DEPARTMENT OF THE NAVY
FISCAL YEAR (FY) 2001
BUDGET ESTIMATES

JUSTIFICATION OF ESTIMATES
FEBRUARY 2000

RESEARCH, DEVELOPMENT, TEST & EVALUATION, NAVY
BUDGET ACTIVITY 4

DTIC QUALITY INSPECTED 3

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Department of the Navy
FY 2001 RDT&E Program

Exhibit R-1

APPROPRIATION: 1319n Research, Development, Test and Evaluation, Navy

DATE: February 2000

R-1 Line Number	Program Element Number	Item Nomenclature	Budget Activity	Thousands of Dollars FY 1999	FY 2000	FY 2001	Security Classification
30	0603207N	Air/Ocean Tactical Application	4	26,702	29,942	30,337	U
31	0603216N	Aviation Survivability	4	10,585	14,201	7,536	U
32	0603254N	ASW Systems Development	4	25,030	20,333	19,680	U
		(R2/R3 Materials provided in Classified Budget Book)					
33	0603261N	Tactical Airborne Reconnaissance	4	1,444	1,964	1,956	U
34	0603382N	Advance Combat System Technology	4	6,438	6,790	6,943	U
35	0603502N	Surface & Shallow Water Mine Countermeasures	4	76,630	109,765	97,929	U
36	0603504N	Advance Submarine Combat Systems Dev	4	4,507	0	0	U
		(R2/R3 Materials included in Classified Budget Book)					
37	0603506N	Surface Ship Torpedo Defense	4	4,840	4,614	0	U
38	0603512N	Carrier Systems Development	4	105,787	141,957	148,952	U
39	0603513N	Shipboard System Component Dev	4	98,980	113,474	244,437	U
40	0603525N	PILOT FISH	4	115,863	96,052	107,598	U
		(Classified -- Material Not Available)					
41	0603526N	Advanced Software and Computing Technology	4	0	994	0	U
42	0603527N	RETRACT LARCH	4	0	7,791	11,895	U
		(Classified -- Material Not Available)					
43	0603536N	RETRACT JUNIPER	4	11,075	5,950	0	U
		(Classified -- Material Not Available)					
44	0603542N	Radiological Control	4	3,228	601	572	U
45	0603553N	Surface ASW	4	4,839	6,948	6,752	U
46	0603559N	SSGN Conversion	4	0	0	34,762	U
47	0603561N	Advanced Submarine System Development	4	116,265	124,051	113,269	U
48	0603562N	Submarine Tactical Warfare Sys	4	3,894	4,643	4,356	U
49	0603563N	Ship Concept Advanced Design	4	9,614	28,659	162	U
50	0603564N	Ship Preliminary Design & Feasibility Studies	4	6,706	11,945	46,896	U
51	0603570N	Advanced Nuclear Power Systems	4	118,909	145,400	168,483	U
		(R2/R3 Materials included in Classified Budget Book)					
52	0603573N	Advanced Surface Machinery Systems	4	29,478	26,581	5,635	U
53	0603576N	CHALK EAGLE	4	116,268	94,823	64,770	U
		(Classified -- Material Not Available)					
54	0603582N	Combat System Integration	4	38,337	78,305	32,966	U
55	0603609N	Conventional Munitions	4	37,105	39,087	28,619	U
56	0603611M	Marine Corps Assault Vehicles	4	100,609	114,210	137,981	U
57	0603612M	Marine Corps Mine/Countermeasures Systems - Adv	4	1,595	0	0	U
58	0603635M	Marine Corps Ground Combat/Support System	4	54,971	50,375	23,216	U

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THE MISSING PAGES ARE CLASSIFIED

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APPROPRIATION: 1319n Research, Development, Test and Evaluation, Navy

DATE: February 2000

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59	0603654N	Joint Service Explosive Ordnance Development	4	10,383	11,107	13,131	U
60	0603658N	Cooperative Engagement Capability	4	189,667	189,877	119,257	U
61	0603713N	Ocean Engineering Technology Development	4	14,073	16,712	15,371	U
62	0603721N	Environmental Protection	4	70,414	82,999	62,194	U
63	0603724N	Navy Energy Program	4	4,520	6,945	4,942	U
64	0603725N	Facilities Improvement	4	1,835	1,974	1,824	U
65	0603734N	CHALK CORAL (Classified -- Material Not Available)	4	96,249	42,472	52,886	U
66	0603739N	Navy Logistic Productivity (Prior Year Only -- R2/R3 Not Required)	4	2,905	17,902	0	U
67	0603746N	RETRACT MAPLE (Classified -- Material Not Available)	4	113,896	121,543	125,222	U
68	0603748N	LINK PLUMERIA (Classified -- Material Not Available)	4	22,024	47,988	42,372	U
69	0603751N	RETRACT ELM (Classified -- Material Not Available)	4	22,791	19,427	13,541	U
70	0603755N	Ship Self Defense	4	15,757	8,607	6,610	U
71	0603764N	LINK EVERGREEN (Classified -- Material Not Available)	4	0	7,836	9,712	U
72	0603787N	Special Processes (Classified -- Material Not Available)	4	81,120	68,949	62,510	U
73	0603790N	NATO Research and Development	4	9,665	5,431	8,992	U
74	0603795N	Land Attack Technology	4	83,761	116,839	143,044	U
75	0603800N	Joint Advance Strike Technology Program - Dem/Val	4	471,362	239,907	131,566	U
76	0603851M	Nonlethal Weapons - Dem/Val	4	33,895	26,132	23,580	U
77	0603857N	All Service Combat ID Eval Team (ASCIET)	4	0	12,949	13,110	U
78	0603889N	Counterdrug RDT&E (Prior Year Only -- R2/R3 Not Required)	4	24,802	0	0	U
79	0604327N	Hard and Deeply Buried Target Defeat System	4	2,906	4,897	0	U
80	0604707N	SEW Architecture/Eng Support	4	22,579	36,904	34,100	U
		Total Demonstration and Validation (Dem/Val)		2,424,303	2,366,852	2,229,666	

Department of the Navy
FY 2001 RDT&E Program

Exhibit R-1

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36	0603504N	Advance Submarine Combat Systems Dev	4	4,507	0	0	U
51	0603570N	Advanced Nuclear Power Systems (R2/R3 Materials included in Classified Budget Book)	4	118,909	145,400	168,483	U
41	0603526N	Advanced Software and Computing Technology	4	0	994	0	U
47	0603561N	Advanced Submarine System Development	4	116,265	124,051	113,269	U
52	0603573N	Advanced Surface Machinery Systems	4	29,478	26,581	5,635	U
30	0603207N	Air/Ocean Tactical Application	4	26,702	29,942	30,337	U
77	0603857N	All Service Combat ID Eval Team (ASCIET)	4	0	12,949	13,110	U
32	0603254N	ASW Systems Development (R2/R3 Materials provided in Classified Budget Book)	4	25,030	20,333	19,680	U
31	0603216N	Aviation Survivability	4	10,585	14,201	7,536	U
65	0603734N	CHALK CORAL (Classified -- Material Not Available)	4	96,249	42,472	52,886	U
53	0603576N	CHALK EAGLE (Classified -- Material Not Available)	4	116,268	94,823	64,770	U
38	0603512N	Carrier Systems Development	4	105,787	141,957	148,952	U
54	0603582N	Combat System Integration	4	38,337	78,305	32,966	U
55	0603609N	Conventional Munitions	4	37,105	39,087	28,619	U
60	0603658N	Cooperative Engagement Capability	4	189,667	189,877	119,257	U
78	0603889N	Counterdrug RDT&E (Prior Year Only -- R2/R3 Not Required)	4	24,802	0	0	U
62	0603721N	Environmental Protection	4	70,414	82,999	62,194	U
64	0603725N	Facilities Improvement	4	1,835	1,974	1,824	U
79	0604327N	Hard and Deeply Buried Target Defeat System	4	2,906	4,897	0	U
75	0603800N	Joint Advance Strike Technology Program - Dem/Val	4	471,362	239,907	131,566	U
59	0603654N	Joint Service Explosive Ordnance Development	4	10,383	11,107	13,131	U
74	0603795N	Land Attack Technology	4	83,761	116,839	143,044	U
71	0603764N	LINK EVERGREEN (Classified -- Material Not Available)	4	0	7,836	9,712	U
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58	0603635M	Marine Corps Ground Combat/Support System	4	54,971	50,375	23,216	U
57	0603612M	Marine Corps Mine/Countermeasures Systems - Adv	4	1,595	0	0	U
73	0603790N	NATO Research and Development	4	9,665	5,431	8,992	U

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66	0603739N	Navy Logistic Productivity	4	2,905	17,902	0	U
		(Prior Year Only -- R2/R3 Not Required)					
76	0603851M	Nonlethal Weapons - Dem/Val	4	33,895	26,132	23,580	U
61	0603713N	Ocean Engineering Technology Development	4	14,073	16,712	15,371	U
40	0603525N	PILOT FISH	4	115,863	96,052	107,598	U
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72	0603787N	Special Processes	4	81,120	68,949	62,510	U
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35	0603502N	Surface & Shallow Water Mine Countermeasures	4	76,630	109,765	97,929	U
45	0603553N	Surface ASW	4	4,839	6,948	6,752	U
37	0603506N	Surface Ship Torpedo Defense	4	4,840	4,614	0	U
33	0603261N	Tactical Airborne Reconnaissance	4	1,444	1,964	1,956	U
		Total Demonstration and Validation (Dem/Val)		2,424,303	2,366,852	2,229,666	

Comparison of FY 1999 Financing as reflected in FY 2000 Budget with 1999 Financing as Shown in the FY 2001 Budget

($ In Thousands)

	Financing per FY 2000 Budget	Financing Per FY 2001 Budget	Increase (+) or Decrease (-)
Program Requirements (Service Account)	8,660,809	8,942,170	+ 281,361
Program Requirements (Reimbursable)	150,000	212,229	+62,229
Appropriation (Adjusted)	**8,810,809**	**9,154,399**	**+343,590**

Explanation of Changes in Financing
($ in Thousands)

The Fiscal Year 1999 program has changed since the presentation of the FY 2000 budget as noted below:

1. Program Requirements (Total). There has been a net increase to the appropriation (adjusted) of +$281,361 as a result of changes in program requirements as noted below.

2. Program Requirements (Service Account). There has been a net increase to the appropriation (adjusted) of $281,361 which is a result of various changes. These changes include rescissions in the FY 2000 DoD Appropriations Act, specifically section 8058 (-$14,900) and section 8090 (-$40,900). Other changes are a result of reprogrammings which require congressional prior approval, including CH-60 (+$4,000), OSCAR (+$9,615), LASM (+$6,900), ESSM (-$22,672), JTCTS (+$6,000), Combat Systems Integration (+$18,000), Ship Self Defense (+$4,000), and various classified programs (+$275,000). Other transfers into or out of the account resulted in changes (-$4,484). Internal realignments for Counter Terrorism (+$8,000) and Counterdrug Operations (+$32,802) are also included.

3. Program Requirements (Reimbursable). There has been a net increase to the appropriation of $62,229, as a result of changes in reimbursable program requirements.

Comparison of FY 1999 Program Requirements as reflected in the FY 2000 Budget with FY 1999 Program Requirements as shown in the FY 2001 Budget

Summary of Requirements ($ in Thousands)

	Total Program Requirements per FY 2000 Budget	Total Program Requirements per FY 2001 Budget	Increase (+) or Decrease (-)
01 – Basic Research	361,499	354,017	-7,482
02 – Applied Research	566,801	550,569	-16,232
03 – Advanced Technology Development	593,176	569,903	-23,273
04 – Demonstration and Validation (DEM/VAL)	2,408,520	2,427,114	+18,594
05 – Engineering and Manufacturing Development (EMD)	2,199,737	2,134,903	- 64,,834
06 – RDTE Management Support	598,664	726,989	+128,325
07 – Operational Systems Development	1,932,412	2,178,675	+246,263
Total Fiscal Year Program	**8,660,809**	**8,942,170**	**+281,361**

Explanation by Budget Activity
($ in Thousands)

01. Basic Research (-$7,482) Changes to this budget activity resulted from a transfer to support the Small Business Innovative Research (SBIR) program (-$5,782), rescissions reflected in the FY 2000 DoD Appropriation Act (-$1,642) and other changes in program requirements which required minor reprogrammings (-$58).

02. Applied Research (-$16,232) Changes to this budget activity resulted from a transfer to support the Small Business Innovative Research (SBIR) program (-$7,215). Other changes included rescissions reflected in the FY 00 DoD Appropriation Act (-$2,581) and other changes in program requirements which required minor reprogrammings (-$6,436).

03. Advanced Technology Development (-$23,273) Changes to this budget activity resulted from a transfer to support the Small Business Innovative Research (SBIR) program (-$8,363). These changes included rescissions reflected in the FY 2000 DoD Appropriation Act (-$2,600), a transfer to Defense-wide R&D for USACOM Joint Experimentation (-$15,900) other changes in program requirements which required minor reprogrammings (+$3,590).

04. Demonstration and Validation (DEM/VAL) (+$18,594) - Changes to this budget activity resulted from a transfer to support the Small Business Innovative Research (SBIR) program (-$32,812), transfers to support the Counter Drug program (+$24,802), change in program requirements (+$7,461), FY 2000 DoD Appropriation Act rescissions (-$14,946) and other changes in program requirements which required minor reprogrammings (+$34,089).

05. Engineering and Manufacturing Development (EMD) (-$64,834) Changes to this budget activity resulted from a transfer to support the Small Business Innovative Research (SBIR) program (-$52,462), transfers to support the Smart Work/TOC initiatives (+$1,554), an adjustment realigning COSSI funds from BA-5 to BA-7 (-$15,208), OSCAR (+$9,615), CH-60 reprogramming (+$4,000), a FY 2000 DoD Appropriation Act rescissions (-$10,162), and other changes in program requirements which required minor reprogrammings, budget activity realignments and accounting updates (-$3,798).

06. RDTE Management Support (+$128,325) - Changes to this budget activity resulted from a transfer to support the Small Business Innovative Research (SBIR) program (+$121,893), a FY 2000 DoD Appropriation Act rescissions (-$2,709), other changes in program requirements which required minor reprogrammings, budget activity realignments and accounting updates (+$5,747) and a transfer for Federal Technology (+$2,945).

07. Operational Systems Development (-$246,263) - Changes to this budget activity resulted from a transfer to support the Small Business Innovative Research (SBIR) program (-$23,153), an internal reprogramming into the classified programs (+$275,000), the Counter-Terrorism Supplemental (+$8,000) and JTCTS (+$6,000). These changes also included rescissions reflected in the FY 2000 DoD Appropriations Act (-$21,160), and other changes in program requirements which required minor reprogrammings, budget activity realignments and accounting updates (-$1,576).

Comparison of FY 2000 Financing as reflected in FY 2000 Budget with 2000 Financing as Shown in the FY 2001 Budget

($ In Thousands)

	Financing per FY 2000 Budget	Financing Per FY 2001 Budget	Increase (+) or Decrease (-)
Program Requirements (Service Account)	7,984,016	9,056,644	+1,072,628
Program Requirements (Reimbursable)	150,000	198,500	+48,500
Appropriation (Adjusted)	**8,134,016**	**9,255,144**	**+1,121,128**

Explanation of Changes in Financing
($ in Thousands)

The Fiscal Year 2000 program has changed since the presentation of the FY 2001 budget as noted below:

1. Program Requirements (Total). There has been a net increase to the appropriation (adjusted) of +$1,072,628, result of changes in program requirements as noted below.

2. Program Requirements (Service Account). There has been a net increase to the appropriation (adjusted) of $1,072,628, as a result of various changes. These changes included rescissions reflected in the FY 2000 DoD Appropriations Act (-$46,821) and specific FY 2000 Congressional adjustments to start, continue, discontinue, reduce or earmark 205 specific initiatives (including transfers, which resulted in a net increase of $1,126,310). Reprogramming actions which require congressional prior approval are also included, such as a transfer of funds for the USACOM Joint Experimentation program (+$1,900), which is managed by the Navy as DoD executive agent, and a transfer to Defense-Wide Chemical/Biological (Chem/Bio) (-$18,200). Internal reprogrammings actions impacting the FY 2000 program include Electronic Warfare Development (+$10,000). Also, other changes in program requirements, phasing, or pricing resulted in transfers into or out of the account (-$561).

3. Program Requirements (Reimbursable). There has been a net increase to the appropriation of +$48,500, as a result of changes in reimbursable program requirements (+$48,500).

Comparison of FY 2000 Program Requirements as reflected in the FY 2000 Budget with FY 2000 Program Requirements as shown in the FY 2001 Budget

Summary of Requirements ($ in Thousands)

	Total Program Requirements per FY 2000 Budget	**Total Program Requirements per FY 2001 Budget**	**Increase (+) or Decrease (-)**
01 – Basic Research	376,748	374,301	-2,447
02 – Applied Research	523,839	622,394	+98,555
03 – Advanced Technology Development	519,523	753,631	+234,108
04 – Demonstration and Validation (DEM/VAL)	2,086,062	2,366,852	+280,790
05 – Engineering and Manufacturing Development (EMD)	1,953,882	2,301,795	+347,913
06 – RDTE Management Support	646,489	641,017	-5,472
07 – Operational Systems Development	1,877,473	1,996,654	+119,181
Total Fiscal Year Program	**7,984,016**	**9,056,644**	**+1,072,628**

Explanation by Budget Activity
($ in Thousands)

01. Basic Research (-$2,447) - Changes to this budget activity resulted from the rescissions found in the FY 2000 DoD Appropriations Act (-$2,447).

02. Applied Research (+$98,555) - These changes included specific FY 2000 Congressional adjustments to start, continue, discontinue, reduce or earmark 35 specific initiatives (including transfers) which resulted in a net increase (+$102,010). Additionally, this change reflects rescissions found in the FY 2000 Appropriations Act (-$3,455).

03. Advanced Technology Development (+$234,108) - These changes included specific FY 2000 Congressional adjustments to start, continue, discontinue, reduce or earmark 14 specific resulting initiatives (including transfers), which resulted in a net increase (+$235,400), as well as the rescissions reflected in the FY 2000 Appropriations Act (-$4,194). Additionally, FY 2000 includes a transfer for the USACOM Joint Experiments program (+$1,900) and other changes in program requirements which required minor reprogrammings (+$1,002).

04. Demonstration and Validation (DEM/VAL) (+$280,790) – These changes included specific FY 2000 Congressional adjustments to start, continue, discontinue, reduce or earmark 49 specific initiatives (including transfers), which resulted in a net increase (+$287,300) as well as the rescissions reflected in the FY 2000 Appropriations Act (-$11,841). Additionally, FY 2000 includes changes in program requirements which required minor reprogrammings (+$5,331).

05. Engineering and Manufacturing Development (EMD) (+$347,913) – These changes included specific FY 2000 Congressional adjustments to start, continue, discontinue, reduce or earmark 40 specific initiatives (including transfers), which resulted in a net increase of (+$367,139), as well as rescissions reflected in the FY 2000 Appropriations Act (-$11,910). Additionally, changes in program requirements which required minor reprogrammings are reflected (-$7,316).

06. Management Support (-$5,472) - These changes included specific FY 2000 Congressional adjustments to start, continue, discontinue, reduce or earmark 13 specific initiatives (including transfers), which resulted in a net increase of (+$24,300), as well as rescissions reflected in the FY 2000 Appropriations Act (-$1,784). Other decreases included a transfer to Defense-wide Chem/Bio (-$18,200) and changes in program requirements which required minor reprogrammings (-$9,788).

07. Operational Systems Development (+$119,181) – These changes included specific FY 2000 Congressional adjustments to start, continue, discontinue, reduce or earmark 28 specific resulting initiatives (including transfers), which resulted in a net increase (+$131,200), as well as rescissions reflected in the FY 2000 Appropriations Act (-$11,190). Additionally, changes in program requirements which required minor reprogrammings (-$829).

EXHIBIT R-2, FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION Date: February 2000

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications

(U) COST: (Dollars in Thousands)

PROJECT NUMBER & Title	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
X2341 METOC Data Acquisition	7,264	8,621	8,756	9,019	10,186	10,398	10,647	CONT.	CONT
X2342 METOC Data Assimilation and Modeling	11,068	12,221	12,295	13,203	12,659	12,955	13,292	CONT.	CONT.
X2343 Tactical METOC Applications	6,963	7,664	7,827	7,950	8,442	8,636	8,803	CONT.	CONT.
X2344 Precise Timing and Astrometry	1,404	1,436	1,459	1,480	1,506	1,536	1,568	CONT.	CONT.
TOTAL	26,699	29,942	30,337	31,652	32,793	33,525	34,310	CONT.	CONT.

EXHIBIT R-2, FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION Date: February 2000

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603207N
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications

(U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION:

The Air Ocean Tactical Applications (AOTA) Program Element is specifically tailored to emphasize techniques which expand knowledge and improve understanding of the meteorological and oceanographic (METOC) environment and its impact on combat systems performance. AOTA focuses on shallow water and other harsh environments, and regional conflict and crisis response scenarios. Projects in this program element develop atmospheric and oceanographic data assimilation techniques, forecast models, data base management systems and associated software for use in both mainframe and tactical scale computers. Global Geospatial Information and Services efforts within this program address the bathymetric and gravimetric needs of the Navy. Also developed are algorithms to process remotely sensed satellite data for integration into other systems and tactical applications. In addition, the projects provide for demonstration and validation of specialized METOC instrumentation and measurement techniques, new sensors, communications and interfaces. Included are techniques to assess, predict and enhance the performance of current and proposed undersea surveillance, tactical and mine warfare and weapons systems. AOTA METOC products are tailored for, and will be incorporated into the Global Command and Control System/Maritime (GCCS/M) and/or onboard combat systems to provide accurate operational system performance predictions. These METOC products will also be incorporated into fleet trainers to provide realistic environments in support of warfare simulations. Finally, this project upgrades the accuracy of the U.S. Naval Observatory's Master Clock system; develops near-real-time earth orientation predictions; develops very precise determination of positions of both faint and bright stars; and supports satellite tracking and space debris studies.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates systems for experimental test related to specific ship or aircraft applications.

EXHIBIT R-2a, FY 2001 RDT&E,N PROJECT JUSTIFICATION Date: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2341
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: METOC Data Acquisition

PROJECT NUMBER & Title	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
X2341 METOC Data Acquisition	7,264	8,621	8,756	9,019	10,186	10,398	10,647	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The major thrust of the meteorology and oceanography (METOC) Data Acquisition Project is to develop, demonstrate, and validate METOC data collection methods and sensors, and to evolve the ability to provide timely and accurate METOC data and products to the Tactical Commander. As the emphasis on Naval Warfare has evolved from blue water operations to the littoral and hinterland battlespace, METOC data requirements have likewise evolved. The littoral and hinterland regions are extremely dynamic and complex, characterized by strong and highly variable oceanographic and atmospheric conditions. As a result, the need to accurately characterize these parameters is more crucial than ever in planning and executing Amphibious Warfare, Mine Warfare, Special Operations, Anti-Submarine Warfare, and Strike Warfare operations. Routinely available data sources, such as climatology, oceanographic and meteorological numerical models, and satellite remote sensing are inadequate to support these warfare areas in the littoral and hinterland regions. Current operational sensors, such as the standard balloon launched radiosonde, are deployed from platforms which are frequently located great distances from the area of interest. The principal challenge is to provide a means for the collection and dissemination of METOC data in highly variable and dynamic littoral environmental conditions or in denied, remote or inaccessible areas over extended periods of time. The principal goals of this project are to: 1) Provide the means to rapidly and automatically acquire a broad array of METOC data using both off-board and on-board sensors; 2) provide an on-scene assessment capability for the tactical commander; 3) provide the tactical commander with real-time METOC data and products for operational use; 4) demonstrate and validate the use of tactical workstations and desktop computers for processing and display of METOC data and products using latest networking technologies; 5) demonstrate and validate techniques which employ data compression, connectivity and interface technologies to ingest, store, process, distribute and display these METOC data and products; 6) develop new charting and bathymetric survey techniques necessary to reduce the existing 300 ship year shortfall in coastal hydrographic survey requirements; and, 7) develop an expanded database for predictive METOC models in areas of potential interest.

EXHIBIT R-2a, FY 2001 RDT&E,N PROJECT JUSTIFICATION Date: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2341
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: METOC Data Acquisition

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:

- (U) ($1,244) Continued Integration of MEASURE Interface Processor (MIP) into airborne unmanned vehicles (UAV's). Continued development of Battlespace characterization techniques to measure environmental data in-situ and transmit to Fleet assets.
- (U) ($700) Completed Airborne Combat Data Collection via fleet assets.
- (U) ($750) Continued sensor developments for ROV/AUV, and initiate sensor integration and development of UAV sensors in Tier II Plus Vehicles.
- (U) ($300) Completed hinterland clandestine micro sensors.
- (U) ($845) Continued assessments of temporal and spatial variability of littoral environments for acoustic data inversion.
- (U) ($700) Continued dem/val of METOC Air, Surface, Undersea Reconnaissance Equipment (MEASURE), and continued development of next-generation sensors for Moriah.
- (U) ($650) Completed data connectivity with the Aegis C2 system and the Mine Countermeasures mission planning system. Continued development of data connectivity with the next generation Tomahawk mission planning system and the Global Command and Control System/Maritime (GCCS/M).
- (U) ($375) Continued development of advanced aerosol measurement techniques.
- (U) ($450) Continued instrumentation demonstration and validation of joint RMS vehicle for remote littoral bathymetry/mine hunting.

- (U) ($400) Completed development of airborne laser bathymetry techniques from fixed wing aircraft for crisis response.

- (U) ($850) Continued information management and DMAP functions.

2. (U) FY 2000 PLAN:

- (U) ($1,381) Complete Integration of MEASURE Interface Processor (MIP) into airborne unmanned vehicles (UAV's). Continue development of Battlespace characterization techniques to measure environmental data in-situ and transmit to Fleet assets.

- (U) ($1,300) Continue sensor developments for ROV/AUV, and continue sensor integration and development of UAV sensors in Tier II Plus Vehicles.

- (U) ($1,050) Continue assessments of temporal and spatial variability of littoral environments for acoustic data inversion.

- (U) ($920) Begin development of advanced techniques to acquire and manage ambient noise data.

- (U) ($1,100) Continue development of next-generation sensors for MEASURE, Moriah and aerosol measurements.

- (U) ($1,245) Continue development of data connectivity with the next generation Tomahawk mission planning system and GCCS/M. Begin development of data connectivity with the next generation Tactical Air Mission Planning System (TAMPS 7.0)

- (U) ($775) Complete instrumentation demonstration and validation of joint RMS vehicle for remote littoral bathymetry/mine hunting.

- (U) ($850) Continue information management and DMAP functions.

3. (U) FY 2001 PLAN:

- (U) ($1,275) Complete sensor developments for ROV/AUV, and continue sensor integration and development of UAV sensors in Tier II Plus Vehicles.
- (U) ($1,175) Continue assessments of temporal and spatial variability of littoral environments for acoustic data inversion.
- (U) ($1,385) Continue development of advanced techniques to acquire and manage ambient noise data.
- (U) ($1,175) Complete development of next-generation sensors for MEASURE, MORIAH and aerosol measurements.
- (U) ($1,175) Complete development of data connectivity with the next generation Tomahawk mission planning system. Continue development of data connectivity with the next generation Tactical Air Mission Planning System (TAMPS 7.0) and GCCS/M.
- (U) ($1,621) Begin development of next-generation acoustic data acquisition techniques
- (U) ($950) Continue information management and DMAP functions.

EXHIBIT R-2a, FY 2001 RDT&E,N PROJECT JUSTIFICATION Date: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2341
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: METOC Data Acquisition

B. (U) PROGRAM CHANGE SUMMARY:

(U) Funding: FY 1999 Reflects congressional reductions associated with Economic Assumptions (-35), Small Business Innovation Research assessment (-104); LOCO GPSI Support (-65); and Miscellaneous Departmental Adjustments (-49) FY 2000 Reflects Congressional adjustments (-48) Portion of extramural program is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638 (183); FY 2001 Miscellaneous Departmental adjustments (-136).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY:

(U) RELATED RDT&E: PE 0604218N, Air/Ocean Equipment Engineering - AN/SMQ-11 satellite receiver/recorder system engineering to receive data from DMSP onboard selected ships and shore sites.

(U) ACQUISITION STRATEGY: Not applicable

Exhibit R-3 Project Cost Analysis (page 1)										Date: FEB 00		
APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA5		PROGRAM ELEMENT: 0603207N								PROJECT NAME AND NUMBER: X2341 METOC DATA ACQUISITION		
Cost Categories	Contract Method & Type	Performing Activity & Location	Total FY98+ PY Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Product Development	WX	NRL	0	2,976	N/A	4,008	N/A	4,072	N/A	CONT	CONT	
	WX	NAWC-AD Lake	0	678	N/A	100	N/A	0	N/A	CONT	CONT	
	CP	SSA	0	1,500	N/A	1,500	N/A	1,525	N/A	CONT	CONT	
	N/A	MISC	0	1,585	N/A	2,473	N/A	2,609	N/A	CONT	CONT	
Subtotal Product Development			0	6,739	NA	8,081	NA	8,206	N/A	CONT	CONT	
Remarks:												
Support	CP	SSA	0	525	N/A	540	N/A	550	N/A	CONT	CONT	
Subtotal Support			0	525	N/A	540	N/A	550	N/A	CONT	CONT	
Remarks												

Exhibit R-3 Project Cost Analysis (page 2)								Date: FEB 00				
APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA5		PROGRAM ELEMENT: 0603207N						PROJECT NAME AND NUMBER: X2341 METOC DATA ACQUISITION				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total FY98+ PY Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal T&E												
Remarks												
Subtotal Management												
Remarks												
Total Cost			0	7,264	N/A	8,621	N/A	8,756	N/A	CONT	CONT	
Remarks												

EXHIBIT R-2a, FY 2001 RDT&E,N PROJECT JUSTIFICATION Date: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2342
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: METOC Data Assimilation and Modeling

(U) COST (Dollars in thousands)

PROJECT NUMBER & Title	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
X2342 METOC Data Assimilation and Modeling.	11,068	12,221	12,295	13,203	12,659	12,955	13,292	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The meteorological and oceanographic (METOC) Data Assimilation Project is a multi-faceted program which includes: 1) development, demonstration and validation of atmospheric and oceanographic data assimilation techniques, forecast models, database management systems, and associated software for use in both mainframe and tactical scale computers. Included are numerical oceanographic and atmospheric models for the Large Scale Computers at the Navy Fleet Numerical Meteorology and Oceanography Center, Monterey, CA and the Naval Oceanographic Office, Stennis Space Center, MS. These models, combined with a global communications network for data acquisition and distribution, form a prediction system which provides METOC data and products necessary to support naval operations worldwide in virtually every mission area; 2) other models, which focus on ocean thermal structure and circulation, and surf and tide prediction; 3) techniques to process and manage satellite remotely-sensed environmental data at Oceanography Centers ashore and on ships equipped with the AN/SMQ-11 satellite receiver/recorder. These techniques allow for the integration and tactical application of significant oceanographic and atmospheric data derived from satellite-borne sensors. Included are techniques and algorithms for the processing of sensor measurements, conversion of raw signal data to geophysical information, analysis schemes encompassing Artificial Intelligence and Expert Systems, and other satellite data applications and field validation of end products; and, 4) a family of acoustic system performance models beginning with active system models and databases in the low-, mid-, and high-frequency regimes and culminating with high fidelity simulation products. As weapons and sensors become more sophisticated and complex, the marine environment has an increasingly significant impact on system performance. Operational limitations induced by the ocean and atmosphere must be understood, and the resulting constraints on mission effectiveness and system employment minimized. Hence, the operating forces require more accurate worldwide forecasts of METOC conditions with increased temporal and spatial resolution. An additional challenge is posed by the emergence of new satellite sensors, which are continually adding new sources of disparate data types. In order to fully exploit this dynamic and massive volume of data, modern data base management systems (DBMS) are required, and must be tailored for individual computer configurations. Improved representation of smaller-scale phenomena, particularly in the littoral, is also an important consideration.

EXHIBIT R-2a, FY 2001 RDT&E,N PROJECT JUSTIFICATION Date: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2342
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: METOC Data Assimilation and Modeling

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:

- (U) ($950) Continued modeling and simulation of atmosphere and ocean environmental effects on Navy systems.
- (U) ($1,067) Completed development of advanced aerosol model and began dem/val of techniques for coupled air/ocean data assimilation.
- (U) ($400) Participated in selected fleet exercises and demonstrations.
- (U) ($1,056) Continued development of MPP version of NOGAPS and the shipboard version of tactical scale nested model for operational use.
- (U) ($760) Continued development of next-generation tropical cyclone forecast model and the Arabian Gulf/Arabian ocean model.
- (U) ($700) Continued development of capabilities to assimilate and quality control METOC data from satellite sensors and conventional data sources using 4D variational techniques.
- (U) ($987) Completed development of SSM/IS atmospheric algorithms and transition of new algorithms for SAR and altimetry data.
- (U) ($250) Completed evaluation of aviation impact variables satellite product.
- (U) ($1,150) Began development of techniques for bathymetry and surf zone and high resolution micro-topography algorithms and automated objective processing in the littoral.
- (U) ($700) Continued development of coastal and enclosed basin tactical scale oceanographic models for selected geographical locations in response to emergent requirements.

EXHIBIT R-2a, FY 2001 RDT&E,N PROJECT JUSTIFICATION Date: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2342
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: METOC Data Assimilation and Modeling

- (U) ($550) Continued development of a shipboard shallow water ocean circulation model and an automated graphical application for tactical data visualization.
- (U) ($650) Began development of next generation tide and surf models.
- (U) ($1,100) Continued the development of mid-frequency bottom loss/bottom scatter models and databases for shallow water environments.
- (U) ($748) Continued the verification and validation of products and data assimilation techniques developed for fleet applications.

2. (U) FY 2000 PLAN:

- (U) ($1,278) Continue modeling and simulation of atmosphere and ocean environmental effects on Navy systems.
- (U) ($1,233) Continue developments of techniques for coupled air/ocean data assimilation.
- (U) ($400) Participate in selected fleet exercises and demonstrations.
- (U) ($925) Complete development of MPP version of NOGAPS and the shipboard version of tactical scale nested model for operational use.
- (U) ($1,385) Begin development of next generation high resolution coupled air/ocean forecast models.
- (U) ($1,460) Complete development of next-generation tropical cyclone forecast model and the Arabian Gulf/Arabian ocean model. Continue development of coastal and enclosed basin tactical scale oceanographic models for selected geographical locations in response to emergent requirements.
- (U) ($1,165) Continue development of capabilities to assimilate and quality control METOC data from satellite sensors and conventional data sources using 4D variational techniques.

- (U) ($1,250) Continue development of techniques for bathymetry and surf zone and high resolution micro-topography algorithms and automated objective processing in the littoral.

- (U) ($1,285) Continue development of shipboard shallow water ocean circulation model, next generation tide and surf models, and automated graphical applications for tactical data visualization.

- (U) ($1,025) Continue the development of mid-frequency bottom loss/bottom scatter models and databases for shallow water environments.

- (U) ($815) Continue the verification and validation of products and data assimilation techniques developed for fleet applications.

3. (U) FY 2001 PLAN:

- (U) ($1,288) Continue modeling and simulation of atmosphere and ocean environmental effects on Navy systems.

- (U) ($1,459) Complete developments of techniques for coupled air/ocean data assimilation. Begin development of variational techniques for coupled assimilation.

- (U) ($579) Participate in selected fleet exercises and demonstrations.

- (U) ($1,253) Continue development of next generation high resolution coupled air/ocean forecast models.

- (U) ($1,250) Continue development of coastal and enclosed basin tactical scale oceanographic models for selected geographical locations in response to emergent requirements.

- (U) ($1,165) Complete development of capabilities to assimilate and quality control METOC data from satellite sensors and conventional data sources using 4D variational techniques.

- (U) ($1,150) Continue development of techniques for bathymetry and surf zone and high resolution micro-topography algorithms and automated objective processing in the littoral.

EXHIBIT R-2a, FY 2001 RDT&E,N PROJECT JUSTIFICATION Date: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2342
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: METOC Data Assimilation and Modeling

- (U) ($1,185) Continue development of shipboard shallow water ocean circulation model, next generation tide and surf models, and automated graphical applications for tactical data visualization.
- (U) ($1,026) Begin development of next-generation active and passive acoustic models.
- (U) ($1,025) Continue the development of mid-frequency bottom loss/bottom scatter models and databases for shallow water environments.
- (U) ($915) Continue the verification and validation of products and data assimilation techniques developed for fleet applications.

B. (U) PROGRAM CHANGE SUMMARY:

(U) Funding: FY 1999 Reflects congressional reductions associated with Economic Assumptions (-47), Small Business LOCO GPSI Support (-88), SBIR (-100) and Miscellaneous Departmental Adjustments (1011). FY 2000 Reflects Congressional adjustments (-68) Portion of extramural program is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638 (98); FY 2001 Miscellaneous Departmental adjustments (-407).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

D. (U) ACQUISITION STRATEGY: Not applicable.

Exhibit R-3 Project Cost Analysis (page 1)												Date: FEB 00
APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/5A5			PROGRAM ELEMENT:0603207N					PROJECT NAME AND NUMBER: X2342 METOC DATA ASSIMILATION AND MODELING				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total FY98+ PY Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Product Development	WX	NRL	0	7,902	N/A	8,709	N/A	8,850	N/A	CONT	CONT	
	WX	NAWC-WD, PM	0	390	N/A	400	N/A	410	N/A	CONT	CONT	
	N/A	MISC	0	2,631	N/A	2,962	N/A	2,880	N/A	CONT	CONT	
Subtotal Product Development			0	10,923	N/A	12,071	N/A	12,140	N/A	CONT	CONT	
Remarks:												
Support	CP	SSA	0	145	N/A	150	N/A	155	N/A	CONT	CONT	
Subtotal Support			0	145	N/A	150	N/A	155	N/A	CONT	CONT	
Remarks												

Exhibit R-3 Project Cost Analysis (page 2)								Date: FEB 00				
APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/5A5		PROGRAM ELEMENT:0603207N						PROJECT NAME AND NUMBER: X2342 METOC DATA ASSIMILATION AND MODELING				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total FY98+ PY Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal T&E												
Remarks												
Subtotal Management												
Remarks												
Total Cost			0	11,068	N/A	12,221	N/A	12,295	N/A	CONT	CONT	
Remarks												

EXHIBIT R-2a, FY 2001 RDT&E,N PROJECT JUSTIFICATION Date: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2343
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: Tactical METOC Applications

(U) COST (Dollars in thousands)

PROJECT NUMBER & Title	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
X2343 Tactical METOC Applications	6,963	7,664	7,827	7,950	8,442	8,636	8,803	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The METOC Data Applications project is a continuing effort to develop and field state-of-the-art software capabilities that provide sensor, communication, and weapon system performance assessments across the full spectrum of open ocean and littoral operating environments. These assessments allow mission planners and warfighters, from the unit to theater level, to tactically optimize sensor employment on airborne, surface, and subsurface platforms in support of all Naval Composite Warfare mission areas including Undersea Warfare (USW), Anti-Submarine Warfare (ASW), Mine Warfare (MIW), Amphibious Warfare (AMW), Anti-Surface Warfare (ASUW), Anti-Air Warfare (AAW), Strike Warfare (STW), and Special Warfare. Emphasis is placed on products to support littoral and regional conflict scenarios. Performance assessments leading to improvements in tactical control are conducted through a two-tiered approach: 1) METOC Decision Aids (MDAs); and, 2) Tactical Decision Aids (TDAs). MDAs consist of a series of analysis tools which characterize the electromagnetic (EM), electro-optical (EO), atmospheric, oceanographic, and acoustical properties of the battlespace based on the best environmental scene description available at the time (i.e., some combination of historical and/or real-time (or near real-time) in-situ data. TDAs, also developed under this project, then use this information to predict how various weapons and sensor systems will perform given the current METOC conditions, and present these predictions in various tabular and graphic formats used by mission planners and combat/weapon system operators to develop ASW and MIW search and localization plans, USW/AAW/ASUW screens, STW profiles, AMW ingress and egress points, and other considerations. Project X2343 MDAs and TDAs use data obtained by sensors developed in Project X2341 (METOC Data Acquisition) and assimilated by software produced by Project X2342 (METOC Data Assimilation and Modeling), also contained in this Program Element. They also used data obtained through direct interfaces to the combat systems. A current emphasis area of the project is the development of new combat system and mine warfare performance prediction and MDA/TDA capabilities required to characterize and/or predict sensor and weapons system performance in the highly complex littoral environments in support of regional conflict scenarios. It addresses multi-warfare areas, particularly Mine Warfare, shallow water ASW, and missile and air defense/strike capabilities.

EXHIBIT R-2a, FY 2001 RDT&E,N PROJECT JUSTIFICATION Date: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2343
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: Tactical METOC Applications

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:

- (U) ($815) Completed development of surface to air and surface to surface EO model. Continued development of AREPS.
- (U) ($2,369) Incorporated prototype Mine Warfare tactical decision aids in baseline surface ship, air and submarine performance prediction systems. Maximized littoral operation support by ensuring interoperability of system via existing Fleet communication mechanisms.
- (U) ($1,463) Completed development of initial sensor prediction capabilities for acoustic and non-acoustic sensors scheduled to be installed on Fleet combatants. Applied advanced COTS visualization techniques to facilitate operator understanding of complex littoral environmental effects on sensor performance. Integrated into appropriate platform ADM's. Performed at-sea evaluation of new capabilities.
- (U) ($1,150) Integrated platform vulnerability assessment TDA into surface ship, submarine and air ADM's to perform vulnerability assessment for acoustic and non-acoustic sensors and weapons. Evaluated functionality during at-sea tests.
- (U) ($1,166) Incorporate additional environmental sensor interface capabilities to allow for real time monitoring and measurement of key environmental parameters in support of the Oceanographer of the Navy's Battlespace METOC Data Acquisition, Assimilation and Applications strategy. Implement in the platform ADM's and evaluate at-sea.

2. (U) FY 2000 PLAN:

- (U) ($915) Continue development of AREPS and begin development of next generation Electro-optical decision aids.
- (U) ($2,734) Continue to incorporate prototype Mine Warfare tactical decision aids in baseline surface ship, air and submarine performance prediction systems. Continue to maximize littoral operation support by ensuring interoperability of system via existing Fleet communication mechanisms.

- (U) ($1,625) Continue to apply advanced COTS visualization techniques to facilitate operator understanding of complex littoral environmental effects on sensor performance and integrate into appropriate platform ADM's. Perform at-sea evaluation of new capabilities.

- (U) ($1,240) Continue to integrate platform vulnerability assessment TDA into surface ship, submarine and air ADM's to perform vulnerability assessment for acoustic and non-acoustic sensors and weapons. Evaluate functionality during at-sea tests.

- (U) ($1,150) Continue to incorporate additional environmental sensor interface capabilities to allow for real time monitoring and measurement of key environmental parameters in support of the Oceanographer of the Navy's Battlespace METOC Data Acquisition, Assimilation and Applications strategy. Implement in the platform ADM's and evaluate at-sea.

3. (U) FY 2001 PLAN:

- (U) ($1,025) Continue development of next generation Electro-optical decision aids.

- (U) ($2,724) Continue to incorporate prototype Mine Warfare tactical decision aids in baseline surface ship, air and submarine performance prediction systems. Continue to maximize littoral operation support by ensuring interoperability of system via existing Fleet communication mechanisms.

- (U) ($1,668) Continue to apply advanced COTS visualization techniques to facilitate operator understanding of complex littoral environmental effects on sensor performance and integrate into appropriate platform ADM's. Perform at-sea evaluation of new capabilities.

- (U) ($1,135) Continue to integrate platform vulnerability assessment TDA into surface ship, submarine and air ADM's to perform vulnerability assessment for acoustic and non-acoustic sensors and weapons. Evaluate functionality during at-sea tests.

- (U) ($1,275) Continue to incorporate additional environmental sensor interface capabilities to allow for real time monitoring and measurement of key environmental parameters in support of the Oceanographer of the Navy's Battlespace METOC Data Acquisition, Assimilation and Applications strategy. Implement in the platform ADM's and evaluate at-sea.

EXHIBIT R-2a, FY 2001 RDT&E,N PROJECT JUSTIFICATION Date: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2343
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: Tactical METOC Applications

B. (U) PROGRAM CHANGE SUMMARY:

(U) Funding: FY 1999 Reflects congressional reductions associated with Economic Assumptions (-30), Small Business Innovation Research assessment (-120), LOCO GPSI Support (-56), and Miscellaneous Departmental Adjustments (647). FY 2000 Reflects Congressional adjustments (-43) Portion of extramural program is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638 (127); FY 2001 Miscellaneous Departmental adjustments (10).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E: PE 0604218N (Air/Ocean Equipment Engineering). TESS/NITES will incorporate METOC data applications.

D. (U) ACQUISITION STRATEGY: Not applicable.

Exhibit R-3 Project Cost Analysis (page 1)								Date: FEB 00				
APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA5		PROGRAM ELEMENT:0603207N						PROJECT NAME AND NUMBER: X2343 TACTICAL METOC APPLICATIONS				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total FY98+ PY Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Product Development	WX	NUWC	0	675	N/A	725	N/A	740	N/A	CONT	CONT	
	WX	SSC SD	0	360	N/A	360	N/A	365	N/A	CONT	CONT	
	WX	NRL	0	300	N/A	300	N/A	305	N/A	CONT	CONT	
	CP	IPD	0	3,067	N/A	4,000	N/A	4,100	N/A	CONT	CONT	
	CP	LOCKHEED	0	500	N/A	553	N/A	560	N/A	CONT	CONT	
	N/A	MISC	0	1,766	N/A	1,426	N/A	1,452	N/A	CONT	CONT	
Subtotal Product Development			0	6,668	N/A	7,364	N/A	7,522	N/A	CONT	CONT	
Remarks:												
Support	CP	IPD	0	295	N/A	300	N/A	305	N/A	CONT	CONT	
Subtotal Support			0	295	N/A	300	N/A	305	N/A	CONT	CONT	
Remarks												

Exhibit R-3 Project Cost Analysis (page 2)								Date: FEB 00				
APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA5		PROGRAM ELEMENT:0603207N						PROJECT NAME AND NUMBER: X2343 TACTICAL METOC APPLICATIONS				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total FY98+ PY Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal T&E												
Remarks												
Subtotal Management												
Remarks												
Total Cost			0	6,963	N/A	7,664	N/A	7,827	N/A	CONT	CONT	
Remarks												

EXHIBIT R-2a, FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION Date: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2344
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: Precise Timing and Astrometry

(U) COST (Dollars in thousands)

PROJECT NUMBER & Title	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
X2344 Precise Timing and Astrometry	1,404	1,436	1,459	1,480	1,506	1,536	1,568	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The major thrusts of the Precise Timing and Astrometry Project in direct support of the U.S. Naval Observatory (USNO) are to: 1) address DoD requirements for needed increases in positioning accuracies of modern weapons systems by the determination of star positions (including objects at other than optical wavelengths) and the stellar inertial reference system (to which all navigation, guidance, and positioning systems are ultimately referred); 2) develop techniques for the prediction of the Earth's instantaneous orientation with respect to the stellar inertial reference system; 3) oversee the determination and dissemination of precise time information using the Navy/DoD Master Clock System and precise time distribution networks; and, 4) develop advanced electronic light detectors and interferometry in the optical and infrared wavelength regions for very precise determination of the positions of both faint and bright stars, satellite tracking, and space debris studies. DoD Instruction 5000.2 assigns to the Navy the responsibility for coordinating Precise Time and Time Interval (PTTI) requirements and for maintaining a PTTI reference standard (astronomical and atomic) for use by all DoD Services, Federal agencies, and related scientific laboratories. The Navy is also responsible for providing astronomical data for navigation, positioning, and guidance, including space. Some operational and many emerging requirements surpass current support capabilities. In response to these DoD requirements, this project transitions Research (6.1) and Exploratory Development (6.2) efforts, as well as developments in the civilian sector, into the operational capabilities and products of the USNO.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1.(U) FY 1999 ACCOMPLISHMENTS:

- (U) ($360) Completed evaluation of time transfer capabilities via fiber optic network and began GPS time transfer capability.

- (U) ($295) Initiated evaluation of cesium fountain clock and VLBI/GPS demonstration for earth orientation parameters.
- (U) ($524) Completed 2 micron measurement capability demonstration over large angles and demonstration of large scale CCD arrays.
- (U) ($225) Initiated InSb (Indium-Antimony) detector survey.

2. (U) FY 2000 PLAN:

- (U) ($500) Continue evaluation of GPS time transfer capability.
- (U) ($540) Continue evaluation of cesium fountain clock and VLBI/GPS demonstration for earth orientation parameters.
- (U) ($396) Continue InSb (Indium-Antimony) detector survey.

3. (U) FY 2001 PLAN:

- (U) ($435) Complete evaluation of GPS time transfer capability. Begin development of next-generation time transfer capabilities
- (U) ($285) Complete evaluation of cesium fountain clock and continue VLBI/GPS demonstration for earth orientation parameters.
- (U) ($406) Complete InSb (Indium-Antimony) detector survey.
- (U) ($333) Begin exploitation of emergent Master Clock technologies.

EXHIBIT R-2a, FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION Date: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603207N PROJECT NUMBER: X2344
PROGRAM ELEMENT TITLE: Air/Ocean Tactical Applications PROJECT TITLE: Precise Timing and Astrometry

B. (U) PROGRAM CHANGE SUMMARY:

(U) Funding: FY 1999 Reflects congressional reductions associated with Economic Assumptions (-6), Small Business Innovation Research assessment (-25), LOCO GPSI Support (-12), and Miscellaneous Departmental Adjustments (135). FY 2000 Reflects Congressional adjustments (-8) Portion of extramural program is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638 (3); FY 2001 Miscellaneous Departmental adjustments (-15).

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

C. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E: None

D. (U) ACQUISITION STRATEGY: Not applicable.

Exhibit R-3 Project Cost Analysis (page 1)								Date: FEB 00				
APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA5		PROGRAM ELEMENT: 0603207N						PROJECT NAME AND NUMBER: X2344 PRECISE TIMING AND ASTROMETRY				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total FY98+ PY Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Product Development	WX	NAVAL OBSERVATORY	0	1,404	N/A	1,436	N/A	1,459	N/A	CONT	CONT	
Subtotal Product Development			0	1,404	N/A	1,436	N/A	1,459	N/A	CONT	CONT	
Remarks:												
Subtotal Support												
Remarks												

Exhibit R-3 Project Cost Analysis (page 2)								Date: FEB 00				
APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA5		PROGRAM ELEMENT: 0603207N						PROJECT NAME AND NUMBER: X2344 PRECISE TIMING AND ASTROMETRY				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total FY98+ PY Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal T&E												
Remarks												
Subtotal Management												
Remarks												
Total Cost			0	1,404	N/A	1,436	N/A	1459	N/A	CONT	CONT	
Remarks												

R-1 Shopping List - Item No 30 (27) of 30 (27)

Exhibit R-3, Project Cost Analysi

EXHIBIT R-2, FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability

(U) COST: (Dollars in Thousands)

Project Number & Title	FY 1999 Actual	FY 2000 Budget	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
W0584 Aircrew Protective Clothing & Devices	6,811*	9,641*	2,872	2,932	2,988	3,048	3,156	CONT.	CONT.
W0594 Aircraft Survivability Vulnerability & Safety	1,285	1,868	1,904	1,912	1,944	1,978	2,031	CONT.	CONT.
W0592 A/C & Ordnance Safety	1,674	1,715	1,768	1,784	1,828	1,860	1,935	CONT.	CONT.
W1819 Carrier Vehicle Aircraft Fire Suppression System	814	977	992	1,037	1,064	1,090	1,132	CONT.	CONT.
TOTAL	10,584	14,201	7,536	7,665	7,824	7,976	8,254	CONT.	CONT.

Quantity of RDT&E Articles : Not Applicable

*The FY 1999 budget reflects a $1,000 Congressional add for Escape System Dynamic Flow, which has been revised by $31K for Congressional undistributed adjustments executed under project W2604. The FY 1999 budget also reflects a $2,000 Congressional add for Helicopter Aircrew Integrated Life Support System (HAILSS), which has been revised by $64K for Congressional undistributed adjustments executed under project W2605. The FY 2000 budget reflects a $3,000 Congressional add for Escape System Dynamic Flow, which has been revised by $16K for Congressional undistributed adjustments executed under project W2604. The FY 2000 budget reflects a $2,000 Congressional add for Helicopter Aircrew Integrated Life Support System (HAILSS), which has been revised by $11K for Congressional undistributed adjustments executed under project W2605. The FY 2000 budget reflects a $1,000 Congressional add for Lightweight Environmentally Sealed Parachute Assembly (LESPA), which has been revised by $6K for Congressional undistributed adjustments executed under project W2727. The FY 2000 budget also reflects a $1,000 Congressional add for Pilot Vehicle Interface Upgrade, which has been revised by 6K for Congressional undistributed adjustments executed under project W2728.

EXHIBIT R-2, FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Aviation Survivability addresses the issues of aircrew and platform survivability, focusing on enhancing overall opportunity for aircrew and platform protection and enhanced performance. The capabilities addressed under this program element counter emerging threats of next generation operational weapons systems and enhance combat effectiveness in future operational mission scenarios.

(U) Aircrew Protective Clothing and Devices develops, demonstrates, and validates technology options that enhance aircrew capability to perform assigned missions. In addition, this project ensures aircrew protection against natural and induced environmental or physiological hazards encountered during routine, combat and emergency flight operations as well as during escape, survival and rescue, following loss of aircraft.

(U) The three remaining projects focus on platform survivability, addressing the reductions in aircraft susceptibility to enemy and non-combat threats, as well as aircraft vulnerabilities to conventional, nuclear, chemical, biological, radiological and directed energy weapons. The Aircraft Survivability, Vulnerability and Safety project expands the survivability technology base and develops prototype hardware which is required to improve the survivability of Naval aircraft. Aircraft and Ordnance Safety transitions generic insensitive munitions technology to Navy and Marine Corps air weapons, ensuring that they are insensitive to fast cook-off, slow cook-off, bullet and fragment impact and sympathetic detonation. Carrier Aircraft Fire Suppression Systems develop improved firefighting systems and fire protective measures for aircraft carriers.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION and VALIDATION because it develops and integrates hardware for experimental tests related to specific ship or aircraft applications.

EXHIBIT R-2a, FY 2001 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N PROGRAM ELEMENT TITLE: Aviation Survivability PROJECT NUMBER: W0584 PROJECT TITLE: Aircrew Protective Clothing & Devices

(U) COST: (Dollars in Thousands)

Project Number & Title	FY 1999 Actual	FY 2000 Budget	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
W0584 Aircrew Protective Clothing & Devices	6,811*	9,641*	2,872	2,932	2,988	3,048	3,156	CONT.	CONT.
TOTAL	6,811	9,641	2,872	2,932	2,988	3,048	3,156	CONT.	CONT.

Quantity of RDT&E Articles: Not Applicable

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Project W0584 develops, demonstrates, and validates technology options for integrated aircrew emergency and life support systems designed to enhance mission effectiveness, in-flight protection and survivability. The project covers fixed and rotary wing life support equipment, advanced helmet vision systems, escape systems technology, crew centered cockpit design, and cockpit integration programs. It responds to a number of operational requirements documents, including OR# 210-05-88 for Chemical and Biological (CB) Protection, OR# 099-05-087 for Laser Eye Protection, and the joint Air Force/Navy (CAF 208-93) for an Aerospace Control Helmet Mounted Cueing System. In 1996, the various sub-projects were restructured into a combined Advanced Technology Crew Station (ATCS) and Advanced Integrated Life Support System (AILSS) program. This project is validated by two Non-Acquisition Program Development Documents (NAPPDs) -- one for an Advanced Technology Crew Station (ATCS), and the other for AILSS.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. FY 1999 ACCOMPLISHMENTS:

- (U) ($1,972) Continued the development of Advance Technology Escape System (ATES) using controllable propulsion (Fourth Generation Escape System).
- (U) ($481) Began the development of Smart Advanced Integrated Life Support System (SAILSS) (referred to as Smart Adaptive Mission Support System (SAMSS) in the FY 99 PRESBUDG).

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N PROGRAM ELEMENT TITLE: Aviation Survivability PROJECT NUMBER: W0584 PROJECT TITLE: Aircrew Protective Clothing & Devices

FY 1999 ACCOMPLISHMENTS: (Continued)

- (U) ($832) Continued the development of frequency agile laser eye protection, including non-linear materials development and demonstration. Frequency agile laser eye protection has application to both AILSS and to CRUSADER day/night helmet development, covered under the AILSS and ATCS NAPDD's, respectively.
- (U) ($621) As a part of the Advanced Helmet Vision System (AHVS) all weather day/night display helmet, initiated upgrade from CRUSADER day only helmet mounted display system to day/night all weather helmet mounted display system.
- (U) ($969) Begin the development of the laminar flow ejection tower test facility.
- (U) ($1,936) Continued the development of Helicopter Aircrew Integrated Life Support System (HAILSS) with emphasis on cooling and laser eye protection.

3. FY 2000 PLAN:

- (U) ($982) Continue ATES using controllable propulsion (Fourth Generation Escape System). Begin component integration.
- (U) ($300) AHVS - complete head/neck weight moments of inertia studies.
- (U) ($300) Continue enhanced resolution development for Crusader day/night all weather helmet mounted display system.
- (U) ($500) Continue SAILSS.
- (U) ($500) Continue development of non-linear materials for frequency agile laser eye protection.
- (U) ($98) Extend Visualization Architecture Technology (VAT) to single user virtual image display.
- (U) ($2,984) Continue the development of the laminar flow ejection tower test facility.
- (U) ($1,989) Continue HAILSS with emphasis on miniaturization of sensors and electronics.
- (U) ($994) Begin the development of the lightweight environmentally sealed parachute.
- (U) ($994) Begin the development of the pilot vehicle interface upgrade.

EXHIBIT R-2a, FY 2001 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 4 | **PROGRAM ELEMENT: 0603216N** | **PROGRAM ELEMENT TITLE: Aviation Survivability** | **PROJECT NUMBER: W0584** | **PROJECT TITLE: Aircrew Protective Clothing & Device**

4. FY 2001 PLAN:

- (U) ($860) Continue ATES using controllable propulsion (Fourth Generation Escape System). Continue component integration.
- (U) ($935) Complete enhanced resolution Crusader day/night all weather helmet mounted display system.
- (U) ($477) Continue SAILSS.
- (U) ($500) Complete technology demonstration for non-linear materials phase of frequency agile laser eye protection development.
- (U) ($100) Continue VAT, validate single user displays.

(U) B. PROGRAM CHANGE SUMMARY

	FY 1999	FY 2000	FY2001
(U) FY 2000 President's Budget:	7,033	2,695	2,914
(U) Appropriated Value:	7,077	9,695	
(U) Adjustments from President's Budget:	-222	+6,946	-42
(U) FY 2001 President's Budget Submit:	6,811	9,641	2,872

EXHIBIT R-2a, FY 2001 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 4 | **PROGRAM ELEMENT: 0603216N** | **PROGRAM ELEMENT TITLE: Aviation Survivability** | **PROJECT NUMBER: W0584** | **PROJECT TITLE: Aircrew Protective Clothing & Devices**

CHANGE SUMMARY EXPLANATION:

(U) Funding: The FY 1999 net decrease of $222 thousand reflects a decrease of $131 thousand for Small Business Innovative Research (SBIR) assessments, a decrease of $32 thousand for inflation savings, and a decrease of $59 thousand for reprioritization of requirements within the Navy. The FY 2000 net increase of $6,946 thousand reflects an Congressional increase of $3,000 thousand for Escape System Dynamic Flow Test Facility, an increase of $2,000 for Helicopter Aircrew Integrated Life Support System (HAILSS), an increase of $1,000 thousand for Lightweight Environmentally Sealed Parachute Assembly (LESPA), and an increase of $1,000 for Pilot Vehicle Interface Upgrades offset by a decrease of $54 thousand for an Across-the-Board Congressional recision. The FY 2001 net decrease of $42 thousand reflects a decrease of $11 thousand for minor economic adjustments, a decrease of $26 thousand for Strategic Sourcing Plan savings, a decrease of $20 thousand for revised economic assumptions, a decrease of $7 thousand for reprioritization of requirements within the Navy offset by an increase of $16 thousand for Navy Working Capital Fund (NWCF) adjustments and an increase of $6 thousand for Military and Civilian Pay.

(U) Schedule: Not Applicable

(U) Technical: Not Applicable

(U) C. OTHER PROGRAM FUNDING SUMMARY

Appn	FY 1999 Actual	FY 2000 Budget	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete

Related RDT&E

(U) PE 0602201F (Aerospace Flight Dynamics)
(U) PE 0602233N (Mission Support Equipment)
(U) PE 0604264N (Aircrew Systems Development)
(U) PE 0604706F (Life Support Systems)
(U) PE 0603231F (Crew Systems and Personal Protection Technology)

DATE: February 2000

BUDGET ACTIVITY: 4 **PROGRAM ELEMENT: 0603216N** **PROGRAM ELEMENT TITLE: Aviation Survivability**

PROJECT NUMBER: W0584 **PROJECT TITLE: Aircrew Protective Clothing & Devices**

(U) D. ACQUISITION STRATEGY: Not Applicable

(U) E. SCHEDULE PROFILE

	FY 1999	FY 2000	FY 2001	To Complete
(U) Program Milestones				
4th Gen Escape (ATES) & controllable propulsion	Continued	Begin Component Integration	Continue Component Integration	Complete 1Q 02
Crusader Day/Night All Weather Display System	Continued	Continue	Complete 4Q 01	
VAT (Networking)			Complete	
VAT (Single User)		Initiate 1Q 00	Continue	Continue
Frequency Agile Laser Eye Protection (non-linear materials)	Continued	Continue	Complete Tech Demo 4Q 01	
SAILSS	Initiated	Continue 1Q 00	Continue	Continue
(U) Engineering Milestones				
(U) T&E Milestones				
Crusader **day/night** system DT-1	Initiated 4Q 99	Complete		

(U) Contract Milestones: Not applicable.

EXHIBIT R-3, FY 2001 RDT&E,N COST ANALYSIS DATE: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N PROJECT NUMBER: W0584
PROJECT TITLE: Aircrew Protective Clothing & Devices

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total Prior Yrs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Miscellaneous	WX	NAWCAD PAX	13,134	2,324	Various	1,192	Various	1,386	Various	CONT.	CONT.	
Miscellaneous	Various	Various	10,765	0	Various	0		0				
McDonnell Douglas			1,325									
Boeing			1,660									
Subtotal Product Development			**26,884**	**2,324**		**1,192**		**1,386**		**CONT.**	**CONT.**	
Remarks												
Miscellaneous	WX	Various	322	430	Various	305	Various	499	Various	CONT.	CONT.	
Subtotal Support			**322**	**430**		**305**		**499**		**CONT.**	**CONT.**	
Remarks												

EXHIBIT R-3, FY 2001 RDT&E,N COST ANALYSIS DATE: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N PROJECT NUMBER: W0584
PROJECT TITLE: Aircrew Protective Clothing & Devices

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total Prior Yrs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Miscellaneous developmental test & evaluation	Various	Various	1869	4,047	Various	8,134	Various	977	Various	CONT.	CONT.	
Subtotal Test & Evaluation			**1869**	**4,047**		**8,134**		**977**		**CONT.**	**CONT.**	
Remarks												
Travel		Various	65	10	N/A	10	N/A	10	N/A	N/A.	N/A	
Subtotal Management			**65**	**10**		**10**		**10**		**0**	**0**	
Remarks												
Total Cost			**29,140**	**6,811**		**9,641**		**2,872**		**CONT.**	**CONT.**	

EXHIBIT R-2a, FY 2001 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 4 | PROGRAM ELEMENT: 0603216N | PROGRAM ELEMENT TITLE: Aviation Survivability | PROJECT NUMBER: W0591 | PROJECT TITLE: Aircraft Survivability Vulnerability & Safety

(U) COST: (Dollars in Thousands)

Project Number & Title	FY 1999 Actual	FY 2000 Budget	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
W0591 Aircraft Survivability Vulnerability & Safety									
	1,285	1,868	1,904	1,912	1,944	1,978	2,031	CONT.	CONT.
TOTAL	1285	1,868	1,904	1,912	1,944	1,978	2,031	CONT.	CONT.

Quantity of RDT&E Articles: Not Applicable

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Aircraft Survivability, Vulnerability and Safety. This project develops prototype hardware to improve the survivability of Navy and Marine Corps aircraft. This project addresses the likelihood of an aircraft being hit (susceptibility) and the probability of a kill if the aircraft is hit (vulnerability). Types of programs funded under this project include signature reduction efforts, subsystem and component hardening and development of fire and explosion suppression techniques for fuel systems. Beginning in fiscal year 1996 Chemical and Biological efforts were consolidated under OSD program element 0603384D (Chemical and Biological Defense (Advanced Development)).

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. FY 1999 ACCOMPLISHMENTS:

- (U) ($1,122) Continued the development of a rotary wing Infrared (IR) survivability signature suppression program (completed prototype ground test).
- (U) ($10) Completed the development of RDT&E master plan (will be updated bi-annually).
- (U) ($30) Continued data population of Aircraft Survivability Database.
- (U) ($123) Continued current Survivability Analysis Methodology development to include a Survivability Analysis Methodology Roadmap for USN/USMC.

DATE: February 2000

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability

PROJECT NUMBER: W0591
PROJECT TITLE: Aircraft Survivability Vulnerability & Safety

2. FY 2000 PLAN:

- (U) ($1,548) Continue the development of a rotary wing IR survivability signature suppression program (initiate flight test).
- (U) ($100) Initiate uninhabited aerial vehicle (UAV) survivability program; focus on trade study/cost analysis.
- (U) ($20) Annual update of Aircraft Survivability Database.
- (U) ($200) Continue development of Survivability Analysis Methodology (based on FY99 roadmap).

3. FY 2001 PLAN:

- (U) ($1,424) Complete the development of a rotary wing IR survivability signature suppression program.
- (U) ($20) Biannual update of RDT&E master plan.
- (U) ($20) Annual update of Aircraft Survivability Database.
- (U) ($200) Continue development of Survivability Analysis Methodology (based on FY99 roadmap).
- (U) ($240) Continue UAV survivability trade study (define hardware technology candidate).

(U) B. PROGRAM CHANGE SUMMARY

	FY 1999	FY 2000	FY 2001
(U) FY 2000 President's Budget:	1,505	1,878	1,932
(U) Appropriated Value:	1,509	1,878	
(U) Adjustments from President's Budget	-220	-10	-28
(U) FY 2001 President's Budget Submit:	1,285	1,868	1,904

DATE: February 2000

BUDGET ACTIVITY: 4 **PROGRAM ELEMENT: 0603216N** **PROJECT NUMBER: W0591**
PROGRAM ELEMENT TITLE: Aviation Survivability **PROJECT TITLE: Aircraft Survivability Vulnerability & Safety**

CHANGE SUMMARY EXPLANATION:

(U)Funding: The FY 1999 net decrease of $220 thousand reflects a decrease of $31 thousand for Small Business Innovative Research (SBIR) assessments, a decrease of $182 thousand for reprioritization of requirements within the Navy, and a decrease of $7 thousand for inflation savings. The FY 2000 decrease reflects a $10 thousand decrease for an Across-the Board Congressional rescission. The FY 2001 net decrease of $28 thousand reflects a decrease of $11 thousand for Strategic Sourcing Plan savings, a decrease of $20 thousand for revised economic assumptions, and a decrease of $5 thousand for reprioritization of requirements within the Navy offset by an increase of $6 thousand for Navy Working Capital Fund (NWCF) adjustments and an increase of $2 thousand for Military and Civilian pay.

(U) Schedule: Not applicable

(U) Technical: Not applicable

(U) C. OTHER PROGRAM FUNDING SUMMARY: Not applicable

Related RDT&E
(U) PE 0605132D (Joint Technical Coordinating Group on Aircraft Survivability)
(U) PE 0603384D (Chemical/Biological Defense (Advanced Development)

(U) D. ACQUISITION STRATEGY: Not Applicable.

(U) E. SCHEDULE PROFILE:

	FY 1999	FY 2000	FY2001	To Complete
(U) Program Milestones				
UAV survivability trade study		Initiate 1Q 00	Complete 3Q 01	
(U) Engineering Milestones: Not Applicable				
(U) T&E Milestones				
IR Suppressor ground test	Completed 4Q 99			
IR Suppressor flight test		Initiate 4Q 00	Complete 2Q 01	
(U) Contract Milestones: Not applicable				

DATE;

EXHIBIT R-3, FY 2001 RDT&E,N COST ANALYSIS — February 2000

BUDGET ACTIVITY: 4 — PROGRAM ELEMENT: 0603216N — PROJECT NUMBER: W0591 — PROJECT TITLE: AIRCRAFT SURV VUL & SAFETY

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total Prior Yrs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Miscellaneous	WX	Various	5115	277	Various	334	Various	528	Various	CONT.	CONT.	
Primary hardware development	SS/CPFF	SIKORSKY Connecticut	635	877	Oct 98	1000	Oct 99	659	Oct 00	3226	3226	3226
Primary hardware development	SS/CPFF	Bell Helicopter Ft. Worth, TX	1307									
Subtotal Project Development			**7057**	**1154**		**1334**		**1187**		**CONT.**	**CONT.**	
Remarks												
Miscellaneous	WX					150	Various	127	Various	CONT.	CONT.	
Subtotal Support			**0**	**0**		**150**		**127**		**CONT.**	**CONT.**	
Remarks												

EXHIBIT R-3, FY 2001 RDT&E,N COST ANALYSIS DATE: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N PROJECT NUMBER: W0591
PROJECT TITLE: AIRCRAFT SURV VUL & SAFETY

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total Prior Yrs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Miscellaneous	Various	Various	770	121	N/A	374	Various	580	Various	CONT.	CONT.	
Subtotal Test & Evaluation			**770**	**121**		**374**		**580**		**CONT.**	**CONT.**	
Remarks												
Travel			165	10	N/A	10	N/A	10	N/A	CONT.	CONT.	
Subtotal Management			**165**	**10**		**10**		**10**		**CONT.**	**CONT.**	
Remarks												
Total Cost			**7992**	**1285**		**1868**		**1904**		**CONT.**	**CONT.**	

EXHIBIT R-2a, FY 2001 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 4 | PROGRAM ELEMENT: 0603216N | PROGRAM ELEMENT TITLE: Aviation Survivability | PROJECT NUMBER: W0592 | PROJECT TITLE: A/C & Ordnance Safety

(U) COST: (Dollars in Thousands)

Project Number & Title	FY 1999 Actual	FY 2000 Budget	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
W0592 A/C & Ordnance Safety	1,674	1,715	1,768	1,784	1,828	1,860	1,935	CONT.	CONT.
TOTAL	1,674	1,715	1,768	1,784	1,828	1,860	1,935	CONT.	CONT.

Quantity of RDT&E Articles: Not Applicable

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project transitions Insensitive Munitions (IM) technology from IM Advanced Development (generic technology) to Air Weapon Systems to comply with Chief of Naval Operations direction that all munitions carried aboard Navy ships be insensitive to fast cook-off (FCO), slow cook-off (SCO), bullet and fragment impact (BI and FI), and sympathetic detonation (SD).

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:

- (U) ($241) Loaded composite cases and conducted IM and static fire testing of 2.75-inch rocket motor.
- (U) ($469) Addressed sympathetic detonation/containment design for tandem warheads and evaluating concept.
- (U) ($964) Completed the High Performance Air to Missile (HPAAM) Hydroxyl Terminated Polyether (HTPE) full scale IM tests and static firings. Continued composite case captive carry demonstration.

EXHIBIT R-2a, FY 2001 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 4 **PROGRAM ELEMENT: 0603216N** **PROGRAM ELEMENT TITLE: Aviation Survivability** **PROJECT NUMBER: W0592** **PROJECT TITLE: A/C & Ordnance Safety**

2. (U) FY 2000 PLAN:

- (U) ($338) Demonstrate manufacturability of 2.75-inch rocket motor. Evaluate reactive material warheads for IM compliance.
- (U) ($424) Continue evaluation of IM technology to pumice as a sympathetic detonation barrier and validate tandem warhead containment models.
- (U) ($953) Fabricate Sidewinder composite rocket motor cases. Perform ground and flight testing of Sidewinder composite rocket motor.

3. (U) FY 2001 PLAN:

- (U) ($855) Continue evaluating reactive material warheads for IM compliance.
- (U) ($413) Demonstrate pumice as a sympathetic detonation barrier for weapon shipping containers.
- (U) ($500) Complete flight testing and document flight certification process for Sidewinder composite case.

(U) B. PROGRAM CHANGE SUMMARY

	FY 1999	FY 2000	FY 2001
(U) FY 2000 President's Budget:	1,723	1,725	1,799
(U) Appropriated Value:	1,732	1,725	
(U) Adjustments from President's Budget:	-49	-10	-31
(U) FY 2001 President's Budget Submit:	1,674	1,715	1,768

EXHIBIT R-2a, FY 2001 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603216N
PROGRAM ELEMENT TITLE: Aviation Survivability

PROJECT NUMBER: W0592
PROJECT TITLE: A/C & Ordnance Safety

CHANGE SUMMARY EXPLANATION:

(U) Funding: The FY 1999 net decrease of $49 thousand reflects a decrease of $8 thousand for inflation savings and a decrease of $41 thousand for reprioritization of requirements within the Navy. The FY 2000 decrease reflects a $10 thousand decrease for an Across-the Board Congressional rescission. The FY 2001 net decrease of $31 thousand reflects a decrease of $26 thousand for Strategic Sourcing Plan savings, a decrease of $19 thousand for revised economic assumptions, and a decrease of $5 thousand for reprioritization of requirements within the Navy offset by an increase of $14 thousand for Navy Working Capital Fund (NWCF) adjustments and an increase of $5 thousand for Military and Civilian pay.

(U) Schedule: Not applicable

(U) Technical: Not applicable

(U) C. OTHER PROGRAM FUNDING SUMMARY: Not applicable

Related RDT&E: PE 0604802A
PE 0603609N

(U) D. ACQUISITION STRATEGY: This is a non-ACAT program with no specific acquisition strategies.

(U) E. SCHEDULE PROFILE: Not applicable

EXHIBIT R-3, FY 2001 RDT&E,N COST ANALYSIS

DATE: February 2000

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603216N

PROJECT NUMBER: W0592

PROJECT TITLE: A/C & Ordnance Safety

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total PriorYrs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Systems Engineering	WX	NAWC WD China Lake	9,293	1,654	10/98	1,685	10/99	1,738	10/00	CONT	CONT	
Subtotal Product Development			**9,293**	**1,654**		**1,685**		**1,738**		**CONT**	**CONT**	
Remarks:												
Subtotal Support			**0**	**0**		**0**		**0**		**0**	**0**	
Remarks:												
Subtotal Test & Evaluation			**0**	**0**		**0**		**0**		**0**	**0**	
Remarks:												
Miscellaneous	WX	NAWC AD PAX	10	20	10/98	30	10/99	30	10/00	CONT	CONT	
Subtotal Management			**10**	**20**		**30**		**30**		**CONT**	**CONT**	
Remarks:												
Total Cost			**9,303**	**1,674**		**1,715**		**1,768**		**CONT**	**CONT**	

EXHIBIT R-2a, FY 2001 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 4 | PROGRAM ELEMENT: 0603216N | PROGRAM ELEMENT TITLE: Aviation Survivability | PROJECT NUMBER: W1819 | PROJECT TITLE: CV A/C Fire Suppression System

(U) COST: (Dollars in Thousands)

Project Number & Title	FY 1999 Actual	FY 2000 Budget	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
W1819 Carrier Vehicle Aircraft Fire Suppression System	814	977	992	1,037	1,064	1,090	1,132	CONT.	CONT.
TOTAL	814	977	992	1,037	1,064	1,090	1,132	CONT.	CONT.

Quantity of RDT&E Articles: Not Applicable

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project develops improvedfirefighting systems and fire protective measures for aircraft related fires on aircraft carriers, including assessment of fire properties, definition of fire threats, improvements to firefighting agents and delivery systems, fire detection and suppression system performance evaluations, and firefighter training improvements.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. FY 1999 ACCOMPLISHMENTS:

- (U) ($83) Completed evaluation of ordnance cooling requirements; remained current on ordnance inventory, conducted full scale fire testing of dummy ordnance (assessed defined threat to individual components, evaluated impact of various fire fighting techniques and equipment).
- (U) ($386) Upgraded capabilities of environmentally safe fire test facility; maintained compliant permit status, designed and constructed test article provisions for conducting wheel/brake, electrical, 2D/3D, spill, and mass conflagration evaluations.
- (U) ($100) Continued fire testing of agents, equipment, aircraft and ordnance materials; finalized engine fire testing, commence wheel/brake and electrical full scale testing (assessed collateral damage, conducted comparative systems testing, developed test standards, optimized operational methodologies).
- (U) ($245) Completed development of flight deck imaging system; developed system designs for comparative testing, secure test articles, develop pass/fail criteria.

BUDGET ACTIVITY: 4 | PROGRAM ELEMENT: 0603216N | PROGRAM ELEMENT TITLE: Aviation Survivability | PROJECT NUMBER: W1819 | PROJECT TITLE: CV A/C Fire Suppression System

2. FY 2000 PLAN:

- (U) ($542) Conduct testing of fire test standards for wheel/brake, electrical, and spill fires. Identify critical test parameters and provide adequate instrumentation for testing. Manufacture details for fire threat simulators with adequate test repeatability provisions. Conduct full scale, fleet representative fire testing to evaluate relative performance of available and developmental extinguishing systems.

- (U) ($155) Enhance the Mobile Aircraft Fire Fighting Training Device by evaluating options to propane fuel. Conduct live fire training demonstrations. Incorporate system upgrades based on fleet responses. Establish zoning criteria to maximize fleet personnel training opportunities.

- (U) ($280) Continue carrier reduced manning studies. Evaluate potential negative safety impact of reduced manning of Navy ships relative to current level of onboard fire fighting provisions. Ensure adequate fire fighting provisions are maintained through evaluation of systems hardware enhancements, development of novel fire fighting approaches, and optimized personnel emergency procedures. Assess opportunities for overall improvement in shipboard handling of fire emergencies.

3. FY 2001 PLAN:

- (U) ($459) Complete testing and finalize fire test standards for wheel/brake, electrical, and spill fires. Complete identification of critical test parameters and provision of adequate instrumentation for testing. Compile pros and cons of each system for review.

- (U) ($225) Continue carrier reduced manning studies. Evaluate potential negative safety impact of reduced manning of Navy ships relative to current level of onboard fire fighting provisions. Ensure adequate fire fighting provisions are maintained through evaluation of systems hardware enhancements, development of novel fire fighting approaches, and optimized personnel emergency procedures. Assess opportunities for overall improvement in shipboard handling of fire emergencies.

- (U) ($134) Initiate studies of fire threat from alternate fuel. Evaluate the different characteristics of JP-8 versus JP-5 fires. Identify deficiencies and promote opportunities for improvement.

- (U) ($174) Evaluate next generation fire threats aboard carriers. Assess enhanced fire threats associated with more reliance on high powered electrical and electromagnetic components aboard ship. Evaluate remote fire detection and fire suppression methodologies and test prototypical hardware for performance.

EXHIBIT R-2a, FY 2001 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 4 **PROGRAM ELEMENT: 0603216N** **PROJECT NUMBER: W1819**
PROGRAM ELEMENT TITLE: Aviation Survivability **PROJECT TITLE: CV A/C Fire Suppression System**

(U) B. PROGRAM CHANGE SUMMARY

	FY 1999	FY 2000	FY 2001
(U) FY 2000 President's Budget:	842	982	1,022
(U) Appropriated Value:	846	982	
(U) Adjustments from President's Budget:	-28	-5	-30
(U) FY 2001 President's Budget Submit:	814	977	992

CHANGE SUMMARY EXPLANATION:

(U) Funding: The FY1999 net decrease of $28 thousand reflects a decrease of $7 thousand for Small Business Innovation Research (SBIR) assessments, a decrease of $4 thousand for inflation savings, and a decrease of $17 thousand for reprioritization of requirements within the Navy. The FY2000 decrease reflects a $5 thousand for an Across -the Board Congressional rescission. The FY 2001 net decrease of $30 thousand reflects a decrease of $9 thousand for Strategic Sourcing Plan savings, a decrease of $20 thousand for Navy Working Capital Fund (NWCF) adjustments, a decrease of $11 thousand for revised economic assumptions, and a decrease of $3 thousand for reprioritization of requirements within the Navy offset by an increase of $10 thousand for Navy Working Capital Fund (NWCF) adjustments and an increase of $3 thousand for Military and Civilian Pay.

(U) Schedule: Not applicable

(U) Technical: Not applicable

(U) C. OTHER PROGRAM FUNDING SUMMARY: Not Applicable.

Related RDT&E: Not applicable

(U) D. ACQUISITION STRATEGY: Not Applicable.

(U) E. SCHEDULE PROFILE: Not Applicable.

EXHIBIT R-3, FY 2001 RDT&E,N COST ANALYSIS DATE: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603216N PROJECT NUMBER: W1819

PROJECT TITLE: CV A/C Fire Suppression

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total Prior Yrs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost to Complete	Total Cost	Targe Value o Contra
Miscellaneous	WX	MISC	4618	631	Various	165	Various	184	Various	CONT.	CONT.	
Subtotal Product Development			**4618**	**631**		**165**		**184**		**CONT.**	CONT.	
Remarks:												
Miscellaneous	WX	MISC	1104	0		280	Various	376	Various	CONT.	CONT.	
Subtotal Support			**1104**	**0**		**280**		**376**		**CONT.**	**CONT.**	
Remarks:												
Miscellaneous	WX	MISC	2238	173	Various	522	Various	422	Various	CONT.	CONT.	
Subtotal Test & Evaluation			**2238**	**173**		**522**		**422**		**CONT.**	**CONT.**	
Remarks:												
Travel	WX	NAWCAD PAX	25	10	Various	10	Various	10	Various	CONT.	CONT.	
Subtotal Management			**25**	**10**		**10**		**10**		**CONT.**	**CONT.**	
Remarks												
Total Cost			**7,985**	**814**		**977**		**992**		**CONT.**	**CONT.**	

EXHIBIT R-2, FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET

DATE: February 2000

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance

(U) COST: (Dollars in Thousands)

Project Number & Title	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
A2467 UAV CONOPS Research	0	1,964	1,956	1,950	1,945	1,943	1,946	CONT.	CONT.
E0534 Tactical Reconnaissance System	1,444	0	0	0	0	0	0	0	220,426
TOTAL	1,444	1,964	1,956	1,950	1,945	1,943	1,946	CONT.	CONT.

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program provides for the development of studies, analyses and demonstrations for Unmanned Aerial Vehicle (UAV) concept of operation (CONOP) development. Additionally, in Fiscal years 1998 and 1999 this program allowed development of systems to provide timely and accurate imagery intelligence for the U.S. Marine Corps. Specifically:

- UAV CONOPS Research: The efforts supported under this program provide studies of concept of operations (CONOPS) for UAV integration into USN Battlespace Dominance Operations. Specifically, the CONOPS research will evaluate the roles UAV' s play innetwork centric warfare, sensor-to-shooter, and time critical strike. Areas of interest include the joint utility of Global Hawk (LVL I-IV) and Predator (LVL IV) integration into CVBG operations.

- F/A–18D Tactical Reconnaissance System: The F/A-18D Tactical Reconnaissance System will replace the RF-4B which was phased out in 1990. Electro-Optical, Infrared and Synthetic Aperture Radar (SAR) sensors will provide high resolution imagery in all weather conditions, day or night at low, medium or high altitude over flight or stand off ranges. Imagery data is digitally recorded and can be data linked in near real-time and/or returned to base for playback, analysis, processing, and storage.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ship or aircraft applications.

DATE: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603261N
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance
PROJECT NUMBER: A2467
PROJECT TITLE: UAV CONOPS Research

U) COST: (Dollars in Thousands)

Project Number & Title	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
A2467 UAV CONOPS Research	0	1,964	1,956	1,950	1,945	1,943	1,946	CONT.	CONT.
TOTAL	0	1,964	1,956	1,950	1,945	1,943	1,946	CONT.	CONT.

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program provides funding for concept of operation (CONOP) development, research and studies in the integration of tactical unmanned aerial vehicles into Naval Strike Warfare. Thisprogram is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware and technologies for experimental test related to specific ship or aircraft applications.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

Previous Accomplishments:

1. FY 2000 Plan:

- (U) ($1,387) Initiate studies and demonstrations for CONOPS development into Naval Strike Warfare.
- (U) ($ 577) Funds miscellaneous efforts including technical and management support.

2. FY 2001 Plan:

- (U) ($1,956) Continue studies and demonstrations for CONOPS development into Naval Strike Warfare.

DATE: February 2000

BUDGET ACTIVITY: 4 **PROGRAM ELEMENT: 0603261N** **PROJECT NUMBER: A2467**
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance **PROJECT TITLE: UAV CONOPS Research**

(U) B. PROGRAM CHANGE SUMMARY

	FY 1999	FY 2000	FY 2001
(U) FY 2000 President' s Budget:	0	1,975	1,981
(U) Appropriated Value:	0	1,975	
(U) Adjustments from Pres Budget:	0	-11	-25
(U) FY 2001 President ' s Budget Submit:	0	1,964	1,956

CHANGE SUMMARY EXPLANATION:

(U) Funding: The FY 2000 decrease reflects a $11 thousand Across the Board Congressional Recision. The FY 2001 net decrease of $25 thousand reflects a decrease of $13 thousand for revised economic assumptions, and a decrease of $12 thousand for reprioritization of requirements within the Navy.

(U) Schedule: N/A

(U) Technical: N/A

(U) C. OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) D. ACQUISITION STRATEGY: N/A.

(U) E. SCHEDULE PROFILE: N/A.

EXHIBIT R-3, FY 2001 RDT&E,N COST ANALYSIS

DATE: February 2000

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603261N

PROGRAM ELEMENT TITLE: TACTICAL AIRBORNE RECONNAISSANCE

PROJECT NUMBER: A2467

PROJECT TITLE: UAV CONOPS RESEARCH

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total Prior Yrs Cost	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Project Development Organizations												
NSAWC	WR	NSAWC Fallon,NV		0		1,387	12/99	1,956	12/00	CONT.	CONT.	
Subtotal Project Development				**0**		**1,387**		**1,956**		**CONT.**	**CONT.**	
Remarks:												
Support Organizations												
NAWCAD	WX	NAWCAD Pax River				148	12/99					
Subtotal Support				**0**		**148**						
Remarks:												
Test & Evaluation Organizations												
Subtotal Test & Evaluation												
Remarks:												
Management Organizations												
FEDSIM	IP	FEDSIM, Va				207	2/00					
NAS, Cherry Point	WX	Cherry Pt.,NC				89	2/00					
MISC.						133	4/00					
Subtotal Management				**0**		**429**						
Remarks:												
Total Cost				**0**		**1,964**		**1,956**		**CONT.**	**CONT.**	

DATE: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603261N PROJECT NUMBER: E0534
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance PROJECT TITLE: Tactical Reconnaissance System

(U) COST: (Dollars in Thousands)

Project Number & Title	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete	Total Program
E0534 Tactical Reconnaissance System	1,444	0	0	0	0	0	0	0	220,426

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Tactical Airborne Reconnaissance Program develops systems to provide timely and accurate imagery intelligence for the U.S. Marine Corps. The F/A-18D Tactical Reconnaissance System will replace the RF-4B that was phased out in 1990. Electro-Optical, Infrared and Synthetic Aperture Radar (SAR) sensors will provide high resolution imagery in all weather conditions, day or night at low, medium or high altitude over flight or stand off ranges. Imagery data is digitally recorded and can be data linked in near real-time and/or returned to base for playback, analysis, processing, and storage.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. FY 1999 ACCOMPLISHMENTS:
   - (U) (1,444) Completed Design and Development (D&D) Phase and conducted OPEVAL
2. FY 2000 PLAN: Not Applicable
3. FY 2001 PLAN: Not Applicable

DATE: February 2000

BUDGET ACTIVITY: 4 **PROGRAM ELEMENT: 0603261N**
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance System

PROJECT NUMBER: E0534
PROJECT TITLE: Tactical Reconnaissance

(U) B. PROGRAM CHANGE SUMMARY

	FY 1999	FY 2000	FY 2001
(U) FY 2000 President' s Budget:	1,474	0	0
(U) Appropriated Value:	1,479	0	0
(U) Adjustments from President' s Budget:	-30	0	0
(U) FY 2001 President' s Budget Submit:	1,444	0	0

CHANGE SUMMARY EXPLANATION:

(U) Funding: The FY 1999 net decrease of 30 thousand reflects a decrease of $7 thousand for revised economic assumptions, a decrease of $19 thousand for Small Business Innovation Research (SBIR) assessment, and a decrease of $4 thousand for paymen t of lapsed liability contracts.

(U) Schedule: Due to technical issues addressed below, the completion of software enhancements, OPEVAL, and the Full Rate Production decision have slipped.

(U) Technical: Software maturity and hardware reliability growth has not progressed at the expected rate to meet original milestones.

DATE: February 2000

BUDGET ACTIVITY: 4 **PROGRAM ELEMENT: 0603261N** **PROJECT NUMBER: E0534**
PROGRAM ELEMENT TITLE: Tactical Airborne Reconnaissance **PROJECT TITLE: Tactical Reconnaissance**

System

(U) C. OTHER PROGRAM FUNDING SUMMARY

Appn	FY 1999 Budget	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	To Complete
APN-5(OSIP 03-97 ATARS)	41,899	55,792	23,793	0	0	0	0	12,723

Related RDT&E: Not Applicable

(U) D. ACQUISITION STRATEGY: Currently on contract for LRIP-2, which is a sole source contract with Boeing.

(U) E. SCHEDULE PROFILE:

	FY 1999	FY 2000	FY 2001
(U) Program Milestones		2Q/00-FULL RATE PRODUCTION DECISION	
(U) Engineering Milestones	3Q/99-COMPLETE SOFTWARE ENHANCEMENTS		
(U) T&E Milestones	4Q/99 OPEVAL	1Q/00 DT III/ FOT&E	
(U) Contract Milestones		2Q/00-FRP CONTRACT AWARD	

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**	PROGRAM ELEMENT NAME AND NUMBER **ADV COMBAT SYS TECH/0603382N**				R-1 ITEM NOMENCLATURE Advanced Combat System Technology /0603382N					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**6.437**	**6.790**	**6.943**	**6.989**	**6.964**	**7.024**	**7.165**	**CONT.**	**CONT.**
Advanced Combat System Technology/K0324		**6.437**	**6.790**	**6.943**	**6.989**	**6.964**	**7.024**	**7.165**	**CONT.**	**CONT.**
Quantity of RDT&E Articles	**Not Applicable**									

A. (U) Mission Description and Budget Item Justification

This line item funds studies and experiments which will be conducted in distributed computer architecture, radar technology, and Tactical Informational Management Concepts to mature them to transition candidates for introduction into the AEGIS Weapon System. This program will take a disciplined systems engineering approach to find how these advances can be integrated into the AEGIS system and subsequent combat systems, and to plan combat system baseline upgrade schedules. Fully Distributed Computing Architecture is the first advanced development effort, leveraging the joint AEGIS/Defense Advanced Research Projects Agency (DARPA) High Performance Distributive Computing (Hiper-D) technology effort. It implements the results of distributed processing advances to replace the current AEGIS Combat System architecture with an open, distributed architecture. Radar studies are also being conducted to identify state-of-the-art technology options for the next generation radar. Complex Tactical Information Management of the flow and display of tactical information through the "detect-control-engage" process to better support the operator/decision maker will be a significant priority of this task. These advanced technologies are candidate systems for future baseline upgrades.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY99 ACCOMPLISHMENTS:
- (U) ($2.000) Conducted studies concerning the feasibility of applying Visualization Architecture and Technology (VAT) concepts to shipboard use.
- (U) ($1.008) Continued system engineering experiments with currently emerging Commercial Off-The-Shelf (COTS) and DARPA computer technologies to assess improvements in upgrades against previously identified shortfalls. Provided feedback on existing shortfalls for future enhancements. Conducted work within the commercial standards communities to address the shortfalls in computing capabilities for Navy applications.
- (U) ($1.317) Conducted an integrated demonstration in the computing testbed of selected AEGIS Weapon System capabilities focused on initial QoS (Quality of Service) functionality in the middleware domain. Demonstrated an initial integrated set of common engineering services for the information infrastructure, including the addition of another warfighting or other shipboard information/control system. Also demonstrated initial middleware capabilities within the Common C&D (Command & Decision) functional areas that support object-oriented computer program architectures.
- (U) ($1.000) Initiated risk reduction experiments focused on middleware issues associated with object-oriented computer program architectures with an initial target of Common C&D capability for AEGIS combat systems. Assessed maturity and transition potential of available or emerging technologies into AEGIS Baseline development efforts on Baseline 6 Phase III and 7 Phase I

EXHIBIT R-2, RDT&E Budget Item Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	R-1 ITEM NOMENCLATURE
RDT&E, N / BA 4	ADV COMBAT SYS TECH/0603382N	Advanced Combat System Technology /0603382N

- (U) ($1.112) Enhanced AEGIS Weapon System architecture and performance models using prototype modeling tools, multi-sensor coordination, and advanced tactical information management concepts. Developed and validated enhanced certification techniques that are applicable to the enhanced computing architecture prototyped in FY98.

(U) FY00 PLAN:
- (U) ($1.212) Continue system engineering experiments with currently emerging COTS/DARPA computer technologies to assess improvements in upgrades against previou identified shortfalls. Provide feedback on any existing shortfalls for future enhancements. Work within the commercial standards communities to address the shortfalls in computing capabilities for Navy applications.
- (U) ($3.380) Conduct an integrated demonstration in the computing testbed of selected AEGIS Weapon System capabilities focused on second phase QoS functionality in middleware domain. Assess and validate the available certification techniques applicable within the Common CDS functional areas that support object-oriented computer program architectures.
- (U) ($1.200) Initiate transition efforts of lessons learned in the FY99 middleware risk reduction experiments targeted at the Common CDS capability for AEGIS combat systems. Work with the Baseline development teams to identify remaining or emerging issues associated with transition to Baseline 6 Phase III and Baseline 7 Phase I for middleware capabilities.
- (U) ($0.998) Validate the performance modeling tools against the existing prototype capabilities in the computing testbed.
- (U) Note: $0.065 of the efforts described represent the portion of extramural program that is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

(U) FY01 PLAN:
- (U) ($1.295) Continue system engineering experiments with currently emerging COTS/DARPA computer technologies to assess improvements in upgrades against previou identified shortfalls. Provide feedback on any existing shortfalls for future enhancements. Work within the commercial standards communities to address the shortfalls in computing capabilities for Navy applications.
- (U) ($3.448) Conduct an integrated demonstration in the computing testbed of selected AEGIS Weapon System capabilities focused on second phase QoS functionality in middleware domain. Assess and validate the available certification techniques applicable within the Common CDS functional areas that support object-oriented computer program architectures.
- (U) ($1.200) Continue integration of lessons learned in the FY00 middleware risk reduction experiments targeted at the Common CDS capability for AEGIS combat systems. Work with the Baseline development teams to identify remaining or emerging issues associated with transition to Baseline 6 Phase III and Baseline 7 Phase I for middleware capabilities.
- (U) ($1.000) Continue validation of the performance modeling tools against the existing prototype capabilities in the computing testbed.

EXHIBIT R-2, RDT&E Budget Item Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	R-1 ITEM NOMENCLATURE
RDT&E, N / BA 4	**ADV COMBAT SYS TECH/0603382N**	Advanced Combat System Technology /0603382N

Program Change Summary:

	FY 1999	FY 2000	FY 2001
FY 2000 PRES Budget Submit	6.634	6.828	12.043
Appropriated Value:	6.653	6.828	
Adjustment to FY 1999/2000 Appropriated Value			
FY2000 President's Budget:	-0.216	-0.038	-5.100
FY 2001 PRES Budget Submit:	6.437	6.790	6.943

Funding: FY 1999 funding decrease is due to SBIR reduction ($-0.154), and minor pricing adjustments ($-0.062). FY2000 funding decrease is due to minor pricing adjustments ($-0.038). FY 2001 change is due to a decrease for shifted Navy priorities ($-1.500), level of effort correction ($-3.559), NWCF Rate increase ($+0.046), and minor pricing adjustments ($-0.087).

Schedule: Not applicable.

Technical: Not applicable.

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
RDT&E, N / 1319 / BA 4 PE0604307	175.562	256.120	179.684	194.015	130.676	107.796	82.409	CONT.	CONT.

C. Acquisition Strategy: Risk reduction efforts are lead by NSWC/DD, the AEGIS Combat System Lifetime Support Engineering Agent (LSEA). Results are transitioned to industry for cost and risk mitigation in the production of AEGIS Combat Systems.

D. Schedule Profile: Not Applicable

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 1)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**			PROGRAM ELEMENT NAME AND NUMBER **ADV COMBAT SYS TECH/0603382N**			PROJECT NAME AND NUMBER: Advanced Combat System Technology /K0324						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Systems Engineering	SS/CPFF	APL, Baltimore, MD	5.850	1.729	11/98	1.570	11/99	1.758	11/00	CONT.	CONT.	
Systems Engineering	WR	NSWC, Dahlgren,VA	8.210	1.695	12/98	4.002	12/99	3.874	12/00	CONT.	CONT.	
Systems Engineering	WR	NAWCAD, St. Inigoes, MD	0.000	2.000	03/99					CONT.	CONT.	
Subtotal Product Development			14.060	5.424		5.572		5.632		CONT.	CONT.	0.000
Remarks:												
Support	WR	Miscellaneous	0.150	0.255	11/98	0.255	11/99	0.275	11/00	CONT.	CONT.	
Subtotal Support			0.150	0.255		0.255		0.275		CONT.	CONT.	
Remarks:												
Test & Evaluation	WR	Miscellaneous	0.000	0.315	11/98	0.325	11/99	0.381	11/00	CONT.	CONT.	
Subtotal T&E			0.000	0.315		0.325		0.381		CONT.	CONT.	
Remarks:												
Program Management Support	WR	Miscellaneous	0.000	0.443	11/98	0.638	11/99	0.655	11/00	CONT.	CONT.	
Subtotal Management			0.000	0.443		0.638		0.655		CONT.	CONT.	
Remarks:												
Total Cost			14.210	6.437		6.790		6.943		CONT.	CONT.	

UNCLASSIFIED

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**					R-1 ITEM NOMENCLATURE Surface and Shallow Water Mine Countermeasure/0603502N					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**76.599**	**109.765**	**97.929**	**121.193**	**91.245**	**107.808**	**88.653**	**CONT.**	**CONT.**
Remote Minehunting System/Q0260/Q2387		**17.417**	**45.231**	**45.696**	**65.252**	**59.383**	**65.345**	**40.020**	**CONT.**	**CONT.**
Integrated Combat Weapons System/Q1233		**10.367**	**20.011**	**14.365**	**9.770**	**3.373**	**3.184**	**3.274**	**CONT.**	**CONT.**
Shallow Water Mine Countermeasure/Q2131		**28.112**	**15.298**	**11.730**	**22.171**	**11.270**	**28.010**	**34.413**	**CONT.**	**CONT.**
Unmanned Underwater Vehicle/V2094		**20.703**	**29.225**	**26.138**	**24.000**	**17.219**	**11.269**	**10.946**	**CONT.**	**CONT.**
Quantity of RDT&E Articles										

A. Mission Description and Budget Item Justification: The program provides for developments to combat the threat of known and projected foreign mines against U.S. Naval and merchant shipping in harbors, channels, choke points, sea lines of communications and amphibious and other fleet operating areas. It develops: (1) organic remote minehunting capability for DDG-51 Class and other surface combatants; (2) the integration and improvement of systems and support for systems which will detect, localize and classify moored, bottom, and close-tethered mines for use in Mine Countermeasure (MCM) MCM-1 Class, Mine Hunter Coastal (MHC) MHC-51 Class, and other surface ships; (3) systems for neutralizing mines and light obstacles from shallow water, very shallow water, surf zones, and beach landing craft zones in support of amphibious operations; (4) near-term and long-term Unmanned Undersea Vehicle (UUV) systems for clandestine mine reconnaissance.
Note: In accordance with 15 USC 638, $2.162M in FY 2000 is reserved for the Small Business Innovation Research (SBIR) assessment.

