Mobile Mill	2	2					
FL	Container Corp	1				1		
	ITT	3	3					
	St. Regis Paper (Champion Int'l)	4	2			2		
GA	Stone Container	6	5			1		
	Gilman Paper	1						1
KY								
MS	St. Regis (GA Pacific)	4	4					
	International Paper NAT	1	1					
	Jackson Co. Port Auth. (Int'l Paper)	1					1	
NC	Alpha Cellulose	5	3		1	1		
	Weyerhaeuser NB	5	5					
	Weyerhaeuser PL	1	1					
	Champion Paper	1	1					
SC	Sonoco Products	1	1					
TN	Mead Corp.	1	1					
TOTALS	23	58	50		1	5	1	1

liquor spill in September, 1983 caused the mill to be in violation of its BOD limit. As a result, the state requested the Jackson County Port Authority (International Paper) to be present at the state office to discuss in-mill and treatment plant improvements. Based on these facts, the higher level enforcement response for these two mills appears to be appropriate. Overall, EPA and delegated state's enforcement actions to non-SNC violations are within the framework of responses outlined in the ERG. Of a total of 58 monthly non-SNC violations involving 23 mills, a large percentage of the responses were in the no-action category (86%).

SNC Violations With Short Duration

Table 31 summarizes Region IV mills with SNC violations with short duration (lasting one quarter). A quarterly review instead of monthly review of the enforcement actions are used because EPA's definition of significant noncompliance (SNC) are based on a review period ranging from 3 to 6 months. According to the definition, a facility is listed as being in SNC for the entire quarter if it has 2 SNC violations or 4 violations (chronic) of the permit limit in any amount over the review period. There were two mills in Region IV that have violations that fall under this review criteria. Each mill had violations of sufficient magnitudes and frequency to trigger

TABLE 31

SUMMARY OF STATE AND EPA ENFORCEMENT ACTIVITIES FOR MILLS WITH SNC VIOLATIONS LASTING ONE QUARTER

					Enforcement Response						
					Informal Action					Formal Action	
State	Mill Name	No. Non-SNC Viol.	No. SNC Viol.	No. of Qtr. in SNC	No Action	Phone Call	Warning Letter	NNC	Show Cause Meeting	A.O.	Referral for Judicial Action
AL	Champion Paper	1	3	1	1						
FL											
GA											
KY	Williamette Ind. W. Kraft	8	2	1	1						
MS											
NC											
SC											
TN											
			TOTAL	2	2	0	0	0	0	0	0

a technical review by the regulatory agencies. In both cases no action was taken. A review of circumstances surrounding the violations revealed that state and EPA actions in these two instances were appropriate. For the case involving Champion Paper, the Company had made numerous contacts with state officials concerning their on going modification of the treatment plant. The Company had maintained optimum treatment performance for a period of two months with half of their activated sludge units in operation. For the case involving Williamette Industry (Western Kraft Paper Group), the Company constructed a new paper machine and bleach plant that came on line December 15, 1981. Total production was increased by 30%. The company had a difficult time meeting limits during the 4 month period from October 1982 to January 1983. During that period, the Company was in SNC with chronic violations of the TSS limits. However, a new permit was issued in the following quarter to reflect the production increase. As a result of these new permit limits the company has not had a permit violation since. Therefore, state and EPA action in these two cases appeared to be within the framework outline in the ERG.

SNC Violations with Long Duration

Table 32 summarizes Region IV mills with SNC violations that were long in duration (lasting two quarters or more). The Table correlates the quarter of a mill in SNC to the corresponding enforcement responses by each delegated state. A total of 4 mills had frequent violations over the 24 month study period. State's enforcement actions against most of these mills had little impact on permit compliance. Only 1 out of 4 mills had returned to permit compliance. The one instance involved a mill in Georgia. The company was able to return to compliance after a formal action by the State. The other three mills with SNC violations received numerous informal actions instead of formal action during the 24 month study period. Enforcement respond from the states of Alabama, North Carolina and Tennessee consisted of 1 phone call, 8 notices of noncompliance (NNC), and 2 show cause meetings. The result of the informal action against these mills was not very effective as violations continued months afterward.

TABLE 32

SUMMARY OF STATE AND EPA ENFORCEMENT ACTIVITIES FOR MILLS WITH SNC VIOLATIONS LASTING TWO QUARTERS OR MORE

State	Mill Name	No. Non-SNC Viol.	No. SNC Viol.	No. Qtr. in SNC	Enforcement Response for Each Quarter in SNC						
					Informal Action					Formal Action	
					No Action	Phone Call	Warning Letter	NNC	Show Cause Meeting	A.O.	Referral for Judicial Action
AL	Gold Bond Bldg.	8	20	8	6	1			1		
FL											
GA	Brunswick Pulp & Paper	10	3	3	2					1	
KY											
MS											
NC	Federal Paper Board	5	19	8	3			5			
SC											
TN	Inland Container	11	16	6	2			3	1		
	TOTAL			25	13	1	0	8	2	1	0

Review of the state's file revealed that all three mills needed additional treatment plant improvements in order to meet permit limits. For example, Gold Bond Building in Alabama and Federal Paper Board in North Carolina both have water quality based permit limits that are more stringent than comparable production mills with BPT based limits. Additional treatment and aeration capacity are needed to improve treatment efficiency. These mills never received any formal enforcement actions although it appears an administrative order with interim limits and/or construction schedule was justified. Using the criteria in the ERG, state enforcement response for frequent significant violators was judged inadequate in all three cases involving mills in Alabama, North Carolina, and Tennessee. States must take forceful enforcement action more quickly in these cases. EPA should increase its overview of State enforcement activities to ensure that appropriate action is taken in a timely manner.

All states have since signed an Enforcement Agreement with EPA in which the states agreed to maintain current enforcement response procedures that are consistent with EPA's Enforcement Response Guide as well as an up-to-date strategy for addressing instances of significant noncompliance consistent with national and state priorities. These procedures set forth: an analytical process for determining the appropriate level of action for specific categories of violation; procedures for preparing and maintaining accurate and complete documentation that can be used in future formal enforcement actions; and time frames

for escalating enforcement responses where the noncompliance has not been resolved. Each state should be able to demonstrate that its enforcement procedures result in: appropriate initial and follow-up enforcement actions that are applied in a uniform, consistent and timely manner; formal enforcement actions that clearly define what the permittee is expected to do by a reasonable date certain; and compilation of complete and accurate permit records that can be used in future formal enforcement actions. In the case of major permittees, by the time a permittee appears on the QNCR, the states are expected to have already initiated enforcement action to achieve compliance. Prior to a permittee appearing on the subsequent QNCR for the same violation, the permittee should either be in compliance or the state should have taken formal enforcement action to achieve the final compliance. This formal action is usually defined as a legally binding administrative order or a referral for judicial action. These standards are essentially unchanged from those in effect at the time of the file reviews with the exception of a requirement for formal action by the time a permittee appears on two QNCRs for the same violation. Using this criteria, four mills in the Region IV states had continuous violations in SNC which lasted for two quarters or more. Table 33 correlates the number of successive quarters these violations were in SNC to the number of formal actions taken. Only one State met this criteria. Of the four states with mills in SNC for two consecutive quarters or more, only Georgia took a formal enforcement action. By presently used criteria, this was a poor record. Initiation of the new national enforcement policy has improved the situation markedly. EPA must assure through independent enforcement actions if necessary, that formal actions are taken on a timely basis.

