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THE RELATIONSHIP BETWEEN PRICE COMPETITION AND
MOBILIZATION CAPABILITY IN. (U) ASSISTANT SECRETARY OF
THE NAVY (SHIPBUILDING AND LOGISTICS) W. R. V BUCK
JAN 86 F/G 5/1

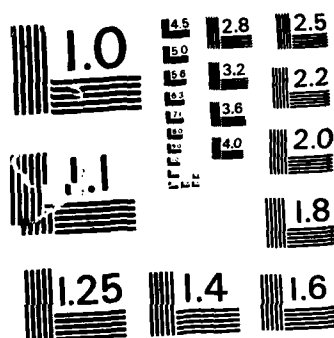
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THE RELATIONSHIP BETWEEN
PRICE COMPETITION AND MOBILIZATION CAPABILITY
IN NAVAL SHIPBUILDING AND REPAIR

A Report to the U.S. Congress,
Committees on Armed Services,

On the Industrial Base
for Construction, Overhaul and Repair
of Naval Vessels

January 1986

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United States Navy
John Lehman, Secretary

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<p>The report considers the current competitive environment in and mobilization capability of the naval shipbuilding and repair base (NSARB) and includes assessments of 1) how competition and mobilization capability would each be affected by an increase in the number of shipyards in the NSARB, 2) alternative ways of achieving such an increase, and 3) options for maintaining the facilities and trained labor force of important yards whose future is in doubt.</p> <ul style="list-style-type: none"> Any industry needs a given level of business to remain viable, though there can be purely internal considerations which sometimes govern the decision to remain in business. For shipbuilding, the trend has been to a slightly larger Navy program and no commercial work. In ship maintenance and repair, the trend is toward more Navy ships scheduled in a year, with less overall work required because of improved approach to maintenance management. <p style="text-align: right;">(Cont'd on reverse)</p>					
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- Nine additional shipbuilding yards entered the NSARB in the last ten years. Fifteen repair yards left the NSARB since 1983. On 1 October 1985 there were fifty-six private facilities and eight naval shipyards in the NSARB.
- Regional distribution of NSARB yards is adequate for current mobilization requirements. Resources available are sufficient to meet current initial requirements, but long term wartime new construction would be constrained until supplier production increased. Our studies show that the declining shipyard base is not jeopardizing the ability to mobilize for even a large-scale conflict.
- Competitive award policies are producing considerable savings. Apparent "low balling" has not resulted in severe negative impacts on the Navy. It has, however, complicated the management of these contracts.
- Increasing the number of yards in the NSARB would require a Navy shipbuilding program beyond 20 ships per year and return to more maintenance-intensive ship designs. Other schemes to force more yards into the NSARB would add little to mobilization capability and would further distort the competitive environment. Artificial support for West Coast shipbuilding yards is not needed. Naval shipyards are no longer configured for modern warship construction and converting them to new construction would not be cost-effective.
- So called, "threatened yards," require more business and more efficient operations to survive for extended periods of time with significant resources intact.
- The Maritime Strategy articulated by this Administration, which underlies our pursuit of a 600-ship Navy, has been far more supportive of a modern and efficient shipbuilding and repair base than policies of previous administrations.



DEPARTMENT OF THE NAVY

**OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20350-1000**

24 February 1986

**The Honorable Barry Goldwater
Chairman, Committee on
Armed Services
U.S. Senate
Washington, DC 20510**

Dear Mr. Chairman:

**I have the privilege of transmitting herewith the Report on
the Industrial Base For Construction, Overhaul, and Repair of
Naval Vessels in accordance with section 1432 of the Department
of Defense Authorization Act, 1986.**

Sincerely,

**John Lehman
Secretary of the Navy**

Enclosure



DEPARTMENT OF THE NAVY

OFFICE OF THE SECRETARY

WASHINGTON, D.C. 20350-1000

24 February 1986

The Honorable Les Aspin
Chairman, Committee on
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Enclosure

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SUMMARY

Section 1432 of the Defense Authorization Act, 1986, requires the Secretary of the Navy to report to the Committees on Armed Services by 31 January 1986 on the industrial base for construction, overhaul, and repair of naval vessels. The report considers the current competitive environment in and mobilization capability of the naval shipbuilding and repair base (NSARB) and includes assessments of (1) how competition and mobilization capability would each be affected by an increase in the number of shipyards in the NSARB, (2) alternative ways of achieving such an increase, and (3) options for maintaining the facilities and trained labor force of important yards whose future is in doubt.

Our findings, as detailed in the report, are summarized as follows:

- Any industry needs a given level of business to remain viable, though there can be purely internal considerations which sometimes govern the decision to remain in business. For shipbuilding, the trend has been to a slightly larger Navy program and no commercial work. In ship maintenance and repair, the trend is toward more Navy ships scheduled in a year, with less overall work required because of improved approach to maintenance management.
- Nine additional shipbuilding yards entered the NSARB in the last ten years. Fifteen repair yards left the NSARB since 1983. On 1 October 1985 there were fifty-six private facilities and eight naval shipyards in the NSARB.
- Regional distribution of NSARB yards is adequate for current mobilization requirements. Resources available are sufficient to meet current initial requirements, but long term wartime new construction would be constrained until supplier production increased. Our studies show that the declining shipyard base is not jeopardizing the ability to mobilize for even a large-scale conflict.
- Competitive award policies are producing considerable savings. Apparent "low balling" has not resulted in severe negative impacts on the Navy. It has, however, complicated the management of these contracts.
- Increasing the number of yards in the NSARB would require a Navy shipbuilding program beyond 20 ships per year and a return to more maintenance-intensive ship designs. Other schemes to force more yards into the NSARB would add little to mobilization capability and would further distort the competitive environment. Artificial support for West coast shipbuilding yards is

not needed. Naval Shipyards are no longer configured for modern warship construction and converting them to new construction would not be cost-effective.


- So called, "threatened yards," require more business and more efficient operations to survive for extended periods of time with significant resources intact.
 - The Maritime Strategy articulated by this Administration, which underlies our pursuit of a 600-ship Navy, has been far more supportive of a modern and efficient shipbuilding and repair base than policies of previous administrations.
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INTRODUCTION

A. LEGISLATIVE REQUIREMENT

This report is submitted in accordance with the requirement of section 1432 of the Defense Authorization Act, 1986, that:

The Secretary of the Navy shall submit to the Committees of Armed Services of the Senate and House of Representatives a report on the industrial base for construction, overhaul, and repair of naval vessels (hereinafter in this section referred to as the "shipyard base").

The report shall consider the current competitive environment in the shipyard base and the current mobilization capability of the shipyard base. The report shall include an assessment of how competition in the shipyard base and the mobilization capability of the shipyard base would each be affected by an increase in the number of shipyards in the shipyard base and shall assess alternative ways of achieving such an increase.

The report shall be submitted not later than January 31, 1986.

B. SCOPE OF THE REPORT

Additional language in section 1432; Title XIV, Part D, of the Conference Committee report; and section 1126 of the House amendment to S. 1160 defined the desired scope of the report to include the following elements:

1. The assessment is to begin with the current situation and shall include a description of the possible costs and benefits.

Lacking more specific mobilization guidance, this report extrapolates to the 1 October 1985 time frame the findings of several recent Navy/Maritime Administration (MARAD) studies ⁽¹⁾ on the shipyard mobilization base. The language on costs and benefits is assumed to apply only to changes to current capabilities.

2. Competition based on price alone could eliminate marginally competitive shipyards and suppliers. On the

⁽¹⁾ Shipyard Mobilization Base Study (SYMBA), February 1984 draft; National Defense Shipyard Study (NADES), February 1985 draft. Requirements for FY '89 and subsequent.

other hand, mobilization considerations - including geographic dispersal of shipyards to reduce vulnerability and expansion of the industrial base in numbers beyond those warranted by competition - could make the retention of certain shipyards imperative.

3. In assessing ways to increase the number of shipyards in the shipyard base, consider the feasibility and desirability of expanding by one the number of shipyards currently engaged in construction of each of the following types of vessels:

- a. Trident nuclear-powered fleet ballistic missile submarines
- b. Nuclear-powered attack submarines
- c. Nuclear-powered aircraft carriers
- d. Complex surface combatants
- e. Auxiliaries

Lacking specific guidance on ships included in the "complex surface combatant" category, the report uses the Navy definition applied to repair of "complex" ships such as guided missile cruisers (CG/CGN), guided missile destroyers (DDG), amphibious assault ships (LHA), amphibious command ships (LCC), command ships (AGF), and Pigeon-class submarine rescue ships (ASR-21).

4. In considering ways to increase the number of shipyards constructing each type of vessel listed in paragraph 3, the expansion of the shipbuilding base on the West Coast of the United States and increased use of public shipyards shall be considered. A description of the possible costs and benefits of each alternative shall be included.

5. As a result of recent competitive procurement decisions the future of some important shipyards is in doubt, including the [General Dynamics] Quincy Shipyard. Include an assessment of possible options for maintaining the facilities and the trained labor force associated with Quincy and similarly situated shipyards.

C. ASSESSMENTS

The following judgments concerning the status of the shipyard industrial base for construction, overhaul, conversion, repair and activation of naval vessels are supported by findings in the main body of the report and detailed data contained in the appendices.

1. Current Competitive Environment

- Considerable savings in shipbuilding and repair are being achieved through competition;

shipbuilding savings were about \$4.4 billion during 1983-1985.

- Navy maintenance award policy has been adjusted to consider fleet readiness, crew morale, and yard capability in addition to price. Total repair base will increase under the strategic homeporting concept.
- Low-ball bidding for Navy maintenance contracts complicates contract management, but has not resulted in severe negative impacts. Contract growth work is being dramatically reduced.
- Small business set-asides disrupt the normal competitive environment and do not appear to be required to assist capable small repair firms to win business.
- Fifteen potential mobilization repair yards have recently left the industry, while nine additional shipbuilding yards have entered the NSARB in the last ten years.

2. Current Mobilization Capability

- Mobilization requirements are dependent upon assumptions such as scenario, active/inactive fleet size, length and intensity of conflict, and labor estimates. Two recent Navy/MARAD studies (SYMBA and NADES) concluded that, while Navy work alone was not sufficient to maintain the current shipyard base, foreseeable initial mobilization requirements could be met despite the declining industrial base.
- Available NSARB resources are 5% less manpower and 18% more facilities than for the NADES Study. However, NADES work-week assumptions were overly conservative. Productive mandays could exceed NADES output for the critical first month.
- Early mobilization requirements for the NSARB involve 6% more ships, but 8% fewer mandays of total labor.
- The primary initial constraints to a moderate wartime ship construction program are found in the component and weapon system production process. If these are resolved, building or modifying specialized facilities for construction of selected combatants, auxiliaries, and sealift

ships after mobilization could enhance the capability of the base.

- Regional distribution of shipyards is adequate.

3. Alternatives for Increasing the Number of Yards

- Benefits of artificially expanding the base are not explicitly obvious when the additional mobilization capability is not required and peacetime business will not sustain the current industry.
- Limiting the size of current yards by law or contract award policy may not ensure that new yards are formed. Management and skilled labor have not been known to migrate to new sites and a significant long-term business base would be necessary to attract competitive and capable new firms due to start-up costs.
- Limiting the maintenance contracts awarded at one time to any given yard may attract additional firms. They would not be likely to add significantly to the mobilization resources unless sufficient business was available to justify the added expenses of ownership over leasing existing underutilized facilities. The number and dollar value of non-ROH maintenance awards have been increasing since 1982, but may not be sufficient to generate new yards.
- Adding more West Coast shipbuilding yards to the NSARB would not improve the competitive environment, is not required for mobilization, would take substantial time, and would require government subsidies to sustain them.
- Naval shipyards are not configured for or skilled in modern, new ship construction. If the time and funding were available, business would have to be taken from the private sector, with a net decrease in the NSARB (since NSYs also do repair work).

4. Options to Maintain Threatened Yards

- Reduced business outlook for the future will impel management of weak or inefficient yards to close or reorganize.
- There are no compelling mobilization reasons to subsidize the existence of the General Dynamics/Quincy Yards.

The obvious solution for increasing the number of NSARB yards or preserving existing threatened ones is to increase the Navy shipbuilding program or increase the commercial orderbook to a level which permits modernization of presently non-competitive firms.

I. NSARB DEFINED

"...report on the industrial base for construction, overhaul, and repair of naval vessels (hereinafter...referred to as the 'shipyard base')."

This report will use the term NSARB, Naval Shipbuilding and Repair Base, in referring to the collection of yards having a recent history of engaging in, or attempting to engage in, construction, conversion, or maintenance of Navy ships since 1980.

The NSARB Study base consists of fifty-six (56) private facilities and eight (8) naval shipyards. To be included in the study base, a shipyard had to meet the following criteria:

- Performed Navy new construction, SLEP, conversion or maintenance (preventative or corrective) work during any part of the period from 1 October 1980 through 1 October 1985.
- The facility must have the capability of constructing or repairing a vessel of over 400 feet in length.
- Open on 1 October 1985.

Each shipyard listed in the study base is a separate facility except the Port of Portland, Oregon, which consists of the employment at Dillingham, Northwest Marine, and Lockport Marine; the Port of San Diego, which consists of the employment at Continental Maritime of San Diego, RMI Inc. and Arcwel; and Bath Iron Works, which includes the Bath and Portland, Maine facilities. Portland, Oregon and San Diego are jointly used by local firms that have no marine facilities of their own but can readily lease these nearby port facilities to accomplish their work. Note that some small firms doing Navy work on specialized craft are not included in the NSARB - Lockheed/Gulfport and Bell Aerospace for instance - because of the size criteria.

Table I-1 summarizes the NSARB distribution, while Table I-2 provides a summary of facilities currently in existence in yards having out-of-water building/repair positions. Appendix A lists all yards and facilities.

TABLE I-1
NO. OF SHIPYARDS BY COAST
Private/Public

	<u>EAST COAST</u>	<u>GULF COAST</u>	<u>WEST COAST</u>	<u>GREAT LAKES</u>	<u>HAWAII</u>	<u>TOTAL BY TYPE</u>
Shipbuilding	8	7	9	1	0	25
Repair w/Drydocks	12/4	0	7/3	0	1/1	20/8
Subtotal	20/4	7	16/3	1	1/1	45/8
Topside Repair	4	1	4	2	0	11
GRAND TOTAL	24/4	8	20/3	3	1/1	56/8

Note: A yard which can both construct and repair is counted as a shipbuilding yard.

TABLE I-2
FACILITIES SUMMARY
Private/Public

	<u>EAST COAST</u>	<u>GULF COAST</u>	<u>WEST COAST</u>	<u>GREAT LAKES</u>	<u>HAWAII</u>	<u>TOTAL BY TYPE</u>
Graving Docks	23/17	5	8/13	1	0/4	37/34
Floating Drydocks	18/4	7	23	1	1	50/4
Shipbuilding Ways	22	20	20/2	1	0	63/2
Land Level Posit.	6	6	0	0	0	12
Marine Railways	6	0	0	0	0/1	6/1
Synchrolifts	0	0	2	0	0	2
TOTAL	75/21	38	53/15	3	1/5	170/41

Yards qualified to construct or repair nuclear powered ships, by area, are as follows:

	<u>East</u>	<u>West</u>	<u>Hawaii</u>
Public	3	2	1
Private	2	0	0

II. CURRENT COMPETITIVE ENVIRONMENT

"The report shall consider the current competitive environment in the shipyard base..."

"The assessment of the current capabilities of the shipyard base...shall be made considering the requirements of...peacetime competition..."

A. INTRODUCTION

Fiscal Year 1985 statistics have been compiled to present an aggregated assessment of the current competitive environment in the NSARB. Detailed data is extremely business sensitive precisely because of the intensely competitive environment in both shipbuilding and ship repair.

B. SHIPBUILDING

Thirteen shipbuilding awards for twenty ships were made in FY 85; all but the Trident SSBN were competitive. We are continuing efforts to develop a second source to build the Trident submarines, including awarding post-shakedown availabilities to potential competitors of General Dynamics. The required approvals for four programs cited industrial mobilization exceptions (Federal Acquisition Regulations, Section 6.302-3) as the reason for not selecting the lowest offeror. Independent government estimates were made for five of the competitive awards. Four shipyards which had no new Navy construction awards in FY 1984 won awards in FY 1985.

