CONGRESSIONAL BUDGET OFFICE
U.S. Congress
Washington, DC 20515

Douglas Holtz-Eakin, Director

October 21, 2003

Honorable Don Young
Chairman
Committee on Transportation
and Infrastructure
U.S. House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

I am responding to your letter of June 5, 2003, requesting that the Congressional Budget Office (CBO) analyze an amendment that would limit the participation of the Bean Stuyvesant company in the U.S. dredging market on the basis of the percentage of the company's foreign ownership.

On the basis of an analysis of the relevant bidding data for dredging contracts let by the Army Corps of Engineers, CBO estimates that preventing Bean Stuyvesant from operating its nonhopper dredging fleet independently of its hopper dredges would likely increase the cost of an average contract by between $50,000 and $250,000. Those effects are in the range of 0.4 percent to 2 percent of current annual federal spending for nonhopper dredging if current levels of activities are maintained. Proponents of the amendment have asserted that Bean Stuyvesant has bid predatorily, but CBO's analysis provides no support for that claim. The details of the analysis are provided in the enclosure.

An identical letter is being sent to the Chairman of the Subcommittee on Coast Guard and Maritime Transportation. Should you have any further questions or concerns, please do not hesitate to contact me directly or either of the analysts who conducted this work, David Moore or David Austin of the Microeconomic and Financial Studies Division at (202) 226-2940.

Sincerely,

Douglas Holtz-Eakin

Douglas Holtz-Eakin

Enclosure

cc: Honorable James L. Oberstar
Ranking Democratic Member

CONGRESSIONAL BUDGET OFFICE
U.S. Congress
Washington, DC 20515

Douglas Holtz-Eakin, Director

October 21, 2003

Honorable Frank A. LoBiondo
Chairman
Subcommittee on Coast Guard and
Maritime Transportation
Committee on Transportation
and Infrastructure
U.S. House of Representatives
Washington, D.C. 20515

Dear Mr. Chairman:

I am responding to your letter of June 5, 2003, requesting that the Congressional Budget Office (CBO) analyze an amendment that would limit the participation of the Bean Stuyvesant company in the U.S. dredging market on the basis of the percentage of the company's foreign ownership.

On the basis of an analysis of the relevant bidding data for dredging contracts let by the Army Corps of Engineers, CBO estimates that preventing Bean Stuyvesant from operating its nonhopper dredging fleet independently of its hopper dredges would likely increase the cost of an average contract by between \$50,000 and \$250,000. Those effects are in the range of 0.4 percent to 2 percent of current annual federal spending for nonhopper dredging if current levels of activities are maintained. Proponents of the amendment have asserted that Bean Stuyvesant has bid predatorily, but CBO's analysis provides no support for that claim. The details of the analysis are provided in the enclosure.

An identical letter is being sent to the Chairman of the Committee on Transportation and Infrastructure. Should you have any further questions or concerns, please do not hesitate to contact me directly or either of the analysts who conducted this work, David Moore or David Austin of the Microeconomic and Financial Studies Division at (202) 226-2940.

Sincerely,

Douglas Holtz-Eakin

Enclosure

cc: Honorable Bob Filner
Ranking Member

Estimating the Effects of Excluding Bean Stuyvesant from Nonhopper Dredging in U.S. Markets

October 2003

This Congressional Budget Office (CBO) analysis, prepared at the request of the House Committee on Transportation and Infrastructure, considers the likely effects of excluding a particular firm, Bean Stuyvesant, from competing for dredging contracts offered by the Army Corps of Engineers (Corps) on jobs that require so-called nonhopper dredge vessels. The Oceans Act of 1992 (Public Law 102-587) contains a provision relating to the 50 percent Dutch-owned C.F. Bean and its dredging subsidiary, Bean Stuyvesant, which allows the firm to operate the pre-1992 hopper dredge *SS Stuyvesant* in U.S. waters despite the law's default foreign-ownership limit of 25 percent. The U.S. Customs Service has interpreted the law as permitting Bean Stuyvesant also to operate nonhopper dredges in U.S. waters, independently of the *Stuyvesant*. A proposed amendment to the Oceans Act would allow Bean Stuyvesant to operate those vessels only in support of the *Stuyvesant,* thereby preventing Bean Stuyvesant from bidding on contracts for jobs on which a hopper dredge could not be used.