TABLE 33

MILLS IN SIGNIFICANT NONCOMPLIANCE IN STUDY PERIOD

Mill Name	State	Number of Successive Quarters in SNC	Number of Formal Actions Taken
Gold Bond	Alabama	8	0
Brunswick Pulp and Paper	Georgia	2	1
Federal Paper Board	North Carolina	8	0
Inland Container	Tennessee	6	0

b. Timeliness of Response

Another key element in enforcement response is the timeliness with which the response is initiated. The study reviewed all enforcement actions issued by EPA and delegated states during the two year study period. These actions involved 13 Notices of Noncompliance (NNC), 1 Consent Order (administrative order), and 2 show cause meetings. Of these 13 NNC's, 10 required less than thirty days to issue and 3 required more than thirty days after identification of the violation. The three instances where the NNC was issued after thirty days of the violations involved a North Carolina mill and a Florida mill. With regard to the Consent Order, it was issued in a timely manner. State officials in Georgia were able to issue a Consent Order within two quarters after the violations occurred. Of the two show cause meetings, all were held in a timely manner. State officials in Alabama and Tennessee have scheduled show cause meetings after the mills were issued NNC's the previous quarter. In conclusion, the enforcement response time of Region IV states was judged adequate. Informal actions, in most cases, were taken within 30 days and formal actions were taken within 60 days of documentation of the violations.

APPENDIX A

FILE REVIEW CHECKLIST

FOR THE

PULP AND PAPER INDUSTRY STUDY

Name of Facility: _____

Address of Facility: _____

NPDES Permit No: _____

Issuance Date: _____

Expiration Date: _____

Reviewer: _____

Date of Review: _____

PERMIT FILE CHECKLIST

I. Permit Processing	Yes	No	N/A
1. Was the application received 180 days prior to - start of discharge or - expiration date of permit? Was a draft permit prepared and sent to the applicant?			
2. Was a public notice prepared?			
3. Was notice complete and appropriate?			
4. Was at least 30 days given for comment?			
5. Were comments received for the draft permit?			
6. Have comments which were received been evaluated and changes made in the permit where warranted?			
7. Were there requests for a public hearing?			
8. Were there enough requests to warrant holding a hearing?			
9. Was a hearing held?			
10. Was a tape recording or written transcript made of the hearing?			
11. Was testimony/information received which warranted changes in the permit?			
12. Have these changes been made?			
II. Technical Development			
1. Is fact sheet complete and accurate?			
2. Is rationale complete and accurate?			
3. Are promulgated BPT/BAT (toxic) or NSPS guidelines properly applied? (use BPT limitation calculation sheet in this attachment)			

	Yes	No	N/A
4. What is the basis of the total production? (e.g., long term average, maximum production, highest annual average of last 5 years, etc.)			
5. Are pounds/day and kg/day calculations correct?			
6. If permit is not technology based, are limits based on waste load allocations either approved by EPA or calculated by methodology approved by EPA?			
7. Has a bioassay been performed on this discharge?			
8. If bioassay(s) has shown this discharge to be toxic, have toxicity limits or a toxicity reduction plan been included in the permit?			
9. Have any BPJ limits been developed where guidelines are not promulgated?			
10. Is there ample documentation fo all BPJ decisions?			
11. Does the rationale underlying BPJ decisions support the limits?			
12. Has permittee certified not to be a user of chlorophenolic biocides?			
13. If not, have BAT limits for PCP and TCP been incorporated in the permit?			
14. Does the permit contain a requirement for a BMP plan?			
15. Does the fact sheet support the BMP requirement?			

	Yes	No	N/A
III. Permit Issuance			
1. If a renewal, is the permit at least as stringent as the previous permit?			
2. If not, have the requirements of 40 CFR 127.44(1), "Reissued Permits" been met?			
3. Are all the effluent limits effective immediately, or is a compliance schedule contained in the permit?			
4. If so, does the fact sheet support using a compliance schedule?			
5. Are monitoring requirements appropriate?			
6. Are all required general and special conditions included?			
7. Is permit term five years or less?			
8. Does the permit as issued accurately reflect the draft permit as well as any changes warranted by public participation?			
9. Have copies of the issued permit been sent to: - Applicant? - EPA? - Anyone requesting a copy?			

COMPLIANCE FILE CHECKLIST

	Yes	No	N/A
I. Pre-Enforcement Evaluation			
1. Are there variances or stays?			
a. If so, what type?			
b. Are they being followed?			
2. Is the permittee on a compliance schedule?			
a. What is the completion date?			
b. Is the schedule being met?			
c. If not, has action been taken?			
d. If not, what has been done to achieve compliance?			
II. Compliance Tracking System			
1. Are DMR's and other related correspondence submitted in a timely manner?			
a. If not, what has been done to achieve compliance?			
2. Are all monitoring data and reporting requirements included in the DMR's?			
a. If not, what has been done to achieve compliance?			

III. Enforcement Evaluation	Yes	No	N/A
1. Are they using EPA's definition of significant noncompliance to screen out violations in the DMR's?			
2. If not, what definition is used?			
3. Are there instances of noncompliance in calendar years 1982 and 1983?			
a. If yes, what are the types of violations?			
significant?			
nonsignificant?			
b. What actions were taken?			
c. Are the actions pending?			
d. Have the actions resolved satisfactorily?			
e. Are actions taken appropriate to the situation?			
f. What is the average response time for significant effluent violations in days?			

	Yes	No	N/A
g. Are all responses and resolutions properly documented, i.e., date and level of sign-off?			
h. Are all instances of significant noncompliance reported in the state's QNCR?			
i. Has enforcement response resulted in compliance?			

IV. Compliance, Surveillance, & Monitoring Program

1. Have any inspections been performed at the facility? (If so, answer 2, 3, & 4.)

2. CEI's

   a. Date performed _____.

   b. Deficiencies found.

   c. Actions taken and status.

3. CSI's

   a. Date performed _____.

   b. Deficiencies found.

3. CSI's - continued

   c. Actions taken and status.

4. PAI's

   a. Date performed _____.

   b. Deficiencies found.

   c. Actions taken and status.