For the period FY 1983-1985, documented savings of \$4.4B have been achieved, as measured from the President's budget submit in each year to contract execution as of 30 September 1985. Table II-1 shows the detailed data.

Because of the Committees' interest in West Coast shipbuilding, those FY 1985 shipbuilding contracts for which West Coast firms submitted offers were closely examined. In each case the West Coast offeror was higher - in five of the six cases, higher by more than 15 percent.

<u>Ship Type(#)</u>	<u>Winner</u>	<u>Coast</u>
DDG (1)	Bath	East
TAO (2)	Penn	East
TAO (1)	Avondale	Gulf
TAGS (2)	Bethlehem	East
TAGOS (2)	Halter	Gulf
LSD (2)	Avondale	Gulf

TABLE II-1

Shipbuilding Contract Savings

(\$Millions)

September 1985

	FY 83		FY 84		FY 85	
	Pres. Bud Submit	Contract Execution	Pres. Bud Submit	Contract Execution	Pres. Bud Submit	Contract Execution
CG-47	3132.9	2691.8	3431.4	2828.9	3126.8	2740.6
DDG-51	-	-	-	-	618.6	415.5
TAH	300.0	246.8	260.0	214.9	-	-
TAKR	-	-	290.5	265.0	-	-
TAVB	-	-	-	-	37.6	30.1
LCAC	84.5	67.2	131.6	127.6	-	-
LHD-1	-	-	1479.7	1427.8	-	-
LSD-41	379.2	375.8	364.7	315.5	486.0	473.1
MCM-1	100.0	135.5	301.0	310.7	-	-
MSH-1	-	-	62.4	61.3	-	-
SSN-688	1196.8	1159.6	1985.0	1808.2	2666.5	2506.5
TAO-187	210.2	145.5	346.2	299.2	562.6	458.2
TRIDENT	1989.7	1570.3	1848.0	1499.6	1777.4	1619.2
FFG-7	666.4	592.7	-	-	-	-
BB-61	411.4	397.7	-	-	-	-
CVN-68	7270.0	6516.3	-	-	-	-
ARS	74.0	65.0	-	-	-	-
ARDM	58.1	40.3	-	-	-	-
TAGOS	-	-	-	-	192.9	109.8
TAGS	-	-	-	-	262.0	217.5
TACS	-	-	-	-	44.0	30.5
TOTAL	15873.2	14004.5	10500.5	9158.7	9774.4	8601.0
SAVINGS		1868.7 (11.8%)		1341.8 (12.8%)		1173.4 (12.0%)

C. SHIP REPAIR AND OVERHAUL

Prior to May 1985 the area of competition for one-third of the Regular Overhauls (ROH) and all of the selected restricted availabilities (SRA) was restricted to within an approximate 50-mile radius of the ship's homeport berthing area. We then changed policy and extended the award area coastwide for all ship

Regular Overhauls (ROHs) to increase competition and reduce costs and in recognition of a maintenance philosophy shift to more short SRAs and Phased-Maintenance Availabilities (PMAs) and fewer long term ROHs. We made these changes in recognition of the need to maintain a coastwide ship repair industrial base and in full accord with previous Congressional direction. In the case of ROHs we offered the crews an opportunity to relocate with the ship. For the shorter SRAs and PMAs we continue to compete in the homeport. This assures an adequate repair base in our homeport areas, keeps the crews home with their families, and makes possible the use of shore training sites and support infrastructures by crew members.

The homeport solicitation area for Norfolk, Virginia was extended in June 1985 to include Baltimore, Maryland for all fixed price, scheduled, planned availabilities of less than six months. Table II-2 shows a sample of the number of ships homeported in several high density areas (more than ten ships).

TABLE II-2
SELECTED HOMEPORT STATISTICS
(16 AUG 1985)

<u>Location</u>	<u># Ships</u>
San Diego, CA	110
Pearl Harbor, HI	41
Long Beach, CA	26
Little Creek, VA	22
Groton, CT	24
Mayport, FL	36
Charleston, SC	69
Norfolk, VA	100

Twenty-four major maintenance awards, involving fifty-four ships, were made by the Naval Sea Systems Command in FY-85. See Table II-3.

The Phased Maintenance Program (PMP) is an element of the Auxiliary and Amphibious ship Maintenance strategy in which depot-level maintenance is performed through a series of short, frequent PMAs in lieu of Regular Overhauls (ROH). To the maximum extent practicable, repairs are defined based on the actual material condition of the ship. Essential features of this program include reliance on condition-directed repairs and the use of highly qualified port engineers. Multi-ship/multi-year contracts are used to maximize benefits by providing flexibility to accommodate condition-directed repairs, involve the contractor in the advance planning process, foster continuity in maintenance management and instill a proprietary interest in the ship by the contractor. Solicitations are for cost-type contracts in the homeport area.

Prior to May 1985, Selected Restricted Availabilities (SRA) were awarded in a manner consistent with three objectives: increase readiness, maintain an adequate repair base, and hold costs to a minimum. This resulted in eighteen multi-ship contracts in FY 85 in the San Diego homeport area. Since May 1985, Navy policy has been changed as follows for SRAs assigned to the private sector:

- Six months or less duration; may be reserved for the homeport area if adequate capability, capacity, and competition exists.
- Use of fixed price type contracts.
- Over six months duration; will be competed coastwide.
- All floating drydocks competed coastwide.

TABLE II-3
NAVAL SEA SYSTEMS COMMAND
NAVY SHIP REPAIR AND OVERHAUL AWARDS IN FY '85

<u>Ship (#)</u>	<u>Type</u>	<u>Winning Firm</u>	<u>Comments</u>
FF	ROH	General Ship, MA	Non-Complex
FF	ROH	Metro Machine, VA	Non-Complex (d)
FF	ROH	Continental Maritime, CA	Non-Complex (d)
DDG	ROH	Litton/Ingalls, MS	Complex
AS	ROH	Litton/Ingalls, MS	Moderately Complex
DD	ROH	Todd Seattle, WA	Moderately Complex (a)
DD	ROH	Northwest Marine, OR	Moderately Complex (a)
LPD	ROH	Northwest Marine, OR	Non-Complex (c)
AOE (2)	PMA	Norfolk S&D, VA	Non-Complex (b)
AFS (3)	PMA	Jonathan, VA	Non-Complex
LSD	PSA	Metro Machine, VA	Non-Complex
LST (3)	PMA	Southwest Marine, CA	Non-Complex
AE (4)	PMA	Service Engineering, CA	Non-Complex (d)
LST (3)	PMA	NASSCO, CA	Non-Complex
LST (4)	PMA	Metro Machine, VA	Non-Complex (d)
AOE (2)	PMA	Todd Seattle, WA	Non-Complex
AE (3)	PMA	Triple A Machine, CA	Non-Complex (d)
LST (5)	PMA	Jonathan, VA	Non-complex (d)
AE (3)	PMA	Coastal Drydock, VA	Non-Complex (d)

(Table continued on next page)

<u>Ship (#)</u>	<u>Type</u>	<u>Winning Firm</u>	<u>Comments</u>
CG (4)	SRA	Southwest Marine, CA	Complex (b)
CG (3)	SRA	NASSCO	Complex
FF	SRA	Campbell Ind., CA	Non-Complex (b)
CVN+CGN	SRA	Continental Maritime, CA	Complex
DD (3)	SRA	NASSCO, CA	Moderately Complex (b)

Notes: (a) FAR 6.302-3 exception which precluded award of both ships to same company - award made to combined lowest pair of offerors.
 (b) Cost-type contracts.
 (c) competition included a Naval shipyard.
 (d) small business set-aside.

D. LOW BALL OFFERS

The government estimate baseline considers neither the business environment impacts nor the relative efficiency of different yards. However, when an offer is submitted for a price of 70% or less of the government estimate (to use a representative trigger percentage), there may be cause to suspect a "buy in" or "low ball" offer. The General Accounting Office and the Commander, Naval Sea Systems Command conducted studies of the extent to which this practice was taking place during FY 82-85 for 105 active and reserve ship overhauls in the private sector (1)(2). Significant findings were as follows:

- The primary motivating factor in "low ball" offers is competition. Four regions have the most competitive environment: San Diego, Norfolk, Boston, and Brooklyn.
- Cost increases are manifest in two principal types of overhaul work, neither of which is necessarily objectionable:

- (1) GAO, "Comparison of Estimated and Actual Costs to Overhaul Navy Ships in Private Shipyards, "Briefing for SAC staff forwarded by Senator Hatfield on 11 September 1985.
- (2) NAVSEASYS COM, "Analysis of 'Low Balling' on Naval Ship Overhauls Conducted in the Private Sector", September 1985.

- growth work, closely or directly associated with specified work;
 - new work, not included in original work package.
- Contract new and growth work is being reduced through a number of Navy management initiatives. Under a pilot program for one ship, announced in November 1985, the prime ship repair contractor will be afforded the opportunity to submit a price proposal for accomplishing growth or new work. If a fair and reasonable price cannot be reached between the prime contractor and the contracting officer, the Navy will either compete the work for accomplishment by a third party at the overhaul site, concurrent with the prime contractor's continued performance, or the work will be deferred and be the subject of a separate competitive procurement.
 - Apparent "low balling" has not resulted in severe negative impacts on the Navy. It has, however, complicated the management of these contracts.

E. SMALL BUSINESS SET-ASIDES

Small business firms constitute 74% of the ship construction and repair firms now doing business with the Navy. These small firms have been very successful in obtaining Navy maintenance work through small business set-aside contracts and have been able to obtain much of the unrestricted competition contracts for this type of work; generally due to their lower overhead rates. This success has impacted significantly on the large businesses, which in many instances have not been able to compete due to the overhead charges that are required to cover their plant and facilities investments. In 1981, nearly half of the Navy overhaul and repair dollars went to small businesses. However, the long term trend from 1979 to the present shows that the large/small business split for overhaul and repair work has averaged 70%/30%. About 2/3 of the small business awards were won in open competition. In FY 1985, small businesses were awarded nearly \$500M in overhaul and repair work, over half of which was set aside. Construction contracts for smaller Navy ships have been mostly small business set-asides, especially those for the boats and other yard craft procured each year.

F. SUMMARY

Lack of commercial orders and an inability to compete price wise in the international market has made the shipbuilding and repair industry virtually completely dependent upon naval ship work. As a result, competition for Navy ship work is more intense and more yards are involved in Navy business. The number of firms involved in Navy construction of vessels over 400 feet in length increased from 8 to 17 between 1974 and 1984.

Entry of new firms into this industry or even movement of current firms into different areas within it is very difficult. The requirement for large capital investments, specialized labor, environmental considerations, and high technology facilities preclude all but two of the largest shipbuilders from constructing nuclear powered combatants except under the most urgent conditions. All of the yards engaged in new construction have in recent years made investments to upgrade their facilities to be more competitive or even considered for a competitive award.

Competition for repair work is extremely intense with only the most efficient/productive yards obtaining repair work. During the 1983/85 time period, 15 yards left this industry (Appendix B).

Increasing the benefits of competition and the size of the mobilization base can best be accomplished by encouraging private shipyards to become competitively involved in construction/repair of conventionally powered complex combatants. This will be difficult for new yards due to the large capital investment required to build the limited number of proposed new Navy ships. Qualifying for repair work is more feasible, but the work would have to be taken from qualified shipyards. No increase in manpower resources would be expected as a result of such a repair work reallocation.

There is an adequate base for construction and repair of nuclear powered ships in Newport News, Electric Boat and six Navy shipyards (repair only). The Navy is attempting to develop a second competitive source for SSBN construction.

The percentage of total contract dollars awarded competitively has increased from 15.7 percent in FY 1980 to 84.3 percent in FY 1985⁽¹⁾.

In summary, there is more capability in the shipbuilding and repair industry than there is work. Competition results in acquiring and repairing ships in the most cost-effective manner in the most productive shipyards. Competition is making the mobilization base stronger by providing the incentive to improve technology, streamline methods, and reduce labor costs in order to win business. A policy based on supporting a base would guarantee some workload for a set of "essential" yards while a policy of pure competition focuses on buying in the least expensive manner. Support of a large, dispersed mobilization base, capable of rapidly increased output, tends to require actions which run counter to encouraging competition. Small business set-asides tend to maintain smaller firms, less able to expand rapidly, at the expense of larger, more capable firms with larger industrial capability. There is evidence that small business ship repair firms are generally quite capable of winning scheduled maintenance awards without set-asides.

(1) FY 1985 Annual Report on Procurement Competition in the Department of the Navy, Competition Advocate General of the Navy, December 1985.

III. CURRENT MOBILIZATION CAPABILITY

"The report shall consider...the current mobilization capability of the shipyard base.

"The assessment of the current capabilities of the shipyard base...shall be made considering the requirements of... wartime mobilization capability and shall include a description of the possible costs and benefits of the current capabilities..."

A. INTRODUCTION

The last major studies of the shipyard mobilization base were done by joint Navy/MARAD teams and completed in February of 1984 (SYMBA) and February 1985 (NADES). The studies were classified and have received limited distribution within the U.S. Government. A final draft copy of SYMBA has been provided to both Armed Services Committees. A final draft copy of NADES was provided to the House Armed Services Committee staff at their request.

The SYMBA Study assumed that resources available in October 1982 would be available for a mobilization starting in September of 1988. A potential base of 119 yards was defined. Requirements were derived from the FY 1984-1988 Five Year Defense Plan (FYDP). The NADES Study considered the effects of mobilizing with a reduced base of 66 yards, assumed to be engaged in performing peacetime work derived from the FY 1985-1989 FYDP. Mobilization requirements were also derived from this later FYDP.

The October 1985 mobilization capabilities of the NSARB are assessed by comparing resources/requirements in the two studies cited to the present.

B. NATIONAL MOBILIZATION BASE RESOURCES

Changes to the original SYMBA Study October 1982 data base of potential mobilization yards are tabulated in Appendix B. Facility and production workforce statistics for both private and public shipyards were gathered, re-evaluations made of the SYMBA shipyards and all known potential candidates to see if they met the criteria for inclusion in the shipyard mobilization base, and a new list of national mobilization shipyards compiled (Appendix C). Sixty-seven of those yards are certified for performing Navy work under MSR (Master Ship Repair) or MOR (Master Ordnance Repair) requirements as of 1 October 1985.

A detailed statistical evaluation of production workforce and all docks, basins, ways, and land positions capable of handling a ship 400' or longer was then made for each shipyard. This data was compared to 1982 mobilization base information to

assess industry profile changes which have occurred over the last three years. Detailed statistics for both public and private shipyards in the national mobilization base are provided in Appendix D and summarized as follows:

	<u>Oct. 1982</u>	<u>Oct. 1985</u>	<u>Change</u>
Number of yards	119	97	-22
Production workforce	160,088	138,554	-21,534
Facilities (\geq 400')	255	231	-24

1. Production Workers - The reduction in on-the-job production workers was distributed as follows across the 88 private and 9 public yards:

- Public yards down 1,934
- Private shipyard sector down 19,600

East Coast	-321	Great Lakes	-261
Gulf Coast	-8,487	P.R./Hawaii	-20
West Coast	-10,511		

2. Facilities

- 24 Private shipyards have closed; 2 have re-opened
- 5 private shipyards were added; 5 were deleted
- net yard reductions (includes opened, closed added, and deleted):

East Coast	- 7	Great Lakes	-1
Gulf Coast	-10	Non-Conus	-1
West Coast	- 3		
- no facility changes have occurred in public yards
- net private shipyard facilities capable of handling a 400' ship or larger have been reduced by 24:

East Coast	-13	Great Lakes	-4
Gulf Coast	- 3	Non-Conus	-0
West Coast	- 4		
- Overall change by type:
 - 7 Floating drydocks (FD)
 - 9 Graving docks (GD)
 - 10 Shipbuilding Ways (SW)
 - + 2 Marine Railways (MR)

C. NSARB vs NADES STUDY RESOURCES

The NADES Study is the most recent comprehensive assessment of a constrained shipyard base in a full mobilization scenario. From the perspective of the FY 1985-89 Five Year Defense Plan (FYDP) used as a basis for the FY 1985 President's Budget, projections for 1988 pre-mobilization workload were made. The study determined that nine public yards and fifty-seven private yards may be performing this work. As a test, the NADES Study assessed the ability of these sixty-six yards to perform mobilization tasks for some nine months. It found that the work could be accomplished, using realistic priority rules, in only sixty-four yards.

