REPORT TO

THE CONGRESS OF THE UNITED STATES

OPPORTUNITY FOR SAVINGS BY REDUCING OVERTIME ON REVETMENT CONSTRUCTION AND MAINTENANCE ON THE LOWER MISSISSIPPI RIVER

CORPS OF ENGINEERS (CIVIL FUNCTIONS)
DEPARTMENT OF THE ARMY

BY THE COMPTROLLER GENERAL OF THE UNITED STATES

APRIL 1966

COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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To the President of the Senate and the
Speaker of the House of Representatives

The accompanying report presents our findings regarding the opportunity for savings by use of a 40-hour workweek in lieu of regularly scheduled overtime on revetment construction and maintenance work performed by the Corps of Engineers (Civil Functions), Department of the Army, on the Lower Mississippi River. Revetment construction involves the laying of concrete mattresses at selected bank locations to protect vulnerable bank areas from the eroding action of the river currents.

On the basis of our review, we believe that, in most cases, the Corps of Engineers could accomplish planned revetment work over an extended construction period by using a 40-hour workweek in lieu of scheduled overtime work to accelerate revetment operations. We made an examination of past construction seasons and programs to demonstrate the feasibility of doing this work in the future without the use of regularly scheduled overtime. We estimate that the Corps of Engineers could have realized savings of about $521,000 during fiscal years 1962 through 1965 by eliminating scheduled overtime in revetment construction activities performed by the Memphis District of the Corps of Engineers on the Lower Mississippi River.

The Department of the Army advised us that the Corps of Engineers must consider many factors in planning and carrying out this complex land and marine construction operation. The primary factors which the Department stated must be considered relate to adverse river stages and weather conditions. In determining that a 40-hour workweek was feasible, we gave consideration to the possible effect of adverse river stages and weather conditions on the Corps' ability to perform the work.

The Department stated that failure to complete the yearly program would subject the bank areas to additional erosion and could result in damage to partially completed revetments. We believe that many of the potential problems mentioned by the Department would be present

regardless of whether the work was performed by using scheduled overtime or on a 40-hour workweek basis with overtime limited to that required after it becomes apparent that necessary work cannot be completed because only a portion of the authorized revetment work can be accomplished in any one construction season. Also, the risks are present in any year because, as district officials informed us, revetment work is most effectively performed when erosion of the banks has progressed to a certain stage. Prior to or after the time this stage has been reached, the effectiveness of performing revetment work is reduced.

We are therefore recommending that the Chief of Engineers direct the Lower Mississippi Valley Division to use a 40-hour workweek in programming revetment construction by the Memphis District and that overtime be limited to that required after it becomes apparent that necessary work cannot be accomplished on a 40-hour workweek basis.

We are reporting this matter to the Congress because it concerns an opportunity for significant savings.

Copies of this report are being sent to the President of the United States, the Secretary of Defense, and the Secretary of the Army.

Comptroller General
of the United States

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INTRODUCTION

The General Accounting Office has examined into selected aspects of the use of overtime by the Corps of Engineers (Civil Functions), Department of the Army, relating to revetment construction activities at the Memphis and Vicksburg Districts, Lower Mississippi Valley Division. Our review, covering the period January 1956 through May 1965, was made pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Accounting and Auditing Act of 1950 (31 U.S.C. 67).

This review was undertaken because of the substantial amount of overtime costs incurred each year by the Corps of Engineers (Civil Functions). We selected the revetment construction and maintenance operations performed on the banks of the Mississippi River for detailed examination because it constitutes one of the major activities on which significant overtime costs were incurred on a continuing basis. During the period of our review, the annual costs incurred by the districts for force account labor and related revetment construction activities exceeded $9 million. The average overtime costs incurred each year amounted to about $850,000 and $650,000 in the Memphis and Vicksburg Districts, respectively. Our primary emphasis during this examination related to those matters

apparently needing attention and included a review of policies and procedures concerning the scheduling of revetment construction and an analysis of the districts' use of scheduled overtime in relation to the length of revetment construction seasons. Our review was conducted at the Lower Mississippi Valley Division and the Vicksburg District, Vicksburg, Mississippi, and at the Memphis District, Memphis, Tennessee.

BACKGROUND

The Memphis and Vicksburg Districts of the Corps of Engineers are responsible for flood control and navigation work under the jurisdiction of the President of the Mississippi River Commission and the Division Engineer, Lower Mississippi Valley Division, and for river and harbor work under the jurisdiction of the Division Engineer. Each district is manned by trained civilian technical and administrative personnel, directed by a commissioned officer of the Corps of Engineers, United States Army.