Based on an analysis of the relevant bidding data for the Corps's dredging contracts, CBO estimates that preventing Bean Stuyvesant from operating its nonhopper dredging fleet independently of its hopper dredges would probably increase the cost of an average nonhopper job by between $50,000 and $250,000, the equivalent of about 0.4 to 2 percent of current annual federal spending on nonhopper dredging in the Atlantic, Pacific, and Gulf coastal regions of the United States. Proponents of this amendment have asserted that Bean Stuyvesant has bid in a predatory manner, but CBO's analysis provides no support for that claim.

BACKGROUND

Most dredging in the United States is conducted by the Corps. From 1999 to 2002, the Corps awarded an average of 74 contracts per year for nonhopper dredging work in regions in which Bean Stuyvesant operates, with an average total value of about $550 million per year. The market for dredging contracts is segmented by geographic region, as the cost of transporting equipment across long distances tends to limit the mobility of the dredging vessels. Bean Stuyvesant has bid on the Corps's nonhopper dredging work along the Atlantic, Pacific, and Gulf coasts, but to date not in the Mississippi or Ohio River systems or in the Great Lakes.

In addition to geographic divisions, the market is also segmented by type of dredging activity: larger jobs that do not require cutting through rock or other consolidated material can be carried out with so-called hopper dredges, which resemble container ships and carry their dredging spoils to disposal sites. Smaller jobs and jobs that require rock cutting must use one of several types of nonhopper dredges, which more closely resemble barges.

Advocates of the proposed legislation, which could effectively preclude Bean Stuyvesant from operating in the nonhopper segment, contend that the current law already restricts the firm from such activity but has been misinterpreted. If enacted, the amendment would have the greatest effect on nonhopper dredging activities in the Atlantic and Gulf regions, where Bean Stuyvesant primarily operates. The amendment would have lesser effects along the Pacific coast, where the firm has done a limited amount of nonhopper dredging. It would affect dredging activities along the Mississippi and Ohio River systems and in the Great Lakes only to the extent that rival firms responded to limitations on Bean Stuyvesant's activities by shifting resources away from those areas and into the Atlantic and Gulf regions.

The amendment's advocates assert that as it is currently interpreted, the *Stuyvesant* provision of the Oceans Act gives Bean Stuyvesant an unfair advantage over other firms. They assert, for instance, that Bean Stuyvesant's access to the capital resources of its foreign partner, Royal Boskalis Westminster (whose total market capitalization is more than three times that of the largest U.S. dredging firm, Great Lakes Dredging and Dock) allows Bean Stuyvesant to satisfy larger bonding requirements than some domestic firms can. They have also expressed the concern that Bean Stuyvesant's capital resources allow it to set below-cost prices—a tactic that could achieve long-term gains in market share at the expense of short-term profits.[1] CBO's analysis includes an evaluation of the latter claim.

In response to concerns that the amendment would reduce the amount of competition in the nonhopper segment, proponents argue that C.F. Bean, the domestic half of the Bean Stuyvesant partnership, could operate the partnership's nonhopper dredges without Dutch participation, either by itself or in a joint venture with another domestic firm.

The committee has asked CBO to estimate the effects of the proposed amendment under the assumption that it would effectively prevent Bean Stuyvesant from bidding on nonhopper dredging work and therefore would reduce the level of competition in nonhopper dredging. Since the committee made this request, the U.S. Court of Federal Claims has held that the Oceans Act indeed prohibits Bean Stuyvesant from chartering nonhopper dredges other than in support of its hopper

1. Such a tactic would be unlikely to increase the firm's long-run profits if new firms could readily enter the dredging market. No significant entry occurred during the period analyzed here, although at least one firm (Cashman) somewhat increased its nonhopper dredging capacity.

dredging work.[2] The analysis presented in this report nevertheless applies to the Court's interpretation of the Oceans Act.