This report does not draw upon the detailed simulation model used in the NADES Study. Instead, current NSARB capability is inferred from a comparison of current resources and requirements with their counterparts in NADES. This section compares pre-mobilization resources, while section III-D compares requirements for mobilization.

1. Pre-mobilization Yards/Production Workers

	<u>NADES (1988)</u>	<u>NSARB (10/1/85)</u>
Public yards		
East	5/23,683	4/23,784
West	3/16,313	3/17,073
Hawaii	<u>1/ 3,240</u>	<u>1/ 4,397</u>
Total	9/43,236	8/45,254
Private yards		
East	24/63,925	24/61,495
Gulf	9/19,486	8/12,324
West	16/14,031	20/14,113
Lakes	4/ 1,254	3/ 1,926
Hawaii	<u>2/ 363</u>	<u>1/ 370</u>
Total	55/99,059	56/90,228
GRAND TOTAL	64/142,295	64/135,482

Note: USCG shipyard at Curtis Bay, MD is not part of the NSARB. It would not be a "Navy" asset until transferred in wartime. It was included in NADES as a "national defense shipyard."

The NSARB is currently supporting about 5% less production labor than projected in NADES for 1988. The comparative distribution of production workers by type of work activity is as follows:

	<u>NADES</u>	<u>NSARB</u>
Construction		
Navy	51,331	61,105
Commercial	<u>0</u>	<u>269</u>
	51,331	61,374
Repair + Non-ship		
Navy	72,153	64,244
Commercial	<u>18,810</u>	<u>9,864</u>
	90,963	74,108

2. Pre-mobilization Facilities* Capable of Dry Hull Work on Ships Over 400'.

	<u>NADES</u>	<u>NSARB</u>
<u>East Coast</u>		
GD	35	40
FD	27	22
SW+LL	24	28
MR+SL	<u>4</u>	<u>6</u>
	90	96
<u>Gulf Coast</u>		
GD	1	5
FD	11	7
SW+LL	11	26
MR+SL	<u>0</u>	<u>0</u>
	23	38
<u>West Coast</u>		
GD	24	21
FD	18	23
SW+LL	8	22
MR+SL	<u>1</u>	<u>2</u>
	51	68
<u>Great Lakes</u>		
GD	1	1
FD	0	1
SW+LL	6	1
MR+SL	<u>1</u>	<u>0</u>
	8	3
<u>Hawaii</u>		
GD	4	4
FD	2	1
SW+LL	0	0
MR+SL	<u>1</u>	<u>1</u>
	7	6
Total	179	211

*GD-graving dock; FD-floating drydock; SW-shipbuilding way;
LL-land-level position; MR-marine railway; SL-synchro-lift.

NSARB shipyards contain in aggregate thirty-two more individual facilities capable of accommodating a ship over 400' in length than were profiled in NADES. The greatest difference in capabilities lies in dedicated construction facilities: an increase of 28 (57%).

D. MOBILIZATION REQUIREMENTS

The early mobilization requirements anticipated in the NADES Study are used as the basis for showing how current requirements differ. In most cases, current workload requirements have been calculated using simple, aggregated approximations instead of the detailed simulations done in the NADES Study. In the cases of acceleration of work in progress, it was not possible to assemble comparable data on the mandays remaining to be done. The data for the NADES study show the beginning total mandays required for the ships projected to be in yards just prior to a FY 1988 mobilization. The data for 1985 is also beginning total mandays for all ships which were in yards on 1 October 1985. The estimated comparison is considered valid within the overall uncertainties of scenario and attrition. Details are presented in Appendix E.

In the case of wartime construction, the comparison is somewhat more complex. The NADES Study examined only the first eight months of conflict. Wartime new construction starts were primarily constrained by lead times to supply components and systems to the yards and by the number of yards with the experience and qualifications to engage in accelerated construction of warships. As documented in the earlier SYMBA Study, most new starts would be beyond the eighth month.

1. Reactivations and Sealift Ship Modifications

	<u>NADES</u>	<u>Change for 1985</u>
Number of ships	596 (1)	-343
Total Mandays	4.1 Million	+3.2 million (2)
Production Workers		
start 0	16,398	-5,194
month 1	32,429	-18,227
2	18,710	-6,488
3	12,942	-3,411
4	9,506	-2,629
5	8,570	-2,271
6	9,945	-590
7	12,810	-1,933
8	14,181	-2,665

(1) Includes activation of 16 idle merchant ships, excludes three RRF ships based and activated in Japan.

(2) Continued on next page...

2) Includes 5 million additional mandays to activate 4 carriers which were not included in the NADES activations. This workload could be reasonably accommodated by starting the first one in the third month and one every three months thereafter, with results as shown.

The current ship inventory is smaller than NADES for inactive Navy ships (ISNAC), the Ready Reserve Force (RRF), and the Sealift Enhancement Feature modifications (SEF). The current National Defense Reserve Fleet (NDRF) is larger than projected for 1988 - it is assumed to all be activated.

Most of the reduced labor demand would be over the first three months on the West and Gulf Coasts. Activating fewer ships would require fewer berths - about 43% of the berths which were modeled for NADES over the first four months.

2. Accelerate Navy and USCG Construction/SLEP in Progress

	<u>NADES</u>	<u>Change for 1985</u>
Number of ships	85	+8
Total Mandays	57.0 million	-3.6 million (6%)
Yards Involved	11	+11

Note: USCG requirement in 1985 assumed the same as in NADES.

3. Accelerate Navy/USCG/MSB Maintenance in Progress

	<u>NADES</u>	<u>Change for 1985</u>
Number of ships	103	+4
Total Mandays	15.1 million	-2.3 million (15%)
Yards Involved	28	+13

Note: USCG requirement in 1985 assumed the same as in NADES.

4. Wartime New Construction

- a. Navy Ships - The NADES Study did not address the requirements for long-term wartime new construction. However, the earlier SYMBA Study did define a representative shipbuilding plan for wartime execution. It was premised on two goals: (1) double existing peacetime annual starts and (2) increase selected ship type inventories by 50% as a hedge against attrition and to support increased post-war tasking.

Even with 119 public and private yards in the potential mobilization base, the SYMBA Study found constraints in achieving wartime production goals. Component and system manufacturing lead times and the qualifications of yards were the two constraints highlighted. There could be a manpower constraint if the requisite numbers of skilled workers are not available at building yards.

The SYMBA Study made the conservative assumption that only currently existing yards which were considered qualified to build certain types of ships in peacetime would build those types in wartime. On that basis, the overall wartime lay down rate for new Navy ships did not achieve the desired goals. Lay down rates for large militarily-useful merchant-type ships were also relatively low, due primarily to the scarcity of qualified yards and large facilities. The fifty-six private yards in the NSARB include twenty-five shipbuilding yards--another four shipbuilding yards are available in the national base, but they are not experienced in building warships. Moreover, there are currently ten fewer shipbuilding ways over 400' in length than were available in the 1982 mobilization base examined in SYMBA.

- b. Sealift and Support Ships - This requirement was met by imposing an initial orderbook of 250 merchant mobilization ships on the base. A mix of handy-size tankers and multi-purpose dry cargo ships was assigned to be built in appropriately qualified yards. The rate of new starts, as constrained by component lead times and yard facilities, increased from about 25 in year one to 50 in year two. The most efficient way to execute this plan would be in highly specialized yards using the latest technology and construction methods. There are no such private yards building commercial ships at present. More facilities would have to be added in wartime, during the lead period while the supplier industries increased production of such critical items as reduction gears and switchboards.

E. ASSESSMENT

The mobilization capability of the current NSARB has not been directly assessed, but inferences can be drawn from the comparisons of resources and requirements tabulated. In general, differences between the 1 October 1985 situation and the detailed 1988 mobilization study projections fall into three areas: activation, accelerated work, long-term construction.

1. Activation work, including sealift enhancement modifications to merchant ships, is currently required for about 40% of the 1988 ship count. Though total mandays are greater, monthly manpower requirements range from about 6% to 56% less over the critical first nine months of mobilization. About one-half the number of activation sites would be required.

2. Accelerated maintenance and construction work in progress would involve work on about 12 more ships (+6%) but would require 8% fewer mandays. Construction acceleration is of lower priority and could be delayed somewhat to divert some of the labor force to repair completions. The NADES study assumed a maximum 56-hour work week, but a 30-day surge to a 72 hour work week should be possible. This would increase the available mandays of productive work by about 20%, even allowing for the decreased individual productivity caused by longer work hours.

3. New construction starts in wartime are expected to be initially constrained by the ability of the supplier base to deliver major components and systems, rather than by shortages of manpower and yards. It is particularly difficult to predict skilled manpower availability a year into a major mobilization (obtained from related construction occupations or specially trained from the unskilled manpower pool). Special modular shipbuilding yards could also be built, tailored to a few key ship types. While a large, existing base of qualified facilities, labor and management appears desirable, there is no evidence that such a base would be required within a year of starting to mobilize.

If an ambitious wartime construction plan were desired, the following actions would be required during peacetime:

- Acquire or build additional facilities for modular construction of desired ship types.

- Prepare pre-engineering and detail design plans and schedules for modular construction of combatants, auxiliaries, and sealift ships.
- Retain skilled labor and supervisory personnel in areas where wartime shipbuilding programs are scheduled.
- Ensure sufficient surge capacity in suppliers of initial and long-lead critical components and systems.

4. Table III-1 summarizes the premobilization resources available at present and as modeled in the NADES Study. Except for a 5% lower production manpower base, current resources available equal or exceed those in NADES. Moreover, some 33 additional firms - with 20 ship facilities and 3,000 workers - are available as a base for expansion. Though not all of the 33 additional firms would be fully qualified for all tasks, 16 of them are currently MSR-qualified and 5 have major shipbuilding facilities.

TABLE III-1

PRE-MOBILIZATION RESOURCE SUMMARY
(Public and Private Shipyards)

		<u># of Yards</u>	<u>Over 400' Facilities</u>	<u>Production Workers</u>
NSARB (OCT 85)	East Coast	28	96	85,279
	Gulf Coast	8	38	12,324
	West Coast	23	68	31,186
	Hawaii	2	6	4,767
	Great Lakes	<u>3</u>	<u>3</u>	<u>1,926</u>
		64	211	135,482
NADES (OCT 88)	East Coast	29	90	87,608
	Gulf Coast	9	23	19,486
	West Coast	19	51	30,344
	Hawaii	3	7	3,603
	Great Lakes	<u>4</u>	<u>8</u>	<u>1,254</u>
		64	179	142,295
NATIONAL BASE (OCT 85)	East Coast	39	101	87,016
	Gulf Coast	23	47	14,399
	West Coast	27	69	30,286
	Non-Conus	3	7	4,827
	Great Lakes	<u>5</u>	<u>7</u>	<u>2,026</u>
		97	231	138,554

There has been considerable interest in the geographical distribution of yards capable of building Navy ships. We do not see strong rationale for such a distributed construction base, despite a concern by some for the strategic vulnerability of the Panama Canal. Table III-2 illustrates the regional shipbuilding deliveries during World War II for Navy steel-hulled ships in public and private yards.

East/Gulf yards built three times the tonnage and number of Navy ships built on the West Coast.

TABLE III-2

WWII REGIONAL NAVY SHIP DELIVERIES

	Combatants			Auxiliaries		
	<u>East</u>	<u>Gulf*</u>	<u>West</u>	<u>East</u>	<u>Gulf*</u>	<u>West</u>
1939	25	-	2	-	2	-
1940	26	-	1	4	-	-
1941	28	-	3	1	-	3
1942	104	5	20	3	-	13
1943	325	121	99	-	1	62
1944	241	147	81	1	10	60
1945	<u>118</u>	<u>40</u>	<u>20</u>	<u>-</u>	<u>2</u>	<u>23</u>
Total:	1180		226	24		161
Displacement						
Tonnage:	3,236,420		380,625	143,416		1,024,353

* includes some inland yards.

Source - Shipbuilders Council of America

IV. ALTERNATIVES TO INCREASE YARDS

"The report shall include an assessment of how competition in the shipyard base and the mobilization capability of the shipyard base would each be affected by an increase in the number of shipyards in the shipyard base.....The report shall assess alternative ways of achieving such an increase.

"...consider the feasibility and desirability of expanding by one the number of shipyards currently engaged in construction of each of the following types of vessels:

- (A) Trident nuclear-powered fleet ballistic missile submarines.
- (B) Nuclear-powered attack submarines.
- (C) Nuclear-powered aircraft carriers.
- (D) Complex surface combatants.
- (E) Auxiliaries.

"...consider [for constructing each type of vessel above] expansion of the shipbuilding base on the West Coast of the United States and increased use of public shipyards.

"The assessment of...each alternative...(1) shall be made considering the requirements of both peacetime competition and wartime mobilization capability; and (2) shall include a description of the possible costs and benefits of...each alternative."

A. INTRODUCTION

Any effort to increase the number of yards in the NSARB should consider that new yards are likely to optimize for ship construction or repair workloads. The modernization plan and workforce mix for each yard/facility would be tailored for peak efficiency in either ship construction or repair. A transition from new construction to repair, or vice versa, would likely require changes in plant layout and facilities, labor skills mix, and management structure. Multi-ship construction is a long-term scheduled commitment. Repair work tends to emerge as an unscheduled workload. A capability to perform maintenance and repair work has been found in our mobilization studies to be more essential than the ability to build new ships, particularly in the first year.

Alternatives considered in this assessment are as follows:

1. Limit maximum size of yards in current base.
2. Limit number of major depot maintenance contracts for any single yard in a year.
3. Add West Coast yards able to build 5 ship types.
4. Qualify Navy shipyards to build 5 ship types.

B. ASSESSMENT OF ALTERNATIVES

The general perception of the Committees, based on language in the Bill, is that "competition based on price alone could eliminate marginally competitive shipyards and suppliers. On the other hand, mobilization considerations - including geographic dispersion of shipyards to reduce vulnerability and expansion of the industrial base in numbers beyond those warranted by competition - could make retention of shipyards imperative."

The alternatives will be assessed on the basis of whether they would increase the number of yards, reduce peacetime shipbuilding and ship repair costs, and would add significantly to mobilization posture.

Alternative 1 - Limit the maximum size of the private yards in the current base.

We observe a high concentration of workers in several large yards. Newport News Shipbuilding and Drydock, General Dynamics/Electric Boat, Bath Iron Works, and Ingalls Shipbuilding together employ over 60 percent of all NSARB private shipyard workers. At any one time, we could expect to find contracts for 10-20 ships in each yard. If employment were capped in these yards, the awards would have to decline comensurately and additional workers could be available to work in existing or new yards only if they agree to migrate to where the work exists. Whether additional yards, not now in the NSARB, would qualify for the displaced work and absorb this displaced workforce, however, is by no means certain. New authorizing legislation would also be required to limit the size of large yards. The form or likelihood of such legislation is beyond the scope of this report.

It might be feasible to involve more yards through exception (FAR Section 6.302-3) or competition, if all shipyards were equally capable and technically qualified to enter the overall naval ship construction market. This is not the case, however, since none of the West or Gulf Coast private shipyards are certified for nuclear work and most do not have MOR certification. There is a wide variation in the level of yard modernization improvements and productivity, and some yards have geographic limitations which restrict work to smaller ships.

A significant business base is necessary to induce yards to make a large capital investment in plant modernization. This is required in order to increase productivity to the point where construction cost and schedule would be

competitive with existing contracts held by yards in the NSARB. The only way to guarantee such a base would be to temporarily waive the provisions of the Competition in Contracting Act of 1984 (PL-98-369) and accept less efficient output until the effects of modernization are realized. This would reduce work in the large yards (which would have to slow their rates of capital investment and recovery) and make it available to other yards. Yards which have made the necessary capital investments to achieve productivity leadership would rightly expect to recover their investment by competitively winning contracts. Awarding contracts to non-competitive yards would invite deliberate buy-ins and low-balling with the attendant risk of defaults, mediocre work, or cost growth and claims.