The Congress established the Mississippi River Commission in 1879 to prepare and consider plans for improving the river channel, protect its banks, improve navigation, prevent destructive floods, and promote and facilitate commerce. Since the enactment of the Flood Control Act of May 15, 1928, the Commission has served as an advisory and consulting body to the Chief of Engineers. As part of its duties, the Commission recommends policies and work programs concerning revetment work. Each year when the water level has receded to a point where vulnerable bank areas can be seen, the Commission makes an inspection of the Mississippi River banks to observe changes and trends in the river for the purpose of confirming or revising the construction program for the coming season. During the inspection, the Commission also revises the preliminary construction program for the next year and starts developing the program for the next succeeding year. Generally, this inspection is made prior to the actual start of revetment construction.

The Commission also makes an inspection after the year's revetment work is completed to update the next 2 years' construction programs. The work of the Commission is directed by the President

of the Commission and is carried out by three Corps districts whose headquarters are at Memphis, Tennessee; Vicksburg, Mississippi; and New Orleans, Louisiana.

In recent years, the Division Engineer of the Corps' Lower Mississippi Valley Division has served as President of the Commission as well. The jurisdiction of this division extends from about Hannibal, Missouri, to the Gulf of Mexico. Work within the division is carried out by the Corps district office at St. Louis, Missouri, in addition to work in those districts with headquarters at Memphis, Vicksburg, and New Orleans. Corps officials have advised us that the revetment operations of the Memphis and Vicksburg Districts are carried out to protect the Mississippi River banks by construction and maintenance of revetments from approximately Cario, Illinois, to approximately Venice, Louisiana. We have been advised also that the districts begin revetment construction at the upstream limit of the area assigned to them and progress downstream and that generally all work--both minor and major construction and repairs to existing revetments--is accomplished concurrently without returning upstream. The completed revetment extends over the affected areas as a continuous blanket, capable of withstanding the erosive forces of the river currents at any stage from low water to over bank.

Revetment construction involves the laying of concrete mattresses (a series of concrete blocks 4 feet long, 14 inches wide, and 3 inches thick, tied together by a noncorrosive copper-coated steel wire) at selected bank locations to protect vulnerable bank areas from the eroding action of the river currents. The mattresses are placed on the bank above the waterline and extend beyond the deepest part of the channel on the river bottom; and the

upper bank, above the mattresses, is paved with stone. The concrete mattresses are put in place by specially designed boats called sinking-plant barges. The Memphis and Vicksburg Districts each operate one sinking-plant barge. Revetment construction is generally performed by force account (Government owned or leased plant and hired labor), with the exception that upper bank paving is performed under contract. Revetment work has been performed on the Mississippi River for many years and has been accelerated since 1928.

In the Memphis District, the Revetment Branch is responsible for the operation of the sinking-plant barge, mattress loading, and bank preparation activities. Assistance is supplied by the Transportation Branch which provides towboats for towing materials and the floating plant. In the Vicksburg District, the Revetment Branch is responsible for the towing function as well as for sinking-plant barge operation, mattress loading, and bank preparation activities.

The Memphis and Vicksburg Districts, under policy established by the Corps of Engineers, have generally required that field personnel performing revetment construction activities work 60-hour workweeks in order to complete the work programmed by the Mississippi River Commission during the revetment construction season. Our report deals with the use of overtime by the Memphis District only because we found that the elimination of overtime in the Vicksburg District would not result in a reduction of the costs of revetment activities. We were informed that the Vicksburg District made more extensive use of leased boats and that lease costs would not necessarily be decreased by a reduction in the hours worked. In addition, we were advised that the types of equipment used by

the two districts were different. For example, we found that the Vicksburg District primarily used steam equipment while the Memphis District made extensive use of diesel equipment. We were advised that since steam equipment requires attention when not in operation, a reduced number of hours of work per week would not correspondingly reduce labor costs.

The principal officials of the Department of Defense and the Department of the Army responsible for the activities discussed in this report are listed in appendix I.

