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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D C 20548

November 10, 1981

COMMUNITY AND ECONOMIC
DEVELOPMENT DIVISION

B-205392



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The Honorable Donald W. Riegle, Jr.
United States Senate

Dear Senator Riegle:

Subject: Information on the Army Corps of Engineers'
Contracting for Dredging Work on the Great
Lakes' (CED-82-10)

In accordance with your May 14, 1981, request and subsequent agreements with your office, we have reviewed the Army Corps of Engineers' contracting policies and procedures for dredging on the Great Lakes. On April 24, 1981, a constituent wrote to you questioning the Corps' policies and procedures in awarding such contracts on the Great Lakes in view of Public Law 95-269 (92 Stat. 218) which, among other things, provides that dredging work is to be carried out principally by contract when feasible and cost effective. The act also provides that the Corps of Engineers maintain a minimum number of federally owned dredges necessary to perform emergency and national defense work.

On September 17, 1981, we briefed your office on the results of our review. This report summarizes the information provided to you at that time.

- The Corps of Engineers' policy is to contract with private industry for its dredging work when feasible and cost effective. In terms of total dredging dollar workload, private industry's share of the Corps' Detroit district's work on the Great Lakes has increased from about 12 percent in fiscal year 1977 to about 56 percent in fiscal year 1981.
- Because of the Corps' method of preparing cost estimates for dredging work on the Great Lakes, individual project estimates may not reflect the best information available on anticipated costs. Since these estimates are critical in determining whether a private contractor will or will not be awarded a dredging contract, inaccurate cost estimates may result in the wrong decision

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on whether a private contractor should be involved. The Chief, Corps Dredging Division, told us that he would inquire into this matter and take appropriate action.

- The measurement of the volume of material actually dredged is basic to determining dredging productivity. The constituent claimed that the Corps was overstating productivity because it used the bin yardage method to measure productivity. Measuring dredging productivity is difficult, but the bin yardage method is an acceptable, though not perfect, technique.

- The constituent claimed that the Corps was unfair to contractors because it scheduled stringent time frames for dredging work. The Corps' criteria in scheduling dredging periods are compatible with a logical schedule for using its dredges effectively and the State's preferred schedule, which is intended to serve environmental and recreational needs. The Corps' 1980-81 dredging work schedule on the Great Lakes conformed for the most part to Michigan's preferred periods.

- The Army, as directed by the Congress, is studying the minimum federally owned fleet necessary to perform emergency and national defense dredging requirements. During fiscal year 1982 the Chief of Engineers plans to announce the eight Corps dredges that will constitute the minimum hopper fleet. Also, the Chief expects to forward a study to the Secretary of the Army during fiscal year 1982 on the nonhopper dredge minimum fleet. Any Corps dredge above the minimum fleet size would have to compete with industry dredges for all work which the industry expresses an interest to bid on.

OBJECTIVES, SCOPE, AND METHODOLOGY

The overall purposes of this review were to provide information relating to a constituent's concerns about the Corps' (1) role and activities in meeting the Nation's dredging needs, including the minimum federally owned fleet necessary to perform emergency and national defense dredging requirements and (2) policies and procedures in allowing contractors to compete for

dredging work on the Great Lakes. In line with the constituent's specific concerns, we obtained information on the Corps' Great Lakes operations pertaining to estimating the cost of dredging work, measuring dredging productivity, and scheduling dredging operations.

We made our review at the Corps' Washington, D.C., headquarters and its Detroit, Michigan, and St. Paul, Minnesota, district offices. We also obtained information from the Corps' Buffalo, New York, district office and its North Central Division in Chicago, Illinois. We examined the Corps' policies and procedures in allowing private industry to compete for dredging work, as implemented by the Corps' Detroit district office, reviewed pertinent legislation, and interviewed Corps officials. In addition, we interviewed a Michigan Department of Natural Resources' official regarding the scheduling of dredging in Michigan waters, and we obtained comments and information from the constituent relating to his concerns about the Corps' Great Lakes dredging program.

In connection with obtaining information about the Corps' role in meeting the Nation's dredging requirements, we reviewed pertinent laws and studies, including the congressionally requested National Dredging Study and the Corps' proposals on minimum federally owned dredge fleet requirements. Although we obtained information on the minimum dredge fleet requirements, we did not evaluate the adequacy of the Corps' proposals for performing emergency and national defense dredging requirements.

Our review as it related to the constituent's concerns was limited to the Corps' Industry Capability Dredging Program on the Great Lakes, and we did not examine the extent to which problems identified there may exist elsewhere

BACKGROUND

The Corps of Engineers is responsible for improving and maintaining the Nation's navigable harbors and channels. In carrying out this responsibility, the Corps uses its own dredging equipment as well as contracts with private dredging firms.

