

## **CHAPTER II**

### **DOWNSIZING IN THE NUCLEAR FLEET**

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The Navy, like the other military services, has been downsizing both its personnel and force structure. The reduction in force structure is reflected in part in the Navy's plans for its nuclear fleet. Over the next eight years, the Navy expects to cut its total number of nuclear-powered ships by about half from the level at the beginning of the 1990s (see Table 2). Although the service continues to phase out its conventional aircraft carriers and replace them with nuclear carriers, all of its other nuclear vessels will be reduced in number or completely phased out over time. For example, Trident ballistic missile submarines will be cut from 34 in 1991 to 14 by 2003. The Navy's nuclear attack submarines have already been reduced from 92 in 1991 to 83 in 1995, with a further decline to 51 projected by 2003. And the Navy intends to reduce its current five nuclear cruisers to two in 2000 and phase them out by 2003. Those cuts in force structure lend credence to the notion that the Navy's need for nuclear-trained officers will diminish in coming years.

### **REQUIREMENTS FOR AND PROJECTED NUMBER OF NUCLEAR OFFICERS**

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The Navy recognizes that as the number of nuclear-powered ships decreases, so will the number of junior-officer billets (ensign through lieutenant) for nuclear-trained officers. As a result, it plans to reduce the number of new nuclear officers ("accessions") by 15 percent between 1994 and 2000 (see Table 3). Without such reductions, the number of new officers could outstrip the number of training slots available on nuclear vessels.

Despite the drawdown, however, the Navy expects a continued shortage of midlevel nuclear officers (lieutenant commander and commander) in the future. To help fill the shortage, it is focusing on keeping more midlevel officers from leaving the service. That focus on retention is reflected in the Navy's accession plans, which suggest a slight shift to relatively more graduates of the Naval Academy and the Reserve Officers Training Corps (ROTC) and fewer Officer Candidate School (OCS) graduates. The Navy contends that academy and ROTC graduates remain in the service longer than their OCS counterparts.<sup>1</sup>

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1. Despite the Navy's plans, accessions from the academy declined in 1996. The Navy had originally projected 130 nuclear officer accessions from the academy but managed to get only 86. The Navy says that result is an anomaly, but it is studying the reasons for the shortfall.

TABLE 2. NUMBER OF NUCLEAR SHIPS IN THE NAVY, SELECTED YEARS, 1991-2003

	1991	1995	2000 <sup>a</sup>	2003 <sup>a</sup>
Ballistic Missile Submarines	34	16	18	14
Nuclear-Powered Aircraft Carriers	6	7	9	10
Nuclear-Powered Attack Submarines	92	83	55	51
Nuclear-Powered Cruisers	<u>9</u>	<u>5</u>	<u>2</u>	<u>0</u>
Total	141	111	84	75

SOURCE: Congressional Budget Office using data from the U.S. Navy.

a. Congressional Budget Office projections.

The Navy continues to rely on the accession bonus to help attract new officers to the nuclear community. If it is successful in meeting its accession goals, the service appears likely to have a steady annual flow of new officers to meet its manning needs.

The Navy's demand for nuclear-trained officers is governed by its billet requirements. Those requirements differ in the specific need for nuclear expertise: some positions in the nuclear submarine and surface communities require an officer with nuclear training, but others do not. Billets in the latter category can be filled by non-nuclear-trained officers in the same community (submarine or surface) or drawn from other naval communities.

In general, the requirements for nuclear officers can be viewed as falling into three categories, each containing both sea and shore billets:

- o Positions that require a nuclear-trained officer--such as positions on the Nuclear Reactors staff, at the Nuclear Power School, as a nuclear prototype instructor, as a member of the wardroom (except supply officer) of a nuclear submarine, or as a member of the engineering department of a nuclear-powered cruiser or aircraft carrier.<sup>2</sup>

2. Those billets are assigned an Additional Qualification Designator or Nuclear Subspecialty Code in the Navy's Master Billet File.