B. Program Change Summary:	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	73.491	82.465	89.610
Appropriated Value:	73.491	107.465	
Adjustment to FY 1999 Appropriated Value/			
FY 2000 President's Budget:	3.108	27.300	8.319
FY 2000/01 OSD/OMB Budget Submit:	76.599	109.765	97.929

Funding: FY99: (+$7.000) RMS Acceleration (Cong Add), (+$.281) BTR Update, (-$1.393) Midyear Review BTRs, (-$1.175) SBIR, (-$.948) Contract Advisory, (-$.657) General Reductions; FY00; (+10.000) RMS Acceleration, (+$15,000) ICWS Acceleration, (+$2.300) LMRS Program Acceleration -UUV; FY01: (+$6.430) Integrated Combat Weapons System, (+$2.100) UUV Acceleration of LMRS, (+$.456) NWCF Rate Adjustment, (+$.217) Strategic Sourcing redistribution, (-.669) Inflation adjustment, (-.215) General Reductions.

Schedule: RMS – RMS (V)4 MSII occurred in 1Q/00 and RMS (V)4 MSIII will occur in 2Q/05.

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Surface & Shallow Water MCM, 0603502N**				PROJECT NAME AND NUMBER Remote Minehunting Systems/Q0260/Q2387					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**17.417**	**45.231**	**45.696**	**65.252**	**59.383**	**65.345**	**40.020**	**CONT.**	**CONT.**
RDT&E Articles Qty			**2**							

A. Mission Description and Budget Item Justification: The Remote Minehunting System (RMS), AN/WLD-1(V), program develops a new remotely operated minehunting system for surface ships. This effort includes development and integration of a remote vehicle, mine-hunting sensors, mission command and control, and installation into the DDG-51 Class Flight IIA Baseline 7 and AN/SQQ-89(V)15 Undersea Warfare Combat System.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS
- (U) ($ 4.500) Completed RMS vehicle builder's trials.
- (U) ($ .525) Prepared documentation for Milestone II.
- (U) ($12.392) Completed System Requirements Review (SRR). Began System Design Review (SDR) efforts, software development, and DDG51 Flight IIA ship integration.

2. (U) FY 2000 PLAN
- (U) ($ 3.510) Complete System Design Review (SDR) [This is a Pre MS II Activity}
- (U) ($27.605) Begin Critical Design and fabrication of Engineering Development Models (EDMs) including Preliminary Design Review (PDR).
- (U) ($ 4.603) Continue software development
- (U) ($ 9.503) Continue DDG51 Flight IIA ship integration
- (U) ($ 4.010) Begin critical item testing
- (U) (-$ 4.000) BTR from Q2131

EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Surface & Shallow Water MCM, 0603502N**	PROJECT NAME AND NUMBER Remote Minehunting Systems/Q0260/Q2387	

4. (U) FY 2001 PLAN
- (U) ($24.013) Continue development and fabrication of Engineering Development Models (EDMs), and complete Critical Design Review (CDR).
- (U) ($ 4.433) Continue software development.
- (U) ($ 9.650) Continue DDG51 Flight IIA ship integration
- (U) ($ 7.600) Continue critical item testing

B. OTHER PROGRAM FUNDING SUMMARY

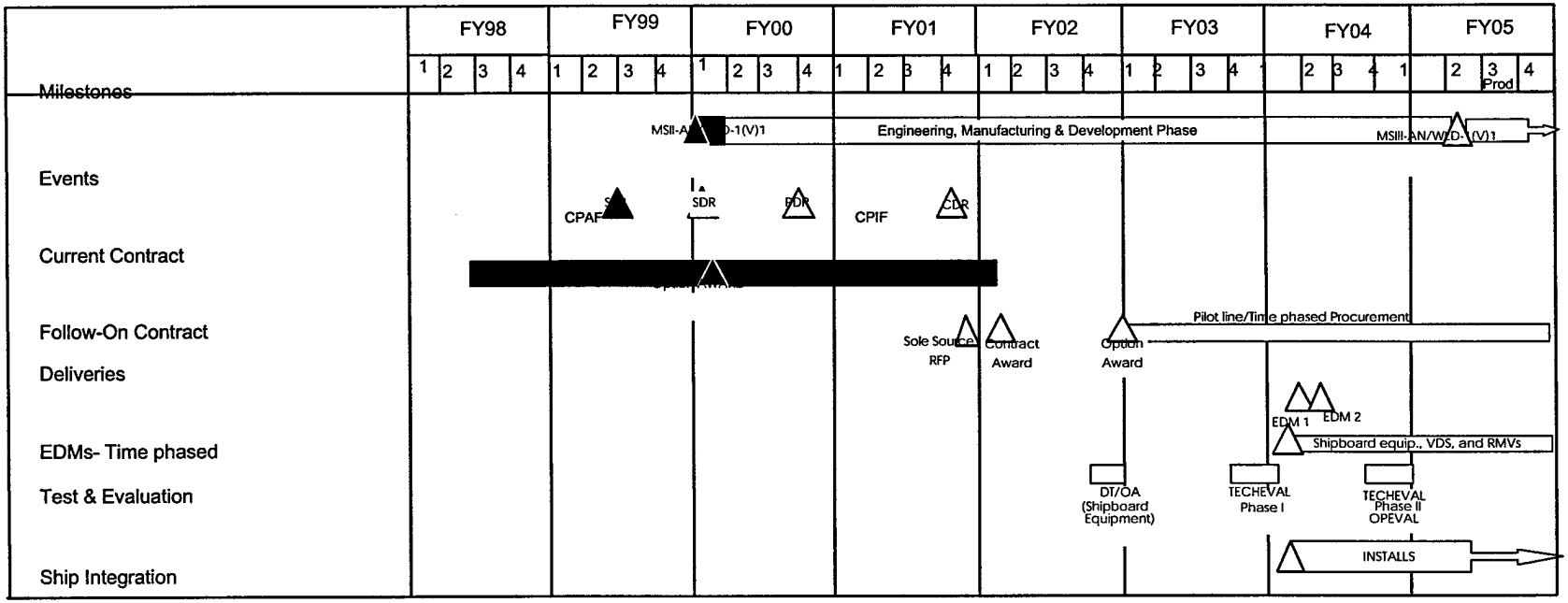
	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	TO COMPLETE	TOTAL COST
(U) OPN RMS Line 262200	0.000	0.000	0.000	0.000	0.000	0.000	0.000	36.279	CONT.	CONT.

C. Acquisition Strategy: The government has issued a series of contract modifications to Lockheed Martin to complete efforts through the System Design Review. Based upon the approved Milestone II decision the program office issued the contract modification to complete the Critical Design Review (CDR); upon completion of CDR a firm fixed price sole source contract to Lockheed Martin to complete the development, fabrication, and testing of the engineering development models, initial pilot line/tooling, and timed phased procurement of initial systems to meet ship delivery schedules. The government has worked with the contractor in an IPT environment to refine the specification and Statement of Work for the overall development effort. The IPT pricing process was used to generate the cost estimates against Navy requirements. The government will pursue commonality between the AN/ AQS-20X airborne minehunting system and the AN/WLD-1(V)1. The AN/WLD-1(V)1 contract plan is for the development of two (2) EDMs, system interactive electronic technical manual (IETM), provisioning data, technical drawings and data, and engineering services.

D. Schedule Profile: See Attached

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Surface & Shallow Water MCM, 0603502N**	PROJECT NAME AND NUMBER Remote Minehunting Systems/Q0260/Q2387

AN/WLD-1(V)1 PROGRAM SCHEDULE



R-1 SHOPPING LIST - Item No. 35

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 1) | DATE: **February 2000**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N , BA-4** | PROGRAM ELEMENT: **Surface & Shallow Water MCM, 0603502N** | PROJECT NAME AND NUMBER: Remote Minehunting System/Q0260/Q2387

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	Various	Various	107.700	5.257	N/A	20.585	12/99	13.653	11/00	CONT.	CONT.	N/A
Ancillary Hardware Development												
Systems Engineering												
Licenses												
Tooling												
GFE												
Award Fees			4.800		N/A		N/A		N/A	0.000	4.800	N/A
Subtotal Product Development			112.500	5.257		20.585		13.653				

Remarks:

Development Support Equipment		TBD									0.000	
Software Development	C/CPFF/IF	Lockheed Martin	2.300	0.400		3.702		3.833		CONT.	CONT.	
Software Development	WR	NSWC, CSS		0.200	N/A	0.901	N/A	0.600	N/A	CONT.	CONT.	N/A
ILS	C/CPFF/IF	Lockheed Martin		0.500		2.800		4.100		CONT.	CONT.	
ILS	WR	NSWC, CSS		1.400	N/A	0.200	N/A	0.200	N/A	CONT.	CONT.	N/A
Ship Integration	C/CPFF	Lockheed Martin						1.500		CONT.	CONT.	
Ship Integration	Various	Various		2.000		9.503		8.150		CONT.	CONT.	
Subtotal Support			2.300	4.500		17.106		18.383		CONT.	CONT.	

Remarks:

Exhibit R-3 Cost Analysis (page 2) | DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N , BA-4 | PROGRAM ELEMENT: Surface & Shallow Water MCM, 0603502N | PROJECT NAME AND NUMBER: Remote Minehunting Systems/ Q0260/Q2387

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	Various	Various	15.370		N/A	4.010	N/A	7.600	N/A	CONT.	CONT.	N/A
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E			15.370	0.000		4.010		7.600		CONT.	CONT.	
Remarks:												
Contractor Engineering Support	C/CPFF/IF	Lockheed Martin		4.500		4.570		3.700		CONT.	CONT.	
Government Engineering Support	Various	Various	32.600	2.000	N/A	1.500	N/A	0.600	N/A	CONT.	CONT.	N/A
Program Management Support	Various	Various		1.100	N/A	1.400	N/A	1.700	N/A	CONT.	CONT.	N/A
Travel	Various	NAVSEA		0.060	N/A	0.060	N/A	0.060	N/A	CONT.	CONT.	N/A
Labor (Research Personnel)												
Overhead												
Subtotal Management			32.600	7.660		7.530		6.060		CONT.	CONT.	
Remarks:												
Total Cost			162.770	17.417		49.231		45.696				

Remarks: FY 00 requirement is $49.231M. This requirement is met with $45.231M control and BTR of $4.000M.

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Surface & Shallow Water MCM, 0603502N**				PROJECT NAME AND NUMBER Integrated Combat Weapons System/Q1233/Q2388					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**10.367**	**20.011**	**14.365**	**9.770**	**3.373**	**3.184**	**3.274**	**CONT.**	**CONT.**
RDT&E Articles Qty										

Mission Description and Budget Item Justification: (1) Closed Loop Degaussing (CLDG) to improve survivability; (2) ICWS is a series of major, incremental block upgrades to the current combat systems. It provides the MCM/MHC Class Ships an affordable and fully integrated combat weapons system which will improve mission execution efficiency, dramatically reduce life-cycle costs, and facilitate changes to meet future mission requirements. (3) Mine Warfare and Environmental Decision Aids Library (MEDAL) is a software segment on the Global Command and Control System – Maritime (GCCS-M). MEDAL provides mine and warfare planning and evaluation tools and databases to the MCM Commander. (4) Organic MCM C4I connectivity to the rest of the fleet is provided through GCCS-M. Design and implement MIW C4I Surveillance and Reconnaissance (C4ISR) architecture to fully integrate and optimize organic and dedicated systems within the Navy's C4ISR architecture.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Surface & Shallow Water MCM, 0603502N**	PROJECT NAME AND NUMBER Integrated Combat Weapons System/Q1233/Q2388

2. (U) FY 1999 ACCOMPLISHMENTS

(U) CLDG
- (U) ($1.592) Completed OPEVAL. TECHEVAL and OPEVAL were extended to accommodate ship schedule and ascertain whether range frequency threshold and goal have been met.
- (U) ($ .100) Completed all documentation required for MSIII.
- (U) ($ .103) Conducted MSIII review.

(U) ICWS
- (U) ($ .590) Completed integration of unique SQQ-32 trainer functionality into SSQ-94 trainer.
- (U) ($ .170) Developed in-depth MNV signature knowledge and began development of silencing modifications.
- (U) ($ .250) Completed tasks associated with SLQ-48 obsolescence issues to reduce life-cycle costs.
- (U) ($3.418) Began software design/code/test for ICWS.

(U) MEDAL
- (U) ($1.639) Completed Build 7 software development, documentation, and Integration.
- (U) ($ .350) Completed Build 7 test and evaluation.
- (U) ($ .790) Began development of Build 8 Core capabilities, tactical algorithms and software upgrades.
- (U) ($ .250) Began Build 8 platform conversion.
- (U) ($. 315) Continued Systems Engineering.

(U) MCS/MCM Ship Studies
- (U) ($ .500) Initiated study of alternatives to replace or retain MCS-12 (USS INCHON) as the only fleet mine countermeasure support ship.
- (U) ($ .300) Initiated study of alternatives for follow-on class of surface mine countermeasures ships.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Surface & Shallow Water MCM, 0603502N**	Integrated Combat Weapons System/Q1233/Q2388

3. (U) FY 2000 PLAN
(U) ICWS
- (U) ($6.000) Initiate hardware design, integration, and testing.
- (U) ($8.000) Initiate software design/code/test for ICWS.
- (U) ($1.000) Develop Life Cycle Support plan.

(U) MEDAL
- (U) ($ .300) Conduct build 8 test and evaluation.
- (U) ($1.045) Begin Build 9 development
- (U) ($ .166) Define Build 10 core capabilities definition.

(U) ORGANIC MCM C4I
- (U) ($1.700) Develop MIW C4ISR data requirements for data fusion, file format, structure and transmission requirements for (organic/dedicated) MIW systems.
- (U) ($1.800) Develop and conduct MOD/SIM to optimize organic and dedicated systems.

4. (U) FY 2001 PLAN

(U) ICWS
- (U) ($2.000) Continue hardware design, integration, and testing.
- (U) ($3.500) Continue software design/code/test for ICWS.
- (U) ($1.038) Develop ILS update.

(U) MEDAL
- (U) ($ .260) Conduct Build 9 test and evaluation.
- (U) ($2.413) Begin Build 10 development, and begin testing.
- (U) ($ .200) Continue Systems Engineering.
- (U) ($. 654) Define Build 11 core capabilities and begin algorithm development.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Surface & Shallow Water MCM, 0603502N**	Integrated Combat Weapons System/Q1233/Q2388

4. (U) FY 2001 PLAN (cont'd)
(U) ORGANIC MCM C4I
- (U) ($1.000) Complete MIW C4I architecture/data requirements development.
- (U) ($1.000) Continue MOD/SIM effort.
- (U) ($1.500) Support MIW systems in implementation of MIW C4ISR architecture.

(U) MCS/MCM Ship Studies
- (U) ($ .500) Complete study of alternatives to replace or retain MCS-12 (USS INCHON).
- (U) ($ .300) Complete study of alternatives for follow-on class of surface mine countermeasures ships.

B. OTHER PROGRAM FUNDING SUMMARY

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
(U) OPN (CLDG) Line 262200	0.204	5.764	2.890	5.381	3.300	3.401	3.479	CONT.	CONT.
(U) OPN (ICWS) Line 262200	12.561	10.399	5.528	6.753	7.949	8.222	8.616	CONT.	CONT.

C. ACQUISITION STRATEGY

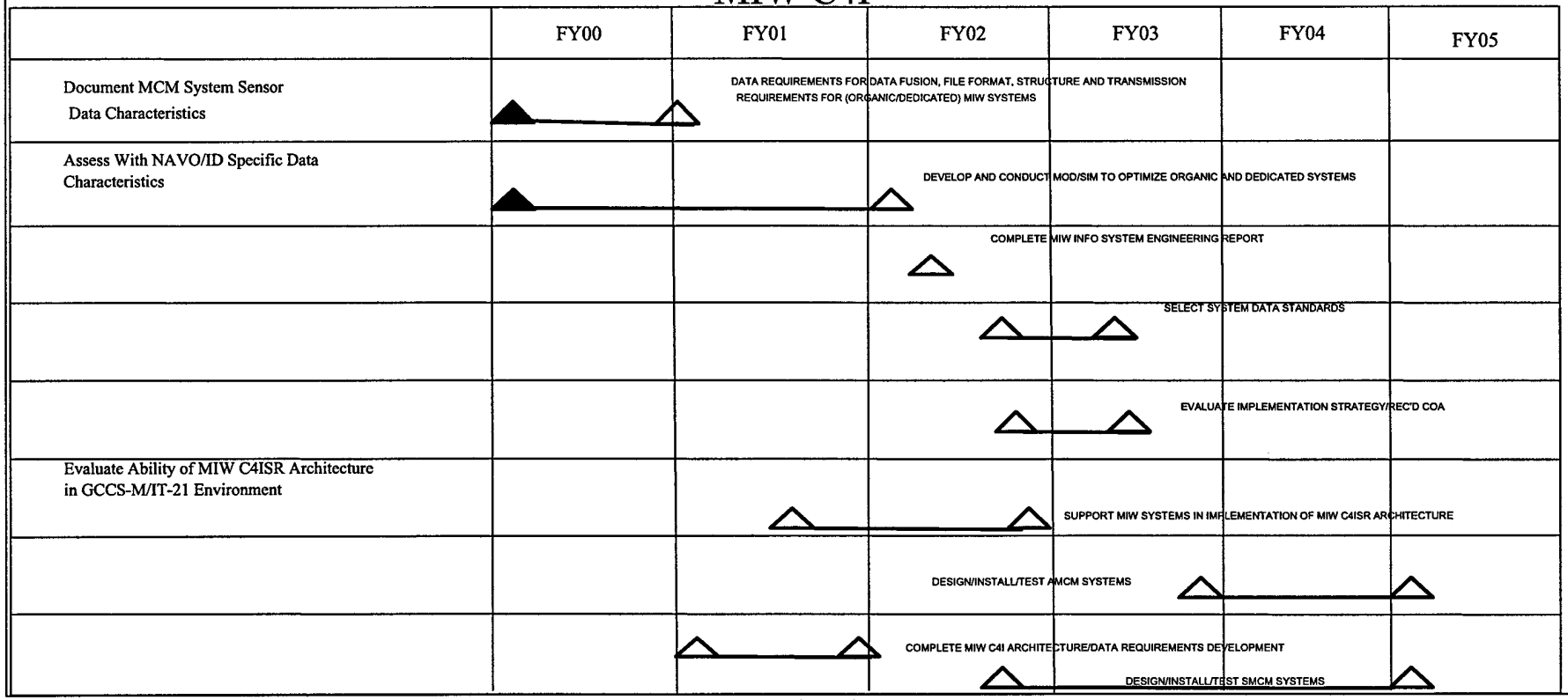
ICWS is a series of major incremental upgrades to the current systems. The original equipment manufacturers have teamed to develop the changes. FY 98 and FY 99 tasks were accomplished under existing BOAs. MEDAL is an evolutionary program with a development cycle of one year per software build.

D. SCHEDULE PROFILE

See attached

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Surface & Shallow Water MCM, 0603502N**	PROJECT NAME AND NUMBER Integrated Combat Weapons System/Q1233/Q2388

MIW C4I

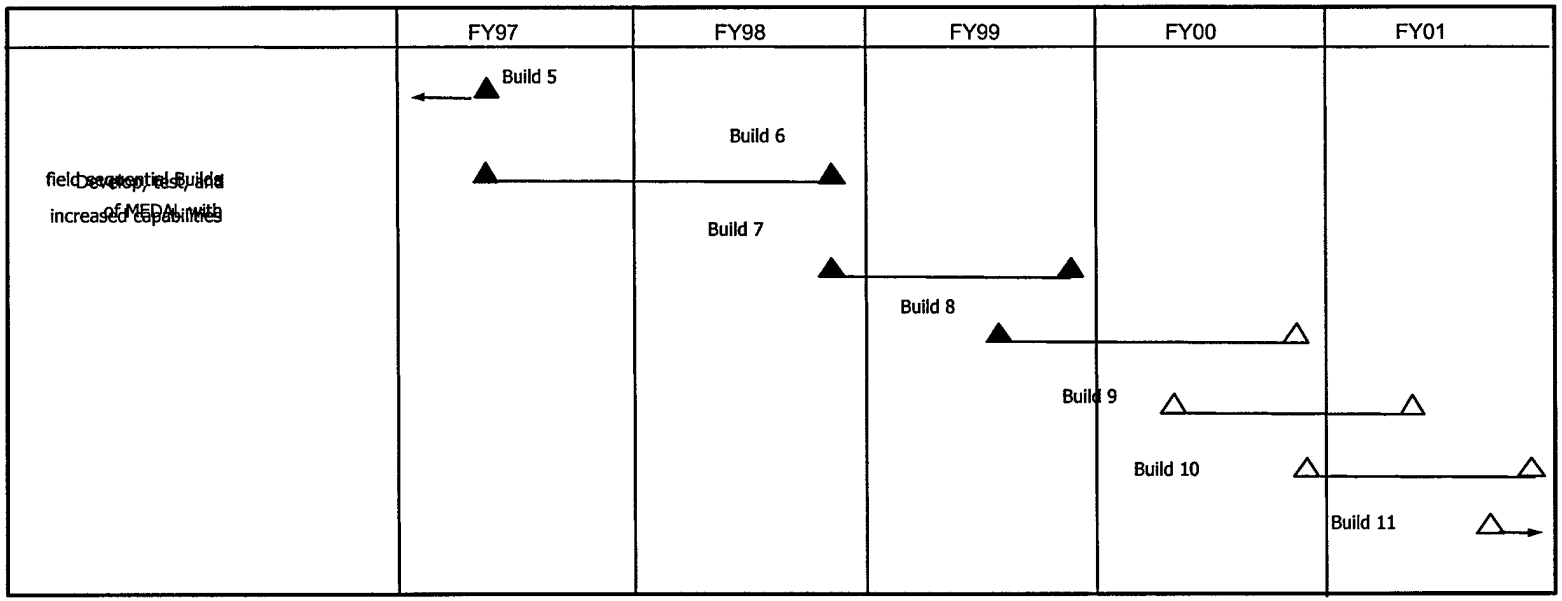


R-1 SHOPPING LIST - Item No. 35

CLASSIFICATION: **UNCLASSIFIED**

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Surface & Shallow Water MCM, 0603502N**	Integrated Combat Weapons System/Q1233/Q2388

MEDAL



R-1 SHOPPING LIST - Item No. 35

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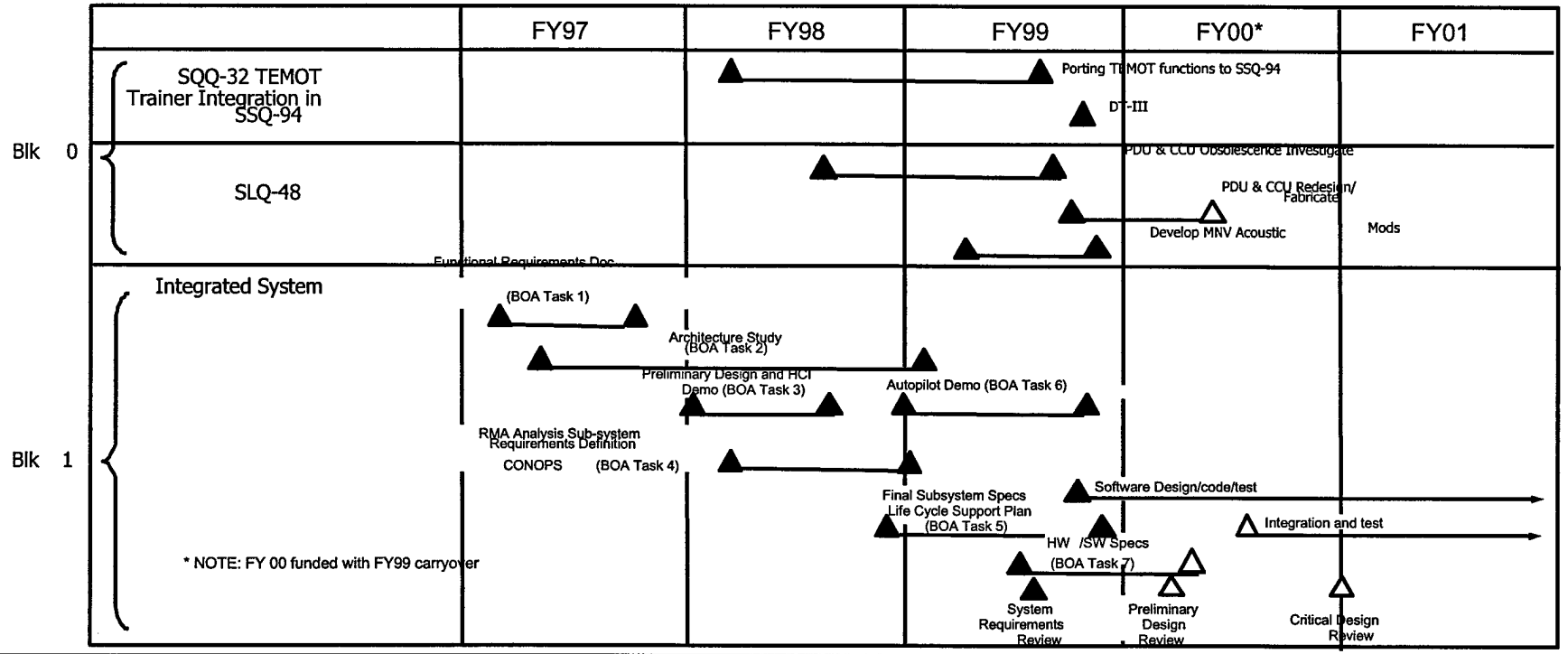
EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Surface & Shallow Water MCM, 0603502N**	PROJECT NAME AND NUMBER Integrated Combat Weapons System/Q1233/Q2388

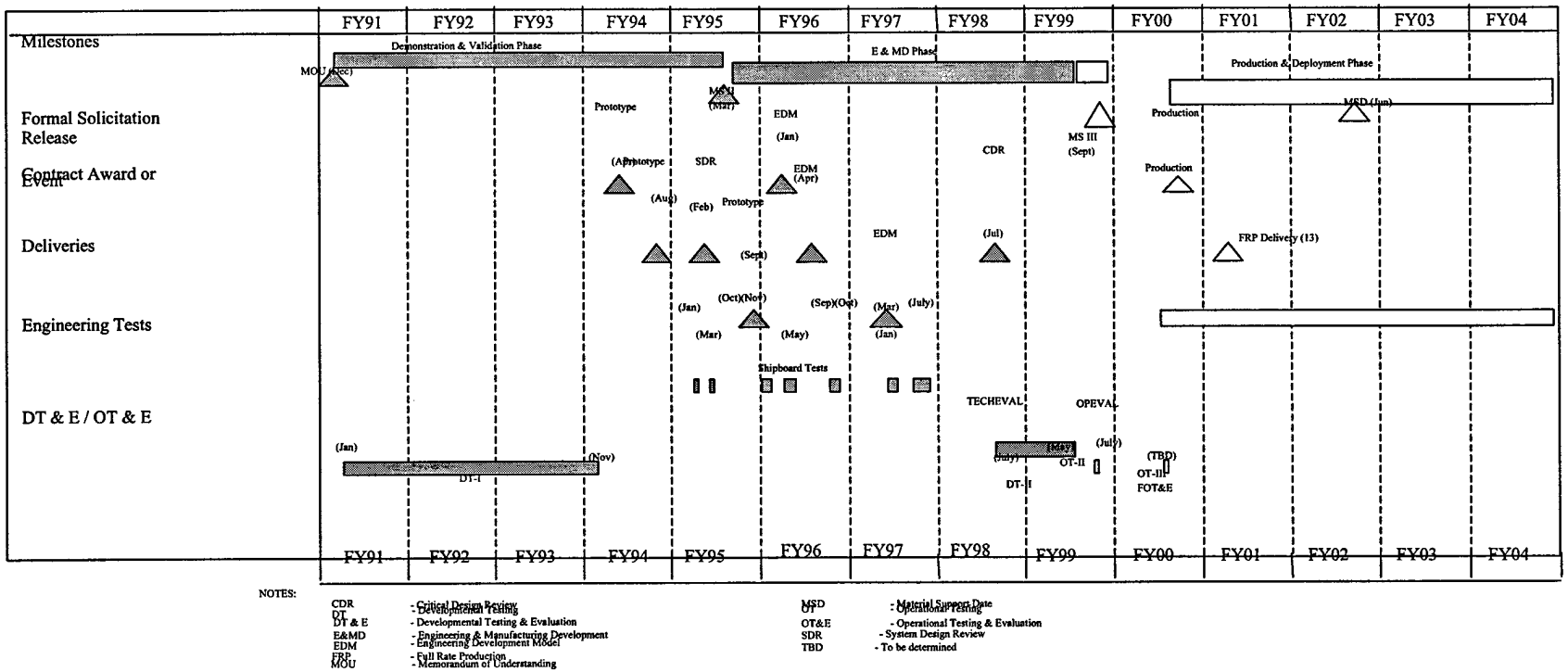
ICWS



R-1 SHOPPING LIST - Item No. 35

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Surface & Shallow Water MCM, 0603502N**	PROJECT NAME AND NUMBER Integrated Combat Weapons System/Q1233/Q2388

CLDG



NOTES:

CDR	- Critical Design Review	MSD	- Material Support Date
DT	- Developmental Testing	OT	- Operational Testing
DT & E	- Developmental Testing & Evaluation	OT&E	- Operational Testing & Evaluation
E&MD	- Engineering & Manufacturing Development	SDR	- System Design Review
EDM	- Engineering Development Model	TBD	- To be determined
FRP	- Full Rate Production		
MOU	- Memorandum of Understanding		

Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA-4

PROGRAM ELEMENT: Surface & Shallow Water MCM/0603502N

PROJECT NAME AND NUMBER: Integrated Combat Weapons System/Q1233/Q2388

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	CPAF	Raytheon		0.760	11/98	6.000	04/00	2.000	11/00	CONT.	CONT.	N/A
Ancillary Hardware Development												
Systems Engineering	Various	NSWC, CD/NRAD, SD	0.100	1.115	11/98	1.700	11/99	2.000	11/00	CONT.	CONT.	N/A
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			0.100	1.875		7.700		4.000		CONT.	CONT.	

Remarks:

Development Support Equipment											0.000	
Software Development	Various	NSWC, CSS	0.300	5.507	11/98	10.900	04/00	7.062	11/00	CONT.	CONT.	N/A
Training Development	Various	NSWC, CD		0.000	N/A	0.000		0.000		CONT.	CONT.	
Integrated Logistics Support	CPAF	Raytheon, RI		0.250		1.000		1.038		CONT.	CONT.	
Configuration Management	Various	Various		0.000	N/A	0.000		0.000		CONT.	CONT.	
Technical Data	Various	Various		0.100	N/A					CONT.	CONT.	
GFE												
Subtotal Support			0.300	5.857		11.900		8.100		CONT.	CONT.	

Remarks:

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 2)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**		PROGRAM ELEMENT **Surface & Shallow Water MCM/0603502N**				PROJECT NAME AND NUMBER Integrated Combat Weapons System/Q1233/Q2388						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	CPFF	SAIC, VA	0.200	0.000	11/98	0.000	11/99	0.000	11/00	Cont.	0.200	N/A
Operational Test & Evaluation	WR	NSWC, CD		1.592	N/A						1.592	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.200	1.592		0.000		0.000		0.000	1.792	
Remarks:												
Contractor Engineering Support	WR	NSWC, CD/CSS		0.153	N/A	0.100		1.298			1.551	
Government Engineering Support	WR	NSWC, CSS		0.500	N/A	0.200					0.700	
Program Management Support	WR	NSWC, CSS/NUWC		0.290	N/A	0.111	N/A	0.967	N/A	Cont.	1.368	N/A
Travel				0.100							0.100	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	1.043		0.411		2.265		0.000	3.719	
Remarks:												
Total Cost			0.600	10.367		20.011		14.365				
Remarks:												

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Surface & Shallow Water MCM, 0603502N**				PROJECT NAME AND NUMBER Assault Breaching Systems/Q2131					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**28.112**	**15.298**	**11.730**	**22.171**	**11.270**	**28.010**	**34.413**	**CONT.**	**CONT.**
RDT&E Articles Qty										

A. Mission Description and Budget Item Justification: This program provides for a combination of joint US Marine Corps and US Navy projects planned to counter the threat to amphibious landing forces from known and projected foreign land and sea mines and light obstacles in the shallow water, very shallow water and surf zone approaches to amphibious assault areas. It develops systems for mine sweeping and explosive mine clearance. Included are the Distributed Explosives Technology (DET), Shallow Water Assault Breach System (SABRE) and follow-on P3I efforts.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Surface & Shallow Water MCM, 0603502N**	PROJECT NAME AND NUMBER Assault Breaching Systems/Q2131

1. (U) FY 1999 ACCOMPLISHMENTS

(U) DET
- (U) ($2.338) Completed DT-II.
- (U) ($1.500) Completed safety testing.
- (U) ($1.249) Completed system procurement preparation.
- (U) ($1.938) Conducted OT-II.
- (U) ($ .262) Preparation for MSIII.

(U) SABRE
- (U) ($1.050) Continued safety testing.
- (U) ($ .431) Continued DT-II
- (U) ($ .375) Continued system procurement preparation.
- (U) ($1.475) Continued OT-II
- (U) ($ .262) Began MSIII preparation.

(U) EN
- (U) ($6.004) Began Extended Range DET Rocket development
- (U) ($5.158) Began Fire Control System (FCS) development.
- (U) ($5.821) Began SABRE Fuze upgrade.
- (U) ($ .190) Completed Autonomous controller development.
- (U) ($ .059) Portion of extramural program is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Surface & Shallow Water MCM, 0603502N**	PROJECT NAME AND NUMBER Assault Breaching Systems/Q2131

2. (U) FY 2000 PLAN

(U) SABRE
- (U) ($2.712) Complete fabrication of DT/OT-II systems.
- (U) ($ .385) Complete DT-II
- (U) ($ .264) Complete system procurement preparation.
- (U) ($ .650) Complete OT-II.
- (U) ($ .465) Complete safety testing.
- (U) ($ .178) MSIII .

(U) EN
- (U) ($2.184) Continue Extended Range DET Rocket development and engineering tests.
- (U) ($1.815) Continue FCS development and engineering tests.
- (U) ($2.645) Complete SABRE Fuze upgrade.
- (U) ($4.000) BTR to Q0260.

3. (4) FY 2001 PLAN

U) EN
- (U) ($6.703) Continue SZA P3I development and engineering tests.
- (U) ($5.027) Continue FCS development and engineering tests.

EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Surface & Shallow Water MCM, 0603502N**	PROJECT NAME AND NUMBER Assault Breaching Systems/Q2131	

B. OTHER PROGRAM FUNDING SUMMARY

	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	TO COMPLETE	TOTAL COST
(U) OPN (SWMCM Line 262400	0.000	7.256	18.708	16.863	37.863	19.769	7.696	8.485	CONT.	CONT.

C. Acquisition Strategy: Complete development of DET, SABRE and the Auto Pilot task of EN and transition to production. Improve the capabilities of DET and SABRE by developing the Surf Zone Array (SZA), and the Fire Control System (FCS) tasks of EN.

D. Schedule Profile

See attached

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Surface & Shallow Water MCM, 0603502N**	PROJECT NAME AND NUMBER Assault Breaching Systems/Q2131

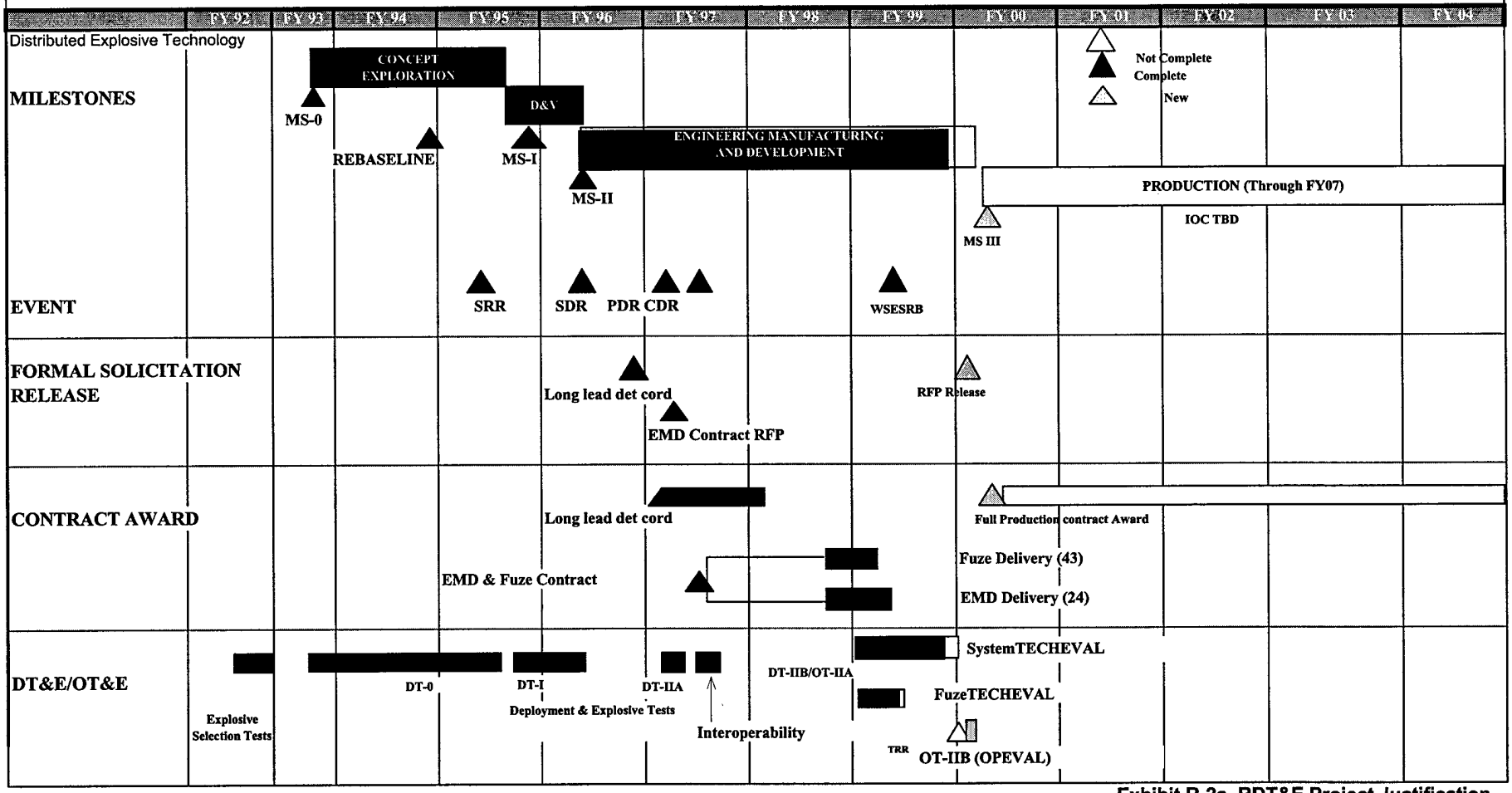


EXHIBIT R-2a, RDT&E Project Justification | DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	Surface & Shallow Water MCM, 0603502N	Assault Breaching Systems/Q2131

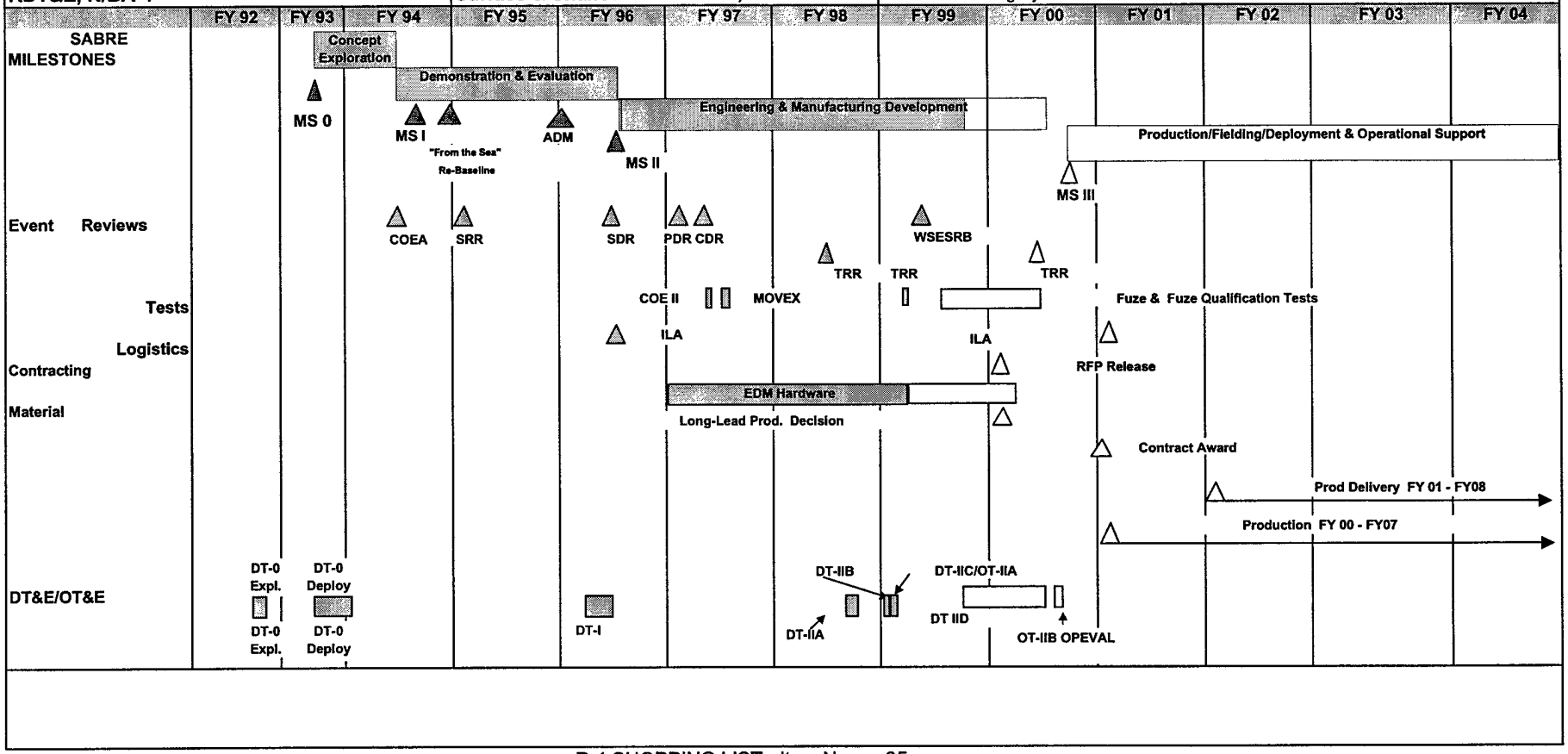
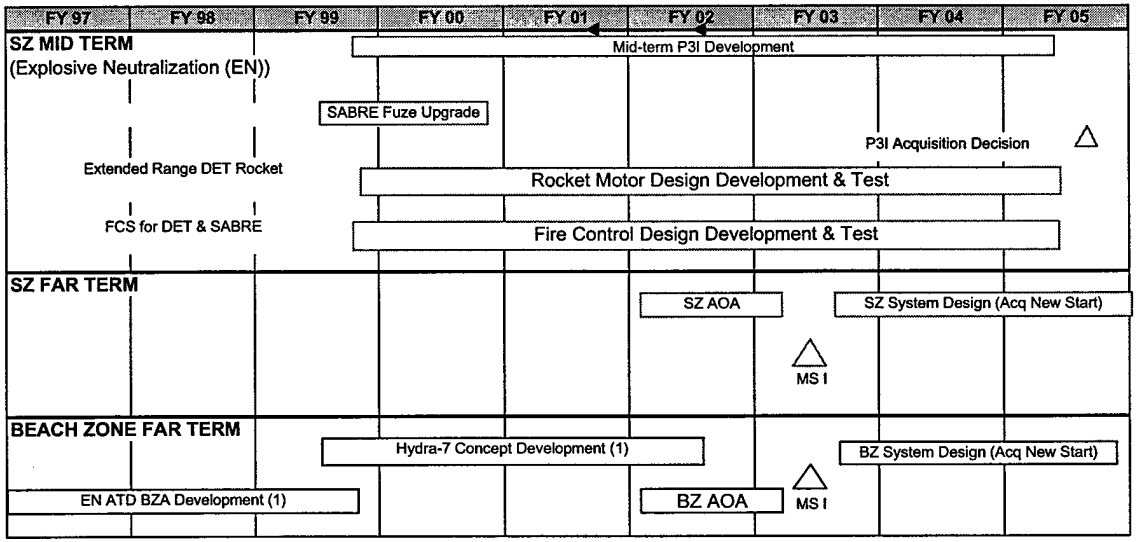


EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Surface & Shallow Water MCM, 0603502N**	PROJECT NAME AND NUMBER Assault Breaching Systems/Q2131



(1) These tasks are funded by ONR.

Exhibit R-3 Cost Analysis (page 1) | DATE: **February 2000**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N/BA-4** | PROGRAM ELEMENT: **Surface & Shallow Water MCM/0603502N** | PROJECT NAME AND NUMBER: Assault Breaching Systems/Q2131

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	WR	IH, CSS, TBD	40.200	8.900	N/A	2.300	N/A	4.800	N/A	CONT.	CONT.	N/A
Ancillary Hardware Development	WR	IH, CSS, TBD	7.100	1.000	N/A	0.500	N/A	0.650	N/A	CONT.	CONT.	N/A
Systems Engineering	WR	IH, CSS	13.000	2.000	N/A	0.500	N/A	0.300	N/A	CONT.	CONT.	N/A
Licenses	WR	N/A	0.800	0.000		0.000		0.000		0.000	0.800	
Tooling	WR	IH, CSS, TBD	0.800	0.060	N/A	0.200	N/A	0.050	N/A	CONT.	CONT.	N/A
GFE	WR	IH, CSS	2.600	0.500	N/A	1.400	N/A	0.200	N/A	CONT.	CONT.	N/A
Award Fees	N/A	N/A	0.500	0.000		0.000		0.000		0.000	0.500	
Subtotal Product Development			65.000	12.460		4.900		6.000		0.000	88.360	

Remarks: This is a combination of DET, SABRE and EN P3I work for FY99. There is more than one performing activity for most cost categories. Award dates are N/A because tasks are performed by government activities.

Development Support Equipment	WR	IH, CSS, TBD	9.500	2.221	N/A	1.000	N/A	0.900	N/A	CONT.	CONT.	N/A
Software Development	WR	CSS	5.000	3.037	N/A	1.300	N/A	0.300	N/A	CONT.	CONT.	N/A
Training Development	WR	IH, CSS	1.500	0.500	N/A	0.300	N/A	0.300	N/A	CONT.	CONT.	N/A
Integrated Logistics Support	WR	IH, CSS	1.500	0.600	N/A	0.200	N/A	0.200	N/A	CONT.	CONT.	N/A
Configuration Management	WR	IH, CSS	1.500	1.900	N/A	0.300	N/A	0.100	N/A	CONT.	CONT.	N/A
Technical Data	WR	IH, CSS	0.800	1.500	N/A	1.100	N/A	0.300	N/A	CONT.	CONT.	N/A
GFE	WR	IH, CSS	0.200	0.200	N/A	0.100	N/A	0.000		0.000	0.500	N/A
Subtotal Support			20.000	9.958		4.300		2.100		CONT.	CONT.	

Remarks: NOTE: Award dates are N/A because tasks are performed by government activities.

Exhibit R-3 Cost Analysis (page 2) | DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA-4 | PROGRAM ELEMENT: Surface & Shallow Water MCM/0603502N | PROJECT NAME AND NUMBER: Assault Breaching Systems/Q2131

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	IH, CSS, TBD	19.500	1.400	N/A	0.850	N/A	2.000	N/A	CONT.	CONT.	N/A
Operational Test & Evaluation	WR	IH, CSS, TBD	7.000	1.000	N/A	0.100	N/A	0.000	N/A	CONT.	CONT.	N/A
Tooling	WR	IH, CSS, TBD	0.500	0.200	N/A	0.100	N/A	0.200	N/A	CONT.	CONT.	N/A
GFE	WR	IH, CSS, TBD	0.300	0.100	N/A	0.050	N/A	0.100	N/A	CONT.	CONT.	N/A
Subtotal T&E			27.300	2.700		1.100		2.300		CONT.	CONT.	
Remarks: NOTE: Award dates are N/A because tasks are performed by government activities.												
Contractor Engineering Support	WR	IH, CSS, TBD	2.000	0.200	N/A	0.100	N/A	0.100	N/A	CONT.	CONT.	N/A
Government Engineering Support	WR	IH, CSS	5.000	1.000	N/A	0.200	N/A	0.300	N/A	CONT.	CONT.	N/A
Program Management Support	WR	IH, CSS, NAVSEA	7.200	1.694	N/A	0.598	N/A	0.830	N/A	CONT.	CONT.	N/A
Travel	WR	NAVSEA	0.600	0.100	N/A	0.100	N/A	0.100	N/A	CONT.	CONT.	N/A
Labor (Research Personnel)	N/A	N/A									0.000	
Overhead	N/A	N/A									0.000	
Subtotal Management			14.800	2.994		0.998		1.330		CONT.	CONT.	
Remarks:												
Total Cost			127.100	28.112		11.298		11.730				

Remarks: FY 00 requirement is $11.298M. This requirement is met with $15.298M control and BTR of -$4.000M.

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**					R-1 ITEM NOMENCLATURE Surface and Shallow Water Mine Countermeasures Program Element (PE) 0603502N					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**20.703**	**29.225**	**26.138**	**24.000**	**17.219**	**11.269**	**10.946**	**CONT.**	**CONT.**
										CONT.
Project Cost (V2094)		**20.703**	**29.225**	**26.138**	**24.000**	**17.219**	**11.269**	**10.946**	**CONT.**	**CONT.**
Quantity of RDT&E Articles		**1 - NMRS**				**1 - LMRS**				

A. Mission Description and Budget Item Justification:
This project was completely restructured in FY 1994 in response to Congressional direction provided in the FY 1994 DOD Appropriations Act. Specifically, the office of the Secretary of Defense and the Navy were directed to (1) establish priorities among various proposed UUV programs, (2) focus on near-term mine countermeasures issues, and (3) establish affordable, cost-effective programs. The Navy developed an overall UUV Program Plan, which was approved by ASN(RD&A) June 1994, endorsed by USD(A&T) and forwarded to Congress to support FY 1995 budget deliberations.

The UUV Program Plan establishes a clandestine, near-term mine reconnaissance capability as the Navy's top UUV priority; a long term-mine reconnaissance system as priority two; the conduct of surveillance, intelligence and tactical oceanography missions as priority three; and exploring advanced UUV designs for the future as priority four. FY 1995 Congressional language complimented the Navy Plan and fully supported priorities one and two starting in FY 1995.

The UUV project funds development of the first three priorities of the UUV Program Plan. The Near-Term Mine Reconnaissance System (NMRS) is a minehunting UUV system launched and recovered from an SSN-688 class submarine capable of mine detection, classification, and localization. One NMRS Operational Prototype (OP) system was made available to the Commander Submarine Development Squadron-Five in FY 1999. No further production of the NMRS is planned. Since the NMRS is viewed as a stop-gap capability with a life expectancy of approximately 6 years, the AN/BLQ-11 Long-Term Mine Reconnaissance System (LMRS) is being developed to provide a robust, long-term Fleet capability to conduct clandestine minefield reconnaissance. Several Long-Term Mine Reconnaissance Systems will be procured beginning in FY 2003. The Navy's third priority is the conduct of surveillance, intelligence and tactical oceanography. To meet this requirement the Navy will develop a Multi-Mission UUV (MMUUV) system that is capable of performing different missions. It is envisioned that this system will use the same vehicle energy section and structure of the LMRS, but will have payload sensors appropriate to meet various mission requirements.

The Near-Term Mine Reconnaissance System (NMRS) program has developed and tested one operational prototype system. The NMRS was made available to the Fleet and will remain available for Fleet use until delivery of the first LMRS. In accordance with N87 letters Ser N87/9U657190 of 26 July 1999 and Ser N87/9U657196 of 27 July 1999, all remaining RDT&E funding for NMRS has been applied to the LMRS program.

The Long-Term Mine Reconnaissance System (LMRS) is currently in development. The fabrication of a prototype system will begin in FY01. This prototype system will support test and evaluation, and then in FY03 will transition to fleet operations.

B. (U) Program Change Summary: (show total funding, schedule, and technical changes for the program element that have occurred since the last submission).

Funding:
FY99 reductions reflect: -.050 for Sec. 8108 Revised Economic, -.010 for Civilian Personnel, -.308 for Sec. 8054 Contract Advisory, -.099 for Inflation Savings, -.508 for SBIR/STTR Transfer, -.085 for BSO 1002 Actual Update Nov99, -.003 for FY1999 BTRs.
FY00 reductions reflect: -.051 for SSP. FY00 increases reflect: +.051 for Restore of Issue 62288 Outsourcing, +2.300 for NMRS Program Completion.
FY01 reductions of -.390 are for congressional undistributed reductions. FY01 increases reflect: +.327 for Restore of Issue 62288 Outsourcing, +.115 for NWCF Rates, +2.100 for Reduction of NMRS O&MN funding, +.008 for PBD411 ICC, +.004 for PBD604 Mil/Civ Pay Rates

Schedule:
MMUUV moved out one year because $2.300 was transferred into LMRS for completion of LMRS R&D.

Technical:
No technical program changes.

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER Surface and Shallow Water Mine Countermeasures Program Element (PE) 0603502N				PROJECT NAME AND NUMBER Unmanned Undersea Vehicle V2094					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**20.703**	**29.225**	**26.138**	**24.000**	**17.219**	**11.269**	**10.946**	**CONT.**	**CONT.**
RDT&E Articles Qty		**1 - NMRS**				**1 - LMRS**				

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 Accomplishments:

(U) (6.106) Priority 1 (NMRS): Conducted Interim Training (in water) and SSN Testing. Completed preparations for fleet availability of the Prototype System. Turned system over to COMSUBDEVRON FIVE.

(U) (14.597) Priority 2 (LMRS): Completed LMRS Detailed Design and conducted the LMRS Critical Design Review. Commenced preparations for award of the LMRS Development Phase contract. Conducted product development risk mitigation testing.

1. (U) FY 2000 Plan:

(U) (29.225) (LMRS): Award development contract and begin development phase.

1. (U) FY 2001 Plan:

(U) (26.138) (LMRS): Continue development phase and begin fabrication of prototype system.

EXHIBIT R-2a, RDT&E Project Justification			DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER Surface and Shallow Water Mine Countermeasures Program Element (PE) 0603502N	PROJECT NAME AND NUMBER Unmanned Undersea Vehicle V2094	

B. Other Program Funding Summary:

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	To FY 2005 Complete	Total Cost
OPN PE 0204281N; Line Item 217100	0.0	0.0	0.0	0.0	25.0	52.6	48.4 CONT.	CONT.
OMN PE 0204281N								
1B2B (LMRS)	0.0	0.0	0.0	0.0	0.7	5.7	6.4 CONT.	CONT.
1D3D (NMRS)	0.0	0.0	0.0	0.0	0.0	0.0	0.0 CONT.	CONT.

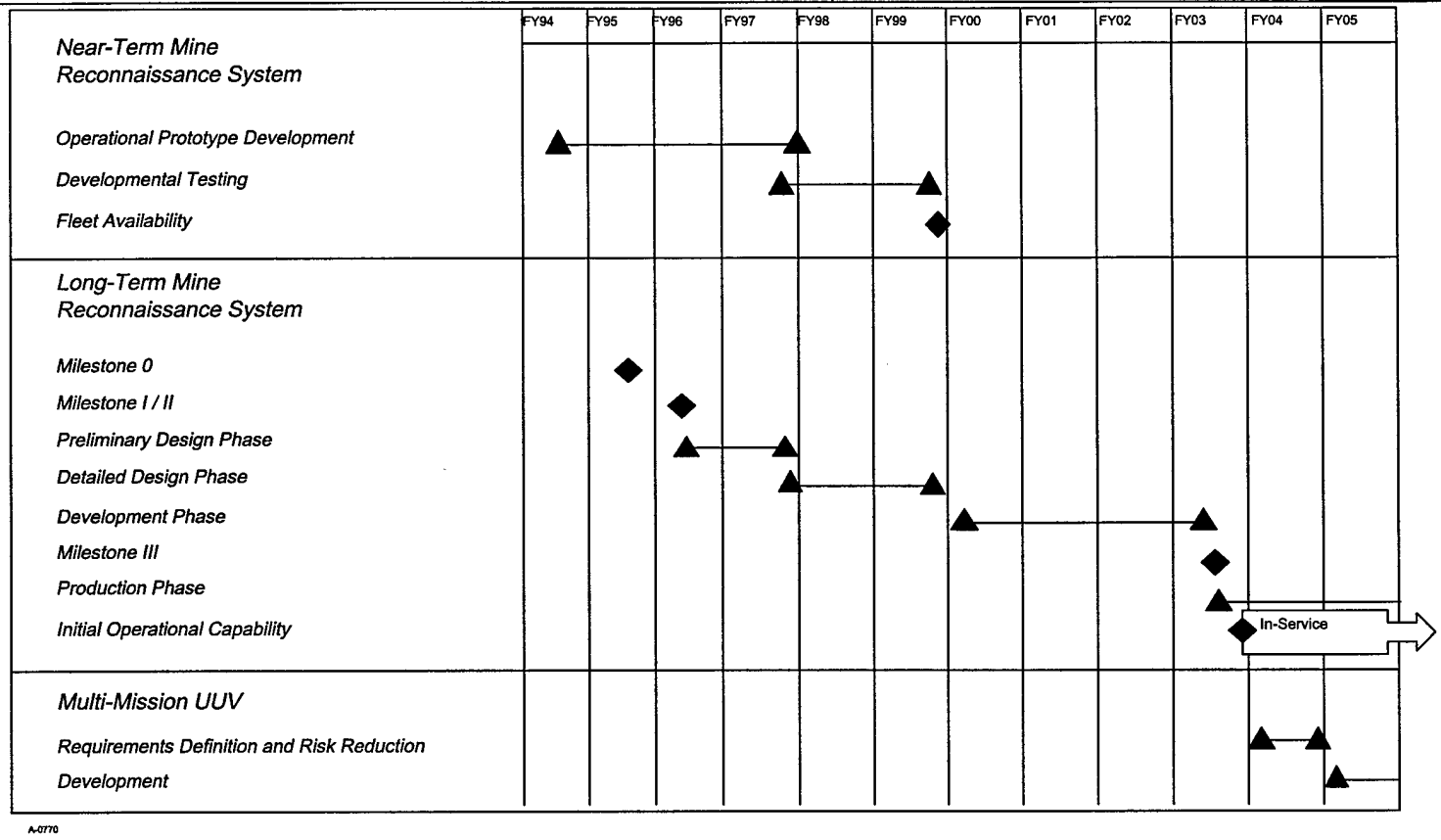
NMRS O&MN funding has been realigned to LMRS RDT&E,N funding in accordance with N87 letters Ser N87/9U657190 of 26 July 1999 and Ser N87/9U657196 of 27 July 1999.

C. Acquisition Strategy: One Operational Prototype NMRS has been procured via sole source contract. No further NMRS production is planned . The LMRS acquisition strategy is structured to maximize competition during system development. In FY97 three one year contracts were awarded for development of preliminary design. In early FY98, two of the preliminary design contrctors were selected to continue development through a critical design review. Selection of these two contractors was based primarily on the contractor's performance during the preliminary design contract. In early FY00, Boeing was selected to complete the LMRS design, fabricate a prototype system and support in-water testing. Procurement of the LMRS will be sole source to Boeing. A competitive procurement is not cost effective due to the limited (6-12) number of systems planned for procurement.

The MMUUV project will use competitive procurement to award an RDT&E contract for the development and prototyping of the system. Procurement and operation is not planned within the FYDP.

D. Schedule Profile: See next page.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE Surface and Shallow Water Mine Countermeasures Program Element (PE) 0603502N



R-1 SHOPPING LIST - Item No. 35

Exhibit R-3 Cost Analysis (page 1) | DATE: **February 2000**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N/BA-4**

PROGRAM ELEMENT: Surface and Shallow Water Mine Countermeasures; Program Element (PE) 0603502N

PROJECT NAME AND NUMBER: Unmanned Undersea Vehicle V2094

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development (NMRS)	SS/CPAF	NGC	44.554	1.269	N/A					0.000	45.823	
Award Fees (NMRS)			3.047	0.669	N/A					0.000	3.716	
System Maintenance (NMRS)	SS/CP	NGC	1.987	1.837	N/A					0.000	3.824	
Primary Hardware Development (LMRS) Detailed Design Contract	CPAF	NGC and Boeing North America	19.876	10.109	N/A					0.000	29.985	
Award Fees (LMRS Design)			0.575	0.266	N/A					0.000	CONT.	
Primary Hardware Development (LMRS) Development Contract	CPAF	Boeing				23.588	11/99	20.226	N/A	CONT.	CONT.	
Award Fees (LMRS Development)						1.539	N/A	1.168	N/A	CONT.	CONT.	
Gov't Facilities Costs (LMRS Development)						0.848	N/A	1.444	N/A	CONT.	CONT.	
Ancillary Hardware Development												
System Engineering												
Licenses												
Tooling												
Subtotal Product Development			70.039	14.150		25.975		22.838		CONT.	CONT.	

Remarks:

Development Support Equipment												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Engineering Technical Services												
Technical Data												
GFE												
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks:

Exhibit R-3 Cost Analysis (page 2)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**		PROGRAM ELEMENT Surface and Shallow Water Mine Countermeasures Program Element (PE) 0603502N			PROJECT NAME AND NUMBER Unmanned Undersea Vehicle V2094							
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	Various						0.225		CONT.	CONT.	
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E			0.000	0.000		0.000		0.225		CONT.	CONT.	
Remarks:												
Contractor Engineering Support	CPAF	JHU/APL, ARL/UT, SGT, Drape	4.808	1.357	N/A*	0.000	N/A	0.350	N/A*	CONT.	CONT.	
Government Engineering Support	WR	Various	10.621	4.262	N/A	2.841	N/A	2.185	N/A	CONT.	CONT.	
Program Management Support	Various	Various	2.460	0.875	N/A	0.363	N/A	0.500	N/A	CONT.	CONT.	
Program Management Personnel												
Travel				0.059	N/A	0.046	N/A	0.040	N/A	CONT.	CONT.	
Labor (Research Personnel)												
Overhead												
Subtotal Management			17.889	6.553		3.250		3.075		CONT.	CONT.	
Remarks: * Multi-year contracts incrementally funded; therefore; Award Date is N/A.												
Total Cost			87.928	20.703		29.225		26.138		CONT.	CONT.	
Remarks:												

CLASSIFICATION: **UNCLASSIFIED**

EXHIBIT R-2, RDT&E Budget Item Justification								DATE: February 2000		
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY / BA 4**					R-1 ITEM NOMENCLATURE Surface Ship Torpedo Defense / 0603506N - Subhead C4NZ					
COST ($ in Millions	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost	0.000	4.840	4.614	0.000	0.000	0.000	0.000	0.000	0.000	9.454
Joint US/UK Surface Ship Torpedo Defense V2045	0.000	4.840	3.978	0.000	0.000	0.000	0.000	0.000	0.000	8.818
Surface Ship Torpedo Defense V0225	0.000	0.000	0.636	0.000	0.000	0.000	0.000	0.000	0.000	0.636
Quantity of RDT&E Articles										

A. Mission Description and Budget Line Justification: Project V2045 continues a joint collaborative program with the United Kingdom to develop future technologies identified during the recent Demonstration/Validation (D&V) phase of the program, such as the mobile expendable acoustic decoy, concept one countermeasures, improved torpedo detection classification and localization, and improved performance of the AN/SLQ-25A in shallow water/ littoral regions. Project V0225 continues the AN/SLQ-25A winch and tow upgrade efforts.

Note: In accordance with 15 USC 638, $.09M in FY 2000 is reserved for the Small Business Innovative Research (SBIR) assessment.

1. (U) FY 1999 Accomplishments:
   - ($2.340) Developed an AN/SLQ-25A Winch and Tow Upgrade to Improve Performance in Littoral, Shallow Water Operations.
   - ($0.900) Completed the Mobile Ship-Launched Countermeasure Acoustic Device (MSCAD) D&V Phase by conducting an end-to-end In Water Demonstration Test.
   - ($0.750) Developed a structured, impartial evaluation system and evaluated Future Technologies to Improve the Performance of the Detection Classification, and Localization (DCL) Processing Component of Surface Ship Torpedo Defense. The Technologies Selected will be Available for Implementation into the DCL Torpedo Recognition and Alertment Functional Subsystem (TRAFS) Component of the AN/SQQ-89 System.
   - ($0.850) Conducted Large Deck Ship Study to Evaluate Present and Potential Concepts and Technologies. These Concepts May Be Used to Force Applications Which Would Focus on the Protection of Large Deck Ships Against Torpedo Attacks. Conducted Studies of Area Torpedo Defense Concepts. Developed an improved scattering mechanism for Concept 1

2. (U) FY 2000 Plan:
   - ($0.636) Follow-On to AN/SLQ-25A Winch and Tow Upgrade Efforts.
   - ($1.478) Complete AN/SLQ-25A Winch and Tow Littoral PECP.
   - ($1.000) Define Tripwire Program Per Large Deck Study.
   - ($1.000) Perform DCL Improvements.
   - ($.250) Conduct Concept One Feasibility Study.
   - ($.250) Develop ATT Processor.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY**	R-1 ITEM NOMENCLATURE Surface Ship Torpedo Defense / 0603506N - Subhead C4NZ

3. (U) FY 2001 PLAN:
   - ($0)

B. Progam Change Summary:

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	5.000	0.640	0.000
Appropriated Value:	5.000	0.640	
Adjustment to FY 1999/2000 Appropriated Value			
FY 2000 President's Budget:	-0.160	3.974	
FY 2001 PRES Budget Submit:	4.840	4.614	0.000

Funding: FY 1999: Revised Economic Assumptions (-$.011), SBIR/STTR Transfer (-$.126), and Inflation Savings (-$.023)
FY 2000: Undistributed congressional reductions (-$.026) and congressional add for the Cooperative International Program ($4.000)
FY 2001: Not Applicable.

Schedule: Not Applicable

Technical: Not Applicable

C. Other Program Funding Summary:

OPN BLI: 217600/217605/217606
Undersea Warfare Support Equipment

FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Complete	To Cost	Total
0	0	11.540	.847	4.266	3.847	6.961	6.547	CONT.	CONT.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY**	R-1 ITEM NOMENCLATURE Surface Ship Torpedo Defense / 0603506N - Subhead C4NZ

D. Acquisition Strategy: Not Applicable

E. Schedule Profile: Not Applicable.

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY / BA 4**					R-1 ITEM NOMENCLATURE Carrier Systems Development - 0603512N					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**105.787**	**141.957**	**148.952**	**156.631**	**70.759**	**76.726**	**75.949**	**Cont.**	**Cont.**
S1722 CV Weapons Elevator Improvements		**0.750**	**1.020**	**1.052**	**1.067**	**1.064**	**1.082**	**1.114**	**Cont.**	**Cont.**
42208 Future CV R & D		**18.742**	**111.040**	**122.521**	**128.428**	**57.468**	**63.534**	**58.479**	**Cont.**	**Cont.**
42678 CVN Technology Insertion		**48.400**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**48.400**
42693 Carrier Systems Definition		**34.243**	**24.529**	**14.362**	**13.088**	**0.000**	**0.000**	**0.000**	**Cont.**	**Cont.**
W1723 CV Launch & Recovery Systems		**1.600**	**1.829**	**6.805**	**13.177**	**12.227**	**12.110**	**16.356**	**Cont.**	**Cont.**
W2269 EAF Matting		**2.052**	**3.539**	**4.212**	**0.871**	**0.000**	**0.000**	**0.000**	**0.000**	**18.512**
Quantity of RDT&E Articles										

A. Mission Description and budget Item Justification: This Navy unique program addresses all technology areas associated with Navy/Marine Corps aircraft operations aboard ships. The program includes:

- (U) (S1722) -- Development of standardized, supportable and maintainable aircraft carrier weapons elevators components.

- (U) (42208 formerly 22208) -- Development of ship hull, mechanical, propulsion, electrical, aviation and combat support systems, subsystems and components to significantly improve aircraft carrier affordability, survivability and operational capabilities and to meet the requirements of existing and pending regulations and statutes critical to the operation of existing and future aircraft carriers.

- (U) (42678) -- Development of technologies for transition from CVN77 to CVNX, for demonstrating enhanced capabilities for CVNX, and for mitigating CVNX cost or technical risk.

- (U) (42693 formerly S2693) - Supports post Milestone 0 ship system technical definition and initial cost estimates through studies for various ship alternatives being considered in the Analysis of Alternatives (AOA). The project supports interim Operational Requirements Document (ORD) preparation and develops the primary supporting documentation for Milestone I decision.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY / BA 4**	R-1 ITEM NOMENCLATURE Carrier Systems Development - 0603512N

- (U) (W1723) -- Development of all systems required to provide approach and landing guidance and control, recovery, service, support and launch aircraft operating onto or from ships. Payoffs include increased safety, greater sortie generation rates, enhanced aircraft boarding rates, reduced manning, increased aircraft service life and fleet modernization.

- (U) (W2269) -- Development of Lightweight Mat and Expeditionary Arresting Gear for use at Marine Corps Expeditionary Airfields (EAF).

- (U) NOTE: FY 2000 total PE amount contains ($3,215) which is the portion of extramural program is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

B. Program Change Summary:

	FY 1999	FY 2000	FY 2001
(U) FY 2000 President's Budget:	109.208	142.783	138.976
(U) Appropriated Value:	109.208	142.783	
(U) Adjustment to FY 99/00 Appropriated Value/FY 2000 PRESBUDG	-3.421	-0.826	9.976
(U) FY 2001 PRES Budget Submit:	105.787	141.957	148.952

Funding:

FY99 change ($-3.421)

($-2.678) SBIR reductions, ($-.590) Inflation savings and various adjustments, ($-.153) (S1722) Recoupment of Future Carrier Below Threshold Reprogramming.

FY00 change ($-.826)

($-.788) Across-the-board reductions, ($-.038) (42208) Strategic Sourcing Redistribution.

FY01 change (+9.976)

($-3.197) Final Rebalancing and various adjustments
($-.789) Strategic Sourcing Redistribution.
($-.868) (42208) Offsets required to finance high priority O&M,N deficiencies.
($12.000) (42208) Rephase Smart Carrier
($2.830) (W1723) Reflects programmatic increase for CROV and AAGE.

Schedule: (U) W1723 -- The deferral of the VISUAL program Milestone II from 4th quarter FY99 to 2nd quarter FY00 are due to delays in developing, coordinating, and finalizing program documentation. Also, funding realignments driven by emergent, higher priority requirements retarded development efforts, deferring the EDM award by three months (1Q to 2Q FY00) and delaying RFP release by two quarters (2Q to 4Q FY99).

Technical: Not applicable.

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Carrier Systems Development - 0603512N**				PROJECT NAME AND NUMBER CV Weapons Elevator Improvements S1722					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**0.750**	**1.020**	**1.052**	**1.067**	**1.064**	**1.082**	**1.114**	**Cont.**	**Cont.**
RDT&E Articles Qty										

A. Mission Description and Budget Item Justification

This project provides for advanced development, fabrication, test, evaluation and documentation of standardized aircraft carrier weapons elevators components such as control systems, hoist machinery, doors and hatches. Emphasis is placed on the reduction of total ownership cost, improvement of safety, reliability, maintainability and watertight integrity and weight reduction.

- (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

FY 1999 ACCOMPLISHMENTS:
(U)($.240) – Conducted investigation and engineering analysis for integration of multiple controllers into Control Net.
(U)($.200) – Procured linear actuators.
(U)($.210) – Completed development and test of embedded sensors in conjunction with Programmable Logic Controller (PLC).
(U)($.100) – Installed linear actuators on Land Based Engineering Site (LBES) test site.

FY 2000 PLAN:
(U)($.150) – Complete linear actuator tests.
(U)($.075) – Complete alternative governor research.
(U)($.165) – Complete alternative governor testing.
(U)($.330) – Develop intelligent controls for multiple car systems.
(U)($.300) – Complete linear drive ropeless elevator research.

FY 2001 PLAN:
(U)($.387) – Complete design for model ropeless elevator.
(U)($.300) – Develop simulation model for multiple cars in non-traditional trunk.
(U)($.165) – Investigate reconfigurable power supplies.
(U)($.200) – Develop design for non-traditional trunk installation at LBES.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Carrier Systems Development - 0603512N**	PROJECT NAME AND NUMBER CV Weapons Elevator Improvements S1722

B. Other Program Funding Summary: Not applicable

C. Acquisition Strategy: Not applicable

D. Schedule Profile.

	FY 1999	FY 2000	FY 2001
Program Milestones	3Q Completed Multiple PLC Investigations	2Q Complete Alternative governor research 4Q Complete linear drive ropeless elevator research	3Q Complete design for ropeless elevator
Engineering Milestones		3Q Develop intelligent multiple car controls	4Q Develop simulation model for multiple cars 2Q Investigate reconfigurable power supplies 4Q Develop design for non-traditional trunk at LBES
T&E Milestones	3Q Completed embedded sensor tests	1Q Complete linear actuator test 4Q Complete alternative governor test	
Contract Milestones	3Q Procured linear actuator		

Exhibit R-3 Cost Analysis (page 1)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**		PROGRAM ELEMENT **Carrier Systems Development - 0603512N**			PROJECT NAME AND NUMBER CV Weapons Elevator Improvements S1722							
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	WR	NSWC Philadelphia		0.540	12/98	1.020	12/99	1.052	12/00	Cont.	Cont.	Cont.
Ancillary Hardware Development		Misc	0.821									
Systems Engineering												
Licenses												
Tooling												
GFE												
Award Fees												
Subtotal Product Development			0.821	0.540		1.020		1.052		Cont.	Cont.	Cont.
Remarks:												
Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												

Exhibit R-3 Cost Analysis (page 2) | DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N / BA 4**

PROGRAM ELEMENT: **Carrier Systems Development - 0603512N**

PROJECT NAME AND NUMBER: CV Weapons Elevator Improvements S1722

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NSWC Philadelphia	0.000	0.210	12/98	0.000				Cont.	Cont.	Cont.
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.000	0.210		0.000		0.000		Cont.	Cont.	Cont.
Remarks:												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support											0.000	
Travel											0.000	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
Total Cost			0.821	0.750		1.020		1.052		Cont.	Cont.	
Remarks:												

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Carrier Systems Development - 0603512N**				PROJECT NAME AND NUMBER Future Carrier R&D - 42208					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**18.742**	**111.040**	**122.521**	**128.428**	**57.468**	**63.534**	**58.479**	**Cont.**	**Cont.**
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification

This project provides for the development of aircraft carrier specific technologies, the infusion of the surface ship technology base into existing and future aircraft carriers and the potential realization of subsystem design capabilities not currently feasible. This project transitions the most promising technologies from the Navy technology base, other government laboratories, and the private sector into specific advanced development efforts. All systems developed in this project have the potential to support emerging requirements and other promising systems technologies for insertion into new aircraft carrier designs. The emphasis is directed toward developing ship hull, mechanical, propulsion, electrical, aviation and combat support systems, sub-systems and components to significantly improve aircraft carrier affordability, survivability, and operational capabilities and to meet the requirements of existing and pending regulations and statutes critical to the operation of future aircraft carriers.

- (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

FY 1999 ACCOMPLISHMENTS:

- (U) ($18.742) Propulsion Plant Development

- (U) ($1.600) Developed preliminary propulsion plant functional requirements. Commenced development of plant component arrangements, including size and weight of structural members and required shielding. Initiated sizing of major plant component foundations.

- (U) ($2.000) Initiated early stages of heat exchanger detailed design, including shock and sizing analyses, to reduce weight and cost while meeting power output requirements.

- (U) ($1.500) Developed initial fluid system functional requirements. Began developing fluid system schematics, descriptions and diagrams. Undertook preliminary main coolant pump hydraulic motor design.

- (U) ($1.600) Started description of functional requirements for instrumentation and control systems and equipment. Began developing advanced propulsion plant control and automation schemes with analysis of manpower cost.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Carrier Systems Development - 0603512N**	PROJECT NAME AND NUMBER Future Carrier R&D - 42208

- (U) ($4.130) Determined preliminary electric system functional requirements. Performed electrical plant computer modeling and analysis. Established turbine generator power rating and voltage, and did conceptual design. Initiated development of procurement specifications. Identified electric plant interface constraints and began refining layout concepts to ensure compatibility with NIMITZ hull form.

- (U) ($3.200) Developed preliminary steam plant performance and functional requirements. Established structural member sizes for major steam plant component foundations. Identified steam plant interface constraints and began refining layout concepts to ensure compatibility with the NIMITZ hull form.

- (U) ($4.712) Began identifying potential impacts of new propulsion plant systems on hull and watertight bulkhead penetrations. Began developing and integrating non-propulsion mechanical systems with the propulsion plant including water purification; potable water; fire main and other fire fighting systems; heating, ventilation, and air conditioning; and ship service air systems. Assessed preliminary sizing of emergency generator support systems.

FY 2000 PLAN:

- (U) ($45.300)-Non-Nuclear Propulsion Plant Development

- (U) ($15.900) Begin preliminary turbine generator design, develop testing requirements and identify required testing capabilities for a prototype unit. Produce turbine generator schematic diagrams identifying all ship and system connections.

- (U) ($5.800) Integrate Non-Propulsion equipment into the Steam and Electric Equipment layouts. Determine major system requirements and performance criteria and provide information for the integrated product model. Establish non-propulsion systems interface requirements with propulsion plant and power distribution systems.

- (U) ($7.000) Continue developing enhancements to the product data management software and prototype automated workflow for construction deliverables. Develop design analysis features required for propulsion plan design development.

- (U) ($16.600) Begin developing conceptual designs for optimized mechanical and electrical systems that interface with the propulsion plant. Establish interface controls between propulsion and non-propulsion equipment. Develop optimal volume and weight requirements for these mechanical and electrical systems. Establish layout of doors, ladders, passageways, hatches, and escape trunks integrated with the optimal propulsion plant.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N / BA 4	**Carrier Systems Development - 0603512N**	Future Carrier R&D - 42208

- (U) ($34.616) – Aircraft Launch, Recovery & Support – Advanced Technology Launcher (ATL) Program Definition and Risk Reduction (PDRR) phase. Develop two, prototype, full size, fully integrated, reduced length, launcher systems. Validate System Specification. Initiate system engineering, technology assessment, and risk mitigation efforts. Conduct candidate energy storage, power electronics, control system and launch engine technology testing. Complete System Design Review and allocate Configuration Item performance requirements. Develop Configuration Item performance specifications. Complete Preliminary Design Review, initiate detailed design and development of product specifications. Initiate development of ATL Test Facility. Conduct site surveys and environmental impact studies. Identify facility and utility requirements. Complete architectural and engineering design. Initiate site construction. Initiate ATL Ship Integration Effort. Identify space and service allocation requirements for integration in CVN-68 class baseline hull. Prepare preliminary arrangement drawings identifying structural and arrangements impacts. Develop other hull, mechanical, and electrical system requirements.

- (U) ($4.577) – Battle Damage Prevention & Recovery – Initiate evaluation and development of Upgraded Armor Protection System – Littoral (UAPS - Littoral), Dynamic Armor Protection System (DAPS), Underwater Protection System (UWPS), and New Torpedo / Mine Side Protection System (New T/MSPS). Define threats and design goals. Develop preliminary system designs and determine installation feasibility within ship concept designs. Develop plans for procurement and development of scaled test components. Prepare test facilities for small scale testing. Commence refinement of analytical capabilities. Improve Hull Girder analytic capability as part of Weapons Damage & Residual Strength analysis. Define design, producibility and material property goals for General Protective Plate and Advanced Shock Isolation of Equipment. Develop performance requirements for Advanced Damage Control System (ADCS). Commence fire vulnerability study in support of initiatives targeted at reducing operation and support costs of related systems. Commence development of enhanced damage control and firefighting concepts. Characterize topside threats for Topside Survivability. Characterize threats and evaluate use of explosive load reduction and anti-fratricide shielding protection techniques in support of Sympathetic Detonation Suppression System (SDSS) development. Commence development of improved weapons effects codes for Advanced Survivability Assessment Model (ASAP) and the application of finite element and hydro codes to provide enhanced modeling and simulation support for development of advanced passive survivability features.

- (U) ($1.384) – Manpower and Material Support – Initiate development of manpower and material support alternatives to achieve manpower reductions and total ownership cost savings. Included will be the development of advanced robotics for ship systems and components operation, maintenance and material handling in the areas of combat and intelligence, logistics and Hull Mechanical & Electrical (HM&E). A standardized open system architecture approach will be incorporated into system and component development.

- (U) ($20.817) - Combat and Intelligence Systems – Complete Phase II competitive solicitation for Combat Systems Integration concepts and design process. Continue monitoring improvements targeted at reducing the operational and support costs of the ship's war fighting systems. Initiatives remain focused on reducing the number of systems through the use of "multi-function"/"volume search" radars and flat planar antenna arrays, data exchange across operational areas, data fusion, and integrated displays for operators. Complete trade studies, including those that result in cost reductions without degrading operational performance into the design development. Evaluate and complete competitive Combat Systems Integration design development and integrate into the ship contract data package. Commence Phase III Design Refinement. Refine Combat Systems Integration design and integrate into the ship design.

- (U) ($4.346) – Systems Development – Support CVNX Engineering Team for design, engineering and interoperability analysis to support Milestone I. Also support for Requirements and AOA Teams for TOC reductions/analysis, survivability analysis and CVNX Advanced Launch & Recovery, and trade studies and Lethality Studies (ORD Specific). Provide acquisition planning support.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N / BA 4	**Carrier Systems Development - 0603512N**	Future Carrier R&D - 42208

FY 2001 PLAN:

- (U) ($50.767) Non-Nuclear Propulsion Plant Development

- (U) ($18.130) Continue preliminary turbine generator and main propulsion turbine design, development of testing requirements and identification of testing capabilities, and start prototype development.

- (U) ($6.270) Determine changes to and complete layout of major electric plant equipment such as load centers outside of propulsion plant spaces. Continue development of inputs to the integrated product model database. Refine interface requirements for the non-propulsion systems with the propulsion and power distribution systems.

- (U) ($7.840) Continue prototyping and implementation of automated workflow for construction deliverables. Continue developing specialized analysis software required for propulsion plant design development and continue adding design data to the database.

- (U) ($18.527) Complete preliminary designs and continue development of mechanical and electrical systems that interface with the propulsion plant. Finalize optimal layout of non-propulsion plant mechanical and electrical systems and assess preliminary volume and weight data .

- (U) ($46.745) – Aircraft Launch, Recovery & Support – Continue Advanced Technology Launcher (ATL) Program Definition and Risk Reduction (PDRR) phase. Complete prototype long lead configuration item product specifications. Complete prototype long lead configuration item product specifications. Conduct Critical Design Review on prototype long lead items and release for procurement/manufacture. Complete Critical Design review on remaining prototype configuration items and initiate procurement/manufacture of Advanced Technology Launcher Program Definition and Risk Reduction phase systems. Continue construction of Advanced Technology Launcher Land Based test Facility. Conduct ship integration trade studies. Identify impacts of candidate launcher configurations on CVN-68 class baseline hull. Recommend system changes to optimize launcher for ship installation and operation. Develop recommended configurations for auxiliary system enhancements required for launcher installation based on prototype design effort. Develop electrical power and distribution system requirements in support of CVNX-1 engineering plant development. Initiate detailed arrangement and system design proposals to support Advanced Technology Launcher integration.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N / BA 4	**Carrier Systems Development - 0603512N**	Future Carrier R&D - 42208

- (U) ($7.300) – Battle Damage Prevention & Recovery – Commence procurement and development of scaled test components for UAPS – Littoral. Commence scaled testing of UAPS – Littoral concepts. Develop plan and commence procurement / construction of large scale test components. Commence small scale testing of DAPS concepts. Commence design of DAPS components. Continue refinement of analytical capability in conjunction with UWPS development. Commence small scale testing of candidate UWPS concepts. Continue assessment of ship design impacts due to these candidate concepts. Continue refinement of analytical capability in conjunction with New T/MSPS development. Commence small scale testing of candidate T/MSPS concepts. Develop plan to build and dynamically test hull girders / models as part of Weapons Damage & Residual Strength analysis. Develop plan and commence procurement of substructure test components for analyzing General Protective Plate concepts. Commence small scale testing of Advanced Shock Isolation of Equipment concepts. Assess ship design impacts of candidate shock isolation concepts. Determine installation feasibility of these candidate concepts. Continue development of enhanced damage control and firefighting concepts, including ADCS and portable sensors. Commence equipment identification (including COTS) for candidate DC / FF concepts. Complete fire vulnerability study in support of firefighting concept development. Conduct characterization tests and develop improvements to weapons effects codes in support of Topside Survivability protection concept development. Develop plans for scaled testing of staged ordnance concept. Continue development of improved weapons effects, finite element and hydro codes to provide enhanced modeling and simulation support for development of advanced passive survivability features.

- (U) ($2.000) – Manpower and Material Support – Continue development of manpower and material support alternatives which will achieve manpower reductions and total ownership cost savings. Develop advanced robotics for ship systems and components operation, maintenance and material handling in the areas of combat and intelligence, logistics and HM&E. Continue development of the standardized open systems architecture.

- (U) ($3.709) – Systems Development – Support CVNX Engineering Team for design, engineering and interoperability analysis to support overall CVNX Design Development. Also support for Requirements and an Analysis Teams for TOC reductions/analysis, survivability analysis and CVNX Advanced Launch & Recovery, and trade studies and Lethality Studies. Provide acquisition planning support.

- (U) ($12.000) - Smart Carrier - The Smart Carrier program is a PEO Carriers' initiative involving the introduction of information technology, automation and controls, and process improvements with the goal of reducing total workload, lowering total ownership cost (TOC), and enhancing quality of life. Evaluate New technologies for potential workload reductions, support advance planning and integrated work package development, and process reengineering efforts on prototype carrier.

CLASSIFICATION: **UNCLASSIFIED**

EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Carrier Systems Development - 0603512N**	PROJECT NAME AND NUMBER Future Carrier R&D - 42208	

B. Other Program Funding Summary

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
Related RDT&E:									
0604567N/42301 CV Contract Design	33.294	35.271	38.311	25.394	24.113	25.789	27.458	CONT	CONT
0603570N/S2692 Advance Nuclear Power System	0.000	68.687	99.212	104.800	142.352	132.321	119.880	688.000	1,355.252
Related SCN:									
200100 Carrier Replacement Program	122.897	749.601	4,075.522	146.826	428.159	1,323.287	128.834	CONT	CONT

C. Acquisition Strategy: The Carrier acquisition strategy for CVN77 and follow-on hulls is to utilize a phased design and technology insertion or "evolutionary" strategy. This strategy will focus on combat system redesign (topside) on CVN77, new propulsion plant and Advanced Technology Launcher on CVNX-1 and hull distributive systems and functional arrangements on the CVNX-2. On each hull, core capabilities will be maintained and Total Ownership Costs will be reduced in accordance with Carrier goals. As with past NIMITZ class carriers, the CVN77 will be awarded as a sole source Fixed Price Incentive Fee (FPIF) contract to Newport News Shipbuilding. For CVNX-1 and future hulls, various contracting methods are being considered.

D. Schedule Profile:

	FY 1999	FY 2000	FY 2001
Program Milestones	CVNX: 4Q AoA PART III CVNX: 1Q AoA PART II completed	CVNX: 2Q MS1	
Engineering Milestones		ATL: 2Q SRR ATL: 4Q PDR	ATL: 3Q CDR
T&E Milestones			
Contract Milestones		ATL: 1Q PDRR Phase	

UNCLASSIFIED

Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N / BA 4

PROGRAM ELEMENT: Carrier Systems Development - 0603512N

PROJECT NAME AND NUMBER: Future Carrier R&D - 42208

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Product Development												
Aircraft Launch, Recovery & Support	CPAF	Northrop Gumman				14.000	11/99	17.365	N/A	Cont.	Cont.	Cont.
	CPAF	General Atomics				14.000	11/99	17.365	N/A	Cont.	Cont.	Cont.
	WR	NAWC Lakehurst, NJ	2.711			2.236	11/99	2.483	11/00	Cont.	Cont.	Cont.
	ACES	NNS, Va				0.450	11/99	5.000	11/00	Cont.	Cont.	Cont.
	Various	Miscellaneous				0.600	11/99	0.618	11/00	Cont.	Cont.	Cont.
Battle Damage & Recovery	WR	NSWC/CD, MD	1.000			2.987	11/99	3.200	11/00	Cont.	Cont.	Cont.
	WR	APG, MD				0.000	11/99	1.000	11/00	Cont.	Cont.	Cont.
	ACES	NNS, Va				1.590	11/99	1.000	11/00	Cont.	Cont.	Cont.
	C	Miscellaneous	1.511			0.000	11/99	2.100	11/00	Cont.	Cont.	Cont.
Propulsion Plant Development	SS,CPFP	BETTIS, PA	9.000	18.739	11/98	45.300	11/99	0.000	N/A	0.000	73.039	73.039
	C	NNS, Va						50.767	11/00	57.200	107.967	107.967
	Various	Miscellaneous	2.299			0.000	N/A	0.000	N/A	Cont.	Cont.	Cont.
Manpower & Material Support	WR	NSWC/CD, MD				0.284	11/99	1.200	11/00	Cont.	Cont.	Cont.
	Various	Miscellaneous	2.298			0.300	11/99	0.000	N/A	Cont.	Cont.	Cont.
	C	Boeing, CA				0.800	11/99	0.800	11/00	Cont.	Cont.	Cont.
Systems Development	Various	Miscellaneous				4.346	11/99	3.709	11/00	Cont.	Cont.	Cont.
Combat & Intelligence Systems	C	NNS, Va				10.400	11/99	0.000	N/A	Cont.	Cont.	Cont.
		TBD				10.417	01/00	0.000	N/A	Cont.	Cont.	Cont.
Smart Carrier	Various	TBD						12.000	11/00	Cont.	Cont.	Cont.
Subtotal Product Development			18.819	18.739		107.710		118.607		Cont.	Cont.	Cont.
Remarks:												
Development Support Equipment											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												

Exhibit R-3 Cost Analysis (page 2)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, N / BA 4	Carrier Systems Development - 0603512N	Future Carrier R&D - 42208

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation												
Aircraft Launch, Recovery & Support	CFAF	Miscellaneous				3.166	11/99	3.745	11/00	Cont.	Cont.	Cont.
Operational Test & Evaluation												
Aircraft Launch, Recovery & Support												
Subtotal T&E			0.000	0.000		3.166		3.745		Cont.	Cont.	Cont.
Remarks:												
Contractor Engineering Support												
Aircraft Launch, Recovery & Support												
Program Management Support	CSS	TBD				0.164	11/99	0.169	11/00	Cont.	Cont.	Cont.
Travel												
Labor (Research Personnel)												
Overhead												
Subtotal Management			0.000	0.000		0.164		0.169		Cont.	Cont.	Cont.
Remarks:												
Total Cost			18.819	18.739		111.040		122.521		Cont.	Cont.	Cont.
Remarks:												

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Carrier Systems Development - 0603512N**				PROJECT NAME AND NUMBER CVN Technology Insertion - 42678					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**48.400**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**48.400**
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification:
This one year project was established to fund the research, development, test, and evaluation, and for acquisition of technologies for use in the CVN77 aircraft carrier program. Specifically, the technologies funded are those which transition from the CVN77 aircraft carrier program to the CVNX aircraft carrier program, that demonstrate enhanced capabilities for the CVNX aircraft carrier program, and that mitigate the cost or technical risks of that program.

FY 1999 ACCOMPLISHMENTS:

- (U) ($14.517) Established contractor and management interface to the integrated product data environment to coordinate design development and manufacturing processes to achieve life cycle cost reductions. Established data transfer protocols for the exchange of design data between shipyards. Developed product data management software for propulsion plant design and analyzed data. Identified advanced analysis capabilities required for design development and began testing product modeling software.

- (U) ($18.099) Completed functional requirement documents for command and control, weapons and sensors, external communications, mission planning, computing architecture, ship interface boundaries, and test and evaluation. Identified and commenced trade studies intended to reduce cost without degrading operational performance. Commenced Phase II; completing competitive solicitation and evaluation of solicitations to determine final two proposed integrators. Continued Combat Systems Integration concepts and design process. Identified updates to CVN77 Contract Design ILS/Configuration Management Plan.

- (U) ($15.784) Supported CVNX Engineering Team for design, engineering and interoperability analysis to support Milestone I. Also supported Requirements and AOA Teams for TOC reductions/analysis, survivability analysis and CVNX Advanced Launch & Recovery, and trade studies and Lethality Studies (ORD Specific). Provided acquisition planning support.

FY 2000 PLAN: Not applicable.

FY 2001 PLAN: Not applicable.

EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Carrier Systems Development - 0603512N**	PROJECT NAME AND NUMBER CVN Technology Insertion -- 42678	

B. Other Program Funding Summary

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
Related RDT&E:									
0604567N/42301 CV Contract Design	33.294	35.271	38.311	25.394	24.113	25.789	27.458	CONT	CONT
Related SCN:									
200100 Carrier Replacement Program	122.897	749.601	4,075.522	146.826	428.159	1,323.287	128.834	CONT	CONT

C. Acquisition Strategy: The Carrier acquisition strategy for CVN77 and follow hulls is to utilize a phased design and technology insertion or "evolutionary" strategy. This strategy will focus on combat system redesign (topside) on CVN77, new propulsion plant and Advanced Technology Launcher on CVNX-1, and hull, distributive systems and functional arrangements on the CVNX-2. On each hull, core capabilities will be maintained and Total Ownership Costs will be reduced in accordance with Carrier goals. As with past NIMITZ class carriers, the CVN77 will be awarded as a sole source FPIF contract to Newport News Shipbuilding. For CVNX-1 and future hulls, various contracting methods are being considered.

D. Schedule Profile:

	FY 1999	FY 2000	FY 2001
Program Milestones	CVNX: 4Q AoA PART III CVNX: 1Q AoA PART II completed	CVNX: 2Q MS1	
Engineering Milestones		ATL: 2Q SRR ATL: 4Q PDR	ATL: 3Q CDR
T&E Milestones			
Contract Milestones		ATL: 1Q PDRR Phase	

Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N / BA 4

PROGRAM ELEMENT: Carrier Systems Development - 0603512N

PROJECT NAME AND NUMBER: CVN Technology Insertion - 42678

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	C	AME Arlington, Va		2.000	01/99						2.000	
	C	JJMA, Arlington Va		2.000	01/99						2.000	
	C	NNS, Va		18.500	01/99						18.500	
	WR	NSWC CD Va		4.200	01/99						4.200	
	WR	NAWC Lake Va		2.500	01/99						2.500	
	SS,CPFP	BETTIS, Pa		14.517	01/99						14.517	
	C	Contractor, Various		2.576	01/99						2.576	
	WR	Navy Field, Various		2.107	01/99						2.107	
Subtotal Product Development			0.000	48.400		0.000		0.000		0.000	48.400	

Remarks:

Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks:

Exhibit R-3 Cost Analysis (page 2)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, N / BA 4	Carrier Systems Development - 0603512N	CVN Technology Insertion - 42678

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation											0.000	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support											0.000	
Travel											0.000	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
Total Cost			0.000	48.400		0.000		0.000		0.000	48.400	
Remarks:												

EXHIBIT R-2a, RDT&E Project Justification							DATE: **February 2000**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Carrier Systems Development - 0603512N**				PROJECT NAME AND NUMBER Carrier Systems Definition - 42693					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**34.243**	**24.529**	**14.362**	**13.088**	**0.000**	**0.000**	**0.000**	**Cont.**	**Cont.**
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification: This project performs the Ship Feasibility Studies required after Milestone 0 (MS 0) to address a specific Mission Needs Statement (MNS) and support the Analysis of Alternatives (AOA) for the Future Carrier (CVNX) Program; performs impact studies of aircraft/air wing composition, propulsion, hull alternatives, combat systems, machinery and electrical subsystems, and cost on CVNX designs, supports the development of the Operational Requirements Document (ORD) and other documentation required at Milestone I. Completion of this phase allows review and approval, at Milestone I, to transfer a ship program to the Contract Design Program Element 0604567N. Ship Feasibility Study products include a description of the alternative ships' principal characteristics and mission critical subsystems, weight estimates, general arrangement sketches, technical risk assessments, and Class F cost estimates. The objective is to provide the decision-makers with feasible, affordable alternatives.

- (U) PROGRAM ACCOMPLISHMENTS AND PLANS:

FY 1999 ACCOMPLISHMENTS:

- (U) ($29.372) Identified and evaluated propulsion plant functional and manning requirements, performed conceptual studies and analyzed component arrangements. Evaluated possible turbine generator power ratings and voltages, identified performance requirements, and established conceptual designs. Developed electric and steam plant weight and volume estimates and determined impacts on stability and survivability. Assessed preliminary sizing of emergency generator support systems and major propulsion plant component foundations. Evaluated shock and sizing analyses of heat exchanger designs. Reviewed possible instrumentation and control systems and equipment. Identified interface constraints and began refining layout concepts to ensure compatibility with the NIMITZ hull form. Identified and assessed potential impacts of new propulsion plant systems on hull and watertight bulkhead penetrations. Identified non-propulsion mechanical system concepts to be developed and integrated with the propulsion plant.

- (U) ($4.871) Supported CVNX Engineering Team for design, engineering and interoperability analysis to support Milestone I. Also supported Requirements and AOA Teams for TOC reductions/analysis, survivability analysis and CVNX Advanced Launch & Recovery, and trade studies and Lethality Studies (ORD Specific). Provided acquisition planning support.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Carrier Systems Development - 0603512N**	PROJECT NAME AND NUMBER Carrier Systems Definition -- 42693

FY 2000 PLAN:

- (U) ($13.122) Conduct ORD level requirements definition, industrial capability assessments, risk assessment and management, schedule development and tracking, and threat assessments necessary to insure a coordinated acquisition effort. Develop an Integrated Master Plan. Develop the Test and Evaluation Master Plan. Develop logistics requirements including integrated logistics assessments, maintenance planning, supportability analysis, logistics process improvements, computer resource requirements analysis, and manpower/workload assessments. Develop cost model and baseline cost estimate.

- (U) ($11.407) Conduct engineering effort associated with the CVNX Ship Development phase to develop ship requirements and definition at the total system level. Conduct trade studies to support total ship definition including baseline design/build budget and baseline cost estimate. Further develop Integrated Product Process Development (IPPD).