If the contracts are to be awarded to yards not previously experienced or qualified to build or repair Navy ships, only non-complex ship programs would have a chance to qualify. Thus, employment in the "big four" would hardly be affected. Moreover, new yards would have to specialize in either construction or repair, but would be unable initially to manage both. Only a few large yards today have the necessary workforce and production sites to conduct parallel new construction and repair in a single yard.

Yards which are marginally competitive - qualified, but have lost past competitions by small margins - may remain viable if awarded a contract on an exception basis.

Alternative 2 - Limit the number of major Depot maintenance contracts (over 6 months duration) awarded at one time to any given yard.

More yards might be able to capture the available work if the highly productive yards were to be prevented from winning large numbers of contracts.

Present policy provides that at least 30% of the dollar value of repair contracts is required to be offered to the private sector. Many contracts for work under six months duration are awarded in the home port areas of the ships, but the distribution of work depends on adequate capability, capacity and competition. Longer duration maintenance is now competed coastwide (see Section IIC.).

Small business awards for scheduled maintenance in 1984 amounted to 45% of total awards - over half of the small business awards were won in open competition. Because of the large amount of Navy maintenance contracts being awarded to small business firms, the limiting of contracts to any one firm gives no guarantee that large businesses, the companies

needed to maintain the industrial shipbuilding base, will be successful in obtaining additional business opportunities. The higher overhead rates that must be charged for investments in facilities reduces the large companies' ability to be competitive with small firms having less substantial facilities.

Alternative 3 - Add West Coast shipbuilding yards to the current list of yards capable of building

- (1) Trident SSBN (16,600 ton displacement)
- (2) SSN (6,000 ton displacement)
- (3) CVN
- (4) Complex Surface combatants
- (5) Auxiliaries

Navy testimony has asserted that there is no persuasive or compelling rationale for distributing shipbuilding capability around the United States, though a case can be made for ensuring a distributed repair base. Nevertheless, the West Coast Yards are assessed on the basis of competitive posture.

(1)(2) The SSBN and SSN require a nuclear-qualified shipyard, deep waterway channels, and large material handling capabilities. The productivity gains in submarine construction are achievable through efficient modular construction, pre-outfitting, and effective management control of complex production operations.

None of the West Coast private shipyards are, or have ever been, nuclear qualified. They also do not have recent experience with submarine construction tolerances and building practices, nor do they have the modular submarine construction pre-outfitting capabilities of Atlantic Coast shipyards. Hence, more West Coast shipyards would not be capable of coming on-line without nuclear qualification, massive plant modernization investment, and an extremely long start-up period, possibly 5 years.

(3) The present sole-source CVN contractor, Newport News Shipbuilding, has always targeted, and proven to be effective in, the capital ship market mainly through their management commitment, plant modernization and employee training programs. They also have the advantage of an expansive building site which permits the accommodation of large ships (such as CVNs), good material flow paths, and the construction of pre-outfitted modules up to 1,000 metric tons. Additionally, this contractor has a nationwide constituency with system, component, and material suppliers from 46 states. The CVN is a unique

entity by virtue of its size and complexity and it requires a facility of Newport News Shipbuilding caliber to cost-effectively carry out CVN construction. Based on this specialization, no other under-utilized shipyard can be considered to be competitive with Newport News Shipbuilding.

To "sectionalize" a CVN for competition by a group of shipyards may be technically feasible, but would not be cost-effective.... even if other shipbuilders were to make large investments in plant modernization and changes to their construction techniques in order to produce these sections.

(4) The CG, DDG and FFG ship types have been or will be built with a multicontractor base. ASN(S&L) testimony to the SASC on 24 October 1985 stated that ships of the FFG-7 Class produced on the East Coast cost 35-40% less for the shipbuilding portion than ships constructed on the West Coast (8-10% less on the basis of total cost, including systems). These comparisons were based on actual cost figures collected through FY 1980. Table IV-1 shows the percentage that Cost at Completion (average per ship) was lower on the East Coast with Bath Iron Works than with the two West Coast firms.

TABLE IV-1

PERCENT THAT AVERAGE COST-AT-COMPLETION PER SHIP AT BATH IRON WORKS WAS LOWER

<u>FY</u>	<u>Todd, San Pedro</u>	<u>Todd, Seattle</u>
	<u>%</u>	<u>%</u>
75	29.1	33.1
76	36.8	36.4
77	35.0	38.7
78	36.1	39.3
79	30.2	31.4
80	30.1	32.3
81*	23.9	22.9
82*	26.8	-
83*	22.6	-

*Estimated

(NOTE: A competitive six-week Post Shakedown Availability for an AEGIS cruiser was offered in early FY 86 to a private yard on the West Coast. The solicitation was

deliberately moved from the Gulf Coast area in order to develop an AEGIS repair capability on the West Coast.)

(5) Auxiliaries can be classed as moderately complex or non-complex. In the former category are the AOE, AE, AS, AR and TARC types. The TAO and TAVB would be examples of ships without complex armament or systems installations.

The base of competition for these classes is already large and mainly composed of shipyards who would normally seek commercial contracts. The dearth of commercial work has forced some shipyards to close (such as Maryland Shipbuilding), others to become idle (Such as Levingston), and others to become underutilized (such as Bethlehem Steel-Sparrows Point). Some of the remaining candidate shipyards have modernized to remain competitive (such as Avondale, Penn Ship, and NASSCO). These last three are well distributed, will provide ample competition in peacetime, and are also important assets in the mobilization base.

On the West Coast NASSCO, Lockheed, Todd San Pedro, and Todd Seattle could compete for most ships of this type. An additional West Coast shipyard would not significantly contribute to lowering costs through competition and probably could not effectively compete with the existing competing yards.

Alternative 4 - Qualify Naval Shipyards in the construction of the following types of ships:

- (1) Trident SSBN
- (2) SSN
- (3) CVN
- (4) Complex surface combatants
- (5) Auxiliaries

Modernizing and qualifying a Naval shipyard to build new ships would reduce the ship construction contracts available for competition in the private sector and exacerbate an existing survival problem. Further, naval shipyards are not optimally configured or skilled in modular construction, pre-outfitting management technologies for new ship construction. Although it would be possible to modernize a naval shipyard, it is extremely improbable that the requisite funding would be available.

Two formal studies provide the basis for evaluating the shipbuilding capability of the Naval shipyards.

- A Naval Sea Systems Command report on the FY 1978-82 Navy shipbuilding program found⁽¹⁾:
 - All FY 1978 warships should be constructed in private shipyards.
 - Where no more than 8 FFGs per year are authorized for FY 1979 -1982, all such ships should be constructed in private shipyards (never exceeded this rate).
 - Where no more than 4 SSNs per year are authorized in FY 1980, assignment should be to the private sector (maximum of 2 awarded).
- An Institute of Defense Analyses study found ⁽²⁾:
 - The private sector appears to have sufficient capacity to complete all the FY 1983-1987 nuclear submarines and carriers and nuclear submarine overhauls scheduled for private yards.
 - There is adequate non-nuclear shipbuilding capacity in the private sector.
 - New construction of CGN-38 and -42 ships in private yards could be unrealistic in 1987-90 (not now programmed) when considered in conjunction with other nuclear-powered ship programs.
 - Government shipyards generally have higher production costs than private yards on the same coast.
 - Surge production of nuclear powered ships could saturate private yard capacity. The study team was unable to show, however, that an active shipbuilding program in Navy yards is necessary or cost-effective.

(1) NAVSEASYS COM, "Reassessment of New Construction in Private/Naval Shipyards", 20 July 1977.

(2) Fry, John N. and Wells, John D; "The Reinstitution of the Construction of U.S. Navy Combatant Ships in U.S. Government Owned Shipyards," IDA Study S-538, January 1982.

Six of the eight Naval shipyards have nuclear certification and all have diversified and specialized repair capabilities, a partial list of which is illustrated by the FY 1985 workload:

<u>Naval Shipyard</u>	<u>Ship Types</u>
Puget Sound*	ARL, CGN, CV, SSN
Mare Island*	AGSS, CVN, SSN
Long Beach	AVM, BB, DDG, FFG, LPD
Pearl Harbor*	AFDM, ATS, DD, DDG, FF, SSN
Portsmouth*	SSBN, SSN
Philadelphia	AVT, CV, DDG, LPH
Norfolk*	BB, CG, CGN, CV, CVN, DDG, LCC, SSN
Charleston*	AE, AS, CG, DDG, FF, SSBN, SSN

*Nuclear qualified

None of the yards have been awarded naval ship construction since 1968, and the Vinson-Trammell Act⁽¹⁾ has been waived on an annual basis. To bring any yard on line for new construction would require large capital investments in plant modernization and personnel training to achieve high productivity in naval ship construction of any type. The achievement of this objective is possible but improbable due to funding constraints and the consequences of exacerbating a private/public sector conflict over a limited new construction workload.

(NOTE: a limited competition for repair contracts was held in accordance with the FY 85 Continuing Resolution authority. An amphibious transport dock ship (LPD) regular overhaul was competed between 8 private yards and 2 navy yards. The ship is "non-complex", 570'x 100'x 23', 10,000 tons light displacement. Northwest Marine Iron Works of Portland, OR, won by obtaining labor's consent to a 25% wage reduction. The Long Beach NSY will overhaul a sister ship and the recorded cost data, quality, and delivery performance will be compared to the private sector overhaul.)

Adding a NSY to the new construction portion of the NSARB would reduce the available work for the private yards which have the most difficulty surviving in today's competitive climate.

(1) Vinson-Trammell Act of 1934 as modified by the 1966 Defense Appropriation Act, Section 302 requires "the first and each succeeding alternate warship and escort vessel be constructed in Naval shipyards", but also provides that the President may waive this in the public interest.

C. SUMMARY

Assessing the possible future effects of hypothetical increases to the NSARB is not a precise process. Generally, all yards able and willing to pursue Navy business are already in the NSARB. It would require considerable time and subsidy to force additions at this point. The obvious alternative of significantly increasing the number of new starts each year is fiscally infeasible and strategically unsupportable. Therefore, expansion of the new construction base is not warranted.

<u>Alternative</u>	<u>Considerations For</u>	
	<u>Competition</u>	<u>Mobilization</u>
1. Limit yard employment	Temporarily waive PL-98-369; low-balling or unqualified offerors.	Little overall effect if new yards develop; could encourage dispersal.
2. Limit major maintenance awards per yard	Already have many exceptions and set-asides.	Too many small yards with limited surge capability; could encourage dispersal.
3. Add West Coast building yards		
a. SSBN	Not feasible.	Not required.
b. SSN	Not feasible.	Not required.
c. CVN	Not feasible.	not required.
d. CG, DDG, FFG	Too costly.	Not required.
e. Auxiliaries	Saturated already.	Could contribute.
4. Qualify NSYs to build	Would force some private yards out of the limited market. Complex ship maintenance now done in NSYs would not transfer easily to private sector. Excessive cost to modify yards.	

V. OPTIONS TO MAINTAIN THREATENED YARDS

"...competition based on price alone could eliminate marginally competitive shipyards and suppliers.

"...include in the report...an assessment of possible options for maintaining the facilities and the trained labor force associated with [the General Dynamics] Quincy [shipyard] and similarly situated shipyards."

A. CRITERIA FOR THREATENED YARDS

There are some shipyards which may consider themselves threatened according to their own criteria. An inability to win Navy construction or maintenance contracts over an extended period, for instance, might lead to a situation in which management feels it must severely curtail employment or cease operations. Root causes for such a situation would include:

- Nationally non-competitive due to inefficient operations.
- Locally non-competitive due to small business set-asides.
- Regionally (coastwide) non-competitive due to marginal cost factors.
- Yard is located outside homeport award areas.

With regard to the third point, it is interesting to note the case of a shipbuilding conglomerate with two West Coast yards. One yard is in the Los Angeles area and has had recent difficulty in winning Navy contracts. The other yard is in the Seattle area and has a sizeable backlog of Navy, commercial and Coast Guard work. While one yard's continued existence may appear "threatened" on an individual basis, there are actions possible by corporate management which could ensure that workloads are shared between the divisions in order to maintain the skilled workforce and facilities of both. This would require no intervention by the government and could be in both the national and corporate interest.

A definition of "threatened yards" based on a statistical analysis of the level of yard activity was considered but was discarded for the following reasons:

- Historically, some shipyards have remained open at a very low level of activity while seeking new work.
- The decision to close a shipyard can involve corporate business considerations beyond current workload.

It is beyond the scope of this report to determine which yards, or their parent firms, will cease operating as shipyards in the future. However, there are several indications of operating difficulties which could lead to a decision to close:

1. A public announcement of intention to close permanently.
2. Publicized financial problems - generally culminating in filing under Chapter 11 of the bankruptcy laws.

B. ASSESSMENT OF OPTIONS

There are essentially seven major options, exclusive of Navy contract awards, available to maintain the resources of "threatened yards." The first six of these options are presented in a 1985 NACOA report⁽¹⁾ and are partially quoted herein since they effectively identify potential courses of action.

1. Federally Funded Shipbuilding Program

"...a number of supporters of U.S. shipyards have proposed a federal building program for new militarily-useful merchant vessels to be sold or leased to private operators or placed in reserve. Such a program was completed in the 1950s with the MARINER class merchant vessels built by the government and sold to private operators; similar proposals have been made in several recent studies and in legislation..."⁽¹⁾

A major Federal building program could benefit U.S. shipyards, particularly if contract awards were given in blocks of 5 to 10 ships of the same design. The yards could build in series and use modern management techniques. However, such vessels must add to U.S. sealift capability to justify Federal involvement and must be capable of operating in the commercial market to produce opportunities to recoup the government's cost.

2. Renewal of Ship Construction Subsidy

"At current prices in U.S. shipyards, [a] \$200 million subsidy...would allow about \$400 million in new ship construction. At the current prices in U.S. shipyards, this would build about five modern container-ships or about three 200,000 dwt tankers. This would

(1) NACOA, "Shipping, Shipyards and Sealift," July 1985.

have little effect on preserving the national shipbuilding base, and the small-order approach would not encourage increased productivity in U.S. yards." (1)

The trend in subsidized vessels built for commercial markets has been toward designs which have low military utility. Even a 50-percent subsidy would probably be insufficient to cover the true price differential between U.S. and foreign construction.

3. Improving Capital Formation

"Shipyard management largely agrees ... that capital formation is not a major problem--that capital can be raised for a vessel if there is a demand for it, and if the vessel cost and delivery time are acceptable. Impact on vessel pricing would require substantially lowered interest rates..." (1)

4. Cargo Preference - Increasing Shipbuilding Demand

"An alternative approach to promoting construction in U.S. shipyards, which would not involve any direct Federal funding, is through a cargo preference scheme for commercial cargos. "Cargo preference" is the restriction of certain cargos or trades to carriage in vessels registered or built in the country imposing the preference. Currently, cargo preference in the United States applies only to the transport of government-impelled cargos.....Although it benefits U.S. ship operators, the government-impelled cargo preference is of sufficiently small scale that it does little to create U.S. shipbuilding demand." (1)

Several cargo preference bills have been introduced in the U.S. Congress in recent years. None have passed. Cargo preference has been generally viewed as simply another, less direct, subsidy.