TABLE 3. NUCLEAR OFFICER ACCESSIONS, BY SOURCE, 1994-2000

	1994	1995	1996 <sup>a</sup>	1997 <sup>a</sup>	1998 <sup>a</sup>	1999 <sup>a</sup>	2000 <sup>a</sup>
<b>Submarine Nuclear Officers</b>							
USNA	91	88	100	100	100	100	100
NROTC	111	106	135	135	135	135	135
OCS	106	85	66	70	70	70	70
Other <sup>b</sup>	<u>43</u>	<u>41</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>
Total	351	320	306	310	310	310	310
<b>Surface Nuclear Officers</b>							
USNA	28	36	30	30	30	30	30
NROTC	31	22	40	40	40	40	40
OCS	66	55	38	35	30	30	30
Other <sup>b</sup>	<u>4</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	129	113	108	105	100	100	100
<b>Total Nuclear Officers</b>							
USNA	119	124	130	130	130	130	130
NROTC	142	128	175	175	175	175	175
OCS	172	140	104	105	100	100	100
Other <sup>b</sup>	<u>47</u>	<u>41</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>	<u>5</u>
Total	480	433	414	415	410	410	410

SOURCE: Congressional Budget Office using data from the U.S. Navy.

NOTE: USNA = United States Naval Academy; NROTC = Navy Reserve Officers Training Corps; OCS = Officer Candidate School.

- a. Projected accessions based on requirements to fill junior-officer billets.
- b. Direct appointments and warrant officers.

- o Positions that could benefit from the knowledge and experience of a nuclear-trained officer but that could be filled by any submarine or surface officer--such as squadron operations officer of a submarine or destroyer, instructor or administrator at a submarine school, or a staff member for the Director of the Submarine Warfare Division.
- o Positions that may be filled by any naval officer--such as staff member at the Naval Post-Graduate School or the Naval War College, instructor at the Naval Academy or for Navy ROTC, or a joint duty assignment. Service in some of those billets is thought to improve an officer's prospects for promotion, so the Navy feels that the opportunity to serve in such positions should be made available to all officers, including nuclear-trained ones.

Only about one-third of the total billets for nuclear submarine officers (one-fourth for surface officers) fall into the first category of needing nuclear-trained personnel. Although the Navy would prefer that the remaining two-thirds of the billets for nuclear submarine officers (three-fourths for nuclear surface officers) be filled by officers with nuclear training, those jobs could be performed by other officers. To the extent that the positions were filled by non-nuclear-trained personnel, the Navy's expected shortfall of nuclear-trained officers could be minimized.

For both nuclear communities (submarines and surface ships), the Navy expects the demand for and supply of officers to decline over the next few years in keeping with its downsizing efforts (see Tables 4 and 5). However, the shortage of officers in the two communities will differ. The Navy projects that the shortage of nuclear-trained submarine officers will lessen from 557 in 1997 to 423 in 2000. The shortage of nuclear surface officers, by contrast, will increase slightly from 350 to 382 over that period.

Those shortages are based on the Navy's overall requirements, which include positions that could be filled by officers with no nuclear training. If the Navy had to fill only those billets that required nuclear training, it would have a surplus of nuclear officers in every pay grade in both the submarine and surface categories (see Tables 6 and 7). For those critical nuclear billets, the supply of officers is projected to exceed the requirements by a total of 2,008 submarine nuclear officers and 584 surface nuclear officers in 1997. The surpluses will decline slightly in 2000--to 1,854 and 536, respectively.

In other words, the Navy's perceived shortage of nuclear-trained officers does not affect the most critical manning needs, such as operating submarines or surface

combatants.<sup>3</sup> Instead, it involves assignments on staffs and in schools, recruiting offices, and joint commands.<sup>4</sup> By focusing specifically on billets that require nuclear training, the Navy would not only have a surplus of nuclear officers but also be able to satisfy any concerns about sea/shore rotation. The reason is that those billet requirements include the necessary shore billets to support a reasonable rotation. For example, of the 1,266 officers expected to fill nuclear-specific submarine positions in 1997, only 77 percent will actually be assigned to sea, with the rest filling shore billets that call for a nuclear-trained officer.

The Navy's projections of the future supply of officers reflect its assumptions about continuation rates--that is, the percentages of nuclear submarine and surface officers who remain in service from one year to the next. The Navy expects continuation rates to remain near their current level for both types of nuclear-trained officers. If nuclear officers became increasingly less willing to remain in the service, however, and the Navy's requirements remained unchanged, the estimated shortage of nuclear officers in both communities would of course grow.

## REASONS THAT NUCLEAR OFFICERS LEAVE THE NAVY

Many factors influence a nuclear officer's decision to leave military service, but they fall into two general categories: the quality of military life, and employment opportunities in the civilian sector.