FY 2001 PLAN:

- (U) ($8.872) Continue to conduct ORD level requirements definition, industrial capability assessments, risk assessment and management, schedule development and tracking, and threat assessments necessary to insure a coordinated acquisition effort. Continue to develop an Integrated Master Plan and the Test and Evaluation Master Plan. Continue development of logistics requirements including integrated logistics assessments, maintenance planning, supportability analysis, logistics process improvements, computer resource requirements analysis, and manpower/workload assessments. Continue to develop cost model and baseline cost estimate.

- (U) ($5.490) Continue to conduct engineering effort associated with the CVNX Ship Development phase to develop ship requirements and definition at the total system level. Continue trade studies to support total ship definition including baseline design/build budget and baseline cost estimate. Further develop IPPD.

CLASSIFICATION: **UNCLASSIFIED**

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Carrier Systems Development - 0603512N**	PROJECT NAME AND NUMBER Carrier Systems Definition - 42693

B. Other Program Funding Summary

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
Related RDT&E:									
0604567N/42301 CV Contract Design	33.294	35.271	38.311	25.394	24.113	25.789	27.458	CONT	CONT
0603570N/S2692 Advance Nuclear Power System	0.000	68.687	99.212	104.800	142.352	132.321	119.880	688.000	1,355.252
Related SCN:									
200100 Carrier Replacement Program	122.897	749.601	4,075.522	146.826	428.159	1,323.287	128.834	CONT	CONT

C. Acquisition Strategy: The Carrier acquisition strategy for CVN77 and follow hulls is to utilize a phased design and technology insertion or "evolutionary" strategy. This strategy will focus on combat system redesign (topside) on CVN77, new propulsion plant and Advanced Technology Launcher on CVNX-1, and hull, distributive systems and functional arrangements on the CVNX-2. On each hull, core capabilities will be maintained and Total Ownership Costs will be reduced in accordance with Carrier goals. As with past NIMITZ class carriers, the CVN77 will be awarded as a sole source FPIF contract to Newport News Shipbuilding. For CVNX-1 and future hulls, various contracting methods are being considered.

D. Schedule Profile:

	FY 1999	FY 2000	FY 2001
Program Milestones	CVNX: 4Q AoA PART III CVNX: 1Q AoA PART II completed	CVNX: 2Q MS1	
Engineering Milestones		ATL: 2Q SRR ATL: 4Q PDR	ATL: 3Q CDR
T&E Milestones			
Contract Milestones		ATL: 1Q PDRR Phase	

Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N / BA 4

PROGRAM ELEMENT: Carrier Systems Development - 0603512N

PROJECT NAME AND NUMBER: Carrier Systems Definition - 42693

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Product Development	SS, CPFF	BETTIS, PA	6.000	29.372	11/98	0.000	N/A	0.000	N/A	0.000	35.372	35.372
		AME, VA	4.800	2.051	02/99	2.000	11/99	2.000	11/00	Cont.	Cont.	Cont.
	C, CPFF	JJMA, VA	5.200	1.000	02/99	1.000	11/99	1.000	11/00	Cont.	Cont.	Cont.
	C, CPFF	NSWC/CD, MD	3.000			1.000	11/99					
	WR	NSWC/DD, VA	1.500			1.000	11/99					
	WR	Miscellaneous	10.624	0.503	02/99	2.000	11/99	2.000	11/00	Cont.	Cont.	Cont.
	Various	Miscellaneous		1.317	02/99	2.529	11/99	1.362	11/00	Cont.	Cont.	Cont.
	C	NNS				15.000	11/99	8.000	11/00	Cont.	Cont.	Cont.
Subtotal Product Development			31.124	34.243		24.529		14.362		Cont.	Cont.	Cont.

Remarks:

Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks:

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 2)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**		PROGRAM ELEMENT **Carrier Systems Development - 0603512N**				PROJECT NAME AND NUMBER Carrier Systems Definition - 42693						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation											0.000	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support											0.000	
Travel											0.000	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
Total Cost			31.124	34.243		24.529		14.362		Cont.	Cont.	N/A
Remarks:												

CLASSIFICATION: **UNCLASSIFIED**

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Carrier Systems Development - 0603512N**				PROJECT NAME AND NUMBER CV Launch & Recovery Systems - W1723					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**1.600**	**1.829**	**6.805**	**13.177**	**12.227**	**12.110**	**16.356**	**Cont.**	**Cont.**
RDT&E Articles Qty				**2**						

A. Mission Description and Budget Item Justification: This project addresses the development of systems providing approach and landing guidance and control; recovery; service; support; and launch for aircraft operating on or from ships. Payoffs include increased safety, greater sortie generation rates, enhanced aircraft boarding rates, reduced manning, increased aircraft service life, and fleet modernization. Specific programs include:

The Virtual Imaging System for Approach and Landing (VISUAL): VISUAL will provide ship's force, the Landing Signal Officer (LSO), and pilots with enhanced images of the aircraft and ship in low visibility and night conditions during launch and recovery operations.

The Constant Run-Out/Retract Valve (CROV): The CROV development effort will replace the existing control and retract valves on the MK7 arresting gear in order to enhance performance and restore margins of safety. This program addresses the CV(N) OAG's Number 10 priority item (arresting gear improvements).

Advanced Arresting Gear Engine (AAGE): The AAGE replace the MK7 arresting gear engine - which has reached the limits of its operating capability. This program addresses the CV(N) OAG's Number 10 priority item (arresting gear improvements).

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

FY 1999 ACCOMPLISHMENTS:

(U) ($1,600) Completed design and integration of the VISUAL technology demonstration system and evaluation of critical technologies. Prepared documentation for Milestone II review in spring 2000. Prepared Engineering Development Model (EDM) RFP and planned for 2000 source selection. Provided continued engineering and management support to the program in anticipation of transition from Program Definition and Risk Reduction (PD&RR) to the Engineering and Manufacturing Development (E&MD) phase.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N	**Carrier Systems Development - 0603512N**	CV Launch & Recovery Systems - W1723

FY 2000 PLAN:

(U) ($1.529) Release VISUAL EDM phase solicitation. Review responses and select VISUAL EDM contractor. Achieve Milestone II decision to proceed to the E&MD phase. Provide engineering and management support to the program, particularly for the transition from the PD&RR phase to the E&MD phase of the program.

(U) ($.300) Develop CROV acquisition strategy, performance specification, milestone and contracting documentation, and source selection criteria. Develop performance requirements and statement of objectives.

FY 2001 PLAN:

(U) ($3.580) Release CROV RFP, conduct proposal review and select EDM contractor. Achieve Milestone I / II. Award contracts for design, analysis, computer simulation, and prototype manufacture of two (2) CROV and control systems test articles. Perform initial test planning and test facility modifications.

(U) ($3.225) Develop AAGE system specification solicitation documentation. Prepare program documentation and make all preparations for Milestone I. Provide engineering and management support to the program.

EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N**	PROGRAM ELEMENT NAME AND NUMBER **Carrier Systems Development - 0603512N**	PROJECT NAME AND NUMBER CV Launch & Recovery Systems - W1723	

B. Other Program Funding Summary: N/A

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete
Related RDT&E								
P.E. 0602122N (Aircraft Technology)	30.251	20.545	21.057	21.675	22.031	22.067	21.835	
P.E. 0604512N (Shipboard Aviation Systems)	8.189	9.002	9.833	8.669	8.866	6.555	6.784	

C. Acquisition Strategy:
VISUAL: The Navy is conducting system integration and risk reduction efforts at NAWCADLKE, and is preparing a performance specification and will competitively award a cost plus award fee contract to deliver EDMs, with fixed price production options.

CROV: The Navy is preparing a performance specification and will competitively award up to two cost plus award fee contracts to develop prototypes. The Navy will then conduct a down select for EDM and production systems.

AAGE: The Navy will award a cost plus award fee contract to develop the AAGE prototype. EDM and production quantities will be awarded on a sole source basis to the PD&RR phase contractor.

Schedule Profile:	FY 1999	FY 2000	FY 2001
Program Milestones		VISUAL: 2Q 00 MS II	CROV: 2Q 01 MS I / II
Engineering Milestones	VISUAL: 4Q 99 PDR		CROV: 3Q 01 PDR AAGE: 3Q 01 System Spec
T&E Milestones			
Contract Milestones	VISUAL: 4Q 99 RFP	VISUAL: 2Q 00 EDM Awd	CROV: 1Q 01 EDM Award AAGE: 3Q 01 RFP

Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, N	**Carrier Systems Development - 0603512N**	CV Launch & Recovery Systems - W1723

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	WX	NAWCAD, LKE	19.532	1.600	10/98	0.300	11/99	3.225	11/00	Cont.	Cont.	
Ancillary Hardware Dev-(CROV)	CPAF	TBD						3.580	12/00	Cont.	Cont.	
Ancillary Hardware Development	CPFF	Kaman,EM	4.900								4.900	
Licenses												
Design, Manufacturing (VISUAL)	CPAF	TBD				1.529	11/99				1.529	
Award Fees												
Subtotal Product Development			24.432	1.600		1.829		6.805		Cont.	Cont.	

Remarks:

Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	Cont.	

Remarks:

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 2) | DATE: **February 2000**

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, N	**Carrier Systems Development - 0603512N**	CV Launch & Recovery Systems - W1723

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation											0.000	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	Cont.	
Remarks:												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support											0.000	
Travel											0.000	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	0.000		0.000		0.000		0.000	Cont.	
Remarks:												
Total Cost			24.432	1.600		1.829		6.805		Cont.	11.291	Cont.
Remarks:												

EXHIBIT R-2a, RDT&E Project Justification							DATE: **February 2000**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Carrier Systems Development - 0603512N**				PROJECT NAME AND NUMBER EAF Matting W2269					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**2.052**	**3.539**	**4.212**	**0.871**	**0.000**	**0.000**	**0.000**	**0.000**	**18.512**
RDT&E Articles Qty			**2**							

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project addresses the Program Definition and Risk Reduction (PDRR) phase of the lightweight airfield mat and expeditionary arresting gear to meet naval aviation unique Expeditionary Airfield (EAF) operational requirements, including transportability requirements on Maritime Prepositioning Ships (MPS).

(U) The currently deployed EAF mat (AM-2) was developed for heavy fighter (such as the F-4) operations and is cumbersome to deploy. Lightweight (1/2 the weight of AM-2), less voluminous (1/2 the volume of AM-2), and easier to install (five days vice fifteen days to install a complete airfield) mat material may be technically feasible and commercially available, but must be evaluated for use with current type/model/series naval and Air Mobility Command (AMC) aircraft at conventional and Vertical and Short Take-off and Landing (V/STOL) airfields ashore. Candidate mat materials under consideration include reinforced synthetic composite materials and polyvinyl fiberglass. These mat materials will be configured and evaluated under Marine Corps operational scenarios.

(U) The expeditionary arresting gear program will provide the Marine Corps with the capability to conduct short span arrestments of designated Navy and Marine Corps tail hook equipped aircraft in the expeditionary environment. The current arresting gear (M-21) cannot be adapted to operate on short span (100 feet or less) surfaces and is incapable of arresting the current inventory under casualty (no flaps or half flap) conditions. The M-21 has inadequate reliability and several replacement components are no longer produced. The replacement gear, M-31, will provide air transportability, rapid setup, full inventory operational compatibility under all arrestment conditions, and adequate operational reliability. Two M-31 prototype systems will be built under this project.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

FY 1999 ACCOMPLISHMENTS:

(U) ($2.028) Evaluated alternative anchoring systems. Designed and initiated fabrication of prototyped M-31 arresting gear.

(U) ($.024) Portion of extramural program is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Carrier Systems Development - 0603512N**	PROJECT NAME AND NUMBER EAF Matting W2269	

FY 2000 PLAN:

(U) ($3.539) Complete fabrication of two prototype M-31 systems and initiate performance testing with deadloads.

FY 2001 PLAN:

(U) ($4.212) Complete performance testing with deadloads. Conduct mobility, environmental, and operability testing. Demonstrate compatibility and performance thresholds with aircraft.

B. Other Program Funding Summary

EAF OPN (PE 0206139M)

FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete
0	0	0	5.435	6.443	6.532	6.731	0

Related RDT&E: N/A

C. Acquisition Strategy: The advanced lightweight mat acquisition strategy envisions the solicitation of candidate material panels from commercial sources for evaluation in the laboratory and in the operational environment. Upon qualification of a viable material, limited production quantities will be procured for full scale environmental, performance, and operational testing. Production quantities will be procured from the commercial source in accordance with Marine Corps priorities.

The arresting gear acquisition strategy is predicated on the creation of a fully integrated team consisting of Navy and contractor personnel. Initial technology development and system design effort will be shared between the partners. The commercial partner will take the lead in the prototype manufacturing effort; the Navy partner will lead the test effort; and the commercial partner will ultimately be tasked with system production.

EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Carrier Systems Development - 0603512N**	PROJECT NAME AND NUMBER EAF Matting W2269	

D. Schedule Profile

	FY 1999	FY 2000	FY2001
Program Milestones			
Engineering Milestones	A/G PDR 1Q 99 CDR 4Q 99	A/G 2 Proto 4Q 00	
T&E Milestones			A/G DT 1Q-3Q 01
Contract Milestones			

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 1)

DATE: **February 2000**

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, N / BA 4	**Carrier Systems Development - 0603512N**	EAF Matting W2269

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	CPAF	ESCO	4.209	0.746	06/98	2.826	06/98	1.340	06/98	0.000	9.121	9.961
Ancillary Hardware Development	WX	NAWCAD LKE	3.629	1.306	10/98	0.713	10/99	2.872	10/00	0.307	8.827	N/A
Systems Engineering												
Licenses												
Tooling												
Award Fees	CPAF	ESCO								0.564	0.564	N/A
Non-Add BTR for M-31 A/G												
Subtotal Product Development			7.838	2.052		3.539		4.212		0.871	18.512	
Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks: None

Exhibit R-3 Cost Analysis (page 2)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, N / BA 4	Carrier Systems Development - 0603512N	EAF Matting W2269

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation											0.000	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks: N/A

Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support											0.000	
Travel											0.000	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks: N/A

Total Cost			7.838	2.052		3.539		4.212		0.871	18.512	

Remarks: N/A

EXHIBIT R-2, RDT&E Budget Item Justification								DATE: February 2000		
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**					R-1 ITEM NOMENCLATURE Shipboard System Component Development/0603513N					
COST ($ in Millions)		FY 1999	(7) FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		99.395	113.474	244.437	317.176	239.701	136.747	116.371	CONT.	CONT.
AGS-Advanced Gun System/32467		(1) 15.025	28.755	101.956	139.844	108.878	51.613	47.449	CONT.	CONT.
Undersea Warfare (USW)/32468		(2) 10.312	15.554	21.235	25.466	20.652	16.790	16.756	CONT.	CONT.
Shipboard Auxiliary System Development/S0382		2.927	(3)	0.000	0.000	0.000	0.000	0.000	0.000	N/A
Consolidated HM&E/32469		(4) 24.344	24.686	22.109	26.847	26.069	26.444	26.822	CONT.	CONT.
HM&E Improvement/S1712		0.957	(5)	0.000	0.000	0.000	0.000	0.000	0.000	N/A
Integrated Topside Design (ITD)/32470		13.022	(5) 13.756	15.080	18.742	14.760	15.040	15.387	CONT.	CONT.
Shipboard Sys Component Development/S2608		0.968	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.968
Integrated Power Systems (IPS)/32471		(6) 31.840	25.723	84.057	106.277	69.342	26.860	9.957	CONT.	CONT.
Man Overboard Indicator/32729		0.000	3.000	0.000	0.000	0.000	0.000	0.000	0.000	3.000
Ship Survivability & Personnel Protection/32730		0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
Advanced Water Jet Technology/S2751		0.000	1.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
Quantity of RDT&E Articles		0	0	0	0	*2/TBD	0	0		

Note (1) (U) FY 1999 funds were budgeted and executed under PE 0603795N/Project K2323 as displayed in the FY99 President's Budget exhibits. Funds from PE 0603795N/Project K2323 transitioned into PE 0603513N/Project 32467 in FY 2000 and out.

Note (2) (U) FY 1999 funds were budgeted and executed under PE 0603553N/Project V1704 as displayed in the FY99 President's Budget exhibits. Funds from PE 0603553N/Project V1704 (except Distant Thunder) transitioned into PE 0603513N/Project 32468 in FY 2000 and out.

Note (3) (U) FY 1999 funds were budgeted and executed under PE 0603513N/Project S0382 as displayed in the FY99 President's Budget exhibits. Funds from PE 0603513N/Project S0382 transitioned into PE 0603513N/Project 32469 in FY 2000 and out.

Note (4) (U) FY 1999 funds were budgeted and executed under PE 0603513N/Project S0382, PE 0603514N/Project S0384, PE 0603514N/Project S1565, and PE 0603563N/Project S2196 (only Affordability Through Commonality) as displayed in the FY99 President's Budget exhibits. Funds from PE 0603513N/Project S0382, PE 0603514N/Project S0384, PE 0603514N/Project S1565, and PE 0603563N/Project S2196 (only Affordability Through Commonality) transitioned into PE 0603513N/Project 32469 in FY 2000 and out.

Note (5) (U) FY 1999 funds were budgeted and executed under PE 0603513N/Project S1712 as displayed in the FY99 President's Budget exhibits. Funds from PE 0603513N/Project S1712 transitioned into PE 0603513N/Project 32470 in FY 2000 and out.

Note (6) (U) FY 1999 funds were budgeted and executed under PE 0603573N/Project S1314 as displayed in the FY99 President's Budget exhibits. Funds from PE 0603573N/Project S1314 (only Integrated Power System) transitioned into PE 0603513N/Project 32471 in FY 2000 and out.

Note (7) (U) $2.421M of the FY01 amount is that portion of the extramural program reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE Shipboard System Component Development/0603513N

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This Program Element (PE) has been modified in FY 2000 and out to focus on DD 21 associated systems development. Specific DD 21 associated systems development efforts that have been realigned under this PE include: the Advanced Gun Systems (formerly the Vertical Gun for Advanced Ships); Undersea Warfare; Integrated Topside Design; and Integrated Power Systems. In addition, a number of HM&E development tasks have been incorporated into a consolidated HM&E Project (32469) focused on DD 21. In FY 00, DD-21 was provided Congressional funding for Man Overboard Indicator, Ship Survivability & Personnel Protection, and Advanced Water Jet Technology. Man Overboard Indicator funds will be used to test and evaluate devices that improve the safety of flight and helicopter deck personnel. Ship Survivability & Personnel Protection funds will be used for the evaluation of commercial off-the-shelf, non-developmental items(COTS/NDI) for personnel protection and survivability equipment and technologies including personnel locators and NDI devices to facilitate improved casualty response. Advanced Water Jet (AWJ) Technology funds will be used to validate the performance of AWJ-21 using hydronumeric modeling and simulation design tools and small scale physical model tests.

(U) This PE now provides funds for the development of the DD 21 Class of U. S. Navy surface combatants and its components. The mission of the DD 21 class is to provide affordable credible independent forward presence/deterrence and operate as an integral part of Naval, Joint or Combined Maritime Forces. DD 21 will provide an advanced level of land attack in support of the ground campaign and contribute to Naval, Joint or Combined battlespace dominance in littoral operations. It will establish and maintain surface and sub-surface superiority, provide local air defense, and will incorporate signature reduction to operate in all threat environments. DD 21 will have seamless Joint Interoperability to integrate all source information for battlespace awareness and weapons direction.

* (U) For explanation of Test Articles see Projects 32467.

B. (U) PROGRAM CHANGE SUMMARY:

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	100.748	108.334	114.643
Appropriated Value:	135.958	113.334	
Adjustment to FY 1999/2000 Appropriated Value/	-36.563	+ 0.140	+129.794
FY 2000 President's Budget:			
FY 2001 PRES Budget Submit:	99.395	113.474	244.437

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE Shipboard System Component Development/0603513N

(U) The FY 1999 net decrease of $36.563M is due to decreases for comparability adjustment (-$22.911M), Restructure/Comparability (-$10.235M), Small Business Innovative Research (-$1.060M), Revised Economic adjustment (-$0.059M), Inflation Savings (-$0.459M), Below Threshhold Reprogrammings (-$0.047M), Congressional cut (-$3.000M), and Actual Update (-$1.994M) is offset by increases for Civilian Personnel underexecution (+$0.002M), Congressional add (+$1.000M), TOC Initiative (+$2.200M).
(U) The FY 2000 net increase of $.140M is due to Outsourcing restoration.
(U) The FY2001 net increase of $129.794 is due to miscellaneous increases (outsourcing restoration/NWCF rate adjustments) of (+$1.331), development of the Advanced Gun (+$73.100), development of DD 21 Integrated Power System (+$59.000), and miscellaneous decreases (contract efficiencies/revised economic assumptions) of (-$3.637).

(U) Schedule: See individual projects

(U) Technical Parameters: Technical parameters are contained in the DD 21 Operational Requirements Document (ORD) approved by JROC on 16 October 1997.

EXHIBIT R-2a, RDT&E Project Justification						DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Shipboard Sys Component Dev/0603513N**			PROJECT NAME AND NUMBER AGS-Advanced Gun System/32467					
COST ($ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost	(1) 15.025	28.755	101.956	139.844	108.878	51.613	47.449	CONT.	CONT.
RDT&E Articles Qty	0	0	0	0	2	0	0	CONT.	CONT.

Note (1) (U) FY 1999 funds were budgeted and executed under PE 0603795N/Project K2323 as displayed in the FY99 President's Budget exhibits. Funds from PE 0603795N/Project K2323 transitioned into PE 0603513N/Project 32467 in FY 2000 and out.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: These funds provide for the development of the Advanced Gun System (AGS) associated with the development of DD 21. The AGS will consist of a major caliber gun, an automated ammunition handling system and a family of munitions/propelling charges. The AGS will, at a minimum, meet the Land Attack and Surface Dominance Missions assigned to the gun system. The system will provide a high rate of fire (approximately 12 rounds per minute) with a magazine capacity sufficient in size for meeting USMC operational requirements. Land based testing of prototype hardware to verify system design will commence in FY 2003.

1. (U) FY 1999 ACCOMPLISHMENTS
- (U) ($0.770) Conducted congressionally directed independent analysis of AGS concepts and delivered report to Congress.
- (U) ($ 12.000) Completed AGS Concept Development phase under an existing agreement with Industry as an integral part of the DD 21 contract.
- (U) ($ 2.255) Defined AGS operational environment.

2. (U) FY 2000 PLAN
- (U) ($14.500) Initiate AGS Sub-system design phase.
- (U) ($4.055) Complete AGS munitions concepts; develop performance and interface specifications.
- (U) ($1.600) Develop proof of concept test fixture.
- (U) ($8.600) Develop Validation and Verification (V&V) tools for AGS.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Shipboard Sys Component Dev/0603513N**	PROJECT NAME AND NUMBER AGS-Advanced Gun System/32467

3. (U) FY 2001 PLAN
- (U) ($61.238) Complete AGS Sub-system design phase.
- (U) ($16.288) Initiate Engineering and Manufacturing Development (E&MD) for AGS munitions; Conduct Industry competition based on performance specifications.
- (U) ($5.141) Continue proof of concept test fixture development.
- (U) ($19.289) Continue development of V & V tools for AGS and AGS munitions.

B. (U) OTHER PROGRAM FUNDING SUMMARY:

COST ($ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
SC-21 Total Ship Systems/Engineering/0604300N	**120.704**	**161.118**	**305.274**	**303.989**	**617.796**	**763.620**	**857.350**	CONT.	CONT.

C. (U) ACQUISITION STRATEGY:

(U) The Navy will conduct a comparison of concepts for the DD 21 Advanced Gun System. The Advanced Gun System will be acquired in conjunction with the DD 21 development schedule. Initial phases will be conducted under section 845/804 other transaction authority. Initial phases include: Phase I – Concept Formulation, Phase II - Initial Prototype Development, Phase III - Subsystem Testing and Validation.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Shipboard Sys Component Dev/0603513N**	PROJECT NAME AND NUMBER AGS-Advanced Gun System/32467

D. (U) SCHEDULE PROFILE:

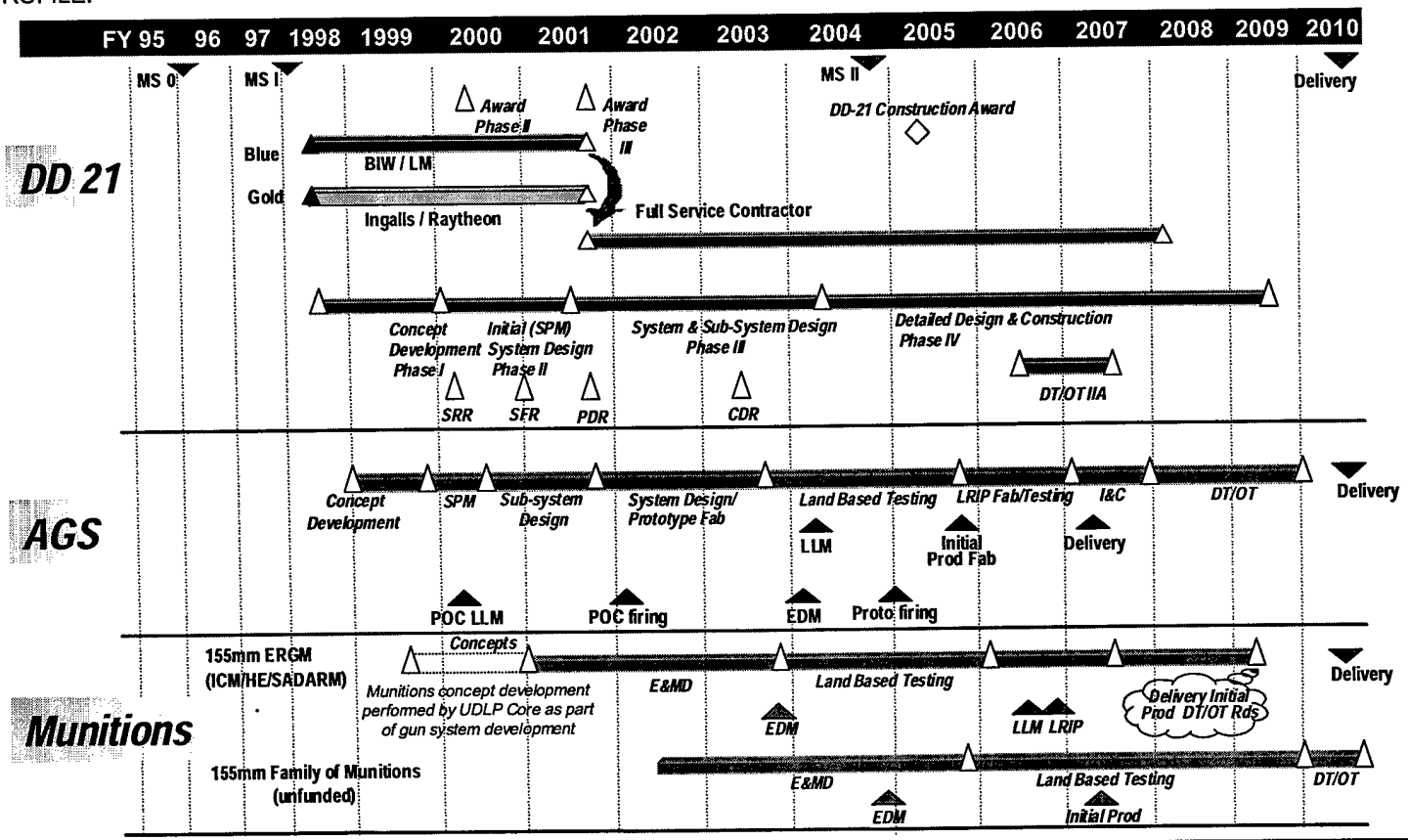


Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Shipboard Sys Comp Dev/0603513N**	AGS-Advanced Gun System/32467

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	Sec845/804	DD 21 Industry Teams	0.000	12.000	02/99	4.874	11/99	0.000	N/A	0.000	16.874	N/A
	Sec845/804	DD 21 Industry Teams	0.000	0.000		20.693	01/00	97.675	11/00	CONT.	CONT.	
Ancillary Hardware Development											0.000	
Systems Engineering											0.000	
Licenses											0.000	
Tooling											0.000	
GFE											0.000	
Award Fees											0.000	
Subtotal Product Development			0.000	12.000		25.567		97.675		CONT.	CONT.	

Remarks:

Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks:

Exhibit R-3 Cost Analysis (page 2) | DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Shipboard Sys Comp Dev/0603513N**	AGS-Advanced Gun System/32467

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation										CONT.	0.000	
Operational Test & Evaluation										CONT.	0.000	
Tooling										CONT.	0.000	
GFE										CONT.	0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks: (U) No developmental or operational evaluation is scheduled during this period.												
Contractor Engineering Support												
Government Engineering Support	WR	NSWC DD Dahlgen, VA	0.000	0.908	12/98	1.520	12/99	2.102	12/00	CONT.	CONT.	
	WR	NSWC PHD Pt Hueneme, CA	0.000	0.475	12/98	1.100	12/99	1.154	12/00	CONT.	CONT.	
	WR	NSWC IH Indian Head, MD	0.000	0.105	12/98	0.150	12/99	0.175	12/00	CONT.	CONT.	
	WR	NSWC CD Bethesda, MD	0.000	0.100	12/98	0.000	12/99	0.075	12/00	CONT.	CONT.	
	WR	SSCSD San Diego, CA	0.000	0.170	12/98	0.000	12/99	0.125	12/00	CONT.	CONT.	
	TBD	Various	0.000	1.267	03/99	0.418	Various	0.650	Various	CONT.	CONT.	
Program Management Support											0.000	
Travel											0.000	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	3.025		3.188		4.281		CONT.	CONT.	
Remarks:												
Total Cost			0.000	15.025		28.755		101.956		CONT.	CONT.	
Remarks:												

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Shipboard Sys Component Dev/0603513N**			PROJECT NAME AND NUMBER Undersea Warfare (USW)/32468					
COST ($ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost	(1) **10.312**	**15.554**	**21.235**	**25.466**	**20.652**	**16.790**	**16.756**	**CONT.**	**CONT.**
RDT&E Articles Qty	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**CONT.**	**CONT.**

Note (1) (U) FY 1999 funds were budgeted and executed under PE 0603553N/Project V1704 as displayed in the FY99 President's Budget exhibits. Funds from PE 0603553N/Project V1704 (except Distant Thunder) transitioned into PE 0603513N/Project 32468 in FY 2000 and out.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Undersea Warfare (USW) project provides advanced development demonstration and validation of technology for potential surface sonar and combat system application in conjunction with submarine efforts. Efforts focus on resolution of technical issues associated with providing capability against the year 2000 and beyond threat with emphasis on shallow water/littoral area USW and on Demonstration and Validation (DEM/VAL) of DD 21 Integrated Undersea Warfare (IUSW-21) concepts and technology. Key technology areas being investigated include: improvements in signal processing, advanced information processing, and multi-sensor data fusion to improve target detection and classification performance and reduce system manning requirements; and towed array, hull array and transducer technology to improve multi-static operation and in-stride mine avoidance. FY 2000 and subsequent efforts will focus on major technological and performance thrusts for DD 21 USW, which will define surface combatant USW capability for the Navy in the next century. These efforts will continue beyond DD 21 and provide improvements that apply across surface ship USW platforms. This project is funded as DEM/VAL because it develops and integrates hardware for experimental tests related to specific ship or aircraft applications.

1. (U) FY 1999 ACCOMPLISHMENTS
- (U) ($2.000) Began Concept Development for DD 21 Undersea Warfare, including risk mitigation plans and support for a Demonstration/Validation program to mitigate risk.
- (U) ($6.944) IUSW-21 BAA Risk Mitigation: Evaluated responses to a Broad Agency Announcement (BAA) and competitively awarded contracts and tasks to Industry, University and Government labs to mitigate risks associated with DD 21 USW system development. Risk mitigation addressed improvements in signal processing, advanced information processing, and multi-sensor data fusion to improve target detection and classification performance and reduced system manning requirements; and hull array and transducer technology to improve broad-band operation and in-stride mine avoidance.
- (U) ($1.368) IUSW-21 Systems Engineering: Completed IUSW-21 functional and operator task decomposition, identified technologies to be used to mitigate risks, established Dem/Val environment, oversaw risk mitigation effort, and conducted Dem/Val of products resulting from BAAs.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Shipboard Sys Component Dev/0603513N**	PROJECT NAME AND NUMBER Undersea Warfare (USW)/32468

2. (U) FY 2000 PLAN
- (U) ($5.000) DD 21 Industry Teams. Begin DD 21 USW initial system design. Participate in IUSW peer group and evaluate USW technologies.
- (U) ($2.244) DD-21 Industry Teams. Continue to advance USW technology to meet DD 21 requirements by competitively awarding contracts to further define mine avoidance, torpedo defense, and reduced manning risk mitigation efforts.
- (U) ($5.058) IUSW-21 BAA risk mitigation. Exercise FY00 option of BAAs awarded in FY99 to further define advanced information processing for automated detect classify and localize, data fusion, automated environmental adaptation, mine avoidance, and displays for reduced manning.
- (U) ($3.252) IUSW-21 System Engineering. Perform Integrated Peer Group (IPG) engineering reviews of IUSW-21 advanced technologies. Perform IUSW-21 ADM system engineering in preparation for FY02 at sea demonstration. Develop interface specifications and sea test plan

3. (U) FY 2001 PLAN
- (U) ($15.536) DD 21 Industry Teams. Continue DD 21 USW system design. Participate in IUSW peer group and evaluate USW technologies. Develop and integrate IUSW-21 advanced technologies into ADM demonstration system.
- (U) ($1.531) IUSW 21 Risk Mitigation. Exercise FY01 option of BAAs awarded in FY99 and other risk reduction efforts to further define advanced information processing for automated detect classify and localize, data fusion, automated environmental adaptation, mine avoidance, and displays for reduced manning.
- (U) ($4.168) IUSW-21 System Engineering. Perform IPG engineering reviews of IUSW-21 advanced technologies. Perform IUSW-21 ADM system engineering in preparation for FY02 at sea demonstration. Finalize ADM sea test demonstration plan.

B. (U) OTHER PROGRAM FUNDING SUMMARY:

COST ($ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
SC-21 Total Ship Systems/Engineering/0604300N	**120.704**	**161.118**	**305.274**	**303.989**	**617.796**	**763.620**	**857.350**	CONT.	CONT.

EXHIBIT R-2a, RDT&E Project Justification			DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER	
RDT&E, N/BA-4	**Shipboard Sys Component Dev/0603513N**	Undersea Warfare (USW)/32468	

C. (U) ACQUISITION STRATEGY:

(U) In Contracting Phase I and II, DD 21 will use Section 845/804 agreement authority for the efforts conducted by the DD 21 Industry Teams. BAAs will be competitively awarded to further refine advanced information processing, broadband signal processing, hull array technology, and integrated stern mitigation and to provide further risk mitigation for DD 21 USW activities. In Contract Phases II and III responsibility for IUSW-21 ADM development will be with the DD 21 Industry Teams.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Shipboard Sys Component Dev/0603513N**	PROJECT NAME AND NUMBER Undersea Warfare (USW)/32468

D. (U) SCHEDULE PROFILE:

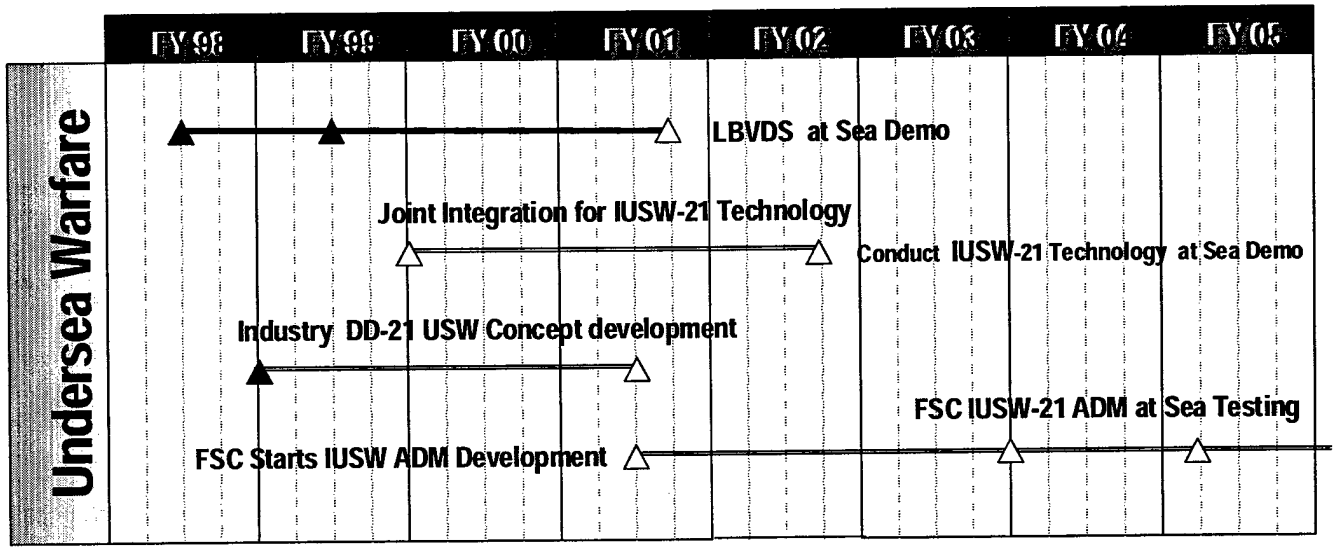


Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Shipboard Sys Comp Dev/0603513N**	Undersea Warfare (USW)/32468

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	Sec845/804	DD 21 Industry Teams	0.000	2.000	11/98	7.244	11/99	15.536	01/01	CONT.	CONT.	
	BAA/CPFF	Competition	0.000	6.944	03/99	5.058	Various	1.531	Various	CONT.	CONT.	
Ancillary Hardware Development											0.000	
Systems Engineering											0.000	
Licenses											0.000	
Tooling											0.000	
GFE											0.000	
Award Fees											0.000	
Subtotal Product Development			0.000	8.944		12.302		17.067		CONT.	CONT.	
Remarks:												
Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data	WR	NUWC/N Newport, RI	1.000	0.550	12/98	1.318	12/99	1.661	12/00	CONT.	CONT.	
	WR	NSWC DD Dahlgren, VA	0.200	0.075	12/98	0.300	12/99	0.400	12/00	CONT.	CONT.	
	SS/CPFF	APL/JHU Laurel, MD	0.400	0.162	12/98	0.400	12/99	0.500	12/00	CONT.	CONT.	
	SS/CPFF	APL/UW Seattle, WA	0.000	0.150	12/98	0.300	12/99	0.400	12/00	CONT.	CONT.	
	SS/CPFF	ARL/UT Austin., TX	0.000	0.150	12/98	0.300	12/99	0.400	12/00	CONT.	CONT.	
	SS/CPFF	ARL/PSU State Col, PA	0.000	0.150	12/98	0.300	12/99	0.400	12/00	CONT.	CONT.	
	C/CPFF	DSR Arlington, VA	0.000	0.000	N/A	0.134	12/99	0.167	12/00	CONT.	CONT.	
GFE											0.000	
Subtotal Support			1.600	1.237		3.052		3.928		CONT.	CONT.	
Remarks:												

Exhibit R-3 Cost Analysis (page 2)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**		PROGRAM ELEMENT **Shipboard Sys Comp Dev/0603513N**			PROJECT NAME AND NUMBER Undersea Warfare (USW)/32468							
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation											0.000	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support	GSA	Techmatics Arlington, VA	0.100	0.131	12/98	0.200	12/99	0.200	12/00	CONT.	CONT.	
Miscellaneous	PD/WR	Various	0.000	0.000	Various	0.000	Various	0.040	Various	CONT.	CONT.	
Travel											0.000	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.100	0.131		0.200		0.240		CONT.	CONT.	
Remarks:												
Total Cost			1.700	10.312		15.554		21.235		CONT.	CONT.	
Remarks:												

EXHIBIT R-2a, RDT&E Project Justification						DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Shipboard Sys Component Dev/0603513N**			PROJECT NAME AND NUMBER Consolidated Hull, Mechanical & Electrical Improvements (HM&E)/32469					
COST ($ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost	(1) **24.344**	**24.686**	**22.109**	**26.847**	**26.069**	**26.444**	**26.822**	**CONT.**	**CONT.**
RDT&E Articles Qty	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**CONT.**	**CONT.**

Note (1)) (U) FY 1999 funds were budgeted and executed under PE 0603513N/Project S0382, PE 0603514N/Project S0384, PE 0603514N/ Project S1565, and PE 0603563N/Project S2196 (only Affordability Through Commonality) as displayed in the FY99 Presidents Budget exhibits. Funds from PE 0603513N/Project S0382, PE 0603514N/Project S0384, PE 0603514N/Project S1565, and PE 0603563N/Project S2196 (only Affordability Through Commonality) transitioned into PE 0603513N/Project 32469 in FY 2000 and out.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project supports the advanced development of DD-21 HM&E ship survivability, auxiliary machinery, and Affordability Through Commonality (ATC) technologies and systems that will enable DD 21 survivability, manning, and life cycle cost goals to be met. The products developed under this project also support the existing fleet and other ship acquisition programs. Note that the efforts under this project were previously supported by four separate projects (See Note 1) and were consolidated to facilitate an integrated system development approach that ensures all design considerations are addressed. The following provides a mission description for each development area (i.e., Survivability, Auxiliary, and Affordability):

(U) Survivability: The survivability area supports development of systems and protection concepts that reduce vulnerability to conventional weapons and peacetime accidents and enables, under reduced manning conditions, a rapid recovery of mission capability. Development categories include damage control computer-based systems that provide for rapid systems restoration, fire protection devices that improve probability of survival with a reduced crew ship, and ship protection concepts that reduce magazine and commercial equipment vulnerability.

(U) Auxiliary: For existing and future ships, this funding: 1) improves reliability/maintainability of fluid, electrical, and mechanical systems and 2) supports reduced manning through automation of operational, maintenance, and day-to-day functions traditionally performed by the crew, and supports development of auxiliary systems to reduce ship magnetic signature and vulnerability to mines.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Shipboard Sys Component Dev/0603513N**	Consolidated Hull, Mechanical & Electrical Improvements (HM&E)/32469

(U) Affordability Through Commonality: The Affordability Through Commonality program develops, demonstrates, and validates architectures, technologies, and concepts that reduce total ownership cost of existing and future ships, especially future surface combatants. Focus areas are total ship open system architectures; total ownership cost methods and modeling; use of ownership cost reduction best practices from industry and other services; cost effective equipment selection, maintenance; and logistics support, and innovative,enabling technologies for total ownership cost reduction.

1. (U) FY 1999 ACCOMPLISHMENTS:

(U) SURVIVABILITY:

- (U) ($7.407) Conducted full scale underwater explosion shock proof-of-concept demonstration test of Advanced Ship Shock Isolation Systems (ASSIST) machinery mount and raft. Conducted DD 21 ship/ system integration design assessments and finalized machinery mount/ design requirements. Initiated ASSIST planning for DD 21 applicable demonstration employing mount, raft and machinery. Conducted full scale demonstration tests of the effectiveness of anti-fratricide shielding in preventing sympathetic detonation. Conducted DD 21 applicable ship/ launcher magazine protection integration studies. Initiated planning for all-up full scale Integrated Magazine Protection System (IMPS) proof-of-concept demonstration employing multiple missiles, launcher, anti-fratricide shielding and water suppression. Completed Real Time Stability Status (RTSS) Fleet evaluation aboard the USS Rushmore. Completed shipboard demonstration of Damage Control System (DCS) firemain reconfiguration management module. Completed fleet evaluations aboard the ex-USS SHADWELL to demonstrate the effectiveness of alternative reduced manning concepts. Developed preliminary shipboard procedures for firefighting in a chemical, biological, and radiological (CBR) environment. Conducted full scale weapon effects demonstrations of automated fire suppression system. Developed DD 21 automated chilled water system isolation and reconfiguration system options. Continued development of the Advanced Survivability Assessment Program (ASAP) fire and smoke model and initiated development of a crew casualty/damage control model. Initiated development of DD 21 firefighting devices/systems that provide for remote control of a firehose nozzle enabling sustained operations in a reduced manning environment. Conducted survey of commercial robotic firefighting devices, developed operational requirements and initiated prototype system design.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Shipboard Sys Component Dev/0603513N**	Consolidated Hull, Mechanical & Electrical Improvements (HM&E)/32469

(U) AUXILIARY SYSTEMS:

- (U) ($9.323) Continued development of advanced HM&E machinery and systems architectures to reduce manning and eliminate at-sea maintenance. Initiated low pressure air system full scale demonstration with Component Level Intelligent Distributed Control (CLIDC) system. Initiated laboratory demonstration of automated chilled water and other auxiliary systems with CLIDC systems. Completed evaluation of Polymer Current Limiters (PCL), Ground Fault Limiters (GFL). Continued development of Power Electronic Building Block (PEBB) based Auxiliary Multi-Functional Power Module (AMF PM). Completed GFL algorithm development, SHIPEVAL and implementation. Completed design, fabrication and LABEVAL of 100 ampere, single phase PCL for fuse replacement. Initiated PCL design for 3 phase fuse replacement. Completed concurrent engineering and cost analysis for AMF PM. Initiated development of a magnetic, onboard, self-monitoring, control system (CLDG) for steel hulled surface combatants including onboard sensor suites and control algorithms. Specified and initiated procurement of CLDG components. Completed development of the Underwater Closed Circuit Blasting System. Continued development of the Remotely Operated Vehicle (ROV) Power System. Completed development of the Transient Analysis Model for the Program of Ship Salvage Engineering (POSSE). Continued development of fuel cells for ship service power applications. Continued MCFC 2500 KW conceptual design and trade off analysis.

(U) AFFORDABILITY THROUGH COMMONALITY:

- (U) ($7.614) Affordability Through Commonality: Developed, demonstrated, and validated architectures, technologies, and concepts that reduce total ownership costs for the future fleet. Identified areas/methods for common, fleet-wide means to improve life cycle affordability of future naval ships and shipboard systems. Where feasible, backfit to existing ships was pursued. Focus of these efforts was on applications for on-going ship programs (DDG 51, DD21, CVN77, CVN(X)) and other ships in the SCN plan.

2. (U) FY 2000 PLAN:

(U) SURVIVABILITY/AUXILIARY SYSTEMS

- (U) ($4.280) Complete evaluation/upgrade of AMF PM brassboard and established requirements for prototype. Continue development of IMPS technologies. Complete laboratory demonstration of automated chilled water and other auxiliary systems with component level control; validate design tools. Continue development of the time-dependent, computer-based ASAP for use in evaluating ship designs. Complete development of the ASAP fire and smoke model and continue development of the crew casualty/damage control model. Continue full scale testing aboard the DDG 76 of the advanced closed loop degaussing system. Complete development of the ROV power system. Develop conceptual/preliminary designs of 2.5 megawatt (MW) Ship Service Fuel Cell Power Module and initiate detailed design of 0.5 MW reduced scale demonstrator. Initiate development of the Improved Shaft Coating System. Initiate development of the Smart Tow Monitoring System. Initiate close out of composite pump contract.
- (U) ($12.366) Begin initial system design and engineering of DD 21 survivability/auxiliary systems.
- (U) ($1.500) Initiate development of composite components and improved ventilation methods/materials that reduce sailor workload.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Shipboard Sys Component Dev/0603513N**	Consolidated Hull, Mechanical & Electrical Improvements (HM&E)/32469

(U) AFFORDABILITY THROUGH COMMONALITY:
- (U) ($2.334) Across Program Total Ship Open Systems Architecture: Continue Navy-Industry effort to develop, demonstrate, validate and implement fleet- wide open systems architectures (OSA) and non- proprietary standard interfaces. The OSA will employ commercial processes and commercial off the shelf material and equipment to the greatest extent practicable. Continue to refine the Total Ship Open Systems Architecture Framework, including improved guidance on the architecture definition, definition of standard interfaces, and market surveillance and technology projection processes. Continue to define risk mitigation and demonstration and validation projects for the TOSA concept.
- (U) ($3.706) Continue Total Ship Open System Architecture Demonstration and Validation.
- (U) ($0.500) Initiate development of improved commercial-based distribution systems for reduced sailor workload.

3. (U) FY 2001 PLAN

(U) SURVIVABILITY/AUXILIARY SYSTEMS
- (U) ($3.041) Complete development of IMPS technologies. Continue development of the time-dependent, computer-based ASAP for use in evaluating ship designs. Continue development of the ASAP crew casualty/damage control model. Continue full scale testing aboard the DDG 76 of the advanced closed loop degaussing system; update prediction algorithim. Continue development of advanced auxilary systems, components, and control systems. Complete design of 0.5 MW reduced scale demonstrator and initiate fabrication. Continue development of the Improved Shaft Coating System and the Smart Tow Monitoring System. Initiate planning for a full scale weapons effects demonstration of an automated fire fighting system for bulkhead boundary cooling and compartment sprinkling. Complete close out of composite pump contract.
- (U) ($9.107) Complete initial system design and engineering of DD 21 survivability/auxiliary systems. Begin system/subsystem development of survivability/auxiliary systems.
- (U) ($1.500) Continue development of composite components and improved ventilation methods/materials that reduce sailor workload.

(U) AFFORDABILITY THROUGH COMMONALITY:
- (U) ($2.029) Across Program Total Ship Open Systems Architecture: Continue Navy-Industry effort to develop, demonstrate, validate and implement fleet- wide open systems architectures (OSA) and non- proprietary standard interfaces. The OSA will employ commercial processes and commercial off the shelf material and equipment to the greatest extent practicable. Continue to refine the Total Ship Open Systems Architecture Framework. Investigate alternative total ship architecture concepts reflecting state-of-the-art concepts and practices for commercial industry and other services. Update the TOSA framework and guidance documents to reflect these evolving architectural concepts. Continue to define risk mitigation and demonstration and validation projects for the TOSA concept.
- (U) ($5.932) Total Ship Open System Architecture Demonstration and Validation
- (U) ($0.500) Continue development of improved commercial-based distribution systems for reduced sailor workload.

EXHIBIT R-2a, RDT&E Project Justification			DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Shipboard Sys Component Dev/0603513N**	PROJECT NAME AND NUMBER Consolidated Hull, Mechanical & Electrical Improvements (HM&E)/32469	

B. (U) OTHER PROGRAM FUNDING SUMMARY:

COST ($ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
SC-21 Total Ship Systems/Engineering/0604300N	**120.704**	**161.118**	**305.274**	**303.989**	**617.796**	**763.620**	**857.350**	CONT.	CONT.

C. (U) ACQUISITION STRATEGY:

(U) These development efforts were realigned into this project in an effort to consolidate related DD 21 RDT&E efforts and will be transitioned into the DD 21 acquisition strategy in FY 2000 and out.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Shipboard Sys Component Dev/0603513N**	PROJECT NAME AND NUMBER Consolidated Hull, Mechanical & Electrical Improvements (HM&E)/32469

D. (U) SCHEDULE PROFILE:

PROGRAM MILESTONES	FY 1999	FY 2000	FY 2001
Survivability/Auxiliary Systems Deliverables	4Q DD 21 ASSIST Machinery Integration Study 4Q DD 21 IMPS Ship Integration Study 4Q ASSIST UNDEX Machinery Mount Shock Tests 4Q IMPS Demonstration 4Q DCAMS Windows NT Software 4Q DCS Structural Training Software 3Q Remote Control Firefighting Operational Requirements 4Q Reduced Manning Option Evaluations 4Q Firemain Reconfiguration Shipboard Demonstration 4Q Automated Fire Supression Demonstration 3Q Complete GFL SHIPEVAL 4Q GFL Specification 4Q Design/Fabrication 30 PCL 4Q UW Closed Circuit Blast System 4Q Transient Analysis Model 4Q PEM FC Concept Design 4Q MCFC Preliminary Design 1Q Advanced Deg ATD transitions to Surfaces Combatants 4Q CLIDG System for Surface Combatants Defined 2Q Complete LP Air LEBEVAL 4Q Demo Functional Control System Design 4Q Validate Chilled Water Fluid Simulation	1Q Initial System Design 4Q ASAP Fire and Smoke Model 4Q ROV Power System 4Q 2.5 MW Ship Service Fuel Cell Power Module 2Q Initiate Smart Tow Monitoring System 3Q CLDG Ranging of DDG 76 4Q Validate Chilled Water Simulation & Design Tools 2Q Initiate Improved Shaft Coating System 4Q ROV Power System 2Q Prototype AMF PM Fabrication	1Q System/Subsystem Development 4Q ASAP Crew Casualty/DC Model

EXHIBIT R-2a, RDT&E Project Justification			DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER	
RDT&E, N/BA-4	**Shipboard Sys Component Dev/0603513N**	Consolidated Hull, Mechanical & Electrical Improvements (HM&E)/32469	

PROGRAM MILESTONES	FY 1999	FY 2000	FY 2001
Affordability Through Commonality (ATC)	4Q PODAC Cost Model Cost Estimating Relationships for Surface Combatants 4Q DD21 Alliance Teams Flexibility, Upgradeability, Supportability, Adapdability Concept Design efforts & technology transfer 4Q Advanced food service Technology demonstration 4Q Advanced pesonnel transfer Architecture implementation 4Q SEALINK/SAVERPRO implementation 4Q Open Systems Architecture interface developmen for open HVAC and open chilled water 4Q Containerized mission element module (CMEMS) concept development 4Q Open Structure Shock & Cost Analysis	4Q Open Systems Architecture Guidance development 4Q SEALINK TRANSITION 4Q DD21 Alliance Teams Flexibility, Upgradeability, Supportability, Adaptability preliminary design efforts & technology transfer 4Q Advanced material handling Architectures 4Q Advanced Accomodation Architectures 4Q Open C4ISR Zone concept development 4Q Open Structure Technology Development 4Q Open distributed data interface development	4Q Open System Architecture interface development for sensor Technologies 4Q DD21 alliance teams technology transfer and Assessments 4Q OSA guidance 4Q OSA business and development 4Q Open C4ISR demonstration 4Q Multi-function transfer system Architecture development 4Q Open distributed data interface implementation

Exhibit R-3 Cost Analysis (page 1)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**			PROGRAM ELEMENT **Shipboard Sys Comp Dev/0603513N**			PROJECT NAME AND NUMBER Consolidated Hull, Mechanical & Electrical Improvement (HM&E)/32469						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
SURVIVABILITY												
Primary Hardware Development												
Product Development	Sec845/804	DD 21 Industry Teams	0.000	2.020	11/98	12.366	11/99	9.107	10/00	CONT.	CONT.	N/A
	WR	NSWC CD Bethesda, MD	3.332	3.516	Various	2.500	Various	2.500	Various	CONT.	CONT.	
	Various	Other Govt Activities	3.018	1.336	Various	1.463	Various	0.805	Various	CONT.	CONT.	
	Various	Other Contractors	2.100	0.535	Various	1.817	Various	1.236	Various	CONT.	CONT.	
Ancillary Hardware Development											0.000	
Systems Engineering											0.000	
Licenses											0.000	
Tooling											0.000	
GFE											0.000	
Award Fees											0.000	
Subtotal Product Development			8.450	7.407		18.146		13.648		CONT.	CONT.	
Remarks: Auxiliary Systems will be consolidated with Survivability in FY 2000 and out												
AFFORDABILITY THROUGH COMMONALITY												
Engineering Dev, Demo & Eval	Sec845/804	DD-21 Industry Teams	0.000	2.500	11/98	4.611	11/99	5.883	10/00	CONT.	CONT.	
	WR	NSWC CD Bethesda, MD	2.795	2.141	Various	0.739	10/99	1.101	10/00	CONT.	CONT.	
	RC	NSWC CD Bethesda, MD	1.145	0.889	Various	0.000	N/A	0.000	N/A	CONT.	CONT.	
	Various	Other Govt Activities	1.129	0.984	Various	0.200	10/99	0.349	10/00	CONT.	CONT.	
	Various	Other Contractors	1.941	1.100	Various	0.990	Various	1.128	Various	CONT.	CONT.	
Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			7.010	7.614		6.540		8.461		CONT.	CONT.	
Remarks:												

Exhibit R-3 Cost Analysis (page 2) | DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA-4 | PROGRAM ELEMENT: Shipboard Sys Comp Dev/0603513N | PROJECT NAME AND NUMBER: Consolidated Hull, Mechanical & Electrical Improvement (HM&E)/32469

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation											0.000	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
AUXILLARY SYSTEMS												
Contractor Engineering Support											0.000	
Product Development	SEC 845/804	DD 21 Industry Teams	0.000	4.950	11/98	0.000	N/A	0.000	N/A	CONT.	CONT.	
	WR	NSWC CD Bethesda, MD	5.481	4.253	11/98	0.000	N/A	0.000	N/A	CONT.	CONT.	
	Various	Other Govt Activities	0.751	0.060	Various	0.000	N/A	0.000	N/A	CONT.	CONT.	
	Various	Other Contractors	0.564	0.060	01/99	0.000	N/A	0.000	N/A	CONT.	CONT.	
Program Management Support											0.000	
Travel											0.000	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			6.796	9.323		0.000		0.000		CONT.	CONT.	
Remarks: Auxiliary Systems will be consolidated with Survivability in FY 2000 and out.												
Total Cost			22.256	24.344		24.686		22.109		CONT.	CONT.	
Remarks:												

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000		
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER			PROJECT NAME AND NUMBER					
RDT&E, N/BA-4	**Shipboard Sys Component Dev/0603513N**			Integrated Topside Design (ITD)/32470					
COST ($ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost	(1) **13.022**	**13.756**	**15.080**	**18.742**	**14.760**	**15.040**	**15.387**	**CONT.**	**CONT.**
RDT&E Articles Qty	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**CONT.**	**CONT.**

Note (1) (U) FY 1999 funds were budgeted and executed under PE 0603513N/Project S1712 as displayed in the FY99 President's Budget exhibits.
Funds from PE 0603513N/Project S1712 transitioned into PE 0603513N/Project 32470 in FY 2000 and out.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project develops and integrates the necessary technologies to achieve a total integrated topside design focused on DD 21 and future surface combatant ships. Technology areas including topside signature control, sensor and antenna integration, weapon system integration, HM&E integration, related decision-making tools, and composite materials will be addressed. Other stand alone technology programs will be synergistically integrated with this topside design integration effort to assure total ship systems integration for future ship design efforts. Surface combatants will need an added (stealth) layer of defense to support hardkill and softkill systems in defeating future threats. Composite materials will also be considered for their corrosion control, reduced maintenance, and reduced manning attributes. This project also develops improved equipments that are small but critical components of non-propulsion HM&E systems. This program is directed toward improved affordability, performance, reduced life cycle cost, reliability and maintainability, signature reduction, standardization, and weight and manning reductions for the existing and future fleet.

1. (U) FY 1999 ACCOMPLISHMENTS:
- (U) ($8.507) Continued development and validation of composite material design procedures and revision of the PC-based composite materials database. Evaluated composite materials for their corrosion control and reduced maintenance attributes. Continued scale modeling signature assessments. Continued development of Radar Cross Section (RCS), Infrared (IR), and Electronic Warfare (EW) prediction codes. Began development of improved baseline EM ENGINEERING toolset. Supported transition of AEM/S system to LPD-17 topside. Continued development of composite value family and advanced gas turbine genset feasibility study. Initiated development of heatpipe based bleed air heat exchanger.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Shipboard Sys Component Dev/0603513N**	Integrated Topside Design (ITD)/32470

- (U) ($4.515) Developed a modeling and simulation plan and a risk reduction plan for integrated topside design (ITD) activities. Initiated risk reduction test in support of DD 21 Industry Team ITD risk reduction plan.

2. (U) FY 2000 PLAN:
- (U) ($2.953) Continue validation of composite material design procedures and revision of the PC-based composite materials database. Continue evaluation of composite materials for their corrosion control and reduced maintenance attributes. Continue development of RCS, IR, and EW prediction codes. Validate and improve EM Engineering Tools. Develop Infrared Signature Database Update. Validate and publish Low Observable (LO) Model scaling techniques.
- (U) ($9.803) Initiate engineering efforts required to begin initial system design of an Integrated Topside Design for DD 21.
- (U) ($1.000) Continue development of heat pipe based bleed air heat exchanger and affordable HM&E machinery and architectures for existing and future fleet. Complete advance gas turbine genset feasibility design study.

3. (U) FY 2001 PLAN:
- (U) ($3.693) Continue validation of composite material design procedures and revision of the PC-based composite materials database. Evaluate composite materials for their corrosion control and reduced maintenance attributes. Continue development of RCS, IR, and EW prediction codes. Continue to validate and improve EM Engineering Tools.
- (U) ($10.387) Complete engineering efforts required for initial system design of DD21 ITD. Begin ITD system/subsystem design for DD 21.
- (U) ($1.000) Complete heat pipe based bleed air heat exchanger. Continue development of affordable HM&E machinery and architectures for existing and future fleet.

B. (U) OTHER PROGRAM FUNDING SUMMARY:

COST ($ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
SC-21 Total Ship Systems/Engineering/0604300N	**120.704**	**161.118**	**305.274**	**303.989**	**617.796**	**763.620**	**857.350**	CONT.	CONT.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Shipboard Sys Component Dev/0603513N**	Integrated Topside Design (ITD)/32470

C. (U) ACQUISITION STRATEGY:

(U) These development efforts were realigned into this project in an effort to consolidate related DD 21 RDT&E efforts and will be transitioned into the DD 21 acquisition strategy in FY 2000 and out.

D. (U) SCHEDULE PROFILE:

PROGRAM MILESTONES

FY1999	FY 2000	FY 2001
2Q C_Missile Update	4Q EM Engineering Tool Validation & Upgrade	4Q RCS/IR/EW Code Updates
4Q RCS Medium Scale Model Test Results	4Q RCS, IR, EW Code Updates	4Q EM Engineering Tool Validation & Improvement
4Q Final LPD Mast EM/Signature/Structural Design	4Q Composite Design Guide Updates	4Q Composite Design Guide Updates
4Q EM Engineering Baseline Upgrade	2Q G.T. Genset Assessment Report	
4Q Complete Structural Design Guide	4Q 2 Way ball valve ILS package	
4Q ITD M&S and Risk Reduction Plans		
2Q Solar Conceptual Design Data		
4Q Gen Set Studies Complete		
4Q 3 Way Ball Valve Drawing and ILS Package		
4Q Allison Conceptual Design Data		

Exhibit R-3 Cost Analysis (page 1)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**		PROGRAM ELEMENT **Shipboard Sys Comp Dev/0603513N**				PROJECT NAME AND NUMBER Integrated Topside Design/32470						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	Sec845/804	DD 21 Industry Teams	0.000	4.515	11/98	9.803	11/99	10.387	11/00	CONT.	CONT.	
Ancillary Hardware Development											0.000	
Systems Engineering											0.000	
Licenses											0.000	
Tooling											0.000	
GFE											0.000	
Award Fees											0.000	
Subtotal Product Development			0.000	4.515		9.803		10.387		CONT.	CONT.	
Remarks:												
Engineering Support	WR	NSWC CD Bethesda, MD	5.532	4.210	12/98	2.282	12/99	2.933	12/00	CONT.	CONT.	
	WR	NRL Suitland, MD	1.005	1.280	12/98	0.622	12/99	0.747	12/00	CONT.	CONT.	
	Various	Other Gov't Activities	0.120	0.875	12/98	0.225	12/99	0.225	12/00	CONT.	CONT.	
	RC	NAVLOGCTR, PA	0.000	0.983	12/98	0.450	12/99	0.500	12/00	CONT.	CONT.	
	Various	Other Contractors	2.054	0.376	12/98	0.199	12/99	0.033	12/00	CONT.	CONT.	
Software Development	C/CPFF	TBD	1.508	0.638	03/99	0.175	12/99	0.255	12/00	CONT.	CONT.	
	MP	JSC Annapolis, MD	0.210	0.145	12/98	0.000	N/A	0.000	N/A	CONT.	CONT.	
Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			10.429	8.507		3.953		4.693		CONT.	CONT.	
Remarks:												

Exhibit R-3 Cost Analysis (page 2)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**			PROGRAM ELEMENT **Shipboard Sys Comp Dev/0603513N**			PROJECT NAME AND NUMBER Integrated Topside Design/32470						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation											0.000	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
Contractor Engineering Support											0.000	
Program Management Support											0.000	
Miscellaneous											0.000	
Travel											0.000	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	0.000		0.000		0.000		CONT.	CONT.	
Remarks:												
Total Cost			10.429	13.022		13.756		15.080		CONT.	CONT.	
Remarks:												

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Shipboard Sys Component Dev/0603513N**			PROJECT NAME AND NUMBER Integrated Power Systems (IPS)/32471					
COST ($ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost	(1) 31.840	25.723	84.057	106.277	69.342	26.860	9.957	CONT.	CONT.
RDT&E Articles Qty	0	0	0	0	0	0	0	CONT.	CONT.

Note (1) (U) FY 1999 funds were budgeted and executed under PE 0603573N/Project S1314 as displayed in the FY99 President's Budget exhibits.
Funds from PE 0603573N/Project S1314 (only Integrated Power Systems) transitioned into PE 0603513N/Project 32471 in FY 2000 and out.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project supports the Integrated Power Systems (IPS) program. IPS provides total ship electric power, including electric propulsion, power conversion and distribution, and mission load interfaces to the electric power system. IPS supports multiple ship class applications for future surface ships, with DD21 being the primary ship application target. On 6 January 2000, SECNAV announced Navy intent that DD21 be an electric drive ship with integrated power architecture. The goals of the IPS are to reduce acquisition and operating costs of naval ships and increase military effectiveness. These goals are to be accomplished by leveraging investments in technologies that will be usable by both military and commercial sectors.

- (U) IPS has the potential to revolutionize the design, construction and operation of U.S. naval ships by using electricity as the primary energy transfer medium aboard ship. The flexibility of electric power transmission allows power generating modules with various power ratings to be connected to propulsion loads and ship service in any arrangement that supports the ship's mission at lowest overall cost. Systems engineering in IPS is focused on increasing the commonality of components used across ship types and in developing modules which will be integral with standardization, zonal system architectures, and generic shipbuilding strategies. The purpose of increased commonality is to reduce the total cost of ship ownership by using common modules composed of standard components and/or standard interfaces.

- (U) IPS addresses ship platform program goals through: reduced ship acquisition cost through integration of propulsion and ship's service prime movers; lower ship operational costs resulting from more flexible operating characteristics and more efficient components; reduced ship construction costs by allowing more extensive modular construction of power generation, distribution, and loads if desired; improved ship survivability and reduced vulnerability through increased arrangement flexibility and improved electrical system survivability; reduced manning through improved power management systems and reduced on-board maintenance requirements; improved ship signature characteristics, if required; improved design adaptability to meet future requirements of multiple ship types or missions; integrating power management and protection by fully utilizing the power electronics in the system to perform fault protection as well as power conversion and load management functions; simplified technology insertion which allows new technologies to be installed within IPS much more inexpensively than presently possible; and, reduced machinery system acquisition costs through utilization of commercially shared technologies and components. The efforts in this project are divided into three major areas as follows:

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Shipboard Sys Component Dev/0603513N**	Integrated Power Systems (IPS)/32471

- (U) System development: IPS development consists of the efforts necessary to develop and demonstrate warfighting and cost reduction requirements, as well as related risk reduction for ship platform applications. System development also includes all efforts to qualify and test integrated power system equipment for DD21.

- (U) At Sea Testing: At Sea Testing of IPS subsystems and components will be conducted on the Trimaran Demonstrator developed and built under a US/UK cooperative Memorandum of Understanding (MOU) signed 3 September 1997. Initial testing on the Trimaran will focus on Naval Architectural and sea-keeping aspects of the Trimaran hull form. The Trimaran is being constructed initially with a commercial electric drive system as well as provisions for fitting IPS components. An opportunity for the US to backfit IPS components and conduct at sea testing is built into the MOU. The US financial contribution to the MOU is also funded from this project. A contract for construction of the demonstrator was awarded in July, 1998. The efforts in this project support the at sea testing on the Trimaran Demonstrator.

- (U) Mission Load Interfaces: Studies have shown that significant opportunities exist to reduce the cost and improve the performance of combat and auxiliary systems by providing the type and quantity of power required directly to the user system. Traditional methods provide standard power and require individual users to perform multiple conversions and conditioning steps prior to use. The efforts in this project provide for initial studies, development, and testing.

1. (U) FY 1999 ACCOMPLISHMENTS:
- (U) ($30.195) Systems Development: Continued development of IPS. Completed factory acceptance testing (FAT) of the FSAD propulsion motor/converter. Took delivery of Ship Service Distribution System (SSDS) equipment and propulsion motor/converter. Completed Installation and Checkout (INCO) of propulsion motor/converter. Completed integration of all advanced development equipment. Conducted advanced development testing at the Land Based Engineering Site (LBES) at NSWCCD Philadelphia PA to: verify and characterize individual component performance; verify that system design requirements are met and validate design tools; verify that requirements for power quality are met throughout the advanced development system; characterize system interfaces for use in future performance/interface specifications; and validate the distributed control system architecture, system design, and performance. Provided testing feedback to DD 21 design teams. In conjunction with DD21 industry teams: evaluated the differences between conventional mechanical drive systems and other advanced technologies, including permanent magnet motors for the integrated power system architecture concept options based on industry specific approaches to DD21 design. Began combat systems interface studies to determine areas where combat system performance can be improved or where cost can be reduced. Commenced a DT Assist by COMPTEVFOR. Developed system description and concept of operations for modular survivable distribution architecture to be demonstrated at LBES. Supported the OSD business case study of Integrated Power systems, Common Electric Drive technologies, and further warfighting benefits of Integrated Power Systems.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Shipboard Sys Component Dev/0603513N**	Integrated Power Systems (IPS)/32471

- (U) ($0.600) At Sea Testing: Note: At sea testing of IPS subsystems and components will be conducted on the Trimaran Demonstrator developed and built under a US/UK cooperative MOU. Began system analysis and design.
- (U) ($1.045) Mission Load Interfaces: Commence assessment of C4I electronic load interfaces. Commence development of Variable Speed Drive (VSD) motor controller for auxiliary applications.

2. (U) FY 2000 PLAN:
- (U) ($23.823) Systems Development: Continue IPS design, development, and integration including performance analysis and testing, modeling and simulation, life cycle cost analysis, producibility studies, manning studies, module development, ship integration, architecture design and related efforts. Continue support for DD 21 development and design efforts as well as support for other ship platforms. Continue advanced development testing at NSWCCD, Philadelphia PA, including controls and power management upgrades, demonstrating various operational modes, and incorporating multi workstation control and automated reconfiguration. Award 804/845 Agreements in December 1999 for Integrated Fight Through Power (IFTP) to Silicon Power Corporation, Exton, PA., Eaton Corporation - Navy Controls Division, Milwaukee, WI., General Atomics, San Diego, CA., Alstom Drives and Controls, Rugby, United Kingdom, L3 Communications SPD Technologies, Inc. Power Systems Group Anaheim, CA., Northrop Grummon Marine Systems, Sykesville, MD. IFTP Agreements will be awarded to mitigate potential risks associated with a fielded IPS system. Efforts include completing preliminary design and beginning detailed design of hardware required to replace Functional Equivalent Modules (FEMs) and populate IPS baseline configuration for survivability testing. Continue propulsion motor analysis using the reduced scale Laboratory Drive Motor. Commence preparations for qualification and test of DD21 integrated power system components via DD21 Industry Teams. Commence advanced development design of permanent magnet motors.
- (U) ($0.800) At Sea Testing: Note: AT sea testing of IPS subsystems and components will be conducted on the Trimaran Demonstrator developed and built under a US/UK cooperative MOU. Continued design of the Trimaran IPS configuration for at-sea testing. Begin development of IPS control system modifications for use during at-sea testing.
- (U) ($1.100) Mission Load Interfaces: Conduct initial combat systems/survivability demonstration to show improved performance and potential to reduce combat system costs. Continue development of VSD motor controller for auxiliary applications. Continue assessment of C4I electronic load interfaces.

(U) FY 2001 PLAN
- (U) ($75.438) Systems Development: Continue IPS design, development, and integration including performance analysis and testing, modeling and simulation, life cycle cost analysis, producibility studies, manning studies, module development, ship integration, architecture design and related efforts. Continue upgrading IPS simulation/stimulation capability for total system risk reduction. Continue support for DD21 design efforts and planned down-select to a single ship concept as well as support for other ship platforms. Complete acoustics testing of the IPS FSAD motor. Continue advanced development testing at NSWC CD, Philadelphia PA. Continue IFTP efforts to mitigate potential risks associated with a fielded IPS system. Efforts include completing detailed design and begin fabrication of hardware required to populate IPS baseline configuration for survivability testing. Demonstrate the survivability and zonal isolation/fight through features of the advanced development system. Demonstrate automated system reconfiguration and start up.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Shipboard Sys Component Dev/0603513N**	Integrated Power Systems (IPS)/32471

Continue qualification and test of DD21 integrated power system components via DD21 Industry Teams. Commence Long Lead Material (LLM) procurement of DD21integrated power system components for system testing. Continue advanced development of permanent magnet motors and other advanced power system technologies.

- (U) ($8.619) At Sea Testing: Note: At sea testing of IPS subsystems and components will be conducted on the Trimaran Demonstrator developed and built under a US/UK cooperative MOU. Provide funding for the Trimaran under the terms of the US/UK MOU. Complete detailed design and begin procurement of hardware required for at sea testing. Continue detailed development and design of the Trimaran IPS configuration for at sea testing. Continue development of IPS control system modifications for use during at-sea testing.

B. (U) OTHER PROGRAM FUNDING SUMMARY:

COST ($ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
SC-21 Total Ship Systems/Engineering/0604300N	**120.704**	**161.118**	**305.274**	**303.989**	**617.796**	**763.620**	**857.350**	CONT.	CONT.

C. (U) ACQUISITION STRATEGY:
(U) IPS is a candidate system for DD-21 and all other future surface ships.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Shipboard Sys Component Dev/0603513N**	PROJECT NAME AND NUMBER Integrated Power Systems (IPS)/32471

D. (U) SCHEDULE PROFILE:

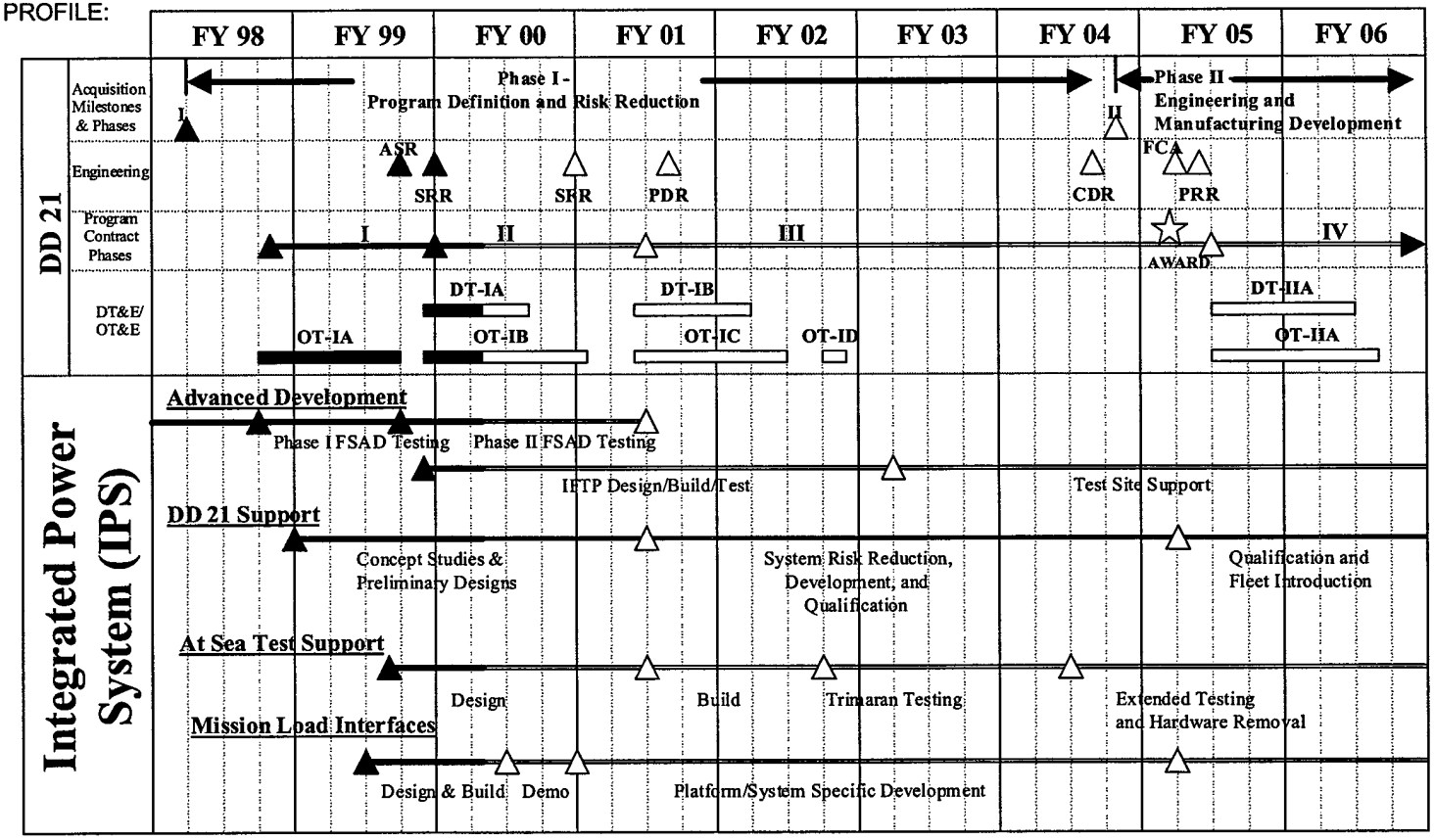


Exhibit R-3 Cost Analysis (page 1)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**		PROGRAM ELEMENT **Shipboard Sys Comp Dev/0603513N**				PROJECT NAME AND NUMBER Integrated Power System/32471						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	C/CPAF	Lockhead M Syracuse, NY	9.417	12.655	12/98				12/00	CONT.	CONT.	
	Sec845/804	DD 21 Industry Teams	0.000	4.000	06/99	15.770	11/99	48.645	12/00	CONT.	CONT.	
	Sec845/804	IFTP Teams	0.000	1.200	07/99	3.248	12/99	20.543	12/00	CONT.	CONT.	
	US/UK MOU	DERA, UK	0.000	0.000	N/A	0.000	N/A	1.630	12/00	CONT.	CONT.	
	WR	NSWCCD Annapolis, MD	3.030	4.845	12/98	2.100	12/99	6.657	12/00	CONT.	CONT.	
	MISC	Other Contractors	1.160	1.525	12/98	1.100	12/99	2.500	12/00	CONT.	CONT.	
	MISC	Other Govt Activities	0.002	0.856	12/98	0.100	12/99	0.482	12/00	CONT.	CONT.	
Ancillary Hardware Development											0.000	
Systems Engineering											0.000	
Licenses											0.000	
Tooling											0.000	
GFE											0.000	
Award Fees	C/CPAF	Lockhead M Syracuse, NY	0.801	0.670	12/99	0.272	08/00	TBD				
Subtotal Product Development			14.410	25.751		22.590		80.457		CONT.	CONT.	
Remarks:												
Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												

Exhibit R-3 Cost Analysis (page 2)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	Shipboard Sys Comp Dev/0603513N	Integrated Power System/32471

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NSWC CD Philadelphia, PA	3.050	5.988	12/98	3.033	12/99	3.500	12/00	CONT.	CONT.	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			3.050	5.988		3.033		3.500		0.000	CONT.	
Remarks:												
Contractor Engineering Support											0.000	
Program Management Support											0.000	
Miscellaneous	Various	Various	0.100	0.101	12/98	0.100	12/99	0.100	N/A	CONT.	CONT.	
Travel											0.000	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.100	0.101		0.100		0.100		CONT.	CONT.	
Remarks:												
Total Cost			17.560	31.840		25.723		84.057		CONT.	CONT.	
Remarks:												

CLASSIFICATION: **UNCLASSIFIED**

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**					R-1 ITEM NOMENCLATURE Radiological Controls/0603542N					
COST ($ in Millions		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**3.227**	**0.601**	**0.572**	**0.566**	**0.634**	**0.614**	**0.602**	**CONT.**	**CONT.**
RADIAC Development/S1830		**3.227**	**0.601**	**0.572**	**0.566**	**0.634**	**0.614**	**0.602**	**CONT.**	**CONT.**
Quantity of RDT&E Articles										

A. Mission Description and Budget Item Justification:

Project S1830 coordinates all Navy efforts for the development of nuclear radiation detection devices in direct support of the Navy Nuclear Propulsion Program and other by providing accurate, reliable Health Physics instrumentation at the lowest possible life cycle cost. Reliable radiation monitoring instruments are needed to ensure the radiological safety of Navy personnel. This includes hand-held RADIAC meters, personnel dose measurement devices, and area monitors used to measure radiation fields. The Navy Dosimetry System will be able to meet new NRC regulations and will provide sensitive measurements down to the levels required for all new and imminent health and safety requirements. The Multifunction RADIAC will cut calibration costs and reduce the requirements for spare parts by replacing over 16 different models of obsolete equipment. New requirements for the measurement of lower neutron levels necessitate the development of modernized instrumentation. The program is critical to joint-service radiation safety initiatives within DOD and has been coordinated with Army, Air Force, and Defense Nuclear Agency personnel to achieve the maximum cross-service applicability.

Multifunction RADIAC (MFR), OR #176-04-86
Navy Dosimetry System, OR #180-04-87
Neutron Dosimetry System, OR #179-04-87
Automated RADIAC Calibration and Diagnostics System, OR #175-04-86
Underwater RADIAC System, OR #178-04-88
Wide Range Survey Meter, OR #177-04-87
Tritium Monitors, OR #182-04-89
EOD Personal Dosimeter, OR #181-04-87 (Updated 09 MAR 95 as 392-04-95)

R-1 SHOPPING LIST - Item No. 44

UNCLASSIFIED

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: Feb-00
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE Radiological Controls/0603542N

(U) Program Accomplishments and Plans:

FY 1999 ACCOMPLISHMENTS:
- (U) ($1.020) Continued development and began testing of Navy Dosimetry System.
- (U) ($1.349) Continued development of MFR extendable probe, directional gamma probe, and alpha probe,and compact neutron probe.

Began MFR control unit enhancement and MFR frisker station development.
- (U) ($ .196) Completed development of Underwater RADIAC System.
- (U) ($ .112) Completed development of Casualty Dosimeter.
- (U) ($ .550) Began enhancements to Air Particle Detectors.

FY 2000 PLAN:
- (U) ($ .301) Complete the development of Navy Dosimetry System.
- (U) ($ .300) Complete the development of MFR directional gamma probe. Continue the development of extendable probe and frisker station.

FY 2001 PLAN:
- (U) ($ .286) Begin enhancement of Navy Dosimetry System.
- (U) ($ .286) Complete the extendable probe and frisker station.

B. Program Change Summary:

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	3.600	0.605	0.573
Appropriated Value:	3.600	0.605	
Adjustment to FY 1999/2000 Appropriated Value/	-0.373	-0.004	-0.001
FY 2000 President's Budget:			
FY 2000/01 President's Budget Submit:	3.227	0.601	0.572

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE Radiological Controls/0603542N

Change Summary Explanation:
Funding: FY 99 decrease of $.373M for minor adjustments.
FY 00 decrease of $.004M for minor pricing adjustments.
FY 01 decrease of $.001M is for minor pricing adjustments.

Schedule: Not applicable.
Technical: Not applicable.

C. Other Program Funding Summary

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete
OPN BLI: 292000 RADIAC	3.994	4.254	8.308	7.887	8.217	8.727	8.736	CONT.

D. Acquisition Strategy:
Developmentefforts are being focused on evaluation,modification(as required to meet operationalrequirements), and adaptationof CommercialOff-The-Shelf technologyin order to minimize total ownership costs. To the maximum extent possible new contracts are targeted for fixed price efforts to control development cost.

E. Schedule Profile:
Dosimetry System
- Delivery of Advance Development Systems – 2/00
- Completion of Testing – 6/00
- Milestone III Decision – 8/01
- Initial Operational Capability – 12/02

MFR Enhancements/Probe Development
- Delivery of Prototypes for Extendable Probe (EP) – 1/99
- Completion of Testing for EP – 4/99

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE Radiological Controls/0603542N

MFR Enhancements/Probe Development con't.
- Delivery of Revised Prototype - 12/00
- Completion of Testing of Revised Prototype- 3/01
- Production Contract Awarded for EP – 9/01
- Delivery of Prototypes for Directional Gamma Probe (DGP) – 11/99
- Completion of Testing for DGP – 3/00
- Production Contract Awarded for DGP – 10/00
- Award Contract for Frisker Station Development - 3/00
- Delivery of Frisker Station – 12/00
- Completion of Testing of Frisker Station – 4/01
- Production Contract Awarded for Frisker Station - 10/01
- Delivery of Alpha Probe Samples for testing – 5/00
- Completion of Testing of Alpha Probe – 9/00
- Production Contract Award for Alpha Probe – 10/00

Underwater RADIAC
- Delivery of Prototypes for Testing – 7/98
- Completion of Testing – 5/99
- Production Decision – 2/00
- Initial Production Award – 2/00

Casualty Dosimeter
- Complete SBIR Phase II Testing – 1/99

IM-239 Enhancements
- Award Enhancement Contract – 3/00
- Delivery of Test Samples – 12/00
- Test and Evaluation Complete - 3/01

Exhibit R-3 Cost Analysis (page 1)

DATE: **February 2000**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N/BA-4**

PROGRAM ELEMENT: **Radiological Control/0603542N**

PROJECT NAME AND NUMBER: RADIAC Development Project - S1830

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Dev Dosimetry	C/FP	Various (See below)	8.464	0.233	09/99	0.000		0.000		CONT.	CONT.	
Primary Hardware Dev Miscellaneous	C/FP	Various	5.212	0.880	Various			0.000		CONT.	CONT.	
Ancillary Hardware Development											0.000	
Systems Engineering											0.000	
Licenses											0.000	
Tooling											0.000	
GFE											0.000	
Award Fees											0.000	
Subtotal Product Development			13.676	1.113		0.000		0.000		CONT.	CONT.	

Remarks:
Prior to 8/96 - International Sensor Technology, Pullman, Washington
12/96 - 7/98 - Keithley Radiation Measurements, Cleveland, Ohio
Follow-on contract will be completed

Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks: Not applicable

R-1 SHOPPING LIST - Item No. 44

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 2)												DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**			PROGRAM ELEMENT **Radiological Control/0603542N**			PROJECT NAME AND NUMBER RADIAC Development Project/S1830						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	Various	2.994	0.329	10/98	0.197	12/99	0.188	10/00	CONT.	CONT.	
Operational Test & Evaluation				0.329	10/98						0.329	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			2.994	0.658		0.197		0.188		CONT.	CONT.	
Remarks:												
Contractor Engineering Support											0.000	
Government Engineering Support	WR	Various	4.716	0.329	10/98	0.096	12/99	0.091	10/00	CONT.	CONT.	
Program Management Support	WR	Various	4.717	0.329	10/98	0.096	12/99	0.090	10/00	CONT.	CONT.	
Travel			0.000	0.010	10/98	0.010	12/99	0.010	10/00	CONT.	CONT.	
Labor (Research Personnel)				0.788	10/98	0.202	12/99	0.193	10/00		1.183	
Overhead											0.000	
Subtotal Management			9.433	1.456		0.404		0.384		CONT.	CONT.	
Remarks:												
Total Cost			26.103	3.227		0.601		0.572		CONT.	CONT.	
Remarks:												

R-1 SHOPPING LIST - Item No. 44

Exhibit R-3, Project Cost Analysis
(Exhibit R-3, page 6 of 6)

UNCLASSIFIED

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY**					R-1 ITEM NOMENCLATURE PE 0603553N Surface ASW/V1704 ASW Adv Dev					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**4.839**	**6.948**	**6.752**	**2.986**	**3.031**	**3.074**	**3.114**	**Continuous**	**Continuous**
ASW Advanced Development/V1704		**4.839**	**6.948**	**6.752**	**2.986**	**3.031**	**3.074**	**3.114**	**Continuous**	**Continuous**
Project B Title/Cost Code										**0.000**
Project C Title/Cost Code										**0.000**
Quantity of RDT&E Articles										

A. Mission Description and Budget Item Justification: The ASW Advanced Development project provides advanced development demonstration and validation of technology for potential surface sonar and combat system applications. Efforts focus on resolution of technical issues associated with providing capability against the Year 2005 and beyond threat with emphasis on shallow water/littoral area USW and on dem/val of Undersea Warfare (USW) concepts and technology. Key technology areas include active sonar transmissions, advanced signal and data processing, active sonar classification, towed and hull arrays and transducer technology, multi-static sonar, and multi-sensor data fusion including multi-platform data fusion and netcentric undersea warfare concepts. The development of a mid-frequency Towed Active Receive Subsystem (TARS) prototype, which functions as a deep receiver for the AN/SQS-53C transmitter and provides significantly enhanced submarine detection performance against deep submarine targets, will complete in FY1999 and transition to the AN/SQQ-89 program. This Program Element, 0603553N, has been designated to support Multi-Static Sonar efforts associated with the Distant Thunder program in order to transition from a DARPA program into the Navy Multistatic Active ASW Program. This project conducts advanced development and testing of active multistatic acoustic concepts. The concept development is directed at providing surface ships combat groups with the capability of detection, classification, and localization of quiet threat submarines in difficult acoustic environments associated with Littoral waters. The project concentrates on the development of acoustic processor algorithms and information sharing technologies to develop a coordinated multi-static acoustic picture employing distributed sensors and active sources. The Program Element, 0603553N, has also been designated to provide Advanced Undersea Warfare Concepts (AUSWC) associated with the development of a Netcentric ASW program. The Netcentric ASW program will provide commonality accross platforms, with common decision aids, models and a common database.

Note: In accordance with 15 USC 638, $.15M in FY 2000 is reserved for the Small Business Innovative Research (SBIR) assessment.

Program Plans and Accomplishments:

1. (U) FY 1999 Accomplishments:

($1.044) TARS: Completed TARS test and evaluation program and completed the transition of this technology to the AN/SQQ-89 Multi-Functional Towed Array (MFTA).
($2.395) Multistatic Active ASW: Participated in SHAREM 127 and 130 and LWAD 99-2 sea tests for Implusive Multistatic Active Processing data collection and demonstration.
($1.400) Advanced Undersea Warfare Concept (AUSWC): Provide Systems Engineering and Integration for development of the AUSWC Builds 1.0 and 2.0. Perform Battle Group platform interface investigation, installation planning and scheduling, platform installation and integration for AUSWC first build.

2. (U) FY 2000 Plan:

($2.949) Multistatic Active ASW: Improve acoustic processors and communication schemes. Participate in sea tests (SHAREMS/LWAD) to collect multi-static processors/communication systems data and environmental acoustic data and analyze system performance. Initiate development of Concept of Operations.
($3.999) Advanced Undersea Warfare Concept (AUSWC): Field and demonstrate a network-centric Undersea Warfare (USW) theater combat system to support air, surface, and sub-surface platforms. Support first installation (Build 1.0) plan for Kitty Hawk Battlegroup for selected battlegroup platform

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY**	R-1 ITEM NOMENCLATURE PE 0603553N Surface ASW/V1704 ASW Adv Dev

3. FY 2001 Plan:
($2.971) Mulstatic Active ASW: Continue improvement of acoustic multi-static algorithms based on results of FY2000 sea test results. Participate in sea te
(SHAREMS/LWAD) to evaluate improved algorithms/communication schemes in Littoral ASW environments. Complete Concept of Operatio
($3.781) Advanced Undersea Warfare Concept (AUSWC): Continue to demonstrate a network-centric Undersea Warfare (USW) theater combat system
to support air, surface, and sub-surface platforms. Support second installation (Build 2.0) plan for Vinson Battlegroup for selected battlegroup platform

B. Program Change Summary:

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	11.871	2.949	2.963
Appropriated Value:	11.871	2.949	
Adjustment to FY 1999/2000 Appropriated Value	-7.032	3.999	3.789
FY 2000 President's Budget:			
FY 2001 President's Budget Submit:	4.839	6.948	6.752

(U) Change Summary Explanation

FY99 reduction is due to Comparability Adjustment (-$10.794), Undistributed Reductions (-$0.129), SBIR/STTR Transfer (-$0.031)
Inflation Savings (-$0.005), Multistatic Active ASW increase (+$2.400), AUSWC increase (+1.400). Minor Pricing increase (+$0.12
(U) FY 2000 increase of (+$3.999), Advanced Undersea Warfare Concept (AUSWC)
(U) FY 2001 increases of (+$3.810) Advanced Undersea Warfare Concept, Strategic Sourcing Redistribution of (+$0.037), NWCF rates adjustments of (+$0.035).
FY 2001 reductions for Minor Pricing Adjustments (-$0.093).

Schedule: N/A

Technical: N/A

C. Other Program Funding Summary: N/A

Related RDT&E:

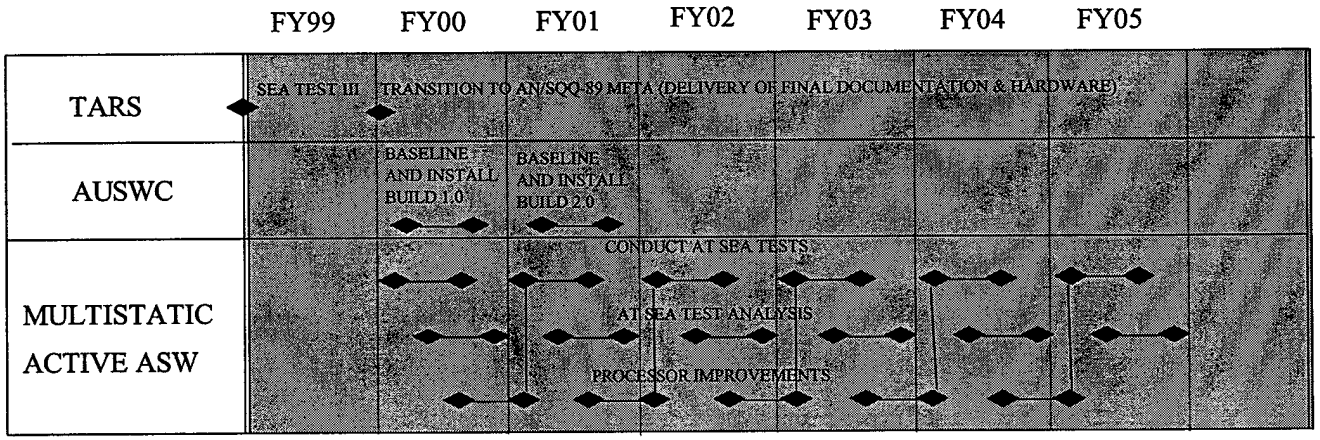
PE 0205620N (Surface ASW Combat Systems Integration)
PE 0602121N (Surface Ship & Submarine HM&E Technology)
PE 0603504N (Advanced Submarine Combat Systems Development)
PE 0603513N (DD-21 Associated System Development)
PE 0603561N (Advanced Submarine System Development)
PE 0603747N (Undersea Warfare Advanced Technology)

D. Acquisition Strategy: Plan to continue competitively awarded contract(s).

E. Schedule Profile: See attached Schedule.

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N**	PROGRAM ELEMENT NAME AND NUMBER **Surface ASW, PE 0603553N**				PROJECT NAME AND NUMBER **ASW Advanced Development, V1704**					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost										
RDT&E Articles Qty										

TARS / AUSWC/MULTISTATIC ACTIVE ASW



R-1 SHOPPING LIST - Item No. 45-3 of 45-5

Exhibit R-2a, RDT&E Project Justification
(Exhibit R-2a, page 3 of 5)

Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N	Surface ASW/ PE 0603553N	ASW Advanced Development/V1704

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
TARS Product Development	WR	NUWC	9.597	0.800	11/98	0.000	-	0.000			10.397	
Multistatic Sonar Development	WR	NAWC/Pax River		0.100	03/99	0.200	12/99	0.225	12/00	Continuous	Continuous	
Multistatic Sonar Development	CPFF	BBN				0.200	01/00	0.235	01/99	Continuous	Continuous	
Multistatic Sonar Development	CPFF	APL/JHU		0.116	03/99	0.234	01/00	0.328	01/99	Continuous	Continuous	
Multistatic Sonar Development	RCP/WR	NRL		0.212	03/99					Continuous	Continuous	
Multistatic Sonar Development	RCP	ONR		0.868	04/99					Continuous	Continuous	
AUSWC	WR	NUWC/Keyport		1.400	07/99					Continuous	Continuous	
Systems Engineering	WR	NSWC/DD		0.108	06/99					Continuous	Continuous	
Subtotal Product Development			9.597	3.604		0.634		0.788		0.000	14.623	

Remarks:

Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks:

R-1 SHOPPING LIST - Item No. 45-4 of 45-5

Exhibit R-3, Project Cost Analysis
(Exhibit R-3, page 4 of 5)

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 2)												DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N**			PROGRAM ELEMENT NAME AND NUMBER **Surface ASW/PE 0603553N**			PROJECT NAME AND NUMBER **ASW Advanced Development/V1704**						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost (K$)	FY 99 Award Date	FY 00 Cost (K$)	FY 00 Award Date	FY 01 Cost (K$)	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NUWC/Npt		0.519	03/99	1.300	10/99	1.241	10/00	Continuous	Continuous	
Developmental Test & Evaluation	WR	NAWC/Pax River		0.505	03/99	0.600	10/99	0.500	10/00	Continuous	Continuous	
Developmental Test & Evaluation	CPFF	BBN				0.750	12/99	0.637	12/00	Continuous	Continuous	
Developmental Test & Evaluation	CPFF	Oasis				0.040	12/99	0.050	12/00	Continuous	Continuous	
Developmental Test & Evaluation	WR	NUWC/Keyport				1.000	10/99	1.000	10/00	Continuous	Continuous	
Developmental Test & Evaluation	WR	NSWC/Carderock, MD				0.250	10/99	0.211	10/00	Continuous	Continuous	
Developmental Test & Evaluation	WR	NSWC/Dahlgren, VA				0.249	10/99	0.200	10/00	Continuous	Continuous	
Developmental Test & Evaluation	SS/CPFF	APL/JHU, MD				2.000	12/99	2.000	12/99	Continuous	Continuous	
Subtotal T&E			0.000	1.024		6.189		5.839		Continuous	Continuous	
Remarks:												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support	CPFF	Stanley Assoc.		0.186	11/98	0.100	12/99	0.100	12/00	Continuous	Continuous	
Travel				0.025		0.025		0.025		Continuous	Continuous	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	0.211		0.125		0.125		Continuous	Continuous	
Remarks:												
Total Cost				4.839		6.948		6.752		Continuous	Continuous	
Remarks:												

R-1 SHOPPING LIST - Item No. 45-5 of 45-5

Exhibit R-3, Project Cost Analysis
(Exhibit R-3, page 5 of 5)

UNCLASSIFIED

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**					R-1 ITEM NOMENCLATURE SSGN 0603559N					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**0.000**	**0.000**	**34.762**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**34.762**
SSGN Trident Conversion/S2413		**0.000**	**0.000**	**34.762**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**34.762**
Quantity of RDT&E Articles										**0.000**

A. (U) Mission Description and Budget Item Justification: This program supports initial design efforts for the conversion of Ohio Class submarines to conventional, land attack, SSGN submarines. The SSGN is envisioned to provide a robust and covert land attack strike and Special Operating Force (SOF) platform fully integrated into a joint battlespace with minimal external support. The goals of the platform design are to include the capability to launch in excess of 100 attack missiles (e.g. Tomahawk) in a single salvo, and over 60 SOF personnel and two Advanced Seal Delivery Systems or Dry Deck Shelters for periods up to 90 days. This capability would allow the SSGN to replace two dedicated SOF submarines scheduled for inactivation, the USS James K. Polk and USS Kamehameha.