CALCULATION OF BPT LIMITATIONS

Subcategory	Production Rate* ADT/day	BOD Average Limit Guideline #/1000 #		BOD Average Limit BPT Limit #/day	TSS Average Limit Guideline #/1000 #		TSS Average Limit BPT Limit #/day
_____	_____	_____	X2	_____	_____	X2	_____
_____	_____	_____	X2	_____	_____	X2	_____
_____	_____	_____	X2	_____	_____	X2	_____
_____	_____	_____	X2	_____	_____	X2	_____
_____	_____	_____	X2	_____	_____	X2	_____
_____	_____	_____	X2	_____	_____	X2	_____
_____	_____	_____	X2	_____	_____	X2	_____
_____	_____	_____	X2	_____	_____	X2	_____
		TOTAL		_____			_____

COMPARISON OF PERMIT TO BPT LIMITATIONS

	BOD #/day	TSS #/day
Permit limitation	_____	_____
BPT limitation	_____	_____

* Taken from application or fact sheet in Air Dried Tons (ADT) per day.

FACILITY NAME:

Monitoring Period	Flow Avg. MGD	Flow Max. MGD	BOD Average Conc. mg/l	BOD Average Loading lb/day	BOD Maximum Conc. mg/l	BOD Maximum Loading lb/day	TSS Average Conc. mg/l	TSS Average Loading lb/day	TSS Maximum Conc. mg/l	TSS Maximum Loading lb/day	Temp °F	pH	D.O.	NH_3-N Conc. mg/l	NH_3-N Loading lb/day	Fecal Coliform #/100 ml	Others
1982																	
January																	
February																	
March																	
April																	
May																	
June																	
July																	
August																	
September																	
October																	
November																	
December																	

FACILITY NAME:

Monitoring Period	Flow		BOD				TSS				Temp	pH	D.O.	NH_3-N		Fecal Coliform	Others
			Average		Maximum		Average		Maximum								
	Avg. MGD	Max. MGD	Conc. mg/l	Loading lb/day	Conc. mg/l	Loading lb/day	Conc. mg/l	Loading lb/day	Conc. mg/l	Loading lb/day	°F			Conc. mg/l	Loading lb/day	#/100 ml	
1983																	
January																	
February																	
March																	
April																	
May																	
June																	
July																	
August																	
September																	
October																	
November																	
December																	

APPENDIX B

ON-SITE TECHNICAL INSPECTION REPORT

FOR THE

PULP AND PAPER INDUSTRY STUDY

Name of Facility _____

Address of Facility _____

NPDES Permit No. _____

Issuance Date _____

Expiration Date _____

Reviewer _____

Date of Review _____

I. NARRATIVE DESCRIPTION OF THE FACILITY

(Such as: Plant size, age, raw material usage, production process, water use, control employed, products manufactured, etc.)

1. Type of mill and product produced.

2. Year operation started.

3. Number of employees.

4. Type of raw material used: _____% pine, _____% hardwood, _____%wastepaper.

5. Number of digesters.

6. Digester type and design capacity.

7. Number of paper machines and design capacity.

8. Source and amount of raw water.

9. In mill water reuse or fiber recovery system used.

II. PRODUCTION

Subcategory	Annual Air Dried Tons/Day* 1979	1980	1981	1982	1983
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____
Total	_____	_____	_____	_____	_____

* Annual Air Dried Tons/Day = $\frac{\text{Total Annual Air Dried Tons}}{\text{Total Days in Operation During the Year}}$

III. DISCUSS THE MAIN SOURCE OF WASTEWATER FLOW AND ITS CHARACTERISTICS
(Attach a copy of plant process flow diagram showing water balance.)

IV. WASTE TREATMENT PROCESS DESCRIPTION

A. Size of treatment facility: Avg. design flow _____
Max. design flow _____

B. Average monthly influent/effluent wastewater values for 1983.

Month	Flow(MGD)	BOD(mg/l)		TSS(mg/l)		Temperature		pH	MLSS
		Inf.	Eff.	Inf.	Eff.	Inf.	Eff.		
January	_____	___	___	___	___	___	___	___	___
February	_____	___	___	___	___	___	___	___	___
March	_____	___	___	___	___	___	___	___	___
April	_____	___	___	___	___	___	___	___	___
May	_____	___	___	___	___	___	___	___	___
June	_____	___	___	___	___	___	___	___	___
July	_____	___	___	___	___	___	___	___	___
August	_____	___	___	___	___	___	___	___	___
September	_____	___	___	___	___	___	___	___	___
October	_____	___	___	___	___	___	___	___	___
November	_____	___	___	___	___	___	___	___	___
December	_____	___	___	___	___	___	___	___	___

C. In the space below, draw the layout of the treatment unit processes, including the sizing of each unit.

V. (A.)PROCESS EVALUATION FOR AERATED LAGOON TREATMENT

1. Give design criteria used to size each unit process:

Primary Treatment

a. Clarifer overflow rate _____ gpd/ft^2.

b. Hydraulic detention _____ hrs.

Secondary Treatment

a. Detention time _____ days.

b. BOD loading rate _____ lb/acre/day.

c. Surface aerator requirement

Number of units _____.

Hp of each unit _____.

Oxygen transfer efficiency _____ lb O_2/hp/hr.

Discuss any preliminary or chemical treatment of raw wastewater.

Discuss methods of sludge treatment and disposal.

2. On-site Evaluation Checklist.

a. Number of treatment units/cells _____.

b. Capacity of each cell _____.

c. What are the lagoon dimensions? _____.
(List size in acres and depth in feet.)

d. Are lagoon contents mixed thoroughly? _____.

e. Are all mechanical aerators operating properly? _____.

What is the frequency of operation? _____.

f. Does the lagoon basin have a foam or scum control system? _____.

g. If multiple lagoons are operating, is the flow distributed equally? _____.

h. Are they operated in series or parallel? _____.

i. When was the last time the lagoon was dredged/cleaned? _____.

j. Is there vegetation growing in the lagoon? _____.

k. What are the most common problems the operator has had with the lagoon system? _____.

V. (B.)PROCESS EVALUATION FOR ACTIVATED SLUDGE AND CLARIFICATION TREATMENT

1. Give design criteria used to size each unit process:

Primary Treatment

a. Clarifer overflow rate _____ gpd/ft^2.

b. Hydraulic detention time _____ hrs.

Secondary Treatment

Process Regime

Conventional _____ Extended aeration _____

Complete mix _____ Pure oxygen system _____

Step aeration _____ Other (specify) _____

a. Hydraulic detention time _____ hrs.

b. BOD loading rate _____ # BOD/1000 ft^3.

c. Mean cell residence time/sludge age _____ days.

d. F/M ratio _____.

e. MLSS _____ mg/l.

f. MLVSS _____ mg/l.

g. Type of aeration

Mechanical aeration _____.

Fine bubble diffused aeration _____.