Over the years considerable controversy has existed regarding the Corps' and private industry's roles in meeting the Nation's dredging needs. Private industry would like to perform the dredging work the Corps now performs with its own equipment, whereas the Corps believes its dredging responsibilities cannot be met without its own fleet. Private industry has opposed the Corps' plan to replace several of its older dredges and build additional dredges.

The total annual Federal dredging program has decreased about 40 percent from 480 million cubic yards in fiscal year 1963 to 289 million cubic yards in fiscal year 1980. Over the years private industry has done most of the new-work dredging--the removal of hard, compacted material to widen or deepen navigation channels and harbors. While this kind of dredging has decreased substantially, maintenance dredging, primarily done by the Corps, has increased slightly, about 8 percent, during this period. Maintenance dredging involves periodic removal of shoals 1/ and similar obstacles to navigation.

Because of the controversy about the amount of dredging done by the Corps when using its own equipment and a 1972 GAO report 2/ on national pipeline dredging requirements, the Congress in fiscal years 1973 through 1975 did not provide funds for dredge replacement and modifications pending a comprehensive study of national dredging needs. Based on the information contained in the "National Dredging Study," the Corps' Chief of Engineers concluded that a comprehensive program to determine industry's capability to perform a larger portion of the dredging workload should be initiated. The Corps started the Industry Capability Program in December 1976 to provide an incentive to private industry to construct modern equipment.

Because the Congress was concerned that private industry would not invest large sums of money to build modern equipment without the assurance of legislation, Public Law 95-269 was enacted and became effective April 26, 1978. Public Law 95-269 established the policy that the Corps' dredging work is to be carried out principally by contract when feasible and cost effective. The act directed the Secretary of the Army to conduct a study, to be submitted to the Congress, to determine the minimum number of federally owned dredges necessary to perform emergency and national defense work. The act states that as private industry demonstrates a capability to perform, at reasonable prices and in a timely manner, the dredging work the Corps currently performs, the existing Corps dredging fleet shall be reduced until the minimum fleet level is reached. The act also provides that where Corps equipment is available to do the work and the cost of doing the work by contract is over 25 percent of the estimated cost of doing the work with Corps equipment, the work shall not be done by contract.

1/An elevation, such as a sand bar, in the bottom of a body of water creating a hazard to navigation.

2/"Observations on Dredging Activities and Problems" (B-161330, May 23, 1972).

Similarly, when Corps equipment is not available, the work shall not be done by contract if the cost of doing it by contract is over 25 percent of the cost estimated by the Corps of what it should cost a well-equipped contractor to do the work.

DREDGING PROGRAM ACTIVITIES

The Corps' total dredging workload for fiscal year 1980 was 289 million cubic yards. The amount of dredging performed on the Great Lakes was relatively small, about 6 million cubic yards, or 2 percent, of the Corps' fiscal year 1980 workload. Nationwide, Corps expenditures for dredging during fiscal year 1980 were about \$383 million, \$20.7 million of which, or about 5 percent, was spent in the Great Lakes region.

In terms of total dredging dollar workload, private industry's share of the Corps' Detroit district's work on the Great Lakes has increased from about 12 percent in fiscal year 1977 to about 66 percent in fiscal year 1981.

Industry Capability Program

The Corps awards dredging contracts to private industry in two ways. Under one program private industry competes with the Corps for dredging work, and under the other, contracts are awarded exclusively to private industry when Corps equipment is not available for the work. Private industry is not awarded a contract if its bid exceeds the Corps' estimate by more than 25 percent. Private industry has been awarded total contracts valued at about \$24.1 million, or 47 percent, of the \$51.7 million the Detroit district office spent on dredging during fiscal years 1977 through 1981.

The Corps' Industry Capability Program is aimed at ascertaining private industry's capability to accomplish at reasonable prices and in a timely manner the work traditionally done by Corps dredges by soliciting bids on such work. The program, which began in fiscal year 1977, has been successful in getting private industry to perform more of the Nation's dredging work. From fiscal year 1977 through the first quarter of fiscal year 1981, 127 projects normally accomplished using Corps equipment were advertised for bid under this program. Industry was awarded 69 of these projects totaling \$101.4 million. For fiscal year 1980, 35 projects totaling \$53 million were advertised for competitive bidding. Private industry was awarded contracts valued at \$35 million for these projects, or 66 percent of the dollar value awarded.

For the Corps' Detroit district office, which is responsible for most of the Great Lakes' dredging projects, 42 dredging projects were advertised under the Industry Capability Program during fiscal years 1977 through 1981. Private industry was awarded 15 project contracts valued at about \$3.2 million, while the Corps accomplished 25 projects, valued at about \$6.5 million. Two projects were canceled.