(U) Program Accomplishments and Plans:

1. (U) FY 1999 Accomplishments :

(U) - FY 1999 feasibility studies were accomplished under PE 0603563N.

(U) FY 2000 Plan:

2. (U) - FY 2000 efforts are funded under PE0603563N ($9.320M).

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE SSGN 0603559N

3. (U) FY 2001 Plan

(U) ($13.900) Conduct design activities for risk mitigation, alternative selection, and conversion planning.
(U) ($15.400) Commence Attack Weapons Systems design and risk mitigation activities which will include: Missile Tube and Launcher/Canister design, test plan development, handling equipment development, and test program fabrication, hardware and software design for the Attack Weapons Systems Fire Control System and design of navigation subsystems.
(U) ($5.462) Commence engineering studies and efforts for ship control, safety, hydrodynamics, test and evaluation, and required technical and milestone documentation.

B. (U) Program Change Summary:

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:			
Appropriated Value:	0.000	0.000	0.000
Adjustments to FY 1999/2000 Appropriated Value:	0.000	0.000	0.000
FY 2000 President's Budget:	0.000	0.000	0.000
FY 2001 President's Budget	0.000	0.000	34.762

(U) Change Summary Explanation:

(U) Funding: A new Program Element (0603559N) was established for the FY 2001 SSGN Trident Conversion design effort.

(U) Schedule: Not Applicable.

(U) Technical Change: Not Applicable.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE SSGN 0603559N

C. (U) Other Program Funding Summary:

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
(U)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0	0.000

- (U) Related RDT&E:

(U) PE 0603563N Ship Concept Advanced Design

D. (U) Acquisition Strategy

(U) To refuel, overhaul, convert and deliver four Trident Submarines into land attack strike and Special Operating Force platforms.

E. (U) Schedule Profile:

(U) See attached Planning Schedule.

CLASSIFICATION: **UNCLASSIFIED**

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE SSGN 0603559N

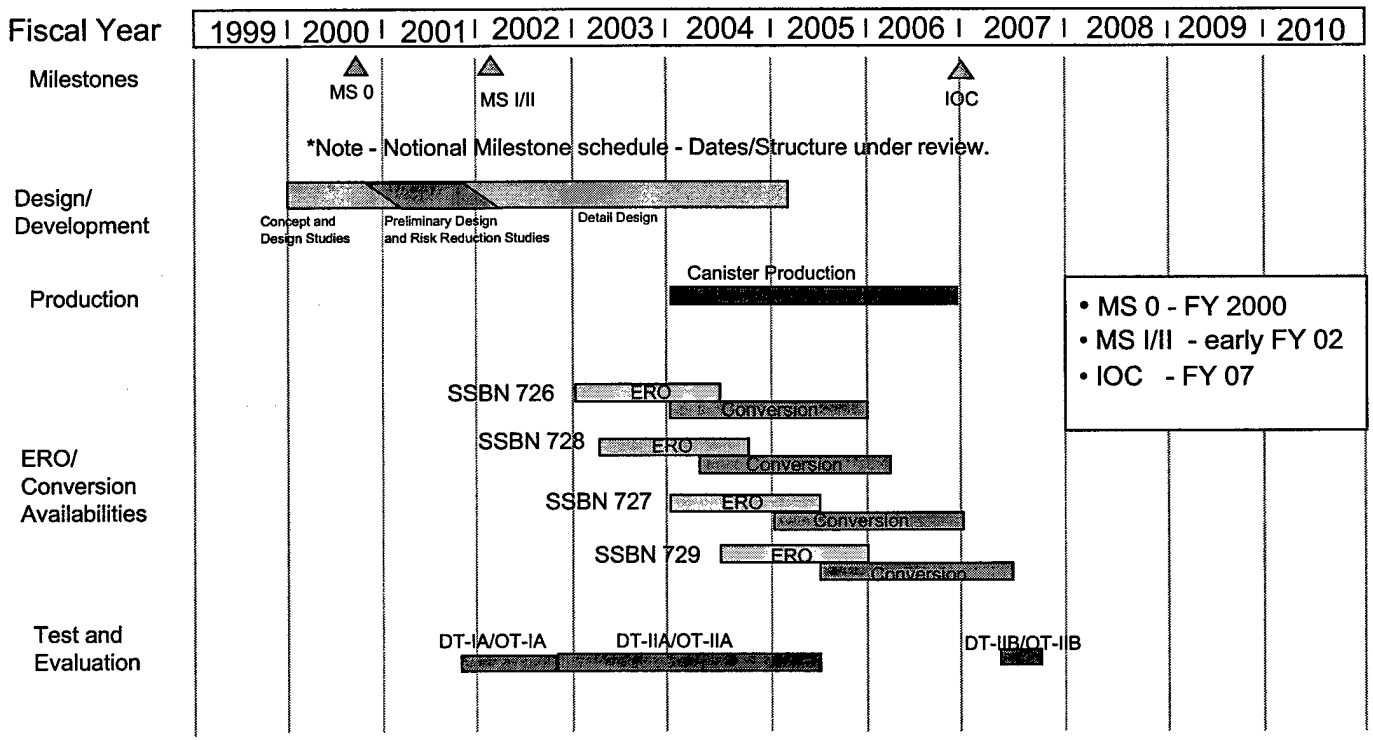


Exhibit R-3 Cost Analysis (page 1)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**			PROGRAM ELEMENT SSGN 0603559N			PROJECT NAME AND NUMBER						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development											0.000	
Ancillary Hardware Development											0.000	
Systems Engineering	SS/CPFF	General Dynam Groton, CT	0.000	0.000		0.000		10.412	Various	0.000	10.412	
Systems Engineering	WR/RC	NSWC Carderock, MD	0.000	0.000		0.000		2.000	10/00	0.000	2.000	
Systems Engineering	WR	NUWC Newport, RI	0.000	0.000		0.000		1.976	Various	0.000	1.976	
AWS Risk Reduction	C/CPFF	Various	0.000	0.000		0.000		7.800	10/00	0.000	7.800	
AWS Concept Exploration	WR/MIPR	NAVAIR	0.000	0.000		0.000		2.250	10/00		2.250	
Systems Engineering	Various	Various	0.000	0.000		0.000		4.924	Various	0.000	4.924	
Award Fees											0.000	
Subtotal Product Development			0.000	0.000		0.000		29.362		0.000	29.362	
Remarks:												
Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												

Exhibit R-3 Cost Analysis (page 2)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**			PROGRAM ELEMENT SSGN 0603559N			PROJECT NAME AND NUMBER						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation											0.000	
Developmental Test & Evaluation											0.000	
Developmental Test & Evaluation											0.000	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support & ET	Various	Various	0.000	0.000		0.000		5.400	Various	0.000	5400.000	
Travel											0.000	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	0.000		0.000		5.400		0.000	5.400	
Remarks:												
Total Cost			0.000	0.000		0.000		34.762		0.000	34.762	
Remarks:												

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: **February 2000**			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**					R-1 ITEM NOMENCLATURE Advanced Submarine Systems Development/0603561N					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**116,245**	**124.051**	**113.269**	**121.064**	**118.988**	**124.926**	**117.464**	**0.000**	**719.762**
Adv. Sub. Systems Development/S2033		**57.075**	**43.898**	**46.084**	**54.774**	**54.906**	**58.891**	**59.397**	**CONT.**	**CONT.**
Enhanced Performance Metal Brush/S2756		**0.000**	**2.287**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Adv. Sub. Combt Sys. Dev/V0223		**59,170**	**69.911**	**67.185**	**66.290**	**64.082**	**66.035**	**58.067**	**CONT.**	**CONT.**
Conf Array Vel Sensor/V2753		**0.000**	**2.983**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Common Towed Array Prog/V2754		**0.000**	**1.989**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**
Afford Adv Acoustic Arrays/V2755		**0.000**	**2.983**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**

A. (U) Mission Description and Budget Item Justification: **A Comparability Adjustment by Issue #64088 for this RDT&E Budget line and NAVSEA restructure by Issue #66765 to transfer all the RDT&E funds from PE 0603504N/V0223, V2389 Advanced Submarine Combat Systems Development in**to PE 0603561N **under Project V0223 for FY2000 and out.** Each page will cite which Project Unit is being described.

(U) This program supports innovative research and development in submarine technologies and the subsequent evaluation, demonstration, and validation for submarine platforms. It will increase the submarine technology base and provide subsystem design options not currently feasible.

(U) Project Unit S2033: The Advanced Submarine Research & Development Office identifies the most promising and emerging technologies for VIRGINIA Class Submarine and other submarine platform insertion and transitions them into specific demonstration/validation efforts. The program element is non-ACAT and transitions technologies developed by Navy technology bases, the private sector, and the Defense Advanced Research Projects Agency Tactical Technology Office. Advanced systems developed under this program have potential for backfit into existing classes of submarines, supporting emerging requirements, and systems technology insertion into future submarine designs. Research and development investment factors used to select these technologies include: economic environment and return on investment; mission enhancement; and safety and survivability. The program office also supports two Information Exchange Programs with the United Kingdom, (one on submarine electromagnetic silencing and the second on submarine platform equipment, systems, and hull technology); operates the Large Scale Vehicle to provide at-sea test capability for propulsor, acoustic and non-acoustic signature reduction, remote vehicle R&D, and large scale hydrodynamic experimentation; operates the Hydrodynamic/Hydroacoustic Technology Center to enhance the Navy's ability to accurately, computationally predict hydrodynamic and hydroacoustic performance of submerged bodies; operates and supports

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE Advanced Submarine Systems Development/0603561N

the Intermediate Scale Measurement System; and provides life cycle support for the R&D Submarine modifications. In addition, the program is designing and constructing a second large scale vehicle, LSV2.

This Program has been structured to support near term VIRGINIA Class insertion as well as core technologies in Hydrodynamics/Hydroacoustics, Affordability, and Stealth.
(U) Project S2756 is authorized by Congress under Committee Report - Senate Rpt. 106-50 - for Advanced Metal Fiber Brush Technology. Metal Fiber electric motor brushes have the potential to significantly improve shipboard quality of life, reduce total ownership costs of ships and increase the survivability and operational reliability of electric motors and generators.

(U) Project Unit V0223: This non-acquisition (Non-ACAT) program supports the Navy Submarine Acoustic Superiority and Technology Insertion Initiatives through the application of advanced development and testing of improvements to present and future sonar and combat control systems. The goal is to address the technology challenges that marginalize tactical control in littoral and open ocean environments during the performance of a variety of missions including peacetime engagement, surveillance, deterrence, regional sea denial, precision strike, task group support, and ground warfare support. Prototype hardware and/or software systems are developed to demonstrate technologically promising system concepts in Laboratory and at-sea submarine environments. Technology areas specific to this program include transducers, hull-mounted and towed arrays, on-board monostatic and bistatic sonar signal processing, target motion analysis (TMA), multiple contact processing and test and evaluation. This program is funded under demonstration and validation because it develops and integrates hardware for experimental test related to specific ship and aircraft applications.
(U) Projects V2753, V2754, and V2755 are authorized by Congress to pursue the application of fiber optic technology in submarine acoustic array systems as potential cost and performance improvements to future operational sonar array systems.

B. (U) Program Change Summary:	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	60,520	115,767	114,926
Appropriated Value:	60,520	126,067	
Adjustment to FY 1999 Appropriated Value/ FY2000 President's Budget	55,725	-2,016	-1,657
FY2001 PRES Budget Submit	116,245	124,051	113,269

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE Advanced Submarine Systems Development/0603561N

(U) Change Summary Explanation:

(U) FY 2000 Total Program Funding: $2.005M of the extramural program is reserved for SBIR assessment IAW 15 USC 638.

(U)S2033 Funding: The FY99 decrease of (-$3,445M) is attributed to Undistributed Adjustments (-$.199K), Small Business Innovative Research (-$1,129M). RDTEN Jun Btr Update (-$500K) and FY99 Midyear Review Btr's (-$1,181), (-$274K) for Inflation Savings, (-$152K) BS 1002 Actual Update and (-$10K) for FY99 BTR .

The FY 2000 increase of ($.57K) is attributed to restore issue 62288 outsourcing and a decrease of (-$51K) for SSP (Contracts), also received (-$243K) across the board reduction.

FY 2001 decrease attributed to Advanced Submarine Technology (-$12,200K) and an increase of ($11,739) for the Buyback of same Technology, increase to Restore issue 62288 Outsourcing ($.371K), SSP Contracts decrease of (-$160K), NWCF increase of ($.101K), SSP - NUWC Functionality Assessment decrease (-$2K) and SSP - NUWC Contract Efficiencies decrease (-$7K). ($77) increase from PBD 411, ($16K) decrease from PBD 606 Military/Civilian pay rates, (-$315K) from PBD 604 Nonpay r Purchase Inflation and (-$121K) decrease from PBD 0222C2 Active Navy Ops.

(U)S2756 Funding: The FY00 decrease of (-$.13K) is due to an Across-the-Board Reduction

(U)V0223 Funding: The FY99 increase of ($59,718) is for a Comparability adjustment and decreases of (-$.538K) for BSO 1002 Update and (-.$10K) for a FY99 BTR. The FY2000 decrease of ($-1,333K) attributed to Advanced Undersea Warfare adjustments and an Across-the-Board Reductions of (-$.388K). The FY 2001 Advanced Sub Technology reduction (-$13,740K) and buyback ($13,740K), NWCF Rate increase of ($.852K), SSP - NUWC Functionality Assessment decrease of (-$52K), SSP - NUWC Contract Efficiencies decrease (-$168K) and a Advanced Undersea Warfare decrease of (-$1,270K), increase of ($.83K) for PBD 411 adjustments, increase of ($.35K) for Mil/Civ Pay Rates, decrease of (-$.459K) for Nonpay Purchase Inflation and a reduction of (-$.177K) for Active Navy Ops.

(U)V2753 Funding: The FY00 decrease of (-$17K) is due to an Across-the Board Reduction.
(U)V2754 Funding: The FY00 decrease of (-$.11K) is due to an Across-the-Board Reduction.
(U)V2755 Funding: The FY00 decrease of (-$.17K) is due to an Across-the-Board Reduction.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE Advanced Submarine Systems Development/0603561N

(U) Schedule: Not Applicable.

(U) Technical: Proceed with the Category II Core Technologies as identified in Secretary of Defense Report on Nuclear Attack Submarine Procurement and Submarine.

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Advanced Submarine Dev/0603561N**				PROJECT NAME AND NUMBER Advanced Submarine Systems Development - S2033/Adv. Metal Fiber Brushes - S2756					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Adv. Submarine Systems Dev. - S2033		**57.075**	**43.898**	**46.084**	**54.774**	**54.906**	**58.891**	**59.397**	**CONT.**	**CONT.**
Adv. Metal Fiber Brushes - S2756		**0.000**	**2.287**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**COMP.**	**COMP.**

A. (U) Mission Description and Budget Item Justification: This program supports innovative research and development in submarine technologies and the subsequent evaluation, demonstration, and validation for submarine platforms. It will increase the submarine technology base and provide subsystem design options not currently feasible.

(U) Project Unit S2033: The Advanced Submarine Research & Development Office identifies the most promising and emerging technologies for the VIRGINIA Class Submarine and other submarine platform insertion and transitions them into specific demonstration/validation efforts. The program element is non-ACAT and transitions technologies developed by Navy technology bases, the private sector, and the Defense Advanced Research Projects Agency Tactical Technology Office. Advanced systems developed under this program have potential for backfit into existing classes of submarines, supporting emerging requirements, and systems technology insertion into future submarine designs. Research and development investment factors used to select these technologies include: economic environment and return on investment; mission enhancement; and safety and survivability. The program office also supports two Information Exchange Programs with the United Kingdom, (one on submarine electromagnetic silencing and the second on submarine platform equipment, systems, and hull technology); operates the Large Scale Vehicle (LSV) to provide at-sea test capability for propulsor, acoustic and non-acoustic signature reduction, remote vehicle R&D, and large scale hydrodynamic experimentation; operates the Hydrodynamic/Hydroacoustic Technology Center to enhance the Navy's ability to accurately, computationally predict hydrodynamic and hydroacoustic performance of submerged bodies; operates and supports the Intermediate Scale Measurement System; and provides life cycle support for the R&D Submarine modifications. In addition, the program is designing and constructing a second large scale vehicle, LSV2.

U) Project S2756 is authorized by Congress under Committee Report - Senate Rpt. 106-50 - for Advanced Metal Fiber Brush Technology. Metal Fiber electric motor brushes have the potential to significantly improve shipboard quality of life, reduce total ownership costs of ships and increase the survivability and operational reliability of electric motors and generators.

(U) This Program has been structured to support near term Virginia Class insertion as well as core technologies in Hydrodynamics/Hydroacoustics, Affordability, and Stealth.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Advanced Submarine Sys Dev/0603561N**	Advanced Submarine Systems Development - S2033/Adv. Metal Fiber Brushes - S2756

(U) Program Accomplishments and Plans:

1. (U) FY 1999 Accomplishments:

- (U) ($7.924M) Stealth: Continued development of advanced submarine propulsor technologies, internal transmission paths, hull radiation and echo formation (Advanced Coating), Advanced EM Silencing, Signature Characterization and Master Plan development.
- (U) ($8.842M) Hydrodynamics/Hydroacoustics: Continued development of elements of Integrated Computational Design Environment analysis of hydrodynamic and hydroacoustic submarine performance (Maneuvering and Control). Continued Rim Driven Thruster/MSW pump development. Developed and demonstrated techniques to improve hydrodynamic performance of submarines through modification of flow and lift characteristics (Powering & Resistance). Completed 1/16 scale evaluation of the Advanced Sail in the LCC. Completed construction of 1/4 scale Advanced Sail for LSV. Developed the Advanced Sail. Initiated transition of NASA's virtual wind tunnel to development of a virtual water tunnel. Initiating of SSM Master Plan.
- (U) ($28.609M) Infrastructure: Continued operations and support for the Large Scale Vehicle (LSV), Hydroacoustic/Hydrodynamic Test Center (H/HTC), Intermediate Scale Measurement System (ISMS), R&D submarine. Continued design and construction of (LSV 2).
- (U) ($4.212M) Total Ownership Cost/Affordability: Continued research and development of Elastomeric EjectionSystem for insertion into the Virginia Class.
- (U) ($7.488M) Initiated study for Payloads in compliance with Defense Science Board Report recommendations. Mission and Future Design (M&FD)/Hull, Mechanical & Electrical (H, M & E) Conform Studies. New Technology Assessment support, Technical Architecture support, N87 SAIC study.

$57.075M TOTAL

2. (U) FY 2000 Plan:
- (U) ($6.917M) Stealth: Continue development of advanced submarine propulsor technologies, internal transmission paths, Advanced Electromagnetic Silencing, hull radiation and echo formation (Advanced Coatings), and signature characterization.
- (U) ($13.324M) Hydrodynamics/Hydroacoustics: Continue development of elements of Integrated Computational Design Environment analysis of hydrodynamic and hydroacoustic submarine performance (Maneuvering and Control). Develop and demonstrate techniques to improve hyrodynamic performance of submarines through modification of flow and lift characteristics (Powering and Resistance). Complete demonstration/validation of the Advanced Sail on LSV. Continue Rim Driven Thruster/Main Seawater Pump development .

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Advanced Submarine Sys Dev/0603561N**	Advanced Submarine Systems Development - S2033/Adv. Metal Fiber Brushes - S2756

- (U) ($15.411M) Infrastructure: Continue operations and support for the Large Scale Vehicle, H/HTC, ISMS, R&D submarine. Continued design and construction of LSV 2.
- (U) ($5.948M) Total Ownership Cost/Affordability: Complete demonstration/validation of EES and transition to Virginia Class PE. Initiate Peel and Stick Damping study, initiate design and testing of Advanced Metal Fiber Brushes technology ($2.3M additional funding under Project Unit S2756).
- (U) ($2.292M) Continue Mission and Future Design (M&FD)/Hull, Mechanical and Electrical (HM&E) Conform Studies and New Technology Assessment support.
- (U) ($.006) Outsourcing restructuring

$43.898M TOTAL

3. (U) FY 2001 Plan:

- (U) ($18.385M) Stealth: Continue development of corporate Electric Drive, advanced submarine propulsor technologies, internal transmission paths, Advanced Electromagnetic Silencing, and signature characterization. Initiate flow noise reduction project.
- (U) ($5.745M) Hydrodynamics/Hydroacoustics: Continue development of elements of Integrated Computational Design Environment analysis of hydrodynamic and hydroacoustic submarine performance (Maneuvering and Control). Develop and demonstrate techniques to improve hydrodynamic performance of submarines through modification of flow and lift characteristics (Powering and Resistance). Complete Rim Driven Thruster/Main Seawater pump development. Complete Advanced Sail development.
- (U) ($16.273M) Infrastructure: Continue operations and support for the Large Scale Vehicle, Hydroacoustic/Hydrodynamic Test Center(H/HTC), Intermediate Scale Measurement System (ISMS), R&D Submarine. Complete design and construction of the LSV 2. Initiate acceptance trials.
- (U) ($2.899M) Total Ownership/Affordability: Complete demonstration and validation of Elastomeric Ejection System for insertion into the Virginia Class. Continue development of Advanced Metal Fiber Brushes.
- (U) ($2.782M) Recontinue study for Payloads in compliance with Defense Science Board Report recommendations. Continue M&FD/HM&E Conform Studies and New Technology Assessment support.

$46.084M TOTAL

EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Advanced Submarine Sys Dev/0603561N**	PROJECT NAME AND NUMBER Advanced Submarine Systems Development - S2033/Adv. Metal Fiber Brushes - S2756	

B. (U) Other Program Funding Summary: additional $50M of SEALIFT National Defense Funds was appropriated in FY97, authorized in FY98 for LSV development.

(U) Related RDT&E: Not applicable.

C. (U) Acquisition Strategy: Not applicable.

D. (U) Schedule Profile:

	FY 1998	FY 1999	FY 2000	FY 2001
PROGRAM MILESTONES	Complete Advanced Submarine Propulion System concepts. Conduct LSV propulsor testing for VIRGINIA propulsor development/improvement program	Advanced coating effort deferred to FY02. Advanced decks & mounts effort restructured	Complete demonstration/validation of advanced sail on LSV, transition to VIRGINIA class PE. Hydroacoustic/Hydrodynamic Test Center computer refresh upgrade Acoustic Research Detachment Range upgrade	Initial operating capability of LSV 2 Complete Rim Driven Thruster/main seawater pump development
ENGINEERING MILESTONES	Complete EES 1st generation elastomeric disk life cycle test Design and fab prototype Adv. Sail & test instrumentation Complete initial phase of development of enabling component and analytical techniques needed for main propulsion electric drives Complete concept design for Large Scale Vehicle 2 (LSV 2)	Closeout and final documentation for development of enabling components and analytical techniques needed for electric drive Complete design of advanced mount and hull attachment Completed fabrication of 1/4 scale Advanced Sail for LSV evaluation	Complete construction of LSV 2 modules Assemble LSV 2 modules at Lake Pend Oreille Initiate advanced truss/deck design, continue shock mount testing, test air mount design Initiate prototype design of flow management Install replacement battery in LSV 1 Begin upgrade/replace LSV range acoustic array Complete 2nd design option for LSV 2 coating	LSV 2 acceptance and characterization trials Initiate electric drive development Complete upgrade/replace LSV range acoustic array

EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Advanced Submarine Sys Dev/0603561N**	PROJECT NAME AND NUMBER Advanced Submarine Systems Development - S2033/Adv. Metal Fiber Brushes - S2756	

	FY 1998	FY 1999	FY 2000	FY 2001
ENGINEERING MILESTONES	Deliver full length composite shaft		Complete development of Stealth Master Plan	
	Completed 1st design option for Large Scale Vehicle 2 (LSV 2) coating		Concept for LSV evaluation	
T&E MILESTONES	Conduct SAS Sea Test II	Completed evaluation of 1/16 Advanced Sail in LCC	Complete EES 2nd generation disk life cycle aging test	
		Begin testing of 2nd gen. Elastomeric Disk for life cycle and aging	Conduct hydroacoustic evaluation of Advanced Sail prototype on LSV 1	
		Conduct pass/fail test of flow mgmt. concepts	Weapons effect testing of advanced decks and mounts	
			Begin EES EDM equipment testing	
CONTRACT MILESTONES		Award LSV 2 detailed design/ build contract		
		Award concept formulation contract		
		Award Virtual Water Tunnel contract		

Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA-4

PROGRAM ELEMENT: Advanced Submarine Sys Dev/0603561N

PROJECT NAME AND NUMBER: Advanced Submarine Systems Development/S2033

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Systems Engineering	S/CPFF	NNS Newport News, VA	40.420	1.781	12/98	4.700	02/00	8.000	12/00	24.200	79.101	67.800
Systems Engineering	S/CPIF	NNS Newport News, VA	0.000	11.267	02/99	4.091	02/00	2.200	12/00	59.200	76.758	80.000
Systems Engineering	S/CPFF	EB Groton, CT	43.900	3.976	12/98	0.707	02/00	4.500	12/00	CONT.	CONT.	37.300
Systems Engineering	WR	NSWC Bethesda, MD	112.190	22.825	10/98	18.600	10/99	17.600		CONT.	CONT.	
Systems Engineering	S/CPFF	ARL/PSU, State College,PA	30.100	1.624		1.600	01/00	3.000	12/00	CONT.	CONT.	
Systems Engineering	WR	NUWC Newport, RI	66.500	3.128	10/98	0.900	10/99	0.800		CONT.	CONT.	
Systems Engineering	S/CPFF	KAPL Schenectady, NY	0.000	2.000	03/99	3.300				CONT.	CONT.	
Systems Engineering		Cortana		1.400		1.400		3.324		CONT.	CONT.	
Subtotal Product Development			293.110	48.001		35.298		39.424				

Remarks:

EB's PY cost is greater than total value of contract due to a new contract award.

Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks: Not applicable.

Exhibit R-3 Cost Analysis (page 2) | DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA-4 | PROGRAM ELEMENT: Advanced Submarine Sys Dev/0603561N | PROJECT NAME AND NUMBER: Advanced Submarine Systems Development/S2033

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NSWC Bethesda, MD	16.634	1.042	10/98	3.000	10/99	3.853		CONT.	CONT.	
Developmental Test & Evaluation	S/CPFF	NNS Norfolk, VA	0.000	1.817	12/98	3.000	02/00	2.000	12/00	66.800	73.617	67.800
Developmental Test & Evaluation	S/CPFF	EB Groton, CT	15.901	1.805	12/98	1.000	02/00	0.807	12/00	21.000	40.513	37.300
Developmental Test & Evaluation	S/CPFF	DARPA Fairfax, VA	0.000	3.000	05/99	0.000		0.000		0.000	3.000	3.000
Developmental Test & Evaluation	S/CPFF	NOESIS	0.200	1.000	03/99	0.700		0.000		0.000	1.900	1.200
Developmental Test & Evaluation	S/CPFF	SPA		0.410	02/99	0.900		0.000		0.000	1.310	0.600
Subtotal T&E			32.535	9.074		8.600		6.660				
Remarks:												
Contractor Engineering Support	S/CPFF	NNS Norfolk, VA	1.700								1.700	
Contractor Engineering Support	S/CPFF	EB Groton, CT	1.700								1.700	
											0.000	
Government Engineering Support	WR	NSWC Bethesda, MD	1.000								CONT.	
											0.000	
											0.000	
Subtotal Management			4.400	0.000		0.000		0.000		0.000	4.400	
Remarks:												
Total Cost			330.045	57.075		43.898		46.084				
Remarks:												

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Advanced Submarine Dev/0603561N**				PROJECT NAME AND NUMBER Advanced Submarine Combat Systems Development/V0223					
COST ($ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost	**0.000**	**59.170**	**69.911**	**67.185**	**66.290**	**64.082**	**66.035**	**58.067**	**CONT.**	**CONT.**
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification: This program supports innovative research and development in submarine technologies and the subsequent evaluation, demonstration, and validation for submarine platforms. It will increase the submarine technology base and provide subsystem design options not currently feasible.

(U) Project Unit V0223: This non-acquisition (Non-ACAT) program supports the Navy Submarine Acoustic Superiority and Technology Insertion Initiatives through the application of advanced development and testing of improvements to present and future sonar and combat control systems. The goal is to address the technology challenges that marginalize tactical control in littoral and open ocean environments during the performance of a variety of missions including peacetime engagement, surveillance, deterrence, regional sea denial, precision strike, task group support, and ground warfare support. Prototype hardware and/or software systems are developed to demonstrate technologically promising system concepts in Laboratory and at-sea submarine environments. Technology areas specific to this program include transducers, hull-mounted and towed arrays, on-board monostatic and bistatic sonar signal processing, target motion analysis (TMA), multiple contact processing and test and evaluation. This program is funded under demonstration and validation because it develops and integrates hardware for experimental test related to specific ship and aircraft applications.
(U) Program Accomplishments and Plans:

FY 2000 Plan (V0223):

($7.200) Advanced Tactical Control – Begin development of Tactical Control Build 2 software. Further define functional priorities and initiate development of 3D tactical scene rendering, improved use of ARCI data and integrated vulnerability information management. Conduct at-sea evaluation. Develop performance quantification metrics and data collection, storage and analysis methodologies.. Develop and deliver SFMPL 6.2. Identify potential information management solutions including cooperative Common Teactical Decisions Aids from DARPA, ONR, industry and academia. Evaluate for inclusion in Tactical Control Builds.

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Advanced Submarine Dev/0603561N**				PROJECT NAME AND NUMBER Advanced Submarine Combat Systems Development/V0223					
COST ($ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost	**0.000**	**59.718**	**70.299**	**67.848**	**67.003**	**64.839**	**66.972**	**59.066**	**CONT.**	**CONT.**
RDT&E Articles Qty										

- ($35.204) Advanced Sonar System and Processing – Complete APB 99 sea test and transition to ARCI Phase III. Complete development and integration, conduct MF and HF, continued automation enhancements, matched field localization, passive torpedo alertment, extension of 3-line MLTA processing, defensive multi-static, signal processing extensions for beamformerless detection, improved OMI, and environmental sensors.
- ($7.107) Advanced Towed Arrays - Continue 3-line array development. Complete fabrication of 1-line array. Develop NTMLTA signal processing design. Conduct 1-line lake test and Critical Item Tests. Complete 3-line ADM design. Conduct 3-line ADM CDR.
- ($11.800) Advanced Hull Arrays – Continue development of CAVES technology. Perform analysis on CAVES pre-patch test data. Install CAVES Patch arrays on USS San Juan. Conduct Post-patch SRA Sea Test. Investigate current coatings CAVES performance. Continue planning for integration of CAVES technology with other Hull arrays. Perform CAVES Outer decoupler buckling experiment. Continue documentation of CAVES program. Investigate impact of outer decoupler on inner decoupler. Initiate CACTISS III test planning. Initiate CAVES WAA transition planning. Initiate conformal array technology in conjunction with Advanced Sail to maintain current capability. Initiate Integrated Bow Conformal Array technology to replace spherical array, HF sail array, and HF chin array. Extend Noise Audit Model for Integrated Conformal Array. Initiate planning for FY04 Lake Test/Demonstration and FY05 Sea Test/Demonstration. Design Bow Dome for demonstration tests. Initiate sensor development. Initiate acoustic source development. Initiate processor software development.
- ($8.100) High Frequency Sonar Program - Complete development, evaluation and testing of Build 2+ build and transition and integration into ARCI program. Complete Test bed upgrades. Initiate integration of ACOMMS processing and hardware into HF suite. Continue sail and conformal array studies. Continue processing improvements for HF APB 01 including bottom and target mapping, ASW improvements, bottom tracking and navigation, and adaptive signal design. Initiate processing improvements to support LMRS precision mapping efforts.
- ($.500) Test and Evaluation – Conduct Towed Array APB lake test. Continue at-sea data gathering program. Initiate planning for HF APB Sea Test.

$69,911 TOTAL

2. (U) FY 2001 Plan:

- ($7.037) Advanced Tactical Control – Complete Tactical Control Build 2. Incorporate upgrades based on at-sea evaluation and deliver to CCS MK 2 and NSSN for integration. Conduct combat system performance assessment based on the defined metrics. Evaluate candidate technologies for Tactical Control Build 3. Conduct at-sea evaluation. Develop, test and deliver SFMPL update.

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Advanced Submarine Dev/0603561N**				PROJECT NAME AND NUMBER Advanced Submarine Combat Systems Development/V0223					
COST ($ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost	**0.000**	**59.170**	**69.911**	**67.185**	**66.290**	**64.082**	**66.035**	**58.067**	**CONT.**	**CONT.**
RDT&E Articles Qty										

- ($40.848) Advanced Sonar System and Processing - Complete development, integration, conduct performance assessment and initiate transition of APB 01 to BQQ-10 project and NSSN. Initiate APB 02 including offensive multistatics enhancements, multi-mode low frequency, continued automation enhancements, extend processing large hull arrays.
- ($4.500) Advanced Towed Arrays- Continue 3-line array development. Conduct subsystem CITs. Fabricate 3-line array ADM. Fabricate 3-line signal processor ADM. Conduct system integration & testing.
- ($9.000) Advanced Hull Arrays- Continue CAVES technology development. Conduct CACTISS III test. Perform data analysis of CAVES Post-SRA Sea Test. Complete update of noise audit model. Initiate planning of CAVES Patch Array Sea Test II. Continue documentation of CAVES program. Continue CAVES WAA transition planning. Continue development of conformal array technology. Continue development of Integrated Conformal Array technology. Complete Noise Audit Model for Integrated Bow Conformal Array. Complete Bow Dome Design. Construct Bow Dome and mold inner decoupler. Construct acoustic sources and sensors, test and evaluate. Continue processor software development. Continue planning for demonstration tests.
- ($5.300) High Frequency Sonar Program- Continue processing improvements, evaluation and testing of HF APB01 initiatives. Continue ACCOMMS integration. Finalize study results. Transition on-going processing developments to advance processing. Continue processing improvements associated with LMRS precision mapping efforts.
- ($.500) Test & Evaluation - conduct TCP sea tests, HF sea tests, MLTA demonstration and hull array testing.

$67,185 TOTAL

B. (U) Other Program Funding Summary: Not applicable.

(U) Related RDT&E: Not applicable.

C. (U) Acquisition Strategy: Plan to use competitively awarded contracts from Board Agency Announcement (BAA) solicitations.

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Advanced Submarine Dev/0603561N**				PROJECT NAME AND NUMBER Advanced Submarine Combat Systems Development/V0223					
COST ($ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost	**0.000**	**59.170**	**69.911**	**67.185**	**66.290**	**64.082**	**66.035**	**58.067**	**CONT.**	**CONT.**
RDT&E Articles Qty										

D. (U) Schedule Profile:

	FY 1999 (PE0603504N)	FY 2000	FY 2001
Program Milestones	2Q - Delivered Range Dependent Search Capability to SFMPL 3Q - Transition TA-APB 99 to ARCI 4Q - Transition TCP Bld 1	2Q - SFMPL 6.2 Complete 3Q - Complete TCP APB-2 3Q - Transition TA-APB00 & HF APB99 to ARCI	3Q - CAVES WAA Transition Decision
Engineering Milestones	1Q - Initiate TA-APB00 1Q - Initiate TCP APB-2 2Q - MLTA 1-line CDR 2Q - Complete TSOA 3Q - Deliver TCP Bld 1	1Q - Initiate TA-APB01 1Q - Deliver SFMPL 6.1 4Q - MLTA 3-line CDR	1Q - Initiate TCP APB -3 1Q - Initiate TA-APB01 3Q - MLTA System Integration 4Q - Deliver TCP APB-2
Test & Evaluation Milestones	3Q - CACTISS II Test 3Q - TA-APB99 Sea Test 4Q - CAVES Pre-Patch Test	3Q - HF APB99 Sea Test 3Q - TA APB00 Sea Test 3Q - TCP APB 1 Sea Test 3Q - MLTA Self Noise Test	3Q - TCP APB-2 Sea Test 3Q - CACTISS III test 3Q - HF APB01 Sea Test 4Q - MLTA RV Sea Test

Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA-4

PROGRAM ELEMENT: Advanced Submarine Sys Dev/0603561N

PROJECT NAME AND NUMBER: Advanced Submarine Combat Systems Development/V0223

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Product Development	WR	NUWC Newport, RI	0.000	0.000		29.232	10/99	21.321	10/00	CONT.	CONT.	
Product Development	RCP	NUWC Newport, RI	0.000	0.000		0.000		0.000	-	CONT.	CONT.	
Product Development	WR	NRL/Washington	0.000	0.000		1.962	10/99	2.050	10/00	CONT.	CONT.	
Product Development	RCP	NRL/Washington	0.000	0.000		0.000		0.000	-	CONT.	CONT.	
Product Development	WR	NSWC Carderock, MD	0.000	0.000		1.308	10/99	1.500	10/00	CONT.	CONT.	
Product Development	RCP	NSWC Carderock, MD AMSI	0.000	0.000		0.000		0.000	-	CONT.	CONT.	
Product Development	WR	NCCOSC San Diego, CA	0.000	0.000		0.150	10/99	0.160	10/00	CONT.	CONT.	
Product Development	RCP	NCCOSC S Diego, CA Litton	0.000	0.000		0.000		0.000	-	CONT.	CONT.	
Product Development	WR	NSMRL	0.000	0.000		0.000		0.000	-	CONT.	CONT.	
Product Development	RCP	NSMA	0.000	0.000		0.180	03/00	0.180	10/00	CONT.	CONT.	
Product Development	WR	NUWC Keyport, HI	0.000	0.000		0.100	10/99	0.000	-	CONT.	CONT.	
Product Development	MIPR	U.S. Army/MITRE	0.000	0.000		2.000	12/99	2.000	12/00	CONT.	CONT.	
Product Development	MIPR	U.S. Air Force/MIT Lincoln Labs	0.000	0.000		0.800	12/99	1.000	12/00	CONT.	CONT.	
Product Development	RCP	ONR/MCCI	0.000	0.000		1.400	01/00	1.400	01/01	CONT.	CONT.	
Product Development	RCP	ONR/University of California	0.000	0.000		0.000		0.000	-	CONT.	CONT.	
Product Development	RCP	ONR/BBN	0.000	0.000		0.000		0.000	-	CONT.	CONT.	
Product Development	RCP	ONR/GTRI	0.000	0.000		1.986		2.315	01/01	CONT.	CONT.	
Product Development	SS/CPFF	ARL/JHU, MD	0.000	0.000		7.207	12/99	7.200	01/01	CONT.	CONT.	
Product Development	SS/CPFF	APL/UW, WA	0.000	0.000		0.000		0.000	-	CONT.	CONT.	
Product Development	SS/CPFF	ARL/UT, TX	0.000	0.000		7.200	12/99	7.000	01/01	CONT.	CONT.	
Product Development	SS/CPFF	ARL/PSU, PA	0.000	0.000		0.315	12/99	0.350	10/00	CONT.	CONT.	
Product Development	MD	ARL/PSU, PA	0.000	0.000		0.130	01/00	0.150	01/01	CONT.	CONT.	
Product Development	PD	NAVAIR PAX/NSWC Indian H	0.000	0.000		0.000		0.000	-	CONT.	CONT.	
Product Development	WR	SPWAR, CA	0.000	0.000		0.100	10/99	0.100	10/00	CONT.	CONT.	
Product Development	C/FP	DSI, VA	0.000	0.000		0.000		0.000	-	CONT.	CONT.	
Product Development	C/CPFF	DSR, VA	0.000	0.000		7.000	12/99	6.000	12/00	CONT.	CONT.	
Product Development	C/CPFF	TWD Associate, VA	0.000	0.000		0.000		0.000	-	CONT.	CONT.	
Product Development		Electric Boat, CT	0.000	0.000		0.000		0.000	-	CONT.	CONT.	
Product Development	CPFF	NNS, VA	0.000	0.000		0.000		0.000	-	CONT.	CONT.	
Product Development	C/CPFF	Systems Planning Analysis, VA	0.000	0.000		0.000		0.000	-	CONT.	CONT.	
Product Development	MIPR	DARPA, VA	0.000	0.000		0.000		9.000	12/00	CONT.	CONT.	

Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA-4

PROGRAM ELEMENT: Advanced Submarine Sys Dev/0603561N

PROJECT NAME AND NUMBER: Advanced Submarine Combat Systems Development/V0223

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
BAAs	C/CPFF	Various	0.000	0.000		1.016	Various	1.000	Various	CONT.	CONT.	
Advanced Towed Array BAA	C/CPFF	Lockheed Martin, NY	0.000	0.000		1.200	12/99	1.000	12/00	CONT.	CONT.	
Product Development	Various	Various	0.000	0.000		4.825	Various	0.000	Various	CONT.	CONT.	
Subtotal Product Development			0.000	0.000		68.111		64,389		CONT.	CONT.	

Remarks:

Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks: This is a Non Acquisition Program which therefore includes no indirect support costs.

Exhibit R-3 Cost Analysis (page 2) | DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA-4 | PROGRAM ELEMENT: Advanced Submarine Sys Dev/0603561N | PROJECT NAME AND NUMBER: Advanced Submarine Combat Systems Development/V0223

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NUWC Newport, RI	0.000	0.000		0.450	10/99	0.450	10/00	CONT.	CONT.	
Developmental Test & Evaluation	Various	Various	0.000	0.000		0.050	Various	0.164	Various	CONT.	CONT.	
Operational Test & Evaluation										0.000	0.000	
GFE										0.000	0.000	
Subtotal T&E			0.000	0.000		0.500		0.614		CONT.	CONT.	
Remarks:												
Program Management Support	C/CPFF	Integrated Product Dec, CT	0.000	0.000		0.400	Various	0.000		CONT.	CONT.	
Program Management Support	C/CPFF	Stanley Associates, VA	0.000	0.000		0.900	12/99	2.000	12/00	CONT.	CONT.	
Program Management Support	Various	Various	0.000	0.000		0.000	Various	0.000		CONT.	CONT.	
Government Engineering Support											0.000	
Travel											0.000	
Overhead											0.000	
Subtotal Management			0.000	0.000		1.300		2.000		CONT.	CONT.	
Remarks:												
Total Cost			0.000	0.000		69.911		67.185		CONT.	CONT.	
Remarks:												

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**					R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. Submarine Tactical Warfare Systems/0603562N					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**3.893**	**4.643**	**4.356**	**5.401**	**5.685**	**5.816**	**5.921**	**CONT.**	**CONT.**
Advanced Sub. Spt. Equipment/F0770		**1.896**	**2.318**	**2.466**	**3.331**	**3.444**	**3.529**	**3.588**	**CONT.**	**CONT.**
Sub. Special Ops. Spt. Devel./V1739		**1.997**	**2.325**	**1.890**	**2.070**	**2.241**	**2.287**	**2.333**	**CONT.**	**CONT.**
Quantity of RDT&E Articles		**3**	**2**	**2**	**3**	**3**	**2**	**2**	**CONT.**	**CONT.**

A. (U) Mission Description and Budget Item Justification: The Submarine Tactical Warfare Systems program element is comprised of the Advanced Submarine Support Equipment Program (ASSEP) and the Submarine Special Operations Support Development Program. The overall objective is to improve submarine operational effectiveness through the development and implementation of advanced Research and Development (R&D) and Electronic Support Measures (ESM) technologies. The goal of the ASSEP is to increase submarine operational effectiveness through advanced R&D of Radar Cross Section Reduction (RCSR), Sensors (RF, Photonics Mast, IR etc.) and the electronic warfare technologies to enhance stealth, threat warning, strike and tactical surveillance. A continuing need exists to improve submarine capabilities in the increasingly dense and sophisticated electromagnetic environment caused by the proliferation of complex radar, communications, and navigation equipment of potential adversaries. The Submarine Special Operations Support Development program responds to the increased threat of Naval activity in the Littorals and the continuing threat of submarine and surface ship activity in regions of the world through the development of advanced submarine R& D technology to provide improved operational capability in shallow water regions. Particular emphasis is placed in the areas of sonar operability and maintainability, Littoral operations, mine warfare, tactical surveillance, and other submarine support missions. Efforts include assessment of combat system effectiveness, development of Arctic shallow water specific improvements for existing sonars, development of class specific Arctic operational guidelines and the testing of ice-capable submarine support structures. This program also provides the framework for various R& D programs to conduct Test and Evaluation in shallow water and Arctic regions.

B. (U) Program Change Summary: (show total funding, schedule, and technical changes for the program element that have occurred since the last submission).

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	4.676	4.667	4.330
Appropriated Value:	4676	4.667	
Adjustment to FY 1999/2000 Appropriated Value/	-0.783	-0.024	0.026
FY 2000 President's Budget:			
FY 2001 PRES Budget Submit:	3.893	4.643	4.356

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. Submarine Tactical Warfare Systems/0603562N

(U) Change Summary Explanation:

(U) Funding:

FY99 adjustments are due to a SBIR transfer (-$0.090), minor program adjustments of (-$0.630), Congressional Undistributed Reductions (-$0.159) Inflation Savings Reduction (-$0.21).

FY00 funding decrease is due to Across the Board reductions (-$0.24), and $.071M of the extramural program is reserved for SBIR assessment IAW 15USC 638.

FY01 funding decrease is due to General Administrative reduction (-$0.20) , NWCF Rate increase ($0.076), outsourcing adjustment ($0.24), CEWG reduction (-$0.14), NUWC Reduction (-$0.04), minor program adjustments of (-$0.105), Nonpay Purchase Inflation reduction (-$0.30).

(U) Schedule: As a result of the DD 1002 update reduction in FY1999 the Imaging Auto Recognition and Tracking and Counter Detection/Range Assessment hardware design have been delayed one year to FY00.

(U) Technical: Not applicable.

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Submarine Tactical Warfare Sys/0603562N**				PROJECT NAME AND NUMBER Advanced Submarine Support Equipment Program (ASSEP)/F0770					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**1.896**	**2.318**	**2.466**	**3.331**	**3.444**	**3.529**	**3.588**	**CONT.**	**CONT.**
RDT&E Articles Qty		**2**	**0**	**1**	**1**	**2**	**0**	**1**	**CONT.**	**CONT.**

A. (U) Mission Description and Budget Item Justification: This program develops submarine ESM equipment and image processing technology. A continuing need exists to improve submarine capabilities in these areas to enhance operational effectiveness in the increasingly dense and sophisticated electromagnetic environment caused by the proliferation of complex radar, communications, and navigation equipment of potential adversaries. Improvements are necessary for submarine ESM and imaging to be effective in conducting the following mission areas: Joint Littoral Warfare, Joint Surveillance, Space and Electronic Warfare, Intelligence Collection, Maritime Protection and Joint Strike. Specific efforts include development of: Radar Cross Section Reduction (RCSR) Techniques, Sensor Technology Insertion Program (STIP), and ESM Technology Insertion Program (ESMTIP). The RCSR evaluates the vulnerability of submarine masts, periscopes and sensors to radar and infrared threats and evaluates the state of the art in radar absorbent material, resulting in potential periscope/mast engineering improvements to reduce the counter-detection threat. The STIP and ESMTIP programs develop submarine unique improvements to mast, periscope and hull mounted ESM electromagnetic and electro-optic sensors based on emerging technologies that are available from DOD Exploratory Development Programs, industry Independent Research and Development, and other sources. Feasibility demonstration models (FDMs) are developed to provide a realistic method of evaluating the improvements, including deployment on submarines for testing. STIP projects include: Radio frequency (RF) extensions; RF bandwidth improvements; passive localization; upgrades to the Imaging Mast sensors and software; and advanced antenna arrays for beam steering and high resolution direction finding enhancements. ESMTIP projects include: improvements to signal sorting and recognition methods to support classification and identification of ESM contacts encountered during Littoral operations; signal processing improvements for processing of low probability of intercept signals; voice/ language recognition and human/ machine interface (HMI) enhancements. All programs funded in this project are non- acquisition category programs in accordance with Non-Acquisition Program Definition Document (NAPDD) # 556-872-872E1. The test articles identified consist of critical components of FDM's that will be fully developed during engineering development into Engineering Development Models (EDM's).

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Submarine Tactical Warfare Sys/0603562N**	Advanced Submarine Support Equipment Program (ASSEP)/F0770

(U) Program Accomplishments and Plans:

1. (U) FY 1999 Accomplishments:
- (U) ($ 0.275) Continued Radar Cross Section Reduction (RCSR) techniques and materials investigation.
- (U) ($ 1.049) Continued STIP development of Passive Localization.
- (U) ($ 0.572) Initiated STIP and Electronic Support Measures Technology Insertion Program (ESMTIP) development of Photonics/Type 18 Low Band Direction Finding (DF) and Counter Detection and Range Assessment software development.
- (U) The estimated total cost of the two sets of Feasibility Demonstration Models (FDM) components initiated during this fiscal year is $0.8M.

2. (U) FY 2000 Plans:
- (U) ($ 0.275) Continue RCSR techniques and materials investigation.
- (U) ($ 1.243) Continue STIP development of Passive Localization, Imaging (Photonics) Auto Target Recognition and Tracking(started in FY98) and Photonics/Type 18 Low Band DF.
- (U) ($ 0.284) Continue ESMTIP development of Counter Detection and Range Assessment.
- (U) ($ 0.516) Initiate ESMTIP development of Combat Control System (CCS) interface for SSN 688 and Integrated Electronic Support (ES) Workstation.

3. (U) FY 2001 Plans:
- (U) ($ 0.283) Continue RCSR techniques and material investigation.
- (U) ($ 1.049) Continue STIP development of Passive Localization, Imaging (Photonics) Auto Target Recognition and Tracking and Photonics/Type 18 Low Band.
- (U) ($ 0.221) Initiate STIP development of Advanced Shared Aperature Comms Antennas.
- (U) ($ 0.913) Continue ESMTIP development of CCS Interface for SSN 688, Integrated ES Workstation and Counter Detection/Range Assessment.
- (U) The estimated total cost of the one set of FDM components initiated during this fiscal year is $0.8M

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Submarine Tactical Warfare Sys/0603562N**	Advanced Submarine Support Equipment Program (ASSEP)/F0770

B. (U) Other Program Funding Summary: Not applicable.
(U)Related RDT&E:
(U) PE 0604503N(Submarine System Equipment Development)
(U) PE 0604558N(New Design SSN Development)
(U) PE 0604777N(Navigation /ID Systems)

C. (U) Acquisition Strategy: This project will optimize technology insertion using a build-test-build approach to support ES operational needs. Operational needs have been based on 1998 COMSUBLANT/COMSUBPAC Command Capability Issues (CCIs), Virginia Class SSN Operational Requirements Document objectives, a review, assessment and prioritization of Sensor and Processor efforts and SSN force level projections for SSN688/688I and SSN21 classes through FY2015. The STIP and ESMTIP efforts will develop submarine unique improvements to mast, periscope and hull mounted ESM electromagnetic and electro-optic sensors based on emerging technologies that are available from DOD Exploratory Development Programs, industry Independent Research and Development, and other sources. Feasibility Demonstration Models (FDMs) will be developed to provide a realistic method of evaluating the improvements, including deployment on submarines for testing.

D. (U) Schedule Profile. See attached schedule.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Submarine Tactical Warfare Sys/0603562N**	PROJECT NAME AND NUMBER Advanced Submarine Support Equipment Program (ASSEP)/F0770

ASSEP Schedules

Revised 5/27/99

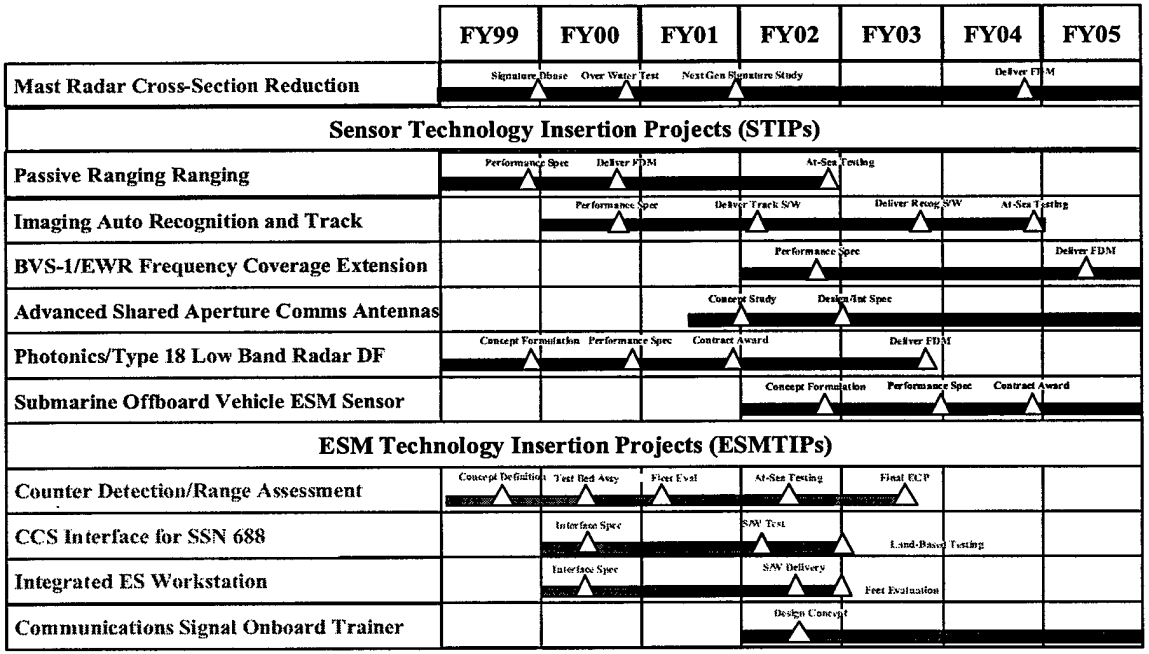


Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA-4

PROGRAM ELEMENT: Sub Tactical Warfare Systems/0603562N

PROJECT NAME AND NUMBER: Advanced Submarine Support Equipment Program (ASSEP)/F0770

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development											CONT.	
LIDAR Warning Receiver	C/CPIF	JHU/APL Laurel, MD	3.100	0.000	N/A	0.000	N/A	0.000	N/A	0.000	3.100	3.100
											CONT.	
Ancillary Hardware Development											0.000	
Systems Engineering	WR	NUWC Newport, RI	9.300	0.717	11/98	1.445	11/99	1.676	11/00	CONT.	CONT.	N/A
Licenses											0.000	
Tooling											0.000	
GFE	N/A	N/A	0.000	0.000	N/A	0.000	N/A	0.000	Various	N/A	N/A	N/A
Miscellaneous	Various	Various	7.072	0.985	Various	0.627	Various	0.556	Various	CONT.	CONT.	N/A
Award Fees											0.000	
Subtotal Product Development			19.472	1.702		2.072		2.232		0.000	25.478	

Remarks:

Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Engineering Technical Services	Various	Various	0.900	0.031	11/98	0.058	11/99	0.060	11/00	CONT.	CONT.	N/A
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.900	0.031		0.058		0.060		0.000	1.049	

Remarks:

Exhibit R-3 Cost Analysis (page 2)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**			PROGRAM ELEMENT **Sub Tactical Warfare Systems/0603562N**			PROJECT NAME AND NUMBER Advanced Submarine Support Equipment Program (ASSEP)/F0770						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation											0.000	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support											0.000	
Management Support Services	C/CPIF/CP	Various	1.000	0.146	11/98	0.173	11/99	0.158	11/00	CONT.	CONT.	N/A
Studies Analysis & Evaluations	MIPR	Mitre, Mclean, Va	0.800	0.000	N/A	0.000	N/A	0.000	N/A	0.000	0.800	0.800
Travel	TO's	Various	0.128	0.017	10/98	0.015	10/99	0.016	10/00	CONT.	0.176	CONT.
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			1.928	0.163		0.188		0.174		0.000	2.453	CONT.
Remarks:												
Total Cost			22.300	1.896		2.318		2.466		CONT.	CONT.	
Remarks:												

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N**	PROGRAM ELEMENT NAME AND NUMBER **Submarine Tactical Warfare Systems/P.E. 0603**				PROJECT NAME AND NUMBER Submarine Special Operations Support Development/V1739					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**1.997**	**2.325**	**1.890**	**2.070**	**2.241**	**2.287**	**2.333**	**CONT**	**CONT**
RDT&E Articles Qty		**Arctic ex 1**	**Arctic ex 2**	**Arctic ex 1**	**Arctic ex 2**	**Arctic ex 1**	**Arctic ex 2**	**Arctic ex 1**	**CONT**	**CONT**

A. (U) Misison Description an Budget Item Justification: This program responds to the increased threat of Naval activity in the Littoral and continuing threat of submarine and surface ship activity in all regions of the world throught the development of advanced submarine concepts. It places particular emphasis on submarine operability and mission support in unique environments. Efforts include assessment of conbat system effectiveness, use of high frequency sonars in Arctic regions, testing of ice-capable submarine structures, and development of class specific Arctic shallow water operational guidelines. This program also provides the framework for various Research and Development (R&D) programs to conduct Test and Evaluation in the shallow water and Arctic regions.

(U) Program Accomplishments and Plans

1. (U) FY 1999 Plans
   - (U) ($1.997) Conduct/Support an Arctic Science Exercise (SCICEX), Ice Exercice (ICEX) 1-99 and Ice Operation (ICEOPS) 1-99, and plan for ICEX 1-00.

2. (U) FY 2000 Plans
   - (U) ($2.125) Conduct/Support SCICEX 1-00 and ICEX 1-00
   - (U) ($0.200) Perform Structual Analysis for SSN 21 and Virginia Class Submarines

3. (U) FY 2001 Plans
   - (U) ($1.890) Conduct/Support Ice Exercise 1-01 and Ice Camp Operations

B (U) Oth P i F di S N tA li bl

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N	**Submarine Tactical Warfare Systems/P.E. 0603**	Submarine Special Operations Support Development/V1739

Program Element: 0603562N
Project Number: V1739
Title: Submarine Special Operations Support Development

Schedule Profile

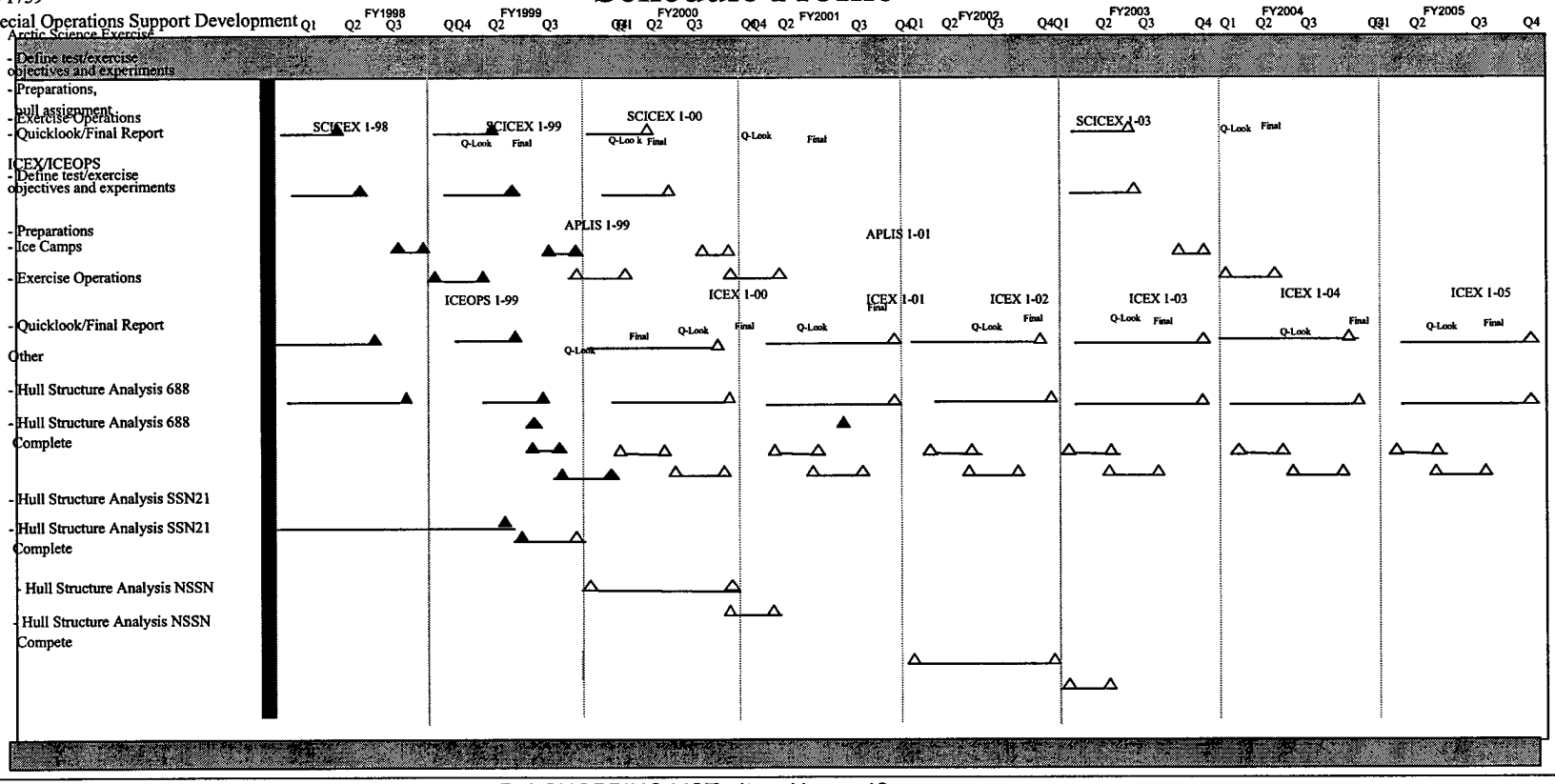


Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, N	Submarine Tactical Warfare Systems/P.E. 060	Submarine Special Operations Support Development/V1739

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development											0.000	
Ancillary Hardware Development											0.000	
Systems Engineering	WR	NSWC Carderock	1.300	0.170	11/98	0.200	11/99				1.670	
Licenses											0.000	
Tooling											0.000	
GFE											0.000	
Award Fees											0.000	
Subtotal Product Development			1.300	0.170		0.200		0.000		0.000	1.670	

Remarks:

Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks:

Exhibit R-3 Cost Analysis (page 2) | DATE: **February 2000**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N** | PROGRAM ELEMENT: **Submarine Tactical Warfare Systems/P.E. 06035** | PROJECT NAME AND NUMBER: Submarine Special Operations Support Development/V1739

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	SUBDEVRON Five	6.700	1.725	11/98	1.928	11/99	1.734	11/00	Cont.	12.087	Cont.
Developmental Test & Evaluation	WR	CMDR,3rd NAVCON BRIGATE	0.050	0.050	10/98	0.050	10/99	0.050	10/00	Cont.	Cont.	Cont.
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			6.750	1.775		1.978		1.784		0.000	12.287	
Remarks:												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support				0.042	11/98	0.137	11/99	0.096		Cont.	0.275	Cont.
Travel				0.010	10/98	0.010	10/99	0.010		Cont.	0.030	Cont.
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	0.052		0.147		0.106		0.000	0.305	
Remarks:												
Total Cost			6.750	1.997		2.325		1.890				
Remarks:												

CLASSIFICATION: **UNCLASSIFIED**

EXHIBIT R-2, RDT&E Budget Item Justification								DATE: February 2000		
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/4**					R-1 ITEM NOMENCLATURE SHIP CONCEPT ADVANCED DESIGN, PE 0603563N					
COST ($ in Millions		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**9.613**	**28.659**	**0.162**	**2.968**	**3.892**	**3.844**	**3.843**	**Continuing**	**Continuing**
DESIGN TOOLS, PLANS & CONCEPTS / S2196		**9.613**	**5.290**	**0.162**	**2.968**	**3.892**	**3.844**	**3.843**	**Continuing**	**Continuing**
SMART PROPULSOR PRODUCT MODEL / S2757		**0.000**	**1.492**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**1.492**
STANDARDS FOR EXCHANGE OF PRODUCT MODEL DATA / S2758		**0.000**	**1.989**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**1.989**
TRIDENT SSGN CONVERSION / F2759		**0.000**	**9.944**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**9.944**
AUTOMATED MAINTENANCE ENVIRONMENT / 22760		**0.000**	**9.944**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**9.944**
Quantity of RDT&E Articles		**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**		

A. (U) Mission Description and Budget Item Justification:
The efforts within this PE directly support the Navy's ability to design more affordable mission capable ships with reduced manning, increased producibility, reduced operating and support costs, and greater utilization of the latest technology. The program directly supports the Navy Shipbuilding Plan with state-of-the-art design tools and methods for ship concept studies, and the actual conduct of design concept studies for the ships in that plan. The program provides the foundation for affordable surface ship design, construction, and life cycle support and is a required first step in the integration of total ship systems, including combat systems and hull, mechanical and electrical (HM&E) systems.

(U) Project S2196 - This project funds pre-milestone 0 ship concept studies, ship and ship systems technology assessments, and the development and upgrade of ship design and engineering tools, methods, and criteria including computer aided tools and simulation based ship design and engineering.

(U) Project S2757 - This project develops a smart propulsor product modeling capability. (Congressional add)

(U) Project S2758 - This project develops Standards for Exchange of Product Model Data (STEP development - Navy CAE Technology). (Congressional add)

(U) Project F2759 - This project funds TRIDENT SSGN design conversion efforts in FY 2000. PE 0604564N / S2610 funded FY 1999 efforts. FY 2001 efforts are planned for funding in PE 0603559N / S2413. (Congressional add)

(U) Project 22760 - This project funds development of an Automated Maintenance Environment for surface ships.(Congressional add)

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/4**	R-1 ITEM NOMENCLATURE SHIP CONCEPT ADVANCED DESIGN, PE 0603563N

B. Program Change Summary:

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	7.077	5.318	5.675
Appropriated Value:	7.077	28.818	
Adjustment to FY 1999/2000 Appropriated Value/			
FY 2000 President's Budget:	2.536	-0.159	-5.513
FY 2001 PRES Budget Submit:	9.613	28.659	0.162

(U) Funding: FY 1999 funding changes reflects increases of $2.926M for LHA Development Options Study (DOS) and JCC(X) ship versus shore basis mission needs analysis, and reductions of $-0.228M to design tools, $-0.121M for SBIR, $-0.008M for FY 1999 Federal Technology Transfer, and -$0.033M Inflation Adjustment.
FY 2000 funding change is: -$0.159M congressional across the board reductions.
FY 2001 funding decrease is due to: -$3.200M to design tools for highrer priority programs, -$0.951M execution adjustment, -$1.270M reallocation of funding to Advanced Undersea Warfare Concept development, and-$0.092M minor adjustment.

(U) Schedule: LHA Replacement MS 0 was delayed pending results of the LHA DOS.

(U) Technical: Cost modeling and analysis capabilities and Reliability Based Structural Design Criteria will be stopped at the end of FY 00. However, the results will be available for each ship acquisition program to individuallyimplement and further develop these life cycle cost models and tools for CAIV analysis. Each on-going and future ship acquisition program individuallywill plan for and develop their needed tools and methods for ship design and engineering.

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E,N/4**	PROGRAM ELEMENT NAME AND NUMBER SHIP CONCEPT ADVANCED DESIGN, PE 0603563N				PROJECT NAME AND NUMBER DESIGN TOOLS, PLANS & CONCEPTS / S2196					
COST ($ in Millions		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost (S2196)		**9.613**	**5.290**	**0.162**	**2.968**	**3.892**	**3.844**	**3.843**	**Continuing**	**Continuing**
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification: The efforts within this project directly support the Navy's ability to design more affordable mission capable ships with reduced manning, increased producibility, reduced operating and support costs, and greater utilization of the latest technology. This project directly supports the Navy Shipbuilding Plan with state-of-the-art design tools and methods for ship concept studies, and the actual conduct of design concept studies for the ships in that plan. This project provides the foundation for affordable surface ship design, construction, and life cycle support and is a required first step in the integration of total ship systems, including combat systems and hull, mechanical and electrical (HM&E) systems. Inadequate early planning and ship concept formulation can result in down-stream design/construction and operational problems. A more subtle and severely negative impact of neglecting this early effort is that the "best" concepts and technologies may never even be considered and our greatest potential ship design advances never realized. Designs and technologies must meet the threat. This project supports this requirement. Computer modeling and simulation developments will permit virtual operation and evaluation of the ship and enable reduction of ship production and support cost by allowing fleet representatives, shipbuilders and maintenance staffs to build, test, operate or repair the ship "in the computer" at a design stage where the design is flexible and where feedback and suggested changes can be incorporated relatively easily.

(U) This project accomplishes the following: (1) identifies future surface ship requirements and characteristics necessary to meet future threats and support mission needs; (2) investigates new affordable ship concepts and evaluates technologies necessary to support these concepts; (3) provides design methods and automated design tools to develop and evaluate ship concepts, support early ship design, and solve pressing fleet engineering problems; (4) develops design criteria and common standards to improve affordability; (5) improves the quality of the product in the design phases, to reduce or eliminate the costs of fixing problems after ships reach the fleet; (6) develops investment strategies for new concepts and technologies; (7) and supports development of Mission Need Statements (MNS) for future ships.

(U) Efforts under Project S2196 transition directly to early stage ship design in PE 0603564N, Ship Preliminary Design and Feasibility Studies. While these efforts support all surface ship acquisition programs, they are not direct efforts for specific authorized shipbuilding programs. This project is the only R&D effort (Government or commercial) that supports and maintains this country's naval ship design and engineering capabilities in the area of early stage (Concept through Contract Design) design tools, criteria, and methods.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:

(U) ($4.243) Pre-Milestone 0 Ship Concepts and Mission Need Analysis: Developed ship concepts and performed mission area analysis (MAA) for potential ships 5-10 years out in the SCN plan, including ship size, configuration, capabilities and rough order of magnitude (ROM) ship costs. Conducted pre-Milestone 0 ship concept studies for joint command ship, medical capabilities afloat, and alternative potential ship concepts in support of SCN planning. Conducted joint command ship (JCC(X)) ship versus shore basis mission needs analysis. Conducted Development Options Study for LHA replacement (large deck amphibious assault ship) including ship concept studies. Developed future surface warfare vision including mission needs and concepts, and technology needs and plans.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E,N/4	SHIP CONCEPT ADVANCED DESIGN, PE 0603563N	DESIGN TOOLS, PLANS & CONCEPTS / S2196

(U) ($0.464) Total Ship Technology Assessment: Analyzed the benefits and impacts of new ship and hull, mechanical and electrical (HM&E) concepts and technologies. Developed a process to identify, characterize and assess new and emergent technologies and updated the HM&E technology database. Supported integration and transition of new technologies in total ship concepts. Established baseline ship concepts and technology characterization process for use in technology assessments.

(U) ($1.344) Ship Design and Engineering Tools, Methods, and Criteria: Developed and improved early stage ship design methods, criteria, standards, and data bases. Improved surface ship synthesis/assessment models in the following areas: improved performance assessment capabilities, completed link to commercial CAD II system, increased ability to handle alternative distributed system architectures, linked to industry STEP data exchange protocols, began efforts to link with operational effectiveness models, updated and enhanced capabilities to support on-going future surface ship designs to handle new ship configurations, hull form alternatives, signature reduction features, addressed minimum required shipboard manning, reduced construction cost, and increased capabilities to determine ship size impacts of new technologies. Improved ship cost estimating capabilities: linked new acquisition cost modeling capability to ship synthesis/assessment models. Supported development of advanced computer aided design methods and tools for early stage ship design in the following areas: completed development and integration of structural analysis tools with CAD II system, upgraded manning estimation tools, enhanced machinery design tools, completed general arrangements tool upgrades, and integrated distributed systems analysis software with CAD II system. Supported Navy Industry Digital Data Exchange Specification Committee (NIDDESC) development of STEP computer aided design (CAD) systems data and parts library exchange protocol standards for shipbuilding industry.

(U) ($1.375) Simulation Based Ship Design and Engineering: Broad-based implementation of state-of-the-art visualization and simulation techniques for ship design and engineering applications. Integrated visualization and simulation tools from all sources, including DARPA, ONR, and other government activities for areas such as ship motions, maneuvering, powering, personnel flow, stores flow, structural response, command and communications systems, electric power systems, piping systems, HVAC systems, and combat systems. Acquired and validated, adapted, and implemented commercial and other source visualization and simulation tools for the areas of: fluid / piping systems simulation, and crew reduction performance simulation. Developed custom visualization and simulation tools where no alternate source exists in the following areas: signature visualization and simulation. Completed development of standard "wrapper" program to integrate visualization and simulation tool with legacy computer aided design and physics-based hull, mechanical and electrical (HM&E) analysis tools. Developed capabilities for realistic, physics-based simulation of ship performance, behavior, and response in the following areas: survivability, damage tolerance, and damaged mission capability simulation by developing an integrated survivability assessment and analysis capability.

(U) ($1.175) Reliability Based Structural Design Criteria: Added new reliability inputs and assessment techniques to design rules. Incorporated methods for predicting extreme and cumulative lifetime loads design rules. Collected and analyzed long-term hydrodynamic loads data. Correlated full scale loads measurements with model test results. Validated and adapted advanced seaway loads prediction methods for use with design rules. Developed methodology for bow form effects on hull loads. Established safety indices for naval ship structures for hull girders. Performed large scale grillage strength tests. Began assessment of grillage strength test data. Updated design data sheet for compressive strength of plating stiffeners and grillages. Developed structural fatigue (part IV) of the reliability-based load and resistance factor design (LRFD) structural rules for naval surface ships. Validated processes and utilized technologies/improved design methods on existing ships and new designs. Supported transition to industry through Ship Structure Committee (SSC).

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E,N/4	SHIP CONCEPT ADVANCED DESIGN, PE 0603563N	DESIGN TOOLS, PLANS & CONCEPTS / S2196

(U) ($1.012) Total Ownership Cost Methods and Modeling: Developed total ownership cost modeling and cost decision making tools for ships. Supported Navy-Shipbuilding Industry cost model development team. Validated the prototype Product Oriented Design and Construction (PODAC) cost model at two or more additional shipyards. Developed plan for PODAC cost model extensions for combat systems and C4I costs. Collected and analyzed cost data of shipbuilders for development of activity cost factors for naval ships. Developed PODAC cost model estimating ratios for shipbuilding interim products, parametric scaleable systems, and shipboard equipment for ships. Developed a plan for risk and schedule capabilities to PODAC cost model. Used PODAC cost model to analyze new technologies to validate model capabilities to correctly reflect acquisition cost impacts. Began execution of plan to adapt and integrate an existing ship operating and support (O&S) cost module with the PODAC cost model. Linked O&S cost analysis methodology with product work break down of PODAC cost model. Developed a link between PODAC and computer aided ship design tools, so that cost-related information produced by these design tools can be readily imported into the cost model. Supported cost modeling and cost analysis for on-going ship programs.

(U) Note: Affordability Through Commonality (ATC) program efforts previously under this PE/Project are shown in PE 0603513N, Project 32469. The FY 1999 funds for ATC were budgeted under this PE/Project as displayed in the FY 1999 President's Budget but transitioned to PE 0603513N / Project 32469 for execution. ATC funding for both budget and execution in FY 2000 and out-years has transferred to PE 0603513N, Project 32469.

3. (U) FY 2000 PLAN:

(U) ($0.530) Pre-Milestone 0 Ship Concepts and Mission Need Analysis: Develop ship concepts and perform mission area analysis (MAA) for potential ships 5-10 years out in the SCN plan, including ship s configuration, capabilities and rough order of magnitude (ROM) ship costs. Conduct pre-Milestone 0 ship concept studies for medical capabilities afloat, future mine countermeasures ships, and other potential ship concepts / configurations in support of SCN planning. Develop potential future fleet architecture concepts.

(U) ($0.395) Total Ship Technology Assessment: Analyze the benefits and impacts of new ship and hull, mechanical & electrical (HM&E) concepts and technologies. Identify, characterize and assess new and emergent technologies and update the HM&E technology database. Support integration and transition of new technologies in total ship concepts. Update baseline ship concepts and technology attribute database for use in technology assessments. Support development of total ship and HM&E technology roadmaps.

(U) ($1.250) Ship Design and Engineering Tools, Methods, and Criteria. Improve capability for rapid and accurate ship performance/cost/risk assessments and tradeoff studies. Improve surface ship synthesis/assessment models in the following areas: improve performance assessment capabilities, increase ability to handle alternative distributed system architectures, update and enhance capabilities to handle new ship configurations, hull form alternatives, signature reduction features, characterize advanced machinery technologies, address minimum required shipboard manning, reduced construction cost, and increased capabilities to determine ship size impacts of new technologies. Improve interoperability of Navy and shipbuilder design systems. Continue development of interoperability standards and capability between and among: synthesis/assessment models, cost estimation models, operational effectiveness models, shipbuilder computer aided design (CAD) models, and Navy-developed analysis tools by participation in and support for collaborative efforts such as the Navy Industry Digital Data Exchange Standards Committee (NIDDESC) and the Maritech Advanced Shipbuilding Enterprise (ASE).

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E,N/4	SHIP CONCEPT ADVANCED DESIGN, PE 0603563N	DESIGN TOOLS, PLANS & CONCEPTS / S2196

(U) ($1.200) Simulation Based Ship Design & Engineering: Continue to adapt state-of-the-art visualization and simulation techniques for ship design and engineering applications. Review pending ship design needs and ship technology developments to identify top priority simulation requirements. Acquire, validate, adapt, and implement commercial visualization and simulation tools for the areas such as piping systems simulation and ergonomic models in crew reduction performance simulation. Validate and implement visualization and simulation tools from DARPA, ONR, and other government sources for areas such as ship motions, maneuvering, powering, personnel flow, stores flow, structural response, command and communications systems, electric power systems, piping systems, HVAC systems, and combat systems. Develop custom visualization and simulation tools where no alternate source exists in areas such as signature visualization and simulation. Continue development of interoperability standards and capability between visualization and simulation tools, ship synthesis/assessment models and computer aided design (CAD) models.

(U) ($0.970) Reliability Based Structural Design Criteria: Begin development of methodology for overall strength analysis of surface ships. Add new reliability inputs and assessment techniques to design rules. Incorporate methods for predicting extreme and cumulative lifetime loads into design rules. Collect and analyze long-term hydrodynamic loads data. Correlate full scale loads measurements with model test results. Validate and adapt advanced seaway loads prediction methods for use with design rules. Develop methodology for bow form effects on hull loads. Establish safety indices for naval ship structures components (unstiffened and stiffened plates). Continue performing large scale grillage strength tests. Assessment of grillage strength test data. Update design data sheet for compressive strength of plating stiffeners and grillages. Begin integration of all four parts of the reliability-based load and resistance factor design (LRFD) structural rules for naval surface ships. Validate processes and utilize technologies/improved design methods on existing ships and new designs. Support transition to industry through the Ship Structure Committee (SSC).

(U) ($0.945) Total Ownership Cost Methods and Modeling: Develop total ownership cost modeling and cost decision making tools for ships. Support Navy-Shipbuilding Industry cost model development team. Enhance the PODAC cost model capability to incorporate separately estimated cost for specific or special systems. Execute development plan for risk and schedule capabilities of PODAC cost model. Collect and analyze cost data of shipbuilders for development of activity based cost estimation factors. Continue to develop PODAC cost model estimating ratios for shipbuilding interim products, parametric scaleable systems, and shipboard equipment for ships. Develop cost estimation ratios for world class shipbuilding processes and practices and for new ship production processes, technologies, and materi Continue integration of operating and support (O&S) cost modeling and analysis capabilities. Develop O&S cost estimating ratios for naval ships through analysis of Visibility And Management of Operating and Support Costs (VAMOSC) and other historical O&S databases. Continue work on design data analysis module to link PODAC with computer-aided ship design tools.

(U) FY 2001 PLAN:

(U) ($0.162) Ship Design and Engineering Tools, Methods, & Criteria. Improve capability for rapid and accurate ship tradeoff studies using surface ship synthesis/assessment models.

B. Other Program Funding Summary: Not applicable.

(U) Related RDT&E

- (U) PE 0602121N (Surface Ship Technology)
- (U) PE 0603513N (Shipboard Systems Component Development)
- (U) PE 0603564N (Ship Preliminary Design and Feasibility Studies)
- (U) PE 0603512N (Carrier Systems Development)
- (U) PE 0604300N (SC21 Total Ship Systems Engineering)
- (U) PE 0604567N (Ship Contract Design/Live Fire T&E)

C. Acquisition Strategy:

This is a non acquisition program that develops, demonstrates, evaluates, and validates early stage total ship concepts, tools, methods, and criteria that are used by on-going and future ship acquisition programs. This program also supports development, demonstration, evaluation, and validation of engineering tools, methods, and criteria for ship life cycle engineering work.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E,N/4**	PROGRAM ELEMENT NAME AND NUMBER SHIP CONCEPT ADVANCED DESIGN, PE 0603563N	PROJECT NAME AND NUMBER DESIGN TOOLS, PLANS & CONCEPTS / S2196

D. Schedule Profile

	FY 1999	FY 2000	FY 2001
Program Milestones	(Not applicable - Non-Acquisition Program)		
Engineering Milestones (All are 4th Quarter unless otherwise indicated)	Complete command ship JCC(X) concept studies	Complete Medical Capability Afloat Study	
		Complete LHA (large deck amphibious assault) Dev. Options Study including ship concept studies 1Q	
	Complete ship synthesis model tool (ASSET) to cost model Interface	Complete ship synthesis model tool interface to major operational assessment tool	
	Simulation of distributed fluid systems behavior	Complete ship synthesis model tool user interface upgrade	
	Standardize interface mechanism (eg, STEP, COM) for design tool interoperability	Publication of interface specifications for 20 analysis programs	
	Structural fatigue LRFD structural rules	Fracture & grillage tests of shipyard fabrication specimens complete	
	Establish safety indices for naval ship structures for hull girders	Safety indices for naval ship structures components (unstiffened and stiffened plates)	
	PODAC cost model validation complete at 2 additional shipyards	Demonstration of Initial Life Cycle cost estimating capabilities	
	PODAC Cost Model Version 1	PODAC Cost Model Version 2	
Testing Milestones	(Not applicable - Non-Acquisition Program)		
Contract Milestones	(Not applicable - Non-Acquisition Program)		

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 1)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E,N/4**		PROGRAM ELEMENT SHIP CONCEPT ADVANCED DESIGN, PE 0603563N				PROJECT NAME AND NUMBER DESIGN TOOLS, PLANS, AND CONCEPTS, S2196						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development											0.000	
Ancillary Hardware Development											0.000	
Systems Engineering, Concept Development, Engineering Development, Demonstration & Evaluation	C/CPFF	Nichols Adv Marine (NAM) Arlington, VA	5.006	1.788	Note (1)	0.200	Note (1)	0.000	Note (1)	Cont.	Cont.	N/A
	C/CPFF	SPAR Assoc, Annapolis, MD Note(2)	0.700	0.750	Note (2)	0.600	Note (2)			Cont.	Cont.	N/A
	various	Other Contractors	42.104	1.462	various	0.260	various	0.000	various	N/A	N/A	N/A
	WR	NSWC/Carderock Div, West Bethesda, MD	19.374	4.291	N/A	3.830	N/A	0.160	N/A	N/A	N/A	N/A
	WR & MIPR	Other Govt. Activities	6.593	1.319	N/A	0.390	N/A	0.000	N/A	N/A	N/A	N/A
Licenses											0.000	
Tooling											0.000	
GFE											0.000	
Award Fees											0.000	
Subtotal Product Development			73.777	9.610		5.280		0.160		Cont.	Cont.	

Remarks: Note (1): Existing Contract awarded April 1995. Modifications award 1st quarter of FY.
Note (2): Existing Contract awarded March 1998. Modifications award 1st quarter of FY. This contract also includes Avondale Industries, New Orleans, LA; Bath Irons Works, Bath, ME; Ingalls Shipbuilding, Pascagoula, MS; NASSCO, San Diego, CA; Designers & Planners, Arlington, VA; and The University of Michigan Transportation Research Institute, Ann Arbor,MI

Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		N/A	N/A	

Remarks:

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 2)											DATE: February 2000		
APPROPRIATION/BUDGET ACTIVITY **RDT&E,N/4**			PROGRAM ELEMENT SHIP CONCEPT ADVANCED DESIGN, PE 0603563N			PROJECT NAME AND NUMBER DESIGN TOOLS, PLANS, AND CONCEPTS, S2196						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation											0.000	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.000	0.000	N/A	0.000	N/A	0.000	N/A	N/A	N/A	
Remarks:												
Contractor Engineering Support											N/A	
Government Engineering Support											N/A	
Program Management Support											N/A	
Travel				0.003		0.010		0.002		Cont.	Cont.	
Labor (Research Personnel)											N/A	
Overhead											N/A	
Subtotal Management			0.000	0.003		0.010		0.002		Cont.	Cont.	
Remarks:												
Total Cost			73.777	9.613		5.290		0.162		Cont.	Cont.	
Remarks:												

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/4**					R-1 ITEM NOMENCLATURE 0603564N - Ship Preliminary Design and Feasibility Studies					
COST ($ in Millions		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**6.706**	**11.945**	**46.896**	**4.944**	**0.000**	**0.000**	**0.000**	**Continuing**	**Continuing**
Ship Feasibility Studies/S0408		**0.000**	**11.945**	**46.896**	**4.944**	**0.000**	**0.000**	**0.000**	**Continuing**	**Continuing**
ADC(X) Auxiliary Cargo Ship Development/S2609		**5.738**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**5.738**
SSBN To SSGN Analysis/S2610		**0.968**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.968**
Quantity of RDT&E Articles		**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**		

A. Mission Description and Budget Item Justification

(U) The primary objective of Ship Preliminary Design and Feasibility Studies is to design more capable warships at reduced cost, with reduced manning and increased producibility, utilizing the latest technologies and ship/system design methodologies. Modern day ship design and acquisition processes do not separate Preliminary and Contract Design. These are seamless design actions conducted between MS I and II. Therefore after FY 1996, design activities formerly conducted in this Program Element (P.E.) as Preliminary Design were combined under P.E. 0604567N, Ship Contract Design/Live Fire Test and Evaluation. This program directly supports the Navy Shipbuilding Plan by performing ship Feasibility Studies.

(U) Project S0408 -- Ship Development (Advanced), supports post Milestone 0 ship Feasibility Studies that provide the technical definition and initial cost estimates for various ship alternatives being considered in the Analysis of Alternatives (AOA). This project develops the primary supporting documentation for Milestone I decisions. This project also develops and upgrades the engineering tools, especially ship synthesis models, used to support AOA studies and the other engineering efforts accomplished during Phase 0, between Milestones 0 and I.

(U) Project S2609 -- This program provides Auxiliary Dry Cargo (ADC(X)) Feasibility Studies and Analysis of Alternatives (AOA) support.

(U) Project S2610 -- This program is funded to analyze the feasibility of converting some Trident SSBNs to the SSGN configuration.

Note: In accordance with 15 USC 638, $.125M in FY 2000 is reserved for the Small Business Innovation Research (SBIR) assessment.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/4**	R-1 ITEM NOMENCLATURE 0603564N - Ship Preliminary Design and Feasibility Studies

B. Program Change Summary

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	2.023	12.012	17.000
Appropriated Value:	2.023	12.012	
Adjustment to FY 1999/2000 Appropriated Value/			
FY 2000 President's Budget:	4.683	-0.067	29.896
FY 2001 PRES Budget Submit:	6.706	11.945	46.896

FY 1999 Changes consist of : +$5.928M FY 99 Congl Transfer: ADC(X), +$1.000M FY 99 Congl Add: SSGN Study, -$1.962M March 1999 DD 1002 Update (BTR to S2196), -$0.220M FY-99 SBIR/STTR Transfer, -$0.063M minor pricing adjustments.

FY 2000 Changes consist of: -$0.067M Across-the Board Reduction.

FY 2001 Changes consist of: +$15.200M JCC(X)., +$16.000M LHA Replacement AOA, -$1.0M to finance higher priority requirements ,-$0.304M for NWCF rate and other pricing adjustments.

Schedule: Not applicable.

Technical: Not applicable.

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E,N/4**	PROGRAM ELEMENT NAME AND NUMBER Ship Prelim Design & Feasibility Studies/0603564N				PROJECT NAME AND NUMBER Ship Development (ADV)/S0408					
COST ($ in Millions		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost (S0408)		**0.000**	**11.945**	**46.896**	**4.994**	**0.000**	**0.000**	**0.000**	**Continuing**	**Continuing**
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification. Ship concepts, identified in PE 0603563N (Ship Concept Advanced Design) are transitioned to and further developed by this project after an approved Milestone 0 (MS 0) decision. This project performs the Ship Feasibility Studies required after MS 0 to address a specific Mission Needs Statement (MNS) and supports the Analysis of Alternatives(AOA) for new surface ships in the Navy Shipbuilding Plan; performs impact studies of warfare, hull, mechanical and electrical subsystems on advanced ship designs; enhances ship/ship system design methodologies that support phase 0; develops and upgrades the engineering tools, especially ship synthesis models, used to support AOA studies and other engineering efforts accomplished during phase 0; evaluates advanced and alternative technologies and develops total ship concepts with these technologies to assess their suitability; develops the initial documentation and design methodology required by the government for the design of surface ships in the Shipbuilding Program in accordance with the requirements of the DoD 5000 directives/instructions; supports the development of the Operational Requirements Document (ORD) and other documentation required at Milestone I; and accomplishes other efforts for future ship acquisitions in support of a Milestone I decision. Completion of this phase allows review and approval, at Milestone I, to transfer a ship program to the Contract Design Program Element 0604567N. Ship Feasibility Study products include a description of the alternative ships' principal characteristics and mission critical subsystems, weight estimates, general arrangement sketches, technical risk assessments, and Class F cost estimates. The objective is to provide the decision makers with feasible, affordable alternatives.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:

(U) ($ 0.000) No funding.

2. (U) FY 2000 PLAN:

(U) ($11.945) Pre-Milestone I AOA, ORD development and supporting feasibility studies for a new Joint Command and Control (JCC(X)) ships.

3. (U) FY 2001 PLAN:

(U) ($30.896) Continue and complete JCC(X) Feasibility Studies, AOA, and ORD development. Prepare documentation required for a Milestone I decision. Develop and upgrade engineering tools, especially ship synthesis models, that support this AOA study and the other engineering efforts accomplished during Phase 0, between Milestones 0 and I.

(U) ($16.000) Begin pre-Milestone I AOA, feasibility studies, and ORD Development for LHA Replacement ships. Develop and upgrade engineering tools, especially ship synthesis models, that support this AOA study and the other engineering efforts accomplished during Phase 0, between Milestones 0 and

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E,N/4	Ship Prelim Design & Feasibility Studies/0603564N	Ship Development (ADV)/S0408

B. (U) Other Program Funding Summary: Not applicable.

(U) Related RDT&E:
- (U) PE 0603563N (Ship Concept Advanced Design)
- (U) PE 0604567N (Ship Contract Design/Live Fire T&E)
- (U) PE 0604300N (SC21 Total Ship Systems Engineering)

C. (U) Acquisition Strategy: Not applicable.
This is a non acquisition program that supports pre-Milestone I efforts for potential ship acquisition programs.

D. (U) Schedule Profile

	FY 1999	FY 2000	FY 2001	FY2002
Program Milestones		2Q LHA Replacement MS 0	4Q JCC(X) MS I	2Q LHA Replacement MS I

Engineering Milestones TBD – Milestone schedule is established at MS I.

T&E Milestones See individual ship acquisition program documentation.

Contract Milestones See individual ship acquisition program documentation.

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 1)											DATE: February 2000	
APPROPRIATION/BUDGET ACTIVITY **RDT&E,N/4**		PROGRAM ELEMENT Ship Prelim Design & Feasibility Studies/0603564N				PROJECT NAME AND NUMBER Ship Development (ADV)/S0408						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development											0.000	
Ancillary Hardware Development											0.000	
Systems Engineering	WR	NSWC Dahlgren, VA	8.842	0.000		0.000		2.000	Various	Cont.	Cont.	N/A
	WR	NSWC Carderock, MD	0.000	0.000		1.000	Various	7.000	Various	Cont.	Cont.	N/A
	WR	NSWC Port Hueneme	0.000	0.000		0.000		1.000	Various	Cont.	Cont.	N/A
	PD	SPAWAR	0.000	0.000		5.882	Various	9.737	Various	Cont.	Cont.	N/A
	PD	NAVAIR	0.000	0.000		0.000		2.000	Various	Cont.	Cont.	N/A
	WR/Reqn	Other Government	10.558	0.000		0.000		0.000		Cont.	Cont.	N/A
	C/CPFF	Nichols Adv Marine, VA	0.000	0.000		3.500	Various	4.000	Various	Cont.	Cont.	N/A
	Comp	J.J. McMullen, VA	5.857	0.000		1.512	Various	0.000		Cont.	Cont.	N/A
	Various	Other Contractor	16.769	0.000		0.000		21.084	Various	Cont.	Cont.	N/A
Licenses											0.000	
Tooling											0.000	
GFE											0.000	
Award Fees											0.000	
Subtotal Product Development			42.026	0.000		11.894		46.821		Cont.	Cont.	N/A
Remarks:												
Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 2)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E,N/4**		PROGRAM ELEMENT Ship Prelim Design & Feasibility Studies/0603564N			PROJECT NAME AND NUMBER Ship Development (ADV)/S0408							
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation											0.000	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support											0.000	
Travel				0.000		0.051		0.075		Cont.	Cont.	N/A
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	0.000		0.051		0.075		Cont.	Cont.	N/A
Remarks:												
Total Cost			42.026	0.000		11.945		46.896		Cont.	Cont.	N/A
Remarks:												

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**					R-1 ITEM NOMENCLATURE 0603573N/ADVANCED SURFACE MACHINERY					
COST ($ in Millions	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**29.478**	**26.581**	**5.635**	**8.579**	**6.426**	**5.893**	**0.000**	**0.000**	**393.115**
Advanced Surface Machinery/S1314		**29.478**	**24.592**	**5.635**	**8.579**	**6.426**	**5.893**	**0.000**	**0.000**	**391.126**
Naval Ship Survivability/32761		**0.000**	**1.989**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**1.989**
Quantity of RDT&E Articles										

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Advanced Surface Machinery (ASM) Programs develop affordable advanced machinery and subsystems for surface ship propulsion, electric and auxiliary requirements.

Project S1314, the ICR Gas Turbine Engine program, is a marine propulsion gas turbine. ICR will reduce life cycle fuel cost and provide an alternate prime mover candidate. A contract for ICR Advanced Development (AD) with an option for Full Scale Development was awarded to Westinghouse Electric Corporation in December 1991. The ICR is derived from the Rolls-Royce RB211 aircraft engine and through the introduction of an intercooler, recuperator, and variable area nozzles achieves approximately a 25% to 27% propulsion annual fuel savings when compared to the LM2500 on a mechanical drive ship.

(U) Project 32761 - The funding will be used to demonstrate advanced open system architectures and controls to further improve electrical power reliability to mission critical loads and further reduce platform costs.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA4**	R-1 ITEM NOMENCLATURE 0603573N/ADVANCED SURFACE MACHINERY

B. PROGRAM CHANGE:

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	24.344	17.727	3.664
Appropriated Value:	24.344	17.727	
Adjustment to FY 1999/2000 Appropriated Value/	5.134	8.854	1.971
FY 2001 PRES Budget Submit:	29.478	26.581	5.635

FY 1999 Adjustments: Restructure/Adjustment and +3.999M for ICR development testing and 1.135M for various adjustments.

FY 2000 Adjustments: +7.000M for ICR Cost Improvement Program. +1.989M for Naval Ship Survivability Program and -0.135M Across the Board reduction.

FY 2001 Adjustment s: +1.971M for various adjustments.

Schedule: ICR - No change. IPS program transitioned to P.E. 0603513N/Project 32471 in FY 2000.

Technical: IPS program transitions to P.E. 0603513N/Project 32471 in FY 2000. In FY 2000, the ICR program will transition the qualification portion of program to Allied countries for completion.

EXHIBIT R-2a, RDT&E Project Justification						DATE: **February 2000**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER ADVANCED SURFACE MACHINERY/PE 0603573N			PROJECT NAME AND NUMBER ICR-Gas Turbine Engine/S1314					
COST ($ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost	**29.478**	**24.592**	**5.635**	**8.579**	**6.426**	**5.893**	**0.000**	**0.000**	**391.126**
RDT&E Articles Qty									

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The ICR Gas Turbine Engine is a marine propulsion gas turbine. ICR will reduce life cycle fuel cost and provide an alternate prime mover candidate. A contract for ICR Advanced Development (AD) with an option for Full Scale Development was awarded to Westinghouse Electric Corporation in December 1991. The ICR is derived from the Rolls-Royce RB211 aircraft engine and through the introduction of an intercooler, recuperator, and variable area nozzles achieves approximately a 25% to 27% propulsion annual fuel savings when compared to the LM2500 on a mechanical drive ship.

(U) ICR full scale system development testing began in July 1994 and completed at Pyestock, U. K. on 30 April1999. Recuperator recovery efforts are continuing following the failure in January 1995 of the initial recuperator. An Engineering Development Model (EDM) recuperator, which is the exhaust heat recovery unit that provides most of the fuel efficiency gains, was delivered to the test site in January 1995. Testing on this EDM has met expectations. System testing to date has completed over 1400 hours of successful testing including over 1150 hours with the second generation recuperator and 175 hours with the EDM recuperator. Tests to date have met objectives.

(U) A Cooperative Agreement between the United Kingdom (U.K.) and United States governments was signed by USD(A&T) on 21 June 1994 and revised in March 1997 for in-kind and cash contributions to the ICR program. A Cooperative Agreement between the French and United States governments was signed by ASN(RD&A) on 30 August 1995 for in-kind and cash contributions to the ICR program.

(U) The FY 1999 funds for Integrated Power Systems (IPS) were budgeted and executed under P. E. 0603573N/Project S1314. IPS funding has transitioned to P. E. 0603513N/Project 32471 for both budget and execution in FY 2000 and out.

CLASSIFICATION: **UNCLASSIFIED**

EXHIBIT R-2a, RDT&E Project Justification			DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER	
RDT&E,N/BA-4	**ADVANCED SURFACE MACHINERY/PE 0603573N**	**ICR-GAS TURBINE ENGINE/S1314**	

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:
(U) ($29.478) ICR: Completed the manufacture and delivered the EDM recuperator. Installed the recuperator at the Royal Navy test facility in Pyestock and performed the last development test at Pyestock. Initiated the last development test at NAVSSES, Philadelphia. This test has been renamed "The Navy Five Hundred Hour Test" (NFHT). The test site was configured for ICR testing. The engine,recuperator, enclosure and all ancillary hardware were delivered to the site, assembled and installed. Modification of the Memoranda of Understanding with the U.K. and France was prepared. This modification implements the "Essential Program".

2. (U) FY 2000 PLAN:
(U) ($23.981) ICR: The development test at NAVSSES, Philadelphia will complete. A final development Design Review called DR5 will be conducted. Following this design review, the development portion of the "Essential Program" will be complete. At that time, the joint U.S./U.K. and U.S./France programs will be transitioned to U.K./France for management of the qualification program.

(U) ($0.611) ICR: Portion of extramural program is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

3. (U) FY 2001 PLAN:
(U) ($5.635) ICR: The Royal and French navies will be performing the 3150 hour endurance qualification test, which will require eighteen months. U.S. Navy responsibilities will include participation in the Steering Committee, technical review, monitoring tests and accepting test results for compliance to U.S. Navy requirements.