ANALYTICAL APPROACH

This analysis estimates the effect of the proposed amendment on the Corps's dredging costs. The Corps typically contracts with private industry for dredging services by issuing a formal invitation for bids (IFB) specifying the job requirements. Bidders respond in the form of sealed bids, and the lowest-priced responsive bidder is usually awarded the job.[3] This analysis is based on Corps's data on nonhopper dredging bids for contracts awarded from 1999 to 2002 in the Atlantic and Gulf regions, the geographic areas in which Bean Stuyvesant primarily operates.[4] The analysis excludes significant nonhopper dredging operations in the Great Lakes region and along the Mississippi, Arkansas, and Ohio Rivers, where to date Bean Stuyvesant has not bid on jobs.

The analysis also compares the leading private dredging firms, including Bean Stuyvesant, on the basis of a basic measure of success: how often the firm has been awarded a contract versus how often it has tendered a bid. Since a higher rate of success need not indicate an unfair advantage, or even necessarily lower bids, the analysis also considers whether any firm has a greater likelihood of winning a contract than another firm that offers an equal bid price. The degree of rivalry between firms is determined by examining firm-specific similarities and differences in bidding patterns over time, including the degree of head-to-head bidding and average bid size relative to the scope of the job. In particular, the analysis seeks to determine whether Bean Stuyvesant has tended to underbid its rivals and to account for any effect this may have had on the size of the bids submitted by its rivals.

The amendment, if enacted, could affect the number of bidders that respond to the Corps's IFBs. Although the departure of a large firm from a market could induce new entry, there is little evidence in the recent history of the dredging industry to suggest that entry is likely to occur in this case. In particular, there was no significant entry, and few new vessels built, between 1999 and 2002. Thus, the likely effect of the amendment would be to decrease the average number of bidders on the Corps's jobs.[5]

---

2. *Norfolk Dredging Co., Inc. v. United States,* 2003 U.S. Claims LEXIS 218 (Fed. Cl. Oct. 14, 2003).

3. The Corps uses an alternative form of solicitation, the request for proposals (RFP), far less often.

4. CBO repeated its analysis with and without data from the Pacific region, with comparable results in both cases.

5. The possibility of Bean Stuyvesant's assets being reconstituted in an identical and significant competitor are limited. If the exclusion induced Bean Stuyvesant to sell its nonhopper dredges to its competitors, this would boost the other firms' ability—and propensity—to bid. Unless a new entrant firm chartered

An analysis of existing capacity in the dredging industry, and of the degree of overlap in firms' bid submissions, provides a basis for estimating a change in the average number of bidders within the extremes of "no replacement" (the average number of bidders is unaffected) and "full replacement" (the average declines by fully one bidder).

CBO examined the statistical relationship between the number of firms bidding on the Corps's dredging jobs and the size of the winning bid to estimate the likely effect of a change in the number of bidders on the Corps's nonhopper dredging costs. In theory, the more firms that compete for a given job, the lower the winning bid will tend to be. CBO found such a relationship in the bidding for the dredging contracts. CBO's estimate of the likely effect of excluding Bean Stuyvesant from bidding on nonhopper dredging jobs relates the expected change in the average number of bidders, as described above, to this estimated relationship between the number of bidders and the size of the winning bid.

CBO's statistical techniques are designed to reveal persistent trends and patterns in the data, to identify and control for the separate influences of confounding factors, and to account for variation in bid size caused by unobserved factors. For example, in estimating the relationship between the size of a winning bid and the number of bidding firms, the statistical analysis accounts for differences in job characteristics, the identities of the bidders, and year-to-year differences in underlying economic conditions. Unobserved factors, such as changes in firms' operating costs over time, may also affect bid sizes. Analyzing a large sample of dredging contract data allows the influence of those factors also to be separated from that of the factor of interest, for example, the number of bidders.

BIDDER CONDUCT AND PERFORMANCE IN THE MARKET FOR DREDGING SERVICES

CBO finds no evidence of systematic differences in bidding behavior across firms. In particular, the data do not reveal any tendency by Bean Stuyvesant—or any other firm—to submit smaller bids, on average, than its rivals. CBO also checked whether any of the firms had bid unusually aggressively when they were the low bidder. Here the concern was whether a firm might have an advantage, either fair or unfair, that it could selectively press, bidding more aggressively when the returns were highest. Such behavior would not necessarily indicate an advantage;

all of those vessels itself, however, the division of Bean Stuyvesant's nonhopper dredges among its competitors would leave unchanged the industry's total resources while decreasing the number of firms. Competition would therefore still decline—and more so if the largest firms chartered those vessels, because those firms already bid on most of the same jobs as Bean Stuyvesant.

in any case, CBO found no evidence that it had occurred: none of the firms' average winning bids were unusually low.