Industry involvement in
other dredging work

In addition to work awarded to private industry under the Industry Capability Program, the Corps awards dredging contracts to industry when Corps equipment is unavailable to do the work. In evaluating the cost of such work, the Corps uses a "well-equipped contractor" estimate--the cost of the work to a well-equipped contractor without profit. During fiscal years 1977 through 1981, the Corps' Detroit district office awarded 28 projects totaling about \$20.9 million based on well-equipped contractor estimates.

THE CORPS HAS EXPERIENCED A PROBLEM
IN ESTIMATING DREDGING COSTS

The Corps' method of accounting for prior years' cost variances when computing dredging cost estimates on its Great Lakes' projects could understate cost for some project work and overstate cost for others. While the understated and overstated cost estimates tend to offset each other or balance out, the cost estimates made for individual projects may not reflect the true cost to the Government. As a result, the Corps may not be in a position to properly evaluate contractor cost estimates when comparing them to Corps estimates.

Because our review was limited to the Corps' dredging program on the Great Lakes and did not include an overall assessment of the impact the Corps' cost estimating methodology has had on the award or nonaward of dredging work to contractors, we are unable to reach any firm conclusions on this matter. However, the Chief, Corps Dredging Division, told us that he would inquire into this matter and take appropriate action.

In preparing its dredging cost estimates, the Corps develops a daily rental rate for each piece of dredging equipment before the beginning of each fiscal year. The estimates essentially represent projected annual costs of the equipment divided by the estimated number of days the equipment will be used. The rate includes all costs involved in operating the dredging equipment, except equipment replacement, but does not include an allowance

for profit. The daily rental rate is based on the dredging equipment's prior year's actual cost as adjusted for prior year's variances in cost as well as a future estimate of cost. A cost variance could result because the dredging equipment was used more or less than anticipated or over or under estimates for such items as fuel. Prior years' variances, called overcharges or undercharges, are deducted or added to the estimated operating costs used to develop the next year's daily rental rate.

Such a procedure may have been adequate when the Corps was performing all of the dredging work since total costs will balance at the end of the fiscal year. However, with the advent of the Industry Capability Program the Corps was directed, among other things, to determine if contractors could perform dredging work at a reasonable cost. The Corps' method of estimating dredging costs may either over or understate the true costs of individual projects. For example, in 1978 the St. Paul district estimated that its actual daily equipment costs were \$494 73. However, because of 1977 overcharged costs, the Corps established a daily rental rate of \$240.35 for its estimate of the Little Lake, Michigan, project.

Detroit district officials agreed that this method of estimating costs affects individual project costs, but they believe the system balances out in the long run. However, the Chief, Corps Dredging Division, pointed out that Corps regulations require that operating personnel review quarterly during the fiscal year the daily rental rate for major equipment which is used under severe or unusual circumstances. According to the regulations, the daily rental rate is to be adjusted as necessary to assure that differences between estimated and actual costs do not exceed 30 percent.

MEASURING DREDGING PRODUCTIVITY
ACCURATELY IS DIFFICULT

The constituent claimed that the Corps was overstating its productivity by using the bin yardage measurement method to compute the yardage of the material actually dredged. For example, he said that in 1979 the Corps reported dredging 35,164 and 25,190 1/ cubic yards in Manistee Harbor and Frankfort, respectively, whereas, based on soundings, it had dredged only 17,439

1/The Corps report shows 24,190 cubic yards dredged.

and 5,944 cubic yards, respectively. He further stated that only 8,967 and 2,982 cubic yards were within the project limits.

Measuring pay and credit yardage (the volume of material actually removed) is one of the basic calculations used to determine the productivity of dredging operations. The Corps uses three different measurement methods to determine how many yards of material have been dredged.

--In-place. The bottom of waterways is surveyed by sonar soundings, and the quantity of material to be dredged is calculated based on the actual depths and desired depths.

--Bin. A yardage meter is attached to the bin of the hopper dredge 1/ and measures the weight of the material placed in the bin.

--Barge or scow measure. The number of barge loads times the barge's known cubic yardage capacity.

Detroit district officials said that the bin measure method is preferred over in-place because it more accurately reflects the actual quantities dredged. The in-place method cannot adequately deal with shoaling conditions which can occur extremely fast or storms which may cause further shoaling. As an example of fast shoaling, the Corps provided us with some charts of the Holland Harbor, located in Michigan on Lake Michigan (as are Manistee and Frankfort), which showed, based on soundings, that substantial changes in depth occur daily.