Coarse bubble diffused aeration _____.

h. Number of aerators/blowers _____.

i. Hp of each unit _____.

j. O_2 transfer efficiency _____lb O_2/hp/hr.

k. Recirculation ratio _____.

l. Return AS flow _____ MGD.

m. Waste AS flow _____ MGD.

n. Waste AS conc. _____ mg/l.

o. Sludge Volume Index _____.

p. Clarifer overflow rate _____ gpd/ft^2.

q. Solids loading rate _____ $lb/day/ft^2$.

r. Side-water depth _____ ft.

Discuss any preliminary or chemical treatment of raw wastewater.

Discuss methods of sludge treatment and disposal.

Discuss any supernatant return from sludge treatment and give average flows and concentration.

2. On-Site Evaluation Checklist

a. Number of basins _____.

b. Capacity of each basin _____.

c. Are tank contents mixed thoroughly? _____.

d. Are all diffusers or mechanical aerators operating properly? _____.

What is the frequency of operation? _____.

e. Do there appear to be dead spots in the aeration tanks? _____.

If yes, at what location? _____

_____.

f. Are all return activated sludge pumps operating? _____.

If not, what is the reason? _____

_____.

g. Are there flow measurement devices for return activated sludge and waste activated sludge systems? _____.

Are they operable _____.

h. Does the aeration basin have a foam control system? _____.

i. If multiple basins are operating, is the flow distributed equally? _____.

How is it distributed? _____

_____.

j. Is operation of the system:

_____ Manual _____ Semi-automatic

_____ Automatic _____ Computer Controlled

_____ Other _____

k. Does the final clarifer surface indicate improper sludge withdrawal? (i.e. excessive floating solids, gas, high sludge blanket, etc.?) _____.

l. What are the most common problems the operator has had with the activated sludge system? _____

_____

_____

VI. BMP PLAN

1. Has a BMP plan been prepared? Yes _____ No _____

If so, does it contain the following elements and are these elements implemented?

A. General Requirements	In Plan		Being Implemented	
	Yes	No	Yes	No
1. Name and location of facility.				
2. Statement of BMP policy and objectives.				
3. Review by plant manager.				
B. Specific Requirements				
1. BMP Committee				
2. Risk Identification and Assessment				
3. Reporting of BMP incidents				
4. Materials Compatibility				
5. Good Housekeeping				
6. Preventive Maintenance				
7. Inspections and Records				
8. Security				
9. Employee Training				

C. BMP Checklist

	Yes	No
Spill Control		
1. Use of spill collection tanks or sumps?		
2. Use of level or flow alarms for early warning?		
3. Use of conductivity probes in U-drains?		
4. Proper diking around fuel and chemical tanks?		
5. Proper curbing and drainage of chemcial process areas?		
Water Conservation		
1. Washdown hoses and water valves closed except when needed?		
2. Use of surface condensers instead of direct contact condensers for evaporators?		
3. Minimizing loss of pump seal water?		
4. Reuse of whitewater?		
5. Reuse of process condensate?		
6. Reuse of steam condensate?		
7. What is the waste flow/ton of production? _____.		
Recovery		
1. Adequate recovery boiler capacity?		
2. Adequate evaporator boiler capacity?		

Other Comments

Please add any other comments about the facility's BMP.

Form Approved
OMB No. 155-R[illegible]

NPDES COMPLIANCE INSPECTION REPORT *(Coding Instructions on back of last page)*

TRANSACTION CODE	NPDES	YR MO DA	INSPEC-TOR	FAC TYPE	TIME
1 2 (5)	3 — 11	12 — 17	18	19	20	a.m. / p.m.

REMARKS

21 — 64

ADDITIONAL

65 — 70

SECTION A - Permit Summary

NAME AND ADDRESS OF FACILITY *(Include County, State and ZIP code)*		EXPIRATION DATE
		ISSUANCE DATE
RESPONSIBLE OFFICIAL	TITLE	PHONE
FACILITY REPRESENTATIVE	TITLE	PHONE

SECTION B - Effluent Characteristics *(Additional sheets attached _____)*

PARAMETER/ OUTFALL		MINIMUM	AVERAGE	MAXIMUM	ADDITIONAL
	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT				
	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT				
	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT				
	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT				
	SAMPLE MEASUREMENT				
	PERMIT REQUIREMENT				

SECTION C - Facility Evaluation *(S = Satisfactory, U = Unsatisfactory, N/A = Not applicable)*

	EFFLUENT WITHIN PERMIT REQUIREMENTS		OPERATION AND MAINTENANCE		SAMPLING PROCEDURES
	RECORDS AND REPORTS		COMPLIANCE SCHEDULE		LABORATORY PRACTICES
	PERMIT VERIFICATION		FLOW MEASUREMENTS		OTHER:

SECTION D - Comments

SECTION E - Inspection/Review

SIGNATURES	AGENCY	DATE
INSPECTED BY		
INSPECTED BY		
REVIEWED BY		

ENFORCEMENT DIVISION USE ONLY

COMPLIANCE STATUS

☐ COMPLIANCE

☐ NONCOMPLIANCE

EPA FORM 3560-3 (9-77) REPLACES EPA FORM T-51 (9-76) WHICH IS OBSOLETE. PAGE 1 OF 4

Sections F thru L: Complete on all inspections, as appropriate. N/A = Not Applicable	PERMIT NO.

SECTION F - Facility and Permit Background

ADDRESS OF PERMITTEE IF DIFFERENT FROM FACILITY *(Including City, County and ZIP code)*	DATE OF LAST PREVIOUS INVESTIGATION BY EPA/STATE
	FINDINGS

SECTION G - Records and Reports

RECORDS AND REPORTS MAINTAINED AS REQUIRED BY PERMIT. ☐ YES ☐ NO ☐ N/A *(Further explanation attached _____)*

DETAILS:

(a) ADEQUATE RECORDS MAINTAINED OF:			
(i) SAMPLING DATE, TIME, EXACT LOCATION	☐ YES	☐ NO	☐ N/A
(ii) ANALYSES DATES, TIMES	☐ YES	☐ NO	☐ N/A
(iii) INDIVIDUAL PERFORMING ANALYSIS	☐ YES	☐ NO	☐ N/A
(iv) ANALYTICAL METHODS/TECHNIQUES USED	☐ YES	☐ NO	☐ N/A
(v) ANALYTICAL RESULTS *(e.g., consistent with self-monitoring report data)*	☐ YES	☐ NO	☐ N/A
(b) MONITORING RECORDS *(e.g.,flow, pH, D.O., etc.)* MAINTAINED FOR A MINIMUM OF THREE YEARS INCLUDING ALL ORIGINAL STRIP CHART RECORDINGS *(e.g. continuous monitoring instrumentation, calibration and maintenance records)*.	☐ YES	☐ NO	☐ N/A
(c) LAB EQUIPMENT CALIBRATION AND MAINTENANCE RECORDS KEPT.	☐ YES	☐ NO	☐ N/A
(d) FACILITY OPERATING RECORDS KEPT INCLUDING OPERATING LOGS FOR EACH TREATMENT UNIT.	☐ YES	☐ NO	☐ N/A
(e) QUALITY ASSURANCE RECORDS KEPT.	☐ YES	☐ NO	☐ N/A
(f) RECORDS MAINTAINED OF MAJOR CONTRIBUTING INDUSTRIES *(and their compliance status)* USING PUBLICLY OWNED TREATMENT WORKS.	☐ YES	☐ NO	☐ N/A