5. Tax Proposals

"Another approach might be tax credits, independent of any commercial cargo preference scheme, to U.S. shippers who import or export on U.S.-flag vessels. Any new tax proposals would presumably be difficult to support at a time when the administration and Congress are addressing tax reform and the elimination of tax supports to many special interest groups." (1)

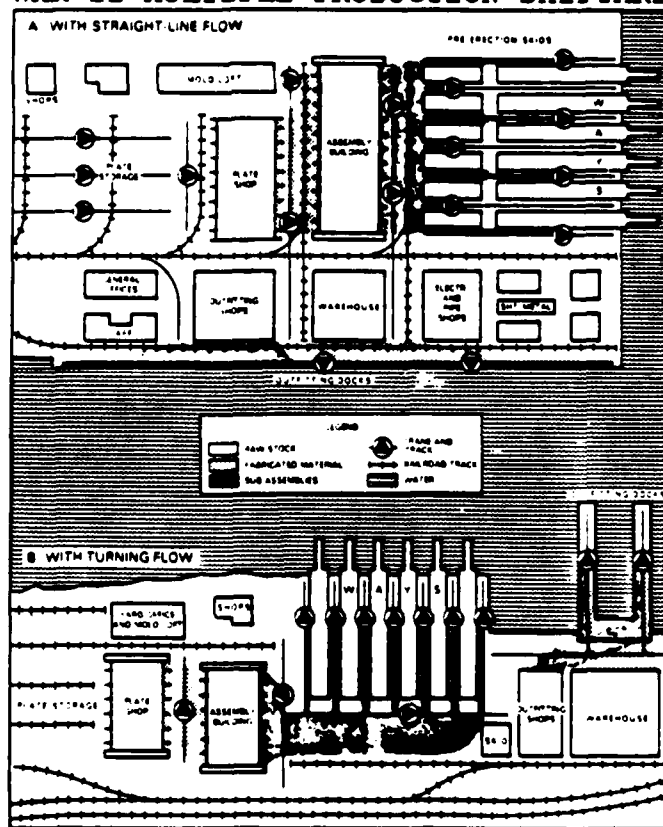
(1) NACOA, 1985

6. Federal Purchase of Private Shipyards to be Mothballed for National Emergency

"A precedent for this practice is an aircraft plant that the government owns in San Diego, which is idled, or "mothballed," to be used in case of emergency. The government already owns significant shipyard capacity, however, including 8 Naval shipyards, 1 Coast Guard Yard, 2 shipyards that are leased to private concerns, 3 overseas U.S. Naval ship repair facilities and numerous repair ships. Mothballed shipyards from World War I were not used in the emergency yard expansion for World War II." (1)

The mass production merchant shipbuilding yards of the World War II era were specifically designed for optimum efficiency with "straight-line" or "turning" flow throughput (see Figure V-1). Most of these yards were disestablished after the war and many of the U.S. shipyards currently in operation cannot achieve similar production rates due to ship size and complexity and yard layout.

FIGURE V-1
WORLD WAR II MULTIPLE PRODUCTION SHIPYARD LAYOUTS



(1) NACOA, 1985

7. Diversification of Shipyard Product Lines

A continuous high level of shipwork is not available from the Navy shipbuilding program or commercial programs. A similar situation prevails throughout the marine industries of Europe, Scandinavia, and Japan. Many foreign shipyards have turned to non-ship fabrications to ameliorate the effects of the shipbuilding recession. An example is the case of the Nippon Kokan (NKK) Tsu shipbuilding works in Japan. The Tsu plant was primarily a shipbuilder when it opened in 1969. It cut operations during the oil supply crises of the 1970s and now devotes 30 percent of its efforts to building bridges and pressure vessels and another 30 percent to offshore oil rigs.

A yard which is optimized for ship production only would be suboptimal in construction and manufacturing efficiency for other products. Retooling and realignment of plants would be required to produce ships and other products with equal efficiency. Most existing yards would need to be modified to make use of flexible-manufacturing and high technology for such water-related projects as flood control caissons, bridges, offshore anti-erosion structures, dock walls and gates, pressure vessels, and underwater storage containers.

C. THE CASE OF QUINCY SHIPYARD

With respect to the Quincy yard, the following points would bear on any decision to modify the yard for modular, pre-outfitted construction:

- GD/Quincy has built nuclear-powered ships (SSN-638, CGN-9 and CGN-25) in the past. Nuclear re-qualification and recruitment of a specialized workforce is technically feasible, but could take up to five years and considerable expenditure of government training funds.
- GD/Quincy has the necessary site area which could be utilized for the assembly of hull modules, fabricated elsewhere, and material flow patterns. (See Appendix F)
- A 1,200-ton Goliath bridge crane could off-load the preoutfitted hull modules, from their trans-shipment barge.
- Quincy added new materials handling equipment in 1975, including two 200-ton transporters.

- The available water depth over the sills (maximum 29') of the large graving docks is not sufficient to float out completed submarines without additional buoyancy mechanisms.

While modification is technically feasible, it appears to be unlikely in peacetime for three reasons: (1) there has been no evidence that the parent corporation has any intention of modifying the yard, (2) expense and time required, and (3) Quincy has been unable to successfully compete for Navy work and generate the necessary business.

One company has considered purchase and revival of the GD/Quincy yard, but has been unable to secure commitments for shipbuilding orders.

In the most recent mobilization base study, NADES, no significant workload was projected for 1988 for Quincy and no critical tasks were assigned within one year of the start of mobilization.

D. SUMMARY

While each yard presents a unique set of considerations to overcome in order to reverse a situation which put it in a "threatened" position, some general observations apply:

- There is not enough total peacetime business to support all existing yards at an economical level.
- Government options to keep yards open will all cost money.
- Closing the Quincy yard would not seriously imperil the mobilization capability of the shipyard base.

APPENDIX A

NAVAL SHIPBUILDING AND REPAIR BASE

as of 1 October 1985

NAVAL SHIPBUILDING AND REPAIR BASE

The NSARB Study base consists of fifty-six (56) private facilities and eight (8) naval shipyards. To be included in the study base, a shipyard had to meet both of the following criteria:

- (1) Performed Navy new construction, SLEP, conversion or overhaul and repair work during any part of the period from October 1, 1980 through October 1, 1985.
- (2) The facility must have the capability of constructing or repairing a vessel of over 400 feet in length.

This analysis does not include Curtis Bay or Derecktor because neither facility has performed any Navy work under the ground rules stated above. Also, Coast Guard shipwork is not considered Navy work except under mobilization conditions.

Each facility listed in the study base is a separate facility except the Port of Portland, which consists of the employment at Dillingham Ship Repair, Northwest Marine Iron Works, and Lockport Marine Co.; the Port of San Diego, which consists of the employment at Continental Maritime of San Diego, RMI Inc. and Arcwel; and Bath Iron Works, which includes the Bath and Portland facilities. The two West Coast port facilities are jointly used by local firms that have no marine facilities of their own but can readily lease these nearby port facilities to accomplish their work.

Facilities of the Port of San Diego are government owned (U.S. Naval Station, San Diego).

The following special categories define levels of qualification for ship repair. Only MSR and MOR status is shown in the accompanying tables.

MSR: Formerly Master Ship Repair, now Master Agreement for Repair and Alteration of Vessels. Must be capable of performing 55% of the work on Navy ship overhauls with their own facilities and work force; subcontracting for those elements beyond their capability or capacity; and assuming responsibility for the integrated scheduling, cost, and quality of subcontractor performance.

The MSR Agreement contractor must own or have available a pier (with services), structural shop, machine shop, pipe shop, electric shop, and rigging shop. He must have committed access to a Navy-certified drydock.

ABR: Agreement for Boat Repair. Contractor must be primarily engaged in ship or boat/craft repair (SIC 3731/3732), have suitable facilities, and must own or have immediate access to marine railways, floating drydocks or other means to lift the vessel from the water. Designed for contractors who can do limited work on Navy ships of MSO size and larger when in a restricted or technical availability (RAV or TAV), as well as selective shipboard component repairs.

NOTE: MSR and ABR status are recertified every 3 years and are not for submarine repairs.

MOR: Master Ordnance Repair program. Designed for advance qualification of private shipyards and companies technically capable of managing combat systems work and conducting combat system testing through stage VII during private sector overhauls of DDG, CG, CG(N), FFG, DD-963, and DDG-993 class ships. Qualification is for a maximum of 2 years and may be required more often.

SHIPYARD CLASSIFICATIONS

NSARB

	SMALL BUSINESS	SHIPBUILDING YARDS	REPAIR YARDS WITH DRYDOCK FACILITIES	TOPSIDE REPAIR YARDS	PRIVATE MASTER SHIP REPAIR CONTRACTORS	PRIVATE MASTER ORDANCE REPAIR CONTRACTORS
Atlantic Dry Dock Corp.	X		X		X	
Bath Iron Works		X			X	X
Bellinger Shipyard			X			
Bethlehem Steel (Sparrows Point)		X			X	
Boston Shipyard Corp.	X		X		X	
Braswell Shipyards	X		X		X	
Charleston Naval Shipyard			X			
Coastal Dry Dock and Repair	X	X			X	
Colonna's Shipyard	X		X		X	
Detyens Shipyards	X		X		X	
General Dynamics (Electric Boat)		X			X	
General Dynamics (Quincy)		X			X	
General Ship Corp.	X		X		X	
Hoboken Shipyards	X		X		X	
Jacksonville Shipyards			X		X	
Jonathan Corp.	X			X	X	
Metal Trades, Inc.	X			X	X	
Metro Machine Corp.	X		X		X	
Newport News Shipbuilding		X			X	
Newport Offshore Ltd.	X			X	X	
Norfolk Naval Shipyard			X			
Norfolk Shipbuilding and Drydock		X			X	X
North Florida Shipyards	X		X		X	
Pennsylvania Shipbuilding		X			X	
Perth Amboy Drydock	X		X		X	
Philadelphia Naval Shipyard			X			
Portsmouth Naval Shipyard			X			
Tracor Marine, Inc.				X	X	
EAST COAST TOTAL	<u>14</u>	<u>8</u>	<u>16</u>	<u>4</u>	<u>23</u>	<u>2</u>
ADDSCO Industries	X	X			X	
Avondale Shipyards		X			X	
Bethlehem Steel (Beaumont)		X			X	
Boland Marine	X			X	X	
Halter Marine, Inc. (Chickasaw)		X			X	
Litton/Ingalls		X			X	X
Tampa Shipyards		X			X	
Todd Shipyards (Galveston)		X			X	
GULF COAST TOTAL	<u>2</u>	<u>7</u>	<u>-</u>	<u>1</u>	<u>9</u>	<u>1</u>
Bay Shipbuilding		X				
Marinette Marine Corp.	X			X		
Petersen Builders	X			X		
GREAT LAKES TOTAL	<u>2</u>	<u>1</u>	<u>-</u>	<u>2</u>	<u>-</u>	<u>-</u>
Campbell Industries	X			X	X	
Continental Maritime of San Francisco	X		X		X	
Lake Union Drydock	X			X	X	
Larson's Boat Shop	X			X		
Lockheed Shipbuilding		X			X	
Long Beach Naval Shipyard			X			
Mare Island Naval Shipyard			X			
Marine Power & Equipment	X	X			X	
National Steel		X			X	X
Pacific Drydock			X		X	
Port of Portland		X			X	
Port of San Diego (US Naval Station)			X		X	
Puget Sound Naval Shipyard			X			
Service Engineering Co.	X			X	X	
Southwest Marine (San Diego)			X		X	
Southwest Marine (San Francisco)			X		X	
Southwest Marine (San Pedro)			X		X	
Tacoma Boatbuilding Co.		X			X	
Todd Shipyards (Seattle)		X			X	X
Todd Shipyards (San Francisco)		X			X	
Todd Shipyards (San Pedro)		X			X	
Triple A Machine	X	X			X	
Triple A South	X		X		X	
WEST COAST TOTAL	<u>9</u>	<u>9</u>	<u>10</u>	<u>4</u>	<u>19</u>	<u>2</u>
Honolulu Shipyard			X		X	
Pearl Harbor Naval Shipyard			X			
NON CONUS TOTAL	<u>-</u>	<u>-</u>	<u>2</u>	<u>-</u>	<u>1</u>	<u>-</u>
GRAND TOTAL	<u>26</u>	<u>25</u>	<u>28</u>	<u>11</u>	<u>51</u>	<u>5</u>

FACILITIES SUMMARY
As of 1 October 1985

	<u>GRAVING DOCKS</u>	<u>FLOATING DOCKS</u>	<u>SHIPWAYS</u>	<u>LAND LEVEL POSITIONS</u>	<u>MARINE RAILWAYS</u>	<u>SYCROLIFTS</u>
Atlantic Dry Dock Corp.					1	
Bath Iron Works		2	3			
Bellingham Shipyard		1	2			
Bethlehem Steel (SP)	1		2			
Boston Shipyard Corp.		2				
Braswell Shipyards		1				
Charleston Naval Shipyard	3	1				
Coastal Dry Dock and Repair	5					
Colonna's Shipyard					2	
Detyens Shipyards		1				
General Dynamics (EB)	3		8	6		
General Dynamics (Quincy)	5					
General Ship Corp.	1					
Hoboken Shipyards	1					
Jacksonville Shipyards		3				
Jonathan Corp.						
Metal Trades, Inc.						
Metro Machine Corp.		1				
Newport News Shipbuilding	7		2			
Newport Offshore Ltd.						
Norfolk Naval Shipyard	5	1				
Norfolk Shipbuilding and DD		2	1		1	
North Florida Shipyards		1				
Pennsylvania Shipbuilding		2	4			
Perth Amboy Drydock		2				
Philadelphia Naval Shipyard	5				2	
Portsmouth Naval Shipyard	3	2				
Tracor Marine, Inc.						
EAST COAST TOTAL	<u>40</u>	<u>22</u>	<u>22</u>	<u>6</u>	<u>5</u>	<u>0</u>
ADDSCO Industries		2	5			
Avondale Shipyards		2	5			
Bethlehem Steel (Beaumont)			1			
Boland Marine						
Halter Marine, Inc.			1			
Litton/Ingalls	1	1	6	6		
Tampa Shipyards	4					
Todd Shipyards (Galveston)		2	1			
GULF COAST TOTAL	<u>5</u>	<u>7</u>	<u>20</u>	<u>6</u>	<u>0</u>	<u>0</u>
Bay Shipbuilding	1	1	1			
Marinette Marine Corp.						
Petersen Builders						
GREAT LAKES TOTAL	<u>1</u>	<u>1</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>0</u>
Campbell Industries						
Continental Maritime (SFRAN)		1				
Lake Union Drydock						
Larson's Boat Shop						
Lockheed Shipbuilding		1	3			
Long Beach Naval Shipyard	3					
Mare Island Naval Shipyard	4		2			
Marine Power & Equipment		2	2			1
National Steel	1	1	3			
Pacific Drydock		1				
Port of Portland		4	1			
Port of San Diego	1					
Puget Sound Naval Shipyard	6					
Service Engineering Co.						
Southwest Marine (SDIEGO)		1				
Southwest Marine (SFRAN)		1				
Southwest Marine (SPEDRO)		1				
Tacoma Boatbuilding Co.		2	5			
Todd Shipyards (Seattle)		3	1			
Todd Shipyards (San Francisco)		2	1			
Todd Shipyards (San Pedro)		2	4			1
Triple A Machine	5					
Triple A South		1				
WEST COAST TOTAL	<u>21</u>	<u>23</u>	<u>22</u>	<u>0</u>	<u>0</u>	<u>2</u>
Honolulu Shipyard		1				
Pearl Harbor Naval Shipyard	4				1	
NON-CONUS TOTAL	<u>4</u>	<u>1</u>	<u>0</u>	<u>0</u>	<u>1</u>	<u>0</u>
GRAND TOTAL	<u>71</u>	<u>54</u>	<u>55</u>	<u>12</u>	<u>7</u>	<u>2</u>