When the bidding data were weighted by the value of the contract—so that winning a large job counted more than winning a small job—they suggested that Bean Stuyvesant has been moderately more successful than several of its chief rivals in winning contracts for which it has bid, but it lags behind Great Lakes, the most successful firm by this measure (see Table 1).[6] However, Bean Stuyvesant bid on far fewer jobs in 2001 and 2002 than it did in the preceding two years, and fewer than all but one of its rivals. Although Bean Stuyvesant's rate of success increased significantly in the latter two-year period—possibly the firm was bidding more selectively while satisfying commitments to jobs won in prior years—its market share continued to rank only third, at 17 percent. As noted earlier, the evidence does not indicate that the amounts bid by Bean Stuyvesant were out of line with those of the other firms in either period.

Additionally, CBO finds no evidence that Bean Stuyvesant—or any other firm—is favored in the contract-award process. The data support the notion that the Corps almost always selects the lowest bidder on a job. In the few cases in which the Corps did not accept the lowest bid—because, for example, the bid was judged nonresponsive—the evidence indicates that the Corps did not favor one firm over the others in selecting an alternate bid.

EFFECTS ON THE NUMBER OF BIDDERS OF EXCLUDING BEAN STUYVESANT

If Bean Stuyvesant were excluded from bidding on nonhopper dredging contracts, the number of bidders responding to the Corps's IFBs would probably change. As previously noted, it is likely that the average number of bidders would decline. The decrease would probably be less than one (that is, there would be some replacement of Bean Stuyvesant's likely future bids) because the exclusion of one firm would raise the other firms' expected return from bidding, making them more likely to bid. The extent of replacement is limited because the other firms—particularly the largest firms—already bid against Bean Stuyvesant in a significant number of cases. CBO believes that the exclusion of Bean Stuyvesant could reasonably be expected to attract a "replacement bidder" for between 40 percent and 80 percent of the available work, by value, on which Bean Stuyvesant could have been expected to bid. In other words, the average number of bidders in those cases would fall by less than one firm, from 3.4 firms to between 2.8 and 3.2 firms.

---

6. Bean Stuyvesant would rank third if the data were not weighted, behind Manson and Great Lakes. Weighting downgrades Manson and upgrades Great Lakes, because the contracts they have won have been, respectively, smaller and larger, on average, than those of the other firms. Weighting does not substantively change the calculated success rates for Bean Stuyvesant and Weeks.

Table 1.
Bidding Outcomes of Leading Firms for Nonhopper Dredging, 1999-2002[a]

	All Years			1999-2000			2001-2002		
Firm	Jobs Bid	Success Rate[b] (In percent)	Market Share[c] (In percent)	Jobs Bid	Success Rate[b] (In percent)	Market Share[c] (In percent)	Jobs Bid	Success Rate[b] (In percent)	Market Share[c] (In percent)
Bean Stuyvesant	49	40	12	39	22	7	10	58	17
Cashman	18	3	0.4	8	8	0.7	10	1	0.2
Great Lakes	108	52	30	60	58	33	48	47	26
Manson	26	27	3	14	44	4	12	17	2
Weeks	203	31	22	116	23	19	87	39	24

Source: Congressional Budget Office based on data from the Army Corps of Engineers.

a. Total of 292 jobs in the Atlantic, Gulf, and Pacific regions. Results weighted by contract value.
b. Ratio of the number of contracts won to the number of jobs bid, weighted by value.
c. Ratio of the value of contracts won to the value of all contracts awarded. Shares do not sum to 100 percent because of rounding.