SECTION H - Permit Verification

INSPECTION OBSERVATIONS VERIFY THE PERMIT. ☐ YES ☐ NO ☐ N/A *(Further explanation attached _____)*

DETAILS:

(a) CORRECT NAME AND MAILING ADDRESS OF PERMITTEE.	☐ YES	☐ NO	☐ N/A
(b) FACILITY IS AS DESCRIBED IN PERMIT.	☐ YES	☐ NO	☐ N/A
(c) PRINCIPAL PRODUCT(S) AND PRODUCTION RATES CONFORM WITH THOSE SET FORTH IN PERMIT APPLICATION.	☐ YES	☐ NO	☐ N/A
(d) TREATMENT PROCESSES ARE AS DESCRIBED IN PERMIT APPLICATION.	☐ YES	☐ NO	☐ N/A
(e) NOTIFICATION GIVEN TO EPA/STATE OF NEW, DIFFERENT OR INCREASED DISCHARGES.	☐ YES	☐ NO	☐ N/A
(f) ACCURATE RECORDS OF RAW WATER VOLUME MAINTAINED.	☐ YES	☐ NO	☐ N/A
(g) NUMBER AND LOCATION OF DISCHARGE POINTS ARE AS DESCRIBED IN PERMIT.	☐ YES	☐ NO	☐ N/A
(h) CORRECT NAME AND LOCATION OF RECEIVING WATERS.	☐ YES	☐ NO	☐ N/A
(i) ALL DISCHARGES ARE PERMITTED.	☐ YES	☐ NO	☐ N/A

SECTION I - Operation and Maintenance

TREATMENT FACILITY PROPERLY OPERATED AND MAINTAINED. ☐ YES ☐ NO ☐ N/A *(Further explanation attached _____)*

DETAILS:

(a) STANDBY POWER OR OTHER EQUIVALENT PROVISIONS PROVIDED.	☐ YES	☐ NO	☐ N/A
(b) ADEQUATE ALARM SYSTEM FOR POWER OR EQUIPMENT FAILURES AVAILABLE.	☐ YES	☐ NO	☐ N/A
(c) REPORTS ON ALTERNATE SOURCE OF POWER SENT TO EPA/STATE AS REQUIRED BY PERMIT.	☐ YES	☐ NO	☐ N/A
(d) SLUDGES AND SOLIDS ADEQUATELY DISPOSED.	☐ YES	☐ NO	☐ N/A
(e) ALL TREATMENT UNITS IN SERVICE.	☐ YES	☐ NO	☐ N/A
(f) CONSULTING ENGINEER RETAINED OR AVAILABLE FOR CONSULTATION ON OPERATION AND MAINTENANCE PROBLEMS.	☐ YES	☐ NO	☐ N/A
(g) QUALIFIED OPERATING STAFF PROVIDED.	☐ YES	☐ NO	☐ N/A
(h) ESTABLISHED PROCEDURES AVAILABLE FOR TRAINING NEW OPERATORS.	☐ YES	☐ NO	☐ N/A
(i) FILES MAINTAINED ON SPARE PARTS INVENTORY, MAJOR EQUIPMENT SPECIFICATIONS, AND PARTS AND EQUIPMENT SUPPLIERS.	☐ YES	☐ NO	☐ N/A
(j) INSTRUCTIONS FILES KEPT FOR OPERATION AND MAINTENANCE OF EACH ITEM OF MAJOR EQUIPMENT.	☐ YES	☐ NO	☐ N/A
(k) OPERATION AND MAINTENANCE MANUAL MAINTAINED.	☐ YES	☐ NO	☐ N/A
(l) SPCC PLAN AVAILABLE.	☐ YES	☐ NO	☐ N/A
(m) REGULATORY AGENCY NOTIFIED OF BY PASSING. *(Dates _____ _____)*	☐ YES	☐ NO	☐ N/A
(n) ANY BY-PASSING SINCE LAST INSPECTION.	☐ YES	☐ NO	☐ N/A
(o) ANY HYDRAULIC AND/OR ORGANIC OVERLOADS EXPERIENCED.	☐ YES	☐ NO	☐ N/A

PERMIT NO.

SECTION J - Compliance Schedules

PERMITTEE IS MEETING COMPLIANCE SCHEDULE. ☐ YES ☐ NO ☐ N/A *(Further explanation attached ____)*

CHECK APPROPRIATE PHASE(S):

- ☐ (a) THE PERMITTEE HAS OBTAINED THE NECESSARY APPROVALS FROM THE APPROPRIATE AUTHORITIES TO BEGIN CONSTRUCTION.
- ☐ (b) PROPER ARRANGEMENT HAS BEEN MADE FOR FINANCING *(mortgage commitments, grants, etc.)*.
- ☐ (c) CONTRACTS FOR ENGINEERING SERVICES HAVE BEEN EXECUTED.
- ☐ (d) DESIGN PLANS AND SPECIFICATIONS HAVE BEEN COMPLETED.
- ☐ (e) CONSTRUCTION HAS COMMENCED.
- ☐ (f) CONSTRUCTION AND/OR EQUIPMENT ACQUISITION IS ON SCHEDULE.
- ☐ (g) CONSTRUCTION HAS BEEN COMPLETED.
- ☐ (h) START-UP HAS COMMENCED.
- ☐ (i) THE PERMITTEE HAS REQUESTED AN EXTENSION OF TIME.

SECTION K - Self-Monitoring Program

Part 1 – Flow measurement *(Further explanation attached ____)*

PERMITTEE FLOW MEASUREMENT MEETS THE REQUIREMENTS AND INTENT OF THE PERMIT. DETAILS	☐ YES	☐ NO	☐ N/A
(a) PRIMARY MEASURING DEVICE PROPERLY INSTALLED.	☐ YES	☐ NO	☐ N/A
TYPE OF DEVICE: ☐ WEIR ☐ PARSHALL FLUME ☐ MAGMETER ☐ VENTURI METER ☐ OTHER *(Specify ____)*			
(b) CALIBRATION FREQUENCY ADEQUATE. *(Date of last calibration ____)*	☐ YES	☐ NO	☐ N/A
(c) PRIMARY FLOW MEASURING DEVICE PROPERLY OPERATED AND MAINTAINED.	☐ YES	☐ NO	☐ N/A
(d) SECONDARY INSTRUMENTS *(totalizers, recorders, etc.)* PROPERLY OPERATED AND MAINTAINED.	☐ YES	☐ NO	☐ N/A
(e) FLOW MEASUREMENT EQUIPMENT ADEQUATE TO HANDLE EXPECTED RANGES OF FLOW RATES.	☐ YES	☐ NO	☐ N/A