B. (U) OTHER PROGRAM FUNDING SUMMARY: N/A

FY1999	FY2000	FY2001	FY2002	FY2003	FY2004	FY2005	TO COMPLETE	TOTAL COST

C. (U) ACQUISTION STRATEGY: ICR is a candidate system for DD-21.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E,N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **ADVANCED SURFACE MACHINERY/0603573N**	PROJECT NAME AND NUMBER **ICR-Gas Turbine Engine/S1314**

D. Schedule Profile:

ICR ESSENTIAL PROGRAM

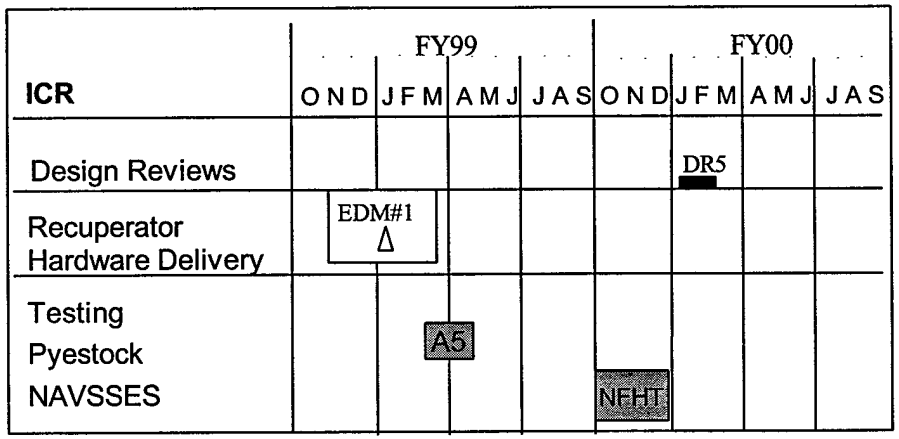


Exhibit R-3 Cost Analysis (page 1)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA4**		PROGRAM ELEMENT **0603573N**				PROJECT NAME AND NUMBER **ADVANCED SURFACE MACHINERY/S1314**						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	C/CPAF	NG, Sunnyvale, CA	296.759	25.663	Oct 98	12.342	Oct 99	3.885	Oct 00	4.658	343.307	
Ancillary Hardware Development												
Systems Engineering	C/CPAF	Other Contractor	0.208	0.050	Oct 98	0.200	Oct 99	0.050	Oct 00	0.250	0.758	
Licenses												
Tooling												
Cost Improvement						7.000					7.000	
Award Fees	CC[AF	NG, Sunnyvale, CA	6.375	0.000	08/99	1.224	04/00	0.000		0.000	7.599	
Subtotal Product Development			303.342	25.713		20.766		3.935		4.908	358.664	
Remarks:												
Development Support Equipment												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support												
Remarks:												

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 2)												DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N**			PROGRAM ELEMENT **0603573N**			PROJECT NAME AND NUMBER ADVANCED SURFACE MACHINERY/S1314						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NSWC Philadelphia, MD	7.185	3.765	Oct 98	3.826	Oct 99	1.700	Oct 00	15.990	32.466	
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E			7.185	3.765		3.826		1.700		15.990	32.466	
Remarks:												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support												
Travel												
Labor (Research Personnel)												
Overhead												
Subtotal Management												
Remarks:												
Total Cost			310.527	29.478		24.592		5.635		20.898	391.130	
Remarks:												

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA 4**					R-1 ITEM NOMENCLATURE **Combat Systems Integration 0603582N**					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**37.492**	**78.305**	**32.966**	**38.054**	**47.448**	**48.895**	**50.726**	**Cont.**	**Cont.**
Combat Systems Integration S0164		**37.492**	**78.305**	**32.966**	**38.054**	**47.448**	**48.895**	**50.726**	**Cont.**	**Cont.**
Quantity of RDT&E Articles		**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**	**N/A**

A. Mission Description and Budget Item Justification: This project provides shore based testing of integrated combat direction, weapon, sensor and computing systems prior to their installation in operational fleet units. The operational computer programs are assembled and tested to assure proper configuration and interoperability in a test environment similar to their ultimate shipboard operational environment. Included is operational assessment testing of the integrated suite of computer programs. Additionally, with issuance of CNO MSG DTG 021648Z May 1998, on Battle Group Interoperability (BGI), this program includes Battle Group (BG)/Battle Force (BF) requirements engineering, analysis, BG/BF configuration management and BG Interoperability testing which is a prerequisite for operational Certification of the battle group configuration. This is the only opportunity for comprehensive interoperability testing of combat system and C4I configuration items prior to shipboard delivery for operational use in surface combatant platforms and battle group units. The BG/BF requirements engineering effort is designed to support the development of a system engineering architecture to ensure future combat systems interoperability through a Common Command and Decision capability. Configuration control is maintained by updates to the Surface Combat System Master Plan (SSCSMP).

PROGRAM ACCOMPLISHMENT AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:

(U) ($6.972) Conducted Combat Systems Integration Testing (CSIT) of Advanced Combat Direction System (ACDS) of Block-0 and 1, Cooperative Engagement Capability (CEC) Baseline 1 and Ships Self Defense System (SSDS) MK-1, and Combat Direction System Level 13 in CV/CVN, LHD, LHA-2, FFG and LSD Ship Classes. Continued design and development of surface ship test beds to include networks for the LHD-7, CVN 68, CVN 76, LHA-1 and LPD 17 ships/classes. Continued planning for out-year Combat System Integration Testing (CSIT) including Common Scenario/Common Environment Simulation (CSCE), test bed and test procedures design and development.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA 4**	R-1 ITEM NOMENCLATURE **Combat Systems Integration 0603582N**

(U) ($15.674) Conducted Battle Group Interoperability Testing (BGIT) in USS THEODORE ROOSEVELT, USS CONSTELLATION AND USS JOHN F. KENNEDY Carrier Battle Groups (CVBGs). Developed the test plans and procedures to support Certification of surface ship combat systems, C4ISR systems and Battle Group Interoperability (BGI). Prepared test beds to support Battle Group Interoperability (BGIO) testing for USS ABRAHAM LINCOLN, USS GEORGE WASHINGTON, USS ENTERPRISE, USS CARL VINSON, USS CONSTELLATION and USS HARRY S. TRUMAN Carrier Battle Groups (CVBGs)

(U) ($5.773) Continued execution of D-30 Process including; Battle Group Action Officer (BGAO) efforts, BG Change Control Process, Land Based Triage, BG Capabilities and Limitations Report and Engineering assessments.

(U) ($8.773) Initiated the development of Warfare Systems Engineering Requirements. Conducted BG related sytems engineering efforts, to include Design Reference Mission (DRM) and Analysis of Alternatives studies (AOA). Initiated Warfare Systems Engineering studies for Common Command and Decision (C&D).

(U) ($.3) Continued SSCSMP updates.

2. (U) FY 2000 PLAN:

(U) ($9.1) Conduct Combat System Integration Testing (CSIT) of Advanced Combat Direction System (ACDS) of Block-1, level 2.1X, ACDS Block-0, level 10.24, Cooperative Engagement Capability (CEC) Baseline-1, and Combat Direction System (CDS) level 12/13 in CV/CVN, LHD, LHA-1, LHA-2, and FFG ship classes. Continue design and development of surface ship test beds to include networks for the CVN-68, CVN-76 and LPD-17 ships/classes. Continue planning for out-year Combat System Integration Testing (CSIT) including Common Scenario/Common Environment (CSCE) Simulation, test bed and test procedures design and development.

(U) ($25.10) Conduct Battle Group Interoperability Testing (BGIT) in USS ABRAHAM LINCOLN, USS GEORGE WASHINGTON, USS ENTERPRISE, USS CARL VINSON, USS CONSTELLATION and USS HARRY S. TRUMAN carrier Battle Groups (CVBGs). Develop the test plans and test procedures to support Certification of surface ship class combat systems, C4ISR systems and Battle Group Interoperability (BGI). Prepare test beds to support Battle Group Interoperability (BGIO) testing for up to six Carrier Battle Groups (CVBGs). Conclude DEP Phases 1/2.

(U) ($39.0) Continue Warfare Systems Engineering Requirements development. Conduct BG related systems engineering efforts, to include Design Reference Mission (DRM) and Analysis of Alternatives studies (AOA). Continue Warfare Systems Engineering studies for Common Command and Decision (C&D).

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA 4**	R-1 ITEM NOMENCLATURE **Combat Systems Integration 0603582N**

(U) ($4.8) Continue execution of D-30 Process including; BGAO efforts, BG Change Control Process, Land Based Triage, BG Capabilities and Limitations Report and Engineering assessments.

(U) ($.3) Continue SSCSMP updates.

Note: $1.065M of the FY00 funding represents that portion of the extramural program that is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

3. (U) FY 2001 PLAN:

(U) ($8.958) Conduct Combat System Integration Testing (CSIT) of Advanced Combat direction System (ACDS) Block-0, level 10.25, Block-1 upgrades; Command and Control Processor (C2P) upgrade; Cooperative Engagement Capability (CEC) Baseline-2; Ship Self Defense System (SSDS) MK-2, mod-0 in CV/CVN, LHD, and LHA ship classes. Continue design and developmentof surface ship test beds to include networks for the CVN-76 and CV/LHD SSDS MK-2, mod-1 back-fit classes. Continue planning for out-year Combat System Integration Testing (CSIT) including Common Scenario/Common Environment (CSCE) Simulation, test bed and test procedures design and development.

(U) ($6.458) Conduct Battle Group Interoperability(BGIO) testing in up to six carrier battle Groups (CVBGs). Prepare test beds to support Battle Group Interoperability(BGIO) testing for six Carrier Battle Groups (CVBGs).

(U) ($13.590) Continue Warfare Systems Engineering Requirements development. Conduct BG related systems engineering efforts, to include Design Reference Mission (DRM) and Analysis of Alternatives studies (AOA). Continue Warfare Systems Engineering studies for Common Command and Decision (C&D).

(IU) ($3.66) Continue execution of D-30 Process including; BGAO efforts, BG Change Control Process, Land Based Triage, BG Capabilities and Limitations Report and Engineering assessments.

(U) ($.3) Continue SSCSMP updates.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA 4**	R-1 ITEM NOMENCLATURE **Combat Systems Integration 0603582N**

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	9.654	46.740	24.239
Appropriated Value:	9.654	78.740	
Adjustment to FY 1999/2000 Appropriated Value/			
FY 2000 President's Budget:	27.838	-0.435	8.727
FY 2001 PRES Budget Submit:	37.492	78.305	32.966

Funding:
FY 1999: Increase by Above Threshold Reprogramming (+$30,000); congressional undistributed reductions of -$1.899K and -$263K for minor pricing adjustments.
FY 2000: Decrease for minor pricing adjustments of -$435K.
FY 2001: Increase by programming for Common C&D (+$9,000) and minor pricing adjustments of -$273K.

Schedule: Not applicable.

C. Other Program Funding Summary: Not applicable.

Related RDT&E: Computer programs developed under these programs are tested in their integrated configuration.

PE 0204571N (Consolidated Training Systems Development)
PE 0205620N (Surface ASW Combat System Technology)
PE 0603382N (Advanced Combat System Technology)
PE 0603755N (Ship Self Defense)
PE 0603852N (Cooperative Engagement Capability)
PE 0604307N (AEGIS Combat Systems Engineering)
PE 0604755N (Ship Self Defense)

Acquisition Strategy: Not applicable.
D. Schedule Profile: Not applicable.

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 2)										DATE: February 2000		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N**		PROGRAM ELEMENT **0603582N**				PROJECT NAME AND NUMBER **Combat Systems Integration**						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Combat Sys Integ Testing/SQI	WR/RC	NSWC PHD	5.700	7.500	VAR	8.900	VAR	6.300	VAR	Cont.	Cont	
Combat Sys Integ Testing/SQI	WR/RC	NSWC DD	1.600									
Combat Sys Integ Testing/SQI	WR/RC/PD	VARIOUS	1.500	0.500		0.600		0.460		Cont.	Cont	
BG Capabilities/Limitations	WR/RC	NSWC PHD	1.000	3.500	VAR	4.200	VAR	3.000	VAR	Cont.	Cont	
BG Capabilities/Limitations	WR/RC	NSWC DD										
BG Capabilities/Limitations	WR/RC/PD	VARIOUS		0.100		0.150		0.160	VAR	Cont.	Cont	
DEP/BGIT Cert/Triage	WR/RC	NSWC PHD										
DEP/BGIT Cert/Triage	WR/RC	NSWC DD		13.202		16.890		5.170		Cont.	Cont	
DEP/BGIT Cert/Triage	WR/RC/PD	VARIOUS		1.220		2.965		1.057	VAR	Cont.	Cont	
Warfare Sys Eng/C&D	WR/RC	NSWC PHD										
Warfare Sys Eng/C&D	WR/RC	NSWC DD		1.700		2.000		1.400		Cont.	Cont	
Warfare Sys Eng/C&D	WR/RC/PD	VARIOUS		2.900		33.400		2.557		Cont.	Cont	
Contract Engineering Support	VARIOUS	VARIOUS	1.300	6.790	VAR	9.100	VAR	12.762	VAR	Cont.	Cont	
Travel		NAVSEA Travel	0.040	0.080		0.100		0.100		Cont.	Cont	
Subtotal Test & Evaluation			11.140	37.492		78.305		32.966		Cont.	Cont	
Remarks:												
Total Cost			11.140	37.492		78.305		32.966		Cont.	Cont	
Remarks:												

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA4**					R-1 ITEM NOMENCLATURE Conventional Munitions/0603609N					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**37.098**	**39.087**	**28.619**	**26.900**	**24.528**	**26.368**	**25.194**	**CONT.**	**CONT.**
Conventional Fuze/Warhead Package/K1821/U1821		**23.991**	**24.635**	**24.528**	**18.552**	**18.766**	**19.000**	**19.524**	**CONT.**	**CONT.**
Optical Correlators/ K2393/U2393*		**0.000**	**3.978**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**CONT.**	**CONT.**
Non-Nuclear Expendable Ordnance (NNEO)/K2299		**2.250**	**1.353**	**0.867**	**0.950**	**0.958**	**0.976**	**1.002**	**CONT.**	**CONT.**
Insensitive Munitions Advanced Development/S0363		**9.889**	**9.121**	**3.224**	**7.398**	**4.804**	**6.392**	**4.668**	**CONT.**	**CONT.**
Env Safe Energetic Materials/S2611		**0.968**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.968**
Quantity of RDT&E Articles										

*Funded in FY99 under 604366N/K2640/U2640)

A. Mission Description and Budget Item Justification

Conventional Fuze/Warhead Package (Project K1821/U1821): The Navy requires improved lethality of air and surface launched ordnance to defeat advanced threats. Current specific requirements and initiatives to address them include: development of advanced missile fuzing system to replace MK 45 MOD 9 and MK 11 Target Detecting Devices (TDDs) for future production missiles (SM-2 Blocks IIIB and IVA); development of modeling and simulations for new reactive warhead; development of advanced components for future advanced ordnance system; and performance of a trade-off analysis for the selection of a future advanced ordnance package . This project will, in future years, also provide a vehicle to address emergent requirements by transitioning mature fuze and warhead technology from conceptual developments to engineering development with minimum technical and financial risk.

Non-Nuclear Expendable Ordnance (NNEO) (Project K2299): This item addresses improvements to Navy surface launched (2T) non-nuclear expendable ordnance. It supports transition of the Multi-Function Fuze from Engineering and Manufacturing Development (E&MD) to production.

Insensitive Munitions Advanced Development (IMAD) (Project S0363): Most Navy munitions react violently when exposed to unplanned stimuli such as fire, shock and bullet impact, thus presenting a great hazard to ships, aircraft, and personnel. This IMAD program will provide, validate, and transition technology for explosives, propellants, and ordnance to enable production of munitions insensitive to unplanned stimuli with no reduction to combat performance.

Environmentally Safe Energetic Materials (Project S2611): This project will mature and demonstrate energetic materials and processes for explosives, propellants, and pyrotechnics which minimize or eliminate any adverse environmental impact normally associated with these materials in production and demilitarization. These new environmentally safe materials will meet insensitive munitions and system performance requirements while lowering the total ownership costs of the weapon systems.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA4**	R-1 ITEM NOMENCLATURE Conventional Munitions/0603609N

Optical Correlator Technology (Project K2393): The purpose of this effort is to enhance next generation target discrimination and aimpoint selection performance.

Note: In accordance with 15 USC 638, $.458M in FY 2000 is reserved for the Small Business Innovation Research (SBIR) assessment.

B. (U) Program Change Summary

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	40.596	34.309	31.318
Appropriated Value:	40.775	39.309	
Adjustment to FY 1999/2000 Appropriated Value/			
FY 2000 President's Budget:	-3.677	-0.222	-2.699
FY 2001 President's Budget Submit:	37.098	39.087	28.619

Funding:
FY99 change is due to SBIR transfer (-$0.775), decreases for Insensitive Munitions for March 1999 update (-$1.200), to fund approved emergent requirements and approved program reductions ($-1.000), inflation savings (-$0.185), actuals update (-$0.349) below threshold reprogramming (-$0.007), midyear review decision ($-.482), and for various rate adjustments (-$0.179); and an increase in Conventional Fuze/Warfare Package to fund approved emergent requirements ($+0.500).
FY00 reduction is due to minor adjustments (-$0.005) and undistributed congressional reductions (-$0.217).
FY01 change is due to adjustments for Conventional Fuze (+$4.300) and Insensitive Munitions (-$1.900), a decrease for offsets required to finance high priority O&M,N deficiencies (-$0.140), NWCF rate adjustments (+$0.193), pricing adjustments (-$0.469), Strategic Sourcing Program Redistribution (-$0.183), an offset in Insensitive Munitions for higher priority programs (-$4.500).
Schedule: Not applicable.
Technical: Not applicable.

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Conventional Munitions/0603609N**				PROJECT NAME AND NUMBER Conventional Fuze and Warhead Package /K1821/U1821					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**23.991**	**24.635**	**24.528**	**18.552**	**18.766**	**19.000**	**19.524**	**Continuing**	**Continuing**
RDT&E Articles Qty										

A. Mission Description and Budget Item Justification

The Navy requires improved lethality of air and surface launched ordnance to defeat advanced threats. This is the only Navy 6.3B RDT&E program that addresses improvements in warhead and fuze technology to meet this requirement. This program is a significant vehicle for orderly planning, timely and effective transition of Navy 6.2 and 6.3A investments into E&MD missile/weapon systems. This program addresses increased lethality against current and emerging threats, is responsive to all mission areas -- anti-air, strike, defense suppression, theater defense and ship defense, and supports development of complete ordnance sections. The current, on-going projects address significant technology advancements for missile systems by developing: mature physical concepts to enhance anti-air kill probability, advanced ordnance with augmented overland cruise missile defense and theater ballistic missile defense capabilities, and advanced seeker technology. The program supports the full spectrum of missile advanced development and technology improvements, and in future years will continue to provide the vehicle to address emergent requirements by transitioning mature development efforts into weapon systems with minimal technical and financial risk.

(U) PROGAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:
- (U) ($.293) DIRECTIONAL ORDNANCE SYSTEM: Prepared final report and project closed-out.
- (U) ($.205) ADVANCED STRIKE WARFARE HIGH VELOCITY PENETRATOR: Conducted low-level testing and data collection.
- (U) ($1.209) ORDNANCE COMPONENT TECHNOLOGY: Completed efforts on high energy density capacitors. Initiated efforts on near field contact sensors and enhanced low energy exploding foil initiator.
- (U) ($1.344) ADVANCED ORDNANCE SECTION: Started interim down select to 3-4 warhead concepts variants. Incorporated updated fuze models, conducted critical experiments, performed fabrication/evaluation studies, performed end-game statistical assessments. Incorporated reactive fragments vulnerability models.
- (U) ($.484) FUZE CONTACT DEVICE: Completed baseline design.
- (U) ($1.430) MICRO-ELECTRICAL MACHINE SYSTEM (MEMS) SAFE & ARMING (S&A) DEVICE : Generated requirements and conducted critical tests.
- (U) ($1.275) REACTIVE MATERIAL WARHEAD: Conducted preliminary studies and risk reduction efforts.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Conventional Munitions/0603609N**	PROJECT NAME AND NUMBER Conventional Fuze and Warhead Packaging /K1821/U1821

1. (U) FY 1999 ACCOMPLISHMENTS: (Continued)
- (U) ($3.617) LOW COST STANDARD FUZE: Developed requirements and started preliminary design of MK 45 MOD 9/11 replacement.
- (U) ($.052) UNCOOLED FOCAL PLANE ARRAY STUDY: Supported ONR study.
- (U) ($13.582) OFFICE OF SPECIAL PROJECTS
- (U) ($.500) To fund approved emergent requirements for Conventional Fuze/Warhead Package.

2. (U) FY 2000 PLAN:
- (U) ($1.101) ORDNANCE COMPONENT TECHNOLOGY: Initiate efforts on delayed functioning exploding foil initiator (EFI) and conduct tests of warhead fragmentation control candidates.
- (U) ($1.269) ADVANCED ORDNANCE SECTION: Conduct endgame analyses, test prototype warthead candidates.
- (U) ($1.330) MEMS S&A: Hardware evaluations, design arming control unit, reliability analysis.
- (U) ($.500) FUZE CONTACT DEVICE: Fabricate and evaluate baseline design.
- (U) ($2.000) LOW COST STANDARD FUZE: Begin critical design and development of hardware and software.
- (U) ($18.435) OFFICE OF SPECIAL PROJECTS

3. (U) FY 2001 PLAN:
- (U) ($1.690) ORDNANCE COMPONENT TECHNOLOGY: Continue evaluation of advanced warhead materials and fragmentation control techniques, continue EFI development.
- (U) ($3.000) ADVANCED ORDNANCE SECTION: Complete critical experiments.
- (U) ($2.500) MEMS S&A: Conduct critical tests.
- (U) ($.500) FUZE CONTACT DEVICE: Develop hardening requirements, initiate design optimization.
- (U) ($6.801) LOW COST STANDARD FUZE: Continue MK 45 MOD 12 TDD development.
- (U) ($1.062) KILL MECHANISMS: Initiate development methodology to evaluate alternate kill mechanisms.
- (U) ($8.975) OFFICE OF SPECIAL PROJECTS

B. Other Program Funding Summary: Not applicable.
C. Acquisition Strategy: Not applicable.
D. Program Schedule: Not Applicable.

Exhibit R-3 Cost Analysis (page 1)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N BA 4**			PROGRAM ELEMENT **Conventional Munitions/0603609N**			PROJECT NAME AND NUMBER Conventional Fuze and Warhead Package/K1821/U1821						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Design and Analysis	WR	NSWC/DD	28.123	1.825	11/98	0.528	11/99	1.980	11/00	Continuing	Continuing	
	WR	NAWC/China Lake	55.042	2.522	11/98	1.152	11/99	4.430	11/00	Continuing	Continuing	
	SS/CPAF	Motorola/Raytheon	4.474	1.600	12/98	0.000		0.000		0.000	6.074	6.074
	RC	ONR	0.000	0.052	01/99	0.000		0.000		Continuing	Continuing	
	PD	Office of Special Projects	7.751	0.000		0.000		0.000		0.000	7.751	N/A
Hardware Fabrication & Procuremen	WR	NSWC/DD	5.000	0.700	11/98	0.312	11/99	0.947	11/00	Continuing	Continuing	
	WR	NAWC/China Lake	6.500	0.800	11/98	0.988	11/99	2.215	11/00	Continuing	Continuing	
	SS/CPAF	Motorola/Raytheon	0.300	0.200	12/98	0.000		0.761	11/00	0.000	1.261	1.261
Other	PD	Office of Special Projects	1.100	14.082	12/98	18.435	12/99	8.975	12/00	Continuing	Continuing	
Subtotal Product Development			108.290	21.781		21.415		19.308		Continuing	Continuing	

Remarks:

Development Support Equipment												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks:

Exhibit R-3 Cost Analysis (page 2)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N BA 4

PROGRAM ELEMENT: Conventional Munitions/0603609N

PROJECT NAME AND NUMBER: Conventional Fuze and Warhead Package/K1821/U1821

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Demonstration Test & Evaluation	WR	NSWC/DD	10.447	1.000	11/98	1.000	11/99	2.000	11/00	Continuing	Continuing	
	WR	NAWC/China Lake	10.482	1.000	11/98	2.000	11/99	3.000	11/00	Continuing	Continuing	
Subtotal T&E			20.929	2.000		3.000		5.000		Continuing	Continuing	
Remarks:												
Program Management Support	WR	NSWC/DD	1.899	0.050	11/98	0.075	11/99	0.075	11/00	Continuing	Continuing	
	WR	NAWC/China Lake	3.135	0.100	11/98	0.075	11/99	0.075	11/00	Continuing	Continuing	
	C/FPI	TMAI	0.000	0.010	11/98	0.020	11/99	0.020	11/00	Continuing	Continuing	
Travel	PD	NAVSEA Travel	0.200	0.050	Various	0.050	Various	0.050	Various	Continuing	Continuing	
Subtotal Management			5.234	0.210		0.220		0.220		Continuing	Continuing	
Remarks:												
Total Cost			134.453	23.991		24.635		24.528		Continuing	Continuing	

Remarks:

EXHIBIT R-2a, RDT&E Project Justification								DATE: February 2000		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Conventional Munitions/0603609N**				PROJECT NAME AND NUMBER Non-Nuclear Expendable Ordnance (NNEO)/K2299					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**2.250**	**1.353**	**0.867**	**0.950**	**0.958**	**0.976**	**1.002**	**Continuing**	**Continuing**
RDT&E Articles Qty										

A. Mission Description and Budget Item Justification:
This budget item addresses improvements to Navy surface launched (2T) non-nuclear expendable ordnance (NNEO) outside existing operational requirements. The commodities comprising 2T NNEO are: Major and medium caliber gun ammunition, small arms ammunition, other ship gun ammunition, pyrotechnics, and demolition items. There are no other RDT&E budget items supporting the 2T NNEO program. This project supports the Multi-function Fuze (MFF), Mk 2 Grenade Proximity Fuze and Cargo Competent Fuzes. These fuzes will be used with 5"/54 gun ammunition.

(U) PROGAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:
 - (U) ($2.250) Multi-Function Fuze (MFF): Incorporated changes to the design of the fuze which reduces cost, increases producibility and improves performance. Pre-Planned Product Improvement (P3I) items include: new battery and semiconductor bridgewire. Achieve Milestone III.

2. (U) FY 2000 PLANS:
 - (U) ($1.353) Multi-Function Fuze (MFF): Incorporate pre-planned product improvement programs to reduce fuze unit cost, increase producibility and performance. P3I items include: multi-plexing air mode and initial velocity sensor.

3. (U) FY 2001 PLANS:
 - (U) ($.867) Multi-Function Fuze (MFF): P3I items include: evaluation of Micro-Electro-Mechanical System (MEMS) Technology and begin Preliminary Design.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N BA 4**	PROGRAM ELEMENT NAME AND NUMBER **Conventional Munitions/0603609N**	PROJECT NAME AND NUMBER Non-Nuclear Expendable Ordnance (NNEO)/K2299

B. Other Program Funding Summary

1. (U) Related RDT&E: PE 0603795 (Naval Surface Fire Support)

2. (U) The 5"/54 Improved Conventional Munition projectile will be qualified with the MFF. Approval decision for proceeding with Low Rate Initial Production in 3rd quarter FY99. Milestone III scheduled for 1st quarter FY01.

Procurement of Ammunition, Navy and Marine Corps (PANMC) 5"/54 Ammunition, BLIN 025000, Cost Code AC100 and AC893 (Reno)

FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
0.0	11.0	8.0	7.2	6.7	6.8	6.8	TBD	TBD

C. Acquisition Strategy: Award 5-Year (Multi-Year) contract for MFF. As P3I are completed, they will be incorporated into the next production lot.

D. Schedule Profile

	FY 1999	FY 2000	FY 2001
Program Milestones			1Q MSIII 1Q IOC
Engineering Milestones			
T&E Milestones	1Q TECHEVAL OPEVAL	1Q TECHEVAL P31 1Q OPEVAL P31	
Contract Milestones	3Q PRODUCTION 3QPRODUCTION P3I	1Q PRODUCTION P3I	3Q PRODUCTION P3I

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 1)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N BA 4**			PROGRAM ELEMENT **Conventional Munitions/0603609N**			PROJECT NAME AND NUMBER Non-Nuclear Expendable Ordnance (NNEO)/K2299						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	WR	NSWC Dahlgren	0.195	0.718	VAR	0.234	VAR	0.667	VAR	CONT.	CONT	N/A
	C/CPFF	ALLIANT	0.322	0.536	VAR	0.094	VAR	0.200	VAR	CONT.	CONT	N/A
	SS/CPFF	MOTOROLA	0.300	0.200	VAR	0.150	VAR	0.000		0.000	0.650	N/A
Subtotal Product Development			0.817	1.454		0.478		0.867		0.000	CONT	N/A
Remarks:												
Development Support Equipment												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												

Exhibit R-3 Cost Analysis (page 2)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N BA 4

PROGRAM ELEMENT: Conventional Munitions/0603609N

PROJECT NAME AND NUMBER: Non-Nuclear Expendable Ordnance (NNEO)/K2299

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NSWC DAHLGREN	0.150	0.150	VAR	0.375	VAR	0.000		CONT.	CONT.	N/A
	WR	NAWC CHINA LAKE	0.150	0.200	VAR	0.200	VAR	0.000		CONT.	CONT.	N/A
Operational Test &Evaluation	WR	COMOPTEVFOR	0.400	0.148	VAR	0.000		0.000		0.000	0.548	N/A
Subtotal T&E			0.700	0.498		0.575		0.000		CONT.	CONT.	
Remarks:												
Contractor Engineering Support												
Government Engineering Support	WR	NSWC DAHLGREN	0.141	0.198	11/98	0.200	11/99	0.000		CONT	CONT.	N/A
Program Management Support	WR	NSWC DAHLGREN	0.054	0.080	11/98	0.080	11/99	0.000		CONT	CONT.	N/A
Travel	WR	NSWC DAHLGREN	0.010	0.010		0.010						
Labor (Research Personnel)												
Overhead	WR	NSWC DAHLGREN	0.010	0.010		0.010						
Subtotal Management			0.215	0.298		0.300		0.000		CONT	CONT.	N/A
Remarks:												
Total Cost			1.732	2.250		1.353		0.867		CONT.	CONT.	N/A
Remarks:												

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N BA4**	PROGRAM ELEMENT NAME AND NUMBER **Conventional Munitions/0603609N**				PROJECT NAME AND NUMBER INSENSITIVE MUNITIONS ADVANCED DEVELOPMENT / S0363					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**9.889**	**9.121**	**3.224**	**7.398**	**4.804**	**6.392**	**4.668**	**Continuing**	**Continuing**
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification:
Most Navy munitions react violently when exposed to unplanned stimuli such as fire, shock and bullet impact, thus presenting a great hazard to ships, aircraft and personnel. This program will provide, validate and transition technology to all new weapon developments and priority weapon systems and enable production of munitions insensitive to these stimuli with no reduction in combat performance. The Insensitive Munitions (IM) Advanced Development Program is the Navy's focused effort on propellants, propulsion units, explosives, warheads, fuzes and pyrotechnics to reduce the severity of cook-off and bullet/fragment impact reactions, minimizing the probability for sympathetic detonation, both in normal storage and in use, increasing ship survivability and satisfying performance and readiness requirements. Each technology area is divided into subtasks addressing specific munition/munition class IM deficiencies. Energetic materials producibility is demonstrated to assure national capability to produce and load munitions systems. The program is being closely coordinated with other Military Departments, NATO and allied countries to eliminate redundant efforts and maximize efficiency. A joint service IM requirement has been developed. Insensitive munitions are identified as a DoD critical technology requirement and considered as part of a weapon design per DoD 5000.2R.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:
- (U) ($1.892) Validated and assessed weapon systems POA&Ms for IM compliance. Compiled and analyzed weapon system, energetic material and generic technology IM test data.
- (U) ($3.118) Demonstrated high explosives that show improved IM characteristics while maintaining or improving operational performance. Demonstrated improved performance deformable high explosives for new Anti-Air-Warfare Warheads. Demonstrated internal blast explosive and high performance pressed metal accelerating explosives and initiated qualification. Continued evaluation of a castable CL-20 based explosive and qualified low cost metal accelerating explosive.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N BA4	**Conventional Munitions/0603609N**	INSENSITIVE MUNITIONS ADVANCED DEVELOPMENT / S0363

1. (U) FY 1999 ACCOMPLISHMENTS: (Continued)
- (U) ($0.825) Evaluated IM ordnance concepts. Conducted system demonstrations of new high explosives combined with improved warhead and booster designed to support technology transitions. Continued modeling applications that reduce and enhance IM warhead design and test efforts. Evaluated improved air-to-air warheads and penetrator warheads. Evaluated IM properties of warheads reactive case materials. Demonstrated improved submunition case concepts.
- (U) ($4.054) Evaluated and demonstrated IM propellants and propulsion systems which provide improved or comparable performance to in-service systems and better IM characteristics. Combined candidate IM propellants and case concepts to demonstrate compliance with IM and performance requirements. Demonstrated performance of super high-pressure composite case motor. Demonstrated insensitive high-energy booster propellants and composite case motors. Continued demonstration of dual-pulse boost rocket motor for surface systems.

2. (U) FY 2000 PLAN:
- (U) ($1.810) Continue validation and assessment of weapon systems POA&Ms for IM compliance. Continue compilation and analysis of weapon system, energetic material and generic technology IM test data.
- (U) ($2.320) Demonstrate high explosives that show improved IM characteristics while maintaining or improving operational performance. Demonstrate high performance cast explosive. Continue qualification and evaluation of internal blast explosive and pressed metal accelerating explosives. Continue evaluation of improved performance deformable explosive. Begin qualification of high performance, low cost replacement for initiator explosives. Begin qualification of high performance booster explosive.
- (U) ($0.705) Evaluate IM ordnance concepts. Conduct system demonstrations of new high explosives combined with improved warhead and booster designed to support technology transitions. Continue modeling applications that reduce and enhance IM warhead design and test efforts. Complete evaluation of improved warhead concepts for shoulder launched weapons. Continue demonstration and evaluation of improved air-to-air warheads, reactive case warheads and penetrator warheads. Continue demonstration and evaluation of improved submuntion case concepts.
- (U) ($3.286) Evaluate and demonstrate IM propellants and propulsion systems which provide improved or comparable performance to in-service systems and better IM characteristics. Combine candidate IM propellants and case concepts to demonstrate compliance with IM and performance requirements. Demonstrate an insensitive, multi mission, high performance rocket motor. Demonstrate high-pressure propellants in high-pressure composite motor cases. Continue demonstration of dual-pulse boost rocket motor for surface systems.
- (U) ($1.000) Continue the evaluation and demonstration of solventless processing of explosive molding powder. Demonstate the recycle, recovery and reuse of hydrolyzable rocket propellant formulations. Evaluate and predict the environmental impact and associated life cycle costs for energetic materials and processes.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N BA4	**Conventional Munitions/0603609N**	INSENSITIVE MUNITIONS ADVANCED DEVELOPMENT / S0363

3. (U) FY 2001 PLAN:
- (U) ($1.209) Continue validation and assessment of weapon systems POA&Ms for IM compliance. Continue compilation and analysis of weapon system, energetic material and generic technology IM test data.
- (U) ($.750) Demonstrate high explosives that show improved IM characteristics while maintaining or improving operational performance. Continue qualification of internal blast explosive. Continue evaluation of pressed metal accelerating explosives. Continue qualification and begin transition high performance booster explosive to weapons systems.
- (U) ($1.265) Evaluate and demonstrate IM propellants and propulsion systems which provide improved or comparable performance to in-service systems and better IM characteristics. Combine candidate IM propellants and case concepts to demonstrate compliance with IM and performance requirements. Continue demonstration of an insensitive, multi-mission, high performance rocket motor. Complete demonstration of high-pressure propellants in high-pressure composite motor cases. Complete demonstration of dual-pulse boost rocket motor for surface systems.

B. (U) OTHER PROGRAM FUNDING SUMMARY: NOT APPLICABLE

(U) RELATED RDT&E:
(U) PE 0601153N (Defense Research Sciences)
(U) PE 0602111N (Surface/Aerospace Surveillance and Weapons Technology)
(U) PE 0602314N (Undersea Surveillance and Weapons Technology)
(U) PE 0602315N (MCM, Mining and Special Warfare Technology)
(U) PE 0603216N (Aviation Survivability) Project W0592 Aircraft and Ordnance Safety
(U) PE 0604603N (Unguided Conventional Air-launched Weapons)
(U) Cooperative technology transfer efforts with all weapons project offices are in progress.

C. (U) ACQUISITION STRATEGY: NOT APPLICABLE

D. (U) SCHEDULE PROFILE: NOT APPLICABLE

Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N BA4

PROGRAM ELEMENT: Conventional Munitions/0603609N

PROJECT NAME AND NUMBER: INSENSITIVE MUNITIONS ADVANCED DEVELOPMENT / S0363

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Propulsion Dev. and Eval.	WR	NAWC WPN DIV/China Lake	75.700	3.554	11/98	2.786	11/99	1.265	11/00	Continuing	Continuing	NA
	RCP	NAWC WPN DIV/China Lake	9.000	0.500	11/98	0.500	11/99	0.000	11/00	Continuing	Continuing	NA
Explosives Dev. and Eval.	WR	NSWC/Indian Head Div	59.646	3.098	11/98	2.300	11/99	0.740	11/00	Continuing	Continuing	NA
Ordnance Dev. and Eval.	WR	NSWC/Dahlgren Div	17.550	0.825	11/98	0.705	11/99	0.000	11/00	Continuing	Continuing	NA
Pyrotechnics Dev. and Eval.	WR	NSWC/Crane Div	6.500	0.020	11/98	0.020	11/99	0.010	11/00	Continuing	Continuing	NA
Environmentally Safe Energetics Dev	WR	NSWC/Indian Head Div	0.000	0.000	NA	1.000	NA	0.000	11/00	0.000	1.000	NA
Subtotal Product Development			168.396	7.997		7.311		2.015		Continuing	Continuing	NA

Remarks: This cost category includes technology development and subsequent test and evaluation of Insensitive Munitions concepts for propulsion, explosives, ordnance and pyrotechnics. Development of Environmentally Safe Energetic Materials will transition to S0363 in FY 00.

Development Support Equipment												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks: Support categories not applicable to this Non-ACAT program.

Exhibit R-3 Cost Analysis (page 2)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N**			PROGRAM ELEMENT **Conventional Munitions/0603609N**			PROJECT NAME AND NUMBER INSENSITIVE MUNTIONS ADVANCED DEVELOPMENT / SO363						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation												
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks: This project, S0363, Insensitive Munitions Advanced Development (IMAD), is a Non-ACAT program. As such no formal, separate developmental or operational test and evaluation plans or efforts are included. Formal DT and OT is conducted once the concepts developed by IMAD are transitioned to weapon development and product improvement programs.												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support		NSWC IH DIV	23.867	1.876	11/98	1.790	11/99	1.189	11/00	Continuing	Continuing	NA
Travel		NAVSEASYSCOM	0.190	0.016	10/98	0.020	10/99	0.020	10/00	Continuing	Continuing	NA
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			24.057	1.892		1.810		1.209		Continuing	Continuing	NA
Remarks:												
Total Cost			192.453	9.889		9.121		3.224		Continuing	Continuing	NA
Remarks: Performing activities include: NSWC/DAHLGREN, NSWC/INDIAN HEAD, NAWC WP DIV/CHINA LAKE AND NSWC/CRANE												

EXHIBIT R-2a, RDT&E Project Justification							DATE: **February 2000**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA4**	PROGRAM ELEMENT NAME AND NUMBER **Conventional Munitions/0603609N**				PROJECT NAME AND NUMBER ENVIRONMENTALLY SAFE ENERGETIC MATERIALS / S2611					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**0.968**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.968**
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification:
The development, manufacture and demilitarization of energetic materials generate significant quantities of waste. The generation and subsequent disposal of this waste has come under increased scrutiny and regulation by Federal, State and local officials. Additionally, due to environmental compliance and waste disposal issues, the cost of energetic materials is rapidly increasing. New technologies, energetic materials and ingredients that minimize any adverse environmental impact are being developed within the Navy's science and technology initiatives. These technologies are commonly referred to as "green" energetic materials. The efforts under this project will provide, validate, and transition technology for explosives, propellants and pyrotechnics using materials and compositions that have low adverse environmental impact in production and demilitarization, will meet insensitive munitions requirements and will have no reduction to combat performance.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:
- (U) ($.968) Initiated the evaluation and demonstration of solventless processing of explosive molding powder. Began the demonstration of the recycle, recovery and reuse of hydrolyzable rocket propellant formulations. Initiated the evaluation and prediction of the environmental impact and associated life cycle costs for energetic materials and processes.

2. (U) FY 2000 PLAN: NOT APPLICABLE

3. (U) FY 2001 PLAN: NOT APPLICABLE

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N / BA4	**Conventional Munitions/0603609N**	ENVIRONMENTALLY SAFE ENERGETIC MATERIALS / S2611

B. (U) OTHER PROGRAM FUNDING SUMMARY: NOT APPLICABLE

(U) RELATED RDT&E:

(U) PE 0601153N (Defense Research Sciences)
(U) PE 0602111N (Surface/Aerospace Surveillance and Weapons Technology)
(U) PE 0602314N (Undersea Surveillance and Weapons Technology)
(U) PE 0602315N (MCM, Mining and Special Warfare Technology)
(U) PE 0603216N (Aviation Survivability) Project W0592 Aircraft and Ordnance Safety
(U) PE 0604603N (Unguided Conventional Air-launched Weapons)

C. (U) ACQUISITION STRATEGY: NOT APPLICABLE

D. (U) SCHEDULE PROFILE: NOT APPLICABLE

Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, N / BA4	Conventional Munitions/0603609N	ENVIRONMENTALLY SAFE ENERGETIC MATERIALS / S2611

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Technology Development	WR	NSWC IH DIV	0.000	0.903	07/99	0.000	NA	0.000	NA	0.000	0.903	NA
Ancillary Hardware Development											0.000	
Systems Engineering											0.000	
Licenses											0.000	
Tooling											0.000	
GFE											0.000	
Award Fees											0.000	
Subtotal Product Development			0.000	0.903		0.000		0.000		0.000	0.903	

Remarks:

Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks: Categories do not apply.

Exhibit R-3 Cost Analysis (page 2)								DATE: **February 2000**				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N / BA4**			PROGRAM ELEMENT **Conventional Munitions/0603609N**			PROJECT NAME AND NUMBER ENVIRONMENTALLY SAFE ENERGETIC MATERIALS / S2611						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation												
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks: This project, S2611, Environmentally, is a Non-ACAT program and a FY 99 Congressional plus-up. As such no formal, separate developmental or operational test and evaluation plans or efforts are included. Formal DT and OT is conducted once the concepts developed are transitioned to weapon development and product improvement programs.												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support	WR	NSWC IH DIV	0.000	0.065	07/99	0.000	NA	0.000	NA	0.000	0.065	
Travel												
Labor (Research Personnel)												
Overhead												
Subtotal Management			0.000	0.065		0.000		0.000		0.000	0.065	
Remarks:												
Total Cost			0.000	0.968		0.000		0.000		0.000	0.968	
Remarks:												

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE JAN 2000
BUDGET ACTIVITY **4 - Demonstration/Validation**	PE NUMBER AND TITLE **0603611M Marine Corps Assault Amphibious Vehicles**
	PROJECT **B0020**

COST *(In Millions)*	FY 1998 Actual	FY 1999 Estimate	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
ADVANCED AMPHIBIOUS ASSAULT VEHICLE (AAAV)	0	100609	114210	137981	178680	158817	103432	61373	Continuing	CONT.
Quantity of RDT&E Articles		1	2			11				

A. (U) Mission Description and Budget Item Justification:

(U) The AAAV program will field a successor to the Marine Corps current amphibious vehicle, the AAV7A1. The AAAV will provide the principle means of tactical surface mobility for the Marine Air-Ground Task Force (MAGTF) during both ship-to-objective maneuver and subsequent combat operations ashore as part of the Navy and Marine Corps Operation Maneuver from the Sea Doctrine. The AAAV will provide the Marine Corps with the capability to execute the full spectrum of military missions from humanitarian operations to conventional combat operations. The AAAV replaces the AAV7A1 family of vehicles.

(U) **Justification for Budget Activity:** The AAAV Program was approved by the Defense Acquisition Board (DAB) at a Milestone I review in 1995 signifying the beginning of the Program Definition and Risk Reduction (PDRR) phase. During this phase, three (3) prototypes will be designed, fabricated, and undergo Development and Operational testing.

(U) FY 1999 Accomplishments:

- (U) $ 91408 Continued PDRR phase, initiated and completed the assembly of the first prototype, initiated extensive contractor prototype testing. Initiated AAAV Command (C) System development. Initiated second and third prototype assembly. Continued AAAV Survivability program.
- (U) $ 3887 Continued to provide in-house technical support.
- (U) $ 4570 Continued to provide program support to coordinate and update program planning, program analysis, and program execution. Initiated software Independent Verification and Validation (IV&V).
- (U) $ 744 Initiated armor validation testing. Initiated combined government/contractor prototype acceptance testing.

(U)Total $ 100609

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE JAN 2000
BUDGET ACTIVITY 4 - Demonstration/Validation	PE NUMBER AND TITLE 0603611M Marine Corps Assault Amphibious Vehicles
	PROJECT B0020

(U) FY 2000 Planned Program:

•	(U) $	92880	Continue PDRR phase. Complete assembly of second and third prototypes. Complete extensive contractor testing of all three prototypes. Continue AAAV (C) system development. Continue AAAV Survivability program.
•	(U) $	10233	Continue to provide in-house technical support.
•	(U) $	5379	Continue to provide program support to coordinate and update program planning, program analysis, and program execution. Continue software IV&V.
•	(U) $	5718	Initiate and complete combined government/contractor Developmental Testing-I (DT-I) , Initiate Early Operational Assessment (EOA) testing,
(U)Total $		114210	

(U) FY 2001 Planned Program:

•	(U) $	24497	Complete PDRR phase. Continue AAAV (C) system and survivability development.
•	(U) $	93851	Transit Milestone II DAB; award the Engineering and Manufacturing Development contract.
•	(U) $	12376	Continue to provide in-house technical support.
•	(U) $	5401	Continue to provide program support to coordinate and update program planning, program analysis, and program execution. Continue software IV&V.
•	(U) $	1856	Complete Early Operational Assessment testing.
(U)Total $		137981	

B. (U) Project Change Summary	FY 1999	FY 2000	FY 2001
(U) Previous President's Budget	103966	94843	110584
(U) Adjustments to Previous President's Budget	-3357	19367	27397
(U) Current Budget Submit	100609	114210	137981

(U) Change Summary Explanation:

(U) Funding: FY 1999 reflects SBIR assessment of $2,883M and, a NavCompt adjustment of $474K. FY 2000 reflects a Congressional increase of $20M and a DoD General Reduction of $633K. FY 2001 reflects a $28.7M adjustment due to prioritization of programs within the Marine Corps, a PBD 604 adjustment of $941K and a NavCompt adjustment of $362K.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE JAN 2000
BUDGET ACTIVITY **4 - Demonstration/Validation**	PE NUMBER AND TITLE **0603611M Marine Corps Assault Amphibious Vehicles**
	PROJECT **B0020**

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

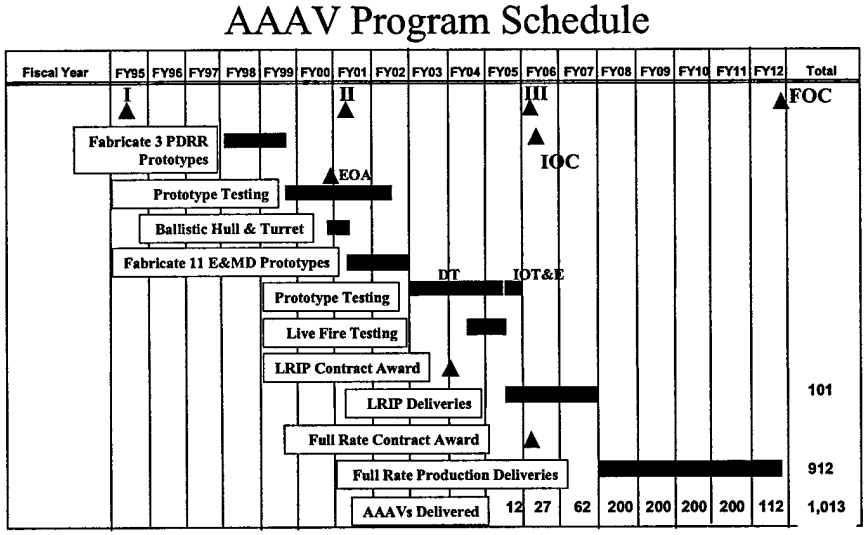
C. (U) Other Program Funding Summary (APPN, BLI #, NOMEN)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Compl	Total Cost
(U) PANMC, BLI# 147500, AAAV							7026	17715	Cont.	Cont.
(U) PMC, BLI# 202200, AAAV						56074	351462	554221	Cont.	Cont.

(U) Related RDT&E

(U) PE 0206623M (Marine Corps Ground Combat/Supporting Arms Systems), Project C0021, AAV7A1.
(U) PE 0206623M (Marine Corps Ground Combat/Supporting Arms Systems), Project C2237, AVTB.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE JAN 2000
BUDGET ACTIVITY **4 - Demonstration/Validation**	PE NUMBER AND TITLE **0603611M Marine Corps Assault Amphibious Vehicles** PROJECT **B0020**

D. (U) Schedule Profile
AAAV Schedule:



RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: JAN 2000

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603611M Marine Corps Assault Amphibious Vehicles

PROJECT: B0020

A. (U) Project Cost Breakdown

	FY 1999	FY 2000	FY 2001
Product Development	91408	92880	118348
Support and Management	8457	15612	17777
Test and Evaluation	744	5718	1856
Total	100609	114210	137981

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1999	FY 1999	FY 2000	FY 2001	Budget to Complete	Total Program
Product Development Organizations										
GDLS (PDRR)	CPAF	JUN 96	CONT.	CONT.	125307	91408	92880	24497	CONT.	CONT.
EMD award		FEB 01						93851	CONT.	CONT.
Support and Management Organizations										
EG&G, Manassas, VA	FFF	SEP 98	CONT.	CONT.	640	3153	4247	4366	CONT.	CONT.
Misc. Contracts	CPFF	Various	CONT.	CONT.	6385	1292	1085	1045	CONT.	CONT.
Misc. Gov. labs	WR	Various	CONT.	CONT.	10620	3887	9980	12066	CONT.	CONT.
Modeling & Simulation	WR	Various	CONT.	CONT.	3330	125	300	300	CONT.	CONT.
Test and Evaluation Organizations										
Miscellaneous	Various	Various	CONT.	CONT.	1285	744	5718	1856	CONT.	CONT.

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: JAN 2000

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603611M Marine Corps Assault Amphibious Vehicles

PROJECT: B0020

Government Furnished Property

Item Description	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Delivery Date	Total Prior to FY 1999	FY 1999	FY 2000	FY 2001	Budget to Complete	Total Program
Product Development Property									
Support and Management Property									
Test and Evaluation Property									

	Total Prior to FY 1999	FY 1999	FY 2000	FY 2001	Budget to Complete	Total Program
Subtotal Product Development	125307	91408	92880	118348	CONT.	CONT.
Subtotal Support and Management	20975	8457	15612	17777	CONT.	CONT.
Subtotal Test and Evaluation	1285	744	5718	1856	CONT.	CONT.
Total Project	147567	100609	114210	137981	CONT.	CONT.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

COST (*In Millions*)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
Total Program Element (PE) Cost	54971	50375	23216	8682	7516	2816	2564	Continuing	Continuing
C1964 Anti-Armor Weapon System	424	629	613	635	865	793	529	Continuing	Continuing
C2112 Howitzer, Medium Towed 155MM (LW 155)	31763	27117	13119	0	0	0	0	0	142633
C2113 Predator Short Range Assault Weapon	14727	10681	492	0	0	0	0	0	143312
C2251 Jt Adv Amphibious Logistics Technology	1	0	0	0	0	0	0	0	1
C2256 Integrated Infantry Combat System (IICS)	309	747	605	1749	1766	1782	1795	Continuing	Continuing
C2507 Small Unit Riverine Craft (SURC)	0	3021	1757	225	10	0	0	0	5003
C2508 Internally Transportable Vehicle	0	5196	6630	6073	4875	241	240	130	23385
C2614 SMAW Follow-On	2905	2984	0	0	0	0	0	0	5889
C2615 Trajectory Corrected Munitions (TCM)	4842	0	0	0	0	0	0	0	4842
Quantity of RDT&E Articles									

(U) **Mission Description and Budget Item Justification:** This PE supports the demonstration and validation of Marine Corps Ground/Supporting Arms Systems for utilization in Marine Air-Ground Expeditionary Force amphibious operations.

(U) **Justification for Budget Activity:** This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental test related to specific ground weapon system applications

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C1964

COST (*In Millions*)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
C1964 Anti-Armor Weapon System	424	629	613	635	865	793	529	Continuing	Continuing
Quantity of RDT&E Articles									

A. (U) Mission Description and Budget Item Justification:

(U) This project provides for Marine Corps participation in the Joint Anti-Armor Program entitled Javelin (Advanced Anti-Tank Weapon System - Medium (AAWS-M)) and the Anti-Armor Weapon System - Heavy (AAWS-H). The Javelin weapon system will provide the Marine Corps and Army with state-of-the-art capability to destroy sophisticated and future armored threats. No such medium anti-armor system is currently available to the infantryman. The AAWS-H is a long range, antitank weapon system that will replace the Tube Launched, Optically Tracked, Wire Guided Missile System. It will satisfy an operational requirement to provide increased range (4000 meters), increased lethality against all armored threats, to include explosive reactive armor, active protection, increased probability of hit and kill and increased gunner survivability. Possible Light Armored Vehicle-Anti Tank usage would promote commonality among Marine Corps systems.

(U) FY 1999 Accomplishments:

- (U) $ 200 Monitored and participated in Production Qualification Test (PQT) & Preplanned Product Improvement (P3I) for Javelin by using Engineering/Technical Support.
- (U) $ 196 Monitored and participated in advancing technical developments in the AAWS-H program by using Engineering / Technical Support.
- (U) $ 28 Prepared necessary Marine Corps documentation for the AAWS-H program.

(U)Total $ 424

(U) FY 2000 Planned Program:

- (U) $ 237 Engineering/Technical support to monitor and participate in PQT and P3I for the Javelin program.
- (U) $ 368 Engineering and Technical Support to monitor and participate in technical developments in the AAWS-H program.
- (U) $ 24 Prepare necessary Marine Corps documentation for the AAWS-H program.

(U)Total $ 629

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
4 - Demonstration/Validation	0603635M Marine Corps Ground Combat/Supporting Arms Systems	C1964

(U) FY 2001 Planned Program:

- (U) $ 243 Engineering/Tecnhical support to monitor and participate in PQT and P3I for the Javelin program.
- (U) $ 335 Engineering/Technical support to monitor and participate in technical developments in the AAWS-H program.
- (U) $ 35 Prepare necessary Marine Corps documentation for the AAWS-H program.

(U)Total $ 613

B. (U) Project Change Summary

	FY 1999	FY 2000	FY 2001
(U) Previous President's Budget	427	633	610
(U) Adjustments to Previous President's Budget	-3	-4	+3
(U) Current Budget Submit	424	629	613

(U) Change Summary Explanation:

(U) Funding: Changes in all fiscal years are due to minor affordability adjustments.

(U) Schedule: N/A

(U) Technical: N/A

C. (U) Other Program Funding Summary (APPN, BLI #, NOMEN)

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Compl	Total Cost
*(U) PMC BLI# 301100	82,653	92,737	29,119	1,033	1,047	113	137	0	302,792
(U)									

(U) Related RDT&E

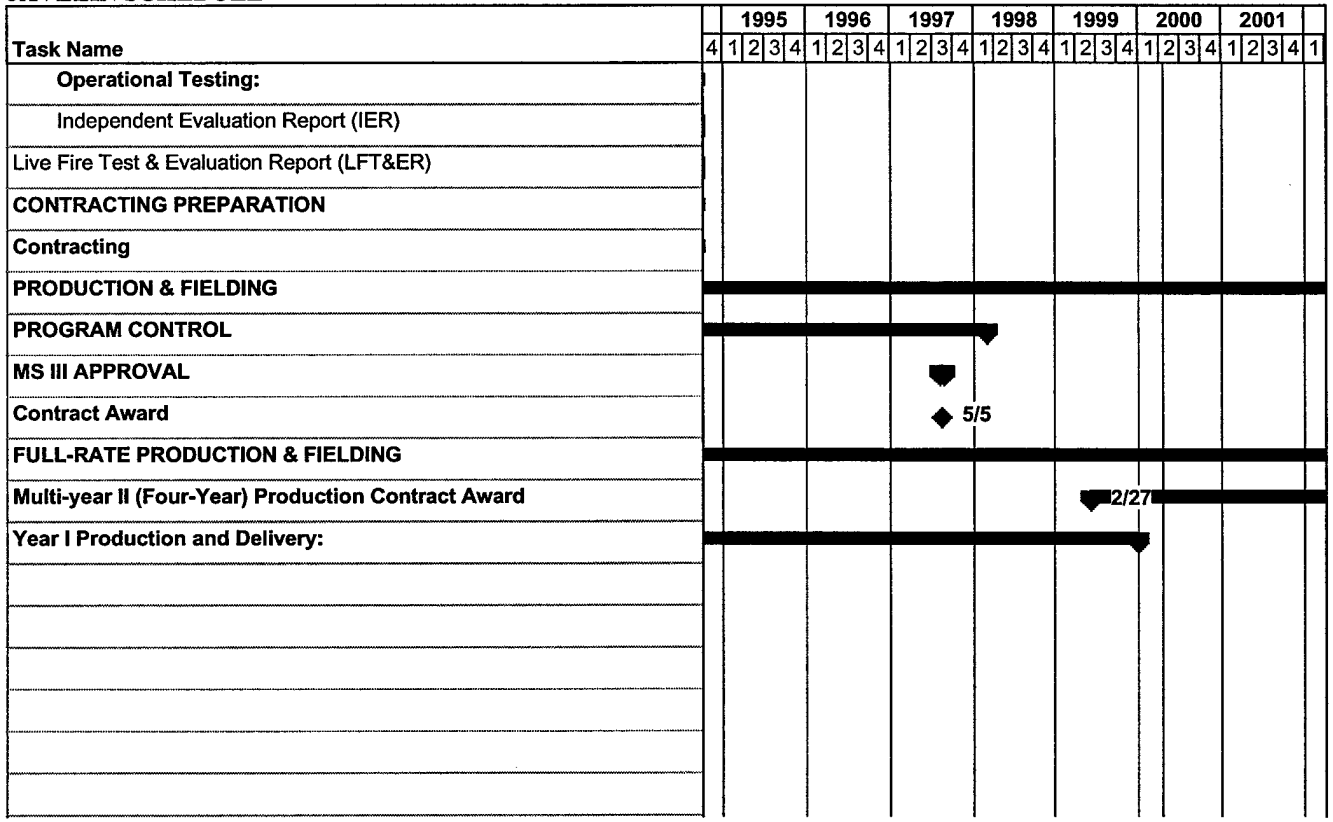
RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
4 - Demonstration/Validation	0603635M Marine Corps Ground Combat/Supporting Arms Systems	C1964

D. (U) Schedule Profile

JAVELIN SCHEDULE



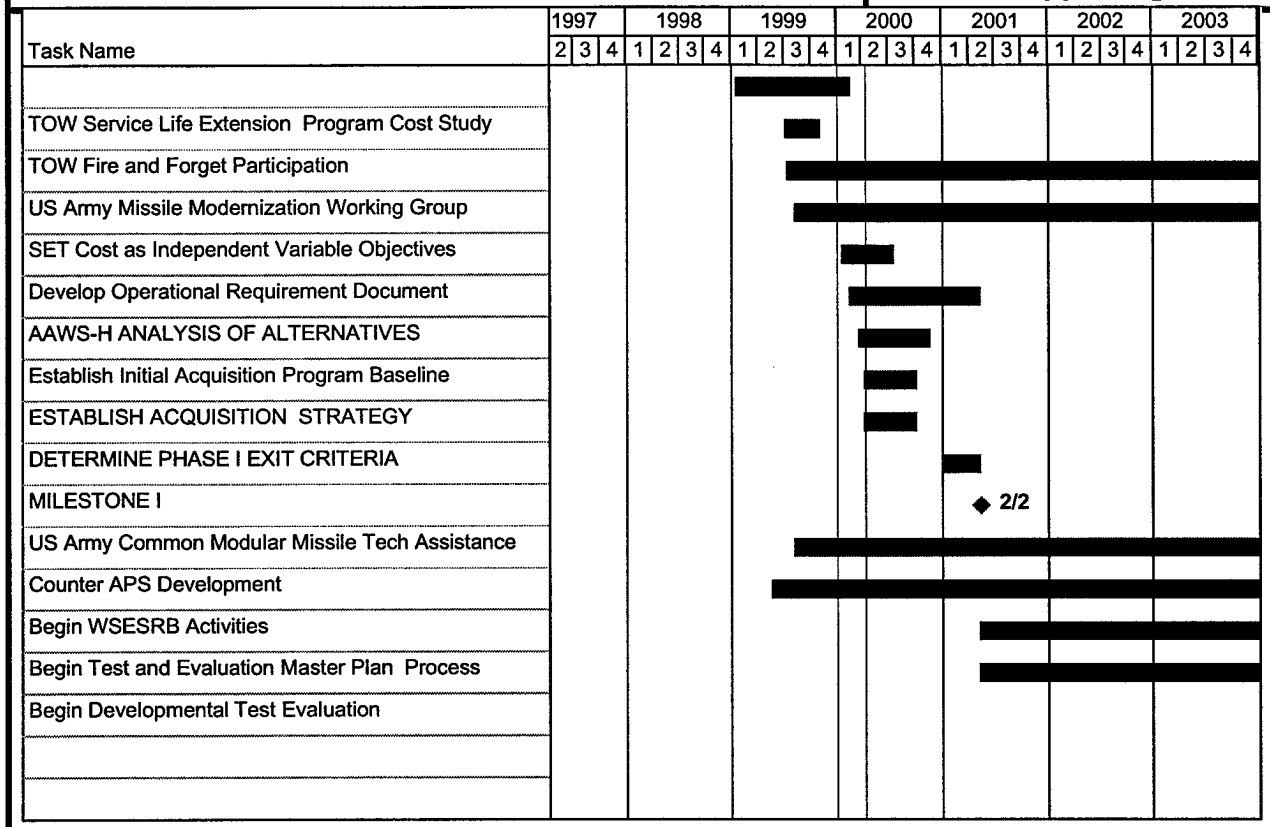
RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C1964



RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2112

COST (*In Millions*)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
C2112 Howitzer, Medium Towed 155MM (LW 155)	31763	27117	13119	0	0	0	0	0	142633
Quantity of RDT&E Articles									

A. (U) Mission Description and Budget Item Justification: (U) The LW155 is the replacement for the aging, operationally deficient M198 155 Howitzer for the Marine Corps and the Army. The LW155 retains the current M198 howitzer's range, but will weigh 9,000 pounds compared to the M198's 16,000 pounds. The weight reduction significantly improves transportability and mobility by sea, air, and land platforms and enables the LW155 to emplace, displace, and bold shift in half the time of the current system while increasing the rate of fire. Thus, the LW155 provides greater transportability and mobility in strategic/tactical movements. The LW155 is a joint Marine Corps and Army program, with the Marine Corps as the Lead service. The Joint Operational Requirements Document (JORD) was approved by the Assistant Commandant of the Marine Corps on 27 June 1996. The JORD was validated and approved by the Army on 29 September 1995. A MS I/II Marine Corps Program Decision Memorandum (MCPDM) was approved on 5 February 1996. After a ten month "shoot-off" between competitors a three year EMD contract was signed with Cadillac Gage Textron Inc. on 17 March 1997. On 21 December 1998, the three parties involved in the development of the LW155 signed a novation agreement whereby Vickers Shipbuilding and Engineering Limited (VSEL) took over prime contractor responsibilities from Cadillac Gage Textron. The program will complete development in FY01 and enter production in FY 02.

(U) FY 1999 Accomplishments:

• (U) $	2,404	Provided government program management support.
• (U) $	2,256	ARDEC continued matrix development engineering to system, logistics, safety, quality assurance, corrosion prevention.
• (U) $	548	Provided other government development engineering to system, logistics, safety, quality assurance.
• (U) $	19,134	Continued and completed contractor development engineering and prototype manufacturing. Restructure efforts such as Primer Feed Mechanism and Modular Artillery Charge System Compatibility, to reduce risk and enhance system performance established in the Joint Operational Requirements Document (JORD).
• (U) $	1,743	Conducted system development test and evaluation at Yuma Proving Grounds, AZ , ARDEC, Picatinny, NJ and ATC, Aberdeen, MD.
• (U) $	5,678	Conducted engineering and prototype manufacturing at Benet Labs and Watervliet Arsenal, NY.
•		
(U)Total$	31,763	

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
4 - Demonstration/Validation	0603635M Marine Corps Ground Combat/Supporting Arms Systems	C2112

(U) FY 2000 Planned Program:

• (U) $	3,035	Program management support.
• (U) $	2,556	ARDEC continues matrix development engineering to system, logistics, safety, quality assurance, corrosion prevention.
• (U) $	16,094	Engineering and manufacturing development (EMD) contract increments to VSEL and Kara, Inc.
• (U) $	527	Provide other government development engineering support to system, safety, logistics and quality assurance.
• (U) $	3,461	Conduct technical test series (fatigue, recoil durability, cold, hot/humid, corrosion, transportability, logistics demonstration, spades, wear, firing tables).
• (U) $	1,444	Conduct engineering and prototype manufacturing at Benet Labs and Watervliet Arsenal, NY.
(U) Total $	27,117	

(U) FY 2001 Planned Program:

• (U) $	2,000	Program Management Support.
• (U) $	1,000	ARDEC continues matrix development engineering to system, logistics, safety, quality assurance.
• (U) $	5,808	EMD Contract increments (VSEL & KARA) to contract close out and final award fee.
• (U) $	1,273	Provide other government development engineering support to logistics and quality assurance.
• (U) $	2,638	Provide support to Multi-service Operational Test & Evaluation (MOT&E) – Marine travel costs, transportation, materials.
• (U) $	400	Conduct engineering and prototype manufacturing at Benet Labs and Watervliet Arsenal, NY.
(U) Total $	13,119	

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2112

B. (U) Project Change Summary

	FY 1999	FY 2000	FY 2001
(U) Previous President's Budget	32,332	23,237	12,105
(U) Adjustments to Previous President's Budget	(569)	+3,880	+1,014
(U) Current Budget Submit	31,763	27,117	13,119

(U) Change Summary Explanation:

(U) Funding: FY 1999 decrease of $422K for SBIR Tax Assessment and $147K Inflation Savings. FY2000 increase in the amount of $3.03M due to $1.5M VSEL Engineering Development, $1.1M Kara Fire Control and $430K additional spares, wear and firing table tests, $1M for risk mitigation testing and reduced by $150K for General Reduction. FY2001 increased by $1.138M for unprogrammed operational test by MCOTEA and reduced by $124K for PBD 604 ($90K) and NAVCOMPT adjustment ($34k).

(U) Schedule: Change shows restructure of program

(U) Technical: Not applicable

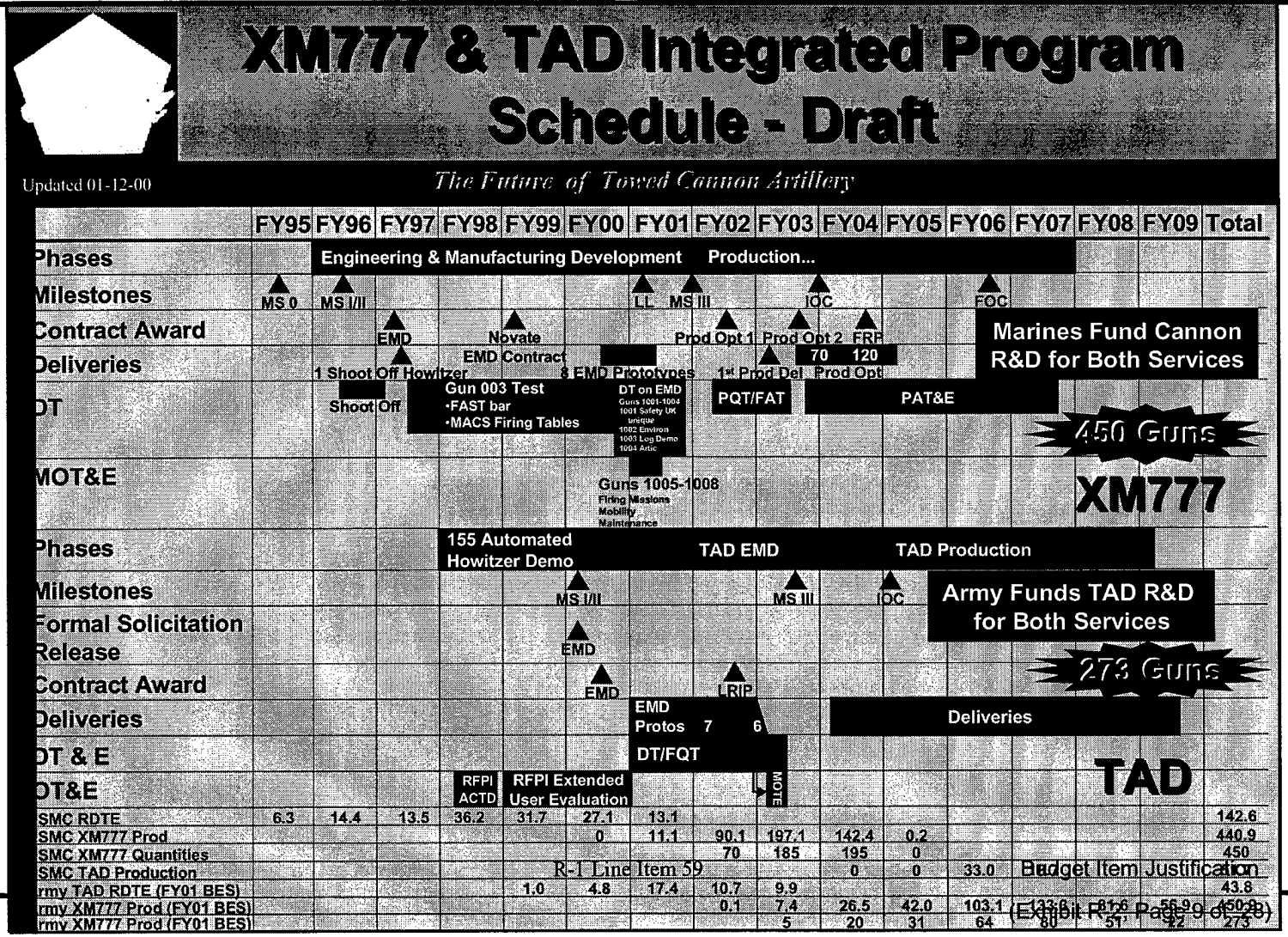
C. (U) Other Program Funding Summary (APPN, BLI #, NOMEN)

	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Compl	Total Cost
(U) PMC, BLI #218500, Howitzer, Medium Towed 155MM XM777 (LW 155)	0	0	0	11,105	90,055	197,065	142,352	238	0	440,815

(U) Related RDT&E: PE 0604854A (Artillery Systems-Engineering Development)

D. (U) Schedule Profile

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE: February 2000
BUDGET ACTIVITY: 4 - Demonstration/Validation	PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems
	PROJECT: C2112



RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: February 2000

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
4 - Demonstration/Validation	0603635M Marine Corps Ground Combat/Supporting Arms Systems	C2112

A. (U) Project Cost Breakdown

Project Cost Categories	FY 1999	FY 2000	FY 2001
a. Primary Hardware Development	19,134	15,786	5,808
b. Government Developmental Engineering	2,804	3,083	2,273
c. Program Management Support	2,404	3,343	2,000
d. Test and Evaluation	1,743	3,461	2,638
e. Conduct Engineering and Prototype Manufacturing, Benet & Watervliet Arsenal, NY	5,678	1,444	400
Total	31,763	27,117	13,119

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1999	FY 1999	FY 2000	FY 2001	BudgetTo Complete	Total Program
Product Development Organizations										
Cadiliac Gage Textron, Inc, New Orleans, LA	CPIF	Mar 1997	28,640	28,640	28,640	0	0	0	0	28,640
VSEL Barrow-in-Furness, UK	CPIF	Dec 1998	35,612	35,612	1,224	17,734	13,186	5,188	0	37,332
Kara Bedford, PA	CPIF	Apr 1999	2,491	2,491	0	1,400	2,600	620	0	4,620
ARDEC, Picatinny, NJ	MIPR	Oct 1996	12,115	12,115	5,337	2,256	2,556	1,000	0	11,149
ARDEC Picatinny, NJ Source Selection Evaluation Board	MIPR	Oct 1996	4,494	4,494	4,494	0	0	0	0	4,494

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: February 2000

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2112

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1999	FY 1999	FY 2000	FY 2001	Budget to Complete	Total Program
Misc Government Accounts	MIPR	Various	11,119	11,119	7,603	548	527	1,273	0	9,951
Support and Management Organizations										
PMO LW 155, Picatinny, NJ	MIPR	Oct 1996	15,867	15,867	7,620	2,070	3,035	2,000	0	14,725
Support Contracts	Contracts	Various			2,042	344	308			2,684
Test and Evaluation Organizations										
Yuma Proving Ground, Yuma AZ (Shoot-off)	MIPR	Feb 1996	1,900	1,900	1,900	0	0	0	0	1.900
Yuma Proving Ground, Yuma AZ	MIPR	Oct 1996	12,929	12,929	1,672	1,288	3,381	1,500	0	7,841
Misc Government	MIPR	Various	3,376	3,376	3,376	30	80	1,138	0	4,624
T&E Contracts	Contracts	Various			0	425	0	0	0	425
Government Furnished Property										
Item Description	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Delivery Date		Total Prior to FY 1999	FY 1999	FY 2000	FY 2001	Budget to Complete	Total Program
Product Development Property										
Benet Labs, Watervliet Arsenal, NY	MIPR	Various	Various		6,726	5,678	1,444	400	0	13,248
Support and Management Property										

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: February 2000

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
4 - Demonstration/Validation	0603635M Marine Corps Ground Combat/Supporting Arms Systems	C2112

Test and Evaluation Property

	Total Prior to FY 1999	FY 1999	FY 2000	FY 2001	Budget to Complete	Total Program
Subtotal Product Development	54,024	27,616	20,313	8,481	0	110,434
Subtotal Support and Management	9,662	2,404	3,343	2,000	0	17,409
Subtotal Test and Evaluation	6,948	1,743	3,461	2,638	0	14,790
Total Project	70,634	31,763	27,117	13,119	0	142,633

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2113

COST (*In Millions*)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
C2113 Predator Short Range Assault Weapon	14727	10681	492	0	0	0	0	0	143312
Quantity of RDT&E Articles	51	103							

A. (U) Mission Description and Budget Item Justification:

(U) Predator (SRAW) will provide the Marine Corps with a lethal, disposable, fire and forget, top-attack, soft launch for firing from enclosed spaces, proliferable, accurate, night vision capable, lightweight, main battle tank killer. Modularity of the system will allow development of optimal warheads (flame, bunker-busting, multi-purpose) to fit on the flight module.

(U) FY 1999 Accomplishments:

- (U) $ 11,591 Continued EMD Phase of program.
- (U) $ 419 Conducted Modeling & Simulation Independent Validation and Verification.
- (U) $ 380 Prepared for Operational Testing.
- (U) $ 1,881 Provided engineering/Technical services to complete Developmental Testing (DT)
- (U) $ 456 Provided PM/In-House Support/Engineering Change Proposals (ECP)

(U)Total $ 14,727

(U) FY 2000 Planned Program:

- (U) $ 4,369 Complete EMD Phase of the program.
- (U) $ 1,971 Conduct Operational Testing.
- (U) $ 205 Complete Modeling & Simulation
- (U) $ 1,330 PM/In-House Support/ECPs
- (U) $ 2,806 Engineering/Technical Services Support

(U)Total $ 10,681

(U) FY 2001 Planned Program:

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 2000
BUDGET ACTIVITY **4 - Demonstration/Validation**	PE NUMBER AND TITLE **0603635M Marine Corps Ground Combat/Supporting Arms Systems**
	PROJECT **C2113**

- (U) $ 171 PM/In-House Support
- (U) $ 321 Engineering/Technical Services Support

(U)Total $ 492

B. (U) Project Change Summary

	FY 1999	FY 2000	FY 2001
(U) Previous President's Budget	12,781	13,371	492
(U) Adjustments to Previous President's Budget	1,946	-2,690	0
(U) Current Budget Submit	14,727	10,681	492

(U) Change Summary Explanation:

(U) Funding: FY 1999: increase of $1946K due to reprioritization of programs within the Marine Corps. FY2000: decrease of $2690K due to reprioritization of programs within the Marine Corps and a minor affordability adjustment.

(U) Schedule: N/A

(U) Technical: N/A

C. (U) Other Program Funding Summary (APPN, BLI #, NOMEN)

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Compl	Total Cost
(U) PMC, 308900, Predator (SRAW)	0	0	43,355	42,480	48,809	64,357	62,621	331,016	592,638

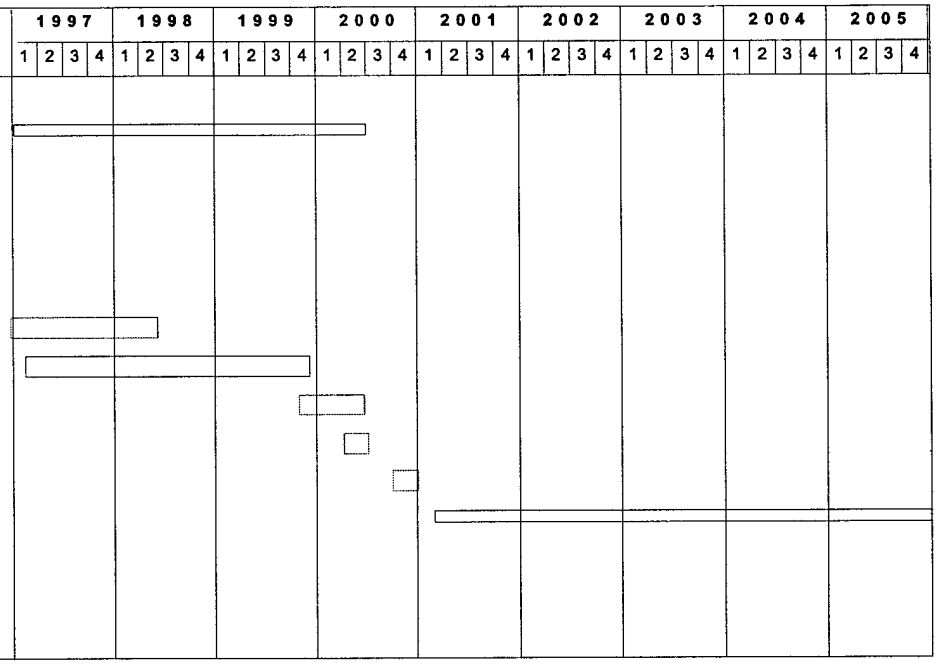
(U) Related RDT&E: Not Applicable.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 2000
BUDGET ACTIVITY 4 - Demonstration/Validation	PE NUMBER AND TITLE 0603635M Marine Corps Ground Combat/Supporting Arms Systems PROJECT C2113

D. (U) Schedule Profile

PREDATOR

Task Name	Start
Milestone II Approval	6/4/94
Engineering and Manufacturing Design Phase	6/4/94
Contract Award	6/4/94
Preliminary Design Review (PDR)	9/13/94
Fab & Test Engineering Models	4/13/95
Critical Design Review (CDR)	10/21/96
Fab Tech Eval Hardware	7/8/96
Development Testing (DT)	11/11/96
LRIP of IOT&E Hardware	7/28/99
Initial Operational T&E (IOT&E)	1/6/00
MS III Approval	9/2/00
Production, Fielding/Deployment & Operation Support	11/22/00
Production Contract Award	11/22/00
Initial Operational Capability (Est.)	3/12/03
Full Operational Capability (Est.)	6/25/08



RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2256

COST (*In Millions*)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
C2256 Integrated Infantry Combat System (IICS)	309	747	605	1749	1766	1782	1795	Continuing	Continuing
Quantity of RDT&E Articles									

A. (U) Mission Description and Budget Item Justification: (U) USMC name for this program is now Integrated Infantry Combat System (IICS) for dismounted combat Marines. The program will enhance the Marine's battlefield capabilities through the development and integration of an assortment of Marine systems/components and technologies into a cohesive, timely and combat effective system. These systems/components include weapon, integrated helmet assembly, protective clothing, communications and target acquisition technologies. This will provide the infantryman with increased lethality, survivability and situational awareness enhancements. Initial funding in this line will be utilized to determine and exploit integration opportunities on existing infantry equipment which will be fielded in the near future. Funds will also be utilized for the Research & Development of a future integrated system which is modular in design which will enhance the infantrymans mobility, lethality, survivability and communications.

(U) FY 1999 Accomplishments:

- (U) $ 86 Program Support and Acquisition Strategy Development
- (U) $ 223 Studies, analysis and support services.

(U)Total$ 309

(U) FY 2000 Planned Program:

- (U) $ 157 Forward Financed
- (U) $ 130 Program Support and Strategy Development
- (U) $ 160 Develop Modeling, Simulation, and Analysis Decision Support System.
- (U) $ 300 Studies and analysis.

(U)Total$ 747

(U) FY 2001 Planned Program:

- (U) $ 423 Integration of existing infantry equipment as determined and recommended by previous studies.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 2000
BUDGET ACTIVITY 4 - Demonstration/Validation	PE NUMBER AND TITLE 0603635M Marine Corps Ground Combat/Supporting Arms Systems PROJECT C2256

• (U) $	0	Integration of existing infantry equipment as determined and recommended by previous studies. This effort forward financed with $157K of FY 00 funding.
• (U) $	110	Continued development and coordination w/US Army Land Warrior Program.
• (U) $	72	Studies, analysis and support services.
(U)Total $	605	

B. (U) Project Change Summary

	FY 1999	FY 2000	FY 2001
(U) Previous President's Budget	730	751	768
(U) Adjustments to Previous President's Budget	-421	-4	-163
(U) Current Budget Submit	309	747	605

(U) Change Summary Explanation:

(U) Funding: FY 1999: Decrease in the amount of $421K was due to reprioritization of requirements within the Marine Corps.
FY 2000: Decrease in the amount of $4K was due to general reduction.
FY 2001: Decrease in the amount of $163K was due to reprioritization of requirements within the Marine Corps and PBD 604 Reduction.

(U) Schedule: N/A

(U) Technical: N/A

(U) Related RDT&E:

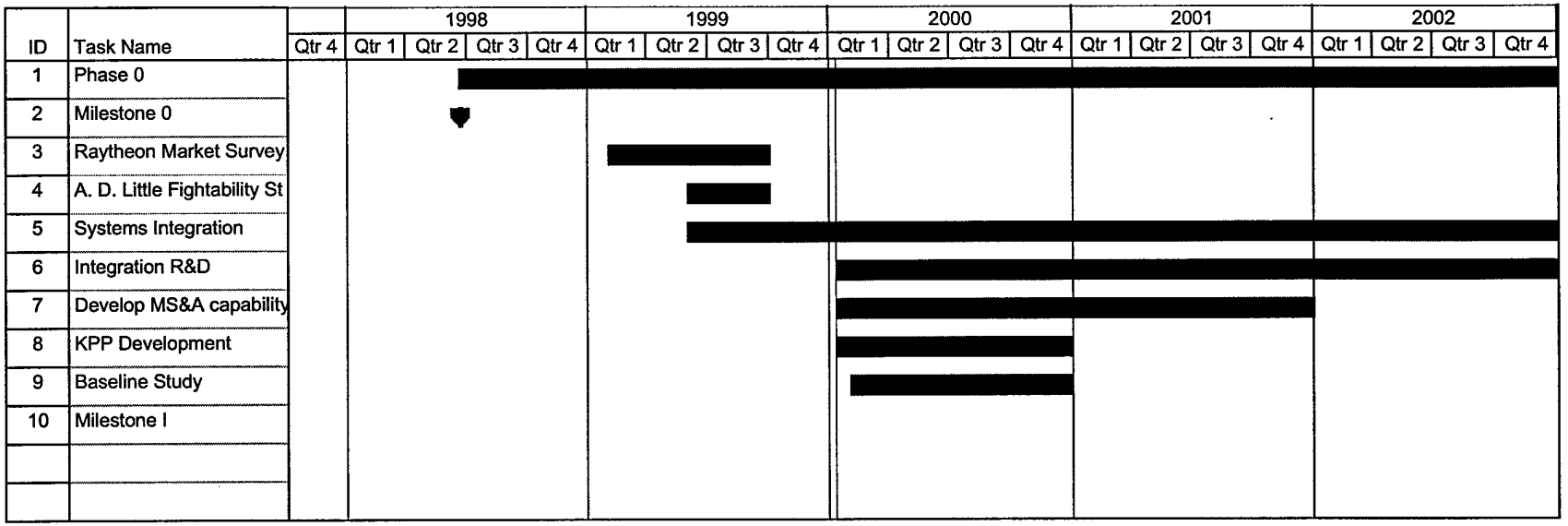
(U) PE 0602131M (Marine Corps Landing Force Technology)
(U) PE 0603640M (Marine Corps Advanced Technology Demonstration)
(U) PE 64657M (US Army Land Warrior Program)

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 2000

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
4 - Demonstration/Validation	0603635M Marine Corps Ground Combat/Supporting Arms Systems	C2256

C. (U) **Schedule Profile:**

INTEGRATED INFANTRY COMBAT SYSTEM



RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2507

COST (*In Millions*)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
C2507 Small Unit Riverine Craft (SURC)	0	3021	1757	225	10	0	0	0	5003
Quantity of RDT&E Articles									

A. (U) Mission Description and Budget Item Justification:

(U) The Small Unit Riverine Craft (SURC) will provide tactical mobility and a weapons platform for elements of a Marine Air Ground Task Force (MAGTF) Ground Combat Element (GCE) in the Riverine Environment. The SURC will replace the Rigid Raiding Craft (RRC) which was fielded 12 years ago. It will augment the larger Riverine Assault Craft (RAC) in riverine operations to include troop transport, troop insertion, and extraction, convoy ops, and application of fires.

(U) FY 1999 Accomplishments: Not Applicable.

(U) FY 2000 Planned Program:

- (U) $ 368 System Analysis for SURC integration and testing of non-developmental components.
- (U) $ 325 Developmental Test Plan/Conduct Developmental Testing / Performance and Functioning testing.
- (U) $ 150 Commercial Design Review for non-developmental integration.
- (U) $ 625 Procure Candidate Hulls and conduct modifications for the integration of non-developmental candidate sub-systems.
- (U) $ 1,483 Procure and Integrate candidate Engines, Propulsion System, Navigation and Communication System, and Weapon System Mounts into Hulls.
- (U) $ 70 Provide Government Project Management and Documentation Support for the SURC Program.

(U)Total $ 3,021

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
4 - Demonstration/Validation	0603635M Marine Corps Ground Combat/Supporting Arms Systems	C2507

(U) FY 2001 Planned Program:

- (U) $ 564 Continue Integration and Testing of NDI System Components / Performance & Functioning Testing.
- (U) $ 800 Fabrication of OT Prototype Craft / Fabrication of Gun Mount.
- (U) $ 300 Continue System Analysis / finalize Prototype Development and Commercial Design / and Developmental Testing Plan.
- (U) $ 93 Continue Government Project Management Office support for the SURC Program.

(U)Total $ 1,757

B. (U) Project Change Summary

	FY 1999	FY 2000	FY 2001
(U) Previous President's Budget	0	3038	1750
(U) Adjustments to Previous President's Budget	0	-17	+7
(U) Current Budget Submit	0	3021	1757

(U) Change Summary Explanation:

(U) Funding: FY 00 decrease of $17K due to a minor affordability adjustment. FY 01 increase of $7K is due to NWCF rate changes and NAVCOMPT adjustments.

(U) Schedule: Milestone-I date was changed to 2d Qtr FY 00 due to staffing of program documentation.

(U) Technical: N/A

C. (U) Other Program Funding Summary (APPN, BLI #, NOMEN)

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Compl	Total Cost
(U) PMC BLI # 667000, SURC	0	0	0	2156	2323	3207	0	0	7686

(U) Related RDT&E: Not Applicable.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2000

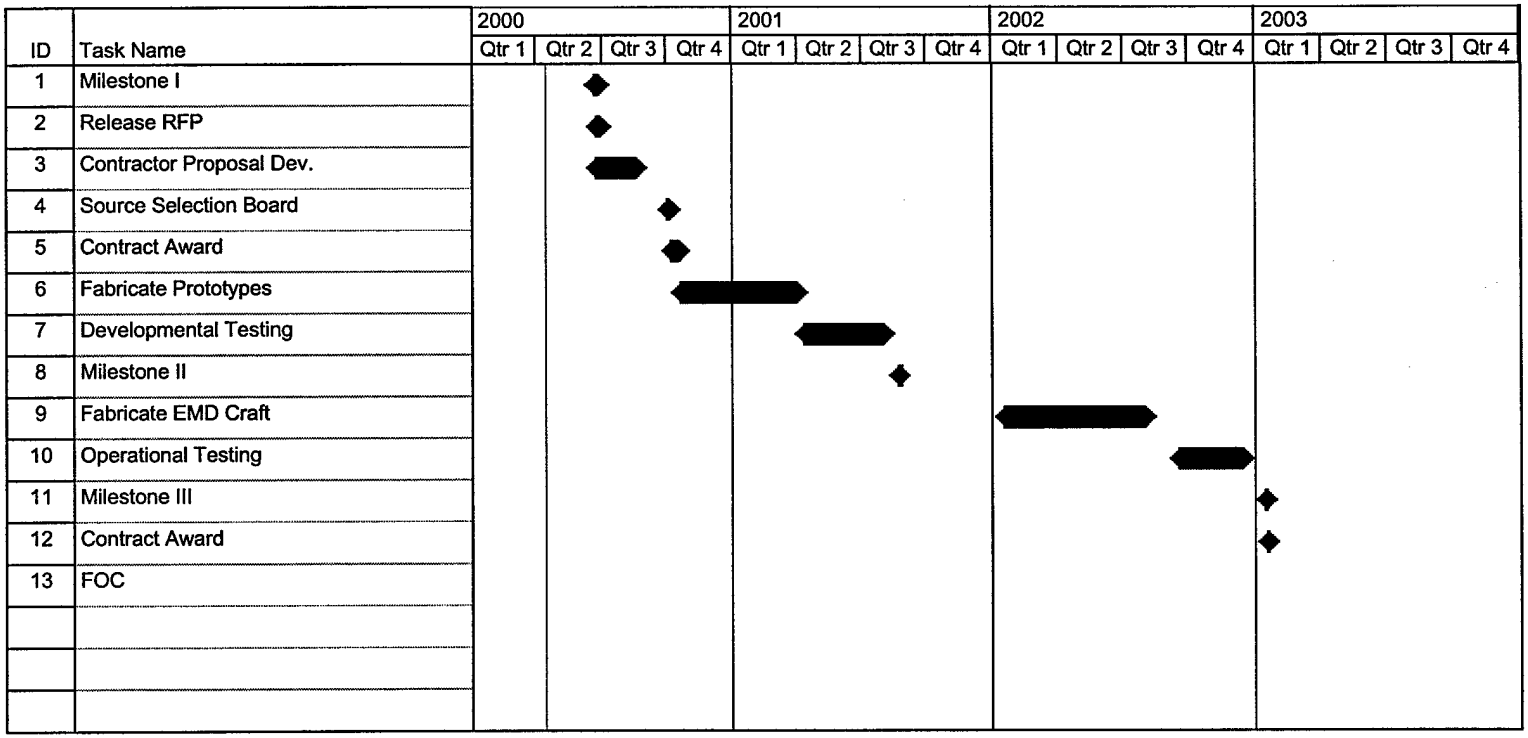
BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2507

D. (U) **Schedule Profile**

SMALL UNIT RIVERINE CRAFT (SURC)



RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: February 2000

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2507

A. (U) Project Cost Breakdown

	FY 1999	FY 2000	FY 2001
a. Government Developmental Engineering / Contract development.	0	2125	300
b. Test and Evaluation.	0	325	609
c. Conduct Engineering and Prototype Development.	0	501	755
d. Program Management Support	0	70	93
Total	0	3021	1757

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1999	FY 1999	FY 2000	FY 2001	Budget to Complete	Total Program
Product Development Organizations										
NSWC Carderock, Suffolk, VA	WR	Oct 1999	2650	2650	0	0	2125	300	225	2650
NSWC Carderock, Suffolk, VA	WR	Oct 1999	1256	1256	0	0	501	755	0	1256
Support and Management Organizations										
ALS Inc. triangle VA	MIPR	Oct 1999	173	173	0	0	70	93	10	173
Test and Evaluation Organizations										
NSWC, Carderock, Suffolk VA	WR	Oct 1999	934	934	0	0	325	609	0	934

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: February 2000

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
4 - Demonstration/Validation	0603635M Marine Corps Ground Combat/Supporting Arms Systems	C2507

Government Furnished Property

N/A

Item Description	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Delivery Date	Total Prior to FY 1999	FY 1999	FY 2000	FY 2001	Budget to Complete	Total Program
Product Development Property									
Support and Management Property									
Test and Evaluation Property									

	Total Prior to FY 1999	FY 1999	FY 2000	FY 2001	Budget to Complete	Total Program
Subtotal Product Development	0	0	2626	1055	225	3906
Subtotal Support and Management	0	0	70	93	10	173
Subtotal Test and Evaluation	0	0	325	609	0	934
Total Project	0	0	3021	1757	235	5013

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603635M Marine Corps Ground Combat/Supporting Arms Systems

PROJECT: C2508

COST (*In Millions*)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
C2508 Internally Transportable Vehicle	0	5196	6630	6073	4875	241	240	130	23385
Quantity of RDT&E Articles		2							

A. (U) Mission Description and Budget Item Justification: The Internally Transportable Vehicles (ITV) program was previously known as the Light Strike Vehicle (LSV) program. This project develops a joint MV-22 aircraft transportable family of light tactical, wheeled vehicles. The ITV's will provide reconnaisance units with a high mobility weapons platform. Follow-on variants will address logistics, command and control, medical and personnel movement missions. The ITV will replace the Fast Attack Vehicles (FAVs) currently employed throughout the Marine Air Ground Task Force (MAGTF).

(U) FY 1999 Accomplishments: Not Applicable.

(U) FY 2000 Planned Program:

- (U) $ 4200 Begin Demonstration and Validation of two contract design vehicles.
- (U) $ 100 Provide In House program management and TAD/travel.
- (U) $ 646 Provide Engineering Support.
- (U) $ 250 Prepare for automotive test rig testing.

(U)Total $ 5196

(U) FY 2001 Planned Program:

- (U) $ 5399 Complete Demonstration and Validaton and begin Engineering, Manufacturing , and Development.
- (U) $ 168 Provide In House program management and TAD/travel.
- (U) $ 613 Provide Engineering Support.
- (U) $ 450 Begin Automotive Test Rig testing

(U)Total $ 6630

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)

DATE: February 2000

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
4 - Demonstration/Validation	0603635M Marine Corps Ground Combat/Supporting Arms Systems	C2508

B. (U) Project Change Summary

	FY 1999	FY 2000	FY 2001
(U) Previous President's Budget	0	1624	1973
(U) Adjustments to Previous President's Budget	0	3572	4657
(U) Current Budget Submit	0	5196	6630

(U) Change Summary Explanation:

(U) Funding: FY00 and FY01 increase provides for the award of two competitive contractor designs through DEM/VAL and EMD.

(U) Schedule: N/A

(U) Technical: N/A

C. (U) Other Program Funding Summary (APPN, BLI #, NOMEN)

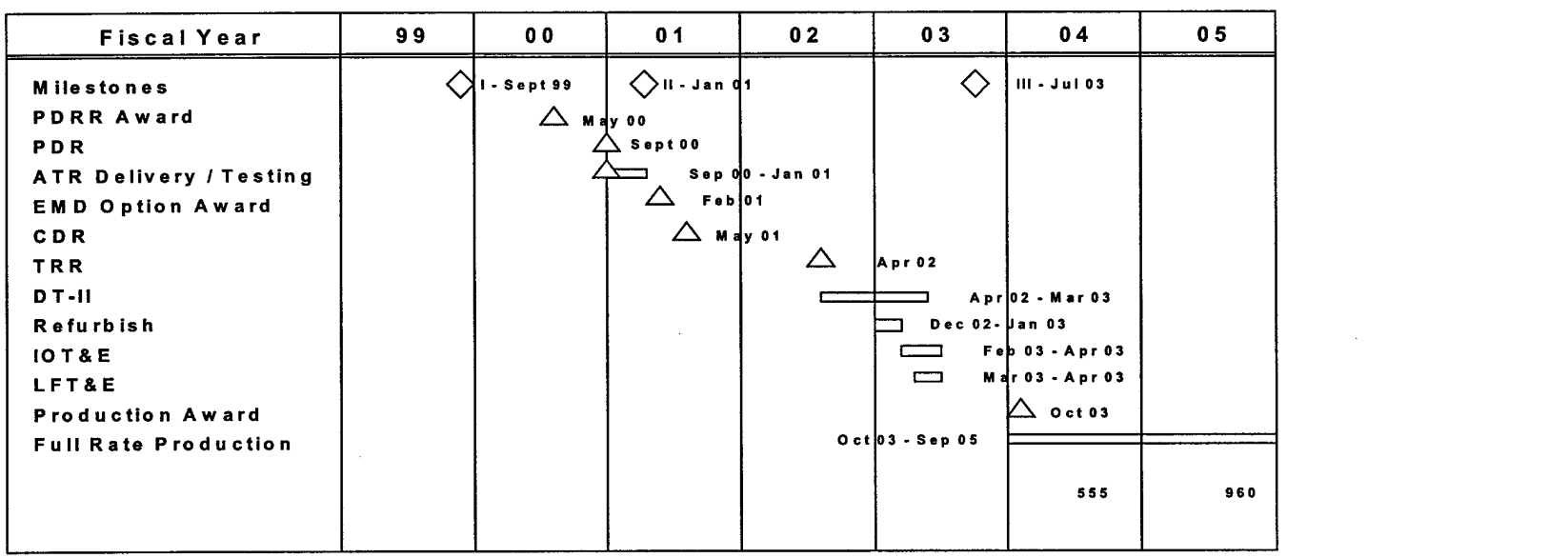
	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Compl	Total Cost
(U) PMC BLI# 204000 Light Strike Vehicle	0	0	0	0	0	15870	29039	Cont.	Cont.
(U)									

(U) Related RDT&E:
SOCCOM joint participation in ITV program

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 2000
BUDGET ACTIVITY 4 - Demonstration/Validation	PE NUMBER AND TITLE 0603635M Marine Corps Ground Combat/Supporting Arms Systems
	PROJECT C2508

D. (U) Schedule Profile

Internally Transportable Vehicle



RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: February 2000

BUDGET ACTIVITY	PE NUMBER AND TITLE	PROJECT
4 - Demonstration/Validation	0603635M Marine Corps Ground Combat/Supporting Arms Systems	C2508

A. (U) Project Cost Breakdown

	FY 1999	FY 2000	FY 2001
Production Development	0	4200	5399
Support and Management	0	746	781
Test and Evaluation	0	250	450
Total	0	5196	6630

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1999	FY 1999	FY 2000	FY 2001	Budget to Complete	Total Program
Product Development Organizations										
MCSC	RCP				0	0	4200	5399	5950	15549
Support and Management Organizations										
NSWC, Carderock					0	0	346	200	500	1046
WES Army Eng	MIPR				0	0	75	0	0	75
NAWC,AD	WR				0	0	75	0	0	75
MCSC	WR				0	0	100	168	232	500
MCSC (PM)	RCP				0	0	150	413	627	1190
Test and Evaluation Organizations										
APG, TEST CTR	MIPR				0	0	50	200	3900	4150
NATC, PAX	RCP				0	0	200	250	350	800

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: February 2000

BUDGET ACTIVITY: **4 - Demonstration/Validation**

PE NUMBER AND TITLE: **0603635M Marine Corps Ground Combat/Supporting Arms Systems**

PROJECT: **C2508**

Government Furnished Property: Not applicable

Item Description	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Delivery Date	Total Prior to FY 1999	FY 1999	FY 2000	FY 2001	Budget to Complete	Total Program
Product Development Property									
Support and Management Property									
Test and Evaluation Property									

	Total Prior to FY 1999	FY 1999	FY 2000	FY 2001	Budget to Complete	Total Program
Subtotal Product Development			4200	5399	5950	15549
Subtotal Support and Management			996	1231	5609	7836
Subtotal Test and Evaluation						
Total Project			5196	6630	11559	23385

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**					R-1 ITEM NOMENCLATURE Joint Service EOD Development/0603654N					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**10.381**	**11.107**	**13.131**	**12.876**	**13.115**	**12.422**	**11.766**	**Continuing**	**Cont.**
Joint Service EOD Systems/Q0377		**5.083**	**6.040**	**6.053**	**6.046**	**6.144**	**6.279**	**6.425**	**Continuing**	**Cont.**
EOD Diving System/Q1317		**5.298**	**5.067**	**7.078**	**6.830**	**6.971**	**6.143**	**5.341**	**Continuing**	**Cont.**
Quantity of RDT&E Articles		**Various**	**Various**	**Various**	**Various**	**Various**	**Various**	**Various**		

A. Mission Description and Budget Item Justification: This is a Joint Service Program. This program provides for the development of Explosive Ordnance Disposal tools and equipment for use by all military services. The responsibility is assigned to the Navy as single service manager, by Department of Defense Directive 5160.62 of 26 April 1989, for management of the Joint Service Explosive Ordnance Disposal Research and Development Program. Increasing types of foreign and domestic weapons necessitate a continuing development program to provide Explosive Ordnance Disposal personnel of all military services with the special equipment and tools required to support this mission. This program also provides life support related equipment necessary to support the performance of Navy Explosive Ordnance Disposal tasks underwater. This equipment must have inherently low acoustic and magnetic signatures in order to allow the Explosive Ordnance Disposal technician to safely approach, render-safe and dispose of sea mines and other underwater ordnance.