### Quality of Life

Nuclear officers, like other officers on surface ships and submarines, serve under unique conditions that should be taken into account when evaluating their retention decisions. Those conditions include "(1) cramped living and working conditions aboard ship, (2) the unpredictability of operating schedules of Navy ships, (3) limited recreational facilities at sea, (4) in-port duties assigned to shipboard personnel to maintain ship readiness, (5) long working hours at sea, (6) long and repetitive deployments, and (7) family separations."<sup>5</sup> For some officers, those conditions are reason enough to leave the Navy. However, in spite of the hardships of shipboard

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3. Ernest Blazer, "Retention of Junior Sub Officers Dives," *Navy Times*, May 1, 1995, p. 4.

4. Ibid.

5. Department of Defense, Office of the Secretary of Defense, *Military Compensation Background Papers* (November 1991), p. 303.

TABLE 4. TOTAL DEMAND FOR AND SUPPLY OF NUCLEAR SUBMARINE OFFICERS, BY PAY GRADE, 1997 AND 2000

Pay Grade	Demand			Number of Nuclear Submarine Officers in the Service	Difference
	Sea	Shore	Total		
<b>1997</b>					
Ensign	338	428	766	556	-210
Lieutenant Junior Grade	517	52	569	556	-13
Lieutenant	398	568	966	1,308	+342
Lieutenant Commander	420	297	717	333	-384
Commander	108	349	457	317	-140
Captain	<u>39</u>	<u>317</u>	<u>356</u>	<u>204</u>	<u>-152</u>
Total	1,820	2,011	3,831	3,274	-557
<b>2000</b>					
Ensign	258	405	663	581	-82
Lieutenant Junior Grade	395	49	444	499	+55
Lieutenant	303	539	842	996	+154
Lieutenant Commander	321	281	602	306	-296
Commander	82	331	413	282	-131
Captain	<u>30</u>	<u>300</u>	<u>330</u>	<u>207</u>	<u>-123</u>
Total	1,389	1,905	3,294	2,871	-423

SOURCE: Congressional Budget Office using data from the U.S. Navy.

TABLE 5. TOTAL DEMAND FOR AND SUPPLY OF NUCLEAR SURFACE OFFICERS, BY PAY GRADE, 1997 AND 2000

Pay Grade	Demand			Number of Nuclear Surface Officers in the Service	Difference
	Sea	Shore	Total		
<b>1997</b>					
Ensign	166	129	295	316	+21
Lieutenant Junior Grade	267	29	296	177	-119
Lieutenant	151	172	323	208	-115
Lieutenant Commander	79	88	167	92	-75
Commander	39	77	116	75	-41
Captain	<u>11</u>	<u>38</u>	<u>49</u>	<u>28</u>	<u>-21</u>
Total	713	533	1,246	896	-350
<b>2000</b>					
Ensign	157	127	284	282	-2
Lieutenant Junior Grade	257	29	286	168	-118
Lieutenant	146	169	315	183	-132
Lieutenant Commander	80	87	167	84	-83
Commander	38	75	113	73	-40
Captain	<u>8</u>	<u>37</u>	<u>45</u>	<u>38</u>	<u>-7</u>
Total	686	524	1,210	828	-382

SOURCE: Congressional Budget Office using data from the U.S. Navy.

TABLE 6. NUMBER OF SUBMARINE OFFICER BILLETS THAT REQUIRE NUCLEAR TRAINING COMPARED WITH NUMBER OF NUCLEAR OFFICERS, BY PAY GRADE, 1997 AND 2000

Pay Grade	Submarine Officer Billets Requiring Nuclear Training			Number of Nuclear Submarine Officers in the Service	Difference
	Sea	Shore	Total		
<b>1997</b>					
Ensign	261	5	266	556	+290
Lieutenant Junior Grade	116	1	117	556	+439
Lieutenant	238	99	337	1,308	+971
Lieutenant Commander	250	66	316	333	+17
Commander	81	66	147	317	+170
Captain	<u>32</u>	<u>51</u>	<u>83</u>	<u>204</u>	<u>+121</u>
Total	978	288	1,266	3,274	+2,008
<b>2000</b>					
Ensign	199	4	203	581	+378
Lieutenant Junior Grade	89	1	90	499	+409
Lieutenant	181	94	275	996	+721
Lieutenant Commander	190	63	253	306	+53
Commander	62	62	124	282	+158
Captain	<u>24</u>	<u>48</u>	<u>72</u>	<u>207</u>	<u>+135</u>
Total	745	272	1,017	2,871	+1,854

SOURCE: Congressional Budget Office using data from the U.S. Navy.