Part 2 – Sampling *(Further explanation attached ____)*

PERMITTEE SAMPLING MEETS THE REQUIREMENTS AND INTENT OF THE PERMIT. DETAILS:	☐ YES	☐ NO	☐ N/A
(a) LOCATIONS ADEQUATE FOR REPRESENTATIVE SAMPLES.	☐ YES	☐ NO	☐ N/A
(b) PARAMETERS AND SAMPLING FREQUENCY AGREE WITH PERMIT.	☐ YES	☐ NO	☐ N/A
(c) PERMITTEE IS USING METHOD OF SAMPLE COLLECTION REQUIRED BY PERMIT. IF NO, ☐ GRAB ☐ MANUAL COMPOSITE ☐ AUTOMATIC COMPOSITE FREQUENCY ____	☐ YES	☐ NO	☐ N/A
(d) SAMPLE COLLECTION PROCEDURES ARE ADEQUATE.	☐ YES	☐ NO	☐ N/A
(i) SAMPLES REFRIGERATED DURING COMPOSITING	☐ YES	☐ NO	☐ N/A
(ii) PROPER PRESERVATION TECHNIQUES USED	☐ YES	☐ NO	☐ N/A
(iii) FLOW PROPORTIONED SAMPLES OBTAINED WHERE REQUIRED BY PERMIT	☐ YES	☐ NO	☐ N/A
(iv) SAMPLE HOLDING TIMES PRIOR TO ANALYSES IN CONFORMANCE WITH 40 CFR 136.3	☐ YES	☐ NO	☐ N/A
(e) MONITORING AND ANALYSES BEING PERFORMED MORE FREQUENTLY THAN REQUIRED BY PERMIT.	☐ YES	☐ NO	☐ N/A
(f) IF (e) IS YES, RESULTS ARE REPORTED IN PERMITTEE'S SELF-MONITORING REPORT.	☐ YES	☐ NO	☐ N/A

Part 3 – Laboratory *(Further explanation attached ____)*

PERMITTEE LABORATORY PROCEDURES MEET THE REQUIREMENTS AND INTENT OF THE PERMIT. DETAILS:	☐ YES	☐ NO	☐ N/A
(a) EPA APPROVED ANALYTICAL TESTING PROCEDURES USED. *(40 CFR 136.3)*	☐ YES	☐ NO	☐ N/A
(b) IF ALTERNATE ANALYTICAL PROCEDURES ARE USED, PROPER APPROVAL HAS BEEN OBTAINED.	☐ YES	☐ NO	☐ N/A
(c) PARAMETERS OTHER THAN THOSE REQUIRED BY THE PERMIT ARE ANALYZED.	☐ YES	☐ NO	☐ N/A
(d) SATISFACTORY CALIBRATION AND MAINTENANCE OF INSTRUMENTS AND EQUIPMENT.	☐ YES	☐ NO	☐ N/A
(e) QUALITY CONTROL PROCEDURES USED.	☐ YES	☐ NO	☐ N/A
(f) DUPLICATE SAMPLES ARE ANALYZED. ____ % OF TIME.	☐ YES	☐ NO	☐ N/A
(g) SPIKED SAMPLES ARE USED. ____ % OF TIME.	☐ YES	☐ NO	☐ N/A
(h) COMMERCIAL LABORATORY USED.	☐ YES	☐ NO	☐ N/A
(i) COMMERCIAL LABORATORY STATE CERTIFIED.	☐ YES	☐ NO	☐ N/A

LAB NAME ____

LAB ADDRESS ____

PERMIT NO.

SECTION L - Effluent/Receiving Water Observations *(Further explanation attached _____)*

OUTFALL NO.	OIL SHEEN	GREASE	TURBIDITY	VISIBLE FOAM	VISIBLE FLOAT SOL	COLOR	OTHER

(Sections M and N: Complete as appropriate for sampling inspections)

SECTION M - Sampling Inspection Procedures and Observations *(Further explanation attached _____)*

- ☐ GRAB SAMPLES OBTAINED
- ☐ COMPOSITE OBTAINED
- ☐ FLOW PROPORTIONED SAMPLE
- ☐ AUTOMATIC SAMPLER USED
- ☐ SAMPLE SPLIT WITH PERMITTEE
- ☐ CHAIN OF CUSTODY EMPLOYED
- ☐ SAMPLE OBTAINED FROM FACILITY SAMPLING DEVICE

COMPOSITING FREQUENCY _____ PRESERVATION _____

SAMPLE REFRIGERATED DURING COMPOSITING: ☐ YES ☐ NO

SAMPLE REPRESENTATIVE OF VOLUME AND NATURE OF DISCHARGE _____

SECTION N - Analytical Results *(Attach report if necessary)*

APPENDIX D

Definition of Significant Noncompliance

In order to manage most effectively the NPDES program with the limited resources available, EPA has developed criteria for tracking and acting upon priority violations as directed by the Strategic Planning and Management System (SPMS). These violations have been defined as a subset of those instances of noncompliance reported on the Quarterly Noncompliance Report (QNCR) and are called Significant Noncompliance (SNC). SNC for the most part is the same as Category I with some exceptions. See Appendix I for details.

SNC is used to report priority violations within EPA's management accountability system and generally indicates the need for agency action unless the problems are corrected. This in no way implies that action will not be initiated against permittees with violations that do not meet SNC criteria. It merely indicates that attention should be focused on those priority violations within the timeframes specified in the Agency Guidance.

The following sections (II.A-C) assume reader familiarity with the QNCR reporting criteria. SNC as a subset of the QNCR is shown in chart form in Appendix I.

II. DEFINITION

SNC is currently defined by criteria for violations of permit, administrative order, and judicial order requirements.

A. PERMIT SIGNIFICANT NONCOMPLIANCE

1. Effluent

Permit effluent SNC criteria are the same as permit effluent QNCR criteria with the exception of violations that are of concern to the Director but have not caused or did not have the potential to cause a water quality or health problem:

a. Violation of Monthly Average Effluent Limits

1) TRC Violations

A violation of a given Group I or Group II parameter at a given discharge point that equals or exceeds the product of TRC times the limit for any two or more months during the two quarter review period is SNC.

2) Chronic Violations

Violation of a given Group I or Group II parameter limit at a given pipe by any amount (not necessarily TRC times the limit or greater) for any four or more months during the two quarter review period is SNC.

b. Violation of Other Limits

Any effluent violation that causes or has the potential to cause a water quality or health problem is SNC.

2. Schedule

Permit schedule SNC criteria are the same as permit schedule Category I QNCR criteria. Therefore, Failure to Start Construction, End Construction, or Attain Final Compliance within 90 days of the scheduled date is SNC.