Estimating the effects of excluding Bean Stuyvesant on the number of bidders for the jobs on which it could have been expected to bid requires that the degree to which the other firms have historically bid in competition with Bean Stuyvesant be taken into account. The two largest dredging firms already bid on most of the same jobs as Bean Stuyvesant; therefore, their ability to replace Bean Stuyvesant in future auctions is limited. The smaller size of the remaining firms in the industry constrains their ability to replace Bean Stuyvesant in future competitions and could limit their ability to do so without reducing their dredging activities in other regions.

On average, 2.4 firms have bid against Bean Stuyvesant for nonhopper dredging contracts (see Table 2). Cashman, for example, constitutes on average one-fourth of a firm in this calculation because it has bid against Bean Stuyvesant for one quarter (25 percent) of the nonhopper contracts, by value, in Bean Stuyvesant's regions of operation. Assuming no new firms enter this market, the remaining

Table 2.
Firms' Bid Overlap with Bean Stuyvesant[a]

Firm	Percentage of Bid Overlap, by Value of Contract
Cashman	25
Great Lakes	83
Manson	15
Weeks	93
Other Firms	22
Total[b]	240

Source: Congressional Budget Office based on data from the Army Corps of Engineers.

a. Contracts for which the indicated firm has also bid.
b. Numbers do not add up because of rounding. The total percentage of overlap (240) is the equivalent of 2.4 firms.

firms would have to bid on more than twice as many jobs as they have in the past (and Great Lakes and Weeks would have to bid on all of the jobs) if excluding Bean Stuyvesant were to have no effect on the average number of bidders on these jobs.[7] Unless those firms had significant idle capacity, they could not dramatically increase their bid frequencies to replace Bean Stuyvesant's bids without reducing their bidding elsewhere.[8]

The "no replacement" and "full replacement" scenarios constitute the upper and lower bounds on the range of likely effects of excluding Bean Stuyvesant from nonhopper dredging jobs.[9] In the former case, none of the firms would change its bidding behavior. In the latter case, the other firms (except for Great Lakes and

7. As noted earlier, however, no meaningful new-firm entry occurred in the markets Bean Stuyvesant serves over the 1999-2002 period, and only a small amount of new capacity was added.

8. *Bid frequency* is the ratio of jobs on which a firm bids to the total number of IFBs issued by the Corps, among all jobs on which Bean Stuyvesant would have bid.

9. It is very unlikely that the number of bidders would actually increase. In theory, it is possible, if there is more than one firm that has avoided bidding against Bean Stuyvesant and which would bid on the jobs if it were certain Bean Stuyvesant would not bid. However, the continued presence of several other, equally formidable rivals should continue to intimidate any such firms.

Weeks) would have to bid on about 2.25 times as many of the types of jobs on which Bean Stuyvesant would have been expected to bid, therefore an intermediate outcome is that those firms would bid on about 60 percent more of those jobs than they have in the past (with Great Lakes and Weeks naturally limited to increases of 20 percent or less).

CBO has no basis on which to determine where the most likely outcome lies within the range of effects.[10] The intermediate outcome corresponds to a drop in the average number of bidders from 3.4 to about 3 firms. The outcomes at the one-quarter and three-quarter points of the range yield 2.8 and 3.2 average bidders, respectively—a range that CBO considers a reasonable estimate of the likely effect of excluding Bean Stuyvesant from nonhopper dredging work. This range is applied in the discussion that follows.

RELATIONSHIP BETWEEN NUMBER OF BIDDERS AND SIZE OF WINNING BID

CBO finds that, compared with contracts for which only one or two firms bid, the Army Corps's dredging costs are, on average, about 10 percent lower when a third firm bids and more than 20 percent lower when five or more firms bid.[11] To estimate the relationship between the number of bidders and the size of the winning bid, CBO fit a linear regression model of the size of the winning bids (relative to the Army Corps's cost estimate in advance of the bids) to the number of firms bidding; identities of leading firms bidding; year of bidding between 1999 and 2002 (to account for changes in underlying economic conditions); and descriptors of the job being bid, including region, method of disposal, and type of bid solicitation. The result of interest is the effect of the number of bidders. The other variables were included to take into account confounding factors that could otherwise bias the estimates.