Note: In accordance with 15 USC 638, $.227M in FY 2000 is reserved for the Small Business Innovative Research (SBIR) assessment.

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	10.756	11.168	10.882
Appropriated Value:	10.756	11.168	
Adjustment to FY 1999 Appropriated Value/2000 President's Budget			
a. General Adjustments	-0.375	-0.061	-0.300
b. MCM Unmanned Underwater Vehicle project			2.600
c. A-76 Adjustment			-0.051
FY 2001 President's Budget:	10.381	11.107	13.131

Funding: FY 99/FY00 decreases are due to general adjustments. FY01 increase is due to the MCM Unmanned Underwater Vehicle project. FY01 includes decrease due to Strategic Sourcing Program study adjustment and general adjustments.

Schedule: Not applicable for Q0377. Q1317-The Acoustic Firing System (AFS) Acquisition Program Baseline has been revised to include the transistion to a new Design Agent. Subsequently the schedule has been updated and reflected in this submit.

Technical: Not applicable.

EXHIBIT R-2a, RDT&E Project Justification							DATE: **February 2000**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **JT Service EOD Development/0603654N**				PROJECT NAME AND NUMBER JT Service EOD Systems/Q0377					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**5.083**	**6.040**	**6.053**	**6.046**	**6.144**	**6.279**	**6.425**	**Continuing**	**Cont.**
RDT&E Articles Qty		**Various**	**Various**	**Various**	**Various**	**Various**	**Various**	**Various**		

A. Mission Description and Budget Item Justification: Provides Explosive Ordnance personnel of all military services with the specialized equipment and tools required to support their mission of detection/location, identification, render-safe, recovery, field and laboratory evaluation, and disposal of unexploded ordnance (UXO) that is a threat to military operations, installations, personnel, or material. UXO includes foriegn and domestic, both conventional and non-conventional, including improvised explosive devices (IEDs).
(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. FY 1999 ACCOMPLISHMENTS:
($1.924) Obtained Milestone III decision for Remote Ordnance Neutralization System (RONS) and Main Charge Disrupter (MCD) projects.
($2.038) Continued development of the Classified Project II and Lightweight Disposable Disrupter (LIDD) projects.
($1.121) Conducted Analysis of Alternatives studies of the Explosive Safe/Arm Monitor, and Large Improvised Explosive Device (IED) Neutralization projects. Initiated the Improved (Standoff) Disrupter Tools (Small Caliber Dearmer and Standoff Disrupter) projects.

2. FY2000 PLAN:
($.900) Obtain Milestone III decision for LIDD project.
($3.240) Continue development of the Classified Project II, Small Caliber Dearmer (SCD) and Standoff Disrupter (SD) projects.
($1.500) Initiate the Large IED Neutralization project.
($.400) Conduct Analysis of Alternative studies for the Explosive Safe/Arm (ESA) Monitor and EOD Incident C2I System projects.

3. FY2001 PLAN:
(1.900) Obtain approval for full rate production for Small Caliber Dearmer project and the Standoff Disrupter UXO and Standoff Disrupter IED projects.
(3.653) Continue development of Large IED Neutralization, Classified Project II and initiate the EOD Incident C2I System project.
(.500) Conduct Analysis of Alternatives studies in the areas of Submunitions Clearance and Hand Held Ordnance Locator.

EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **JT Service EOD Development 0603654N**	PROJECT NAME AND NUMBER JT Service EOD Systems/Q0377	

B. Other Program Funding Summary:

OPN Line Item	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
5509	3.044	1.568	0.614	0.934	0.960	1.290	1.200	CONT.	CONT.
3400		0.234	0.563					0.000	0.797

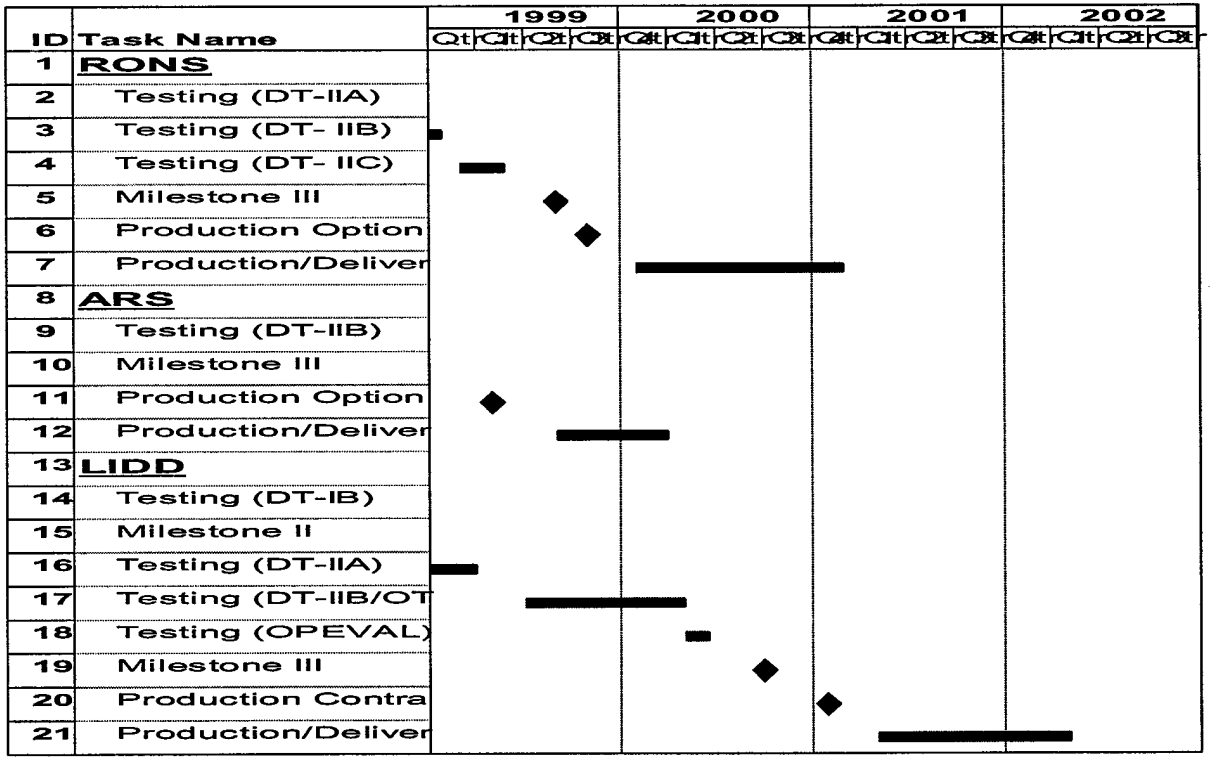
C. Acquisition Strategy: Analysis of Alternatives (AOA) studies are always conducted prior to the initiation of new subprojects. The AOA addresses and emphasizes acquisition strategies of the most cost-effective solution over the subprojects' life-cycle. The acquisition strategies observe the following hierarchy of alternatives: commercial item (including modification), non-developmental item (including modification), and lastly, developmental programs. Contracting for RDT&E, if required, is always competitive and when feasible, production options are included.

D. Schedule Profile: See Attached.

EXHIBIT R-2a, RDT&E Project Justification			DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **JT Service EOD Development 0603654N**	PROJECT NAME AND NUMBER JT Service EOD Systems/Q0377	

0603654N JOINT SERVICE EOD DEVELOPMENT Q0377 JOINT SERVICE EOD SYSTEMS

RDT&E MILESTONE CHART

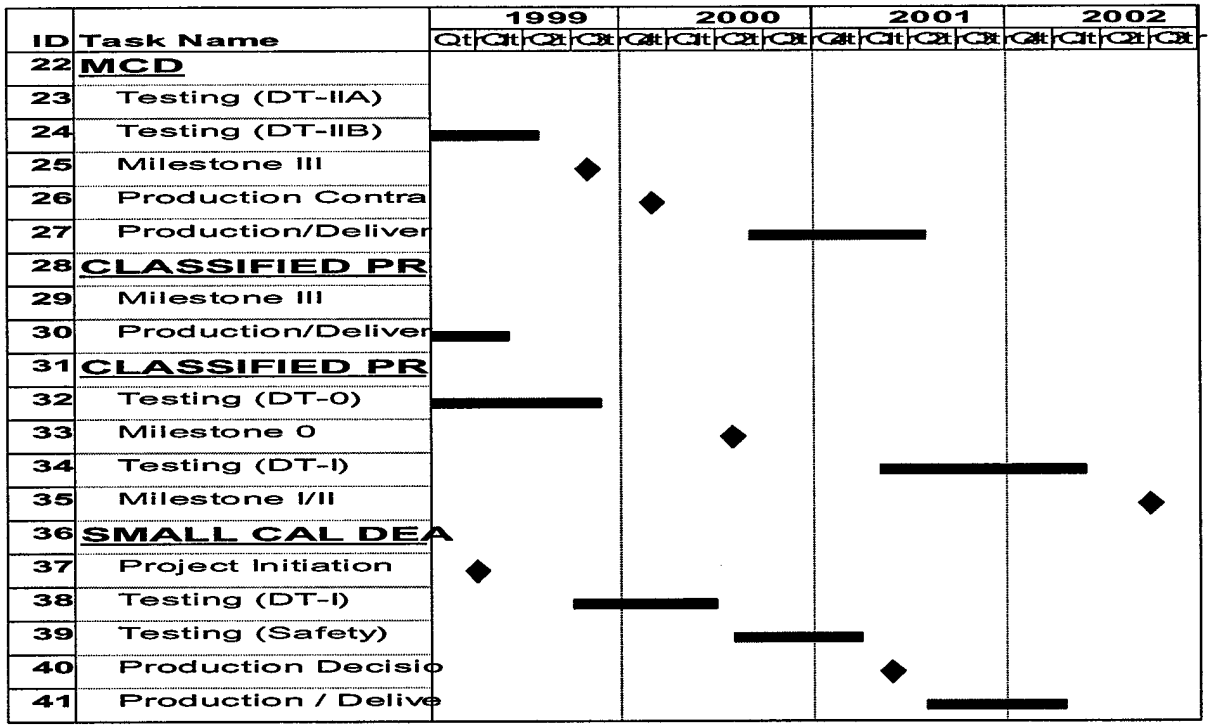


**This Milestone Chart is in Fiscal Years

EXHIBIT R-2a, RDT&E Project Justification			DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **JT Service EOD Development 0603654N**	PROJECT NAME AND NUMBER JT Service EOD Systems/Q0377	

0603654N JOINT SERVICE EOD DEVELOPMENT Q0377 JOINT SERVICE EOD SYSTEMS

RDT&E MILESTONE CHART

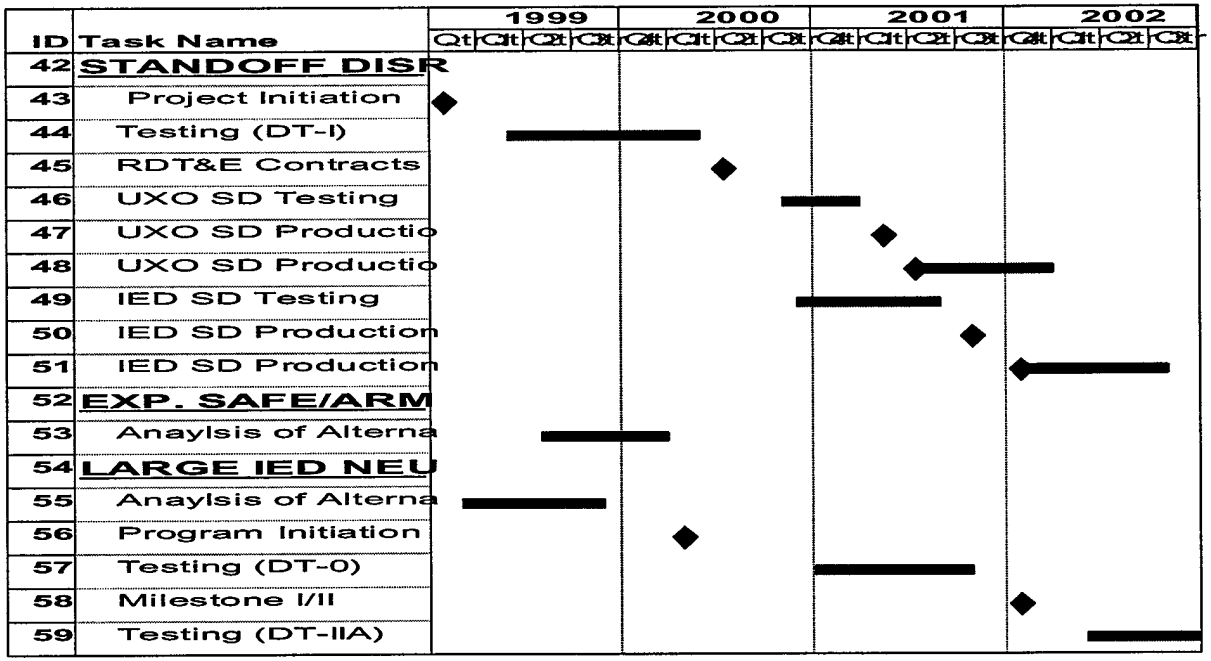


**This Milestone Chart is in Fiscal Years

EXHIBIT R-2a, RDT&E Project Justification			DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **JT Service EOD Development 0603654N**	PROJECT NAME AND NUMBER JT Service EOD Systems/Q0377	

0603654N JOINT SERVICE EOD DEVELOPMENT Q0377 JOINT SERVICE EOD SYSTEMS

RDT&E MILESTONE CHART

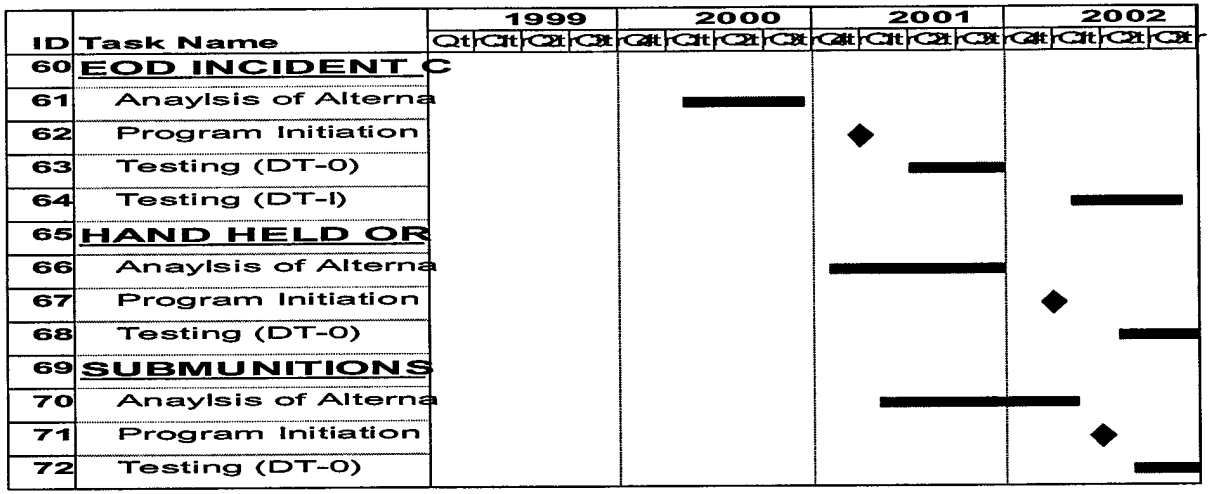


**This Milestone Chart is in Fiscal Years

EXHIBIT R-2a, RDT&E Project Justification			DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **JT Service EOD Development 0603654N**	PROJECT NAME AND NUMBER JT Service EOD Systems/Q0377	

0603654N JOINT SERVICE EOD DEVELOPMENT Q0377 JOINT SERVICE EOD SYSTEMS

RDT&E MILESTONE CHART



**This Milestone Chart is in Fiscal Years

Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA-4

PROGRAM ELEMENT: 0603654N

PROJECT NAME AND NUMBER: Joint Service EOD Systems/Q0377

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	WR	EODTD, IH, MD	69.956	1.611	10/98	2.493	10/99	2.085	10/00	Continuing	Continuing	N/A
Software Development	WR	EODTD, IH, MD	3.254	0.050	10/98			0.075	10/00	Continuing	Continuing	N/A
ILS	WR	EODTD, IH, MD	32.540	0.820	10/98	0.910	10/99	0.850	10/00	Continuing	Continuing	N/A
											0.000	
											0.000	
											0.000	
											0.000	
Subtotal Product Development			105.750	2.481		3.403		3.010		Continuing	Continuing	N/A

Remarks:

Program Management Support	C/CPFF	Dynamic Systems, Alex, VA	2.020	0.320	01/99	0.340	01/00	0.340	01/01	0.500	3.520	N/A
Program Management Support	C/CPFF	TBD	0.000	0.000		0.000		0.000		0.000	Continuing	N/A
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
Subtotal Support			2.020	0.320		0.340		0.340		0.500	3.520	N/A

Remarks:

Exhibit R-3 Cost Analysis (page 2) | DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA-4 | PROGRAM ELEMENT: 0603654N | PROJECT NAME AND NUMBER: Joint Service EOD Systems/Q0377

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	EODTD, IH, MD	48.812	1.296	10/98	1.050	10/99	1.545	10/00	Continuing	Continuing	N/A
Operational Test & Evaluation	WR	EODTD, IH, MD	8.135			0.110	10/99			Continuing	Continuing	N/A
											0.000	
											0.000	
Subtotal T&E			56.947	1.296		1.160		1.545		Continuing	Continuing	N/A
Remarks:												
Program Management Personnel	WR	EODTD, IH, MD	3.000	0.220	10/98	0.225	10/99	0.225	10/00	Continuing	Continuing	N/A
Miscellaneous	Various	Various	0.800	0.766	02/99	0.912	02/00	0.933	02/01	Continuing	Continuing	N/A
											0.000	
											0.000	
											0.000	
											0.000	
Subtotal Management			3.800	0.986		1.137		1.158		Continuing	Continuing	N/A
Remarks:												
Total Cost			168.517	5.083		6.040		6.053		0.500	Continuing	N/A
Remarks:												

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **JT Service EOD Development/0603654N**				PROJECT NAME AND NUMBER EOD Diving Systems/Q1317					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**5.298**	**5.067**	**7.078**	**6.830**	**6.971**	**6.143**	**5.341**	**Continuing**	**Cont.**
RDT&E Articles Qty		**Various**	**Various**	**Various**	**Various**	**Various**	**Various**	**Various**		

A. Mission Description and Budget Item Justification: Provides for development of diving equipment and explosive charges to support Explosive Ordnance Disposal (EOD) underwater operations. The equipment must have inherently low acoustic and magnetic signatures in order to allow the EOD technician to safely approach, render-safe, and dispose of sea mines and other underwater ordnance. Provides support for the Navy's high priority mission of Very Shallow Water (VSW) mine countermeasures, including clandestine reconnaissance, in support of amphibious operations. This also includes the development of small, affordable MCM Unmanned Underwater Vehicles.
(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. FY 1999 ACCOMPLISHMENTS:
($.323) Continued to develop equipment which improves diver capability and endurance.
($.400) Continued to develop a non-magnetic acoustic firing system.
($.777) Continued to develop non-magnetic diver held underwater equipment to detect objects in the water column.
($.300) Continued to develop non-magnetic diver underwater navigation system compatible with GPS.
($.309) Continued development of low influence underwater diver mounted display which will provide video interface with other EOD systems (Underwater Imaging System, Underwater Navigation System and MK 16 UBA).
($.385) Continued development of non-magnetic underwater vehicles to transport divers and associated equipment in support of MCM operations.
(2.804) Continued development, testing and gained approval for fleet use of specialized equipment to support the Very Shallow Water Mine Countermeasures mission and CNO approved VSW MCM Detachment (USN/USMC).

2. FY2000 PLAN:
($.380) Continue developing equipment which improves diver capability and endurance.
($.853) Continue developing a non-magnetic acoustic firing system.
($.904) Continue developing non-magnetic diver held underwater equipment to detect objects in the water column.
($.434) Initiate the development of 1.3 ata HeO2 diving tables for the MK 16 MOD 0 underwater breathing apparatus.

EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER	
RDT&E, N/BA-4	**JT Service EOD Development/0603654N**	EOD Diving Systems/Q1317	

($2.496) Continue to develop, test and gain approval for fleet use of specialized equipment to support the Very Shallow Water Mine Countermeasures mission and CNO approved VSEMCM Detachment (USN/USMC).

3. FY2001 PLAN:
($.203) Continue developing equipment which improves diver capability and endurance.
($.920) Continue developing a non-magnetic acoustic firing system.
($.709) Continue developing non-magnetic diver held underwater equipment to detect objects in the water column.
($.584) Continue developing 1.3 ata HeO2 diving tables for the MK 16 MOD 0 underwater breathing apparatus.
($.083) Conduct Analysis Of Alternatives for equipment to enhance the divers ability to detect, neutralize and gather intelligence on underwater limpet and special attach mines.
($4.579) Continue to develop, test and gain approval for fleet use of specialized equipment to support the Very Shallow Water Mine Countermeasures mission and CNO approved VSW MCM Detachment (USN/USMC). This also includes the development of small, affordable MCM Unmanned Underwater Vehicles.

B. Other Program Funding Summary

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
OPN Line Item									
1140	4.080								
3400				1.400	1.000				2.400
0975		2.219	3.305	5.886	3.487	2.284	6.194	Cont.	Cont.

C.Acquisition Strategy: Analysis of Alternatives (AOA) studies are always conducted prior to the initiation of new subprojects. The AOA addresses and emphasizes acquisition strategies of the most cost-effective solution over the subprojects' life-cycle. The acquisition strategies observe the following hierarchy of alternatives: commercial item (including modification), non-developmental item (including modification), and lastly, developmental programs. Contracting for RDT&E, if required, is always competitive and when feasible, production options are included.

D. Schedule Profile: See Attached.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **JT Service EOD Development/0603654N**	PROJECT NAME AND NUMBER EOD Diving Systems/Q1317

Q1317 EOD Diving Systems MS Chart

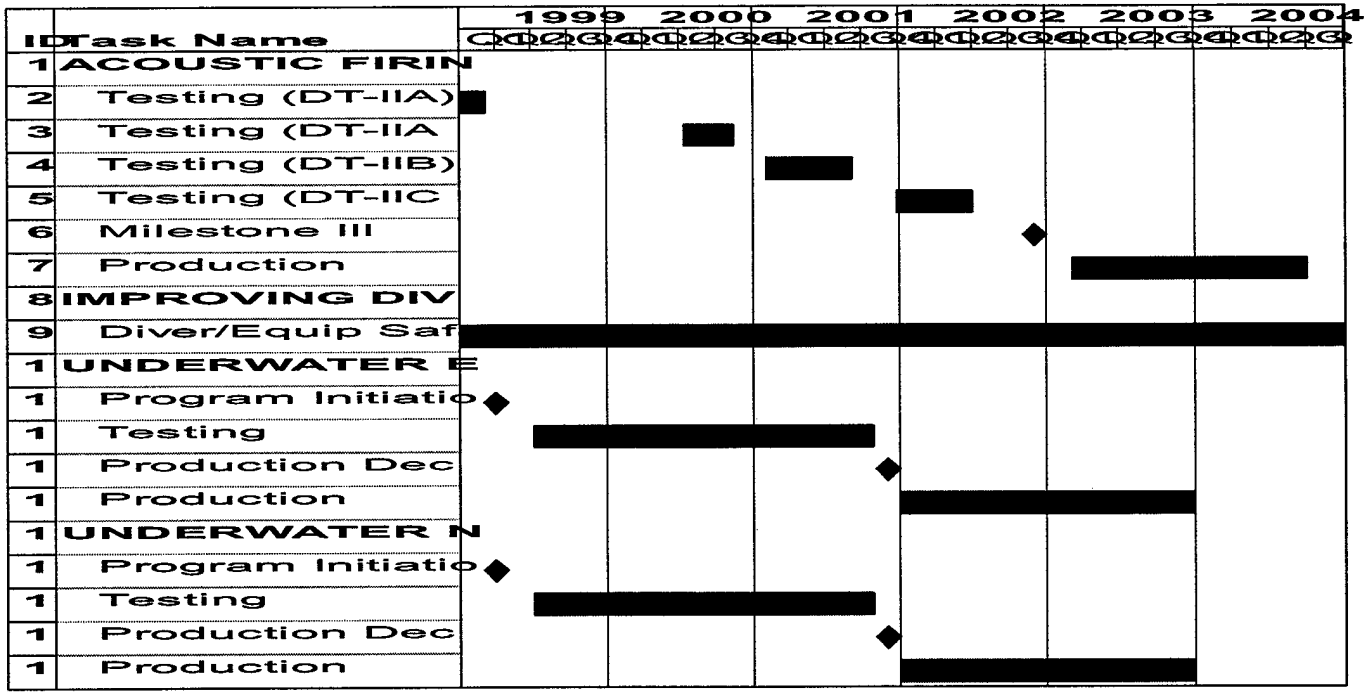


EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **JT Service EOD Development/0603654N**	PROJECT NAME AND NUMBER EOD Diving Systems/Q1317	

Q1317 EOD Diving Systems MS Chart

ID	Task Name
21	**DIVERS HEADS-UP DISPLAY**
22	Program Initiation
23	Testing
24	Production Decision
25	Production
26	**DIVER SUPPORT VEHICLE, (AAP)**
27	Program Initiation
28	Testing
29	Production Decision
30	Production
31	**VERY SHALLOW WATER**
32	Milestone 0
33	Primary Hardware Development
34	**Advance Limpet Mine Equip**
35	AOA
36	Milestone 0

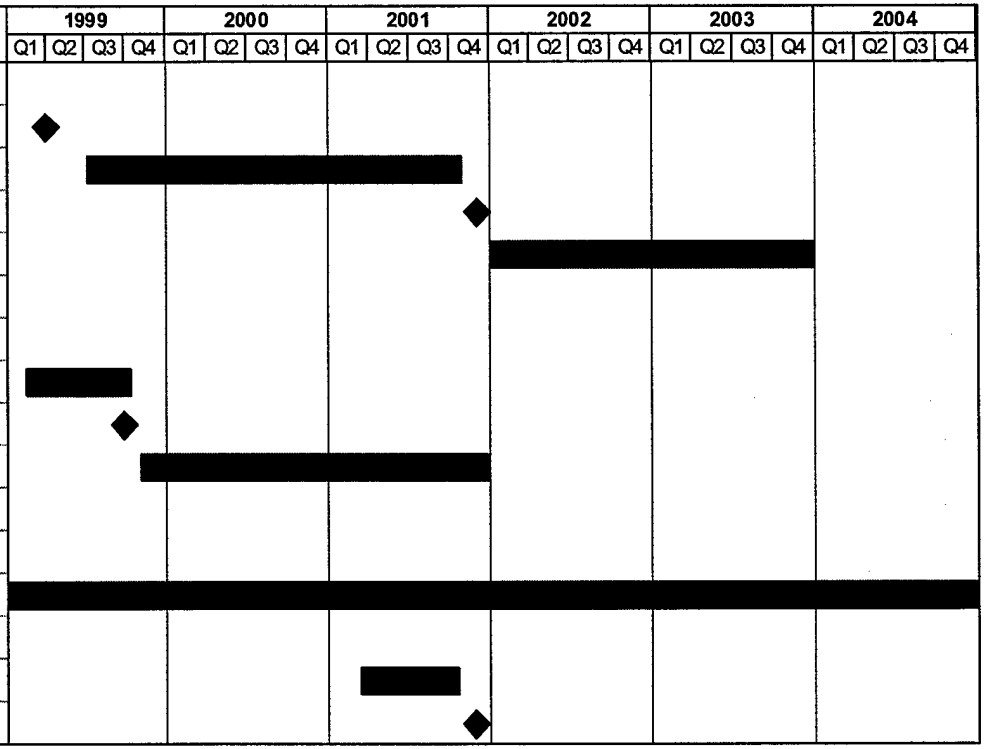


Exhibit R-3 Cost Analysis (page 1)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**		PROGRAM ELEMENT **0603654N**				PROJECT NAME AND NUMBER EOD Diving Systems/Q1317						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	WR	SPAWAR, SD, CA	1.500	1.130	10/98	1.000	10/99	0.770	10/00	Continuing	Continuing	N/A
Primary Hardware Development	WR	Various	14.273	1.300	10/98	0.857	10/99	2.689	10/00	Continuing	Continuing	N/A
Software Development	WR	Various	0.600	0.133	10/98	0.158	10/99	0.200	10/00	Continuing	Continuing	N/A
Systems Engineering	WR	Various	6.000	0.400	10/98	0.350	10/99	0.300	10/00	Continuing	Continuing	N/A
ILS	WR	Various	10.192	0.500	10/98	0.200	10/99	0.200	10/00	Continuing	Continuing	N/A
											0.000	
											0.000	
Subtotal Product Development			32.565	3.463		2.565		4.159		Continuing	Continuing	N/A
Remarks:												
Program Management Support	C/CPFF	Dynamic System, Alex, VA	1.418	0.428	01/99	0.440	01/00	0.450	01/01	1.150	Continuing	N/A
Program Management Support	C/CPFF	TBD	0.000	0.000		0.000		0.000		0.000	0.000	N/A
											0.000	
											0.000	
											0.000	
											0.000	
											0.000	
Subtotal Support			1.418	0.428		0.440		0.450		1.150	Continuing	N/A
Remarks:												

Exhibit R-3 Cost Analysis (page 2)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA-4

PROGRAM ELEMENT: 0603654N

PROJECT NAME AND NUMBER: EOD Diving Systems/Q1317

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	Various	1.200	0.720	10/98	0.400	10/99	0.400	10/00	Continuing	Continuing	N/A
Operational Test & Evaluation	WR	Various	0.450	0.150	10/98	0.320	10/99	0.340	10/00	Continuing	Continuing	N/A
											0.000	
											0.000	
Subtotal T&E			1.650	0.870		0.720		0.740		0.000	Continuing	N/A
Remarks:												
Program Management Personnel	WR	EODTD, IH, MD	3.000	0.467	10/98	0.650	10/99	0.650	10/00	Continuing	Continuing	N/A
Miscellaneous	Various	Various	1.000	0.070	02/99	0.692	02/00	1.079	02/01	Continuing	Continuing	N/A
											0.000	
											0.000	
											0.000	
											0.000	
Subtotal Management			4.000	0.537		1.342		1.729		Continuing	Continuing	N/A
Remarks:												
Total Cost			39.633	5.298		5.067		7.078		Continuing	Continuing	N/A
Remarks:												

EXHIBIT R-2, RDT&E Budget Item Justification						DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY - BA 4**				R-1 ITEM NOMENCLATURE **Cooperative Engagement Capability 0603658N**					
COST ($ in Millions	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost	**189.648**	**189.877**	**119.257**	**49.135**	**48.842**	**46.868**	**47.001**	**Cont.**	**Cont.**
Cooperative Engagement Capability (CEC) K2039	**115.111**	**114.296**	**119.257**	**49.135**	**48.842**	**46.868**	**47.001**	**Cont.**	**Cont.**
Cooperative Engagement Capability (CEC) K2616	**74.537**	**75.581**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**150.118**
Quantity of RDT&E Articles									**22**

A. (U) Mission Description and Budget Item Justification: Cooperative Engagement Capability (CEC) significantly improves Battle Force Anti-Air Warfare (AAW) capability by coordinating all Battle Force AAW sensors into a single, real-time, composite track picture capable of fire control quality. CEC distributes sensor data from each ship and aircraft, or cooperating unit (CU), to all other CUs in the battle force through a real-time, line of sight, high data rate sensor and engagement data distribution network. CEC is highly resistant to jamming and provides accurate gridlocking between CUs. Each CU independently employs high capacity, parallel processing and advanced algorithms to combine all distributed sensor data into a fire control quality track picture which is the same for all CUs. CEC data is presented as a superset of the best AAW sensor capabilities from each CU, all of which are integrated into a single input to each CU's combat weapons system. CEC will significantly improve our Battle Force defense in depth, including both local area and ship defense capabilities against current and future AAW threats. Moreover, CEC will provide critical connectivity and integration of over-land air defense systems capable of countering emerging air threats, including land attack cruise missiles, in a complex littoral environment.

(U) CEC consists of the Data Distribution System (DDS), the Cooperative Engagement Processor (CEP), and Combat System modifications. The DDS encodes and distributes ownship sensor and engagement data, is a high capacity, jam resistant, directive system providing a precision gridlocking and high throughput of data. The CEP is a high capacity distributed processor which is able to process force levels of data in a timely manner that allows its output to be considered real-time fire control data. This data is passed to the ship's combat system as high quality data for which the ship can cue its onboard sensors or use the data to engage targets without actually tracking them.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA 4**	R-1 ITEM NOMENCLATURE **Cooperative Engagement Capability 0603658N**

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1999 ACCOMPLISHMENTS:
- (U) ($ 54.800) Continued CEC hardware and software engineering efforts at Raytheon Systems Company, St. Petersburg, FL; completed AN/USG-2 Design Agent transition from John Hopkins University, Applied Physics Laboratory, Laurel, MD.
- (U) ($ 24.200) Continued CEC TDA/DA engineering efforts at JHU/APL.
- (U) ($ 35.500) Continued CEC E-2C integration efforts at PMA-231.
- (U) ($ 1.698) Completed P-3 aircraft integration (Lockheed-Martin).
- (U) ($ 1.250) Initiated development of software baseline 2.2 (AEGIS Navy Area and Theater Wide TBMD integration) with Lockheed-Martin.
- (U) ($ 9.726) Continued integration of CEC with Space Based IR Sensors (SBIRS) at Lockheed-Martin.
- (U) ($ 7.667) Continued ACDS/CEC integration efforts (test support, correction of interoperability/interface problems).
- (U) ($ 12.536) Continued field support (In-service Engineering; software support; Integrated Logistics Support Planning).
- (U) ($ 20.443) Continued T&E efforts; conducted engineering, developmental and operational testing.
- (U) ($ 12.079) Continued Navy integration exercises and integration efforts.
- (U) ($ 9.749) Continued Program Management support.

(U) FY 2000 PLAN:
- (U) ($ 89.200) Continue CEC hardware and software engineering efforts and DA efforts at Raytheon Systems Company, St. Petersburg, FL.
- (U) ($ 10.800) Continue CEC TDA engineering efforts at JHU/APL.
- (U) ($ 11.600) Continue CEC E-2C integration efforts at PMA-231.
- (U) ($ 4.000) Continue development of software baseline 2.2 (AEGIS Navy Area and Theater Wide TBMD integration) with Lockheed-Martin.
- (U) ($ 13.300) Continue field support (In-service Engineering; software support; Integrated Logistics Support Planning).
- (U) ($ 30.000) Continue T&E efforts; conduct engineering, developmental and operational testing.
- (U) ($ 15.500) Continue Navy integration exercises and integration efforts.
- (U) ($ 5.577) Continue Program Management support.
- (U) ($ 9.900) Support at-sea prototypes, risk reduction, systems engineering, and software development which will help the production Area Air Defense Commander system meet Joint Interoperability requirements.

Note: $4.315M of the FY00 plan is that portion of extramural program reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA 4**	R-1 ITEM NOMENCLATURE **Cooperative Engagement Capability 0603658N**

(U) PROGRAM ACCOMPLISHMENTS AND PLANS: (Cont.)

(U) FY 2001 PLAN:
- (U) ($ 35.300) Continue CEC hardware and software engineering efforts at Raytheon Systems Company, St. Petersburg, FL.
- (U) ($ 13.500) Continue CEC TDA engineering efforts at JHU/APL.
- (U) ($ 6.400) Continue CEC E-2C integration efforts at PMA-231.
- (U) ($ 2.000) Continue development of software baseline 2.2 (AEGIS Navy Area and Theater Wide TBMD integration) with Lockheed-Martin.
- (U) ($ 12.400) Continue field support (In-service Engineering; software support; Integrated Logistics Support Planning).
- (U) ($ 38.300) Continue T&E efforts; conduct engineering, developmental and operational testing.
- (U) ($ 6.300) Continue Navy and integration exercises and integration efforts.
- (U) ($ 5.057) Continue Program Management support.

	To	Total

B. (U) Program Change Summary:

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	195.462	114.931	98.203
Appropriated Value:	196.123	190.931	
Adjustment to FY 1999/2000 Appropriated Value/			
FY 2000 President's Budget:	-6.475	-1.054	21.054
FY 2001 PRES Budget Submit:	189.648	189.877	119.257

Funding: The FY 1999 adjustments are due to a decrease for Congressional Undistributed reductions ($-1.549); offset for Small Business Innovation Research (SBIR) ($-4.609); and minor pricing adjustments ($-0.317). The FY 2000 adjustment is due to an across-the-board budget reduction of ($-1.054). The FY 2001 adjustments are due to the addition of ($+22.250) to reduce technical risk associated with the change in the OPEVAL schedule; decrease for minor pricing adjustments ($-0.189); an increase for adjustment of NWCF rates ($0.106); an increase of ($0.014) for military/civilian pay increases; a decrease of ($-0.814) for nonpay purchases inflation reduction; and a decre of ($-0.313) for active Navy operations.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA 4**	R-1 ITEM NOMENCLATURE **Cooperative Engagement Capability 0603658N**

B. (U) Program Change Summary: (Cont.

Schedule: Detailed TECHEVAL/OPEVAL schedule has been refined with Fleet schedulers and is planned for Feb-May 2001, with Milestone III rescheduled from July 2001 to November 2001. Because of the Milestone III revision, a fourth LRIP is now planned for FY 2001. A detailed schedule is provided on page 5.

Technical: Not applicable.

C. (U) Other Program Funding Summary:	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
OP,N (CEC) P-1 Item No. 70	81.730	60.157	15.853	117.329	147.279	115.197	137.874	616.793	1,363.120
SC,N (Various)	15.700	36.000	20.500	20.100	48.900	55.600	52.600	0.000	271.000
AP,N (E-2C) (BA-1/5)		12.700	24.200	19.700	8.000	31.200	23.200	386.100	505.100
O&M,N (CEC)	21.007	21.330	16.636	18.092	17.519	20.471	23.030	Continuing	Continuing

D. (U) ACQUISITION STRATEGY:
The CEC program was approved for Low Rate Initial Production (LRIP-1) in March 1998 and a sole source contract was awarded to Raytheon Systems Company, St. Petersburg, FL. A follow-on procurement of eleven (11) additional systems (LRIP-2) was approved 14 May 1999. Full Rate Production (FRP) is planned for December 2001 following completion of OPEVAL.

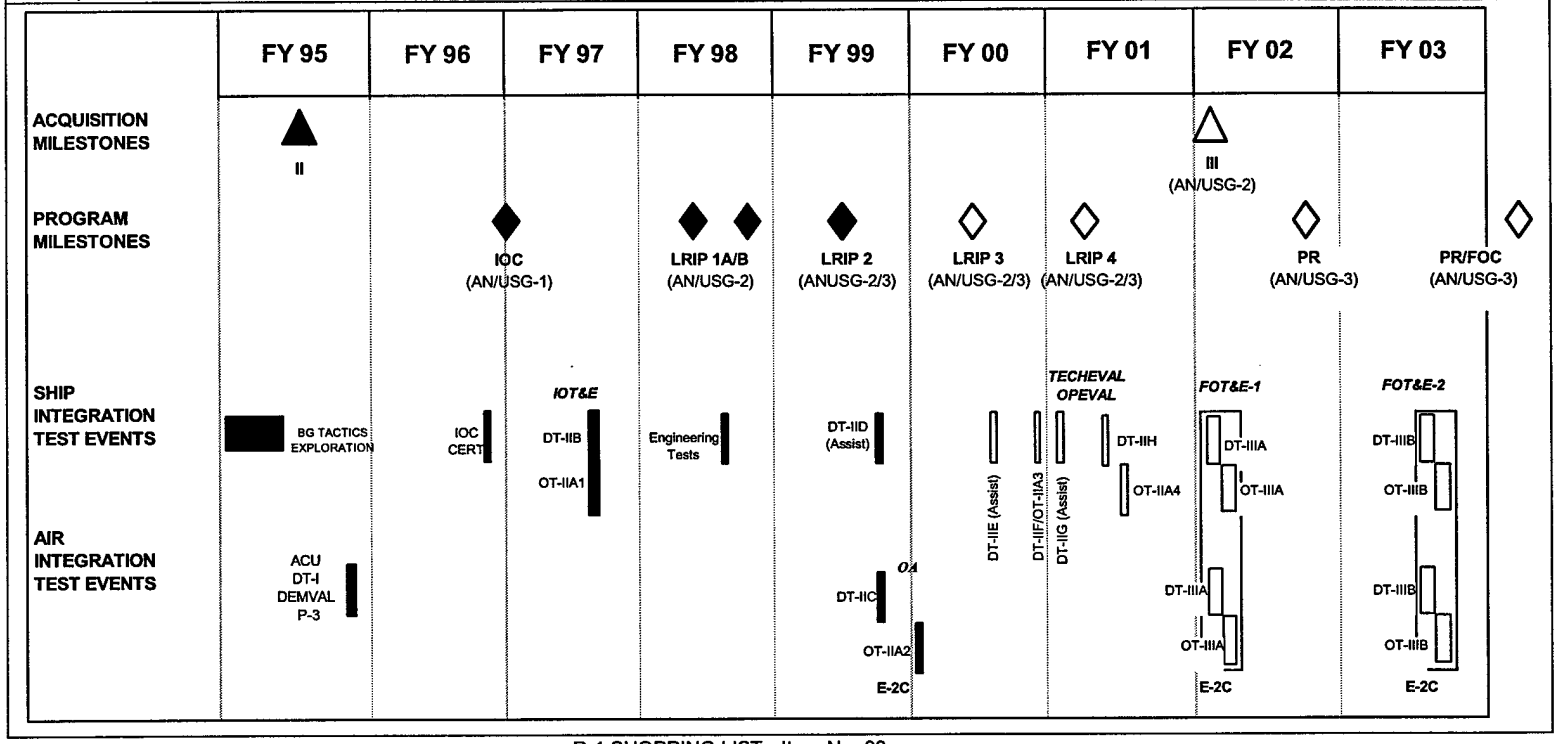
The Navy, Raytheon Systems Company, and Lockheed-Martin Corporation have reached an agreement whereby:
(a) Raytheon will be the design agent for Ship Self Defense System (SSDS) Mark 2, and design agent and implementor of CEC baseline 2.1 supporting SSDS Mark 2.
(b) Lockheed-Martin will be the design agent for CEC baseline 2.2 effort which supports CEC integration into the TBMD program.
(c) The Navy will plan for full and open competition for procurement of CEC equipment and engineering support.

Concurrent contracts were awarded by the Navy on 30 April 1999 in accordance with the agreement, and award fees are structured to ensure cooperation between the contractors. Both contractors participate as members of a "Navy Review Team" of each other's design, and participate in a Navy-led task to define future architecture of CEC in a Battle Force context.

E. (U) SCHEDULE PROFILE: See Next Page.

CLASSIFICATION: **UNCLASSIFIED**

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, N/BA 4	R-1 ITEM NOMENCLATURE Cooperative Engagement Capability 0603658N



R-1 SHOPPING LIST - Item No. 60

Exhibit R-2, RDT&E Budget Item Justification

(Exhibit R-2, page 5 of 7)

UNCLASSIFIED

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 1)										DATE: February 2000		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA 4**		PROGRAM ELEMENT **CEC - 0603658N**				PROJECT NAME AND NUMBER **CEC - Project K2039**						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
AN/USG-2/3 Development	C/CPAF	Raytheon, St. Peters., FL	432.693	54.800	Nov-98	89.200	Nov-99	35.300	Oct-00	4.000	615.993	TBD
AN/USG-2/3 Development/TDA	C/CPFF	JHU/APL, Laurel, MD	174.833	24.200	Nov-98	10.800	Dec-99	13.500	Oct-00	20.000	243.333	TBD
E-2C Aircraft Integration	C/CPAF	PMA-231	108.238	35.500	Oct-98	11.600	Nov-99	6.400	Oct-00		161.738	
P-3 Aircraft Integration	C/CPAF	Lockheed-Martin	40.512	1.698	Dec-98						42.210	42.210
Baseline 2.2 Software Development	SS/CPAF	Lockheed-Martin		1.250	Apr-99	4.000	Feb-00	2.000	Oct-00	30.000	37.250	TBD
Space Based IR Sensors (SBIRS)	C/CPAF	Lockheed-Martin	3.700	9.726	Aug-99						13.426	TBD
AEGIS Integration	C/CPAF	PMS-400	119.968								119.968	
ACDS Integration	C/CPAF	Raytheon (Hughes), LA, CA	26.266	7.667	Oct-98						33.933	TBD
In-Service Engineering Activity	WR	NSWC, Port Hueneme	0.000	3.048	Mar-99	4.100	Dec-99	4.500			11.648	
Land Based Test Network	PD	SPAWAR (PMW-159)	0.000	1.361	Mar-99						1.361	
Land Based Test Network	PD	NATC, Patuxent River	0.000	1.000	Mar-99						1.000	
Software Support Activity	WR	NSWC, Dahlgren, VA	28.677	3.838	Oct-98	4.700	Jan-00	3.800	Oct-00	CONT.	CONT.	
ILS Planning	WR	NSWC, Crane, IN	19.982	3.289	Oct-98	4.500	Dec-99	4.100	Oct-00	CONT.	CONT.	
Area Air Def. Commander (AADC)	C/CPAF	TBD				9.900				0.000	9.900	
Various	Various	Miscellaneous	67.977	12.079	Oct-98	15.500	Oct-99	6.300	Oct-00	CONT.	CONT.	
Subtotal Product Development			1,022.846	159.456		154.300		75.900		CONT.	CONT.	
Remarks: (1) Award Date indicates initial authorization of funds; (2) Area Air Defense Commander (AADC) prime contractor to be determined.												
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												

R-1 SHOPPING LIST - Item No. 60

Exhibit R-3, Project Cost Analysis
(Exhibit R-3, page 6 of 7)

UNCLASSIFIED

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 2)

DATE: **February 2000**

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, N/BA 4	**CEC - 0603658N**	**CEC - Project K2039**

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Land Based Test Network (DEP)	WR	NSWC, Dahlgren, VA		2.200	Oct-98						2.200	
Test Support	C/CPAF	Raytheon, St. Peters., FL		1.278	Mar-99	2.000	Nov-99	2.300	Oct-00	2.000	7.578	TBD
AEGIS Test Support	C/CPAF	PMS-400						5.200			5.200	
ACDS Test Support	C/CPAF	Raytheon (Hughes), LA, CA						3.000			3.000	
Test Support	C/CPFF	JHU/APL, Laurel, MD		1.800	Mar-99	2.500	Dec-99	2.500			6.800	TBD
Test Support	WR	NAWC-AD, Pt. Mugu, CA				2.300	Nov-99	2.500			4.800	
Test Support	WR	NRL, Washington, DC				2.000	Jan-00	2.100			4.100	
Test Support	WR	NSWC, Port Hueneme, CA		7.787	Oct-98	4.100	Dec-99	4.100	Oct-00		15.987	
Test Support	PD	SPAWAR (PMW-159)									0.000	
Air Operations Test Support	WR	COMNAVAIRLANT	1.700			3.200	Oct-99	4.600	Oct-00	4.000	13.500	
Air Operations Test Support	WR	NATC, Pax River	2.800	1.429	Mar-99				Oct-00	3.000	7.229	
Test Requirements	WR	COMOPTEVFOR				.500	Jan-00	1.400	Oct-00	1.000	2.900	
Test Data Reduction	WR	NWAS, Corona	5.500	1.000	Oct-98	2.500	Jan-00	1.000	Oct-00	1.500	11.500	
P-3 Support/Target Procurement	PD	NAVAIRSYSCOM				3.700	Jan-00	4.500	Oct-00	3.000	11.200	
ECM Test Support (BIG CROW)	MIPR	Kirkland AFB, NM				1.500	Feb-00	2.000			3.500	
Various	Various	Miscellaneous	37.207	4.949	Oct-98	5.700	Oct-99	3.100	Oct-00	CONT.	CONT.	
Subtotal T&E			47.207	20.443		30.000		38.300		CONT.	CONT.	
Remarks:												
Program Management Support	C/CPFF	Technautics, Alexandria, VA	6.000	2.400	Oct-98	2.400	Nov-99	2.400			13.200	
Various	Various	Miscellaneous	26.738	7.349	Oct-98	3.177	Oct-99	2.657	Oct-00	CONT.	CONT.	
Subtotal Management			32.738	9.749		5.577		5.057		CONT.	CONT.	
Remarks:												
Total Cost			1,102.791	189.648		189.877		119.257		CONT.	CONT.	
Remarks:												

R-1 SHOPPING LIST - Item No. 60

Exhibit R-3, Project Cost Analysis
(Exhibit R-3, page 7 of 7)

UNCLASSIFIED

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**					R-1 ITEM NOMENCLATURE Program Element (PE) Name and No. Ocean Engineering Development 0603713N					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**14.070**	**16.712**	**15.371**	**16.052**	**14.330**	**14.615**	**14.908**	**CONT.**	**CONT.**
Deep Submergence Biomedical Development/S0099		**3.976**	**3.756**	**3.668**	**3.710**	**3.867**	**3.944**	**4.023**	**CONT.**	**CONT.**
Shallow Depth Diving Equipment/S0394		**10.094**	**12.956**	**11.703**	**12.342**	**10.463**	**10.671**	**10.885**	**CONT.**	**CONT.**
Quantity of RDT&E Articles									**CONT.**	**CONT.**

A. Mission Description and Budget Item Justification: Developments in this program will enable the U.S. Navy to overcome deficiencies that constrain underwater operations in the areas of search, location, rescue, recovery, salvage, construction, and protection of offshore assets. This program develops medical technology, diver life support equipment, vehicles, systems, and tools to permit manned underwater operations.

B. Program Change Summary:

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	15.257		
Appropriated Value:	15.257	16.813	16.289
Adjustment to FY 1999/2000 Appropriated Value/ FY 2000 President's Budget:	-1.187	-0.101	-0.918
FY 2001 President's Budget Submit:	14.070	16.712	15.371

Funding: The FY 1999 decrease of $1.187M is due to Congressional undistributed reductions and FY 1999 midyear reprogrammings to finance higher priority emergent requirements. The FY 2000 decrease of $0.101M is due to Congressional undistributed reductions. The FY 2001 reduction of $0.918M is due to pricing adjustments.

Schedule: Not applicable.

Technical: Not applicable.

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E,N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Ocean Engineering Development 0603713N**				PROJECT NAME AND NUMBER Deep Submergence Biomedical Development/S0099					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**3.976**	**3.756**	**3.668**	**3.710**	**3.867**	**3.944**	**4.023**	**CONT.**	**CONT.**
RDT&E Articles Qty										

A. Mission Description and Budget Item Justification: Develops advanced biomedical/bioengineering technology for enhancing medical and life support for submarine escape and rescue; and for diver safety and effectiveness; supports deeper, longer, safer, more flexible dives. Deliverables include: a) exposure guidance for atmospheric contaminants, underwater continuous and impulsive noise, underwater blast, oxygen breathing, and diving depth/time profiles; b) medical procedures for life support, submarine escape and rescue (including new Submarine Rescue Diving and Recompression System, SRDRS), prevention and treatment of decompression illness, c) technologies to assess underwater noise and life support parameters; enable non-chemical CO2 scrubbing; predict decompression risk in diving; provide senior survivor with expert decision system, and enhance underwater swimming efficiency. Requirements: Deep Submergence Biomedical Development (NAPDD #429-873) of 29 March 95.

Program Accomplishments and Plans:

FY 1999 Accomplishments:

- ($2.049) Diver Health and Safety Research: Delivered integrated set of diving decompression tables for air and nitrox. Developed methods to record variables (e.g. time, depth, water temp, decompression stress) during operational dives. Delivered tables of pulmonary and central nervous system (CNS) oxygen toxicity and identify methods to prevent CNS oxygen toxicity. Develop one-atmosphere treatment protocols for decompression sickness using large animals. Develop adjustable, non-tethered diver thermal protection garment specifications; issue guidance for swimming efficiency. Delivered dive site capability to measure underwater sound exposure. Developed procedures for assessing underwater blast/impulse noise hazards; identify underwater acoustic threats to divers and develop strategy to protect divers; issued standardized tool noise assessment instruction.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Ocean Engineering Development 0603713N**	Deep Submergence Biomedical Development/S0099

- ($1.927) Submarine Rescue: Delivered Submarine escape and rescue Senior Survivor Expert decision aid (SEAREX) hardware & software, plus training recommendations for class SSN 688. Determined impact of hypothermia on crew survival in disabled submarine, refine estimates of crew escape time in disabled submarine scenario by actual trial, publish effects of low oxygen and high carbon dioxide on oxygen consumption; published new guidance for passive CO2 scrubbing. Continue work on nitrox decompression and efforts to develop alternative decompression protocol for air saturated divers for the Deep Submergence Rescue Vehicle (DSRV) and SRDRS.

FY 2000 Plan:

- ($1.877) Diver Health and Safety Research: Develop new underwater thermal protection garments. Develop guidance for acceptable underwater breathing apparatus respiratory loads present in combination. Produce diving at altitude decompression tables. Deliver validated scaling procedures from animals to humans for decompression. Conduct manned test of one-atmosphere treatments for decompression sickness with divers. Determine damage risk thresholds for underwater blast/impulse noise. Develop protective materials and procedures against underwater sound threats to divers.

- ($1.879) Submarine Rescue: Deliver SEAREX and Guard Book package for Ohio class submarines. Issue DISSUB atmosphere contaminant exposure guidance. Deliver new markers for re-entry into fire-contaminated spaces. Publish revised Pressurized Submarine Rescue Manual. Develop guidance for decompression in SRDRS. Provide alternative to electrically-powered or passive CO2 scrubbing.

FY 2001 Plan:

- ($ 1.867) Diver Health and Safety Research: Final integration of USN decompression tables across gases, pressures, mixes, and repetitions. Updated performance standards for non-UBA diving gear. Deliver human exposure limits for underwater blast. Assess efficacy of prototype underwater swimmer protection strategies. Deliver guidance for acceptable UBA respiratory loads in combination. Continue development of new diver thermal protective garments with industry, and begin prototype evaluations. Issue recommendations to manufacturers for procedures to reduce drag underwater.

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Ocean Engineering Development 0603713N**	Deep Submergence Biomedical Development/S0099

- ($1.801) Submarine Rescue: Determine allowable surface intervals for escapers and rescuees from pressurized DISSUB. Determine actual escape times from SSN 688 and SSBN 726 classes. Provide SEAREX package for SEAWOLF class. Develop SEAREX decision aid for New Attack Submarine (NSSN). Develop SRDRS biomedical acceptance criteria.

B. Other Program Funding Summary: FY99: SBIR reduction -$.292M. FY00: $.300M of the extramural program is reserved for SBIR assessment IAW 15 USC 638.

Related RDT&E: Not Applicable.

C. Acquisition Strategy: Integrated thrust area teams (e.g. decompression research) are established with university, commercial and in-house Navy lab to jointly execute biomedical R&D; peer review of research proposals accomplished by independent Technical Advisory Board; annual review of progress by Executive Review Board (CNO/NAVSEA/ONR/BUMED); program management by 0-6 Medical Dept Officer; contracting by competitive process using BAA and leveraging ONR capabilities.

D. Schedule Profile: Not applicable

Exhibit R-3 Cost Analysis (page 1)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**			PROGRAM ELEMENT **Ocean Engineering Development 0603713N**			PROJECT NAME AND NUMBER Deep Submergence Biomedical Developmental/S0099						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development											0.000	
Ancillary Hardware Development											0.000	
Systems Engineering											0.000	
Licenses											0.000	
Tooling											0.000	
GFE											0.000	
Award Fees											0.000	
Subtotal Product Development			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks: Not Applicable.												
Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks: Not Applicable.												

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 2)										DATE: February 2000		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA - 4**			PROGRAM ELEMENT **Ocean Engineering Development 0603713N**			PROJECT NAME AND NUMBER Deep Submergence Biomedical Development/S0099						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation											0.000	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support	WR	NEDU	3.741	3.976		3.756		3.668		CONT.	CONT.	
Travel												
Labor (Research Personnel)												
Overhead												
Subtotal Management			3.741	3.976		3.756		3.668		CONT.	CONT.	
Remarks:												
Total Cost			3.741*	3.976		3.756		3.668		CONT.	CONT.	

Remarks: * Prior to FY98, funds were in Project M0099.

EXHIBIT R-2a, RDT&E Project Justification							DATE: **February 2000**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E,N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Ocean Engineering Development 0603713N**				PROJECT NAME AND NUMBER Shallow Depth Diving Equipment/S0394					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**10.094**	**12.956**	**11.703**	**12.342**	**10.463**	**10.671**	**10.885**	**CONT.**	**CONT.**
RDT&E Articles Qty										

A. Mission Description and Budget Item Justification: This project is to develop systems to support submarine escape and rescue missions, and conventional diver operations. Diver operations include ship husbandry, salvage/recovery, and submarine rescue operations to support national, as well as, Navy needs around the world. Modern certifiable diving systems that ensure diver safety and allow maximum work efficiency will replace currently antiquated systems. Efforts are currently focused on the Submarine Rescue Diving and Recompression System (SRDRS) to provide a new rapidly deployed emergency submarine rescue capability. SRDRS will fill the gap created by the decommissioning of USS PIGEON (ASR 21) and USS ORTOLAN (ASR 22) and provide a new capability of pressurized transportation of rescuees from a stricken submarine directly to the decompression system eliminating the requirement for Deep Submergence Rescue Vehicles, Mother Submarines and Submarine Rescue Chambers. SRDRS is to include an air transportable rapid assessment/underwater work system, a decompression chamber system and a pressurized rescue module. The SRDRS will provide a global rapid response capability to support submarine rescue missions with an increase in capability at a fraction of the cost of the currently available systems.

Program Accomplishments and Plans:

FY 1999 Accomplishments:

- ($10.094) Submarine Rescue Diving and Recompression System: Complete acquisition of and continue acceptance testing of the prototype assessment/Underwater Work System. Continue fabrication of the prototype Submarine Decompression System. Solicit for detailed design and fabrication of the Pressurized Rescue Module. Complete design and award contract for Submarine Decompression System support equipment.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Ocean Engineering Development 0603713N**	Shallow Depth Diving Equipment/S0394

FY 2000 Plan:

- ($12.956) Submarine Rescue Diving and Recompression System: Complete acceptance testing of the prototype Assessment/Underwater Work System. Complete fabrication and acceptance testing of the prototype Submarine Decompression System and support equipment. Complete contract award for detailed design and fabrication of prototype Pressurized Rescue Module.

FY 2001 Plan:

- ($11.703) Submarine Rescue Diving and Recompression System: Continue design and fabrication of prototype Pressurized Rescue Module.

B. Other Program Funding Summary: Not applicable.

Related RDT&E: Not Applicable.

C. Acquisition Strategy: The Atmospheric Diving Suit (ADS) Segment of the SRDRS is a Non-Developmental Item (NDI) which is procured via a sole source contract. The Submarine Rescue System (SRS) segment of the SRDRS is largely based on the use of Commercial-Off-the-Shelf (COTS) technology and maximum use of Non-Developmental Items (NDI). The SRS segment is being procured using performance based specifications. The SRS contracts will be awarded competitively and will be based on technical capability and cost considerations (best value). Program Management of SRDRS is accomplished through the use of SEA 00C leadership of an Integrated Product Team (IPT). The Prototype system will provide full operational capability and no additional procurement is planned. The system is designed to be Government Owned/Commercially Operated (GO/CO).

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Ocean Engineering Development 0603713N**	PROJECT NAME AND NUMBER Shallow Depth Diving Equipment/S0394

D. Schedule Profile:

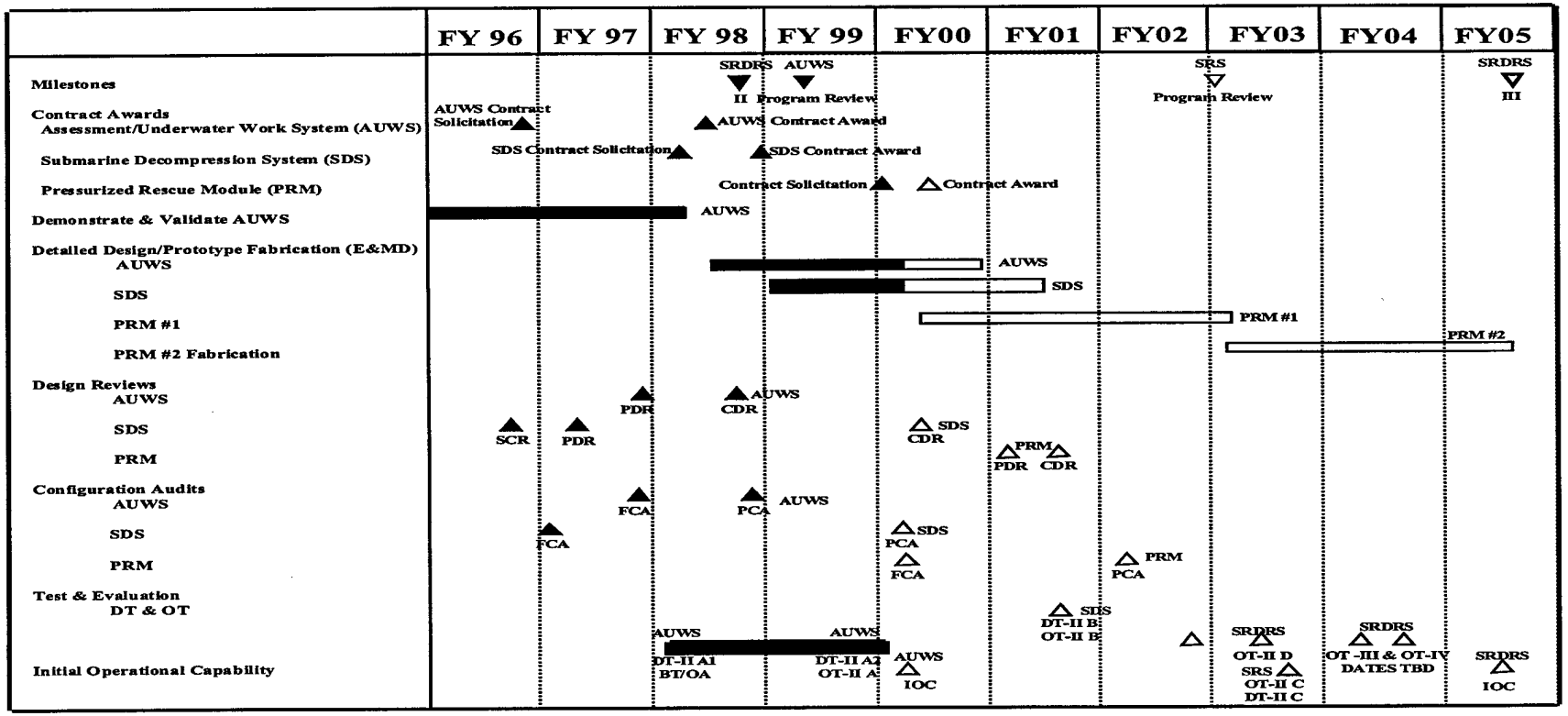


Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, N/BA-4	**Ocean Engineering Development 0603713N**	Shallow Depth Diving Equipment/S0394

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	WR	NSWC - CSS	16.259	1.960	12/98	1.600	12/99				18.219	
	CPAF	Oceaneering	9.078								9.078	9.078
	RC	NAVFACCO	0.900	2.340	12/98						7.655	
	CPAF	GPC	0.000	1.756	03/99	4.415	11/99				1.756	1.756
	Various	Miscellaneous	1.985	0.263		4.358		8.203		CONT.	CONT.	
Ancillary Hardware Development											0.000	
Systems Engineering	CPAF	Oceaneering		2.892	12/98	1.754	12/99	3.000		CONT.	CONT.	
											0.000	
Licenses											0.000	
Tooling											0.000	
GFE											0.000	
Award Fees	CPAF	Oceaneering	0.597	0.232	12/98	0.140	12/99				0.969	0.829
	CPAF	GPC	0.000	0.067	03/99	0.189	11/99				0.067	0.067
Subtotal Product Development			28.819	9.510		12.456		11.203		CONT.	CONT.	

Remarks: Award Fees are 6%.

Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support				0.000		0.000		0.000		CONT.	CONT.	

Remarks:

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 2)										DATE: February 2000		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA - 4**			PROGRAM ELEMENT **Ocean Engineering Development 0603713N**			PROJECT NAME AND NUMBER Shallow Depth Diving Equipment/S0394						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	Various	Miscellaneous	0.529									
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E			0.529	0.000		0.000		0.000		CONT.	CONT.	
Remarks:												
Contractor Engineering Support	Various	Miscellaneous	0.316	0.327		0.400		0.400		CONT.	CONT.	
Government Engineering Support	WR	NFESC	0.095	0.172	12/98					CONT.	CONT.	
Program Management Support												
Travel			0.050	0.085		0.100		0.100		CONT.	CONT.	
Labor (Research Personnel)			0.453								0.453	0.453
Overhead												
Subtotal Management			0.914	0.584		0.500		0.500		CONT.	CONT.	
Total Cost			30.262	10.094		12.956		11.703		CONT.	CONT.	
Remarks:												

R-1 SHOPPING LIST - Item No. 61-11 of 61-11

Exhibit R-3, Project Cost Analysis
(Exhibit R-3, page 11 of 11)

UNCLASSIFIED

CLASSIFICATION:

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, BA4**					R-1 ITEM NOMENCLATURE Environmental Protection / PE0603721N					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**70.404**	**82.999**	**62.194**	**45.181**	**44.315**	**44.439**	**44.670**	**Cont**	**Cont**
Shipboard Waste Mgmt / S0401		**43.073**	**55.273**	**48.557**	**29.607**	**27.981**	**27.789**	**27.546**	**Cont**	**Cont**
Env Compliance / W2210		**4.278**	**4.497**	**4.820**	**5.096**	**5.373**	**5.494**	**5.671**	**Cont**	**Cont**
Aviation Depot Maint Tech / W2623*		**1.936**	**1.989**						**0.0**	**3.925**
Pollution Abatement / Y0817		**8.588**	**9.306**	**8.817**	**10.478**	**10.961**	**11.156**	**11.453**	**Cont**	**Cont**
Asbestos Removal / Y2402*		**3.855**	**3.978**						**0.0**	**9.720**
Resource Recovery Tech Center / Y2403*		**6.747**	**7.956**						**0.0**	**18.477**
Molten Salt Oxidation / Y2622*		**1.927**							**0.0**	**1.927**

A. (U) Mission Description and Budget Item Justification: This program develops processes, prototype hardware, systems, and operational procedures that will allow the Navy to operate in the U.S., foreign and international waters, air, space, and land areas while complying with U.S. statutes and international agreements. The program also includes efforts to improve the Navy's response to salvage-related pollution incidents. Projects support the Navy's requirement to meet environmental standards outlined by Environmental Protection Agency Executive Order 12088 of October 1978, Act to Prevent Pollution from Ships, Endangered Species Act, Marine Mammal Protection Act, Endangered Species Act, Clean Air Act, Clean Water Act, DoD Directive 6050.4 of 16 March 1982, DoD Directive 4210.15 of 27 July 1989, DoD Directive 6050.15 of 14 June 1985, DoD Directive 6050.9 of 13 February 1989, and OPNAVINST 5090.1B CH-1 of 2 February 1998. Project S0401 supports RDT&E efforts that allow the Navy to be in compliance with existing and anticipated laws with regard to four major areas: 1) ozone depleting substances, 2) solid wastes, 3) liquid wastes, and 4) hazardous and other ship wastes. Project W2210 supports development of environmental systems for naval aviation operations to enable compliance with environmental laws and regulations and minimize the cost associated with environmental compliance. Project Y0817 supports and validates development of technologies to enable facilities to comply with environmental laws and regulations in a cost effective manner.

* Projects W2623, Y2402, Y2403, and Y2622 are Congressional adds.

CLASSIFICATION:

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, BA4**	R-1 ITEM NOMENCLATURE Environmental Protection / PE 0603721

B. (U) Program Change Summary:

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	71.170	70.793	64.373
Appropriated Value:	71.170	82.793	
Adjustment to FY 1999/2000 Appropriated Value/			
FY 2000 President's Budget:	-0.766	12.206	-2.179
FY 2001 DON Budget Submit:	70.404	82.999	62.194

(U) Funding:

FY 1999 Reduction of $0.766M reflects general Undistributed Reductions (-$0.647M), SBIR Transfer (-1.119M), and ASN(RD&A) restoration of funds for Uniform National Discharge Standards (UNDS) development (+$1.000M).

FY 2000 Increase of $12.206M reflects N86 sponsor reprogramming for Project S0401 for Advanced Undersea Warfare Concept (-$1.333M); FY00 Congressional add for Resource Recovery Technology Center - Y2403 (+8.0M); FY00 Congressional add to Asbestos Removal - Y2402 (+$4.0M); Program Budget Decision for Aviation Depot Maintenance - W2623 (+$2.0M); undistributed reductions (-$0.461M); and minor pricing adjustments.

FY 2001 Reduction of $2.179M.

(U) Schedule: Not applicable.
(U) Technical: Not applicable.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, BA4**	PROGRAM ELEMENT NAME AND NUMBER **Environmental Protection / PE0603721N**				PROJECT NAME AND NUMBER Shipboard Waste Management / S0401					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Shipboard Waste Management / S0401		**43.073**	**55.273**	**48.557**	**29.607**	**27.981**	**27.789**	**27.546**	**Cont**	**Cont**
RDT&E Articles Qty										
Oily Waste Polishing System - Engineering Development Models		**1-$1M**	**1-$1M**	**1-$0.4M**						
Non-Oily Waste Polishing System - Engineering Development Models		**1-$1M**	**1-$1M**	**1-$1M**		**1-$0.6M**				
Non-CFC Refrigerant Replacement Kits - Engineering Development Models		**1-$0.5M**								
Liquid Waste Thermal Destruction - Engineering Development Models			**2-$3M**		**1-$2M**		**1-$0.9M**			
Shipboard Pollution Prevention - Test Articles		**27-$0.5M**						**2-$0.8M**		
Solid Waste - Engineering Development Models		**1-$0.7M**	**1-$2M**	**1-$2M**						
Underwater Hull Cleaning - Engineering Development Models				**1-$0.7M**		**1-$0.9M**				

A. (U) Mission Description and Budget Item Justification

1. (U) FY 1999 ACCOMPLISHMENTS:

(U) ($13.812M) Ozone Depleting Substances - Completed evaluation of first submarine refrigeration plants converted to HFC-134a. Continued development of backfit modification kits for surface ship 125-ton & 150-ton CFC-114 air-conditioning plant designs. Continued development of backfit modification kits for surface ship 300-ton and 363-ton CFC-114 air-conditioning plant designs. Continued development and initiated qualification of backfit modifications for remaining surface ship 250-ton CFC-114 air-conditioning plant designs. Continued one-year at-sea ship test and evaluation of HFC-236fa backfit modifications in 200-ton CFC-114 air-conditioning plants. Completed laboratory evaluations of future fleet non-chlorofluorocarbon 200-ton centrifugal air-conditioning plant and 1.5-ton refrigeration plant prototypes to qualify systems. Completed development of alternative solvents and processes for oxygen systems cleaning applications. Completed development of Alternative Firefighting Agent Delivery System (AFFADS) for new ship construction and initiated evaluation of non-ODS fire protection concepts and systems for future surface combatants.

(U) ($20.280M) Integrated Liquid Wastes - Continued support of rulemaking process with Environmental Protection Agency (EPA) in development of Uniform National Discharge Standards (UNDS) for liquid waste discharges from Navy vessels: completed Phase I, determination of incidental discharges requiring Marine Pollution Control Devices (MPCDs); and initiated Phase II, setting of MPCD performance standards. Continued development of integrated liquid waste treatment system: continued development of 10-gal/min unit Oily Waste Polishing System (OWPS) (OWS-10 Polisher) and continued development of 50-gal/min OWPS (OWS-50 Polisher); continued development of Engineering Development Model (EDM) non-oily wastewater treatment system; continued development of advanced Oil Content Monitor (OCM); and continued test and evaluation of upgraded shipboard vortex sewage incinerator. Continued development of design fixes for compensated fuel ballast systems. Completed development of High-Capacity Oil/Water Separator (HCOWS). Completed testing of Non-Seeping Grease Seal on submarine dive and steering gear.

(U) ($3.635M) Solid Wastes - Continued development of management processes and systems for plastics for submarine application: performed Temporary Alterations (TEMPALTs) of prototype equipment aboard two SSN-688 Class submarines and conducted at-sea test & evaluation; investigated onboard storage techniques and locations for SSBN-726 Class submarines.

(U) ($5.346M) Hazardous and Other Major Ship Wastes - Continued shipboard hazardous materials substitution and elimination task and continued Test and Evaluation (T&E) of pollution prevention equipment aboard ship. Issued final report for Non-Asbestos Substitutes (NAS). Continued quality assurance testing on reformulated commercial paints. Continued development of oil spill response capabilities: completed development of computer-based contingency planning system; completed development of in-situ oil burning system; continued development of Recovered Oil Logistics System; continued development of oil outflow and salvage response analysis program; and continued development of oil and skimmer tracking system. Initiated development of marine mammals ship database tracking system.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, BA4	**Environmental Protection / PE0603721N**	Shipboard Waste Management / S0401

2. (U) FY 2000 PLAN:

(U) ($11.167M) Ozone Depleting Substances - Complete development of backfit modification kits for surface ship 125-ton & 150-ton CFC-114 air-conditioning plant designs. Complete development of backfit modification kits for surface ship 300-ton and 363-ton CFC-114 air-conditioning plant designs. Complete one-year at-sea ship test and evaluation of HFC-236fa backfit modifications in 200-ton CFC-114 air-conditioning plants. Continue development and qualification of backfit modifications for remaining surface ship 250-ton CFC-114 air-conditioning plant designs. Continue evaluation of non-ODS fire protection concepts and systems for future surface combatants.

(U) ($27.906M) Integrated Liquid Wastes - Continue support of rulemaking process with EPA in development of UNDS for liquid waste discharges from Navy vessels: continue Phase II, setting of MPCD performance standards. Continue development of integrated liquid waste treatment system: continue development of 10 gal/min OWPS (OWS-10 Polisher), continue development of 50-gal/min OWPS (OWS-50 Polisher), and initiate development of 5-gal/min combined OWPS (OWS-5 Polisher) for new-construction ships; continue development of EDM non-oily wastewater treatment system; continue development of advanced OCM; complete test and evaluation of upgraded shipboard vortex sewage incinerator; and initiate development of advanced thermal destruction system for concentrated ship liquid wastes. Continue development of design fixes for compensated fuel ballast systems.

(U) ($7.200M) Solid Wastes - Continue development of management processes and systems for plastics for submarine application: convert SSN-688 Class submarine TEMPALT to a Ship Alteration (SHIPALT) and upgrade test submarines; perform TEMPALTs of prototype equipment aboard two SSBN-726 Class submarines and conduct at-sea test and evaluation; investigate onboard storage techniques and locations for SSN-21 Class submarines; and initiate investigation of onboard storage techniques and locations for SSN-774 Class submarines. Initiate development of advanced thermal destruction system for processing shipboard solid wastes.

(U) ($9.000M) Hazardous and Other Major Ship Wastes - Continue shipboard hazardous materials substitution and elimination task and continue T&E of pollution prevention equipment aboard ship. Complete quality assurance testing on reformulated commercial paints. Continue development of oil spill response capabilities: complete development of oil outflow and salvage response analysis program; complete development of oil and skimmer tracking system; continue development of Recovered Oil Logistics System; and initiate development of oil and skimmer efficiency improvements. Continue development of marine mammals ship database tracking system. Initiate development and testing of new low-copper underwater hull antifouling coatings. Initiate development of underwater hull cleaning system.

3. (U) FY 2001 PLAN:

(U) ($5.998M) Ozone Depleting Substances - Complete development and qualification of backfit modifications for remaining surface ship 250-ton CFC-114 air-conditioning plant designs. Continue evaluation of non-ODS fire protection concepts and systems for future surface combatants.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, BA4	**Environmental Protection / PE0603721N**	Shipboard Waste Management / S0401

(U) ($27.759M) Integrated Liquid Wastes - Continue support of rulemaking process with EPA in development of UNDS for liquid waste discharges from Navy vessels: continue Phase II, setting of MPCD performance standards. Continue development of integrated liquid waste treatment system: continue development of OWS-10 Polisher, continue development of OWS-50 Polisher, and continue development of OWS-5 Polisher; complete development of advanced OCM; continue development of EDM non-oily wastewater treatment system; and continue develoment of advanced thermal destruction system for concentrated ship liquid wastes. Continue development of design fixes for compensated fuel ballast systems.

(U) ($5.400M) Solid Wastes - Continue development of management processes and systems for plastics for submarine application: convert SSBN-726 Class submarine TEMPALT to SHIPALT and upgrade test submarines; perform TEMPALT of prototype equipment aboard SSN-21 Class submarine and initiate at-sea test and evaluation; and continue investigation of onboard storage techniques and locations for SSN-774 Class submarines. Continue development of advanced thermal destruction system for processing shipboard solid wastes.

(U) ($9.400M) Hazardous and Other Major Ship Wastes - Continue shipboard hazardous materials substitution and elimination process and continue T&E of pollution-prevention equipment aboard ship. Continue development of oil spill response capabilities: complete development of Recovered Oil Logistics System; continue development of oil and skimmer efficiency improvements; and initiate development of light-oil recovery modifications. Continue development of marine mammals ship database tracking system: initiate demonstration. Continue development and testing of new low-copper underwater hull antifouing coatings. Continue development of underwater hull cleaning system.

B. (U) Other Program Funding Summary: Demonstrated and validated technologies are transitioned to various SCN, OPN, and O&MN budget accounts for implementation as part of a Fleet modernization program or new ship construction.

(U) Related RDT&E: (U) Defense Research Sciences/Shipboard Processes (PE 61153N/R3162)
(U) Readiness, Training, and Environmental Quality/Logistics and Environmental Quality (PE 62233N)
(U) Environmental Quality and Logistics Advanced Technology/Environmental Requirements Advanced Technology (PE 63712N/R2206)

C. (U) Acquisition Strategy: (U) RDT&E Contracts are Competitive Procurements.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification			DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, BA4**	PROGRAM ELEMENT NAME AND NUMBER **Environmental Protection / PE0603721N**	PROJECT NAME AND NUMBER Shipboard Waste Management / S0401	

D. (U) Schedule Profile:

	FY99	FY00	FY01
Ozone Depleting Substances	Completed Evaluation First Submarine Refrigeration Plant Modifications Completed Evaluation Future 200T A/C & 1.5T Refrigeration Prototypes Completed Development Alternative Solvents for O2 Systems Completed Development AFFADS for New Ships	Complete Development 125T & 150T CFC-114 A/C Modification Kits Complete Ship Test 200T CFC-114 A/C Modification Complete Development 300T & 363T CFC-114 A/C Modification Kits	Complete Development Remaining 250T A/C Modification Kits
Integrated Liquid Wastes	Completed UNDS Phase I (Discharges Requiring MPCD) Initiated UNDS Phase II (MPCD Performance Standards) Completed Development High-Capacity Oil/Water Separator Completed Test Sub Non-Seeping Grease Seal	Complete UNDS Phase II (MPCD Performance Standards) Initiate UNDS Phase III (MPCD Guidelines) Complete Development OWS-10 Polisher Initiate Development Future OWS-3 Polisher	Complete UNDS Phase III (MPCD Guidelines) Complete Development OWS-50 Polisher Complete Development Future OWS-3 Polisher Complete Development Advanced OCM
Shipboard Solid Wastes	SSN-688 Plastics TEMPALT & Initiate T&E Investigated SSBN-726 Plastics Storage Techniques	SSBN-726 Plastics TEMPALT & Initiate T&E Investigate SSN-21 Plastics Storage Techniques Initiate Development Advanced Thermal Destruction System	Complete SSN-688 Plastics T&E Aboard Ship SSN-21 Plastics TEMPALT & Initiate T&E
Hazardous & Other Major Ship Wastes	Issued Final Report Non-Asbestos Substitutes Initiated Development Marine Mammal Database	Complete Test Reformulated Paints Complete Development Oil Contingency Planning System Complete Development Oil Outflow/Salvage Program Complete Development In-Situ Oil Burning System Initiate Development Oil & Skimmer Improvements & OWS Initiate Development New Underwater Hull Coatings Initiate Development Underwater Hull Cleaning System	Complete Hazardous Materials Elimination/Substitution Complete Pollution Prevention Afloat Initiate Light-Oil Recovery System Modifications Initiate Marine Mammal Database Demonstration

CLASSIFICATION:

EXHIBIT R-3, Cost Analysis (page 1) | DATE: **February 2000**

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, BA4	**Environmental Protection / PE0603721N**	Shipboard Waste Management / S0401

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development	C/CPFF	Westinghouse Machinery Tech Div, Pitts, PA	14.580	0.000	N/A	0.000	N/A	0.000	N/A	N/A	14.580	14.580
Primary Hardware Development	C/CPFF	Geo-Centers, Inc., Boston, MA	7.450	6.300	01/99	4.000	12/99	6.500	12/00	Cont	Cont	N/A
Primary Hardware Development	SS/CPFF	York International Corp York, PA	2.700	0.000	N/A	0.000	N/A	0.000	N/A	N/A	2.700	2.700
Primary Hardware Development	SS/CPFF	York International Corp York, PA	4.800	3.550	04/99	3.000	02/00	2.500	02/01	11.150	25.000	25.000
Primary Hardware Development	SS/CPFF	Northern Research & Engineering Corp, Waburn, MA	1.200	0.000	N/A	0.000	N/A	0.000	N/A	N/A	1.200	1.200
Primary Hardware Development	C/CPFF	M. Rosenblatt & Son New York, NY	7.163	2.200	01/99	6.000	01/00	3.450	01/01	Cont	Cont	N/A
Ancillary Hardware Development	Various	Misc. Contracts	15.110	0.000	N/A	1.000	N/A	1.274	N/A	N/A	N/A	N/A
Systems Engineering	C/CPFF	John J. McMullen &	2.087	1.500	01/99	2.000	12/99	3.050	12/00	Cont	Cont	N/A
Subtotal Product Development			55.090	13.550		16.000		16.774		Cont	Cont	N/A

Remarks: (1) Hardware Development and Systems Engineering Tasks use CPFF Delivery Order Contracts for Continuing Development of Pollution Abatement Hardware and Ship Systems Engineering Analysis

Software Development	Various	Misc. Contracts	0.070	0.000	01/00	0.000				0.000	0.070	0.070
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.070	0.000		0.000		0.000		0.000	0.070	

Remarks: Not Applicable.

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EXHIBIT R-3, Cost Analysis (page 2)

DATE: **February 2000**

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, N	**Environmental Protection / PE0603721N**	Shipboard Waste Management / S0401

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NSWC Carderock Div, Bethesda, MD	63.824	22.500	N/A	24.967	N/A	22.400	N/A	Cont	Cont	N/A
Developmental Test & Evaluation	WR	Naval Research Lab Wash, DC	15.082	4.000	N/A	3.350	N/A	3.045	N/A	Cont	Cont	N/A
Developmental Test & Evaluation	WR	NCCOSC San Diego, CA	2.710	0.600	N/A	0.250	N/A	0.250	N/A	Cont	Cont	N/A
Developmental Test & Evaluation	WR	NNSY Norfolk, VA	4.158	0.635	N/A	1.000	N/A	1.000	N/A	Cont	Cont	N/A
Developmental Test & Evaluation	WR	Misc. Govt Labs	15.825	0.714	N/A	0.150	N/A	0.450	N/A	Cont	Cont	N/A
Developmental Test & Evaluation	C/CPFF	Geo-Centers, Inc. Boston, MA	8.651	0.500	01/99	4.000	12/99	1.500	12/00	Cont	Cont	N/A
Developmental Test & Evaluation	C/CPFF	York International Corp, York , PA	12.000	0.000	N/A	0.000	N/A	0.000	N/A	0.000	12.000	12.000
Developmental Test & Evaluation	C/CPFF	Misc. Contracts	6.866	0.574	Var	5.556	Var	3.138	Var	Cont	Cont	N/A
Subtotal T&E			129.116	29.523		39.273		31.783		0.000	Cont	N/A
Remarks:												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support											0.000	
Travel											0.000	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks: Not applicable.												
Total Cost			184.276	43.073		55.273		48.557		Cont	Cont	Cont
Remarks:												

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EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, BA4**	PROGRAM ELEMENT NAME AND NUMBER **Environmental Protection / PE0603721N**				PROJECT NAME AND NUMBER Environmental Compliance / W2210					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Environmental Compliance / W2210		**4.278**	**4.497**	**4.820**	**5.096**	**5.373**	**5.494**	**5.671**	**Cont**	**Cont**
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification: This project supports development and implementation of technologies which will lead to environmentally safe naval aviation operations and support; compliance with international, federal, state, and local regulations and policies; reduction of increasing compliance costs and personal liability; and enhancement of naval aviation mission effectiveness. Naval aviation pollution prevention efforts were previously supported by Project Y0817, Pollution Abatement Ashore. This project will support that part of project Y0817 that addressed aviation pollution prevention technologies as well as additional operational and shipboard aviation requirements previously unsupported. Specific regulatory requirements include Executive Orders 12856 (Pollution Prevention) and 12873 (Recycling & Waste Prevention), the Clean Air Act (CAA) and associated National Emission Standards for Hazardous Air Pollutants (NESHAPs) and National Ambient Air Quality Standards (NAAQS), the Clean Water Act (CWA), the Resource Conservation and Recovery Act (RCRA), as well as Occupational, Safety and Health Administration (OSHA) standards.

1. (U) FY 1999 ACCOMPLISHMENTS:

(U) ($2.454M) Continued to research, develop and test: Alternatives for cadmium, chromium, and cyanide plating nonchromate aluminum pre-treatments, and sealants; non-hazardous chemical paint stripping processes; alternative non-hazardous solvents and cleaners; low/non-VOC coatings; and non-hazardous corrosion control materials and processes.

(U) ($0.850M) Continued to evaluate alternative aircraft systems to eliminate or reduce the emission of hazardous materials.

(U) ($0.889M) Continued to demonstrate performance of water-borne topcoats. Developed and tested hazardous operational chemical and material alternatives. Developed and demonstrated technologies for control of ordnance and composite material emissions.

(U) ($0.085M) A Below Theshold Reprogram (BTR) reducing funding for higher Navy priorities was received.

2. (U) FY 2000 PLAN:

(U) ($2.625M) Continue to research, develop, and test alternatives to aircraft finishing, repair and maintenance processes that use toxic heavy metals, hazardous air pollutants (HAPs), and volatile organic compounds (VOCs). Formulate and certify newly developed aircraft coatings. Continue technology research development, demonstrations/validations of alternatives to chromium and cadmium electroplating processes. Develop and validate source reduction in aircraft wash and de-icing. Develop and demonstrate alternative propulsion system technologies that minimize the use and generation of hazardous materials in manufacturing and repair processes. Complete development and demonstration of the following technologies: waterborne topcoats, electrocoat/powder coat, flashjet, non-HAPs paint purge solvents, non-HAPs chemical strippers, zinc/nickel plating as a cadmium replacement, tin-zinc plating as a cadmium replacement, CO2 retrofit of portable chloro-flouro carbon (CFC) fire extinguishers, reduction of halon 1301 release during maintenance and glass bead media recycling.

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EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, BA4	**Environmental Protection / PE0603721N**	Environmental Compliance / W2210

(U) ($0.290M) Continue to provide scientific and technical expertise for continued aviation pollution prevention technology development, demonstration, and validation.

(U) ($0.535M) Continue to develop and demonstrate low VOCs, non-chromated adhesive bonding primers, and aluminum-manganese electroplating as a cadmium replacement.

(U) ($0.440M) Continue to develop and demonstrate conversion coatings alternatives.

(U) ($0.280M) Initiate development and demonstration of alternative ordnance materials and processes, innovative industrial wastewater source reduction technology that minimizes hazardous waste generation and toxic emissions to the atmosphere.

(U) ($0.327M) Initiate development and demonstration of environmentally compatible Aircraft Launch and Recovery Equipment (ALRE) lubricants and certify processes that reduce their emission to the sea.

3. (U) FY 2001 PLAN:

(U) ($2.858M) Continue to research, develop, and test alternatives to aircraft manufacturing, finishing, repair and maintenence processes that use toxic heavy metals, hazardous air pollutants (HAPs), and volatile organic compounds (VOCs). Continue to formulate and certify newly developed aircraft coatings. Continue technology research development, demonstrations/validations of alternatives to chromium and cadmium electroplating processes. Continue to develop and validate source reduction in aircraft wash and de-icing. Continue to develop and demonstrate alternative propulsion system technologies that minimize the use and generation of hazardous materials in operations, manufacturing and repair processes. Initiate development of Low Emissions Technology. Complete development of conversion coatings alternative, non-chromated paint primers, non-HAP sealants, mobile paint stripping technology, non-HAPs pre-paint cleaner, composite materials alternatives.

(U) ($0.290M) Continue to provide scientific and technical expertise for continued aviation pollution prevention technology development, demonstration, and validation.

(U) ($0.535M) Continue to develop and demonstrate low volatile organic compound (VOC), non-chromated adhesive bonding primers, waterborne topcoats, non-HAP chemical strippers, non-HAP paint purge solvents, electroplating and aluminum-manganese as a cadmium (CD) replacement.

(U) ($0.445M) Complete development and demonstration of conversion coatings alternatives.

(U) ($0.280M) Continue development and demonstrate alternative ordnance materials and processes, innovative industrial wastewater source reduction technology that minimizes hazardous waste generation and toxic emissions to the atmosphere.

(U) ($0.412M) Continue development and demonstrate environmentally compatible Aircraft Launch and Recovery Equipment (ALRE) lubricants and certify processes that reduce their emission to the sea.

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APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, BA4	**Environmental Protection / PE0603721N**	Environmental Compliance / W2210

B. (U) Other Program Funding Summary: Not applicable.

(U) RELATED RDT&E: (U) PE 0602233N (Readiness/Training/Environmental Quality)
(U) PE 0603716D (Strategic Environmental R&D Program)
(U) PE 0603851D (Environmental Security Technology Certification Program)
(U) PE 0603721N (Environmental Quality & Logistics Advanced Technology)
(U) PE 605864N (NAVAIR Environmental Compliance)

C. (U) Acquisition Strategy: Technologies developed under this project are demonstrated and validated primarily through Competitive Procurements. Validated technology is transitioned to users through new or revised Performance Specifications, Technical Manuals or Competitive Procurements of subsystems, materials or processes.

D. (U) Schedule Profile:

	FY99	FY00	FY01
Engineering Milestones	Cont Eval Waterborne Topcoats Cont Eval Electrocoat & Powder Coat Cont Dev Zn-Ni Plating as Cd Replacement Cont Dev Sn-Zn Plating as Cd Replacement Cont Dev Flashjet Cont Dev Non-HAPs Chemical Strippers Cont Dev Paint Purge Solvents Cont Eval Glass Bead Media Recycling Cont Eval CO2 Retrofit of Halon Extinguishers Cont Eval Halon Releases During Bottle Maint	Comp Eval Waterborne Topcoats Comp Eval Electrocoat & Powder Coat Comp Dev Zn-Ni Plating as Cd Replacement Comp Dev Sn-Zn Plating as Cd Replacement Comp Dev Flashjet Comp Dev Non-HAPs Chemical Strippers Comp Dev Paint Purge Solvents Comp Eval Glass Bead Media Recycling Init Dev Env Compatible ALRE Lubricants Init Dev Alternative Ordnance Materials & Processes Comp Eval CO2 Retrofit of Halon Extinguishers Comp Eval Halon Releases During Bottle Maint Init Eval Wastewater Source Reduction	Comp Dev Conv Coating Alternatives Comp Dev Non-Chromated Primers Comp Dev Non-HAP Sealants Comp Dev Mobile Paint Stripping Technology Comp Eval Non-HAPs Prepaint Cleaner Comp Eval Composite Materials Alternatives Init Dev Low Emissions Technology

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DATE: **February 2000**

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, BA4	**Environmental Protection / PE0603721N**	Environmental Compliance /W2210

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development												
Ancillary Hardware Development												
Systems Engineering	WX	Various		1.739		1.872		1.962		Cont	Cont	Cont
	WX	NAWC-Pax		2.444		2.613		2.843		Cont	Cont	Cont
		BTR for Higher Navy Priorities		0.085								
Subtotal Product Development			0.000	4.268		4.485		4.805		Cont	Cont	Cont
Remarks:												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks: Not Applicable.												

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APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, N	**Environmental Protection / PE0603721N**	Environmental Compliance /W2210

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation										Cont	Cont	N/A
Operational Test & Evaluation										Cont	Cont	N/A
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	Cont	N/A
Remarks:												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support				0.010		0.012		0.015		Cont	Cont	Cont
Travel											0.000	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	0.010		0.012		0.015		0.000	Cont	
Remarks: Not applicable.												
Total Cost				4.278		4.497		4.820		Cont	Cont	Cont
Remarks:												

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EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, BA4**	PROGRAM ELEMENT NAME AND NUMBER **Environmental Protection / PE0603721N**				PROJECT NAME AND NUMBER Pollution Abatement / Y0817					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Pollution Abatement / Y0817		**8.588**	**9.306**	**8.817**	**10.478**	**10.961**	**11.156**	**11.453**	**Cont**	**Cont**
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification: This project develops and validates new technologies needed to address pervasive Navy shoreside environmental requirements imposed on Naval shore activities by the need to comply with environmental laws, regulations, orders, and policies. The goal of the program is to minimize personnel liabilities, operational costs, and regulatory oversight while preserving or enhancing the ability of Naval shore activities to accomplish their required missions and functions. Each project task addresses one or more of the requirements from the Navy Environmental Quality RDT&E Strategic Plan of October 1994. The plan is being updated and upon Chief of Naval Operations approval it will govern future task selections. Project investment is made in five thrust areas:

(U) SHIP MAINTENANCE/REPAIR/DEACTIVATION

(U) Thus far, tasks in this thrust area have addressed environmental requirements originating at Naval shipyards. As the Navy pursues a strategy to reduce ship maintenance costs by shifting work to Ship Intermediate Maintenance Activities (SIMAs), new requirements are emerging as these processes and resulting hazardous waste streams become more decentralized. SIMAs will require technologies that are cost-effective when operated less frequently and with lower throughput. Future SIMA tasks will be selected based on compliance and pollution prevention studies being conducted on the Naval Station Mayport SIMA as part of the Navy Environmental Leadership Program (NELP) during FY 1999.

(U) ORDNANCE TESTING/MANUFACTURE/DISPOSAL

(U) Current tasks in this thrust address specific compliance-driven environmental requirements of Navy ordnance activities. With respect to disposal, the thrust addresses requirements for disposal of quantities typical of testing and manufacturing operations, not of the much larger quantities associated with demilitarization. Future tasks will shift much of the investment in this area to pollution prevention requirements, particularly where they also reduce compliance impacts and costs. These tasks will be identified as part of an ordnance environmental requirements study being conducted in partnership with the Navy's Ordnance Environmental Specialty Office (OESO) during FY 1999.

(U) OTHER INDUSTRIAL OPERATIONS

(U) Tasks in this thrust address compliance and pollution prevention environmental requirements originating from the industrial operations of Navy Public Works Centers and Naval Stations. As part of an overall Navy strategy, future tasks will shift more of the investment from compliance technologies to pollution prevention technologies that are cost-effective solutions to compliance requirements. It is also expected that there will be new requirements driven by the trend towards stricter federal, state, and local air emission regulations.

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APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, BA4	**Environmental Protection / PE0603721N**	Pollution Abatement /Y0817

(U) NON-INDUSTRIAL OPERATIONS

(U) Tasks in this thrust address requirements to reduce air and water emissions (CAA, CWA), hazardous waste (RCRA) generation, and cost of environmental compliance for non-industrial operations occurring at Naval activities. In addition, tasks evaluate alternative restoration technologies for the over 1000 Navy sites requiring cleanup and restoration under CERCLA. The alternative restoration tasks are selected and linked to the urgent requirements of specific restoration projects in partnership with the Navy's Alternative Restoration Technology Team (ARTT). It is expected that one area requiring new investment is technologies to reduce the long-term operation and monitoring costs of installation restoration projects.

(U) HAZARDOUS WASTE MINIMIZATION/RECYCLING/DISPOSAL

(U) Prior tasks have shown that the Navy neither has the funding required to acquire a new government-owned hazardous waste treatment system nor a large enough hazardous waste stream to make a new contractor-owned treatment systems profitable. Tasks now primarily address requirements to upgrade capabilities of Navy-owned industrial waste treatment plants (IWTPs) and/or to pre-treat Navy-generated wastes prior to being discharged to publicly-owned wastewater treatment systems (POWTS).

1. (U) FY 1999 ACCOMPLISHMENTS:

(U) ($2.385M) Ship Maintenance/Repair/Deactivation – Completed development of Bilge Derusting and Pacification Chemicals: validation of system to recycle citric acid used for the derusting and pacification of ship bilges. Completed development of Recycling of Shipyard Hazardous Waste Using Catalytic Extraction Process: feasibility of recycling hazardous wastes generated by the deactivation of submarines and ships using a contractor owned and operated facility based on molten metal technology. Completed development (evaluation) of alternatives for reduction of Hexavalent Chromium Emission Reduction from Shipyard Welding Operations. Continued development of Automated Paint Application with Overspray Capture and Treatment. Continued development of Air Emission Reduction from Shipyard Cutting and Arc-Gouging Operations.