3. Reporting

Permit reporting SNC criteria are the same as permit reporting Category I QNCR criteria. Therefore, DMRs, Pretreatment Reports, and the Compliance Schedule Final Report of Progress (i.e., attain final compliance) that are submitted 30 or more days late are SNC.

4. Other

There are no "other" permit SNC violations.

B. ADMINISTRATIVE ORDER SIGNIFICANT NONCOMPLIANCE

1. Effluent

Administrative order effluent SNC criteria are currently determined by the

level (stringency) of the effluent limitations established compared to the permit limitations.

a. Effluent limitations that are as stringent as the current permit (or in the case of an order issued with the reissuance of a permit such as BAT permits, as stringent as the prior (or BPT) permit).

Administrative order effluent SNC criteria in this case are the same as permit effluent SNC criteria:

1) Violation of Monthly Average Effluent Limits

a) TRC Violations

A violation of a given Group I or Group II parameter at a given discharge point that equals or exceeds the product of TRC times the limit for any two or more months during the two quarter review period is SNC.

b) Chronic Violations

Violation of a given Group I or Group II parameter limit at a given pipe by any amount (not necessarily TRC times the limit or greater) for any four or more months during the two quarter review period is SNC.

2. Violation of Other Limits

Any effluent violation that causes or has the potential to cause a water quality or health problem is SNC.

b. Effluent limitations that are less stringent than the current permit.

Administrative order effluent SNC criteria in this case are the same as enforcement order effluent QNCR criteria:

1) Violation of Monthly Average Effluent Limits

Any violation of a monthly average effluent limitation cited in an enforcement order is SNC.

2) Violation of Other Limits

Any violation of an effluent limitation cited in an enforcement order that causes or has the potential to cause a water quality or health problem is SNC.

2. Schedule

Administrative order SNC criteria are the same as enforcement order schedule Category I QNCR criteria. Therefore, Failure to Start Construction, End Construction, or Attain Final Compliance within 90 days of the scheduled date is SNC.

3. Reporting

Administrative Order reporting SNC criteria are the same as enforcement order reporting Category I QNCR criteria. Therefore, DMRs, Pretreatment Reports, and the Compliance Schedule Final Report of Progress (i.e., attain final compliance) that are submitted 30 or more days late are SNC.

4. Other

Any violation of an administrative order requirement other than an effluent, schedule, or reporting requirement is SNC. These violations would include failure to pay stipulated penalties, maintain required staffing or follow prescribed operation and maintenance procedures.

C. JUDICIAL ORDER SIGNIFICANT NONCOMPLIANCE

Since violations of judicial orders are of special concern to EPA, judicial order SNC criteria are the same as enforcement order QNCR criteria:

1. Effluent

a. Violation of Monthly Average Effluent Limits

Any violation of a monthly average effluent limitation cited in a judical order is SNC.

b. Violation of Other Limits

Any violation of an effluent limitation cited in a judicial order that causes or has the potential to cause a water quality or health problem is SNC.

2. Schedule

a. Failure to Start Construction, End Construction, or Attain Final Compliance within 90 days of the scheduled date is SNC.

b. Failure to achieve any other schedule milestone (other than a report) within 90 days of the scheduled date is SNC. This includes all milestones and events scheduled as part of the pretreatment program.

3. Reporting

a. DMRs, Pretreatment Reports, and the Compliance Schedule Final Report of Progress (i.e., attain final compliance) that are submitted 30 or more days late are SNC.

b. Additional reports that are submitted 30 days or more late are SNC.

c. All reports (including DMRs, Pretreatment Reports, the Compliance Schedule Final Report of Progress, and any other reports) that are incomplete or deficient are SNC.

4. Other

Any violation of a judicial order requirement other than an effluent, schedule, or reporting requirement is SNC. These violations would include failure to pay stipulated penalties, maintain required staffing or follow prescribed operation and maintenance procedures.

D. RESOLUTION OF SIGNIFICANT NONCOMPLIANCE

An instance of SNC is considered resolved when the SNC criteria are no longer met (e.g., neither two TRC nor four chronic violations of permit monthly averages occur over the two quarter period) during the review period or when the permittee formerly in SNC exhibits compliance for all three months of the most recent quarter.

III. EXCEPTIONS LIST

The Exceptions List is a report that is submitted as part of the SPMS reports. Its purpose is to track timely enforcement against major permittees that are in SNC in accordance with the Guidance for Oversight of NPDES Programs and the Enforcement Management System Guide.

Any major permittee that is listed on the QNCR for two consecutive quarters for the same instance of SNC (e.g., same pipe, same parameter for effluent violations; same milestone for schedule violations; same report for reporting violations; and same requirement for "other" violations) must be listed on the Exceptions List unless the permittee was addressed with a formal enforcement order prior to the completion date of the second QNCR:

February 28 for permittees in SNC on the July-September and October-December QNCRs;

May 31 for permittees in SNC on the October-December and January-March QNCRs;

August 31 for permittees in SNC on the January-March and April-June QNCRs;

November 30 for permittees in SNC on the April-June and July-September QNCRs.

For the purposes of the Exceptions List, a formal enforcement order is defined in the National Guidance for Oversight of NPDES Programs FY 1986 (page 19). Orders are to be counted as follows:

- Administrative orders and State equivalents are counted when issued (signed);
- Judicial referrals are counted when forwarded to Headquarters, the Department of Justice, or the State Attorney General.

Permittees that appear on the Exceptions List must be accompanied with a justification of the administering agency's failure to respond to these "priority violations" with a formal enforcement order within the timeframes specified.

Group I Pollutants - TRC=1.4

Oxygen Demand

Biochemical Oxygen Demand
Chemical Oxygen Demand
Total Oxygen Demands
Total Organic Carbon
Other

Solids

Total Suspended Solids (Residues)
Total Dissolved Solids (Residues)
Other

Nutrients

Inorganic Phosphorus Compounds
Inorganic Nitrogen Compounds
Other

Detergents and Oils

MBAS
NTA
Oil and Grease
Other detergents or algicides

Minerals

Calcium
Chloride
Fluoride
Magnesium
Sodium
Potassium
Sulfur
Sulfate
Total Alkalinity
Total Hardness
Other Minerals

Metals

Aluminum
Cobalt
Iron
Vanadium

Group II Pollutants - TRC=1.2

Metals (all forms)

Other metals not specifically listed under Group I

Inorganic

Cyanide
Total Residual Chlorine

Organics

All organics are Group II except those specifically listed under Group I

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

DEC 18 1984

APPENDIX E

OFFICE OF WATER

MEMORANDUM

SUBJECT: Calculation of Production-Based Effluent Limits

FROM: J. William Jordan, Chief
NPDES Technical Support Branch (EN-336)

TO: Regional Permits Branch Chiefs

The purpose of this memorandum is to clarify the procedure for calculating production-based effluent limitations and to provide guidance on the use of alternate limitations. Many effluent guidelines are expressed in terms of allowable pollutant discharge rate per unit of production. To determine permit limits, these standards are multiplied by an estimate of the facility's actual average production.