Economic theory predicts that greater competition will cause market prices to fall. In terms of the market for dredging services, the theory predicts that a larger number of bidding firms will result in a lower winning bid because firms must offer lower bids to achieve a given likelihood of winning. The bids included in the analysis were submitted in response to open invitations from the Corps. The

---

10. An alternative approach to that taken here would be to construct a detailed economic model. This would require gaining access to proprietary data on firms' costs, net revenues, and bidding strategies. While such an approach would yield more precise predictions, it would not produce additional insights beyond those gained here.

11. Fifty-one of the jobs, or about 17 percent, attracted only a single bidder. The Army Corps indicated that in those cases, the job specifications did not attract much interest or included characteristics, such as a short startup time or highly demanding requirements, that most firms could not satisfy. The conclusions of this analysis are essentially unchanged when those sole-bidder jobs are omitted.

invitations specify job requirements, with the expected scope of the job expressed as a cost range (for example, $1 million to $5 million, or greater than $10 million). The Army Corps develops its own detailed cost estimate against which it evaluates the bids it receives, but the bidders are not told what that cost estimate is. For all but exceptional cases, contracts are awarded to the low bidder.[12]

The results of fitting a linear regression model to the Corps's data indicate that, indeed, the greater the number of bidders for the Corps's dredging contracts, the lower the winning bid. As stated previously, compared with jobs that attract one or two bidders, the average winning bid for jobs that draw three bidding firms is about 10 percent lower relative to the Corps's cost estimate; when there is a fourth firm bidding, the average winning bid is 12 percent lower, and for contracts that draw five or more bidders, the average winning bid is 20 percent lower.[13] Competition among sellers of dredging services drives bid prices down toward the marginal cost of providing the services, that is, the cost of performing the next dredging job taking into account the extent to which existing equipment has previously been committed to other jobs.

As noted earlier, CBO calculated as a plausible range of likely effects on average number of bidders a drop from 3.4 firms to between 2.8 and 3.2 firms. The estimated relationship between bid price and the number of bidders suggests that the winning bid price would increase by about 0.4 percent if the average number of bidders dropped to 3.2, and between 1.2 percent and 2 percent if the number of bidders fell to 2.8 firms.[14] If no firm changed its bidding behavior, so Bean Stuyvesant's bids were not replaced, CBO estimates that the winning bid would be about 7 percent greater than it currently is.

COST IMPLICATIONS FOR THE ARMY CORPS OF ENGINEERS

Bean Stuyvesant bids on only a fraction of the nonhopper contracts the Corps awards each year. From 1999 through 2002, the total annual value of nonhopper dredging contracts in all U.S. regions was about $550 million per year, on average, of which Bean Stuyvesant bid on about 30 percent, by value. The implications of

12. This information was provided by Barry Holliday of the Army Corps of Engineers.

13. These estimates are based on a sample of 301 nonhopper jobs contracted by the Army Corps: 117 in the Atlantic region, 149 along the Gulf of Mexico, and 35 along the Pacific coast. The sample excludes contracts set aside for small-firm bidding. All of the results are highly statistically significant. The jump between the estimates for four and for five or more firms reflects differences in types of jobs (larger jobs attract fewer bidders because the requirements can be beyond smaller firms' capacities), which may place different kinds of demands on the Army Corps's cost estimations.

14. These numbers result from interpolating between the estimated effects of having four, three, and two bidders in a competition to estimate the effects of dropping from 3.4 to 3.2 and 2.8 firms.

CBO's estimates for the Corps's overall nonhopper dredging costs depend on total appropriations for those activities. If future dredging activity by the Corps remains at current average levels, those costs could be expected to increase by between $50,000 and $250,000 per contract, or about $0.6 million to $3.3 million per year given current levels and practices. To compensate for such an increase, appropriations for the Corps's operations would have to increase, or the Corps's other spending would have to be cut. Those average cost increases would be slightly higher if the increase in bidding by the remaining firms (to replace bids Bean Stuyvesant would otherwise have made) resulted in a drop in their bidding elsewhere. If no firm replaced Bean Stuyvesant's excluded bidding activity and the average number of bidders declined fully by one firm, the Corps's nonhopper dredging costs would be expected to rise by about $11 million per year in the affected geographic regions, or by about $850,000 per contract.