CURRENT NSARB FACILITIES

Atlantic Dry Dock Corp.	450 x 75 MR
Bath Iron Works	550 x 98 SW/(2) 700 x 130 SW/550 x 88 FD/1000 x 136 FD
Bellinger Shipyard	400 x 53 FD/400 x 50 SW/475 x 70 SW
Bethlehem Steel (SP)	900 x 106 SW/800 x 95 SW/1200 x 192 GD
Boston Shipyard Corp.	533 x 85 FD/690 x 92 FD
Braswell Shipyards	570 x 32 FD
Charleston Naval Shipyard	600 x 120 GD/580 x 110 GD/750 x 150 GD/433 x 600 FD
Coastal Dry Dock and Repair	(2) 1082 x 141 GD/451 x 72 GD/755 x 102 GD/717 x 110 GD
Colonna's Shipyard	(2) 400 x 65 MR
Detyens Shipyards	500 x 35 FD
General Dynamics (EB)	(4) 400 x 33 SW/(4) 440 x 33 SW/(6) 560 x 15 LL/515 x 55 GD/600 x 98 GD/625 x 95 GD
General Dynamics (Quincy)	(2) 860 x 123 GD/936 x 143 GD/(2) 860 x 144 GD
General Ship Corp.	690 x 105 GD
Hoboken Shipyards	1082 x 138 GD
Jacksonville Shipyards	660 x 90 FD/900 x 140 FD/745 x 127 FD
Jonathan Corp.	PS
Metal Trades, Inc.	PS
Metro Machine Corp.	660 x 96 FD
Newport News Shipbuilding	549 x 93 SW/715 x 93 SW/950 x 124 GD/1100 x 130 GD/646 x 88 GD/858 x 102 GD/455 x 68 GD/521 x 58 GD/1600 x 246 GD
Newport Offshore Ltd.	PS
Norfolk Naval Shipyard	500 x 105 GD/700 x 115 GD/1000 x 130 GD/(2) 466 x 70 GD/1100 x 150 GD/433 x 60 FD
Norfolk Shipbuilding and DD	475 x 85 SW/670 x 90 FD/1000 x 155 FD/441 x 60 MR
North Florida Shipyards	500 x 66 FD
Pennsylvania Shipbuilding	(2) 825 x 136 SW/700 x 195 SW/1000 x 195 SW/1100 x 195 FD/400 x 90 FD
Perth Amboy Drydock	400 x 68 FD/443 x 70 FD
Philadelphia Naval Shipyard	433 x 34 GD/700 x 120 GD/1000 x 135 GD/(2) 1100 x 150 GD/(2) 400 x 50 MR
Portsmouth Naval Shipyard	433 x 60 GD/700 x 105 GD/466 x 70 GD/(2) 433 x 60 FD
Tracor Marine, Inc.	PS
ADDSCO Industries	(4) 523 x 90 SW/620 x 105 SW/625 x 93 FD/750 x 100 FD
Avondale Shipyards	(2) 1020 x 175 SW/(3) 1200 x 126 SW/450 x 90 SW/1000 x 216 FD/750 x 110 FD
Bethlehem Steel (Beaumont)	900 x 96 SW
Boland Marine	PS
Halter Marine, Inc.	550 x 75 SW
Litton/Ingalls	590 x 95 SW/550 x 90 SW/(4) 650 x 90 SW/460 x 60 GD/850 x 173 FD/(5) 1000 x 225 LL/1500 x 200 LL
Tampa Shipyards	546 x 72 GD/896 x 146 GD/(2) 746 x 121 GD
Todd Shipyards (Galveston)	475 x 95 SW/900 x 160 FD/600 x 118 FD
Bay Shipbuilding	730 x 105 SW/640 x 66 FD/1100 x 136 GD
Marinette Marine Corp.	PS
Petersen Builders	PS
Campbell Industries	PS
Continental Maritime (SFRAN)	750 x 138 FD
Lake Union Drydock	PS
Larson's Boat Shop	PS
Lockheed Shipbuilding	(2) 650 x 88 SW/690 x 90 SW/643 x 96 FD
Long Beach Naval Shipyard	1050 x 140 GD/(2) 567 x 110 GD
Mare Island Naval Shipyard	580 x 105 SW/455 x 99 SW/500 x 65 GD/(?) 700 x 95 GD/433 x 30 GD
Marine Power & Equipment	(2) 500 x 104 SW/400 x 57 FD/400 x 100 SL/400 x 60 FD
National Steel	590 x 90 SW/(2) 900 x 106 SW/990 x 170 GD/750 x 130 FD
Pacific Drydock	400 x 52 FD
Port of Portland	175 x 100 SW/650 x 94 FD/550 x 98 FD/810 x 108 FD/1150 x 181 FD
Port of San Diego	687 x 85 GD
Puget Sound Naval Shipyard	533 x 90 GD/870 x 115 GD/930 x 125 GD/(?) 1000 x 140 GD/1100 x 160 GD
Service Engineering Co.	PS
Southwest Marine (SDIEGO)	655 x 104 FD
Southwest Marine (SFRAN)	400 x 54 FD
Southwest Marine (SPEDRO)	720 x 33 FD
Tacoma Boatbuilding Co.	(2) 425 x 45 SW/(2) 430 x 50 SW/650 x 400 SW/540 x 75 FD/420 x 64 FD
Todd Shipyards (Seattle)	600 x 96 SW/420 x 62 FD/650 x 84 FD/943 x 133 FD
Todd Shipyards (San Francisco)	550 x 36 SW/700 x 31 FD/950 x 144 FD
Todd Shipyards (San Pedro)	(2) 725 x 87 SW/655 x 106 SL/826 x 106 SW/545 x 120 SW/408 x 80 FD/711 x 86 FD
Triple A Machine	705 x 92 GD/995 x 108 GD/1088 x 138 GD/(2) 416 x 56 GD/416 x 71 GD
Triple A South	400 x 53 FD
Honolulu Shipyard	400 x 54 FD
Pearl Harbor Naval Shipyard	1000 x 115 GD/1000 x 135 GD/580 x 84 GD/1100 x 150 GD/ 400 x 55 MR

SW = Shipbuilding Way
 FD = Floating Drydock
 MR = Marine Railroad
 GD = Graving Dock
 SL = Syncrolift
 LL = Land Level
 PS = Pier/Berthing Facilities for vessels over 400' in length only

NSARB MOBILIZATION BASE FACILITIES SUMMARY

	<u>EAST COAST</u>	<u>GULF COAST</u>	<u>WEST COAST</u>	<u>GREAT LAKES</u>	<u>NON CONUS</u>	<u>TOTAL BY TYPE</u>
Graving Docks	40	5	21	1	4	71
Floating Drydocks	22	7	23	1	1	54
Ship Ways	22	20	22	1	--	65
Land Level Positions	6	6	--	--	--	12
Marine Railways	6	--	--	--	1	7
Syncrolifts	--	--	2	--	--	2
TOTAL (BY COAST)	96	38	68	3	6	211

NUMBER OF NSARB MOBILIZATION SHIPYARDS BY COAST

	<u>EAST COAST</u>	<u>GULF COAST</u>	<u>WEST COAST</u>	<u>GREAT LAKES</u>	<u>NON CONUS</u>	<u>TOTAL YARDS BY TYPE</u>
Shipbuilding	8	7	9	1	--	25
Repair with Drydock Facilities	16	--	10	--	2	28
Subtotal	24	7	19	1	2	53
Topside Repair	4	1	4	2	0	11
GRAND TOTAL (BY COAST)	28	8	23	3	2	64

PRIVATE YARD PRODUCTION EMPLOYMENT

	COAST	NEW CONST	NAVY OVHL	10/01/85 (PROD)
Atlantic Dry Dock Corp.	E		X	350
Bath Iron Works	E	X	X	5,550
Bellinger Shipyard	E		X	120
Bethlehem Steel (Sparrows Point)	E	X		1,217
Boston Shipyard Corp.	E		X	265
Braswell Shipyards	E		X	274
Coastal Dry Dock and Repair	E		X	600
Colonna's Shipyard	E		X	240
Detyens Shipyards	E		X	340
General Dynamics (Electric Boat)	E	X		20,467
General Dynamics (Quincy)	E	X		2,744
General Ship Corp.	E		X	280
Hoboken Shipyards	E		X	204
Jacksonville Shipyards	E		X	1,000
Jonathan Corp.	E		X	450
Metal Trades, Inc.	E		X	200
Metro Machine Corp.	E		X	400
Newport News Shipbuilding	E	X	X	22,260
Newport Offshore Ltd.	E		X	185
Norfolk Shipbuilding and Drydock	E		X	2,800
North Florida Shipyards	E		X	522
Pennsylvania Shipbuilding	E		X	824
Perth Amboy Drydock	E		X	85
Tracor Marine, Inc.	E		X	110
EAST COAST TOTAL				61,495
ADOSCO Industries	G		X	911
Avondale Shipyards	G	X		2,747
Bethlehem Steel (Beaumont)	G	X		175
Boland Marine	G	X		125
Halter Marine, Inc. (Chickasaw)	G	X		70
Litton/Ingalls	G	X	X	6,400
Tampa Shipyards	G	X		1,550
Todd Shipyards (Galveston)	G	X		646
GULF COAST TOTAL				12,324
Bay Shipbuilding	L	X		750
Marinette Marine Corp.	L	X		360
Petersen Builders	L	X		816
GREAT LAKES TOTAL				1,926
Campbell Industries	W		X	168
Continental Maritime of San Francisco	W		X	170
Lake Union Drydock	W		X	170
Larson's Boat Shop	W		X	112
Lockheed Shipbuilding	W	X	X	1,500
Marine Power & Equipment	W		X	200
National Steel	W	X	X	3,330
Pacific Drydock	W		X	95
Port of Portland	W		X	2,000
Port of San Diego (U.S. Naval Station)	W		X	234
Service Engineering Co.	W		X	206
Southwest Marine (San Diego)	W		X	500
Southwest Marine (San Francisco)	W		X	206
Southwest Marine (San Pedro)	W		X	680
Tacoma Boatbuilding Co.	W	X		350
Todd Shipyards (Seattle)	W	X	X	344
Todd Shipyards (San Francisco)	W		X	300
Todd Shipyards (San Pedro)	W	X	X	2,321
Triple A Machine	W		X	290
Triple A South	W		X	147
WEST COAST TOTAL				14,113
Honolulu Shipyard	NC		X	370
NON CONUS TOTAL				370
GRAND TOTAL				90,228

NEW CONST = NAVY NEW CONSTRUCTION since 1981
NAVY OVHL = NAVY OVERHAUL AND REPAIR since 1981
10/01/85 (PROD) = PRODUCTION MANPOWER as of October 1, 1985

**NAVAL SHIPYARD CURRENT AND
PROJECTED PRODUCTION WORKFORCE
FY 85 - 87**

	PRODUCTION WORKFORCE <u>As of 30 Sep 85</u>	TOTAL YARD <u>As of 30 Sep 85</u>	TOTAL EMPLOYMENT PROJECTED <u>86</u>	PROJECTED <u>87</u>
Portsmouth	4,591	8,519	8,400	8,300
Philadelphia	6,585	10,140	9,277	8,600
Norfolk	7,675	12,627	11,800	10,400
Charleston	<u>4,933</u>	<u>8,384</u>	<u>8,050</u>	<u>7,900</u>
EAST COAST TOTAL	<u>23,784</u>	<u>39,670</u>	<u>37,527</u>	<u>35,200</u>
Puget Sound	7,644	11,840	10,500	10,400
Mare Island	5,488	9,903	9,501	9,330
Long Beach	3,941	6,390	4,809	4,800
WEST COAST TOTAL	<u>17,073</u>	<u>28,153</u>	<u>24,810</u>	<u>24,530</u>
Pearl Harbor	4,397	6,661	6,100	6,000
NON CONUS TOTAL	<u>4,397</u>	<u>6,661</u>	<u>6,100</u>	<u>6,000</u>
GRAND TOTAL	<u>45,254</u>	<u>74,464</u>	<u>68,437</u>	<u>65,730</u>

CURRENT NAVY WORK
As of October 1, 1985

NSAB

	<u>NEW CONSTRUCTION</u>	<u>OVERHAUL AND REPAIR</u>
Atlantic Dry Dock Corp.		1 FFG(DSRA)/1 FF(SRA)
Bath Iron Works	2 FFG/4 CG-47/1 DDG-51	1 DD(ROH)/1 FFG(ROH)
Bellinger Shipyard		
Bethlehem Steel (Sparrows Point)	2 TAGS	
Boston Shipyard Corp.		
Braswell Shipyards		1 AE-(DRMA)
Charleston Naval Shipyard		1 SSBN(CONV)/2 SSBN(ROH/RF)/2 DDG(ROH)/1 SSN(ROH)/1 SSN(SR)
Coastal Dry Dock and Repair		1 AE(ROH)/1 DD(ROH)/1 LPD(ROH)
Colonna's Shipyard		
Detyens Shipyards		1 LPD(ROH)
General Dynamics (Electric Boat)	8 SSN/6 SSBN	
General Dynamics (Quincy)	3 TAKX	
General Ship Corp.		1 DD(NRT)/1 FF(DPMA)
Hoboken Shipyards		1 FF(ROH)
Jacksonville Shipyards		2 FFG(SRA)/1 CV(SRA)
Jonathan Corp.		1 AFS(PMA)/1 AOR(PMA)
Metal Trades, Inc.		1 FF(SRA)
Metro Machine Corp.		1 LST(ROH)/1 FF(ROH)/1 FF(SRA)/1 LST(PMA)
Newport News Shipbuilding	3 CVN/8 SSN	3 SSBN(RF)
Newport Offshore Ltd.		
Norfolk Naval Shipyard		1 CGN(COH)/1 CV (ROH)/3 SSN(ROH)/1 CG(ROH)/1 LCC(SRA)/
		2 DDG(SRA)/2 CG(SRA)/1 SSN(SRA)
		1 AO(SRA)/1 AO(PMA)/1 AR(SRA)/1 DD(SRA)
		1 PHM(DSRA)/1 DDG(SRA)
Norfolk Shipbuilding and Drydock		
North Florida Shipyard		
Pennsylvania Shipbuilding	1 T-AKR(C)/2 T-AO	
Perth Amboy Drydock		
Philadelphia Naval Shipyard		2 CV(SLEP)/1 DDG(ROH)/1 LPH(ROH)/2 APL(SRA)
Portsmouth Naval Shipyard		2 SSBN(ROH/RF)/3 SSN(ROH)/1 SSN(SRA)
Tracor Marine, Inc.		
EAST COAST TOTAL	<u>40</u>	<u>62</u>
ADDSCO Industries		1 AE(ROH)
Avondale Shipyards	5 T-AO/2 T-AKR(C)/3 LSD	
Bethlehem Steel (Beaumont)	1 T-AK(C)	
Boland Marine		
Halter Marine, Inc. (Chickasaw)	2 TAGOS	
Litton/Ingalls	9 CG-47/1 LHD	1 DDG(ROH)/1 AS(ROH)
Tampa Shipyards	3 T-5	
Todd Shipyards (Galveston)	1 T-AVB(C)	
GULF COAST TOTAL	<u>27</u>	<u>1</u>
Bay Shipbuilding		
Marinette Marine Corp.	2 MCM	
Petersen Builders	3 MCM/3 ARS	
GREAT LAKES TOTAL	<u>8</u>	<u>0</u>
Campbell Industries		1 FF(SRA)
Continental Maritime of SF:34	1 T-ACS(C)	1 CVN(SRA)*
Lake Union Drydock		1 MSD(NRT)
Larson's Boat Shop		
Lockheed Shipbuilding	2 LSD	
Long Beach Naval Shipyard		1 BB(ACTIVATION)/2 DDG(ROH)
Mare Island Naval Shipyard		3 SSN(ROH)/1 AGSS(ROH)/1 CVN(SRA)/1 SSN(SRA)
Marine Power & Equipment		
National Steel	2 T-AH(C)	1 DD(SRA)/1 CG(SRA)/1 LPH(ROH)
Pacific Drydock		
Port of Portland	1 T-ACS(C)	1 DD(ROH)/1 LPD(ROH)
Port of San Diego		1 LPH(ROH)/1 FF(SRA)/1 LST(ROH)/1 CV(SRA)**
Puget Sound Naval Shipyard		1 SSN(RF)/2 SSN(ROH)/1 LHA(CH)/1 CGN(CH)/1 CGN(RA)
Service Engineering Co.		1 AE(PMA)
Southwest Marine (San Diego)		1 AD(DSRA)/1 DD(SRA)
Southwest Marine (San Francisco)		
Southwest Marine (San Pedro)		1 LSD(ROH)/1 AOR(PMA)
Tacoma Boatbuilding Co.	6 T-AGOS	
Todd Shipyards (Seattle)	1 ARDM	1 DD(ROH)
Todd Shipyards (San Francisco)		1 AE(ROH)/1 AD(DSRA)
Todd Shipyards (San Pedro)	3 FFG	1 FFG(DSRA)
Triple A Machine		1 CVN(SRA)*
Triple A South		1 LHA(SRA)/1 CV(SRA)**
WEST COAST TOTAL	<u>16</u>	<u>37</u>
Honolulu Shipyard		1 ASR(ROH)
Pearl Harbor Naval Shipyard		2 SSN(ROH)/1 FF(ROH)/1 ADFM(ROH)/1 DD(ROH)/1 ATS(ROH)/
		1 SSN(SRA)/1 CG(SRA)
TOTAL	<u>0</u>	<u>9</u>
GRAND TOTAL	<u>91</u>	<u>110</u>

* Joint contract between Triple A Machine and Continental Maritime of San Francisco.