FINDING AND RECOMMENDATION

OPPORTUNITY FOR SAVINGS BY USE OF A 40-HOUR WORKWEEK IN LIEU OF OVERTIME ON REVETMENT CONSTRUCTION AND MAINTENANCE

On the basis of our review, we believe that, in most cases, the Corps of Engineers could accomplish planned revetment work over an extended construction period by using a 40-hour workweek in lieu of scheduled overtime work to accelerate revetment operations. We made an examination of past construction seasons and programs to demonstrate the feasibility of doing this work in the future without the use of regularly scheduled overtime. We estimate that the Corps of Engineers could have realized savings of about $521,000 during fiscal years 1962 through 1965 by eliminating scheduled overtime in revetment construction activities performed by the Memphis District of the Corps of Engineers on the Lower Mississippi River.

The Memphis District has generally required that field personnel performing revetment construction activities work 60-hour workweeks during the revetment construction season. Even though the amount of planned revetment construction and the length of time available during the construction season vary from year to year, the district continues to schedule 60-hour workweeks. In 1959 and again in 1961, the Memphis District compared the costs of revetment construction experienced on 60-hour workweeks with those costs which would have accrued by extending the construction period and scheduling 40-hour workweeks. On the basis of these comparisons, the district estimated that possible savings of $296,000 and $300,000 could have been realized on the cost of revetment operations during 1959 and 1961, respectively, if 40-hour workweeks had been utilized instead of the 60-hour workweeks actually used.

We were advised that, although the district's study had shown that the revetment work could be accomplished more economically by using 40-hour workweeks, the district had continued to schedule 60-hour workweeks at the direction of the division. The division had not adopted the use of 40-hour workweeks because it believed that acceleration of construction activities was necessary in order to complete planned revetments before high-water levels occurred. Our review showed that, for the past 7 years (fiscal years 1959 through 1965), the district could have completed the same amount of revetment work before high-water levels occurred by using 40-hour workweeks over a longer construction period which was available within the construction seasons.

We have estimated that, during the last 4 years of this period, the Memphis District could have effected a reduction of $1,253,000 in overtime premium and lay-up costs by extending the construction period and working 40-hour workweeks, except in fiscal year 1962 when the use of overtime would have been required during the latter part of the construction season in order to complete planned revetment work. This reduction would have been partially offset, however, because the district would have incurred additional costs of about $338,000 for increased employee fringe benefits, $254,000 for subsistence, and $140,000 for additional labor and security personnel. The net result would have been a saving of about $521,000 for the 4-year period by working 40-hour workweeks. (See app. II.)

Corps officials advised us that, pursuant to a policy established by the Mississippi River Commission, the district generally carries out its revetment operations when the river is no more than 15 feet above mean low-water level at Memphis, Tennessee. Our

review of Corps' records showed that the water level met this criteria for an average elapsed period of 219 days a year during the seasons when revetment operations could have been carried out for fiscal years 1959 through 1965. During these years, an average elapsed period of only 139 days a year were used for revetment operations.

We found that, of these 139 days, an average of 25 elapsed before the start of actual revetment work, while the Commission conducted its annual bank inspection and the division planned for performance of the revetment work for the season. Grading operations began an average of 8 days prior to mattress-sinking operations, and both grading and mattress-sinking crews worked an average of 106 days. Therefore, if 40-hour workweeks had been used instead of the 60-hour workweeks actually used, the construction periods would have been extended an average of only 53 days. The average total time required for all revetment operations would have been 192 days, or 27 days less than the 219 days available.

In only 1 of the 7 years would the district have been unable to complete, at the same level of efficiency, the revetment work actually accomplished in that year by using 40-hour workweeks. In fiscal year 1962, the district would have had an estimated 24 fewer days than the number required to complete the year's revetment work. Because the district would not have completed all planned revetment work in 1962 by using 40-hour workweeks, our estimates of possible savings provide for the use of overtime during the latter part of the construction season in order to complete the planned revetment work. However, an official in the Memphis District's Operations Division advised us that, generally, if all the work planned in a given year was not accomplished, it could be scheduled and completed the following year.

Although our estimates of possible savings provided for the use of overtime in fiscal year 1962 to complete the planned revetment work, our review of Corps' records showed that, in fiscal year 1963, the district would have had an estimated 27 days not needed for that year's work, which could have been used to complete any work carried over from 1962. In any year when it becomes apparent that the scheduled work cannot be accomplished on the 40-hour workweek basis because of possible adverse water levels or weather conditions, the district could accelerate the work by scheduling overtime in order to complete all the revetment work scheduled for that year. As an alternative, in those years in which circumstances permit, the unfinished work could be deferred until the succeeding year.