TABLE 7. NUMBER OF SURFACE OFFICER BILLETS THAT REQUIRE NUCLEAR TRAINING COMPARED WITH NUMBER OF NUCLEAR OFFICERS, BY PAY GRADE, 1997 AND 2000

Pay Grade	Surface Officer Billets Requiring Nuclear Training			Number of Nuclear Surface Officers in the Service	Difference
	Sea	Shore	Total		
<b>1997</b>					
Ensign	54	0	54	316	+262
Lieutenant Junior Grade	105	0	105	177	+72
Lieutenant	46	21	67	208	+141
Lieutenant Commander	41	17	58	92	+34
Commander	18	3	21	75	+54
Captain	<u>4</u>	<u>3</u>	<u>7</u>	<u>28</u>	<u>+21</u>
Total	268	44	312	896	+584
<b>2000</b>					
Ensign	48	0	48	282	+234
Lieutenant Junior Grade	98	0	98	168	+70
Lieutenant	41	21	62	183	+121
Lieutenant Commander	42	17	59	84	+25
Commander	17	3	20	73	+53
Captain	<u>2</u>	<u>3</u>	<u>5</u>	<u>38</u>	<u>+33</u>
Total	248	44	292	828	+536

SOURCE: Congressional Budget Office using data from the U.S. Navy.

life, the vast majority of officers view matters differently. According to the Bureau of Navy Personnel's fifth annual survey of the fleet, 73 percent of the officers polled said they were satisfied with their current job.<sup>6</sup> Moreover, 84 percent indicated that they were pleased with what they were doing in the Navy, and 78 percent said they were enjoying their Navy career.<sup>7</sup> Those results notwithstanding, the rigors of life at sea figure prominently in the decision of some nuclear-trained officers not to stay in the Navy.

### Civilian Job Opportunities

One major reason for officers to leave the military is the lure of job opportunities outside it. In the Navy's survey of the fleet, 48 percent of the officers polled said they "would leave the Navy at the end of [their] current [obligation] if suitable civilian employment was available."<sup>8</sup> In practice, many nuclear-trained officers find civilian employment as nuclear engineers. Others develop postmilitary careers in a variety of managerial, professional, and technical occupations. One civilian sector in which nuclear-trained officers tend to seek job opportunities, the civilian nuclear industry, currently offers mixed prospects for employment and pay.

Employment Outlook. Nuclear-trained officers who consider leaving the Navy in the near future will most likely face less competition from their newly trained civilian counterparts than in the past. Between 1983 and 1993, the number of nuclear engineering degrees awarded fell by nearly 30 percent. That drop is likely to continue through 2000.<sup>9</sup>

Although civilian competition is declining, former naval officers may also face a dwindling supply of civilian nuclear jobs. About three-quarters of nuclear engineers employed in the civilian sector are concentrated in three areas: reactor operations and maintenance, reactor and facility design and redesign/better-

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6. John Burlage and Ernest Blazar, "Sounding Off," *Navy Times*, August 28, 1995, p.13. Not all of the officers in the survey were nuclear-trained officers.

7. Ibid.

8. Ibid., p.12.

9. Norman Seltzer, Larry M. Blair, and Joe G. Baker, *Labor Market Trends for Nuclear Engineers Through 2000* (Oak Ridge, Tenn.: Oak Ridge Institute for Science and Education, 1995), p. 6.

TABLE 8. EMPLOYMENT OF CIVILIAN NUCLEAR ENGINEERS,  
BY TYPE OF WORK, 1993

	Number <sup>a</sup>	Percent
Weapons Development	370	3.3
Waste Management and Decommissioning	370	3.3
Reactor and Facility Design and RBB	2,070	18.7
Reactor Operations and Maintenance	2,610	23.5
Nonuniversity Research and Development	780	7.0
Fuel Cycle	110	1.0
Government	3,660	33.0
University	500	4.5
All Other	<u>630</u>	<u>5.7</u>
Total	11,100	100.0

SOURCE: Norman Seltzer, Larry M. Blair, and Joe G. Baker, *Labor Market Trends for Nuclear Engineers Through 2000* (Oak Ridge, Tenn.: Oak Ridge Institute for Science and Education, 1995), Table 1.