** Joint contract between Triple A South and Port of San Diego.

APPENDIX B

CHANGES TO THE NATIONAL MOBILIZATION BASE

SINCE 1982

YARDS CLOSED* SINCE OCTOBER 1982 MOBILIZATION
BASE SURVEY (SYMBA)

East Coast

Allied Repair Service - Norfolk, VA (1985)
Bethlehem Steel - Baltimore, MD (1982)
** Horne Brothers - Newport News, VA (1984)
Hudson Engineering - Bayonne, NJ (1984)
Jackson Engineering - Staten Island, NY (1984)
Maryland Shipbuilding & Drydock - Baltimore, MD (1984)
** Munro Drydock - Chelsea, MA (1985)
** Savannah Shipyard - Savannah, GA (1984)
Todd Shipyard - Brooklyn, NY (1983) (re-opened 1985)
Wiley Manufacturing - Port Deposit, MD (1984)

Gulf Coast

Delta Shipyard - Houma, LA (1985)
Burton Shipyard - Port Arthur, TX (1983)
Galveston Shipbuilding - Galveston, TX (1984)
Geosource, Inc. - Harvey, LA (1984)
Levingston Shipbuilding - Orange, TX (1982)
Misener Industries - Tampa, FL (1985)
Teh Tung Steamship - Orange, TX (1984)
Texas Gulfport Shipbuilding Company - Port Arthur,
TX (1985)
Todd-Houston - Houston, TX (1983)

West Coast

Port Richmond Shipyard - Richmond, CA (1985)
(ex. Tri-Marine Industries)
Zidell Explorations - Portland, OR (1984)

Great Lakes

American Shipbuilding - Lorain, OH (1983)
American Shipbuilding - Toledo, OH (1983)
(re-opened 1985)

Non-Conus

** Pacific Marine - Honolulu, HI (1985) - merged with
Dillingham to become Honolulu Shipyards

* CLOSED IS DEFINED AS THOSE YARDS WITH NO WORK AND SKELETON
CREWS WHICH MANAGEMENT MAY DEFINE AS "TEMPORARILY CLOSED,"
IN ADDITION TO THOSE COMPANIES WHICH HAVE STATED THEY ARE
CLOSED PERMANENTLY.

** Shipyards included in the SYMBA Extended Analysis Base
(NADES).

YARDS RE-OPENED SINCE 1982 MOBILIZATION BASE SURVEY (SYMBA)

Old Name (Closure Date)

New Name (Re-opened Date)

American Shipbuilding Co. -
Toledo, OH (1983)

The Toledo Shipyard (1985)

Todd Shipyards -
Brooklyn, NY (1983)

Rodermond Industries (1985)

YARDS ADDED OR DELETED SINCE OCTOBER 1982 MOBILIZATION
BASE SURVEY (SYMBB)

Added

Bethlehem Steel Corporation - Sabine - Port Arthur, TX
(opened - 1985)

* Jacksonville Shipyards - Bellinger Division -
Jacksonville, FL (1985)

* Marine Power & Equipment - Yard No. 1- N. Seattle, WA
(1985)

Moon Engineering - Portsmouth, VA (opened 10-85)

North Florida Shipyard - Jacksonville, FL (added - 1983)

Deleted

RMI, Inc. - San Diego, CA (1985) (ex. Atkinson Marine)
(Facilities owned do not meet criteria; however, can be
leased from the U.S. Naval Station - San Diego)

Runyan Machine - Pensacola, FL (1985) (insufficient pier
space)

SBA Shipyard, Inc. - Jennings, LA (1985) (shallow water)

South Portland Shipyard - South Portland, ME (1985)
(insufficient pier space)

West Winds - San Francisco, CA (1985) (pier lease
terminated; facilities owned do not meet criteria)

* Subdivided from original entry based on diverse geographical
location (1985 re-evaluation of facilities).

APPENDIX C
PRIVATE SHIPYARDS
IN THE
NATIONAL MOBILIZATION BASE

PRIVATE SHIPYARDS IN THE NATIONAL MOBILIZATION BASE

CLASSIFICATION DEFINITIONS

- Shipbuilding: Facilities that are open, having at least one shipbuilding position, either an inclined way, a side-launching platform, or a building basin--provided that water depth in the channel to the facility itself is at least 12 feet*--capable of accommodating a minimum ship size of 475' x 68'. With few exceptions, these shipbuilding facilities are also major repair facilities with drydocking capability.
- Repair (With Drydocking): Drydocking facilities for ship 400' in length and above, provided that water depth in the channel to the facility itself is at least 12 feet*. These facilities may also be capable of constructing a vessel smaller than 475' x 68'.
- Topside Repair: Facilities with sufficient berth/pier space for topside repair of ships 400' in length and over, provided that water depth in the channel to the facility itself is at least 12 feet. These facilities may also have drydocks for vessels smaller than 400' in length and/or be capable of constructing a vessel smaller than 475' x 68'.

*12 foot draft accommodates Victory Ships

PRIVATE SHIPYARDS IN MOBILIZATION BASE (88 YARDS)EAST COASTShipbuilding Yards

- # \$ * Bath Iron Works - Bath, ME
- # * Beth Steel Corporation - Sparrows Point, MD
- # * Coastal Drydock & Repair Corporation - Brooklyn, NY
- # * General Dynamics - Electric Boat - Groton, CT
- # * General Dynamics Corporation - Quincy, MA
- # * Newport News Shipbuilding & Drydock Company -
Newport News, VA
- # \$ * Norfolk Shipbuilding & Drydock Corporation - Norfolk, VA
- # * Pennsylvania Shipbuilding Company - Chester, PA

Repair Yards (With Drydock Facilities)

- # * Atlantic Drydock Corporation - Fort George Island, FL
- # * Bath Iron Works Corporation - Portland, ME
- # Boston Shipyard Corporation - East Boston, MA
Boston Marine Industrial Park - Boston, MA
- # * Braswell Shipyards - Charleston, SC
- # Colonna's Shipyard, Inc. - Norfolk, VA
- # * Robert E. Derecktor of Rhode Island, Inc. -
Middletown, RI
- # * Detyens Shipyard - Mt. Pleasant, SC
- # * General Ship Corporation - East Boston, MA
- # * Hoboken Shipyards, Inc. - Bayonne, NJ
- # * Jacksonville Shipyards - Jacksonville, FL
Jacksonville Shipyards - Bellinger Division -
Jacksonville, FL
- # * Metro Machine Corporation - Norfolk, VA
- # North Florida Shipyards - Jacksonville, FL
- # Perth Amboy Drydock Company - Perth Amboy, NJ
Rodermond Industries - Brooklyn, NY

Topside Repair Yards

- # Caddell Drydock & Repair Company - Staten Island, NY
- # * Jonathan Corporation - Norfolk, VA
- # * Metal Trades, Inc. - Hollywood, SC
- # * Moon Engineering - Norfolk, VA
Moon Engineering - Portsmouth, VA
- # * Newport Offshore, Ltd. - Newport, RI
- # Promet Marine Services Corporation - E. Providence, RI
- # Reynolds Shipyard Corporation - Staten Island, NY
Rodermond Industries - Jersey City, NJ
- # Tracor Marine, Inc. - Port Everglades, FL

East Coast Total = 34 Yards

* Shipyards included in the SYMBA Extended Analysis Base (NADES) (51).

Navy certified Master Ship Repair Contractor.

\$ Navy certified Master Ordnance Repair Contractor.

GULF COAST

Shipbuilding Yards

- # * ADDSCO Industries, Inc. - Mobile, AL
- # * Avondale Shipyards, Inc. - New Orleans, LA
- # * Bethlehem Steel Corporation - Beaumont, TX
- # * Halter Marine, Inc. - Chickasaw Division - Chickasaw, AL
- # \$ * Litton/Ingalls Shipbuilding Division - Pascagoula, MS
- * Marathon LeTourneau Company - Brownsville, TX
- # Tampa Shipyards, Inc. - Tampa, FL
- # * Todd Shipyards Corporation - Galveston, TX

Repair Yards (With Drydock Facilities)

- # Bender Shipbuilding & Repair Co., Inc. - Mobile, AL
- Bethlehem Steel Corporation-Sabine - Port Arthur, TX
- Bludworth Bond Shipyard - Houston, TX
- # * Gulf-Tampa Drydock Company - Tampa, FL
- # Todd Shipyards Corporation - New Orleans, LA

Topside Repair Yards

- American Marine Corporation - New Orleans, LA
- # Boland Marine Manufacturing - New Orleans, LA
- # Buck Kreihs Company - New Orleans, LA
- # Coastal Iron Works - Corpus Christie, TX
- # Dixie Machine Welding - New Orleans, LA
- # Halter Marine, Inc. - Equitable Division -
 New Orleans, LA
- # Hendry Corporation - Tampa, FL
- Marine Maintenance - Houston, TX
- * McDermott Shipyard - Morgan City, LA
- Newpark Shipbuilding - Houston, TX

Gulf Coast Total = 23 Yards

-
- * Shipyards included in the SYMBA Extended Analysis Base (NADES) (51).
 - # Navy certified Master Ship Repair Contractor.
 - \$ Navy certified Master Ordnance Repair Contractor.

WEST COAST

Shipbuilding Yards

- * Gunderson, Inc. - Portland, OR
- # Lockheed Shipbuilding Company - Seattle, WA
- # * Marine Power & Equipment Yard No. 4 - S. Seattle, WA
- # \$ * National Steel & Shipbuilding Co. - San Diego, CA
- * Portland Ship Repair Yard - Portland, OR
 - # - Dillingham Ship Repair
 - # - Northwest Marine Iron Works
 - Lockport Marine Company
- # * Tacoma Boatbuilding - Tacoma, WA
- # * Todd Pacific Shipyards - Los Angeles, CA
- # \$ Todd Pacific Shipyards - Seattle, WA
- # * Todd Pacific Shipyards - San Francisco, CA
- # * Triple A Shipyards - San Francisco, CA

Repair Yards (With Drydocking Facilities)

- # Continental Maritime of San Francisco, Inc. -
San Francisco, CA
- # Marine Power & Equipment Yard No. 1 - N. Seattle, WA
- # * Pacific Drydock & Repair Co. - Oakland, CA
- # Southwest Marine, Inc. - San Diego, CA
- # * Southwest Marine, Inc. - San Pedro, CA
- # Southwest Marine of San Francisco - San Francisco, CA
- # * Triple A South - San Diego, CA
- * U.S. Naval Station - San Diego, CA
 - # - Arcwel Corporation
 - # - Continental Maritime of San Diego
 - # - RMI, Inc.

Topside Repair Yards

- # Campbell Industries - San Diego, CA
- * Kaiser Steel Corporation - Napa, CA
- # * Lake Union Drydock - Seattle, WA
- * Larson Boat Shop - Terminal Island, CA
- Pacific Fisherman, Inc. - Seattle, WA
- # Service Engineering Company - San Francisco, CA

West Coast Total = 24 Yards

-
- * Shipyards included in the SYMBA Extended Analysis Base (NADES) (51).
 - # Navy certified Master Ship Repair Contractor.
 - \$ Navy certified Master Ordnance Repair Contractor.

Non-Conus

Shipbuilding Yards

None

Repair Yards (With Drydock Facilities)

* Honolulu Shipyard, Inc. - Honolulu, HI

* Puerto Rico Drydock & Marine Terminals - San Juan, PR

Topside Repair

None

Non-Conus Total = 2 Yards

* Shipyards included in the SYMBA Extended Analysis Base (NADES)
(51).

Navy certified Master Ship Repair Contractor.

GREAT LAKES

Shipbuilding Yards

- * Bay Shipbuilding Corporation - Sturgeon Bay, WI
- * Fraser Shipyards - Superior, WI
- The Toledo Shipyard - Toledo, OH

Repair Yards (With Drydocking Facilities)

None

Topside Repair Yards

- * Marinette Marine Corporation - Marinette, WI
- * Peterson Builders - Sturgeon Bay, WI

Great Lakes Total = 5 Yards

* Shipyards included in the SYMBA Extended Analysis Base (NADES) (51).

APPENDIX D

NATIONAL MOBILIZATION BASE PROFILE

Shipyard Mobilization Base Profile

		<u>October 1982</u>	<u>October 1985</u>	<u>Net Change</u>
<u>No. Shipyards 1/</u>				
- Shipbuilding/Repair (with Drydocking)				
- private		63	60	-3
- public		8	8	0
Total		71	68	-3
- Topside Repair:				
- private		47	28	-19
- public		1	1	0
Total		48	29	-19
Grand Total		119	97	-22
<u>Production Employment</u>				
- private		112,455	92,855	-19,600
- public (9 yds.)		47,633 2/	45,699	- 1,934
Total		160,088	138,554	-21,534
<u>Facilities 3/</u>				
- Floating Drydocks:				
- private (69-1)		68	61	-7
- public		4	4	0
Total		72	65	-7
- Graving Docks:				
- private (55-2)		53	44	-9
- public		34	34	0
Total		87	78	-9
- Land level building positions:				
- private (13-1)		12	12	0
Total		12	12	0
- Shipways:				
- private (77-2)		75	65	-10
- public		2	2	0
Total		77	67	-10
- Marine Railways:				
- private		2	4	+2
- public		3	3	0
Total		5	7	+2
- Syncrolift:				
- private		2	2	0
Total		2	2	0
Grand Total		255	231	- 24

1/ See Classification Definitions, TAB A.

2/ Originally 52,095 in SYMBA; corrected to 47,633 in NADES.

3/ Can accommodate a ship 400' in length or greater.
Original SYMBA data revisions based on October '85 facility
re-evaluation shown in parenthesis.

October 1985

MOBILIZATION BASE

PRIVATE SHIPYARDS STATISTICS

FACILITIES SUMMARY

	East Coast	Gulf Coast	West Coast	Great Lakes	Non Conus	Total By Type
Graving Docks	25	5	8	5	1	44
Floating Drydocks	21	15	23	1	1	61
Ship Ways	22	21	21	1	--	65
Land Level Positions	6	6	--	--	--	12
Marine Railways	4	--	--	--	--	4
Syncrolifts	--	--	2	--	--	2
TOTAL	78	47	54	7	2	188

NO. PRIVATE SHIPYARDS BY COAST

Shipbuilding	8	8	10	3	--	29
Repair w/Drydocks	16	5	8	--	2	31
Subtotal	24	13	18	3	2	60
Topside Repair	10	10	6	2	0	28
TOTAL	34	23	24	5	2	88

PRODUCTION EMPLOYMENT

	<u>OCT. 82</u>	<u>OCT. 83</u>	<u>OCT. 84</u>	<u>OCT. 85</u>
	<u>110 Yards</u>	<u>101 Yards</u>	<u>95 Yards</u>	<u>88 Yards</u>
EAST COAST	63,108	62,593	61,922	62,787
GULF COAST	22,886	15,835	16,591	14,399
WEST COAST	23,724	18,392	15,701	13,213
GREAT LAKES	2,287	1,371	1,511	2,026
NON-CONUS	450	375	210	430
TOTAL	112,455	98,566	95,935	92,855

October 1985

MOBILIZATION BASE PUBLIC SHIPYARDS STATISTICS*

FACILITIES SUMMARY

	<u>East Coast</u>	<u>West Coast</u>	<u>Non Conus</u>	<u>Total By Type</u>
Graving Docks	17	13	4	34
Floating Drydocks	4	0	--	4
Ship Ways	0	2	--	2
Marine Railways	2	0	1	3
Total	23	15	5	43

No. Shipyards by Coast

Shipbuilding	0	1	0	1
Repair w/Drydock	4	2	1	7
Subtotal	4	3	1	8
Topside Repair	1	--	--	1
Total	5	3	1	9

Production Employment

	<u>Oct. 82</u>	<u>Oct. 83</u>	<u>Oct. 84</u>	<u>Oct. 85</u>
East Coast	24,765	25,036	23,755	24,229
West Coast	18,707	16,682	17,065	17,073
Non-Conus	<u>4,161</u>	<u>4,281</u>	<u>4,099</u>	<u>4,397</u>
Total	47,633	45,999	44,919	45,699

* There are no public shipyards on the Gulf Coast or Great Lakes.

APPENDIX E

MOBILIZATION REQUIREMENTS

Comparison of RRF/NDRF Mobilization Workload
(NADES vs. Oct. '85)

	<u>NADES</u>	<u>Oct. 85</u>
# Ships	273	214
# Mandays	1,218,050	957,750
Avg. Monthly Workers	(Phased in)	(Percentage)*
9/88	12166	9489
10/88	23755	11529
11/88	10136	7906
12/88	3717	2899
1/89	376	293

* Current activation labor requirement approximately
78% of NADES projections.