Section 122.45(b) of the NPDES permit program regulations sets forth the requirements for calculating production-based effluent limitations. The central feature of this section is the requirement that limitations be based upon a "reasonable measure of the actual production of the facility", rather than upon design capacity. Interpretation of this requirement has proven confusing in the past. This memorandum provides recommendations for developing production-based limitations and alternate limitations. The Agency is also planning to revise this portion of the regulations, and has revised Part III of Application Form 2C, in order to clarify language which might lead to the use of inappropriate production-based limitations.

Background

The proper application of production-based effluent limitation guidelines is dependent upon the methodology that is used to develop the guidelines. When most guidelines are developed, a single long term average daily production value and its relationship to flow are determined. This is combined with effluent concentration data collected from plants to form the basis of the guideline standards. Variability factors are developed on concentration data obtained from samples taken during periods of varying production. The variability factors and performance data are then used to derive the guideline standards.

Calculation of Limitations

To apply these guidelines, permit writers should determine

a single estimate of the expected production over the life of the permit using the long term average production from the plant's historical records. Usually, a five year production history would be used to derive this value. This single production value is then multiplied by both the daily maximum and monthly average guidelines limitations to obtain permit limits. In determining this single estimate, the permit writer should take into account the distribution of production by analyzing data taken as frequently as possible. For most cases, monthly data compiled from daily data would be sufficient.

The permit writer should avoid the use of a limited amount of production data in estimating the production for a specific facility. For example, the data from a particular month may be unusually high and thus lead to the derivation of effluent limitations which are not actually reflective of normal plant operations. As previously explained, effluent limitations guidelines already account for some of the variations which occur within long term production rates. Therefore, the use of too short a time frame in the calculation of production based limitations for a specific industrial facility may lead to "double accounting" of the variability factors.

In some cases, the historical data may show large random or cyclic fluctuations in production rates, of either a short or long term nature. In those situations, it may be appropriate to have alternate limits which are applicable at some increased production rate (see discussion of Alternate Limits) or setting the limit based upon a level of production higher than the average (e.g. 10-20 percent or higher).

However, the primary objective is to determine a production estimate for a facility which approximates the long term average production rate (in terms of mass of product per day) which can reasonably be expected to prevail during the next term of the permit. The following example illustrates the proper application of guidelines:

> Example: Company A has produced 331,500 tons, 292,000 tons, 304,000 tons, 284,000 tons, and 312,000 tons per year for the previous five years. The use of the highest year of production (331,500 tons per year) might be an appropriate and reasonable measure of expected production. One check on this could be to determine if maximum yearly values are within a certain percent of the average, such as 20 percent.
>
> One of several methods may be appropriate to convert from the annual production rate to average daily production. One method takes the annual production rate and divides it by the number of production days per year. To determine the number of production days, the total number of normally scheduled non-production days are subtracted from the total days in a year.
>
> This method is appropriate in cases where the plant

discharges intermittently as a direct result of production flows. In cases where the plant discharges continuously, even on days when there are no production activities, other methods may be appropriate.

If Company A normally has 255 production days per year, which are approximately equal to the number of discharge days, the annual production rate of 331,500 tons per year would yield an average daily rate of 1,300 tons per day. If pollutant X has an effluent limitation guideline of 0.10 lbs./1000 lbs. for the monthly average and 0.15 lbs./1000 lbs. for the maximum daily average, the effluent limitations would be calculated as follows:

Monthly Average Limit (Pollutant X)

$$1{,}300 \frac{\text{tons}}{\text{day}} \times \frac{2000 \text{ lbs.}}{\text{ton}} \times \frac{0.10 \text{ lbs.}}{1000 \text{ lbs.}} = 260 \text{ lbs./day}$$

Daily Maximum Limit (Pollutant X)

$$1{,}300 \frac{\text{tons}}{\text{day}} \times \frac{2000 \text{ lbs.}}{\text{ton}} \times \frac{0.15 \text{ lbs.}}{1000 \text{ lbs.}} = 390 \text{ lbs./day}$$

In the example above, the production during the highest year of the last five years was used as the estimate of production. This estimate is appropriate when production is not expected to change significantly during the permit term. However, if historical trends, market forces, or company plans indicate that a different level of production will prevail during the permit term, a different basis for estimating production should be used.

Alternate Limits

If production rates are expected to change significantly during the life of the permit, the permit can include alternate limits. These alternate limits would become effective when production exceeds a threshold value, such as during seasonal production variations. Definitive guidance is not available with respect to the threshold value which should "trigger" alternate limits. However, it is generally agreed that a 10 to 20 percent fluctuation in production is within the range of normal variability, while changes in production substantially higher than this range (such as 50 percent) could warrant consideration of alternate limitations. The major characteristics of alternate limits are best described by illustration and example:

Example: Plant B has produced 486,000 tons, 260,400 tons, 220,000 tons, 240,800 tons, and 206,500 tons per year for the previous five years. The high year is significantly higher than the rest and the permittee has made a plausible argument that production is expected to return to that level. The guideline for pollutant X is 0.8 lbs./1000 lbs. for the monthly average and 0.14 lbs./1000 lbs. for the daily maxi-

mum. The alternate effluent limitations could be calculated as follows:

Primary Limits:

- Basis of calculation: 260,400 tons/yr. = 1,050 tons/day (248 production days per year)

- Applicable level of production: less than 1,050 tons per day average production rate for the month

  Monthly Average Limit

  $$1{,}050 \frac{\text{tons}}{\text{day}} \times 2000 \frac{\text{lbs.}}{\text{ton}} \times \frac{0.08 \text{ lbs.}}{1000 \text{ lbs.}} = 168 \text{ lbs./day}$$

  Daily Maximum Limit

  $$1{,}050 \frac{\text{tons}}{\text{day}} \times 2000 \frac{\text{lbs.}}{\text{ton}} \times \frac{0.14 \text{ lbs.}}{1000 \text{ lbs.}} = 294 \text{ lbs./day}$$

Alternate Limits:

- Applicable threshold level of production = more than 1,260 tons/day average production rate for the month (20 percent above normal production levels)

- Basis of calculation: 486,000 tons/yr. = 1,350 tons/day (based upon historical data and to be applicable beyond a 20 percent increase in production)

  Monthly Average Limit = 216 lbs./day

  Daily Maximum Limit = 378 lbs./day

Alternate limits should be used only after careful consideration and only when a substantial increase or decrease in production is likely to occur. In the example above, the primary limits would be in effect when production was at normal levels. During periods of significantly higher production, the alternate limits would be in effect. When production reverted to normal levels, the primary limits would have to be met. The thresholds, measures of production, and special reporting requirements must be detailed in the permit.

If you have any questions concerning the calculation of production-based limitations or the use of alternate limitations, please call me or have your staff contact James Taft at (202/FTS-426-7010).