The Chief, Operations and Maintenance Branch, Detroit Corps District, said the Corps often uses preliminary surveys or soundings, in which the distances between soundings is extreme, to determine where shoals are located and that dredging needs to be performed rather than to determine total yardage actually dredged. He agreed that a measure based on this type of survey might indicate considerable variances in the volume of dredged material at Manistee and Frankfort; however, this was not the case. He stated that the master of the Corps' dredge has 30 years experience and is capable of dredging in the assigned areas. He also said that because the 1979 soundings for Manistee and Frankfort were taken some time after the dredging was completed,

1/Self-propelled dredge equipped with suction pumps and supporting machinery used for dredging unconsolidated material such as sand from the seafloor.

significant shoaling could have occurred. Manistee was dredged June 27 to July 8 and soundings taken July 10 to 17; Frankfort was dredged July 9 to 12 and soundings taken July 25.

Although not a perfect measurement technique because of variables such as density of material and unfilled hopper capacity, bin yardage is an acceptable technique used in determining pay and credit yardage.

CORPS CRITERIA IN SETTING
DREDGING PERIODS

The constituent claimed that the Corps' scheduling of projects was unfair to contractors because it scheduled stringent time frames for performing the dredging work. The Corps attempts to obtain dredging periods compatible with a logical schedule for using its dredges effectively. However, other criteria are also used. To protect the environment, the Corps attempts to conform to the preferred dredging period established by Michigan's Department of Natural Resources. The State's schedule is intended to serve fishing needs, such as fish migration and spawning, and recreational boating needs.

The Chief, Michigan Water Management Division, said that the State and the Corps meet and agree on the dredging periods. He said the Corps has tried to conform to the State's preferred periods although the State is also ready to accommodate the Corps' needs. According to this official, only one contractor has complained directly to the State regarding dredging schedule periods, and the State referred the complaint to the Corps.

We compared the Corps' 1980-81 actual dredging work on the Great Lakes to the State's preferred periods and found that there had been substantial conformance to the preferred periods. When variances did occur, they were primarily in commercial and industrial areas for which the State is less concerned

THE CORPS' MINIMUM FLEET

As mentioned earlier, Public Law 95-269 directs the Secretary of the Army to undertake a study, to be submitted to the Congress, to determine the minimum federally owned fleet necessary to perform emergency and national defense dredging requirements. The Corps divided the minimum fleet study into two parts: hopper dredging and other types of dredging requirements.

The Secretary forwarded his comprehensive study of the hopper dredge requirements to the Office of Management and Budget on February 6, 1979. The Secretary recommended that the minimum

federally owned fleet include eight hopper dredges to provide for emergency conditions, national defense, and national interest requirements. Two of the eight dredges would be assigned to the Great Lakes. The Chief of the Corps Dredging Division, told us that the Chief of Engineers expects to announce the eight Corps dredges that will constitute the Corps' minimum hopper fleet by July 1982.

Concerning nonhopper dredges, the Chief of Engineers expects to forward a study to the Secretary of the Army during fiscal year 1982 recommending that the nonhopper minimum fleet consist of 12 dredges with no nonhopper dredges being permanently assigned to the Great Lakes region. However, he recommended that dredges from the east coast and Interior Waterways regions be used within the Great Lakes region during defense-related or prolonged emergency dredging situations, such as extended industry strikes or following devastating storms. One of the 12 fleet dredges is planned to be a research and development vessel, which may be assigned to the Great Lakes region. According to the Chief of Engineers' assessment, the research and development vessel should not be considered an operational asset to meet defense and emergency requirements because it will often not be available due to modifications associated with test operations.

As of November 1981, the executive branch had not approved the hopper or nonhopper studies. Any Corps dredge above the minimum fleet size would have to compete with industry dredges for all work which industry expresses an interest to bid on. It should be noted that the law provides that the minimum fleet be used with maximum efficiency and in a manner which will permit immediate responses to emergency situations. The law states that the size of the minimum fleet and the rate of reduction of the Corps' total fleet to the minimum fleet are matters solely within the Secretary's discretion, acting through the Chief of Engineers.

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At your request, we did not obtain written Corps of Engineers comments on the information presented in this report. However, the report was discussed with Corps field and headquarters officials and their comments were included where appropriate

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As arranged with your office, we are sending copies of this report to the Secretary of the Army and the Chief of Engineers. Copies of this report will also be available to other interested parties upon request. Also, as you requested, we are sending a copy of this report to your Cadillac, Michigan, office.

Sincerely yours,

A handwritten signature in cursive script that reads "Henry Eschwege". The signature is written in black ink and is positioned above the typed name and title.

Henry Eschwege
Director