Ready Reserve Force

The NADES study projected a 77 ship RRF activation workload for October 1988, requiring an aggregate of 84,700 mandays of production labor.

On October 3, 1985, the RRF consisted of 65 ships as shown in Table 1. This results in an aggregate requirement for 79,200 mandays of production labor -- 93% of that modeled in the NADES study. NADES conclusions noted that, with the shipyard mobilization base as profiled, "the equivalent of a 90-ship RRF could be activated within 9 days...about 50 ready within 5 days..." Current RRF demand is considerably less -- 58 ships to be activated within 10 days; only 28 of those are in a 5-day readiness status.

It should be noted that although current fleet numbers and disposition create a less vigorous demand than those modeled in NADES, the RRF is planned to expand to a target of 116 ships in the next few years which would result in an increased shipyard mobilization demand of 39 ships (42,900 mandays over NADES). Fleet breakout, towing, and activation workload difficulties which would be associated with this large an RRF will be ameliorated, however, by the recently approved RRF outporting plan whereby certain vessels will be berthed at or near activation sites. As of September 30, 1985, 22 ships had been designated to layberths on the East Coast and 16 ships on the West Coast; Gulf Coast ships will be added to the plan during FY 1986.

All RRF ships are assigned to General Agents who are responsible for seeing that ship activation tasks required to achieve readiness dates are accomplished in a timely manner. Although specific activation shipyard assignments are tentatively proposed by MARAD, General Agents may use any qualified workforce and available facility to accomplish the work (i.e. a machine shop and municipal pier space). Therefore, although RRF activations are expected to take place in mobilization base shipyards, this does not necessarily have to happen.

National Defense Reserve Fleet

The NADES Study profiled activation of 196 NDRF ships with a total production manday requirement of 1,133,350. There were 124 Victory ships (682,000 mandays), 53 non-Victory ships (291,500), and 19 MSC ships (159,850).

Comparable NDRF shipyard activation workload requirements based on October 1985 fleet status involve 149 ships with an aggregate production labor demand of 886,250 mandays. This represents only 76% of the number of ships modeled in NADES and 78% of the labor (tables 2-5).

Most of the NDRF activation delays in NADES were encountered on the Gulf and West Coasts, but the current NDRF fleet status requires a significantly diminished activation capability in those areas. If mobilization were to occur at present, the Gulf Coast NDRF production labor demand would be only 63% of that modeled in NADES. The West Coast demand would be 75% of NADES.

The NADES Study documented manpower constraints on the West Coast that would delay starting activation work on 37 Victory ships. Considering the reduced RRF/NDRF demands based on current Suisun Bay reserve fleet status (31 fewer ships than the 1988 NADES projections), it is probable that all current NDRF work could be accomplished as scheduled.

TABLE 1
Number of Ships in Each Status
October 1985 (vs NADES)

RRF
(1100 production mandays)

<u>Coast</u>	<u>Number of ships in each status</u>				<u>Manday 1/ Δ NADES</u>
	<u>Total</u>	<u>5-day</u>	<u>10-day</u>	<u>20-day</u>	
East - Outported James River	4 (5) <u>27 (31)</u> 31 (36)	4 (5) 11 (6)	-- 10 (25)	-- 6 (0)	-1100 <u>+2200</u> +1100
West - Outported Suisun Bay	1 (1) <u>10 (19)</u> 11 (20)	1 (1) 8 (9)	-- 1 (10)	-- 1 (0)	0 <u>-8800</u> -8800
Gulf - Outported Beaumont	-- <u>20 (18)</u> 20 (18)	-- 4 (1)	-- 16 (17)	-- --	0 <u>+2200</u> +2200
Non-Conus - Japan Hawaii	2 (3) <u>1</u> 3 (3)	-- --	2 1	-- --	-1100 <u>+1100</u> 0
Grand Total	65 (77)	28 (22)	30 (52)	7 (-)	-5500

1/ 20-day readiness ships estimated to take 2200 production mandays to activate. In NADES no 20-day ships were projected to be in the fleet in 1988.

TABLE 2
NDRF Activation Requirements
(NADES vs. current status)

<u>Fleet</u>		<u>NADES</u>	<u>CURRENT</u>	<u>DIFFERENCE</u>	<u>MANDAY REQUIREMENTS Δ NADES</u>
James River	Victory	46	39	-7	-38,500
	Non-Victory	14	15	+1	+ 5,500
	MSC	8	8	0	0
	Total	<u>68</u>	<u>62</u>	<u>-6</u>	<u>-33,000</u>
Beaumont	Victory	24	19	-5	-27,500
	Non-Victory	23	9	-14	-77,000
	MSC	2	2	0	0
	Total	<u>49</u>	<u>30</u>	<u>-19</u>	<u>-104,500</u>
Suisun Bay	Victory	54	44	-10	-55,000
	Non-Victory	16	8	-8	-44,000
	MSC	9	5	-4	-10,600
	Total	<u>79</u>	<u>57</u>	<u>-22</u>	<u>-109,600</u>
Grand Total		196	149	-47	-247,100

TABLE 3

Non-Victory NDRF Ships

<u>Fleet</u>	<u>NADES</u>	<u>Current</u>	<u>Difference</u>	<u>Mandays ^{1/}</u> <u>Δ NADES</u>
James River	14	15	+1	+ 5,500
Beaumont	23	9	-14	-77,000
Suisun Bay	16	8	-8	-44,000
Total	<u>53</u>	<u>32</u>	<u>-21</u>	<u>-115,500</u>

1/ Assuming each ship requires 5500 mandays over 25 yard days.

TABLE 4

NDRF Victory Ships

<u>Fleet</u>	<u>NADES</u>	<u>Current</u>	<u>Difference</u>	<u>Mandays ^{2/}</u> <u>Δ NADES</u>
James River	46	39 <u>3/</u>	-7	-38,500
Beaumont	24	19	-5	-27,500
Suisun Bay	54	44	-10	-55,000
Total	<u>124</u>	<u>102</u>	<u>-22</u>	<u>-121,000</u>

2/ Assumed 5500 production mandays of effort to activate, allocated over 30 to 60 days yard time.

3/ Excludes 8 VC2-S-AP5 troopships at James River.

TABLE 5

MSC NDRF Ships ^{1/}

<u>Fleet</u>	<u>NADES</u>	<u>Current</u>	<u>Difference</u>	<u>Mandays</u> <u>Δ NADES</u>
James River	8	8	0	same
Beaumont	2	2	0	same
Suisun Bay	9	5 <u>2/</u>	-4	-10,600
Total	<u>19</u>	<u>15</u>	<u>-4</u>	<u>-10,600</u>

1/ Both counts exclude troopships; currently there are 6 P2's at James River and 7 P2's at Suisun Bay.

2/ Four LST's departed to the Navy for transfer to the Government of Peru.

Comparison of ISNAC
Mobilization Workload
(NADES vs. Oct. '85)

	<u>NADES</u>	<u>Oct. '85</u>
# ships <u>1/</u>	46	31
# Mandays	2,638,800	6,342,000
Production Workers (Avg./Mo.)	(Phased in)	(Phased in percentage) <u>2/</u>
10/88	5,242	2,673
11/88	8,464	4,316
12/88	9,244	6,632 <u>3/</u>
1/89	9,130	6,584
2/89	8,570	6,299
3/89	9,945	9,355 <u>3/</u>
4/89	12,810	10,877
5/89	14,181	11,516

1/ NADES did not include 4 CV's; Oct. '85 data does.

2/ The current ISNAC activation workload (minus 4 CV's) is 51% of that modeled in NADES. The noted manpower requirement assumes similar priorities and proportional loading to that used in NADES for this portion of the current ISNAC fleet.

3/ Of the four CV's to be activated from Bremerton layup, CVS-20 could start activation at Puget NSY in 3rd month at 1928 men/mo. -- CVS-12 could start three months later at Puget at 2356 men/mo. Additional CV activations in the first 9 months would exceed manpower availability in Puget and occupy valuable facilities for too long a period of time to be reasonable. There is only one other adequate graving dock available on the West Coast at Long Beach NSY which is already fully employed in NADES. Otherwise, CV activations would require tow to Pearl NSY, East Coast, or Far East.

NAVY INACTIVE SHIP MOBILIZATION ASSETS
30 OCTOBER 1985

<u>Crusiers</u>	<u>Time in Months</u>		<u>Mandays</u>
DESMOINES (CA 134)	9	NISMF PHILADELPHIA	242K
SALEM (CA 139)	9	NISMF PHILADELPHIA	242K
 <u>Destroyers</u>			
FORREST SHERMAN (DD 931)	6	NISMF PHILADELPHIA	65K
DAVIS (DD 937)	6	NISMF PHILADELPHIA	65K
MANLEY (DD 940)	6	NISMF PHILADELPHIA	65K
DUPONT (DD 941)	6	NISMF PHILADELPHIA	65K
BIGELOW (DD 942)	6	NISMF PHILADELPHIA	65K
BLANDY (DD 943)	6	NISMF PHILADELPHIA	65K
MULLINIX (DD 944)	6	NISMF PHILADELPHIA	65K
MORTON (DD 948)	6	NISMF PEARL HARBOR	65K
RICHARD A. EDWARDS (DD 950)	6	NISMF PEARL HARBOR	65K
TURNER JOY (DD 951)	6	NISMF PEARL HARBOR	65K
 <u>Amphibious</u>			
THOMASTON (LSD 28)	5	NISMF BREMERTON	17.5K
PLYMOUTH ROCK (LSD 29)	5	NISMF PORTSMOUTH	17.5K
FORT SNELLING (LSD 30)	5	NISMF PORTSMOUTH	17.5K
POINT DEFIANCE (LSD 31)	5	NISMF BREMERTON	17.5K
MONTICELLO (LSD 35)	5	NISMF BREMERTON	17.5K
SUFFOLK COUNTY (LST 1173)	5	JAMES RIVER NDRF	17.5K
LORAIN COUNTY (LST 1177)	5	JAMES RIVER NDRF	22.5K
WOOD COUNTY (LST 1178)	11	JAMES RIVER NDRF	42.5K
 <u>Auxillaries</u>			
ASHTABULA (AO 51)	4.5	SUISUN BAY NDRF	15K
TAKELMA (ATF 113)	2	SUISUN BAY NDRF	2.5K
MOCTOBI (ATF 105)	2	NISMF BREMERTON	2.5K
QUAPAW (ATF 110)	2	NISMF BREMERTON	2.5K
PAIUTE (ATF 159)	2	NISMF PORTSMOUTH	2.5K
PAPPAGO (ATF 160)	2	NISMF PORTSMOUTH	2.5K
SANCTUARY (AH 17)	5	JAMES RIVER NDRF	17.5K
 <u>Aircraft Carriers</u>			
HORNET (CVS 12)	26	NISMF BREMERTON	1,250K
BENNINGTON (CVS 20)	23	NISMF BREMERTON	905K
BON HOMME RICHARD (CVA 31)	29	NISMF BREMERTON	1,407.5K
ORISKANY (CV 34)	29	NISMF BREMERTON	1,430K
			<hr/> 6,342 K

**COMPARISON OF SEALIFT ENHANCEMENT FEATURE (SEF) WORKLOADS
OCT '85 VS NADES**

The NADES Study projected that SEF equipment would be available for 1988 mobilization installation in 264 ships and would require 255,640 mandays of production labor.

As of 5 October 1985 the following SEF workload would be required:

<u>Code</u>	<u>Equipment</u>	<u>Ships</u>	<u>Mandays</u>
1	{ 234 40' flat racks 83 sea sheds }	5	31,400
6	3 UNREP dry console	3	3,600
		<u>8</u>	<u>35,000</u>

The current workload is 4% of the NADES ships and 14% of the labor.

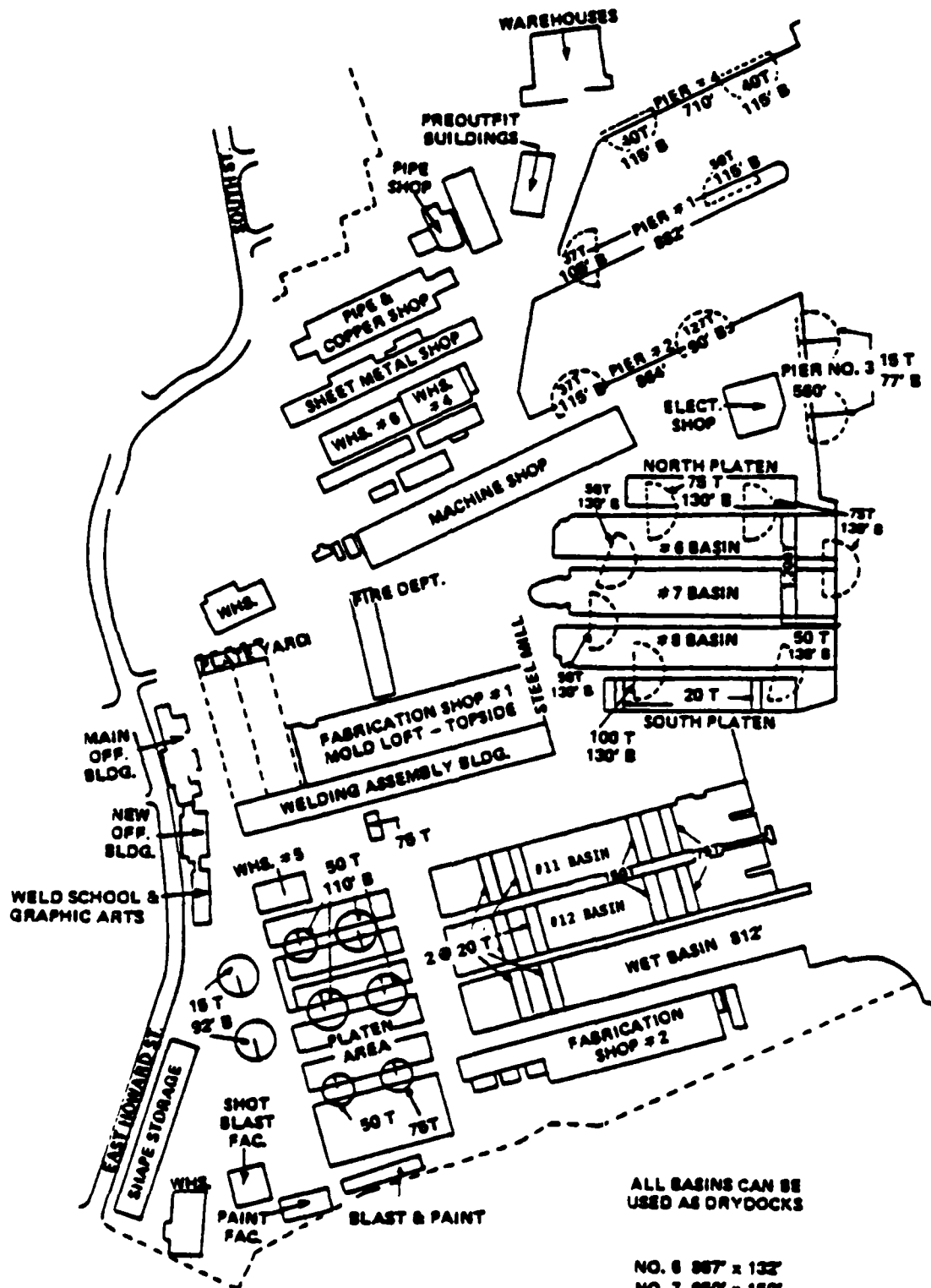
The NADES Study SEF work was accomplished in three months and required the following average number of production workers per month in 44 yards as compared to the current requirements in about 8 yards:

<u>Month</u>	<u>NADES</u>	<u>Current</u>
0 (9/88)	4232	1715*
1 (10/88)	3430	0
2 (11/88)	109	0

*5180 for 7 days only

APPENDIX F
QUINCY YARD PLAN

GENERAL DYNAMICS QUINCY SHIPBUILDING DIVISION



NO. 6 887' x 132'
NO. 7 980' x 150'
NO. 8 887' x 132'
NO. 11 874' x 150'
NO. 12 874' x 150'

END

DTIC

6-86