In our estimates, we allowed for all the time that actually elapsed, which varied from a high of 43 days to a low of no days, between the start of the Commission's inspection of the banks and the start of revetment operations. Although no specific time was established for the start of revetment operations, the wide variance is apparently attributable to the fact that the district generally did not start actual revetment operations until about mid-July, while the time that the Commission started its inspection varied from year to year, dependent on favorable water levels. In 1958 the water level remained high unusually late in the year and the district started operations with very limited planning. Thus, it appears that the district could lengthen the periods of actual operation even more than those used in our estimates by limiting initial planning to that required for a few days' actual operations and completing plans after actual operations have started.

Our review disclosed that the district scheduled 60-hour workweeks regardless of the programmed revetment workload. For example, the workload planned for fiscal year 1965 was about 24 percent less than that for fiscal year 1964, but the district did not reduce the workweek. Although the actual amount of revetment work performed exceeded the amount planned, the work was completed on November 4, 1964--64 days before the river reached a level that was unfavorable.

Division officials informed us that they had directed the district to use the longer workweeks in order to complete the work before high-water levels occurred. District officials advised us that the mattress-sinking operations must be completed in time to allow the contractors to complete upper bank paving before adverse weather and river conditions prevail. The officials stated that upper bank paving usually begins about 10 days after mattress-sinking operations begin and may extend up to 6 weeks after completion of the mattress sinking. Corps' records showed that, in fiscal years 1961 through 1964, the upper bank paving was completed from about 3 to 5 weeks after mattress-sinking operations were completed.

Agency comments and our evaluation thereof

In a letter to us dated December 27, 1965, commenting on the matters presented in this report, the Department of the Army stated that many factors must be considered by the district engineer in carrying out this complex land and marine construction operation. Also, the Department stated that many years of experience had established the need for performing this type of work at low-river stages and before winter weather makes operations impracticable and that contingencies must be allowed for many variables. The

contingencies set out in the Department's letter, which appear to us to most directly concern the length of the workweek, include such factors as river stages, weather, hazardous working conditions, swift currents, and shallow and deep water.

During our review we considered many of the factors and contingencies pointed out by the Department in commenting on this matter, several of which are closely related. With regard to the effects of weather conditions on revetment construction, we were advised by an official in the Memphis District's Operations Division that, generally speaking, revetment work can be accomplished in temperatures as low as the teens without extensively reducing production rates. On this basis it appears that the revetment operation season can be extended through December because the district completes its revetment operations downstream near the Arkansas-Louisiana border where December temperatures seldom drop below 20 degrees. In fiscal year 1961, the district completed mattress-sinking operations as late as December 7, while upper bank paving was not completed until December 31. In regard to the water levels, our review disclosed that, for 6 of the past 7 years, the district could have completed the revetment work by using a 40-hour workweek before favorable water levels, as determined by the Corps, were exceeded.

Further, the Department stated that the failure to complete the yearly program and subsequent rescheduling in the following year would subject the operation to unwarranted risks and serious consequences, such as additional caving of banks, loss of proper bank alignment, loss by flanking of work completed in previous years, postponement of completion of the project and its benefits, loss of protection by overtopping before upper bank paving could be

completed, and failure to complete required maintenance of existing revetment during the normal time, thereby permitting deterioration during the next high-water season.

We have recognized the need in some cases to use overtime in order to complete needed revetment work and have suggested deferment of work as an alternative only when circumstances warrant it. Revetment work on the Mississippi River has been going on for many years and apparently will continue to go on for many more years. To some extent the risks included in the Department's comments always are present regardless of the workweek used, because only a portion of the authorized revetment work can be completed in any one construction season. Also, the risks are present in any year because, as district officials informed us, revetment work is most effectively performed when erosion of the banks has progressed to a certain stage. Prior to or after the time this stage has been reached, the effectiveness of performing revetment work is reduced.

Conclusion

We believe the rigid policy of using a 60-hour workweek as a basis for programming the revetment work has resulted in higher costs of revetment operations than necessary. We estimate that the Memphis District could have realized savings of about $521,000 on the cost of its revetment work for fiscal years 1962 through 1965 by extending the construction period and working 40-hour workweeks rather than the 60-hour workweeks actually used. Scheduled overtime may be justified at the district to accomplish critical work in years when water levels remain high unusually late in the year.

Recommendation

We therefore recommend that the Chief of Engineers direct the Lower Mississippi Valley Division to use 40-hour workweeks in

programming revetment construction by the Memphis District and that overtime be limited to that required after it becomes apparent that necessary work cannot be accomplished on the 40-hour workweek basis.