NOTES: The types of work are by primary activity of the employing establishment.

RBB = redesign/betterment/backfit.

a. Rounded to the nearest ten.

**Military Versus Civilian Compensation.** A key feature of the lure of the civilian sector for naval officers is the prospect of high salaries. As in other occupations, the salaries of nuclear engineers vary from one geographic location to another, depending in part on local demand and the cost of living. The salaries of civilian nuclear engineers and other managerial, professional, and technical personnel might provide a reasonable gauge of the compensation that nuclear-trained naval officers could expect in the private sector.

The compensation of a nuclear surface officer with a rank of O-4 or O-5 (lieutenant commander or commander) is competitive with the salaries earned by people with similar years of experience in the private sector (see Table 9). The compensation of submarine officers with the same rank is more than competitive.

TABLE 9. COMPENSATION FOR NUCLEAR PROFESSIONALS IN THE MILITARY AND CIVILIAN SECTORS (In 1996 dollars)

	Annual Compensation
<b>Nuclear Officers in the Navy<sup>a</sup></b>	
Grade O-4 with 10 Years of Service	
Surface	70,909
Submarine	78,049
Grade O-5 with 16 Years of Service	
Surface	85,855
Submarine	92,995
<b>Civilian Workers</b>	
Nuclear Engineer <sup>b</sup>	
Five to nine years of experience	57,336
Ten to 14 years of experience	70,675
Fifteen to 19 years of experience	82,240
Managerial, Professional, or Technical Position <sup>c</sup>	
Ten years of experience	42,036
Sixteen years of experience	54,965

SOURCE: Congressional Budget Office based on data from the Department of Defense Compensation Office; National Society of Professional Engineers, *Professional Engineer Income and Salary Survey, 1995* (prepared by Abbott, Langer & Associates, May 1995), p. 128; and the Census Bureau.

- a. Compensation includes regular military compensation, nuclear officer incentive pay, sea duty pay, and submarine duty incentive pay where applicable.
- b. Compensation is 1995 median income adjusted by the 1996 employment cost index wage and salary deflator.
- c. Compensation is 1996 mean income. The majority of these positions are not in the nuclear field, but they are the type of jobs that nuclear officers seek out in the civilian sector.

BOX 2.  
SPOT PROMOTION OF LIEUTENANTS

An overall shortage of nuclear officers, not necessarily an imbalance among pay grades, is at the center of the Navy's problem. Nonetheless, because of the Navy's decisions governing assignments, the shortage of personnel to man lieutenant commander billets is at times magnified. Currently, the Navy resorts to a quick fix to fill selected lieutenant commander positions by using "spot promotions" of deserving lieutenants. That involves selectively promoting highly qualified lieutenants who are recommended by their commanding officer and chosen by a special selection board. Those who are spot-promoted assume the rank of lieutenant commander as long as they remain in their assigned billet. Should they leave that assignment, they revert to their former rank of lieutenant. But in general, officers who are spot-promoted become eligible for regular promotion to lieutenant commander before their spot tour is over. Their chances of receiving a regular promotion are usually excellent.

(Note, however, that officers' pay includes NOIP and other bonuses.) Despite the competitive salaries, some officers might view a civilian job with comparable pay more favorably than a naval position, based on personal preferences and family circumstances.

### DEALING WITH THE SHORTFALL OF OFFICERS

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The Navy hopes sufficient retention will alleviate its perceived shortage of nuclear-trained officers. A short-term but temporary approach it sometimes takes involves the "spot promotion" of selected lieutenants (see Box 2). But a long-term approach to the shortfall might be for the Navy to reevaluate its requirements for nuclear officers. It is already doing that in part because of current downsizing efforts, which involve reducing the number of ships and accompanying sea billets.<sup>19</sup> But the real issue concerns the requirements for billets that do not require nuclear training. A concomitant reduction in those requirements would immediately alleviate the Navy's overall shortage of nuclear officers. Some of the non-nuclear-specific billets are needed to give nuclear officers access to assignments that afford them the opportunity to develop management skills and enhance their careers. Billets in that category, however, make up two-thirds of the total requirement for nuclear submarine officers and three-fourths for nuclear surface officers. Whether that many non-nuclear-specific billets are needed is questionable. Moreover, offering additional pay to fill more of those positions than necessary would be inefficient.

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19. Blazer, "Retention of Junior Sub Officers Dives," p. 4.