(U) ($2.560M) Ordnance Testing/Manufacture/Disposal - Completed development of Marine Sediment Toxicity Data for Ordnance Compounds. Continued development of Exhaust Scrubber for Static Testing of Small Rocket Motors: design phase 2 prototype. Continued development of Confined Burn Facility to Replace Open Burning of Ordnance and Energetics: test 10-pound capacity prototype. Completed evaluation of Electrochemical Oxidation for Destruction of Waste Energetic Materials.

(U) ($1.527M) Other Industrial Operations - Completed development (validation) of Leak Detection System for Large Underground Bulk Fuel Storage Tanks. Continued Jet Engine Test Cell Emissions Reduction. Initiated development of In-Line Monitoring and Diversion for Problem Contaminants in Discharges: sensor and valve components needed for systems to automatically detect and divert occasional wastewater discharges with treatment-resistant contaminants.

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APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, BA4	**Environmental Protection / PE0603721N**	Pollution Abatement /Y0817

(U) ($1.267M) Non-Industrial Operations - Completed development (validation) of Controlling Non-Point Source Discharges Using Constructed Wetlands. Completed development of Sub-Lethal Biochemical Toxicity Analysis Using DNA Integrity. Completed development of In-Situ Remediation of Contaminants Using Fenton's Reagent. Continued development of Sound Propagation Over Water Model Corrections for Navy-Unique Scenarios. Continued development of QwikSet Marine Sediment Bioassays Using Bioluminescent Dinoflagellates. Continued development of Subsurface Contaminant Transport and DNAPL Sensor System. Continued development of Integrated Field Screening for Rapid Sediment Contaminant Characterization. Continued development of Pier-Side Oil Spill Detection System. Continued development of Environmentally Sound Fire Fighting Training Facilities. Continued development of Reduced False Positive From Marine Sediment Bioassays. Initiated development of Methods to Assess Subsurface Contaminant Migration From Coastal Landfills.

(U) ($0.849M) Hazardous Waste Minimization/Recycling/Disposal - Completed development (validation) of Plasma Arc Waste Treatment Technology. Completed development of Contaminated Sediment Volume Minimization Using Particle Separation. Completed Evaluation of Waste Paint Disposal and Recycling Alternatives. Continued development of Options for Recycling Rags Contaminated With RCRA Wastes. Continued Transition of Cyanide Wastewater Treatment Technologies from Navy Exploratory Development (6.2) Program. Initiated development of Shoreside Collection and Treatment System for Compensated Fuel Tank Ballast Water. Initiated development of Total Toxic Organic Reduction for Navy Industrial Waste Treatment Plants.

2. (U) FY 2000 PLAN:

(U) ($2.429M) Ship Maintenance/Repair/Deactivation - Complete development of Automated Paint Application with Overspray Capture and Treatment. Complete development of Air Emission Reduction from Shipyard Cutting and Arc-Gouging Operations. Initiated tasks addressing Ship Intermediate Maintenance Activity (SIMA) requirements identified during compliance and pollution prevention studies conducted on Naval Station Mayport SIMA as part of Navy Environmental Leadership Program (NELP) during FY99.

(U) ($1.929M) Ordnance Testing/Manufacture/Disposal - Continue development of Exhaust Scrubber for Static Testing of Small Rocket Motors: initiate fabrication of phase 2 prototype. Continue development of Confined Burn Facility to Replace Open Burning of Ordnance and Energetics: initiated tasks to address requirements identified as part of ordnance environmental requirements study conducted in partnership with Navy's Ordnance Environmental Specialty Office (OESO) during FY99.

(U) ($2.140M) Other Industrial Operations - Complete development of Jet Engine Test Cell Emissions Reduction: complete validation of approaches to reduce nitrous oxide, particle, and noise emissions. Continue development of In-Line Monitoring and Diversion of Problem Contaminants in Discharges to automatically detect and divert occasional wastewater discharges with treatment-resistant contaminants. Initiate tasks to address requirements identified as part of update of Navy Environmental Quality RDT&E Strategic Plan completed during FY99; it is expected that there will be new requirements driven by stricter federal, state, and local air emission regulations.

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APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, BA4	**Environmental Protection / PE0603721N**	Pollution Abatement /Y0817

(U) ($1.935M) Non-Industrial Operations - Complete development of Sound Propagation Over Water Model Corrections for Navy-Unique Scenarios. Complete development of QwikSet Marine Sediment Bioassays Using Bioluminescent Dinoflagellates. Complete development of Subsurface Contaminant Transport and DNAPL Sensor System. Complete development of Integrated Field Screening for Rapid Sediment Contaminant Characterization. Complete development of Pier-Side Oil Spill Detection System. Continue development of Environmentally Sound Fire Fighting Training Facilities. Continue development of Reduced False Positive From Marine Sediment Bioassays. Continue development of Methods to Assess Subsurface Contaminant Migration from Coastal Landfills. Initiate tasks to address requirements identified as part of update of Navy Environmental Quality RDT&E Strategic Plan completed during FY99; it is expected that one area requiring new investment is technologies to reduce the long-term operation and monitoring costs of installation restoration projects.

(U) ($0.873M) Hazardous Waste Minimization/Recycling/Disposal - Complete development of Options for Recycling Rags Contaminated with RCRA Wastes. Complete Transition of Cyanide Wastewater Treatment Technologies from Navy Exploratory Development (6.2) Program. Continue development of Shoreside Collection and Treatment System for Compensated Fuel Tank Ballast Water. Continue development of Total Toxic Organic Reduction for Navy Industrial Waste Treatment Plants. Initiate additional tasks for Volume and Contaminants Reduction in Wastewater Discharged to Navy-Owned Industrial Waste Treatment Plants (IWTPs) and Publicly-Owned Wastewater Treatment Systems (POWTS).

3. (U) FY2001 PLAN:

(U) ($2.157M) Ship Maintenance/Repair/Deactivation - Continue tasks addressing Ship Intermediate Maintenance Activity (SIMA) requirements identified during compliance and pollution prevention studies conducted on Naval Station Mayport SIMA as part of Navy Environmental Leadership Program (NELP) during FY99.

(U) ($1.690M) Ordnance Testing/Manufacture/Disposal - Continue development of Exhaust Scrubber for Static Testing of Small Rocket Motors: complete fabrication of phase 2 prototype. Continue development of Confined Burn Facility to Replace Open Burning of Ordnance and Energetics: continue tasks to address requirements identified as part of ordnance environmental requirements study conducted in partnership with Navy's Ordnance Environmental Specialty Office (OESO) during FY99.

(U) ($2.090M) Other Industrial Operations - Complete development (validation) of In-Line Monitoring and Diversion of Problem Contaminants in Discharges to automatically detect and divert occasional wastewater discharges with treatment-resistant contaminants. Continue tasks to address air emissions reductions requirements identified as part of update of Navy Environmental Quality RDT&E Strategic Plan completed during FY99.

(U) ($1.990M) Non-Industrial Operations - Complete development of Environmentally Sound Fire Fighting Training Facilities. Complete development of Reduced False Positive From Marine Sediment Bioassays. Complete development of Methods to Assess Subsurface Contaminant Migration from Coastal Landfills. Continue tasks to reduce long-term operation and monitoring costs of installation restoration projects as identified by updated Navy Environmental Quality RDT&E Strategic Plan completed during FY99.

(U) ($0.890M) Hazardous Waste Minimization/Recycling/Disposal - Complete development (validation) of Shoreside Collection and Treatment System for Compensated Fuel Tank Ballast Water. Complete development of Total Toxic Organic Reduction for Navy Industrial Waste Treatment Plants. Continue Volume and Contaminants Reduction in Wastewater Discharged to Navy-Owned Industrial Waste Treatment Plants (IWTPs) and Publicly-Owned Wastewater Treatment Systems (POWTS).

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, BA4	**Environmental Protection / PE0603721N**	Pollution Abatement /Y0817

B. (U) Other Program Funding Summary: This project transitions technologies from PE0603712N, Environmental Quality, Logistics Advanced Technology Demonstrations Program, and PE0603716D, the Strategic Environmental Research and Development Program (SERDP). Whenever possible, funding is leveraged by transitioning technologies to PE 0603851D, the Environmental Security Technology Certification Program (ESTCP), for certification and by providing funding for Navy participation in ESTCP projects that could address Navy requirements. Within this program element, the project looks for fund leveraging opportunities with Project S0401 and W2210. Execution of this project is coordinated with related Army and Air Force programs by the Tri-Service Environmental Quality R&D Strategic Plan developed under the leadership of the Joint Engineers Management Panel (JEMP). Additional coordination occurs between the Army, Navy, and Air Force centers for environmental excellence.

(U) RELATED RDT&E: This project transitions shoreside pollution abatement technologies from two Navy Science and Technology programs and the Strategic Environmental Research and Development Program (SERDP). Project funding is leveraged by transitioning technologies to the Environmental Security Technology Certification Program (ESTCP) for final certification and by providing funding for Navy participation in ESTCP projects. Execution of this project is coordinated with related Army and Air Force programs by the Tri-Service Environmental Quality R&D Strategic Plan developed under the leadership of the Joint Engineers Management Panel (JEMP).

(U) PE 0602233N, Readiness, Training, and Environmental Quality Technology Development
(U) PE 0603712N, Environmental Quality, Logistics Advanced Technology Demonstrations
(U) PE 0603716D, Strategic Environmental Research & Development Program (SERDP)
(U) PE 0603851D, Environmental Security Technology Certification Program (ESTCP)

C. (U) Acquisition Strategy: This project is categorized as Non-ACAT (Non Acquisition). The project delivers a broad spectrum of products that require a variety of acquisition processes to implement. Equipment products for Naval stations and other mission funded activities costing over 100K are often procured centrally through the Navy Pollution Prevention Equipment Program (PPEP) where as equipment products for Shipyards and other Navy Working Capital Fund (NWCF) activities costing over 100K are procured through their Capital Purchases Program (CPP). For both types of activities, equipment products costing less than 100K, and process changes not requiring the purchase of new equipment such as consumable material or product substitutions, are funded through the activity's operating budgets. Occasionally there is a technology that must be implemented as a specialized facility. These are acquired through the Military Construction (MCON) Program. All these acquisition processes are pursued using a common strategy that satisfies the needs of all the critical stakeholders: 1) Navy end user; 2) Funding sponsor for the Navy end user; 3) Cognizant environmental federal, state, and local regulators; 4) Other stakeholders with cognizance over the Navy process or operation being changed, and 5) The private or government organization that will produce the product.

CLASSIFICATION:

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, BA4**	PROGRAM ELEMENT NAME AND NUMBER **Environmental Protection / PE0603721N**	PROJECT NAME AND NUMBER Pollution Abatement /Y0817

D. (U) Schedule Profile:

FY99	FY00	FY01
Ship Maintenance/Repair/Deactivation		
Comp Recyc of Bilge Derusting & Pacification Chemicals	Comp Automated Painting Appl w/ Overspray Capture & Treatment	Cont Ship Intermediate Maint Activity (SIMA) Rqmts under NELP
Comp Recyc of Shpyd HW using Catalytic Extraction Process	Comp Air Emission Reduction from Shpyd Cutting & Arc-Gouging Operations	
Comp Hexavalent Cr Emission Reduction from Shpyd Welding Operations	Init Ship Intermediate Maint Activity (SIMA) Rqmts under NELP	
Cont Automated Paint Application w/ Overspray Capture & Treatment		
Cont Air Emission Reduction from Shpyd Cutting & Arc-Gouging Operations		
Ordnance Testing/Manufacture/Disposal		
Cont Exhaust Scrubber for Static Testing of Small Rocket Motors	Cont Exhaust Scrubber for Static Testing of Small Rocket Motors	Cont Exhaust Scrubber for Static Testing of Small Rocket Motors
Cont Confined Burn Facil to Replace Open Burning of Ordn & Energetics	Cont Confined Burn Facil to Replace Open Burning of Ordn & Energetics	Cont Confined Burn Facil to Replace Open Burning of Ordn & Energetics
Comp Dev of Marine Sediment Toxicity Data for Ordn Compounds		
Comp Eval of Electrochem Oxid Options for Destr of Waste Energetic Mat'ls		
Other Industrial Operations		
Comp Leak Detection Sys for Large Underground Bulk Fuel Storage Tanks	Comp Jet Engine Test Cell Emissions Reduction	Comp In-Line Monitoring & Diversion of Problem Contam in Discharges
Cont Jet Engine Test Cell Emissions Reduction	Cont In-Line Monitoring & Diversion of Problem Contam in Discharges	Cont New Rqmts from Navy EQ RDT&E Strat Plan Update
Init In-Line Monitoring & Diversion of Problem Contam in Discharges	Init New Rqmts from Navy EQ RDT&E Strat Plan Update	
Non-Industrial Operations		
Comp Controlling Non-Paint Source Discharges using Constructed Wetlands	Comp Sound Propagation Over Water Mod Corrections for Navy-Unique Scenarios	Comp Env Sound Fire Fighting Training Facil
Comp Sub-Lethal Biochemical Toxicity Analysis using DNA Integrity	Comp QwikSet Marine Sediment Bioassays using Bioluminescent Dinoflagellates	Comp Reduced False Positive from Marine Sediment Bioassays
Comp In-Situ Remediation of Contam using Fenton's Reagent	Comp Subsurface Contam Transport & DNAPL Sensor System	Comp Methods to Assess Subsurface Contam Migration from Coastal Landfills
Cont Sound Prop Over Water Mod Corrections for Navy-Unique Scenarios	Comp Integ Field Screening for Rapid Sediment Contam Characterization	Cont New Rqumts from Navy EQ RDT&E Strat Plan Update
Cont QwikSet Marine Sedmnt Bioassays using Bioluminescent Dinoflagellates	Comp Pier-Side Oil Spill Detection System	
Cont Subsurface Contam Transport & DNAPL Sensor Sys	Cont Environmentally Sound Fire Fighting Training Facil	
Cont Integ Field Screening for Rapid Sediment Contam Characterization	Cont Reduced False Positive from Marine Sediment Bioassays	
Cont Pier-Side Oil Spill Detection Sys	Cont Methods to Assess Subsurface Contam Migration from Coastal Landfills	
Cont Environmentally Sound Fire Fighting Training Facil	Init New Rqmts from Navy EQ RDT&E Strat Plan Update	
Cont Reduced False Positive from Marine Sediment Bioassays		
Init Methods to Assess Subsurface Contam Migration from Coastal Landfills		
Hazardous Waste Minimization/Recycling/Disposal		
Comp Eval of Waste Paint Disposal & Recyc Alternatives	Comp Options for Recyc Rags Contam w/ RCRA Wastes	Comp Shoreside Collection & Treatment Sys for Comp Fuel Tank Ballast Water
Cont Options for Recyc Rags Contam w/ RCRA Wastes	Comp Trans Cyanide Wastewater Treatment Tech from Navy Expl Dev Prog	Comp Total Toxic Organic Reduction for Navy Indust Waste Treatment Plants
Cont Trans Cyanide Wastewater Treatment Tech from Navy Expl Dev Prog	Cont Shoreside Collection & Treatment Sys for Comp Fuel Tank Ballast Water	Cont Vol & Contam Reduct in Wastewater Discharged to Navy IWTPs & POWTs
Comp Plasma Arc Waste Treatment Tech	Cont Total Toxic Organic Reduction for Navy Industrial Waste Treatment Plants	
Comp Contam Sediment Vol Minimiztion using Particle Separation	Init Vol & Contam Reduction in Wastewater Discharged to Navy IWTPs & POWTs	
Comp Eval of Waste Paint Disposal & Recyc Alternatives		
Init Shoreside Collection & Treatment Sys for Comp Fuel Tank Ballast Water		
Init Total Toxic Organic Reduction for Navy Indust Waste Treatment Plants		

CLASSIFICATION:

EXHIBIT R-3, Cost Analysis (page 1) | DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT	PROJECT NAME AND NUMBER
RDT&E, BA4	Environmental Protection / PE0603721N	Pollution Abatement / Y0817

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Ship Maintenance/Repair/Deact	WR/PO	NSWC/CD	4.745	1.815	varies	1.955	varies	1.850	varies	Cont	Cont	N/A
Ship Maintenance/Repair/Deact	WR/PO	NFESC	3.428	0.452	varies	0.480	varies	0.450	varies	Cont	Cont	N/A
Ordnance Testing/Manufact/Disp	WR/PO	NSWC/IH	8.299	2.393	varies	1.930	varies	1.840	varies	Cont	Cont	N/A
Other Industrial Operations	WR/PO	NFESC	10.429	1.170	varies	1.500	varies	1.400	varies	Cont	Cont	N/A
Other Industrial Operations	WR/PO	SSC/SD	5.824	0.487	varies	0.640	varies	0.625	varies	Cont	Cont	N/A
Non-Industrial Operations	WR/PO	SSC/SD	10.168	0.807	varies	1.165	varies	1.130	varies	Cont	Cont	N/A
Non-Industrial Operations	WR/PO	NFESC	5.203	0.537	varies	0.770	varies	0.715	varies	Cont	Cont	N/A
Haz Waste Min/Recycle/Disp	WR/PO	NFESC	5.817	0.748	varies	0.690	varies	0.625	varies	Cont	Cont	N/A
Haz Waste Min/Recycle/Disp	WR/PO	NRL	1.789	0.179	varies	0.176	varies	0.182	varies	Cont	Cont	N/A
Subtotal Product Development			55.702	8.588		9.306		8.817				

Performing Activities: Naval Surface Warfare Center, Carderock Division (NSWC/CD), Naval Facilities Engineering Service Center (NFESC), Naval Surface Warfare Center, Indian Head Division (NSWC/IH), Space and Warfare Systems Center, San Diego (SSC/SC), Naval Research Laboratory (NRL).

Total Prior Years Cost: Summation starts with FY80. Subtotal does not include performing activities from prior years that are no longer performing activities.

Award Dates: About 55% of the project is executed via contracts awarded by the performing activities.

Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks: Included in Product Development costs.

CLASSIFICATION:

EXHIBIT R-3, Cost Analysis (page 2)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N**			PROGRAM ELEMENT **Environmental Protection / PE0603721N**			PROJECT NAME AND NUMBER Pollution Abatement / Y0817						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation												
Operational Test & Evaluation												
Subtotal T&E			0.000	0.000		0.000		0.000		0.000		
Remarks: Included in Product Development costs.												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support											0.000	
Travel											0.000	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks: Not applicable.												
Total Cost			55.702	8.588		9.306		8.817		Cont	Cont	Cont
Remarks:												

FY 2001 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 2000

UDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

U) COST: (Dollars in Thousands)

ROJECT UMBER & ITLE		FY 1999 ACTUAL	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
0829	Energy Conservation (ADV)									
		2,458	2,783	2,757	2,871	2,887	2,942	3,027	CONT.	CONT.
0838	Mobility Fuels (ADV)									
		2,060	2,173	2,185	2,219	2,246	2,289	2,355	CONT.	CONT.
2766	Dehumidification Demo									
		-	1,989	-	-	-	-	-	1,989	1,989
OTAL		4,518	6,945	4,942	5,090	5,133	5,231	5,382	CONT.	CONT.

. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program supports projects to evaluate, adapt, and demonstrate nergy related technologies for ship and aircraft operations to: (a) increase fuel-related weapons systems capabilities such s range and time on station; (b) reduce energy costs; (c) reduce dependence on petroleum fuels and apply energy technologies hat improve environmental compliance; (d) relax unnecessarily restrictive fuel specification requirements to reduce cost and ncrease availability worldwide; (e) provide guidance to fleet operators for the safe use of commercial grade or off-pecification fuels when military specification fuels are unavailable or in short supply; and (f) make needed periodic changes o fuel specifications to ensure fuel quality and avoid fleet operating problems. As presently funded and planned the Navy hip and Aircraft Energy Conservation Research and Development Program, of which Project R0829 is a part, is estimated to

esult in energy cost avoidance of $70M/yr by FY2005. Project R2766 is an FY2000 Congressional plus-up to demonstrate essicant dehumidification in Naval Facilities.

U) This program, and the companion PE 0604710N, Navy Energy Program support the achievement of legislated, White House, Department of Defense and Navy Energy Management Goals. It also responds to direction from the Office of the Secretary of Defense, the Secretary of the Navy and the Chief of Naval Operations to make up-front investment in technologies that reduce future cost of operation and ownership of the fleet and supporting infrastructure.

U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental tests related to specific ship or aircraft applications.

) PROGRAM CHANGE SUMMARY FOR TOTAL PE:

	FY 1999	FY 2000	FY2001
(U) FY 2000 President's Budget:	4,571	4,984	4,962
(U) Appropriated Value:		6,984	
(U) Adjustments from PRESBUDG:			
(U) SBIR/STTR Adjustment	-31		
(U) Various Rate Adjustment	-20		-20
(U) Execution Rate Adjustment	-2		
(U) Congressional Rescissions		-39	
(U) Congressional Plus-Up (R2766)		2000	
(U) FY 2001 PRESBUDG Submission	4,518	6,945	4,942

(U) CHANGE SUMMARY EXPLANATION:

(U) Schedule: Not applicable.

FY 2001 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 2000

UDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

(U) Technical: Not applicable.

FY 2001 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 2000

UDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

U) COST: (Dollars in Thousands)

ROJECT UMBER & ITLE	FY 1999 ACTUAL	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
0829 Energy Conservation	2,458	2,783	2,757	2,871	2,887	2,942	3,027	CONT.	CONT.

. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project improves the energy efficiency of Navy ships and ircraft, and thereby contributes to reduced operating costs and improved fleet sustainability and performance. Major efforts nclude work to increase the efficiency of aircraft engines; and develop improved hull drag reducing technologies and more fficient energy conversion systems for ships.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:
   - (U) ($916) Aircraft: Continued cooperative effort with General Electric (GE) for detailed design of an advanced High Pressure Turbine (HPT) to meet F414 (the F/A-18E/F engine) growth requirements. Directed F-414/F/A-18E/F simulator set up to support testing of an advanced engine "Performance Seeking Control" (PSC) system to ensure flight worthiness. Monitored conceptual design of an advanced fan for F414 engine (a joint F414 program office and GE program) to ensure efficiency consideration.
   - (U) ($1,542) Ships: Model tested bow bulb and stern/propeller hydrodynamic enhancements for TAO-187 class to determine drag reduction. Completed detailed design and drawings for Guided Missile Destroyer (DDG-51) retrofit stern flap applicable to first 28 ships. Completed LHA/LHD stern flap model tests. Continued laboratory to bilge-keel panel tests of emerging Anti-Fouling coatings: self-polishing reduced copper/cobiocide paints in particular.

FY 2001 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 2000

UDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

Continued development of variable geometry diffusor technology to improve efficiency of air conditioning plants using non Chloro-flouro-carbon (CFC) refrigerants; for both forward and backfit.

FY 2001 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 2000

UDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT: R0829
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT TITLE: Energy Conservation

2. (U) FY 2000 PLAN:

- (U) ($1,050) Aircraft: Flight test PSC advanced engine control logic on F/A-18E/F. Develop advanced components to meet F414 growth requirements: HPT, advanced fan, compressor, low- pressure turbine, and advanced full authority digital engine control with PSC. These are joint efforts with the Navy F414 program office and GE. Energy program participation incentivizes these efforts and ensures that efficiency, as well as performance gains are pursued.
- (U) ($1,733) Ships: Begin assessment of hydrodynamic refinements for Landing Ship Dock (LSD) 41/49 classes. Evaluate self-polishing reduced copper/cobiocide paints for energy savings and environmental impact. Support design of optimized air-conditioning plants for both retrofit and forward fit. Begin development of on-line water-wash system for gas turbines. Optimize tool designs for hull inspection remotely operated vehicle for fouling assessment and spot cleaning.

3. (U) FY 2001 PLAN:

- (U) ($1,050) Aircraft: Continue participation in development of advanced F414 engine components: (advanced fan, compressor and low pressure turbine). These efforts are jointly funded with the Navy F414 Program Office, and GE, and in some cases transition new technology from the Integrated High Performance Turbine Engine Technology Program. Components will be tested via the next GE-23a demonstrator engine build. Energy R&D participation incentivizes efficiency improvements. Begin evaluation of new, fuel efficient, component technology options for application to future F404 variants (F/A-18C/D engine).
- (U) ($1,707) Ships: Evaluate effectiveness and maintenance requirements of self-polishing reduced copper/cobiocide paints. Screen candidate paints by rates of copper release and binder hydrolysis --best paints will undergo large scale testing in PE 0604710N to demonstrate suitability for Navy use. Support design of optimized air-conditioning plants for both retrofit and forward fit. Continue development of on-line water-wash system for gas turbines. Continue screening and model testing of simple hydrodynamic mods for future ships to improve energy efficiency.

. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

FY 2001 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 2000

UDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT: R0829
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT TITLE: Energy Conservation

(U) RELATED RDT&E:

(U) PE 0601153N (Defense Research Sciences)
(U) PE 0602121N (Surface Ship Technology)
(U) PE 0602122N (Aircraft Technology)
(U) PE 0602234N (Materials, Electronics and Computer Technology)
(U) PE 0603217N (Air Systems and Weapons Advanced Technology)
(U) PE 0603712N (Environmental Quality and Logistics Advanced Technology)
(U) PE 0603721N (Environmental Protection)
(U) PE 0604710N (Navy Energy Program (ENG))

. (U) SCHEDULE PROFILE: Not applicable.

FY 2001 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 2000

UDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT: R0829
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT TITLE: Energy Conservation

. (U) PROJECT COST BREAKDOWN: ($ in thousands)

roject Cost Categories	FY 1999	FY 2000	FY2001
. System Development and Integration	2,458	2,783	2,757

. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION: Not applicable.

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: FEBRUARY 2000

UDGET ACTIVITY: 4

PROGRAM ELEMENT: 0603724N
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV)

U) COST: (Dollars in thousands)

ROJECT UMBER & ITLE	FY 1999 ACTUAL	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
0838 Mobility Fuels (ADV)	2,060	2,173	2,185	2,219	2,246	2,289	2,355	CONT.	CONT.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This project provides data through engine and fuel system tests hich relate the effects of changes in Navy fuel procurement specification properties to the performance and reliability of aval ship and aircraft engines and fuel systems. This information is required to: (a) determine the extent to which nnecessarily restrictive specification features can be relaxed to reduce cost and increase availability worldwide; b) provide guidance to fleet operators for the safe use of off-specification or commercial grade fuels when military pecification fuels are unavailable or in short supply; and (c) make needed periodic changes to fuel specifications to ensure uel quality and avoid fleet operating problems while accommodating evolutionary changes in the fuel supply industry. Recent roblems with fuel quality have adversely affected ship and aircraft system performance and reliability and resulted in egradation of fuel in storage. The resulting readiness impacts, additional maintenance costs, and the cost of lost quipment, although difficult to quantify, are many times the cost of this project. Over the next decade, the potential for uel quality related problems will increase because of changing industry practices required to comply with new environmental egulations. This project represents the only investment designed to maintain the Navy's ability to operate as a "smart" ustomer for fuels that cost over $2B per year to procure, transport, store and consume and are essential to fleet operations.

FY 2001 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 2000

UDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT NUMBER: R0838
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT TITLE: Mobility Fuels (ADV)

U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:
   - (U) ($910) Ships: Completed experimental work to determine lubricity characteristics of low sulfur Navy military specification (MILSPEC) ship diesel fuels. Initiated work to determine effects of low lubricity ship diesel fuels on the durability of Navy gas turbine engine and high-speed diesel engine fuel handling systems. Conducted bench scale tests to determine the effects of red-dyed marine distillate fuels on Navy gas turbine engine hot section materials. Completed study to forecast marine distillate fuel and Navy engine characteristics through 2010.
   - (U) ($1,150) Aircraft: Completed test & evaluation (T&E) of prototype fuel/water separator elements for +100 aircraft fuel thermal stability enhancing additive containing fuels. Completed evaluation of effect of +100 additives on P-3 and C-130 engines. Initiated evaluation of effects of +100 additives on F/A-18 engine systems. Completed test and evaluation of non-toxic, environmentally benign fuel system icing inhibitors.

2. (U) FY 2000 PROGRAM:
   - (U) ($970) Ships: Continue gas turbine and diesel engine component tests with low lubricity MILSPEC ship diesel fuels to determine effects on durability and initiate full-scale fuel handling system tests. Initiate evaluation of lubricity enhancing additives for use with low lubricity MILSPEC ship diesel fuels. Initiate work to quantify effects of low thermal stability Navy distillate fuels on maintenance requirements for navy gas turbine and diesel engines. Initiate work to determine the feasibility of specifying a single fuel for use by all Naval systems (ships, aircraft, and ground equipment).

   - (U) ($1,203) Aircraft: Initiate shipboard evaluation of prototype fuel/water separator elements for +100 additive containing fuels. Complete evaluation of effects of +100 additives on F/A-18C/D and T-45 engine systems. Complete detailed cost benefit analysis for Naval use of +100 additives. Complete F/A-18E/F engine component tests to determine effects of copper contaminated Navy jet fuels on engine maintenance requirements. Complete development of a prototype copper contamination removal system for fuels.

FY 2001 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 2000

UDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT NUMBER: R0838
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT TITLE: Mobility Fuels (ADV)

3. (U) FY 2001 PLAN:

- (U) ($990) Ships: Complete testing of full scale Navy gas turbine and diesel engine fuel handling systems with low lubricity fuels. Use results to specify minimum lubricity levels and test method to be used for fuel acceptance. Complete evaluation of lubricity enhancing additives for use with Navy distillate fuels. Complete component tests to determine effects of low thermal stability Navy distillate fuels on maintenance requirements for Navy gas turbine and diesel engines, and initiate tests on full scale fuel handling systems. Complete assessment of the feasibility of specifying the use of a single fuel for all Naval Systems.
- (U) ($1,195) Aircraft: Complete evaluation of the effects of +100 additives on F/A-18E/F and AV-8B engine systems. Complete shipboard evaluation of prototype fuel/water separator elements for +100 additive containing fuels. Initiate Joint Strike Fighter engine component tests to determine effects of copper contaminated jet fuel on engine maintenance requirements. Conduct field tests of prototype copper contamination removal system for fuels.

. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:

(U) PE 0601152N (In-House Laboratory Independent Research)
(U) PE 0602234N (Materials, Electronics and Computer Technology)

. (U) SCHEDULE PROFILE: Not applicable.

FY 2001 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: FEBRUARY 2000

UDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603724N PROJECT NUMBER: R0838
PROGRAM ELEMENT TITLE: Navy Energy Program (ADV) PROJECT TITLE: Mobility Fuels (ADV)

. (U) PROJECT COST BREAKDOWN: ($ in thousands)

roject Cost Categories	FY 1999	FY 2000	FY2001
. Reliability, Maintainability, and Availability	2,060	2,173	2,185

. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION: Not applicable.

EXHIBIT R-2, RDT&E Budget Item JustificationSheet							DATE: **February 2000**		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, BA4**	PROGRAM ELEMENT NAME AND NUMBER **Facilities Improvement / PE0603725N**				PROJECT NAME AND NUMBER Navy Facilities System/Y0995				
COST ($ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost	**1.834**	**1.974**	**1.824**	**1.719**	**1.759**	**1.811**	**1.864**		
Navy Facilities System/Y0995	**1.834**	**1.974**	**1.824**	**1.719**	**1.759**	**1.811**	**1.864**	**Cont**	**Cont**
RDT&E Articles Qty	**5**	**5**	**6**	**TBD**	**TBD**	**TBD**	**TBD**	**NA**	**NA**

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program provides the Navy with new civil engineering capabilities that are required to overcome specific performance limitations of Naval shore facilities while reducing the cost of sustaining the Naval shore infrastructure. The program focuses available resources on satisfying facility requirements where the Navy is a major stakeholder. There are no test validated Commercial off the Shelf (COTS) solutions available, and a timely solution will not emerge without a Navy sponsored demonstration and validation. The program completes the development and validation of facility technologies originating in Navy Science and Technology programs, plus a variety of other sources which includes the National Science Foundation (NSF) and the National Institute of Standards and Technology (NIST). Validated technologies are implemented in the Navy's Military Construction (MILCON) and Real Property Maintenance (RPM) Programs. Project Y0995 is addressing four Navy facility requirements during the fiscal years FY 1999 through FY2001: The High Performance (HP) Magazine, Waterfront Facilities Repair and Upgrade, Facilities Technologies to Reduce the Real Property Maintenance (RPM) Backlog, and the Modular Hybrid Pier. The execution of this program is consistent with the findings and recommendation of two National Academy of Sciences Reports: "The Role of Federal Agencies in Fostering New Technology and Innovation in Building" and "Federal Policies to Foster Innovation and Improvement in Constructed Facilities."

B. (U) PROGRAM CHANGE SUMMARY:	FY 1999	FY 2000	FY 2001
(U) FY 2000 President's Budget:	1.853	1.985	1.916
(U) Appropriated Value:	1.853	1.985	
(U) Adjustments from Pres Budget:	-0.019	-0.011	-0.092
(U) FY 2001 President's Budget Submit:	1.834	1.974	1.824

CHANGE SUMMARY EXPLANATION

(U) Funding: Reflects a combination of general decreases including SBIR transfers (FY99), Across-the-Board Reduction (FY00), and NWCF rate adjustments (FY01).
(U) Schedule: One year delay in completion of one Real Property Maintenance (RPM) technology validation
(U) Technical: N/A

C. (U) OTHER PROGRAM FUNDING SUMMARY: Provided in Project Y0995 R-2a

D. (U) ACQUISITION STRATEGY: Provided in Project Y0995 R-2a

E. (U) SCHEDULE PROFILE: Provided in Project Y0995 R-2a

EXHIBIT R-2a, RDT&E Project Justification						DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, BA4**	PROGRAM ELEMENT NAME AND NUMBER **Facilities Improvement / PE0603725N**								
COST ($ in Millions)	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Navy Facilities System/Y0995	**1.834**	**1.974**	**1.824**	**1.719**	**1.759**	**1.811**	**1.864**	**Cont**	**Cont**
RDT&E Articles Qty	**5**	**5**	**6**	**TBD**	**TBD**	**TBD**	**TBD**	**NA**	**NA**

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program provides the Navy with new civil engineering capabilities that are required to overcome specific performance limitations of Naval shore facilities while reducing the cost of sustaining the Naval shore infrastruture. The program focuses available resources on satisfying facility requirements where the Navy is a major stakeholder. There are no test validated Commercial off the Shelf (COTS) solutions available, and a timely solution will not emerge without a Navy sponsored demonstration and validation. The program completes the development and validation of facility technologies originating in Navy Science and Technology programs, plus a variety of other sources which includes the National Science Foundation (NSF) and the National Institute of Standards and Technology (NIST). Validated technologies are implemented in the Navy's Military Construction (MILCON) and Real Property Maintenance (RPM) Programs. This project is addressing four Navy facility requirements during the fiscal years FY 1999 through FY2001:

(U) THE HIGH PERFORMANCE (HP) MAGAZINE.

(U) Based on current magazine technologies, substantial land areas within Naval activities cannot be used for inhabited buildings in order to satisfy Explosives Safety Quantify Distance (ESQD) arcs. The converse is also true, the Navy is not able to construct new magazines where they are needed because of the presence of inhabited buildings. This effort enables a quantification of the specific hazard scenarios capable of causing ordnance detonation, an improved capability to model an ordnance explosion in a magazine, and the innovative use of energy absorbing construction materials to provide the Navy with a new magazine concept. The new magazine will have smaller ESQD arcs that are based on a Maximum Credible Event (MCE) that is not the detonation of the entire magazine but rather the detonation of the contents of one, much smaller, storage cell within the magazine. For a typical magazines with Net Explosive Weight (NEW) capabilities of 250,000 pounds, the allowable ordnance storage density is increased from 370 pounds/acre to 2,222 pounds/acre. In addition, the number of incompatible classes of ordnance that can be stored in the same magazine is incased from none to eight. This will lead to lower operational costs for the Receipt, Segregation, Storage, and Issue (RSSI) of ordnance and, for some activities, a reduction in the number of magazines required to accomplish their mission.

(U) WATERFRONT FACILITIES REPAIR AND UPGRADE.

(U) Over 75% of the Navy's waterfront facilities are over 45 years old. They were designed for a service life of no more that 25 years and to satisfy the mission requirements existing at that time of construction. The reinforced concrete used to construct nearly all of them requires costly and repetitive repairs. In addition, they are unable to satisfy new mission requirements, such as the increase in pier deck capacity required to accomplish more extensive pier-side ship maintenance and repair tasks using truck-mounted cranes that have concentrated outrigger loads of up to 120 tons on a pier originally designed for no concentrated deck loading. This effort integrates new methods to extend the service life of existing waterfront facilities by an additional 15 to 30 years, and to cost effectively upgrade them to satisfy new mission requirements. Specific benefits include increasing the durability of spalled marine concrete repairs from 3 to 15 years, new longer-lasting low-maintenance fendering systems that eliminate the need for the frequent replacement of timber piles, a new Impulse Load Method of assessing the vertical load capacity of pile-supported waterfront structures, and providing new pier upgrade alternatives costing about $5M for a typical pier instead of the now required demolish then replace approach costing about $30M.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, BA4**	PROGRAM ELEMENT NAME AND NUMBER **Facilities Improvement / PE0603725N**	PROJECT NAME AND NUMBER Navy Facilities System/Y0995

(U) FACILITY TECHNOLOGIES TO REDUCE THE REAL PROPERTY MAINTENANCE (RPM) BACKLOG.

(U) The Real Property Maintenance (RPM) costs to correct critical facility deficiencies are over $2.0B as reported in the FY 1995 Annual Inspection Summary (AIS). Current Navy RPM funding levels are insufficient to prevent the continued growth of the critical backlog of maintenance and repairs. This effort will validate and accelerate the wide-spread implementation of a broad range of advanced facility technologies needed to overcome design and construction practices that are conservative and remain costly because of the high risk the private sector associates with the utilization of new facility technologies. The effort will accelerate the validation, commercialization, and wide-spread implementation of the facility technologies urgently required to reduce the cost of deficiencies in the Navy's RPM backlog by reducing initial construction costs up to 20% and facility components with service lives that are up to 25 years longer.

(U) MODULAR HYBRID PIER.

(U) The Navy is faced with the necessity of recapitalizing a large portion of its waterfront infrastructure over the next several decades. The Modular Hybrid Pier thrust develops and validates technologies for a mission flexible waterfront infrastructure characterized by significantly reduced life cycle costs. The concepts validated by this project's Waterfront Facilities Repair and Upgrade thrust will enable the Navy to economically extend the useful service life of many existing piers and wharves. They will reduce the Navy's need to construct new piers and wharves, but will not eliminate the need completely. Emerging innovative materials technologies, particularly those that will transition from the Navy's Exploratory Development (6.2) Research Program, can provide a new capability to design replacement structures that have a comparable initial cost yet have far less maintenance and repair cost. Use of fiber-reinforced plastics (FRP) for appurtenances and FRP-reinforced high strength light-weight concrete for structural elements will produce structures that have twice the structural service life of the structures that they will replace. Modular design will enable off-site fabrication that will shorten the duration and lower the cost of the on-site construction. Modular design will also facilitate change-out of components to repair damage or to modify structure geometry or capacity to adapt to future changes in ship designs. An economic analysis has shown that a modular hybrid pier will have a Net Present Value (NPV) cost that is $8M less over its service life than that for a conventional structure constructed on steel-reinforced concrete.

1. (U) FY 1999 ACCOMPLISHMENTS:

(U) ($0.220M) The High performance (HP) Magazine – Completed standard design of magazine, documentation of operation procedures, and other documentation required to obtain Department of Defense Explosives Safety Board (DDESB) certification.

(U) ($0.660M) Waterfront Repair and Upgrade - Installed and tested two composite submarine camels and backing fender piles (one complete submarine berth) at SUBASE New London. Collected load and energy dissipation performance data. Conducted field test of blocking, whale and camel replacement components comprised of composite wood products. Completed performance specifications for composite fender piling and composite camel systems. Initiated design for upgrade of a pier or wharf using composite structural systems. Validated performance of the falling weight deflectometer (FWD) on a Navy pier having a deck thickness greater than 18-inches.

EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, BA4**	PROGRAM ELEMENT NAME AND NUMBER **Facilities Improvement / PE0603725N**	PROJECT NAME AND NUMBER Navy Facilities System/Y0995	

(U) ($0.954M) Real Property Maintenance (RPM) Backlog Reduction - Initiated large scale field tests to validate performance of selected facility technologies within the general areas of high performance concrete, roofing, coatings and corrosion protection, and composite materials. Continued FY 1999 testing coordination with the Civil Engineering Research Foundation (CERF), and with participating Navy activities. Began technology selection and validation test planning for the FY 2000 tests.

2. (U) FY 2000 PLAN:

(U) ($0.748M) Waterfront Repair and Upgrade - Complete testing for advanced pile and camel systems using composite materials. Complete design and award contract from corrosion stabilization, concrete repair and strengthening with composites of a selected Navy pier. Install instrumentation to monitor long term corrosion state and structural performance.

(U) ($1.226M) Real Property Maintenance (RPM) Backlog Reduction - Continue technology validation tests initiated in FY 1999. Initiate additional tests planned during FY 1999. National performance standards will be used to evaluate resulting test data when they are applicable. When none exist, the resulting test data will be submitted to the National Evaluation Service - Building Innovation Center (NES-BIC) of CERF for independent technical evaluation. Begin technology selection and validation test planning for FY 2001 tests.

3. (U) FY 2001 PLAN:

(U) ($0.250M) Waterfront Repair and Upgrade - Complete initial testing for corrosion stabilization, concrete repair and strengthening with composites. Develop documentation for implementation of new repair and upgrade concepts by both NAVFAC field activities and private-sector contractors. Concepts will be applicable to both repair and upgrade and for both vertical and lateral strengthening.

(U) ($1.299M) Real Property Maintenance (RPM) Backlog Reduction - Continue testing of high temperature airfield pavement, roofing management system, hangar floor coatings systems, moisture-cured urethane coating systems, and additional technologies identified in FY 2000. Begin technology selection and validation test planning for FY 2002 tests.

(U) ($0.275M) Modular Hybrid Pier - Conduct a constructability evaluation of components transitioning from related 6.2 Exploratory Development program. Complete design concept and begin test planning for the major assemblies.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, BA4**	PROGRAM ELEMENT NAME AND NUMBER **Facilities Improvement / PE0603725N**	PROJECT NAME AND NUMBER Navy Facilities System/Y0995

B. (U) OTHER PROGRAM FUNDING SUMMARY: This project transitions waterfront facility technologies from three Navy Exploratory Development (6.2) Research Programs: PE0602121N - Ship, Submarine and Logistics Technology, PE0602234N - Materials, Electronics and Computer Technology, and PE0603712N - Environmental Quality and Logistics Advanced Technology Demonstrations. It also transitions facility technologies developed at universities under the sponsorship of the National Science Foundation (NSF), by the Building and Fire Research Laboratory (BRL) of the National Institute of Standards and Technology (NIST), and by the Constructed Engineering Reserach Laboratories (CERL) and Waterways Experiment Station (WES) of the U. S. Army Corps of Engineers (USACOE) when they can contribute to the solution of one of the Navy requirements being addressed by this project. The project pursures opportunities to leverage private sector investment through partnerships with private sector organizations, such as the Civil Engineering Research Foundation (CERF) and the Composites Institute (CI) of The Society of the Plastics Industry (SPI). The project pursues opportunities to leverage Navy Real Property Maintenance (RPM) and Military Construction (MILCON) investment through partnerships with RPM and MILCON program and project managers .

C. (U) ACQUISITION STRATEGY: This project is categorized as Non-ACAT (Non Acquisition). The information produced from this project for: 1) specifying the performance of the technology, 2) utilization of the technology in designs, 3) control of quality of the technology during constructions, 4) maintenance of the technology during operations, and 5) life-cycle costs of the technology is transitioned to Navy users by being included or referenced by the applicable Naval Facilities Engineering Command policy, guidance, and criteria. Navy Real Property Maintenance (RPM) and Military Construction (MILCON) program and project managers are then able to implement the technologies in their RPM and MILCON proejcts. Private sector capabiilty to provide the new technology for use by the Navy is developed by including both individual contractors and industry organizations in development and testing of the technology.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, BA4**	PROGRAM ELEMENT NAME AND NUMBER **Facilities Improvement / PE0603725N**	PROJECT NAME AND NUMBER Navy Facilities System/Y0995

D. (U) SCHEDULE PROFILE:

FY99	FY00	FY01
High Performance (HP) Magazine		
Complete all documentation required for DDESB approval of design and operating concepts		
Waterfront Facilities Repair and Upgrade		
Completed impulse load assessment methodology using Falling Weight Deflectometer (FWD) Completed advanced fendering and camel systems using composite materials		
	Complete pier and wharf capability upgrades using composites materials	Complete corrosion stabilization, and concrete repair and strengthening
Real Property Maintenance (RPM) Backlog Reduction		
Begin four technology validations Plan FY2000 initiated technology validations	Complete FY 1999 initiated technology validations Continue FY 2000 initiated technology validations Plan FY 2001 initiated technology validations	Complete FY2000 initiated technology validation Continue FY2001 initiated technology validation Plan FY 2002 initiated technology validations
Modular Hybrid Pier		
		Complete design based on transitioned technologies and planning of testing of new components Continue validation testing of components

Exhibit R-3 Cost Analysis (page 1)									DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, BA4**			PROGRAM ELEMENT **Facilities Improvement / PE0603725N**				PROJECT NAME AND NUMBER Navy Facilities System/Y0995						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location		Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
High Performance (HP) Magazine	WX	NFESC Pt. Hueneme, CA		3.478	85	10/98							
	WR	NSWC Indian Head, MD		45	15	10/98							
	WR	LANTDIV Norfolk, VA		334	100	12/98							
	FP	SVERDRUP St. Louis, MO		236	25	02/99							
Waterfront Facilities Repair and Upgrade	WX	NFESC Pt. Hueneme, CA		770	458	06/99	292	10/99	114	10/00			
	WR	NUWC New London, CT		487	200	06/99							
	FP	Contractors TBD Locations TBD					452	04/00	120	05/01			
Real Property Maintenance (RPM) Backlog Reduction	WX	NFESC Pt. Hueneme, CA		200	393	11/98	440	10/99	420	10/00	cont	cont	na
	FP	CERF Washington, DC		45	50	12/98	50	10/99	50	12/00	cont	cont	na
	FP	Contractors TBD Locations TBD			508	09/99	740	06/00	835	05/01	cont	cont	na
Modular Hybrid Pier	WX	NFESC Pt. Hueneme, CA							285	10/00	cont	cont	na
Subtotal Product Development				5.595	1.834		1.974		1.824				

Remarks:
Total Prior Years Cost: Summation starts with FY94. Subtotal does not include performing activities from prior years that are no longer performing activities.

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 2)												DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N**			PROGRAM ELEMENT **Facilities Improvement / PE0603725N**			PROJECT NAME AND NUMBER Navy Facilities System/Y0995						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation												
Operational Test & Evaluation												
Subtotal T&E			0.000	0.000		0.000		0.000		0.000		
Remarks: Included in Product Development costs.												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support												
Travel												
Labor (Research Personnel)												
Overhead												
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks: Not applicable.												
Total Cost			5.595	1.842		1.974		1.824			Cont	Cont
Remarks:												

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Exhibit R-3, Project Cost Analysis
(Exhibit R-3, page 8 of 8)

UNCLASSIFIED

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY BA 4**					R-1 ITEM NOMENCLATURE Ship Self Defense/0603755N					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**15.756**	**8.607**	**6.610**	**8.919**	**9.064**	**9.270**	**9.678**	**CONT.**	**CONT.**
QRCC / K2133/U2133/22133		**6.863**	**2.984**	**0.000**	**2.166**	**2.177**	**2.224**	**2.471**	**CONT.**	**CONT.**
Force AAW Coord. Tech. (FACT)/ K2184/U2184		**8.893**	**5.623**	**6.610**	**6.753**	**6.887**	**7.046**	**7.207**	**CONT.**	**CONT.**
Quantity of RDT&E Articles										

A. (U) Mission Description and Budget Item Justification:

This program incorporates efforts dedicated to the enhancement of ship self defense against Anti-Air Warfare (AAW) threats. Its primary focus is on the development of technologies, systems, and procedures necessary to defeat the evolving Anti-Ship Cruise Missile (ASCM) threat. These projects focus on ship defense improvements through the development of advanced concepts and capabilities that will enhance both defense in depth of ships in a force and self defense of individual ships in a littoral war-fighting environment. Quick Reaction Combat Capability (QRCC), Project K2133, provides advanced concepts and technology developments for the multi-sensor integration of ship detection equipment, integration and coordination of ship self defense weapons, and coordination of hardkill and softkill assets to improve individual ship self defense capabilities against the ASCM threat. Force Anti-Air Warfare Coordination Technology (FACT), Project K2184, demonstrates Force Anti-Air Warfare (AAW) concepts and capabilities which will enhance the AAW war-fighting ability of ships and aircraft and enable the coupling of the Force into a single, distributed AAW weapon system through more effective use of tactical data, and force sensors and weapons.

B. (U) Program Change Summary

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	12.120	5.654	7.707
Appropriated Value:	12.337	8.654	
Adjustment to FY 1999/2000 Appropriated Value/			
FY 2000 President's Budget:	3.419	-0.047	-1.097
FY 2001 PRES Budget Submit:	15.756	8.607	6.610

Funding: FY99 reductions are due to congressional undistributed reductions of (-$.547), CVN-68 integration (+$2.597), BTR of (+$1.400) and minor pricing adjustments (-$31). FY2000 decrease due to minor princing adjustments (-$0.047). FY 2001 Affordability reduction of (-$1.000), and other minor pricing adjustments ($0.097).

FY 2000 PLAN: ($0.611) Portion of extramural program is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

CLASSIFICATION: **UNCLASSIFIED**

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N BA4**	PROGRAM ELEMENT NAME AND NUMBER **SHIP SELF DEFENSE 063755N**				PROJECT NAME AND NUMBER: FORCE AAW COORDINATION TECHNOLOGY K2184/U2184					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**8.893**	**5.623**	**6.610**	**6.753**	**6.887**	**7.046**	**7.207**	**CONT.**	**CONT.**
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification: Force Anti-Air Warfare Coordination Technology (FACT) Program is an advanced development effort designed to demonstrate Force Anti-Air Warfare (AAW) concepts and capabilities which will significantly improve our Force defense in depth, including both local area and self defense capabilities against current and future AAW threats. FACT improvements are designed to enhance the AAW warfighting ability of ships and aircraft and to enable coupling of the Force into a single, distributed AAW weapon system and towards more effective use of tactical data and the cooperative use of all the force sensors and weapons. These capabilities will provide the ship defense flexibility needed to meet the threat brought about by increasing numbers of highly sophisticated weapons held by potentially hostile third world countries. FACT defines requirements and develops prototype systems or modifications to existing systems to test new concepts for the coordination of Force AAW operations. Some examples of prototype systems now in production are AN/SPS-48C Detection Data Converter, AN/SPS-48E Environmental Control Feature, Shipboard Gridlock System Automatic Correlation (SGS/AC) and Dial-a-Track Link-11 Quality Selection. Other FACT developments nearing production stages are the Automatic Identification System (Auto-ID) and the Multi-Frequency Link-11 capability; Dual Net Multi-Frequency Line (DNMFL); Force Threat Evaluation Weapons Assignment (FTEWA); and the prototype Area Air Defense Commander (AADC) capability. Short and long term objectives will be phased in to produce higher degrees of ship defense and battle coordination and effectiveness.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

(U) FY 1999 ACCOMPLISHMENTS:
- (U) ($4.815) Continued AADC concept development and evaluation, beginning the integration of air space deconfliction capabilities, Combat Air Patrol (CAP) stationing, and Engage on Remote (EOR).
- (U) ($3.263) Supported DNMFL experiments in IKE Battle Group, USS LaSalle; supported AADC experiments with the AADC prototypes at land based facilities and at-sea (USS SHILOH and MT WHITNEY).
- (U) ($.815) Supported Navy and Joint link interoperability

CLASSIFICATION: **UNCLASSIFIED**

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N BA4	**SHIP SELF DEFENSE 0603755N**	FORCE AAW COORDINATION TECHNOLOGY K2184/U2184

(U) FY 2000 PLAN:
- (U) ($1.448) Continue concept development of advanced air defense command and control capabilities, including development of concepts to support CAP/SAM coordination, Joint Fires airspace coordination, coordinated cooperative engagements, and advanced air defense capabilities, including Upper Tier Systems.
- (U) ($0.852) Support landbased and at-sea experiments of advanced Command and Control systems to evaluate air defense concepts and capabilities, including multi-TADIL operations, and air defense operations.
- (U) ($1.000) Develop concepts and capabilities to support the integration of Multi-TADIL and cooperative engagement networks across Joint air defense systems, improve Navy and Joint Link interoperability.
- (U) ($0.150) Provide top-level programmatic support, technical analysis, and assist in the development of processes, procedures, and documentation that impact the execution of the FACT program requirements.
- (U) ($2.173) Develop concepts and define requirements for detection, control and engagement of time sensitive targets beyond the Fire Support Coordination Line (FSCL).

(U) FY 2001 PLAN:
- (U) ($0.852) Support landbased and at-sea experiments of advanced Command and Control systems to evaluate air defense concepts and capabilities, including multi-TADIL operations, and air defense operations.
- (U) ($1.000) Develop concepts and capabilities to support the integration of Multi-TADIL and cooperative engagement networks across Joint air defense systems, improve Navy and Joint Link interoperability.
- (U) ($ 4.758) Develop concepts and define requirements for detection, control and engagement of time sensitive targets beyond the Fire Support Coordination Line (FSCL).

EXHIBIT R-2a, RDT&E Project Justification		DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY	PROGRAM ELEMENT NAME AND NUMBER	PROJECT NAME AND NUMBER
RDT&E, N BA 4	SHIP SELF DEFENSE	FORCE AAW COORDINATION TECHNOLOGY K2184/U2184

B. (U) Other Program Funding Summary: Not applicable.

C. (U) Acquisition Strategy: Not applicable

D. (U) Schedule Profile: Not applicable

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 1)											DATE: February 2000		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N BA 4**			PROGRAM ELEMENT **SHIP SELF DEFENSE 0603755N**			PROJECT NAME AND NUMBER : FORCE AAW COORDINATION TECHNOLOGY K2184/U2184							
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract	
Primary Hardware Development	CPFF	APL/LAUREL, MD	50.408	7.840	10/98	5.623	10/99	6.610	10/00	CONT.	CONT		
Systems Engineering		SPAWAR, S.D.		0.150	08/99								
Systems Engineering		SPAWAR, NORFOLK		0.417	06/99								
Systems Engineering		PUGET SOUND BOSTON		0.029	04/99								
Tooling													
GFE													
Award Fees													
Subtotal Product Development			50.408	8.436		5.623		6.610		CONT.	CONT		
Remarks:													
Development Support Equipment													
Software Development													
Training Development													
Integrated Logistics Support		NSWC/PHD		0.175	08/99								
Integrated Logistics Support		NSLC MECH. PA		0.005	09/99								
Integrated Logistics Support	GSA	AMERIND		0.111	07/99								
Configuration Management													
Technical Data													
GFE													
Subtotal Support			0.000	0.291		0.000		0.000		0.000	0.291		
Remarks:													

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 2)												DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N BA4**			PROGRAM ELEMENT **SHIP SELF DEFENSE 0603755N**			PROJECT NAME AND NUMBER: FORCE AAW COORDINATION TECHNOLOGY K2184/U2184						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation												
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												
Contractor Engineering Support	CPAF	RGE, SPRINGFIELD, VA		0.006	05/99							
Contractor Engineering Support	CPFF	SPA, FAIRFAX, VA		0.100	09/99							
Contractor Engineering Support	CPFF	LOGICON,FALLS CHUR, VA		0.060	04/99							
Government Engineering Support												
Program Management Support												
Travel												
Labor (Research Personnel)												
Overhead												
Subtotal Management			0.000	0.166		0.000		0.000		0.000	0.166	
Remarks:												
Total Cost			50.408	8.893		5.623		6.610		CONT.	CONT.	CONT.
Remarks:												

CLASSIFICATION: **UNCLASSIFIED**

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N**	PROGRAM ELEMENT NAME AND NUMBER **SHIP SELF DEFENSE 0603755N**				PROJECT NAME AND NUMBER Quick Reaction Combat Capability (QRCC)/22133					
COST ($ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost	**0.000**	**6.863**	**2.984**	**0.000**	**2.166**	**2.177**	**2.224**	**2.471**	**CONT.**	**CONT.**
RDT&E Articles Qty										

A. Mission Description and Budget Item Justification: Quick Reation Combat Capability (QRCC) provides advanced concepts and technology developments for the multi-sensor integration of ship detection equipment, integration and coordination of ship self defense weapons, and coordination of hardkill and softkill assets to improve individual ship self defense capabilities against the ASCM threat. The funding for the Self Defense Test Ship is for the dry-docking and overhaul of the Self Defense Test Ship to extend the service life for another 4 years.

1. (U) FY 1999 ACCOMPLISHMENTS:
   (U) (1.804) Conduct the LPD-17 Analysis of Alternatives including capstone requirement analysis.
   (U) (2.597) Began systems engineering for the QRCC integration efforts on CVN-68.
   (U) (2.462) Completed follow-on test and evaluation on Self Defense Test Ship for SSDS MK1.

2. (U) FY 2000 PLAN:
   (U) (2.984) Complete dry-docking and overhaul of the Self Defense Test Ship.

3. (U) FY 2001 PLAN:
   Not Applicable

B. Other Program Funding Summary: Not Applicable

C. Acquisition Strategy: Not Applicable

D. Schedule Profile:

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 1)											DATE: February 2000		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N**			PROGRAM ELEMENT **SHIP SELF DEFENSE 0603755N**			PROJECT NAME AND NUMBER Ship Self Defense/22133						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development											0.000	
Ancillary Hardware Development											0.000	
Systems Engineering	Various	Various		4.955						0.000	4.955	
Licenses											0.000	
Tooling											0.000	
GFE											0.000	
Award Fees											0.000	
Subtotal Product Development				4.955		0.000		0.000		0.000	4.955	
Remarks:												
Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support				0.000		0.000		0.000		0.000	0.000	
Remarks:												

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 2)											DATE: February 2000		
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N**			PROGRAM ELEMENT **SHIP SELF DEFENSE 0603755N**			PROJECT NAME AND NUMBER Ship Self Defense/22133							
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	PHD NSWC, CA		1.748		2.984				CONT.	CONT.	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E				1.748		2.984		0.000		CONT.	CONT.	
Remarks:												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support	CPFF	Various		0.150						CONT.	CONT.	
Travel				0.010							0.010	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management				0.160		0.000		0.000		CONT.	CONT.	
Remarks:												
Total Cost				6.863		2.984		0.000		CONT.	CONT.	CONT.
Remarks:												

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2000

UDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603790N PROJECT NUMBER: R2293
PROGRAM ELEMENT TITLE: NATO Research and Development PROJECT TITLE: NATO Cooperative R&D

U) COST: (Dollars in Thousands)

ROJECT UMBER & ITLE	FY 1999 ACTUAL	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
2293 NATO Cooperative Research and Development (R&D)	9,664	5,431	8,992	11,565	11,637	11,830	12,331	CONT.	CONT.

. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This program implements the provisions of Title 10 U.S. Code, ection 2350a, Cooperative Research and Development (R&D) Projects: Allied Countries. The objective is to improve, through he application of emerging technologies, the conventional defense capabilities of the United States, the North Atlantic reaty Organization (NATO), and U.S. major non-NATO allies. This program element only funds the U.S. equitable share of the ooperative R&D project and is only spent in the U.S. Projects are implemented with allied partners through international greements that define the scope, cost and work sharing arrangements, management, contracting, security, data protection and hird party transfers. The international agreements supported by this project are US Department of Defense and Department of he Navy signed commitments to joint projects with our allies. The projects jointly develop equipment to improve US and llied operational capabilities as well as achieve interoperability and standardization. Funds support all the R&D cost ncluding the identification of cooperative opportunities and administration of the program. All funds are used to pay for he U.S. work share in the United States at U.S. Government and U.S. contractor's facilities. The planned program is shown elow. The final program will be reported separately as required by Title 10 U.S. Code, Section 2350a.

U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and ntegrates hardware for experimental tests related to specific ship or aircraft applications.

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2000

UDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603790N PROJECT NUMBER: R2293
PROGRAM ELEMENT TITLE: NATO Research and Development PROJECT TITLE: NATO Cooperative R&D

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

2. (U) FY 1999 ACCOMPLISHMENTS:
   - (U) ($1,000) Supported on-going work related to the U.S./United Kingdom Anti-Torpedo Torpedo cooperative Research and Development project.
   - (U) ($1,600) Supported on-going work related to the cooperative R&D program between the U.S. and United Kingdom for Trimaran Hull initiated with OSD funding.
   - (U) ($1,100) Supported on-going work on the U.S./Japanese Cooperative Material Project for Advanced Steel.
   - (U) ($2,500) Supported work on the Vector Project between the U.S. and Germany.
   - (U) ($ 756) Supported efforts on the High Speed Protocol Project with France.
   - (U) ($ 539) Supported work on the Unmanned Undersea Vehicle cooperative R&D project between the U.S. and France initiated with OSD funding.
   - (U) ($1,169) Supported on-going Navy work related to the U.S./United Kingdom development of the Intercooled Recuperated (ICR) Gas Turbine Engine.
   - (U) ($1,000) Supported Norwegian Mineclearing.

3. (U) FY 2000 PLAN:
   - (U) ($1,766) Support work on the Vector Project between the U.S. and Germany.
   - (U) ($ 373) Support Fiber Optic Bottom Mounted Acoustic Array.
   - (U) ($ 752) Support efforts on the Multilateral Memorandum of Understanding for Interoperable Network for Secure Communications.
   - (U) ($ 327) Support on-going work related to the U.S./United Kingdom Anti-Torpedo Torpedo cooperative R&D project.

- (U) ($ 650) Support on-going Navy efforts on the U.S./Japanese Cooperative Material Project for Advanced Steel initiated with OSD funding.
- (U) ($ 373) Support work on the Unmanned Undersea Vehicle cooperative R&D project between the U.S. and France initiated with OSD funding.
- (U) ($1,190) Support on-going work related to the cooperative R&D project between the U.S. and United Kingdom for Timaran Hull initiated with OSD funding

4. (U) FY 2001 PLAN:

- (U) ($2,450) Support work on the Vector Project between the U.S. and Germany.
- (U) ($1,942) Support efforts on the Multilateral Memorandum of Understanding for Interoperable Network for Secure Communications.
- (U) ($1,400) Support work on the Allied Warfare Project between the U.S. and United Kingdom.
- (U) ($ 700) Support Fiber Optic Bottom Mounted acoustic Array.
- (U) ($1,100) Support work on the Six (6) Degrees of Freedom Ship Roll Project with Italy.
- (U) ($1,400) Support work on the Network Centric Battlespace Management Project between the U.S. and United Kingdom

. (U) PROGRAM CHANGE SUMMARY:

	FY 1999	FY 2000	FY 2001
(U) FY 2000 President's Budget:	8,852	5,461	9,053
(U) Appropriated Value:			
(U) Adjustments from PRESBUDG:			
(U) Congressional Rescissions		-30	
(U) Execution Adjustment	868		

FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2000

UDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603790N PROJECT NUMBER: R2293
PROGRAM ELEMENT TITLE: NATO Research and Development PROJECT TITLE: NATO Cooperative R&D

(U) SBIR/STTR Adjustment	-15		
(U) Various Rate Adjustments	-41		
(U) NWCF Rate Adjustments			-54
(U) Strategic Source Adjustments			-7
(U) FY 2001 PRESBUDG Budget Submission:	9,664	5,431	8,992

(U) CHANGE SUMMARY EXPLANATION:

(U) Schedule: Not applicable.

(U) Technical: Not applicable.

. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

(U) RELATED RDT&E:
(U) PE 0603790D (NATO Cooperative Research and Development)
(U) PE 0605853N (Management, Technical and International Support)
(U) PE 0605130D (Foreign Comparative Testing)

. (U) SCHEDULE PROFILE: Not applicable.

FY 2001 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 2000

UDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603790N PROJECT NUMBER: R2293
PROGRAM ELEMENT TITLE: NATO Research and Development PROJECT TITLE: NATO Cooperative R&D

. (U) PROJECT COST BREAKDOWN: ($ in thousands)

roject Cost Categories	FY 1999	FY 2000	FY 2001
. Cooperative Research and Development	9,664	5,431	8,992

. (U) BUDGET ACQUISITION HISTORY AND PLANNING INFORMATION:

ERFORMING ORGANIZATIONS

ontractor/ overnment erforming ctivity	Contract Method/ Fund Type Vehicle	Award/ Oblig Date	Perform Activity EAC	Project Office EAC	FY 1999 Actual	FY 2000 Budget	FY 2001 Budget	To Complete	Total Program
roduct Development									
estinghouse	C/CPAF	12/26/91			400	0	0	CONT.	CONT.
SWC-CD	WX	1/31/97			1,610	180	550	CONT.	CONT.
oeing					2,000	1,500	2,300		
iscellaneous					5,654	3,751	6,142	CONT.	CONT.

upport and Management: Not applicable.

est and Evaluation: Not applicable.

OVERNMENT FURNISHED PROPERTY: Not applicable.

FY 2001 RDT&E,N PROGRAM ELEMENT/PROJECT COST BREAKDOWN DATE: February 2000

UDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603790N PROJECT NUMBER: R2293
PROGRAM ELEMENT TITLE: NATO Research and Development PROJECT TITLE: NATO Cooperative R&D

	FY 1999 Actual	FY 2000 Budget	FY 2001 Budget	To Complete	Total Program
ubtotal Product Development	9,664	5,431	8,992	CONT.	CONT.
ubtotal Support and Management	0	0	0	0	0
ubtotal Test and Evaluation	0	0	0	0	0
otal Project	9,664	5,431	8,992	CONT.	CONT.

CLASSIFICATION: **UNCLASSIFIED**

EXHIBIT R-2, RDT&E Budget Item Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**					R-1 ITEM NOMENCLATURE Gun Weapons Systems Technology/0603795N					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		**87.466**	**116.839**	**143.044**	**125.772**	**57.278**	**57.737**	**83.536**	**CONT**	**CONT**
NSFS/K2156/K2624*		**61.038**	**62.291**	**51.969**	**32.991**	**12.920**	**7.662**	**14.892**	**CONT**	**CONT**
ALAM/K2324		**0.501**	**0.000**	**19.809**	**33.141**	**11.874**	**28.676**	**48.425**	**CONT**	**CONT**
NFCS/K2325		**18.560**	**26.864**	**49.027**	**40.520**	**24.699**	**21.399**	**20.219**	**CONT**	**CONT**
LASM/K2409		**7.367**	**21.717**	**22.239**	**19.120**	**7.785**	**0.000**	**0.000**	**0.000**	**80.928**
NSWC Continuous Processor/K2771 **		**0.000**	**5.967**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**5.967**
Quantity of RDT&E Articles & Cost (see attached projects)										

* Funding includes the following Congressional adds for ERGM Project K2624: FY 1999 $7.745M and FY 2000 $9.945M.

** FY 2000 Congressional add for Continuous Processor, Naval Surface Warfare Center, Indian Head.

A. (U) Mission Description and Budget Item Justification: The Gun Weapons Systems Technology program element supports the Naval Surface Fire Support (NSFS) mission. In order to meet the United States Marine Corp (USMC) requirements for NSFS in support of Operational Maneuvers from the Sea (OMFTS), the Navy is developing a variety of weapons systems including both gun and missile systems that can provide the required range, lethality, accuracy, and responsiveness. The NSFS program (**Project K2156/K2624**) develops gun systems including the 5"/62 gun (a modification of the existing 5"/54 gun); a 5" Extended Range Guided Munition (ERGM) with a coupled internal Global Positioning System (GPS) and Inertial Navigation System (INS) capable of delivering a submunition payload to a range of 63 Nautical Miles (NM); and associated propelling charge improvements. In order to satisfy USMC requirements for longer range, responsive fire support, the Navy is developing a land attack variant of the Land Attack Standard Missile (LASM) (**Project K2409**). In addition, the Advance Land Attack Missile (ALAM) (**Project K2324**) is being developed to expand the interim LASM capability using upcoming technology to fully meet extended range requirements and service the land attack target set as derived from the OMFTS strategy. The Naval Fires Control System (NFCS) (**Project K2324**) develops systems that will support mission planning for 5"/62 – ERGM and Land Attack Missiles. It will automate shipboard land attack battle management duties to be interoperable and consistent with joint C4ISR systems. These shipboard weapon systems will significantly improve the Navy's ability to support OMFTS. This program element also includes the transition of Advance Technology Demonstrations (ATDs) and Pre-Planned Product Improvements (P3Is) into the NSFS program. In FY 2000 this program element includes a Congressional addition for the Continuous Processor, Naval Surface Warfare Center, Indian Head (NSWC IH) (**Project K2771**). The continuous processor program will support the advancement and implementation of a lower cost, safer, and less polluting technology for the manufacturing of energetics that will benefit many Navy systems that rely on energetic materials to meet their operational requirements.

EXHIBIT R-2, RDT&E Budget Item Justification	DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RESEARCH DEVELOPMENT TEST & EVALUATION, NAVY/BA-4**	R-1 ITEM NOMENCLATURE Gun Weapons Systems Technology/0603795N

B. (U) Program Change Summary:

	FY 1999	FY 2000	FY 2001
FY 2000 President's Budget:	78.858	101.489	93.494
Appropriated Value:	105.604	117.488	
Adjustment to FY 1999/2000 Appropriated Value/ FY 2000 President's Budget:	-18.138	-0.649	49.550
FY 2001 President's Budget Submit:	87.466	116.839	143.044

Funding:
FY 1999: Adjustment is due to termination of the NTACMS program ($-11.301), transfer of Vertical Gun Advanced System (VGAS) to PE 0603513N ($-15.169), increases for Micro-Electro-Mechanical System (MEMS) ($+1.500), Land Attack Standard Missile ($+7.400), ERGM ($+2.033), and Advanced Land Attack Missile (ALAM) ($+0.501), a SBIR/STTR transfer ($-1.591), and decreases for various minor adjustments ($-1.511).
FY2000: Adjustment is due to various minor adjustments ($-0.649).
FY 2001: Adjustment is due to increases for ERGM ($+11.800), Naval Fires Control System ($+19.000), and ALAM ($+20.000), and decreases for various minor adjustments ($-1.250).

Note: In accordance with 15 USC 638, $2.21M in FY 2000 is reserved for the Small Business Innovation Research (SBIR) assessment.

Schedule: Since the ERGM contract award in September 1996, the contractor has experienced numerous technical challenges. In addition, the prime contractor recently closed its developmental plant in Lewisville, TX and moved ERGM related development activities to Tucson, AZ. The prime contractor has submitted a proposal to rebaseline the ERGM program to address the technical challenges and the move to Tucson. The Government is still in negotiation for resolution.

Technical: N/A

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Gun Weapons Systems Tech/0603795N**				PROJECT NAME AND NUMBER Naval Surface Fire Support/K2156/2624					
COST ($ in Millions)		FY 1999*	FY 2000**	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**61.038**	**62.291**	**51.969**	**32.991**	**12.920**	**7.662**	**14.892**	**CONT**	**CONT**
RDT&E Articles Qty					**80**					

* FY 1999 funding includes $7.745M Congressional Plus Up for ERGM Project K2624; BTR 99-55 for $4.033M for ERGM/MEMs K2156.
** FY2000 funding includes $9.945M Congressional Plus Up for ERGM Project K2624.

A. (U) Mission Description and Budget Item Justification: These funds provide for the development of the 5"/62 Extended Range Guided Munition (ERGM) weapons system which consists of a: 5" MK 45 gun modification which strengthens the gun to accommodate higher firing loads (18 megajoules) to fire the EX 171 Extended Range Guided Munition (ERGM); ERGM, a 5" munition with an internal Global Positioning System receiver coupled with an inertial Navigation System capable of delivering a submunitions to a range of 63NM; a gun fire control system which updates the MK 160 MOD 7 to a MOD 8 providing direct digital interface with the gun as well as the ERGM; and an upgraded propelling charge to provide the higher gun firing energy required by ERGM. This project also includes the transition of ATDs and P^3Is into the NSFS envelope.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:
- (U) ($38.228) Continued development of EX-171 EDMs for ERGM. Continued rocket motor testing and component integration.
- (U) ($ 4.492) Continued development of EX-167 Propelling Charge.
- (U) ($10.868) Continued development of 5" MK 45 modification and Government Furnished Property (GFP) preparation. Commenced test firing.
- (U) ($ 4.820) Continued development of the Gun Fire Control modification and required interfaces.
- (U) ($ 1.130) Analyzed life cycle costs and evaluated tradeoffs.
- (U) ($ 1.500) Continue development of the Micro-Electro-Mechanical System (MEMS).

2. (U) FY 2000 PLAN:
- (U) ($42.629) Continue development of EX-171 EDMs for ERGM. Continue rocket motor testing and component integration.
- (U) ($ 1.406) Continue development of EX-167 Propelling Charge.
- (U) ($ 11.500) Continue development of 5" MK 45 Modification and GFP preparation.
- (U) ($ 4.240) Continue development of the Gun Fire Control modification and required interfaces.
- (U) ($ 2.016) Analyze life cycle costs and evaluated tradeoffs

EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Gun Weapons Systems Tech/0603795N**	PROJECT NAME AND NUMBER Naval Surface Fire Support/K2156/2624	

2. (U) FY 2000 PLAN: (Continued)
- (U) ($ 0.500) Continue development of the Micro-Electro-Mechanical System (MEMS).

3. (U) FY 2001 PLAN:
- (U) ($39.120) Continue development of EX-171 EDMs for ERGM. Continue rocket motor testing and component integration.
- (U) ($ 1.448) Continue development of EX-167 Propelling Charge.
- (U) ($ 6.800) Continue development of 5" MK 45 modification and GFP preparation. Commence test firing of the modification.
- (U) ($ 2.695) Continue development of the Gun Fire Control Modification and required interfaces.
- (U) ($ 1.906) Analyze life cycle costs and evaluated tradeoffs.

B. (U) Other Program Funding Summary:

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
PAN,MC BL, 025300	14.225	2.992	5.723	6.233	32.155	56.982	0.000	CONT.	CONT.

(U) Related RDT&E,N: N/A

C. (U) Acquisition Strategy: A competition was held in FY 96 for the ERGM. It resulted in an award to Texas Instruments (now Raytheon Systems Company) with a corporate investment of 47.5% of development cost. The gun is being developed under a sole source arrangement with United Defense, the current MK 45 MOD 2 producer. The Fire Control (MK 160) and the propelling charge are being developed by the Naval Surface Warfare Center, Indian Head since they are modifications to current government owned/supplied equipment.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Gun Weapons Systems Tech/0603795N**	PROJECT NAME AND NUMBER Naval Surface Fire Support/K2156/2624

D. (U) Schedule Profile:

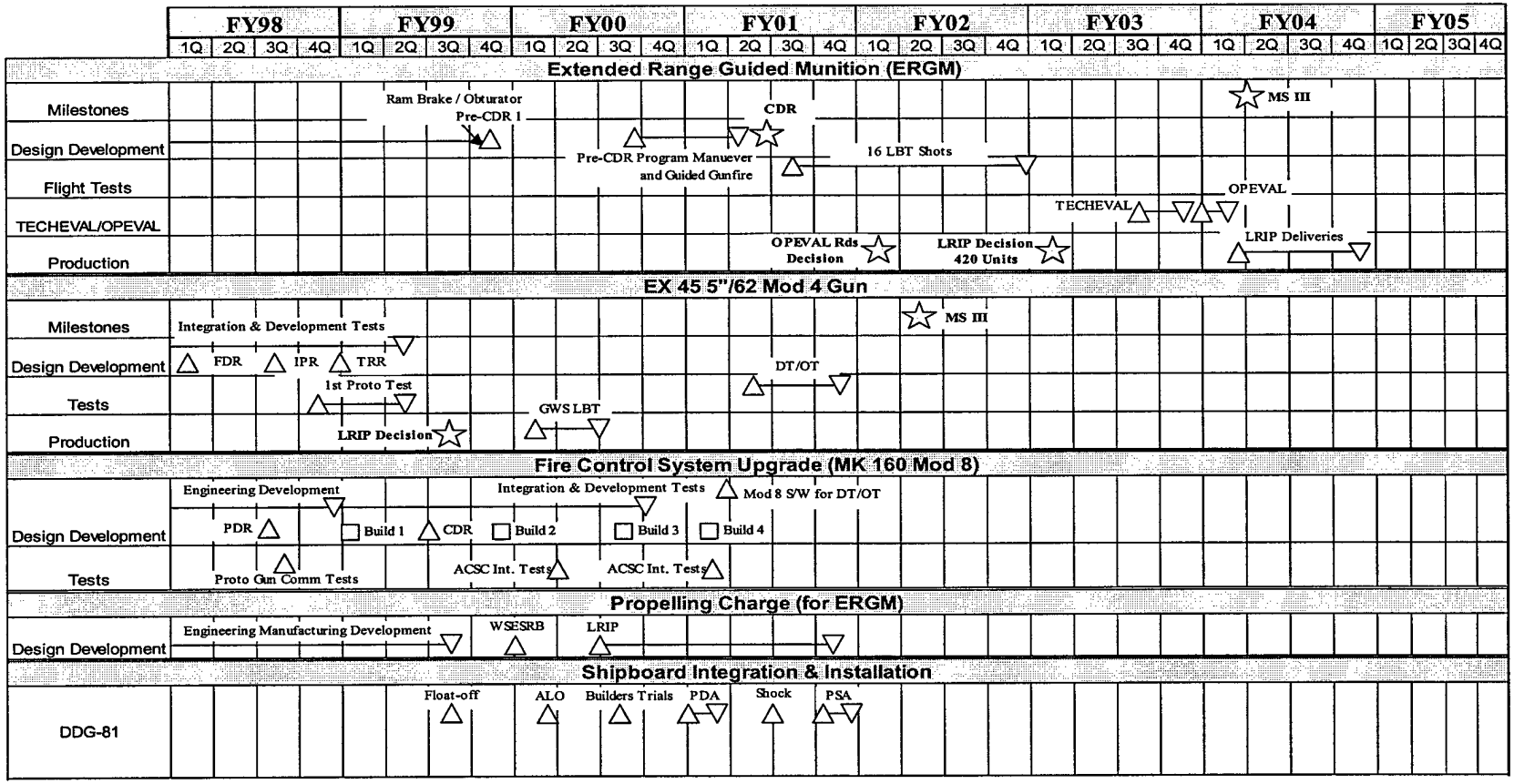

Exhibit R-3 Cost Analysis (page 1)

DATE: **February 2000**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N/BA-4**

PROGRAM ELEMENT: **Gun Weapons Systems Tech/0603795N**

PROJECT NAME AND NUMBER: Naval Surface Fire Support/K2156/2624

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target of Contract
Primary Hardware Development	CPFF	UDLP, Minneapolis, MN	42.961	8.517	10/98	7.200	12/99	5.400	10/00	CONT	CONT	44.726
	CPAF/IF	Raytheon Texas Inst.,	33.237	23.428	10/98	29.952	Various	25.200	10/00	CONT	CONT	87.000
	WR	NSWC Dahlgren, VA	39.999	16.868	10/98	17.174	11/99	13.063	10/00	CONT	CONT	N/A
	WR	NSWC Indian Head, MD	11.024	4.065	10/98	1.899	11/99	1.841	10/00	CONT	CONT	N/A
	WR	NSWC Port Hue., CA	23.096	2.290	10/98	2.343	11/99	2.283	10/00	CONT	CONT	N/A
MEMS	VAR	Miscellaneous	0.000	1.500	Various	0.500	Various	0.000		CONT	CONT	N/A
Systems Engineering	VAR	Miscellaneous	48.357	3.623	10/98	2.975	11/99	4.000	10/00	CONT	CONT	N/A
Award Fees	CPAF/IF	Raytheon Texas Inst.,	1.123	0.647	6/99	0.148	12/99; 6/00	0.082	12/00; 06/01	0.019	2.019	2.070
Subtotal Product Development			199.797	60.938		62.191		51.869		CONT	CONT	CONT

Remarks: The budget for each development contract is higher than the target value based on the program managers estimate of what will be needed to cover changes to requirements and cost growths.

Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks:

Exhibit R-3 Cost Analysis (page 2)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N/BA-4**

PROGRAM ELEMENT: **Gun Weapons Systems Tech/0603795N**

PROJECT NAME AND NUMBER: Naval Surface Fire Support/K2156/2624

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation											0.000	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks: Test & Evaluation included with hardware development.												
Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support											0.000	
Travel	PD	NAVSEA HQ	0.223	0.100	Various	0.100	VAR	0.100	VAR	CONT	CONT	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.223	0.100		0.100		0.100		CONT	CONT	
Remarks:												
Total Cost			200.020	61.038		62.291		51.969		CONT	CONT	CONT
Remarks:												

EXHIBIT R-2a, RDT&E Project Justification							DATE: **February 2000**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Gun Weapons Systems Tech/0603795N**				PROJECT NAME AND NUMBER Advanced Land Attack Missile/K2324					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**0.501**	**0.000**	**19.809**	**33.141**	**11.874**	**28.676**	**48.425**	**CONT**	**CONT**
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification: The Advanced Land Attack Missile (ALAM) and its associated weapons control system is intended to expand present interim capability provided by LASM in Aegis ships and to fully meet extended range requirements beyond present capability and service the land attack target set as derived from the OMFTS strategy. This capability shall be introduced into the DD21 Land Attack Destroyer to supplement its operational Mission Needs Statement. The ALAM will exploit upcoming technologies to service high threat mobile and stationary targets during all stages of conflict. It will be compatible with and integrated into future theater level command, control and other support weapons and systems. The program will proceed to a Milestones I and II decision in FY 2001 and FY 2003, respectively.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:
- (U) ($0.501) Initiated Analysis of Alternatives (AOA).

2. (U) FY 2000 PLAN: ($0)

3. (U) FY 2001 PLAN:
- (U) ($19.809) Complete analysis of alternatives: Initiate concept development; Begin program development and risk reduction; Continue program planning and execution for Milestone I and Preliminary Design Review (PDR).

B. (U) Other Program Funding Summary: N/A

- (U) Related RDT&E,N: N/A

C. (U) Acquisition Strategy: Competitive development program FY01-03, down selected in FY03 after demo/fly-off.

EXHIBIT R-2a, RDT&E Project Justification			DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E, N/BA-4	PROGRAM ELEMENT NAME AND NUMBER Gun Weapons Systems Tech/0603795N	PROJECT NAME AND NUMBER Advanced Land Attack Missile/K2324	

D. (U) Schedule Profile:

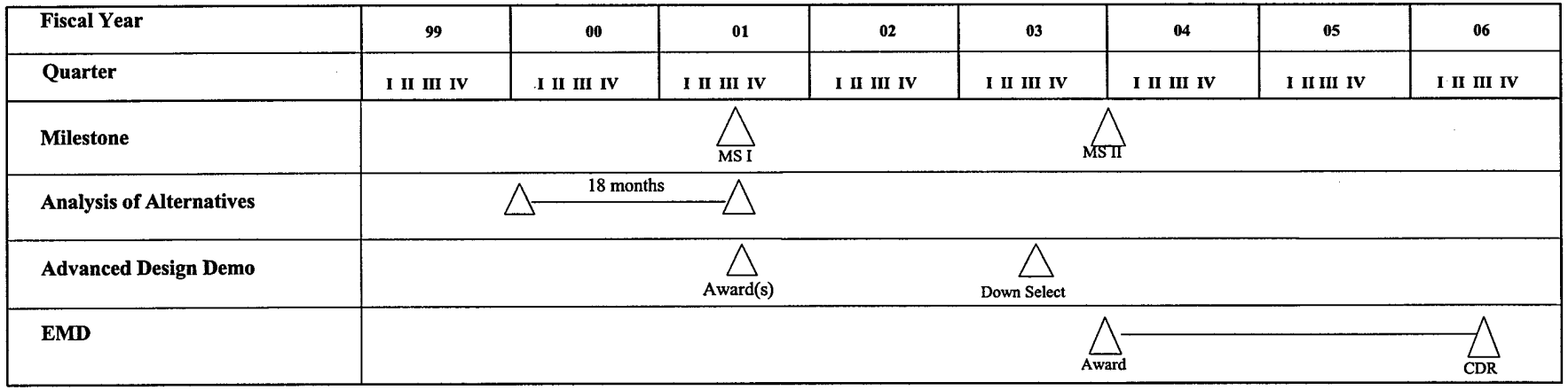

Exhibit R-3 Cost Analysis (page 1)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**			PROGRAM ELEMENT **Gun Weapons Systems Tech/0603795N**			PROJECT NAME AND NUMBER Advanced Land Attack Missile/K2324						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target of Contract
Primary Hardware Dev Phase I & II	C/CP	ALAM Industry Team						15.000	10/00 & 3/01			
Ancillary Hardware Development												
Systems Engineering	WR	NSWC, Dahlgren, VA	0.000	0.155		0.000		1.000	10/00	CONT	CONT	
	SS/CPFF	JHU/APL	0.000	0.090		0.000		1.000	10/00	CONT	CONT	
	WR	NAWC, China Lake, CA	0.000	0.000		0.000		0.309	10/00	CONT	CONT	
	VAR	Various (AOA contractors)	0.000	0.090		0.000		0.800	11/00	CONT	CONT	
Tooling												
GFE												
Award Fees												
Subtotal Product Development			0.000	0.335		0.000		18.109		CONT	CONT	CONT
Remarks: The budget for each development contract is higher than the target value based on the program managers estimate of what will be needed to cover changes to requirements and cost growths.												
Development Support Equipment												
Software Development												
Training Development												
Integrated Logistics Support												
Configuration Management												
Technical Data												
GFE												
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	
Remarks:												

Exhibit R-3 Cost Analysis (page 2)								DATE: February 2000				
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**			PROGRAM ELEMENT **Gun Weapons Systems Tech/0603795N**			PROJECT NAME AND NUMBER Advanced Land Attack Missile/K2324						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation												
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E			0.000	0.000		0.000		0.000			0.000	
Remarks:												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support	VAR	VARIOUS	0.000	0.166		0.000		1.600	11/00	CONT	CONT	
Travel	PD	NAVSEA HQ	0.000	0.000		0.000		0.100	VAR	CONT	CONT	
Labor (Research Personnel)												
Overhead												
Subtotal Management			0.000	0.166		0.000		1.700		CONT	CONT	
Remarks:												
Total Cost			0.000	0.501		0.000		19.809		CONT	CONT	CONT
Remarks:												

CLASSIFICATION: **UNCLASSIFIED**

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Gun Weapons Systems Tech/0603795N**				PROJECT NAME AND NUMBER Naval Fires Control System/K2325					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**18.560**	**26.864**	**49.027**	**40.520**	**24.699**	**21.399**	**20.219**	**CONT**	**CONT**
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification: Naval Fires Control System (NFCS) covers the mission planning and coordination for future Naval Surface Fire Support system requirements. NFCS will plan, coordinate and manage the firing of the new Naval Surface Fires Support (NSFS) weapon systems including the 5"/62 caliber gun and the Land Attack Standard Missile (LASM) and LASM Fire Control. It will be available to amphibious ships, command ships, and the DD-21 program if selected by the full service contractor. The software may ultimately be integrated into future Tactical TOMAHAWK Weapons Control Systems (TTWCS), but will initially be hosted in the existing combat suite on DDG-81 for fleet introduction in FY 2002. Prototyping, demonstrations and developments will be conducted during FY 1999, FY 2000 and FY 2001.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:
- (U) ($12.066) Software development and system engineering including analysis, design and reuse of existing government and commercial computer programs to support ERGM, LASM, and other naval weapon applications.
- (U) ($ 4.050) Identified and configured hardware configuration to support NFCS implementation.
- (U) ($ 1.174) Technical Direction Agent support, joint requirements investigation, Concept of Operations (CONOPs) scenario development.
- (U) ($ .300) C4I and combat system interface investigation and analysis including Battle Force Tactical Trainer (BFTT), LINK 16, TTWCS and other developing C4I system and technology.
- (U) ($ .970) Developmental testing, and logistic support elements development.

2. (U) FY 2000 PLAN:
- (U) ($15.354) Software and system engineering to include analysis, development, reuse and integration of government and commercial computer programs to support ERGM, LASM and other naval weapon applications.
- (U) ($ 5.880) Support hardware configuration to support NFCS implementation. Support Developmental Testing (DT) Validation.
- (U) ($ 1.930) Technical Direction Agent support, joint requirements investigation, Concept of Operations (CONOPs) scenario development.
- (U) ($ 1.700) C4I and combat system interface investigation and analysis to include BFTT, Link 16, TTWCS and other developing C4I system and technology.
- (U) ($ 2.000) Developmental test and evaluation and logistic support elements development.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Gun Weapons Systems Tech/0603795N**	PROJECT NAME AND NUMBER Naval Fires Control System/K2325

3. (U) FY 2001 PLAN:
- (U) ($16.509) Software and system engineering to include analysis, development, reuse and integration of government and commercial computer programs to support ERGM, LASM and other naval weapon applications.
- (U) ($ 6.318) Support hardware configuration to support NFCS implementation. Support DT Validation.
- (U) ($ 2.700) Technical Direction Agent support, joint requirements investigation, Concept of Operations (CONOPs) scenario development.
- (U) ($ 1.000) C4I and combat system interface investigation and analysis to include BFTT, Link 16, TTWCS and other developing C4I system and technology.
- (U) ($ 3.500) Developmental test & evaluation, and logistic support elements development.
- (U) ($ 7.500) LASM integration design, development and integration includes modification to Vertical Launch System.
- (U) ($ 9.500) LASM Fire Control system engineering and software development including interface development with NFCS, GPS and other weapon systems.
- (U) ($ 2.000) LASM Fire Control Program management and logistic support elements development.

B. (U) Other Program Funding Summary:

	FY 1999	FY2000	FY2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
O&MN				1.900	2.500	3.200	3.300	CONT.	CONT.

(U) Related RDT&E,N: N/A

C. (U) Acquisition Strategy: The acquisition strategy has been approved. A sole source contract will be awarded to ITC for Phase 1. Phase 2 requirements will be either competed or an existing system development contract will be used.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Gun Weapons Systems Tech/0603795N**	PROJECT NAME AND NUMBER Naval Fires Control System/K2325

D. (U) Schedule Profile:

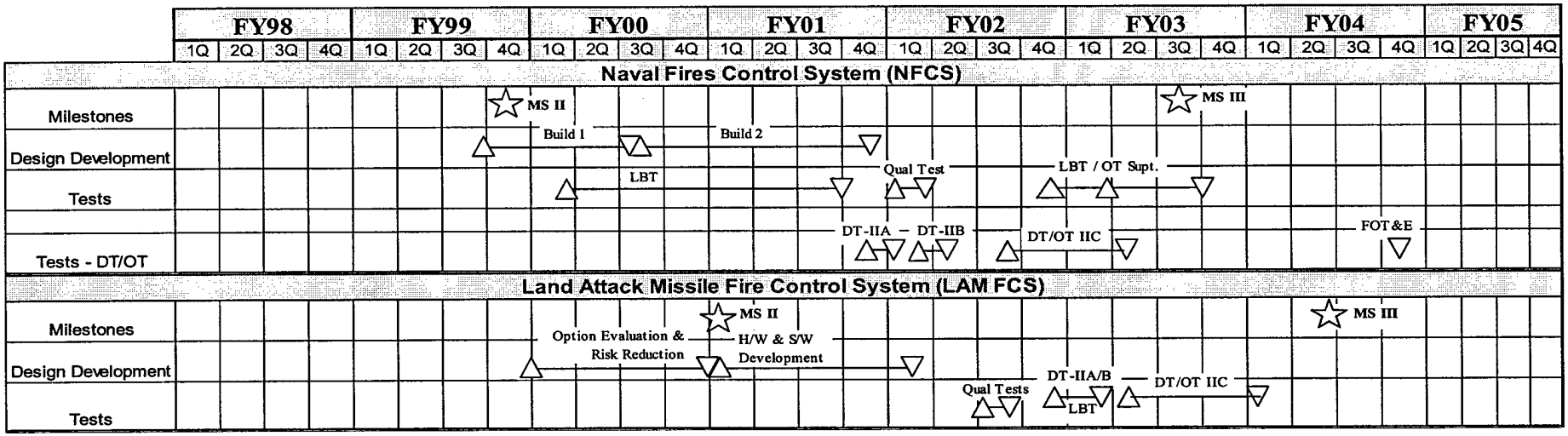

Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N/BA-4**

PROGRAM ELEMENT: **Gun Weapons Systems Tech/0603795N**

PROJECT NAME AND NUMBER: Naval Fires Control System/K2325

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Software Development	SS/CPFF	ITC, Arlington, VA	0.000	3.500	01/99	0.000		0.000		0.000	3.500	
	SS/CPAF	ITC, Arlington, VA	0.000	3.404	06/99	11.200	11/99/TBD	12.985	11/99	CONT	CONT	TBD
	WR	NSWC, Dahlgren, VA	0.000	1.000	11/98	1.300	11/99	1.600	10/99	CONT	CONT	
	VAR	VARIOUS	0.000	0.919	11/98	0.700	02/00	0.400	11/00	CONT	CONT	
Systems Engineering	WR	SSC/SD	0.000	1.500	02/99	1.451	11/99	1.700	10/00	CONT	CONT	
	SS/CP	VITRO	0.000	0.300	11/98	0.300	11/99	0.300	11/00	CONT	CONT	
	VAR	VARIOUS	0.000	1.104	Various	0.700	11/99	0.582	Various	CONT	CONT	
Ancillary Harware Development	WR	NUWC, Keyport Division	0.000	1.000	04/99	5.100	11/99/TBD	4.484	10/00	CONT	CONT	
	WR	NSWC, Dahlgren, VA	0.000	1.000	11/98	1.100	11/99	1.200	10/00	CONT	CONT	
	VAR	VARIOUS	0.000	2.028	Various	0.513	11/99	0.411	10/00	CONT	CONT	
Systems Engineering	WR	NSWC, Dahlgren, VA	0.000	1.339	11/98	1.100	11/99	1.200	10/00	CONT	CONT	
LASM FC Hardware/Software Dev	SS/CPFF	LM/Baltimore, MD	0.000	0.000		0.000		5.000	11/00	CONT	CONT	
	SS/CPFF	Contractor TBD	0.000	0.000		0.000		7.000	11/00	CONT	CONT	
LASM FC Systems Engineering	SS/CPFF	JHU/APL	0.000	0.000		0.000		1.300	11/00	CONT	CONT	
	SS/CPFF	Contractor TBD	0.000	0.000		0.000		1.200	11/00	CONT	CONT	
	WR	NSWC, Dahlgren, VA	0.000	0.000		0.000		1.500	10/00	CONT	CONT	
	VAR	VARIOUS	0.000	0.000		0.000		1.000	11/00	CONT	CONT	
	VAR	VARIOUS	0.000	0.000		0.000		2.000	11/00	CONT	CONT	
Award Fees			0.000	0.396	02/00	1.300	TBD	1.565	TBD	CONT	CONT	
Subtotal Product Development			0.000	17.490		24.764		45.427	10/00	CONT	CONT	
Remarks:												
Development Support Equipment												
Software Development												
Training Development												
Integrated Logistics Support	VAR	VARIOUS	0.000	0.670	11/98	1.500	Various	2.000	Various	CONT	CONT	
Configuration Management												
Technical Data												
GFE												
Subtotal Support			0.000	0.670		1.500		2.000		CONT	CONT	
Remarks:												

Exhibit R-3 Cost Analysis (page 2) | DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N/BA-4 | PROGRAM ELEMENT: Gun Weapons Systems Tech/0603795N | PROJECT NAME AND NUMBER: Naval Fires Control System/K2325

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NSWC/PT HUE, CA	0.000	0.300	01/99	0.500	11/99	1.500	10/00	CONT	CONT	
Operational Test & Evaluation												
Tooling												
GFE												
Subtotal T&E			0.000	0.300		0.500		1.500		CONT	CONT	
Remarks:												
Contractor Engineering Support												
Government Engineering Support												
Program Management Support												
Travel	PD	NAVSEA HQ	0.000	0.100	Various	0.100	Various	0.100	Various	CONT	CONT	
Labor (Research Personnel)												
Overhead												
Subtotal Management			0.000	0.100		0.100		0.100		CONT	CONT	
Remarks:												
Total Cost			0.000	18.560		26.864		49.027		CONT	CONT	
Remarks:												

EXHIBIT R-2a, RDT&E Project Justification							DATE: **February 2000**			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **0603795N Gun Weapons Systems Tech**				PROJECT NAME AND NUMBER Land Attack Standard Missile K2409					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**7.367**	**21.717**	**22.239**	**19.120**	**7.785**	**0.000**	**0.000**	**0.000**	**80.928**
RDT&E Articles Qty			**8**	**5**	**2**					**15**

A. (U) Mission Description and Budget Item Justification: This project funds the Land Attack Standard Missile (LASM) (SM-4) program to provide responsive, all-weather, around-the-clock Naval Surface Fire Support to Ground Combat Elements beyond that which is available from gun systems. Major efforts involved are systems integration and testing. Systems integration consists of integrating GPS/INS guidance, height of burst (HOB) sensor(s), warhead modifications, and new flight software to optimize effects against ground targets. Testing will include ground and flight tests to demonstrate safety, range, accuracy, jamming resistance, lethality, and reliability. RDT&E,N articles include inert operational missiles (IOMs) and a Dynamic Inert Missile (DIM) for ground testing and complete all up rounds (AURs) for flight testing.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:
- (U) ($ 1.488) Initiated and developed ORD, TEMP, APB, Program Protection Plan, Acquisition Strategy, Plans, and other program management documents; planned PDRR and E&MD efforts.
- (U) ($ 5.879) Initiated Program Definition and Risk Reduction (PDRR): a series of trade studies, engineering analyses, assessments, and tests which will result in the definition of a preliminary design to assure a low risk entry into E&MD.

2. (U) FY 2000 PLAN:
- (U) ($ 0.700) Develop programmatic documentation and make other preparations for Milestone II decision meeting and award of E&MD contract.
- (U) ($ 4.000) Complete PDRR. Continue to define missile system technical requirements; analyze, test, and select GPS/INS, HOB sensor(s), warhead mods, and other component hardware and software; develop ITEP, SRD, TLR, PIPS, CIPS, ICDs, and other preliminary drawings.
- (U) ($13.467) Integrate hardware and software, develop preliminary missile design, and apply results of early testing to verify and/or refine preliminary design.
- (U) ($ 3.550) Procure, test, and evaluate hardware, and plan for next round of testing (including flight tests).

3. (U) FY 2001 PLAN:
- (U) ($16.609) Continue round level integration as well as integration of missile with ship systems, and continue to use testing results to refine preliminary design.
- (U) ($ 5.630) Continue ground testing and conduct engineering flight tests, evaluate results, finalize plans for developmental flight testing, and initiate planning for and procurement of production representative hardware for TECHEVAL and OPEVAL.