APPENDIXES

PRINCIPAL OFFICIALS

OF THE DEPARTMENT OF DEFENSE

AND THE DEPARTMENT OF THE ARMY

RESPONSIBLE FOR ADMINISTRATION OF

ACTIVITIES DISCUSSED IN THIS REPORT

	Tenure of office	
	From	To
DEPARTMENT OF DEFENSE		
SECRETARY OF DEFENSE:		
Robert S. McNamara	Jan. 1961	Present
Thomas S. Gates, Jr.	Dec. 1959	Jan. 1961
Neil H. McElroy	Oct. 1957	Dec. 1959
DEPARTMENT OF THE ARMY		
SECRETARY OF THE ARMY:		
Stanley P. Resor	July 1965	Present
Stephen Ailes	Jan. 1964	July 1965
Cyrus R. Vance	July 1962	Jan. 1964
Elvis J. Stahr, Jr.	Jan. 1961	June 1962
Wilber M. Brucker	July 1955	Jan. 1961
CHIEF OF ENGINEERS:		
Lt. Gen. William F. Cassidy	July 1965	Present
Lt. Gen. W. K. Wilson, Jr.	May 1961	June 1965
Lt. Gen. E. C. Itschner	Oct. 1956	May 1961
PRESIDENT, MISSISSIPPI RIVER COMMISSION AND DIVISION ENGINEER, LOWER MISSISSIPPI VALLEY DIVISION:		
Maj. Gen. E. I. Davis	June 1962	Present
Maj. Gen. T. A. Lane	June 1960	June 1962
Maj. Gen. W. A. Carter	June 1958	June 1960

PRINCIPAL OFFICIALS

OF THE DEPARTMENT OF DEFENSE

AND THE DEPARTMENT OF THE ARMY

RESPONSIBLE FOR ADMINISTRATION OF

ACTIVITIES DISCUSSED IN THIS REPORT (continued)

	Tenure of office	
	From	To
DEPARTMENT OF THE ARMY (continued)		
DISTRICT ENGINEER, MEMPHIS DISTRICT:		
Col. James A. Vivian	Feb. 1965	Present
Lt. Col. Thomas W. Dale (acting)	Dec. 1964	Feb. 1965
Col. Edmond Kirby Smith	Aug. 1962	Dec. 1964
Col. Marvin L. Jacobs	Aug. 1959	July 1962
Col. William P. Jones	Aug. 1957	July 1959
DISTRICT ENGINEER, VICKSBURG DISTRICT:		
Lt. Col. James A. Betts	Feb. 1964	Present
Maj. W. T. King, Jr. (acting)	Dec. 1963	Feb. 1964
Col. Warren S. Everett	Mar. 1961	Nov. 1963
Capt. Cleatus J. Cox (acting)	Dec. 1960	Mar. 1961
Col. James E. Walsh	July 1959	Dec. 1960
Col. Milton P. Barschdorf	July 1956	July 1959

ESTIMATED SAVINGS IN REVETMENT OPERATION COSTS

BASED ON 40-HOUR INSTEAD OF 60-HOUR WORKWEEKS

FISCAL YEARS 1962 THROUGH 1965

Description	Fiscal year 1965		Fiscal year 1964	
	Revetment	Towing	Revetment	Towing
ESTIMATED SAVINGS:				
Overtime premium	$232,200	$26,300	$278,700	$30,800
Lay-up	51,400	(a)	59,800	17,300
Total possible estimated savings	283,600	26,300	338,500	48,100
ADDITIONAL ESTIMATED COSTS:				
Per diem and subsistence	68,000	4,100	70,200	5,500
Added personnel and security costs	36,900	-	38,600	-
Employee benefits	90,100	9,700	89,600	12,100
Total estimated costs	195,000	13,800	198,400	17,600
	88,600	12,500	140,100	30,500
Net estimated savings by fiscal year	$101,100		$170,600	

[a]Towing and revetment for lay-up combined in fiscal year 1965.

Fiscal year 1963		Fiscal year 1962		
Revetment	Towing	Revetment	Towing	Totals
$266,400	$34,200	$129,400	$16,200	$1,014,200
55,300	13,700	30,800	10,600	238,900
321,700	47,900	160,200	26,800	1,253,100
66,900	5,900	30,400	3,100	254,100
38,100	-	26,500	-	140,100
77,200	11,900	41,300	6,000	337,900
182,200	17,800	98,200	9,100	732,100
139,500	30,100	62,000	17,700	
	$169,600		$79,700	$ 521,000