EXHIBIT R-2a, RDT&E Project Justification			DATE: February 2000
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **0603795N Gun Weapons Systems Tech**	PROJECT NAME AND NUMBER Land Attack Standard Missile K2409	

B. (U) Other Program Funding Summary:

Cost	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total Cost
WPN 223700	0	0	0	0	11.611	13.772	31.324	33.875	304.000	394.582
O&MN	0	0	0	0	0.945	2.707	3.670	4.293	115.000	126.615

(U) Related RDT&E,N: N/A

C. (U) Acquisition Strategy: Pre E&MD efforts will be conducted under level of effort contracts with the SM-2 Design Agent (DA). A cost-plus E&MD completion contract will be awarded to the DA to develop and integrate the necessary changes and to support DT/OT of LASM. Existing GFE SM-2 Block II/III missiles will be refurbished and converted into Land Attack Missiles (SM-4). Refurbishment and conversions are "turn key" and do not involve separate installations.

EXHIBIT R-2a, RDT&E Project Justification		DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**	PROGRAM ELEMENT NAME AND NUMBER **Gun Weapons Systems Tech/0603795N**	PROJECT NAME AND NUMBER Land Attack Missile/K2409

E. (U) Schedule Profile

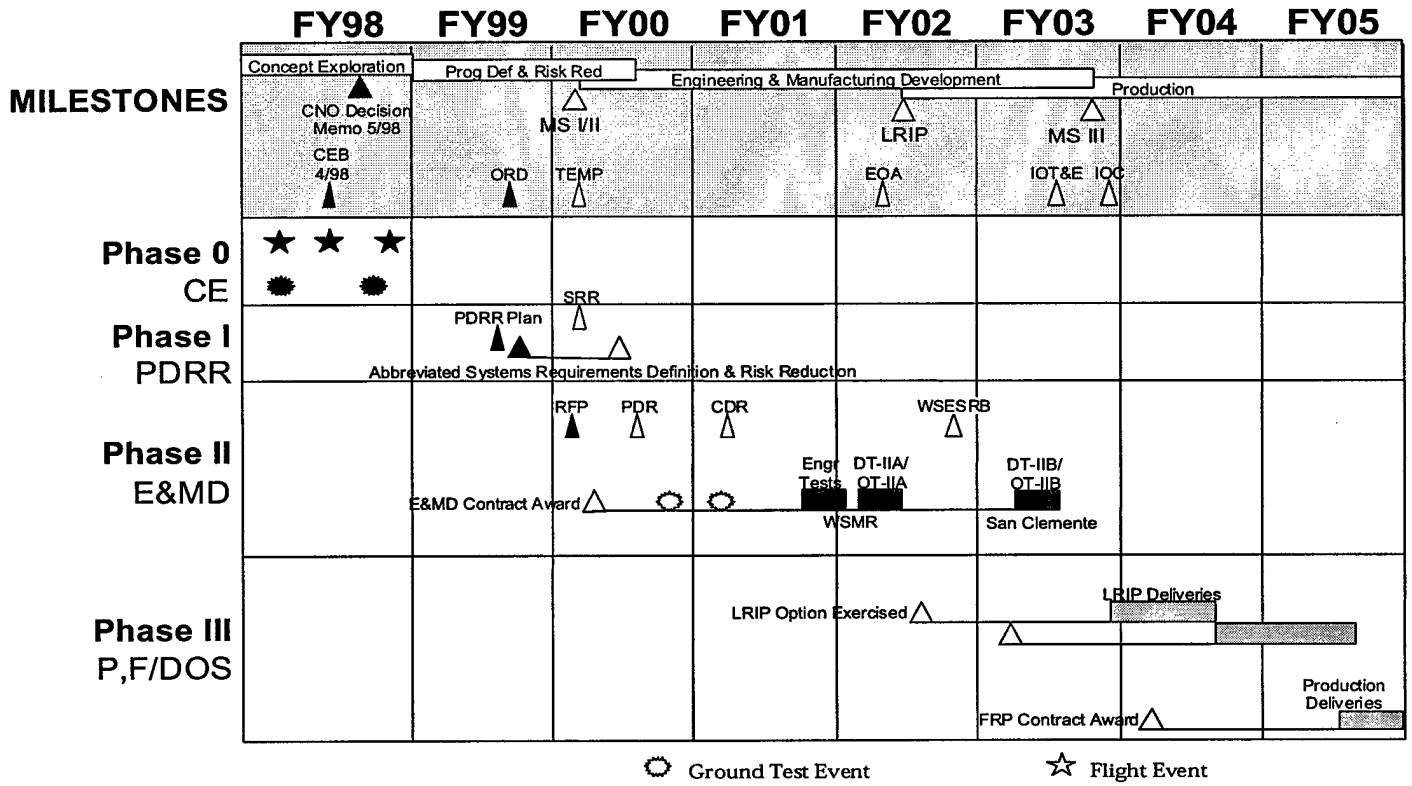

Exhibit R-3 Cost Analysis (page 1)

DATE: **February 2000**

APPROPRIATION/BUDGET ACTIVITY: **RDT&E, N/BA-4**

PROGRAM ELEMENT: **0603795N Gun Weapons Systems Tech**

PROJECT NAME AND NUMBER: Land Attack Standard Missile K2409

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Primary Hardware Development												
Ancillary Hardware Development	WR	NSWC/Dahlgren, VA	0.700	0.525	07/99	1.600	12/99	1.400	10/00	0.600	4.825	
	WR	VAR	0.110	0.150	07/99	0.415	12/99	0.585	10/00	0.525	1.785	
Systems Engineering	WR	VAR	0.300	1.600	07/99	2.200	12/99	0.900	10/00	1.650	6.650	
	SS/CPAF	Raytheon Missile	0.819	3.353	07/99	14.400	02/00	13.978	10/00	15.736	48.286	52.470
Award Fees			0.071	0.276	07/99	1.252	02/00	1.216	10/00	1.369	4.184	
Subtotal Product Development			2.000	5.904		19.867		18.079		19.880	65.730	

Remarks:

Development Support Equipment												
Software Development												
Training Development												
Integrated Logistics Support	WR	VARIOUS	0.000	0.090	07/99	0.220	12/99	0.200	10/00	0.240	0.750	
Configuration Management	WR	VARIOUS	0.000	0.135	07/99	0.330	12/99	0.300	10/00	0.360	1.125	
Technical Data												
GFE												
Subtotal Support			0.000	0.225		0.550		0.500		0.600	1.875	

Remarks:

CLASSIFICATION: **UNCLASSIFIED**

Exhibit R-3 Cost Analysis (page 2)											DATE: February 2000	
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N/BA-4**		PROGRAM ELEMENT **0603795N Gun Weapons Systems Tech**				PROJECT NAME AND NUMBER Naval Surface Fire Support K2409						
Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation	WR	NAWC/WD, White Sands	0.700	0.000		0.250	12/99	1.700	10/00	1.200	3.850	
	WR	VAR	0.000	0.095	07/99	0.140	12/99	0.460	10/00	0.330	1.025	
Operational Test & Evaluation	WR	NAWC/AD, Pt Mugu,CA	0.000	0.050	07/99	0.150	12/99	0.200	10/00	2.800	3.200	
	WR	VAR	0.000	0.030	07/99	0.060	12/99	0.090	10/00	0.195	0.375	
Tooling												
GFE												
Subtotal T&E			0.700	0.175		0.600		2.450		4.525	8.450	
Remarks:												
Contractor Engineering Support	VAR	VAR	0.000	0.425	07/99	0.550	12/99	0.850	10/00	1.175	3.000	
Government Engineering Support												
Program Management Support	VAR	VAR	0.000	0.613	07/99	0.100	12/99	0.300	10/00	0.625	1.638	
Travel	PD	NAVSEA HQ	0.000	0.025	VAR	0.050	VAR	0.060	VAR	0.100	0.235	
Labor (Research Personnel)												
Overhead												
Subtotal Management			0.000	1.063		0.700		1.210		1.900	4.873	
Remarks:												
Total Cost			2.700	7.367		21.717		22.239		26.905	80.928	
Remarks:												

EXHIBIT R-2a, RDT&E Project Justification							DATE: February 2000			
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N**	PROGRAM ELEMENT NAME AND NUMBER **0603795N Gun Weapons Systems Tech**				PROJECT NAME AND NUMBER Continuous Processor K2771					
COST ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost		**0.000**	**5.967**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**0.000**	**5.967**
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification: Development of technology to manufacture propellants and explosives using continuous processing methods will result in lower costs for the energetic materials used in Naval Guns. Prior investments in this technology have established the fundamental science and engineering supporting the feasibility of this process to significantly reduce the cost to produce energetics, to reduce waste and pollution during manufacturing, improve the safety of operations and to improve product quality and reproducibility. The efforts under this project will be directed towards scale-up of the continuous processing technology, demonstration of the benefits, and the technology transition to industry for the manufacture of gun propellants and other energetics.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS: N/A

2. (U) FY 2000 PLAN:
- (U) ($5.967) Initiate process definition and design for a flexible capability to scale-up continuous processing technology. This includes hazards and environmental analyses, design and acquisition of specific process equipment needed to demonstrate gun propellant manufacture, and processing technology development and support.

3. (U) FY 2001 PLAN: N/A

EXHIBIT R-2a, RDT&E Project Justification			DATE: **February 2000**
APPROPRIATION/BUDGET ACTIVITY **RDT&E, N**	PROGRAM ELEMENT NAME AND NUMBER **0603795N Gun Weapons Systems Tech**	PROJECT NAME AND NUMBER Continuous Processor K2771	

B. (U) Other Program Funding Summary: Not Applicable

C. (U) Acquisition Strategy: Not Applicable

D. (U) Schedule Profile: Not Applicable

Exhibit R-3 Cost Analysis (page 1)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N

PROGRAM ELEMENT: 0603795N Gun Weapons Systems Tech

PROJECT NAME AND NUMBER: Continuous Processor K2771

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Technology Development	WR	NSWC IHDIV	0.000	0.000	N/A	3.435	01/00	0.000	N/A	0.000	3.435	
Ancillary Hardware Development											0.000	
Systems Engineering											0.000	
Licenses											0.000	
Process equipment/tooling	C/FP	Various/TBD	0.000	0.000	N/A	2.532	Various	0.000	N/A		2.532	
GFE											0.000	
Award Fees											0.000	
Subtotal Product Development			0.000	0.000		5.967		0.000		0.000	5.967	

Remarks:

Development Support Equipment											0.000	
Software Development											0.000	
Training Development											0.000	
Integrated Logistics Support											0.000	
Configuration Management											0.000	
Technical Data											0.000	
GFE											0.000	
Subtotal Support			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks: Categories do not apply

Exhibit R-3 Cost Analysis (page 2)

DATE: February 2000

APPROPRIATION/BUDGET ACTIVITY: RDT&E, N

PROGRAM ELEMENT: 0603795N Gun Weapons Systems Tech

PROJECT NAME AND NUMBER: Continuous Processor K2771

Cost Categories (Tailor to WBS, or System/Item Requirements)	Contract Method & Type	Performing Activity & Location	Total PY s Cost	FY 99 Cost	FY 99 Award Date	FY 00 Cost	FY 00 Award Date	FY 01 Cost	FY 01 Award Date	Cost to Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation											0.000	
Operational Test & Evaluation											0.000	
Tooling											0.000	
GFE											0.000	
Subtotal T&E			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks: This is a non-ACAT program and a FY00 Congressional plus-up. DT and OT testing of energetics manufactured by this process will be conducted when those products are incorporated into a weapon systems development or product improvement program.

Contractor Engineering Support											0.000	
Government Engineering Support											0.000	
Program Management Support											0.000	
Travel											0.000	
Labor (Research Personnel)											0.000	
Overhead											0.000	
Subtotal Management			0.000	0.000		0.000		0.000		0.000	0.000	

Remarks:

Total Cost			0.000	0.000		5.967		0.000		0.000	5.967	

Remarks:

EXHIBIT R-2, FY 2001 RDT&E,N BUDGET ITEM JUSTIFICATION SHEET DATE: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603800N
PROGRAM ELEMENT TITLE: JOINT STRIKE FIGHTER (JSF) PROGRAM

(U) COST (Dollars in thousands)

PROJECT NUMBER / TITLE	FY 1999 ACTUAL	FY 2000 BUDGET	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
D2209 JSF	471,290	239,907	131,566	0	0	0	0	0	1,742,506

Quantity of RDT&E Articles 4

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Joint Strike Fighter (JSF) Program will develop and field an affordable, highly common family of next generation strike fighter aircraft for the USN, USMC, USAF and allies. Current program emphasis is on facilitating the evolution of fully validated and affordable joint operational requirements, and demonstrating cost leveraging technologies and concepts to lower risk prior to entering Engineering and Manufacturing Demonstration (E&MD) in FY 2001. This is a joint program with no executive service. Navy and Air Force each provide approximately equal shares of annual funding for the program. The United Kingdom is a collaborative partner in this phase of the program and several other countries also participate.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it integrates hardware for test related to specific ship or aircraft applications.

EXHIBIT R-2a, FY 2001 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET DATE: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603800N
PROGRAM ELEMENT TITLE: JOINT STRIKE FIGHTER (JSF) PROGRAM

(U) COST (Dollars in thousands)

PROJECT NUMBER TITLE	FY 1999 ACTUAL	FY 2000 BUDGET	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
D2209 JSF	471,290	239,907	131,566	0	0	0	0	0	1,742,506

Quantity of RDT&E Articles 4

(U) A. MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Joint Strike Fighter (JSF) Program will develop and field an affordable, highly common family of next generation strike fighter aircraft for the USN, USMC, USAF and allies. Current program emphasis is on facilitating the evolution of fully validated and affordable joint operational requirements, and demonstrating cost leveraging technologies and concepts to lower risk prior to entering Engineering and Manufacturing Demonstration (E&MD) in FY 2001. This is a joint program with no executive service. Navy and Air Force each provide approximately equal shares of annual funding for the program. The United Kingdom is a collaborative partner in this phase of the program and several other countries also participate.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS: (Breakout reflects Navy, Air Force, United Kingdom, Multi-Lateral, Canadian and Italian funding)

- (U) ($762,415) Continued Concept Demonstration efforts by Boeing, Lockheed Martin and Pratt & Whitney including company unique technology demonstrations, completed final design and continued build of Concept Demonstrator Aircraft (CDA) and continued concept refinement for a tri-service family of aircraft.

- (U) ($ 40,153) Continued the Alternate Engine Program.

- (U) ($141,580) Continued technology maturation demonstrations and assessments in the areas of airframe, flight sy stems, manufacturing and producibility, propulsion and mission systems. Completed approximately half of the demonstrations. Continued systems engineering support for the Concept Demonstration Phase in the areas of system test, air vehicle analysis and integration, advanced cost estimating, survivability, integrated flight and propulsion control and carrier suitability.

• (U) ($ 9,341) Continued technology maturation demonstrations and assessments in the areas of supportability and training and prognostics and heal th management.

• (U) ($ 13,307) Continued modeling and simulation activities to support strike warfare mission area analysis and requirements analysis efforts including COPT to facilitate the Services' joint requirements definition. Continued requirements analysis in support of final requirements document. Continued modeling and simulation support testing, training, and refinement of concept of operations for the weapons system (simulation based acquisition).

• (U) ($ 15,227) Continued mission support, including program office functions.

• (U) ($982,023) Total

2. (U) FY 2000 PLAN: (Breakout reflects Navy, Air Force, United Kingdom, Multi-Lateral and Canadian funding)

• (U) ($394,892) Continue Concept Demonstration efforts by Boeing, Lockheed Martin and Pratt & Whitney including ground and flight demonstrations, areas of technology maturation and concept refinement for a tri-service family of aircraft. Request proposals from contractors for their designs and E&MD programs.

• (U) ($ 26,190) Continue the Alternate Engine Program.

• (U) ($ 68,554) Continue technology maturation demonstrations and assessments in the areas of airframe, flight systems, manufacturing and producibility, propulsion and mission systems. Continue systems engineering support for the Concept Demonstration Phase in the areas of system test, air vehicle analysis and integration, advanced cost estimating, survivability, integrated flight and propulsion control and carrier suitability.

• (U) ($ 8,853) Continue technology maturation demonstrations and assessments in the area of autonomic logistics (formerly supportability and training) and complete prognostics and health management technology maturation demonstrations and assessments.

• (U) ($ 9,030) Continue modeling and simulation activities to support strike warfare mission area analysis and requirements analysis efforts including COPT to facilitate the Services' joint requirements definition. Support analysis as required for final Joint Operational Requirements Document (JORD) coordination and signature. Continue modeling and simulation support testing, training, and refinement of concept of operations for the weapons system (simulation based acquisition).

• (U) ($ 15,377) Continue missi on support, including program office functions.

• (U) ($522,896) Total

EXHIBIT R-2a, FY 2001 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET **DATE: February 2000**

BUDGET ACTIVITY: 4 **PROGRAM ELEMENT: 0603800N**
PROGRAM ELEMENT TITLE: JOINT STRIKE FIGHTER (JSF) PROGRAM

3. (U) FY 2001 PLAN: (Breakout reflects Navy, Air Force, UK, Multi-Lateral and Canadian funding)

• (U) ($110,552) Complete Concept Demonstration efforts by Boeing, Lockheed Martin and Pratt & Whitney including ground and flight demonstrations, areas of technology maturation and concept refinement for a tri-service family of aircraft.

• (U) ($ 94,000) Complete the Alternate Engine Phase IIIA effort (Common Core Design Trade Studies) in this Program Element. (Alternate Engine Development Program will continue in JSF E&MD, Program Elements 0604800N and 0604800F.)

• (U) ($ 38,137) Complete technology maturation demonstrations and assessments in the areas of airframe, flight systems, manufacturing and producibility, mission systems, propulsion and autonomic logistics. Complete systems engineering support for the Concept Demonstration Phase in the areas of system test, air vehicle analysis and integration, advanced cost estimating, survivability, integrated flight and propulsion control and carrier suitability. Complete analyses required for Milestone II. Commence and complete source selection evaluation to down-select for final design.

• (U) ($ 5,000) Complete modeling and simulation activities to support required Milestone II analyses. Complete modeling and simulation support testing, training, and refinement of concept of operations for the weapons system (simulation based acquisition).

• (U) ($ 15,715) Complete mission support, including program office functions.

• (U) ($263,404) Total

(U) B. PROGRAM CHANGE SUMMARY: (Dollars in thousands)

	FY 1999	FY 2000	FY 2001
(U) FY 2000 President's Budget:	$468,509	$241,238	$ 25,762
(U) Appropriated Value:	$470,902	241,238	
(U) Adjustments from President's Budget:	+ 2,781	- 1,331	+105,804
(U) FY 2001 President's Budget Submit:	$471,290	$239,907	$131,566

EXHIBIT R-2a, FY 2001 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET **DATE: February 2000**

BUDGET ACTIVITY: 4 **PROGRAM ELEMENT: 0603800N**
PROGRAM ELEMENT TITLE: JOINT STRIKE FIGHTER (JSF) PROGRAM

(U) CHANGE SUMMARY EXPLANATION:

(U) Funding: FY 1999 net increase of +$2,781 thousand reflects an increase to preclude reduction of Boeing and Lockheed Martin CDP contracts funding increments, an increase for Contract Advisory and Assistance Services and minor pricing adjustments. FY 2000 decrease of -$1,331 thousand reflects an across-the-board congressional rescission. FY 2001 net increase of $105,804 thousand reflects a transfer of funds from E&MD to Concept Demonstration Program (CDP) to cover alternate engine program and CDP requirements and minor pricing adjustments.

(U) Schedule: Completion of the Operational Requirements Document (ORD) has moved from December 1999 to March 2000 due to Joint Requirements Oversight Council (JROC) scheduling problems.

(U) Technical: Not applicable.

(U) C. OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands) This is a joint program with no executive service. The United Kingdom is a collaborative partner in this phase of the program and several other countries also participate.

Appn	FY 1999 ACTUAL	FY 2000 BUDGET	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) RDT&E 0603800F	$456,137	$249,088	$129,538	0	0	0	0	0	$1,695,723
(U) RDT&E 0603800E	0	0	0	0	0	0	0	0	$118,006
(U) UNITED KINGDOM	$34,096	$26,101	0	0	0	0	0	0	$200,291
(U) MULTI-LATERAL	$7,500	$5,100	$1,700	0	0	0	0	0	$32,100
(U) CANADA	$3,000	$2,700	$600	0	0	0	0	0	$10,600
(U) ITALY	$10,000	0	0	0	0	0	0	0	$10,000

(U) RELATED RDT&E:
Milestone II for E&MD of the Joint Strike Fighter (JSF) is planned in FY 2001.

EXHIBIT R-2a, FY 2001 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET **DATE: February 2000**

BUDGET ACTIVITY: 4 **PROGRAM ELEMENT: 0603800N**
PROGRAM ELEMENT TITLE: JOINT STRIKE FIGHTER (JSF) PROGRAM

	FY 1999 ACTUAL	FY 2000 BUDGET	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) RDT&E 0604800F	0	0	$299,540	$1,321,726	$1,927,241	$1,853,319	$1,631,937	TBD	TBD
(U) RDT&E 0604800N	0	0	$295,962	$1,324,048	$1,932,487	$1,859,938	$1,639,111	TBD	TBD

Excludes anticipated foreign funding which is TBD. December 1998 Selected Acquisition Report (SAR) reflected total E&MD cost estimate of $19.8B ($TY) funded by USN, USAF, and anticipated (but not finalized) foreign sources

(U) RELATED PROCUREMENT FUNDING:
Advanced Procurement for the Joint Strike Fighter (JSF) is planned in FY 2004.

	FY 1999 ACTUAL	FY 2000 BUDGET	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) USAF 0207142F	0	0	0	0	0	$18,000	$587,308	TBD	TBD
(U) APN-1 0204800N	0	0	0	0	0	0	$57,735	TBD	TBD

(U) D. ACQUISITION STRATEGY:

Program activities center around three distinct objectives that provide a sound foundation for the start of Engineering and Manufacturing Development (E&MD) in 2001:

(1) facilitating the Services' development of fully validated, affordable operational requirements;
(2) lowering risk by investing in and demonstrating key leveraging technologies that lower the cost of development, production and ownership; and
(3) demonstrating operational concepts.

Early warfighter and technologist interaction is an essential aspect of the requirements definition process, and key to achieving JSF affordability goals. To an unprecedented degree the JSF Program is using cost-performance trades early, as an integral part of the weapon system development process. The Services are defining requirements through an iterative process, balancing weapon system capability against life cycle cost at every stage. Each iteration of requirements is provided to industry. They evolve their designs and provide cost data back to the warfighters. The warfighters evaluate trades and make decisions for the next iteration. This process produced the Services' first Joint Initial Requirements Document (JIRD I) in 1995 and the second and third iterations in 1997 and 1998, respectively. The Services continue to refine their requirements through this process, which will culminate in the Operational Requirements Document (ORD) in FY 2000 to support the Milestone II decision.

EXHIBIT R-2, FY 2001 RDT&E,N BUDGET PROJECT JUSTIFICATION SHEET **DATE: February 2000**

BUDGET ACTIVITY: 4 **PROGRAM ELEMENT: 0603800N**
PROGRAM ELEMENT TITLE: JOINT STRIKE FIGHTER (JSF) PROGRAM

A sizable technology maturation effort is underway to reduce risk and life cycle cost (LCC) through technology maturation and demonstration. The primary emphasis is on technologies which have been identified as high payoff contributors to affordability, supportability, survivability and lethality. Numerous demonstrations have been accomplished and others are in process to validate performance and life cycle cost impact to component, subsystem, and the total system.

A multi-year $2.2 billion JSF Concept Demonstration effort commenced in November 1996 with competitive contract awards to Boeing and Lockheed Martin for Concept Demonstration Programs. These competing contractors will build and fly concept demonstrator aircraft, conduct concept unique ground demonstrators, and continue refinement of their ultimate delivered weapon system concepts. Specifically, Boeing and Lockheed Martin will demonstrate commonality and modularity, STOVL hover and transition, and low speed handling qualities of their respective weapon system concepts. Pratt and Whitney is providing propulsion hardware and engineering support for both Boeing's and Lockheed Martin's on-going JSF Concept Demonstration efforts. The JSF Concept Demonstration approach has several benefits:

(1) maintains the competitive environment prior to E&MD and provides for two different STOVL approaches and two different aerodynamic configurations
(2) demonstrates the viability of a multi-service family of variants with high commonality and modularity between CTOL, CV, and STOVL variants
(3) provides affordable and low risk technology transition to the JSF E&MD phase.

The JSF Alternate Engine Program, with General Electric, continues development of an alternate engine for production.

Downselect to a single prime weapon system contractor for E&MD and Milestone II are planned in FY 2001. JSF production is planned to begin in FY 2005.

(U) E. SCHEDULE PROFILE:
Dec 94 Commenced Concept Development Phase
Mar 96 Released RFP for Concept Demonstration Efforts
May 96 Designated a joint, DOD, Acquisition Category ID Program by USD(A&T)
Nov 96 Competitively Awarded Concept Demonstration Contracts to Boeing and Lockheed Martin
Mar 00 Complete Operational Requirements Document (ORD)
Mar 01 Milestone II for JSF E&MD

EXHIBIT R-3, FY 2001 RDT&E,N COST ANALYSIS

DATE: February 2000

BUDGET ACTIVITY: 4	PROGRAM ELEMENT:	0603800N	USN	PROJECT NUMBER:	D2209
BUDGET ACTIVITY: 4	PROGRAM ELEMENT:	0603800F	USAF	PROJECT NUMBER:	2025
BUDGET ACTIVITY: 3	PROGRAM ELEMENT:	0603800E	DARPA	PROJECT NUMBER:	JA-01
BUDGET ACTIVITY: NA	PROGRAM ELEMENT:	N/A	UNITED KINGDOM	PROJECT NUMBER:	UK
BUDGET ACTIVITY: NA	PROGRAM ELEMENT:	N/A	MULTI-LATERAL	PROJECT NUMBER:	ML
BUDGET ACTIVITY: NA	PROGRAM ELEMENT:	N/A	CANADA	PROJECT NUMBER:	CAN
BUDGET ACTIVITY: NA	PROGRAM ELEMENT:	N/A	ITALY	PROJECT NUMBER:	ITALY
	PROGRAM ELEMENT TITLE:		JOINT STRIKE FIGHTER (JSF) PROGRAM	PROJECT TITLE:	JSF

B. (U) BUDGET ACQUISITION HISTORY AND PLANNING ($ in thousands) No budget in FY 1993 and Prior.

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total FY 1998 & Prior	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
PROJECT DEVELOPMENT												
Strike Warfare Concept Studies (Total Prior to FY 2001)												
	Various	Miscellaneous	11,467								11,467	
SUBTOTAL			11,467								11,467	
Technology Maturation Concept Exploration Phase (Total Prior to FY 2001)												
	Various	Fld. Activ.	3,432								3,432	
Strike Warfare Systems Design Development (Total Prior to FY 2001)												
	C/CPFF	Boeing Seattle WA	32,770								32,770	
	C/CPFF	McAir St. Louis MO	23,708								23,708	
	C/CPFF	Northrop Pico Rivera CA	21,358								21,358	
	C/CPFF	Lockheed Fort Worth TX	28,311								28,311	
	Various	Miscellaneous	1,121								1,121	
	Various	Fld. Activ.	8,322								8,322	
SUBTOTAL			115,590								115,590	
ASTOVL (Total Prior to FY 2001)												
	SS/CPFF	Lockheed	16,416								16,416	
	SS/CPFF	Boeing	11,200								11,200	
	Various	Miscellaneous	15,539								15,539	
SUBTOTAL			43,155								43,155	
Core Team Support (Total Prior to FY 2001)												
	Various	Fld. Activ.	2,522								2,522	

EXHIBIT R-3, FY 2001 RDT&E,N COST ANALYSIS

DATE: February 2000

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total FY 1998 & Prior	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Weapon System Concept Demonstrations (including flying demonstrators and supporting propulsion efforts)												
	C/CPFF	Boeing *	291,356	269,627	Oct 98	156,761	Oct 99	16,269	Oct 00		734,013	734,013
	C/CPFF	Lockheed *	349,423	280,122	Oct 98	153,931	Oct 99	14,083	Oct 00		797,559	797,559
	SS/CPFF	Pratt & Whitney * West Palm Beach FL	537,405	212,666	Nov 98	84,200	Nov 99	80,200	Nov 00		914,471	951,861
Award Fees												
SUBTOTAL			1,178,184	762,415		394,892		110,552			2,446,043	
Alternate Engine Program												
	SS/CPFF	GE Cincinnati OH	7,000								7,000	
											0	
	SS/CPFF	GE	61,794	40,153	Nov 98	26,190	Oct 99	94,000	Oct 00		222,137	225,137
SUBTOTAL			68,794	40,153		26,190		94,000			229,137	
Technology Maturation												
Airframe												
	SS/CPFF	McAir	19,240								19,240	
	Various	Miscellaneous	1,985	94	Various	44	Various	45	Various		2,168	
	Various	Fld. Activ.	4,236	1,137	Nov 98	1,376	Nov 99	1,455	Nov 00		8,204	
SUBTOTAL			25,461	1,231		1,420		1,500			29,612	
Flight Systems												
	C/CPFF	Lockheed	41,515	9,807	Nov 98	1,378	Nov 99				52,700	
	C/CPFF	McAir	46,901	17,920	Nov 98	1,000	Nov 99				65,821	
	Various	Miscellaneous	9,090	650	Nov 98	60	Nov 99	805	Various		10,605	
	Various	Fld. Activ.	13,491	4,212	Nov 98	4,230	Nov 99	2,515	Nov 00		24,448	
SUBTOTAL			110,997	32,589		6,668		3,320			153,574	

*includes government managed equipment

Note: Consistent with recent Boeing and Lockheed Martin replans, annual funding increments reflect budgeted basic Concept Demonstration Program (CDP) efforts as well as areas of technology maturation. Boeing and Lockheed Martin Target Value of Contract reflects total contract funding requirements.

Pratt and Whitney Total Value of Contract reflects award fees totaling $35.1M, FY 1998 and prior, basic CDP efforts and technology maturation efforts in Propulsion and Prognostics and Health Management.

Note: The Target Value includes Propulsion Technology Maturation efforts.

EXHIBIT R-3, FY 2001 RDT&E,N COST ANALYSIS

DATE: February 2000

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total FY 1998 & Prior	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Manufacturing and Producibility												
	C/CPFF	Hughes Los Angeles CA	5,065								5,065	
	C/CPFF	Lockheed	7,500	2,100	Nov 98	600	Nov 99				10,200	
	C/CPFF	General Res. Corp. Huntsville AL	1,945								1,945	
	C/CPFF	Scaled Composites	2,000								2,000	
	C/CPFF	Lockheed	700								700	
	Various	Miscellaneous	1,343	201	Various	75	Various	60	Various		1,679	
	Various	Fld. Activ.	3,286	1,374	Nov 98	558	Nov 99	1,470	Nov 00		6,688	
SUBTOTAL			21,839	3,675		1,233		1,530			28,277	
Propulsion												
	C/CPFF	Pratt/Whitney	5,448								5,448	
	SS/CPFF	GE	5,681								5,681	
	SS/CPFF	Pratt/Whitney	30,000								30,000	
	SS/CPFF	GE	3,000								3,000	
	SS/CPFF	Pratt/Whitney	22,988	3,789	Jan 99						26,777	
	SS/CPFF	Pratt & Whitney	3,640								3,640	
	SS/TBD	Pratt & Whitney	7,000	1,200	Dec 98						8,200	
	NASA Contract		700	2,100	Jul 99						2,800	
	Various	Miscellaneous	12,895	1,804	Various	48	Various	50	Various		14,797	
	Various	Fld. Activ.	24,484	15,389	Nov 98	7,197	Nov 99	2,950	Nov 00		50,020	
SUBTOTAL			115,836	24,282		7,245		3,000			150,363	
Mission Systems												
	C/CPFF	TI Plano TX	2,464								2,464	
	SS/CPFF	Lockheed	6,856								6,856	
	SS/CPFF	McAir	6,524								6,524	
	C/CPFF	Raytheon	27,274	17,899	Nov 98						45,173	
	C/CPFF	Northrop/Grumman	25,946	15,957	Nov 98						41,903	
	C/CPFF	Boeing	1,575								1,575	
	C/CPFF	Lockheed	1,517								1,517	
	C/CPFF	Hughes	3,681								3,681	
	Classified	Classified	2,000	1,000	Nov 98						3,000	
	Various	Miscellaneous	20,097	1,467	Various	2,139	Various	2,389	Various		26,092	
	Various	Fld. Activ.	22,283	5,352	Nov 98	7,383	Nov 99	7,566	Nov 00		42,584	
SUBTOTAL			120,217	41,675		9,522		9,955			181,369	

EXHIBIT R-3, FY 2001 RDT&E,N COST ANALYSIS

DATE: February 2000

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total FY 1998 & Prior	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering Support												
	Various	Miscellaneous	11,993	8,573	Various	10,011	Various	3,129	Various		33,706	
	Various	Fld. Activ.	64,969	28,635	Nov 98	31,535	Nov 99	7,339	Nov 00		132,478	
SUBTOTAL			76,962	37,208		41,546		10,468			166,184	
Autonomic Logistics (formerlly Prognostics and Health Management/Supportability and Training)												
	C/CPFF	Pratt & Whitney	10,100								10,100	
	C/CPFF	General Electric		1,500	Jan 99						1,500	
	C/CPFF	Classified										
	C/CPFF	Project 3	7,826	750	Jan 99						8,576	
	C/CPFF	Project 4	4,799	750	Jan 99						5,549	
	Various	Miscellaneous	2,271	2,281	Various	5,661	Various	1,117	Various		11,330	
		Fld. Activ.	7,677	4,030	Nov 98	3,192	Nov 99	6,327	Nov 00		21,226	
SUBTOTAL			32,673	9,311		8,853		7,444			58,281	
Modeling, Simulation, Analysis, Threat, COPT and Core Support												
	Various	Miscellaneous	37,719	5,033	Various	3,277	Various	690	Various		46,719	
	Various	Fld. Activ.	19,008	7,874	Nov 98	5,353	Nov 99	3,910	Nov 00		36,145	
SUBTOTAL			56,727	12,907		8,630		4,600			82,864	
Mission Support												
	Grant	Institute for Defense Anal	2,500								2,500	
	Various	Fld. Activ.	20,633	5,709	Various	5,972	Various	6,210	Various		38,524	
SUBTOTAL			23,133	5,709		5,972		6,210			41,024	
Subtotal Project Development			2,006,989	971,155		512,171		252,579			3,742,894	
SUPPORT (CS)												
	SS/CPFF	ANSER Arlington VA	19,541	4,720	Jan 99	4,720	Jan 00	4,720	Jan 01		33,701	
	Various	Miscellaneous	14,373	6,148	Various	6,005	Various	6,105	Various		32,631	
Subtotal Support			33,914	10,868		10,725		10,825			66,332	

EXHIBIT R-3, FY 2001 RDT&E,N COST ANALYSIS DATE: February 2000

Cost Categories:	Contract Method & Type	Performing Activity & Location	Total FY 1998 & Prior	FY 1999 Cost	FY 1999 Award Date	FY 2000 Cost	FY 2000 Award Date	FY 2001 Cost	FY 2001 Award Date	Cost To Complete	Total Cost	Target Value of Contract
TEST AND EVALUATION: (included above)												
MANAGEMENT: N/A												
Total Cost			2,040,903	982,023		522,896		263,404			3,809,226	
Funding Resources												
0603800N			899,743	471,290		239,907		131,566			1,742,506	
0603800F			860,960	456,137		249,088		129,538			1,695,723	
0603800E			118,006								118,006	
United Kingdom			140,094	34,096		26,101					200,291	
Multi-Lateral			17,800	7,500		5,100		1,700			32,100	
Canada			4,300	3,000		2,700		600			10,600	
Italy			0	10,000		0		0			10,000	
Total			2,040,903	982,023		522,896		263,404			3,809,226	

•	(U) $	6810	Active Denial Technology (ADT) – Evaluation, testing and target assessment of a HMMWV mounted directed energy system.
•	(U) $	2339	66mm NL Munitions – Continued development and testing of 66mm vehicle launched munitions.
•	(U) $	52	UAV NL Payloads – Continued integration of non-lethal payloads into Unmanned Aerial Vehicles (UAVs).
•	(U) $	1610	Bounding NL Munitions – Continued development and evaluation of NL bounding munitions to serve as an area denial/perimeter defense system.
•	(U) $	1006	Canister Launched Area Denial System (CLADS) – Further development of NL munitions launched from a multi-platform mounted mine dispenser.
•	(U) $	977	Foams – Continued evaluation and testing of foams and packaging delivery platforms.
•	(U) $	875	Modular Crowd Control Munitions (MCCM) –Engineering & Manufacturing Development of a ground emplaced NL "claymore" mine and initial design and test of the vehicle mounting bracket.
•	(U) $	123	Joint Intergration Project (JIP) – Selected and tested commercial products that will meet the Joint Services' requirement for specific NL Capability set items.
(U)Total		33,895	

U) FY 2000 Planned Program:

•	(U) $	1226	Execution oversight and administration of the Joint NLW Program and technologies database expansion.
•	(U) $	1038	Evaluation of NLWs by Service warfighting laboratories for direct user feedback on various NL technologies and munitions.
•	(U) $	705	Continue development of a modeling and simulation anlaysis tool for NLWs such as the Joint Conflict and Tactical Simulation (JCATS) model and performance effects data collection.
•	(U) $	1215	Continue pursuit of new technology through open competion of industry, academia and government lab sources for NL capabilities.
•	(U) $	918	NL Crowd Dispersal Cartridge – Engineering & Manufacturing Development of a NL round of munitions for the M203 40mm Grenade Launcher.
•	(U)	3000	Establish a technology innovation initiative to allow pursuit of new NL materials and technologies.
•	(U) $	883	Ground Vehicle Stopper (GVS) – Continue evaluation of several proposed electrical vehicle stopper technologies that have potential to stop/slow ground vehicles.
•	(U) $	693	Vessel Stopper System (VSS) – Continue evaluation of NL means of stopping maritime vessels and small, fast moving boats.
•	(U) $	4328	Active Denial Technology (ADT) – Continue evaluation, testing and target assessment of a HMMWV mounted directed energy system.
•	(U) $	2320	66mm NL Munitions – Complete testing of the 66mm vehicle launched munitions for crowd control and site security missions.
•	(U) $	533	Bounding NL Munitions – Continue development of NL bounding munitions to serve as an area dential/perimeter defense system.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 2000
BUDGET ACTIVITY 4 - Demonstration/Validation	PE NUMBER AND TITLE 0603851M Non-Lethal Warfare DEM/VAL PROJECT C2319

COST (*In Thousands*)	FY 1999 Actual	FY 2000 Estimate	FY 2001 Estimate	FY 2002 Estimate	FY 2003 Estimate	FY 2004 Estimate	FY 2005 Estimate	Cost to Complete	Total Cost
C2319 Non Lethal Weapons Program	33895	26132	23580	23982	24390	26225	26752	Continuing	Continuing
Quantity of RDT&E Articles									

A. (U) Mission Description and Budget Item Justification:

This project covers non-lethal weapon (NLW) systems which are those systems that by their design, do not inflict fatal or permanent injuries. Instead, these systems are designed to stun, incapacitate, or hinder movement of individuals, crowds, or equipment. The availability of NLWs allows commanders less than lethal options, particularly in urban warfare and military operations other than war, i.e., peacekeeping, humanitarian assistance and disaster relief, as well as special operations.

(U) Justification for Budget Activity: This program is funded under Demonstration/Validation because it develops and integrates hardware for non-lethal weapons capabilities.

(U) FY 1999 Accomplishments:

- (U) $ 2054 Execution oversight and administration of the Joint NLW Program and technologies database expansion.
- (U) $ 1240 Evaluation of NLWs by Service warfighting laboratories for direct user feedback on various NL technologies and munitions.
- (U) $ 2802 Continued pursuit of new technology through open competion of industry, academia and government lab sources for NL capabilities.
- (U) $ 535 Continued modeling and simulation of NLW in the Joint Conflict and Tactical Simulation (JCATS) model.
- (U) $ 575 NL Crowd Dispersal Cartridge - Continued production definition and risk reduction of a NL round of munitions for the M203 40mm Grenade Launcher.
- (U) $ 3196 Acoustics –Demonstration and evaluation of bio-effects on target vulnerability and operator safety in the infrasound and inaudible acoustic regimes and continue work on the database.
- (U) $ 1324 Ground Vehicle Stopper – Continued evaluation of several proposed electrical vehicle stopper technologies that have potential to stop/slow ground vehicles.
- (U) $ 1324 Vessel Stopper System – Continued evaluation of NL means of stopping maritime vessels and small, fast moving boats.
- (U) $ 3786 Studies and Analysis – Medical and NL casuality data collection; strategic planning; human effects assessments; and technical studies/analysis of emerging technologies for possible NL application.
- (U) $ 1229 Area Denial – Explored and developed technical NL solutions to anti-personnel landmines.
- (U) $ 2038 Portable Vehicle Immobilizer System (PVIS) – Complete development and testing of a pre-emplaced system to stop a vehicle (up to 7500 pounds) traveling at speeds up to 45 mph.

- (U) $ 1670 Canister Launched Area Denial System (CLADS) – Continue development of NL munitions launched from a multi-platform mounted mine dispenser.
- (U) $ 1020 Foams – Continue evaluation and testing of both rigid and slippery foams and packaging delivery platforms.
- (U) $ 1076 Studies and Analysis – Medical and NL casualty data collection; strategic planning; human effects assessements; and technical studies/analysis of emerging technologies for possible NL application.
- (U) $ 2050 Concept Exploration Program (CEP) – Continue to explore and develop technical NL solutions to clear facilities and area dential for personnel.
- (U) $ 54 Joint Integration Project (JIP) – Continue to select and test commercial products that will meet the Joint Services' requirement for specific NL capability sets items.
- (U) $ 2022 Develop and evaluate new RDT&E NLW technology initiatives.
- (U) $ 796 Modular Crowd Control Munitions (MCCM) – Complete evaluation and testing of a vehicle mounted NL "claymore" mine.
- (U) $ 585 Running Gear Entaglement System (RGES) – Continue development of a NL entanglement capability to stop small, fact moving boats.

Total $ 26,132

(U) FY 2001 Planned Program:

- (U) $ 874 Execution oversight and administration of the Joint NLW Program and technologies database.
- (U) $ 540 Evaluation of NLWs by Service warfighting laboratories for direct user feedback of various NL technologies and munitions.
- (U) $ 756 Initial modeling and simulation validation and verification of NLW in the Joint Conflict and Tactical Simulation (JCATS) model and performance effects data collection.
- (U) $ 1512 Continue pursuit of new technology through open competition of industry, academia and government lab sources for NL capabilities.
- (U) $ 215 66mm NL Munitions – Complete Engineering & Manufacturing Development of 66mm vehicle launched munitions for crowd control and site security missions.
- (U) $ 891 Service Program Support for oversight and administration of the Joint NLW Program.
- (U) $ 3440 Ground Vehicle Stopper (GVS) - Continue evaluation of several proposed electrical vehicle stopper technologies that have potential to stop/slow ground vehicles.
- (U) $ 2376 Vessel Stopper System (VSS)- Continue evaluation of NL means of stopping maritime vessels
- (U) $ 4581 Active Denial Technology (ADT) - Continue evaluation, testing and target assessment of a HMMWV mounted directed energy system.
- (U) $ 1098 Running Gear Entanglement System (RGES) – Continue development of a NL entanglement capability to stop small, fast moving boats.
- (U) $ 1979 Develop and evaluate new RDT&E NLW technology initiatives.
- (U) $ 1585 Foams - Continue evaluation and testing of both rigid and slippery foams and packaging delivery platforms.
- (U) $ 756 Studies and Analysis – Medical and NL casuality data collection; strategic planning; human effects assessments; and technical studies/analysis of emerging technologies for possible NL application.

RDT&E BUDGET ITEM JUSTIFICATION SHEET (R-2 Exhibit)	DATE February 2000
BUDGET ACTIVITY 4 - Demonstration/Validation	PE NUMBER AND TITLE 0603851M Non-Lethal Warfare DEM/VAL
	PROJECT C2319

- (U) $ 2042 Concept Exploration Program – Continue to explore and develop technical NL solutions for clearing facilities, area denial to personnel, and to incapacitate peronnel..
- (U) $ 752 Joint Integration Program (JIP) – Continue to select and test commercial products that will meeting the Joint Services' requirement for specific NL capability set items.
- (U) $ 183 NL Crowd Dispersal Cartridge – Complete Engineering & Manufacturing Development of a NL round of munitions for the M203 40mm Grenade Launcher.

Total $ 23,580

B. (U) Project Change Summary

	FY 1999	FY 2000	FY 2001
(U) Previous President's Budget	34,512	23,277	23,782
(U) Adjustments to Previous President's Budget (Taxes)	(617)	2,855	(202)
(U) Current Budget Submit	33,895	26,132	23,580

(U) Change Summary Explanation:

(U) Funding: FY99 decrease of $360K due to SBIR assessment and a $257K due to minor affordabilty adjustment. FY2000 increase is due to a $3,000K congressional plus up and a $145 decrease for minor affordability adjustment. The FY 2001 decrease is due to a minor affordability adjustment.

(U) Schedule: N/A

(U) Technical: N/A

C. (U) Other Program Funding Summary (APPN, BLI #, NOMEN)

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Compl	Total Cost
(U) PANMC, BLI 166300, Items <$2M	0	0	0	0	0	0	0	0	3806
(U) PAN,MC BLI 162800, Non-Lethals	984	2000	2700	2079	4136			Cont.	Cont.
(U) PMC BLI 237100, Operations Other Than War (OOTW)	0	1452	1347	1151	1139	989	1148	Cont.	Cont.

(U) **Related RDT&E:** Not Applicable.

(U) **Schedule Profile:** Not Applicable.

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)

DATE: February 2000

BUDGET ACTIVITY: 4 - Demonstration/Validation

PE NUMBER AND TITLE: 0603851M Non-Lethal Warfare DEM/VAL

PROJECT: C2319

A. (U) Project Cost Breakdown

	FY 1999	FY 2000	FY 2001
Product Development	27055	19657	19689
Support and Management	6840	6475	3891
Total	33895	26132	23580

B. Budget Acquisition History and Planning Information

Performing Organizations

Contractor or Government Performing Activity	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Performing Activity EAC	Project Office EAC	Total Prior to FY 1999	FY 1999	FY 2000	FY 2001	Budget to Complete	Total Program
Product Development Organizations										
USAIC, Ft. Benning, GA	MIPR	Oct 97			1500	690	250	300	Cont	Cont
MCWL, Quantico, VA	WR	Apr 98			500	650	235	208	Cont	Cont
Lackland AFB, TX	MIPR	Feb 00					365	340	Cont	Cont
ARDEC, Picatinny, NJ	MIPR	Oct 97			15607	14192	10199	6906	Cont	Cont
NSWC, Various	WR	Oct 97			4035	1376	1296	3474	Cont	Cont
Brooks AFB, TX	MIPR	Oct 97			3605	6810	4325	4581	Cont	Cont
JWFC, Ft. Monroe, VA	MIPR	Mar 98			300	250	35	50	Cont	Cont
MCSC, Quantico, VA	WR MIPR						1026	1021	Cont	Cont
Various (M&S)	WR	Oct 97			1090	285	416	406	Cont	Cont
Various (TIP)	MIPR	Oct 97			650	2802	1510	1512	Cont	Cont
Various (Service)	MIPR							891	Cont	Cont
Support and Management Organizations										

RDT&E PROGRAM ELEMENT/PROJECT COST BREAKDOWN (R-3)			DATE: February 2000
BUDGET ACTIVITY: 4 - Demonstration/Validation	PE NUMBER AND TITLE: 0603851M Non-Lethal Warfare DEM/VAL		PROJECT: C2319

MCSC, Quantico, VA	WR	Oct 97	400	977	1095	2107	Cont	Cont
NSWC, Dahlgren, VA	WR	Oct 97	756	293	405	425	Cont	Cont
CTQMCSC, Quantico, VA	RCP	Dec 97	602	3290	2669	603	Cont	Cont
Various		Oct 97	450	2280	2056	456	Cont	Cont
MCLB, Albany, GA	RCP	Jan 00			250	300	Cont	Cont

Test and Evaluation Organizations

Government Furnished Property N/A

Item Description	Contract Method/Type or Funding Vehicle	Award or Obligation Date	Delivery Date	Total Prior to FY 1999	FY 1999	FY 2000	FY 2001	Budget to Complete	Total Program
Product Development Property									
Support and Management Property									
Test and Evaluation Property									

	Total Prior to FY 1999	FY 1999	FY 2000	FY 2001	Budget to Complete	Total Program
Subtotal Product Development	27287	27055	19657	19689	Cont	Cont
Subtotal Support and Management	2208	6840	6475	3891	Cont	Cont
Subtotal Test and Evaluation						
Total Project	29495	33895	26132	23580	Cont	Cont

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603857N PROJECT NUMBER: X2691
PROLGRAM ELEMENT TITLE: JWE - BATTLE LAB

(U) COST (Dollars in thousands)

PROJECT NUMBER & TITLE		FY 1999 ACTUAL	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X2691 All Service Combat Identification Evaluation Team (ASCIET)										
	*	12,949	13,110	13,310	13,525	13,500	13,484		CONT.	CONT.
TOTAL	*	12,949	13,110	13,310	13,525	13,500	13,484		CONT.	CONT.

Note: * Moved ASCIET from the Joint Staff to CINCUSACOM and ASCIET's RDT&E funding to the Department of Navy, Air Force as Executive Agent, effective FY 00. Prior year funds are reflected in the Joint Staff RDT&E, Defense Wide (DW) budget submission. Funds for this program were transferred from the Joint Staff to the Department of Navy, which moves ASCIET from CJCS to CINCUSJFCOM beginning in FY00.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The All Service Combat Identification Evaluation Team (ASCIET) transferred from General Officer Steering Committee-Combat Identification (GOSC-CI) oversight to the Joint Staff during FY 1998. ASCIET was formed from the OSD-Sponsored Joint Air Defense Operations/Joint Engagement Zone (JADO/JEZ) Joint Test and Evaluation Program conducted during FY 1990 through FY 1994. JADO/JEZ tested the ability of Service forces to execute an effective air defense (air-to-air and surface to air) network in a tactical environment. Because of the relatively high fratricides (ground-to-ground and air-to-ground) experienced in DESERT STORM and other conflicts, in December 1993, the Joint Requirements Oversight Council (JROC) directed that the JADO/JEZ Program convert to the ASCIET Program on 1 October 1994. ASCIET ran evaluations in 95, 96 and 97 in the Gulfport/Camp Shelby MS area. However because the Army was dissatisfied with the small maneuver area at Camp Shelby, ASCIET was directed by GOSC-CI to conduct Joint Service site surveys to find an operational area which would better support all four Services' mission needs, and simultaneously support evaluation of all four combat ID mission areas. In addition the area of operations had to support cost effective, full instrumentation for collection of time, space, position information and shot pairing. Based on the Joint surveys, in March of 1998 the JROC selected Ft Stewart GA/East Coast as the ASCIET 99 evaluation venue and directed that ASCIET conduct a four mission area evaluation in the Ft Stewart area. The ASCIET Mission is to investigate, evaluate and assess combat identification (CID) concepts and selected critical warfighting areas on the joint battlefield and provide recommendations that address organization, systems, technology, tactics, techniques and procedures (TTP) and doctrine. As part of JFCOM, ASCIET will become the primary demonstration/experimentation venue that utilizes and evaluates operational forces and robust tactical Command, Control, Communications, Computers and Intelligence (C4I) networks. Defense Reform Initiative Directive (DRID) #29 directed a study to determine which "joint agencies" should be transferred to a Unified Commander-in-Chief. The study determined that ASCIET should be transferred to the then United States STET Command (USACOM). As such,

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603857N PROJECT NUMBER: X2691
PROLGRAM ELEMENT TITLE: JWE - BATTLE LAB

Assigned Air Force as Executive Agent for ASCIET. Subsequently, CINC USJFCOM has directed ASCIET to continue its surface-to-surface, air-to-surface emphasis with a fix-test-fix approach to air defense in the Ft Stewart area for FY2000. Some future evaluations may take place at the National Training Center.

(U) JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION AND VALIDATION because it includes efforts to evaluate integrated technologies in as realistic an operating environment as possible to assess the performance potential of current TTPs, weapons systems, and to help expedite technologies that meet the joint warfighters' needs.

B. (U) PROGRAM CHANGE SUMMARY: Moved ASCIET from the Joint Staff to CINCUSACOM and ASCEIT's RDT&E funding to the Department of Navy, Air force is Executive Agent for CINCUSACOM, effective FY 00. Prior year funds are reflected in the Joint Staff RDT&E, DW budget submission.

FY 2000: Congressional reduction (-$78K).

FY 2001: Miscellaneous Departmental adjustments (-138K).

(U) Funding: RDT&E funds were budget base transferred from Joint Staff's RDT&E, DW budget to SPAWAR's RDT&E,N budget.

(U) Schedule: No change.

(U) Technical: No change.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:

- (U) USCINCACOM Implementation Plan (I-Plan) for the All Service Combat Identification Team (ASCIET) approved is CINCUSACOM's concept and plan for executing the Charter for ASCIET. It establishes the transfer time table and methodology. Describes how USJFCOM will task organize to accomplish the mission. ASCIET conducted the ASCIET 99 evaluation in the Ft Stewart/East Coast area in the February - March 99 time frame. This evaluation was an increase in scope to the surface-to-surface (from company to battalion size elements) and also an expanded emphasis on air-to-surface. In order to meet these requirements, ASCIET changed its venue to a larger maneuver area (Ft Stewart, GA.) for ASCIET 99.

- (U) FY 1999 EVALUATION: The priorities for ASCIET 99 were Surface-to-Surface (S-S) Air-to-Surface (A-S), and Air Defense (AD) that includes surface-to-air and Air-to-Air (A-A). ASCIET 99, Held from 1 through 11 March, was fourth in a series of annual ASCIET combat ID evaluations. There were over 5,000 participants from the four services including reserve components and service-sponsored technologies from industry. ASCIET 99 was conducted in an area that encompassed Fort Stewart, Hunter AAF, Wright AF, Savannah GA ANG Combat Readiness Training Center (CRTC), NAS Jacksonville, FL W-157/158 (over-water ranges), and the Quick Thrust/Gator/Moody/Live Oak Military Operating Areas (MOAs). The S-S evaluation utilized the Fort Stewart maneuver ranges. The A-S Quick Thrust MOAs R3005A/B/C/D/E/, and R3007A/B/C/D/E ranges. The AD evaluation was conducted over water in W157/158 ranges and over land in the Quick Thrust, Gator, Moody, and Live Oak MOAs. Blufor aircraft operated from Savannah CRTC, Hunter AAF, Moody AFB, and NAS Norfolk, OPFOR aircraft operated from NAS Jacksonville, NAS Cecil Field, NAS Oceana, and Robins AFB. The war was conducted during a 5-hour vulnerability window each evaluation day. The vulnerability window on 1-5 March was 0900-1400 to support daylight operations. The vulnerability window on 7-11 March was 1700-2200 to support daylight operations transitioning to night operations. The evaluation environment was an air, land, and sea joint littoral battle space in a mild climate. The land range included moderately rolling terrain and vegetation that limited clear lines of sight and encouraged use of terrain-masking techniques. The airspace was a compilation of MOAs, warning and restricted areas and Altitude Reservation (ALTREVS) to create a seamless airspace allowing multi-axis overland and over-water attacks culminating at the ground battle. Some flight restrictions were necessary to comply with airspace limitations. Every participant that moved during the vulnerability window was instrumented for Time-Space-Position Information (TSPI) and weapon engagements. Real-Time Casualty Assessments (RTCA) and kill removals were used when appropriate. Players compared their perceptions against what actually took place on the battlefield during truth-based postmission debriefs. These factual debrief provided an opportunity for discovery and learning. Participants were encouraged to develop innovations in Tactic, Techniques, and Procedures (TTP) to improve joint combat ID during the course of the evaluation. In addition to TTP excursions, ASCIET also measured the influence of certain developmental technologies against the base line of currently fielded systems. This class of technology was considered on-line, and the influence of those technologies on combat ID will be evaluated and reported. ASCIET also allowed certain technologies to participate on a not-to-interfere basis in an off-line status. Offline-line technologies are not part of our analysis and will not be evaluated in the ASCIET final report.

2. (U) FY 2000 PLAN:

- (U) ($5,660) Evaluation Support. ASCIET 2000 will be a simulated combat, realistic, joint task force scenario in littoral area. ASCIET's expanded surface-to-surface and air-to-surface operation will continue to require full instrumentation of a battalion size task force, an opposing (OPROR) and airborne platforms. Air defense platforms including aircraft, ships at sea and land based assets will be fully instrumented. Instrumentation provides time, space, position information and shot pairing for real time casualty assessment, and kill removal subsequent analysis. Results from the instrumentation will point to solutions to combat ID deficiencies. Contractor support will be required for instrumentation installation and checkout and to ensure instrumentation is reliable and accurate. OPFOR vehicles and air defense systems will be real Former Soviet Union equipment and will be leased and transported from their home base to the evaluation location. ASCIET will fund travel, billeting and per diem for over 6000 participants consisting of service warfighters and augmentees for security, weapons systems expertise and airspace support (FAA). Site visits required to prepare for the evaluation will be conducted as necessary.

- (U) ($851) ASCIET Support. ASCIET will remain as a tenant at Eglin AFB requiring base support including utilities, waste disposal and cleaning contracts. These are new costs for ASCIET brought about due to the transfer to USACOM. In prior years, ASCIET as Detachment 1 of the 53rd Fighter Wing, was not required to pay such bills as they were covered by the 53rd Fighter Wing. ASCIET will maintain and upgrade its analysis capabilities with needed software and hardware improvements. The following major documents will be published for ASCIET 2000: Evaluation Spin-up Plan, Evaluation Plan 45-day Quick Look Report and Final Report. Quick Look and Final results briefings will be prepared and presented to the Joint Staff, the services and the Commanders-in-Chief (CINCs). The ASCIET staff will provide technical and operational support to forums dealing with combat ID issues e.g., the Joint Integrated Air Defense Interoperability Working Group and the World Wide Combat ID conference.

- (U) ($6,133) Annual Contracts. The ASCIET 2000 evaluation scenario will be developed to mirror real world joint combat operations. Participant command and control systems data tactical displays, voice and data link communications, identification systems data engagement decisions will be thoroughly analyzed to determine cause of fratricide and assist in developing solutions. Overall mission effectiveness to include exchange ratios, lost shot opportunities and missed targets will also be evaluated and analyzed. ASCIET's focus will be on tactics, techniques and procedures (TTP), interoperability and combat systems. A white force (evaluation control) network will be designed and constructed to meet ASCIET 2001 scenario requirements. A classified debriefing network will also be designed and constructed to allow participants at up to eight different geographical locations, including ships at sea, to debrief the mission of the day. This

debriefing process will allow the participants the opportunity to discover and learn and to adjust TTP and systems performance for the following day.

- (U) ($305) Conferences. ASCIET will host five planning conferences: Air Space, OPFOR, Initial Planning, Mid-Term planning and Final Planning. Through these planning conferences, warfighter participants will be an integral part of the planning process including scenario development and preparation for interoperability between the services.

- (U) Venue for FY00 is currently planned for the Ft Stewart, GA area. Fiscal considerations dictate that the FY00 evaluation again be conducted at Ft Stewart and the surrounding area; however, this is an ongoing staff effort and will require service component coordination.

3. (U) FY 2001 PLAN:

- (U) ($5,732) Evaluation Support. ASCIET 2001 will be a simulated combat, realistic, joint task force scenario in littoral area. ASCIET's expanded surface-to-surface and air-to-surface operation will continue to require full instrumentation of a battalion size task force, an opposing (OPROR) and airborne platforms. Air defense platforms including aircraft, ships at sea and land based assets will be fully instrumented. Instrumentation provides time, space, position information and shot pairing for real time casualty assessment, and kill removal subsequent analysis. Results from the instrumentation will point to solutions to combat ID deficiencies. Contractor support will be required for instrumentation installation and checkout and to ensure instrumentation is reliable and accurate. OPFOR vehicles and air defense systems will be real Former Soviet Union equipment and will be leased and transported from their home base to the evaluation location. ASCIET will fund travel, billeting and per diem for over 6000 participants consisting of service warfighters and augmentees for security, weapons systems expertise and airspace support (FAA). Site visits required to prepare for the evaluation will be conducted as necessary.

- (U) ($932) ASCIET Support. ASCIET will remain as a tenant at Eglin AFB requiring base support including utilities, waste disposal and cleaning contracts. These are new costs for ASCIET brought about due to the transfer to USACOM. In prior years, ASCIET as Detachment 1 of the 53rd Fighter Wing was not required to pay such bills as the 53rd Fighter Wing covered them. ASCIET will maintain and upgrade its analysis capabilities with needed software and hardware improvements. The following major documents will be published for ASCIET 2001: Evaluation Spin-up Plan, Evaluation Plan 45-day Quick Look Report and Final Report. Quick Look and Final results briefings will be prepared and presented to the Joint Staff, the services and the Commanders-in-Chief (CINCs). The ASCIET staff will provide technical and operational support to forums dealing with combat ID issues

e.g., the Joint Integrated Air Defense Interoperability Working Group and the World Wide Combat ID conference.

- (U) ($6,125) Annual Contracts. The ASCIET 2001 evaluation scenario will be developed to mirror real world joint combat operations. Participant command and control systems data tactical displays, voice and data link communications, identification systems data engagement decisions will be thoroughly analyzed to determine cause of fratricide and assist in developing solutions. Overall mission effectiveness to include exchange ratios, lost shot opportunities and missed targets will also be evaluated and analyzed. ASCIET's focus will be on tactics, techniques and procedures (TTP), interoperability and combat systems. A white force (evaluation control) network will be designed and constructed to meet ASCIET 2001 scenario requirements. A classified debriefing network will also be designed and constructed to allow participants at up to eight different geographical locations, including ships at sea, to debrief the mission of the day. This debriefing process will allow the participants the opportunity to discover and learn and to adjust TTP and systems performance for the following day.

- (U) ($321) Conferences. ASCIET will host five planning conferences: Air Space, OPFOR, Initial Planning, Mid-Term planning and Final Planning. Through these planning conferences, warfighter participants will be an integral part of the planning process including scenario development and preparation for interoperability between the services.

C. (U) OTHER PROGRAM FUNDING SUMMARY: (Dollars in thousands)

	FY 1999 ACTUAL	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
(U) Procurement	*								
(U) O&M	*								

Note: *O&M and procurement funds remain funded in XXXX and did not shift to Navy for executive agency.

(U) RELATED RDT&E: Not applicable

D. (U) ACQUISITION STRATEGY

- FY 1999-01.

Competitive contract was awarded to SAIC in Sept 98 on a GSA schedule for ASCIET advisory and technical support, also contract awarded to Mevatec on 1 Feb 95 (2 year + 3 option years). Several Sole source contracts for short periods to conduct the annual evaluation that include Video Conferencing ability to software applications and instrumentation packages for vehicles for data collection.

EXHIBIT R-3, FY 2001 RDT&E,N PROJECT COST ANALYSIS DATE: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603857N PROJECT NUMBER: X2691
PROGRAM ELEMENT TITLE: JWE - BATTLE LAB

Exhibit R-3 Cost Analysis (page 1)								Date: FEB 2000				
APPROPRIATION/BUDGET ACTIVITY 1319/BA 4			PROGRAM ELEMENT: 0603857N					PROJECT NAME AND NUMBER: ASCIET/X2691				
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Operational Test & Evaluation	C/FP PO	SAIC EGLIN AFB				4,214	15 Oct	4,214		Cont	Cont	Cont
Operational Test & Evaluation	SS/CPFF MIPR	Stanford Research Inst, Menlo Park CA				148		148		Cont	Cont	Cont
Operational Test & Evaluation	SS/FP PO	MEVATEC EGLIN AFB				1,914	31 Jan	1,914		Cont	Cont	Cont
Evaluation other Costs	Niper/PO	Savannah GA				5,780	Var	5,758		Cont	Cont	Cont
Travel and Conferences		ASCIET/ Various	.			709		773		Cont	Cont	Cont
Operation Costs/Research		ASCIET/ Various	.			184		303		Cont	Cont	Cont
Subtotal T&E						12,949		13,110				
Remarks:												
Subtotal Support												

EXHIBIT R-3, FY 2001 RDT&E,N PROJECT COST ANALYSIS DATE: February 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0603857N PROJECT NUMBER: X2691
PROGRAM ELEMENT TITLE: JWE - BATTLE LAB

Exhibit R-3 Cost Analysis (page 2)												Date: FEB 2000
APPROPRIATION/BUDGET ACTIVITY: 1319/BA 4			PROGRAM ELEMENT: 0603857N									PROJECT NAME AND NUMBER: ASCIET/x2691
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal T&E												
Remarks												
Subtotal Management												
Remarks												
Total Cost						12,949		13,110				

Exhibit R-2, RDT&E Budget Item Justification	Date: Jan 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E,N - BA4	Program Element Name & No. PE 0604327N Hardened Target Munitions

C sot ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Total PE Cost		2.9	4.9	0	0	0	0	0	CONT.	CONT.
J2331 Hard Target Munitions		0	4.9	0	0	0	0	0		
J2629 Hard Target Munitions		2.9	0	0	0	0	0	0	CONT	CONT
									CONT	CONT
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification:
The Advanced Penetrator Definition Program will develop an advanced conventional earth penetrating warhead for use on conventional ballistic missiles.
(U) JUSTIFICATION FOR BUDGET ACTIVITY: The Advanced Penetrator Definition Program is appropriately justified in BA-4, Demonstration and Validation, as this effort evaluates advanced conventional earth penetrating warhead materials in as realistic an operating environment as possible to assess the performance of advanced technology.

B. (U) Program Change Summary:

	FY1999	FY 2000
FY 2000 President's Budget:	3.0	4.9
Appropriated Value:	3.0	4.9

Exhibit R-2, RDT&E Budget Item Justification	Date: Jan 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E,N - BA4	Program Element Name & No. PE 06043327N Hardened Target Munitions

Adjustments to FY 1999/2000 Appropriated Value/ FY 2000 President's Budget:

-0.1	0.0
FY 2001 President's Budget Submit:	
2.9	4.9

Explanation: The FY 1999 reduction (-.1) was attributable to SBIR.

C. (U) Other Program Funding Summary: See enclosed R-2a for each individual project data.

D. (U) Acquisition Strategy: See enclosed R-2a for each individual project data.

E. (U) Schedule Profile: Not Applicable.

Exhibit R-2a, RDT&E Project Justification		Date: Jan 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E,N - BA4	Program Element Name & No. PE 0604327N, Hardened Target Munitions	Project Name and Number. Hard Target Munitions J2331

Cost ($ in Millions)		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project Cost J2331 Hard Target Munitions		0	4.9	0	0	0	0	0	CONT.	CONT.
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification:
The Advanced Penetrator Definition Program will develop an advanced conventional earth penetrating warhead for use on conventional ballistic missiles.

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 PLAN: Funding is provided in Project J2629

Exhibit R-2a, RDT&E Project Justification			Date: Jan 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E,N - BA4	Program Element Name & No. PE 0604327N, Hardened Target Munitions	Project Name and Number. Hard Target Munitions J2331	

2. (U) FY 2000 PLAN:

- (U) ($4.9) Continue Advanced Penetrator Definition program. Design efforts will focus on risk reduction technology efforts. Full obligation is projected by the 4th quarter of the first year. FY 2000 efforts include:
  - (U) Define penetrator fuze requirements.
  - (U) Initiate testing to obtain environment data on penetrators which impact concrete at velocities up to 4000 feet per second.
  - (U) Initiate preliminary design of the missile/reentry body separation system.
  - (U) Initiate trade studies focusing on internal packaging and system guidance architectures.
  - (U) Define GPS receiver design and data processing options that optimize system accuracy and minimize degradation due to jamming.
  - (U) Provide funds to the Air Force for completion of Analysis of Alternatives (AOA) activities.

3. (U) FY 2001 PLAN: N/A

B. (U) Other Program Funding Summary: (Dollars in Thousands)

Program	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	To Complete	Total

Exhibit R-2a, RDT&E Project Justification		Date: Jan 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E,N - BA4	Program Element Name & No. PE 0604327N, Hardened Target Munitions	Project Name and Number. Hard Target Munitions J2331

	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(U) Related RDT&E: Project J2629 in FY 1999

C. (U) Acquisition Strategy:
Contracts will continue to be awarded to those sources who were engaged in the TRIDENT II (D5) development program and are currently engaged in the production and/or operational support of the deployed D5/C4 Strategic Weapons Systems on the basis of Other Than Full and Open Competition pursuant to the authority of 10 U.S.C. 2304 ©(1) and (3) implemented by FAR 6.302.-1, 3 4.

D. (U) Schedule Profile: Not Applicable.

Exhibit R-3, Cost Analysis			Date: Jan 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E,N - BA4	Program Element Name & No. PE 0604327N, Hardened Target Munitions	Project Name and Number. Hard Target Munitions J2331	

Cost Categories Product Development	Contract Method & Type	Performing Activity & Location	Total Pys Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Ancillary Hardware Development	SS/CPFF	LMDS/CAL.	1.2	0.0	N/A	1.0	10/99		N/A	Cont.	Cont.	Cont.
Ancillary Hardware Development	SS/CPFF	SPA/MD	0.2	0.0	N/A	.1	10/99		N/A	Cont.	Cont.	Cont.
Ancillary Hardware Development	WR	AIR FORCE	0.0	0.0	N/A	.1	10/99		N/A	Cont.	Cont.	Cont.
Ancillary Hardware Development	MIPR	DOE/NM	1.5	0.0	N/A	1.7	10/99		N/A	Cont.	Cont.	Cont.
Ancillary Hardware Development	WR	ARMY/ALA	1.1	0.0	N/A	1.4	10/99		N/A	Cont.	Cont.	Cont.
Ancillary Hardware Development	SS/CPFF	CSDL/MA	0.0	0.0	N/A	.6	10/99		N/A	Cont.	Cont.	Cont.
Subtotal Product Development			4.6	0.0		4.9						
Remarks:												
Total Cost			4.6	0.0		4.9				Cont.	Cont.	Cont.
Remarks:												

Exhibit R-2a, RDT&E Project Justification		Date: Jan 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E,N - BA4	Program Element Name & No. PE 0604327N Hardened Target Munitions	Project Name and Number. Hard Target Munitions - J2629

Cost ($ in Millions)	FY 1998	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005	Cost to Complete	Total Cost
Project J2629 Hard Target Munitions	0*	2.9	0*	0	0	0	0	0	CONT.	CONT.
RDT&E Articles Qty										

A. (U) Mission Description and Budget Item Justification:
The Advanced Penetrator Definition Program will develop an advanced conventional earth penetrating warhead for use on conventional ballistic missiles.

* Funded in Project J2331

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

Exhibit R-2a, RDT&E Project Justification		Date: Jan 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E,N - BA4	Program Element Name & No. PE 0604327N Hardened Target Munitions	Project Name and Number. Hard Target Munitions - J2629

1. (U) FY 1999 Plan (2.9) This supports a Milestone I acquisition decision. Conducted a joint Navy/Air Force Analysis of Alternatives (AOA) as well as initial planning efforts associated with establishing a joint hard and deeply buried target defeat program. This effort is fully obligated. FY 1999 efforts included:

(U) Program Office AOA support for the Generic Super Sonic Cruise Missile

(U) Completed AOA Studies/Analysis.

(U) Produced documentation for Defense Acquisition Board (DAB), supported AOA efforts and DAB activities.

(U) Supported AOA Alternative Defeat Analysis.

2. (U) FY 2000 Plan: Funded in Project J2331

3. (U) FY 2001 Plan: N/A

B. (U) Other Program Funding Summary: (Dollars in Thousands)

FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005To	TOTAL

Exhibit R-2a, RDT&E Project Justification		Date: Jan 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E,N - BA4	Program Element Name & No. PE 0604327N Hardened Target Munitions	Project Name and Number. Hard Target Munitions - J2629

ESTIMATE	ESTIMATE	ESTIMATE	ESTIMATE	ESTIMATE	ESTIMATE	ESTIMATE	COMPLETE	PROGRAM
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

(U) Related RDT&E: Project J2331 in FY 1998 and FY 2000

C. (U) Acquisition Strategy:
Contracts will continue to be awarded to those sources who were engaged in the TRIDENT II (D5) development program and are currently engaged in the production and/or operational support of the deployed D5/C4 Strategic Weapons Systems on the basis of Other Than Full and Open Competition pursuant to the authority of 10 U.S.C. 2304 (c) (1) and (3) implemented by FAR 6.302.-1, 3 4.

D (U) Schedule Profile: Not Applicable

Exhibit R-2a, RDT&E Project Justification		Date: Jan 2000
APPROPRIATION/BUDGET ACTIVITY RDT&E,N - BA4	Program Element Name & No. PE 0604327N Hardened Target Munitions	Project Name and Number. Hard Target Munitions - J2629

Cost Categories Product Development	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY99 Cost	FY99 Award Date	FY00 Cost	FY00 Award Date	FY01 Cost	FY01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Ancillary Hardware Development	SS/CPFF	SPA/MD	00.	.2	12/98	0.0	N/A		N/A	Cont.	Cont.	Cont.
Ancillary Hardware Development	WR	NAWC/NJ	00.	.3	12/98	0.0	N/A		N/A	Cont.	Cont.	Cont.
Ancillary Hardware Development	MIPR	DOE/NM	00.	.4	12/98	.0.0	N/A		N/A	Cont.	Cont.	Cont.
Ancillary Hardware Development	WR	ARMY/ALA	00.	.4	12/98	.0.0	N/A		N/A	Cont.	Cont.	Cont.
Ancillary Hardware Development	PD	Air Force	00.	1.5	12/98	0.0	N/A		N/A			
Ancillary Hardware Development	SS/CPFF	CSDL/MA	0.0	.1	12/98	0.0	N/A		N/A			
Subtotal Product Development			0.0	2.9		0.0						
Remarks:												
Total Cost			0.0	2.9		0.0				Cont.	Cont.	Cont.
Remarks:												

FY 2001 RDT&E,N Budget Item Justification Sheet DATE: FEBRUARY 2000

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng Support

(U) COST: (Dollars in Thousands)

PROJECT

NUMBER TITLE	FY 1999 ACTUAL	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0798 OTH Targeting	1,527	1,591	2,109	2,166	2,191	2,569	2,653	Cont.	Cont.
X2144 SEW Engineering	7,973	8,545	8,154	8,093	7,200	9,068	9,345	Cont.	Cont.
R2357 Maritime Battle Center	11,140	23,784	23,837	23,897	23,906	23,855	23,819	Cont.	Cont.
R2630 Adv Comm Info Tech	1,936	2,984	0	0	0	0	0	0	4,920
TOTAL	22,576	36,904	34,100	34,156	33,297	35,492	35,817	Cont.	Cont.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: This Program Element (PE) contains four projects: Over-the-Horizon Targeting, Space and Electronic Warfare (SEW) Engineering, Maritime Battle Center, and Advanced Communications Information Technology (ACI). The projects are systems engineering non-acquisition programs with the objectives of developing, testing, and validating Naval Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) architectures to support naval missions in Joint and Coalition Theater. The mission of this program element is carried out by multiple tasks that are used to ensure Naval C4ISR Command and Control Warfare (C2W) components of SEW are effectively integrated into the C4ISR architectures. The Program additionally ensures that (1) the composite operational capabilities of SEW systems (not the individual component systems) conform to the Naval C4ISR architecture as related to the objectives of National Defense Strategy and evolving joint visions and direction, such as Joint Vision 2010 (JV 2010), "Copernicus...C4ISR for the 21st Century," "Forward...From the Sea," C4I For the Warrior, and the Defense Science Board Summer Study Task Force on Information Architecture for the Battlefield and are guided by CINC requirements; and (2) that SEW systems and systems integration effort involves leading-edge technology transfer of information processing technologies primarily through integration of government and commercial off-the-shelf (GOTS/COTS) products to enhance the Navy's operational capability, interoperability, flexible reconfiguration, as well as reduce costs. The Maritime Battle Center is a distributed organization consisting of concept development, experimentation and analysis coordinated by the Naval War College, and the Navy Warfare Development Command, and C4ISR technical and acquisition support coordinated by the Space and Naval Warfare Systems Command in FY99. For MBC, there will be a claimant change from Space and Naval Warfare Systems Command to Office of Naval Research, effective FY00. The MBC will also act as the Navy representative to the Joint Battle Center and the Battle Labs of other services.

FY 2001 RDT&E,N Budget Item Justification DATE: FEBRUARY 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under DEMONSTRATION & VALIDATION because it develops and integrates hardware for experimental tests related to specific ship or aircraft applications. It also develops a virtual demonstration and validation environment across Navy for C4ISR.

B. (U) PROGRAM CHANGE FOR TOTAL P.E.:

	FY 1999	FY 2000	FY 2001
(U) FY 2000 President's Budget:	19,804	35,170	35,912
- Appropriated Value		38,170	
- Execution Adjustments	3,283		
- Congressional Recission		- 204	
- Minor Program Adjustments		3,000	- 1,437
- Various Rate Adjustments	- 90		- 337
- SBIR/STTR Transfer	- 421	*	
- Strategic Sourcing Adjustment			- 38
- Program Adjustment		-1,062	
FY 2001 President's Budget Submission:	22,576	36,904	34,100

*$112K is portion of extramural program is reserved for Small Business Innovation Research assessment in accordance with 15 USC 638.

FY 2001 RDT&E,N Budget Item Justification DATE: FEBRUARY 2000

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng

(U) COST: (Dollars in Thousands)

NUMBER TITLE	FY 1999 ACTUAL	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X0798 OTH Targeting	1,527	1,591	2,109	2,166	2,191	2,569	2,653	Cont.	Cont.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The Over-the-Horizon Targeting (OTH-T) program provides a virtual, global systems integration and test facility for Information Technology for the 21st Century (IT-21) C4ISR technology that supports the collection, transmission, correlation, and display of track data into a Common Operational Picture (COP) in support of warfighting requirements. This effort was originally undertaken to support targeting of over the horizon weapons such as the TOMAHAWK cruise missile. The common view of the battle space that was provided to the warfighter by OTH-T has been applied across the spectrum of warfare missions; however, the technology and doctrine on which it was based has changed radically in recent years. The result is that the first goal of the OTH-T program is to transition the OTH architectures and systems from older MIL STD technologies to COTS based technologies that support the network centric model of the Navy's plan to support JV 2010 implementing IT-21 technology. The second goal of the OTH-T program will be to support the integration of all C4I systems into warfighting capabilities which includes Year 2000 (Y2K) integration and testing. This support includes providing technical expertise afloat and ashore via a cadre of highly-trained Fleet Systems Engineers who ensure smooth integration of new capabilities to enhance OTH-T during major Fleet exercises and demonstrations which are used to validate and evaluate developed portions of configuration. The OTH-T program integration and testing in support of the warfighting capabilities will also include Y2K interoperability testing for both MIL-STD and IT-21 COTS equipment for submarines, surface, and land based components. Allied interoperability is an important issue for future naval operations, especially with the Navy initiative to expand Internet Protocol (IP) networking throughout the Fleet (IT-21 and Naval Intranet). Specific solutions do not exist to solve the IP connectivity issue with Allies. Funding will allow development of solutions for emerging Allied interoperability requirements. Data throughput will need to be increased for the exchange of larger sized files within the limitations of the HF medium. Funding will allow for further development of potential solutions for merging improved TCP/IP capability with ADNS and existing international standards (e.g.: STANAG 5066). Funding will also allow for development of subnet relay protocols which will provide for a significant improvement within battlegroups.

FY 2001 RDT&E,N Budget Item Justification DATE: FEBRUARY 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0604707N PROJECT NUMBER: X0798
PROGRAM ELEMENT TITLE: SEW Architecture/Eng PROJECT TITLE: OTH TARGETING

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:

- (U) ($147) Based on results of integration testing, developed capability functional description documents which were used by the programs of record to define system functional requirements that support these capabilities. Developed system interface standards where required. Provided a valid master configuration database in support of the new IT-21 Battle Group configurations.

- (U) ($302) Conducted systems integration, interoperability, and Y2K testing using the facilities of the Land Based Test Network (LBTN) and Systems Integration and Test (expanded RLBTS to validate IT-21 technologies prior to shipboard installation).

- (U) ($474) Validated and verified the interoperability of architectures for new capabilities and supporting systems to the fleet. Worked with the fleet staffs and Naval Doctrine Command to develop policy and doctrine for operations of Naval Intranet (NI) in support of Network Centric Warfare ideology. Served as technical expert in researching the fleet's technical questions and providing information.

- (U) ($399) Ensured joint interoperability of all systems on the NI by enforcing compliance with the Joint Technical Architecture and Y2K. Verified relevance, recommended modifications to, and maintained OTH-T specifications for support of distribution of the COP to maritime forces. The program's systems engineers made input into the SPAWAR advanced technology division to insure critical deficiencies are high priority during investigation of IT-21. Provided connectivity and conduct integration and interoperability testing to verify Y2K compliance and provided systems engineering expertise for both IT-21 and MIL-STD technologies.

- (U) ($205) Provided software enhancements to the REPEAT software including adapting the software operationally to transfer Mission Data Updates through available data links.

FY 2001 RDT&E,N Budget Item Justification DATE: FEBRUARY 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0604707N PROJECT NUMBER: X0798
PROGRAM ELEMENT TITLE: SEW Architecture/Eng PROJECT TITLE: OTH TARGETING

2. (U) FY 2000 PLAN

- (U) ($154) Based on results of integration testing, develop capability functional description documents which will be used by the programs of record to define system functional requirements that support these capabilities. Develop system interface standards where required. Provided a valid master configuration database in support of the new IT-21 Battle Group configurations.

- (U) ($314) Conduct systems integration, interoperability, and Y2K testing using the facilities of the Land Based Test Network (LBTN) and Systems Integration Environment. (RLBTS has been expanded to validate IT-21 technologies prior to shipboard installation.)

- (U) ($492) Validate and verify the interoperability of architectures for new capabilities and supporting systems to the fleet. Work with the fleet staffs and Naval Doctrine Command to develop policy and doctrine for operations of NI in support of Network Centric Warfare ideology. Serve as technical expert in researching the fleet's technical questions and providing information.

- (U) ($417) Ensure joint interoperability of all systems on the NI by enforcing compliance with the Joint Technical Architecture and Y2K. Verify relevance, recommend modifications to, and maintain OTH-T specifications for support of distribution of the COP to maritime forces. The program's systems engineers will make input into the SPAWAR advanced technology division to insure critical deficiencies are high priority during investigation of IT-21. Provide connectivity and conduct integration and interoperability testing to verify Y2K compliance and provide systems engineering expertise for both IT-21 and MIL-STD technologies.

- (U) ($214) Conduct integration testing of OTH-T and combat systems.

3. (U) FY 2001 PLAN

- (U) ($246) Integrate code combination techniques developed during FY00 into internationally agreed HF data profiles for significant improvement in guarantee of delivery of email attachments in poor propagation conditions associated with the HF medium.

- (U) ($271) Exploit and coordinate subnet relay protocols and multi-frequency band channels to provide greater data throughput in the HF and UHF Line-of-Site RF mediums.

- U) ($154) Based on results of integration testing, develop capability functional description documents which will be used by the programs of record to define system functional requirements that support these capabilities. Develop system interface standards where required. Provided a valid master configuration database in support of the new IT-21 Battle Group configurations.

- (U) ($315) Conduct systems integration, interoperability, and Y2K testing using the facilities of the Land Based Test Network (LBTN) and Systems Integration Environment. (RLBTS has been expanded to validate IT-21 technologies prior to shipboard installation.

- (U) ($493) Validate and verify the interoperability of architectures for new capabilities and supporting systems to the fleet. Work with the fleet staffs and Naval Doctrine Command to develop policy and doctrine for operations of NVI in support of Network Centric Warfare ideology. Serve as technical expert in researching the fleet's technical questions and providing information.

- (U) ($416) Ensure joint interoperability of all systems on the NI by enforcing compliance with the Joint Technical Architecture and Y2K. Verify relevance, recommend modifications to, and maintain OTH-T specifications for support of distribution of the COP to maritime forces. The program's systems engineers will make input into the SPAWAR advanced technology division to insure critical deficiencies are high priority during investigation of IT-21. Provide connectivity and conduct integration and interoperability testing to verify Y2K compliance and provide systems engineering expertise for both IT-21 and MIL-STD technologies.

- (U) ($214) Conduct integration testing of OTH-T and combat systems.

FY 2001 RDT&E,N Budget Item Justification DATE: FEBRUARY 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0604707N PROJECT NUMBER: X0798
PROGRAM ELEMENT TITLE: SEW Architecture/Eng PROJECT TITLE: OTH TARGETING

(U) OTHER PROGRAM FUNDING SUMMARY:

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004	FY 2005
(U) PE 0204660N, AGSAG 4B7N	336	578	440	460	477	438	451

(U) RELATED RDT&E: (SEW) Architecture/Engineering Support program element is related to all Naval C4I related efforts.

C. (U) ACQUISITION STRATEGY: Not applicable.

D. (U) SCHEDULE PROFILE: Not applicable.

FY 2001 RDT&E,N Program Element/Project Cost Breakdown DATE: FEBRUARY 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0604707N PROJECT NUMBER: X0798
PROGRAM ELEMENT TITLE: SEW Architecture/Eng PROJECT TITLE: OTH TARGETING

Exhibit R-3 Cost Analysis (page 2)									Date: Sep 99			
APPROPRIATION/BUDGET ACTIVITY RDT&E, N/4		PROGRAM ELEMENT 0604707N							PROJECT NAME AND NUMBER OTH Targeting X0798			
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY-99 Cost	FY-99 Award Date	FY-00 Cost	FY-00 Award Date	FY-01 Cost	FY-01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Program Management	Various	Various	1319	149	TBD	152	TBD	151	TBD	Cont.	Cont.	Cont.
System Test and Evaluation	Various	Various	3056	592	TBD	722	TBD	723	TBD	Cont.	Cont.	Cont.
Systems Engineering	Various	Various	764	312	TBD	234	TBD	234	TBD	Cont.	Cont.	Cont.
Interoperability Requirements	Various	Various	2792	474	TBD	483	TBD	1001	TBD	Cont.	Cont.	Cont.
Subtotal T&E			7931	1527		1591		2109		Cont.	Cont.	Cont.
Remarks												
Subtotal Management												
Remarks												
Total Cost			7931	1527		1591		2109		Cont.	Cont.	Cont.

R-1 Line Item No 80

Project Cost Breakdown
(Exhibit R-3, page 8 of 28)

FY 2001 RDT&E,N Budget Item Justification Sheet DATE: FEBRUARY 2000

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng Support

(U) COST: (Dollars in Thousands)

NUMBER TITLE	FY 1999 ACTUAL	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
X2144 SEW Engineering	7,973	8,545	8,154	8,093	7,200	9,068	9,345	Cont.	Cont.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: Space and Electronic Warfare (SEW) Engineering is a non-acquisition engineering effort defined as the neutralization or destruction of enemy targets and the enhancement of friendly force battle management through integrated employment and exploitation of the electromagnetic spectrum and the medium of space. SEW Engineering encompasses efforts to ensure that 1) the composite operational capabilities of SEW systems (not the individual component systems) conform to the Naval C4ISR architecture as related to the National Defense Strategy and evolving joint visions and direction such as Joint Vision 2010, "Copernicus...C4ISR for the 21st Century," "Forward...From the Sea," C4I for the Warrior, and the Defense Science Board Summer Study Task Force Report on Information Architecture for the Battlefield, and are guided by CINC requirements; 2) the systems support emerging fleet requirements as documented and necessitated through concepts such as Network Centric Warfare, Integrated Information Base, IT-21, and Naval Virtual Intranet; and 3) the SEW systems and systems integration effort involves leading edge technology transfer of information processing technologies primarily through integration of government and commercial off-the-shelf (GOTS/COTS) products to enhance the Navy's operational capability, interoperability, flexible reconfiguration, as well as reduce costs. SEW Engineering also provides the Navy support in the demonstration and integration of C4I systems developed by the services and by commercial vendors as part of the annual Joint Warrior Interoperability Demonstration (JWID) sponsored by the Joint Chiefs of Staff. Each JWID is designed to identify joint interoperability deficiencies, and to solicit solutions to these deficiencies from commercial industry. Additionally, JWID demonstrates these technologies for assessment by the warfighters from ongoing service efforts. Service participants benefit from the exposure to the new technologies, the assessments process, and the equipment that is left in place for further use and evaluation.

FY 2001 RDT&E,N Budget Item Justification DATE: FEBRUARY 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0604707N PROJECT NUMBER: X2144
PROGRAM ELEMENT TITLE: SEW Architecture/Eng PROJECT TITLE: SEW ENGINEERING

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS:

- (U) ($758) Developed plans for the integration of maturing system developments and military and commercial technologies that support the "Copernicus…C4ISR for the 21st Century" concept into the annual Joint Warrior Interoperability Demonstration (JWID). Plans incorporated the use of enhanced operational capabilities in key CINC priority areas and Joint Mission Area (JMA) Assessment Thrust Areas which included high-capacity communications, improved Command and Control Warfare (C2W), integrated landfight architecture, trusted systems/multi-level security, improved sensors/strike planning, common tactical/operational picture, theater air defense/force protection, and combat identification.

- (U) ($384) Remainder of FY1998 Below Threshold Reprogramming (BTR) received in FY 1999 in support of the Maritime Battle Center to support the Fleet Battle Experiment "D" to build continued lessons learned from previous Fleet Battle Experiments. FBE "D" primary focus was the development of tactics, techniques and procedures supporting execution of Theater Air Defense and prevention of incursion by enemy Special Operations Forces. Completion of FBE "D" was a critical step toward successful preparation for the follow-on experiment, FBE "E".

- (U) ($935) Generated the Copernicus Implementation Guidance, applying a web-based collaborative grid approach where programs/projects are synchronized across the claimancy/acquisition community. The current guidance requires redirection to incorporate emerging warfighter requirements and concepts. The shift from platform-centric warfare to network-centric warfare demands that new approaches are identified, matured, and tested with the warfighters and systems developers. The product was a validated and modeled methodology, based on web technology, whereby a matrix of capabilities are mapped to organizations and products, leading to prioritized and scoped C4ISR work elements for claimancy pursuits.

- (U) ($200) Augmented/updated/maintained the Overarching C4ISR Operational Requirements Documentation. The composite operational capabilities of C4ISR systems (not the individual component systems) were designed so that they conform to the Naval C4ISR architecture as it relates to the National Defense Strategy and evolving joint visions and direction such as Joint Vision 2010, "Copernicus...C4ISR for the 21st Century," "Forward...From the Sea", C4I for the Warrior and the Defense Science Board Summer Study Task Force Report on Information Architecture for the Battlefield, and are guided by CINC requirements. As operational requirements changed, either through changes in mission, technological change, technical insertion into systems, or through systems integration efforts, these changes were reflected in the latest operational architectures. Additionally, supported related C4ISR architecture projects as they supported Theater and Battleforce C4ISR architectures.

- (U) ($2,816) Enhanced and refined the C4ISR Planned Systems Design for the POM years. Continued to develop and validate a Naval C4ISR Architecture based on the multi-tier architecture framework of Operational, System, and Technical to support Naval missions in a Joint and Coalition Theater. Architectural development consisted of (1) assisting OPNAV, Navy Doctrine Command, and Fleet Commanders in the development of operation and overarching architectures and maintaining documentation describing the Systems Architectures; and (2) providing system architecture parameters, attributes, and characteristics necessary to ensure that Program Executives and Managers acquire systems that achieve the desired operational objectives. Participated with the Joint Battle Center and Naval Battle Laboratories to verify and validate systems architectures. The POM C4ISR Systems Architecture was enhanced. The "As-Is" C4ISR Systems Architecture was updated as appropriate. The decomposition of the overarching POM C4ISR Systems Architecture was accomplished. This involved breaking down the specifics of warfighter functions to lower levels of detail. From this, SPAWAR developed the "ring charts" for some Battle Groups/Amphibious Ready Groups, generic platform designs, and detailed designs for each platform. Sponsored and/or participated in related IPTs within the claimancy and throughout the Navy Department and DoD, as required; and participated in OSD and joint architectural working groups and panels. Defined an end-to-end process model to document the C4ISR systems development process and relationships among the systems development components.

- (U) ($892) Continued support to the Joint Technical Architecture/Standards development/documentation and implementation effort, and published periodic updates. Represented and coordinated Navy inputs into the Joint Technical Architecture developed in conjunction with both internal Naval and external service units and agencies including the and ASD(C3I) Joint Technical Architecture (JTA) Development Group (JTADG). Navy inputs to the JTA Version 3.0 were developed in accordance with direction from the Technical Architecture Steering Group (TASG) and the DoD Architecture Coordination Council (ACC). Coordinated the JTA standards and protocols with the DON CIO's Information Technology Standards Guidance (ITSG) document. Coordinated the implementation of JTA standards and protocols throughout the C4ISR systems development community. Provided appropriate design guidance and resulting data inputs into the Naval Architecture Database (NAD). Supported and coordinated NAD tools development for JTA products. Matured the Levels of Information Systems Interoperability (LISI) constructs as they relate to the JTA.

- (U) ($1,988) Matured the Naval Architecture Database (NAD) to encompass, establish, and populate the dynamic systems model; analyzed the criteria and requirements for the operational system architecture functional transition; continued population of the data models; updated the Hierarchical Data Dictionary to reflect additional study inputs; and provided C4ISR inputs to the Maritime Battle Center (MBC) to provide test/experimentation development planning with other Navy and service organizations for the conduct of Naval and Joint experiments including Fleet Warfare Experiments, IT-21, Theater Air Defense (TAD) Battle Management C4I (BMC4I), etc. Products included expanded reference sets, a refined data model and schema, the addition of the SMIDB database, the Levels of Information Systems Interoperability Technical Reference Model, an expanded tool set, and documented relationships to related databases.

3. (U) FY 2000 PLAN:

- (U) ($2,684) Develop plans for the integration of maturing system developments, military and commercial technologies that support enhanced operational capabilities in key CINC priority areas and Joint Mission Area (JMA) Assessment Thrust Areas into the annual Joint Warrior Interoperability Demonstration (JWID). Integration plans will include high-capacity communications, improved Command and Control Warfare (C2W), integrated landfight architecture, trusted systems/multi-level security, improved sensors/strike planning, common operational picture, collaborative planning, knowledge based systems, smart push-warrior pull data flow, theater air defense/force protection, and combat identification. In conjunction with all services, assess mature technologies and submit recommendation for rapid acquisition of technologies that provide solutions to the warfighter's problems.

- (U) ($497) Generate a web-based collaborative grid approach where programs/projects are synchronized across the claimancy/acquisition community. The shift for the afloat part of the Navy, from platform-centric warfare to network-centric warfare, and the Naval Intranet for the land based portion of the Navy, demands that new approaches are identified, matured, and tested with the warfighters and systems developers. The product will be a validated and modeled methodology, based on web technology, whereby a matrix of capabilities are mapped to organizations and products, leading to prioritized and scoped C4ISR work elements for claimancy pursuits.

- (U) ($1,094) Migrate the Overarching C4ISR Operational Requirements Documentation to a web-based, fully interactive, collaborative site, where requirements generators, systems developers, and other users requiring such data, can gain access to automated databases and accompanying tools. Continue support to the C4ISR portion of the Joint Technical Architecture/Standards development/documentation and implementation effort, and publish periodic updates. Represent and coordinate Navy inputs into the Joint Technical Architecture developed in conjunction with both internal Naval and external service units and agencies including the ASD(C3I) Joint Technical Architecture (JTA) Development Group (JTADG). Navy inputs to the C4ISR portion of the JTA Version 3.0 will be developed in accordance with direction from the Technical Architecture Steering Group (TASG) and the DoD Architecture Coordination Council (ACC). Coordinate the C4ISR JTA standards and protocols with the DON CIO's Information Technology Standards Guidance (ITSG) document. Coordinate the implementation of JTA standards and protocols throughout the C4ISR systems development community. Provide appropriate design guidance and resulting data inputs into the Naval Architecture Database (NAD). Support and coordinate NAD tools development for JTA products. Support the maturation of the Levels of Information Systems Interoperability (LISI) constructs as they relate to the JTA.

- (U) ($945) Enhance and refine the C4ISR Planned Systems Design for the POM years. Continue to develop and validate a Naval C4ISR systems design environment to support Naval missions in a Joint and Coalition Theater. Architectural development will consist of (1) assisting OPNAV, Navy Doctrine Command, and Fleet Commanders in the development of battlegroup-wide and hull specific designs, (2) maintaining documentation describing the Systems Architectures/shipboard and ashore configurations, and (3) providing system architecture parameters, attributes, and characteristics necessary to ensure that Program Executives and Managers acquire systems that achieve the desired operational objectives. Participate with the Joint Battle Center and Naval Battle Laboratories to verify and validate overall systems designs and detailed implementation designs. The decomposition of the overarching POM C4ISR Systems Architecture will be accomplished. This involves breaking down the specifics of warfighter functions to lower levels of detail. From this, SPAWAR can develop the "ring charts" for Battle Groups/Amphibious Ready Groups, generic platform designs, and detailed designs for each platform. These developed documents, coupled with control measures, will allow configuration management of installed designs. Sponsor and/or participate in related IPTs within the claimancy and throughout the Navy Department and DoD, as required, and participate in OSD and joint architectural working groups and panels. Define an end-to-end process model to document the C4ISR systems development process and relationships among the systems development components.

- (U) ($640) Augment/update/maintain the Overarching C4ISR Operational Requirements documentation. The composite operational capabilities of C4ISR systems must be designed so that they conform to the Naval C4ISR architecture as it relates to the National Defense Strategy and evolving joint visions and direction such as Joint Vision 2010, "Copernicus...C4ISR for the 21st Century," "Forward...From the Sea", C4I for the Warrior, and the Defense Science Board Summer Study Task Force Report on Information Architecture for the Battlefield, and are guided by CINC requirements. As operational requirements change, either through changes in mission, techological change, technical insertion into systems,or through systems integration efforts, these changes must be reflected in all applicable requirements documents. Additionally, support to related C4ISR projects as they define and maintain Theater and Battleforce C4ISR architectures must be maintained.

- (U) ($2,685) Develop the Navy's common repository for architectural and interoperability support, data integration, and systems design data and information. As part of the repository, the Naval Architecture Database (NAD) will encompass establishment and population of the dynamic systems model, analysis of the criteria and requirements for the operational system architecture functional transition, continuation of the population of the data models, update of the Hierarchical Data Dictionary to reflect Joint study inputs, and provision for C4ISR implementation of the Maritime Battle Center (MBC). This effort includes senior test engineers and laboratory coordinators to provide test/experimentation development planning with other Navy and service organizations for the conduct of Naval and Joint experiments including Fleet Warfare Experiments, JWID, IT-21, Theater Air Defense (TAD) Battle Management C4I (BMC4I), etc. Products include expanded reference sets, a refined data model and schema, the addition of the SMIDB database, the Levels of Information Systems Interoperability Technical Reference Model, an expanded tool set, and documented relationships to related databases.

4. (U) FY 2001 PLAN:

- (U) ($2,613) Develop plans for the integration of maturing system developments, military and commercial technologies that support enhanced operational capabilities in key CINC priority areas and Joint Mission Area (JMA) Assessment Thrust Areas into the annual Joint Warrior Interoperability Demonstration (JWID). Integration plans will include high-capacity communications, improved Command and Control Warfare (C2W), integrated landfight architecture, trusted systems/multi-level security, improved sensors/strike planning, common operational picture, collaborative planning, knowledge based systems, smart push-warrior pull data flow, theater air defense/force protection, and combat identification. Field demonstrated and assessed Joint Chief of Staff mandated Golden Nuggets Technologies that will benefit operational forces with their immediate employment at sea or in the field.

- (U) ($477) Continue development and of the web-based collaborative grid approach where programs/projects are synchronized across the claimancy/acquisition community. The shift for the afloat part of the Navy, from platform-centric warfare to network-centric warfare, and the Naval Intranet for the land based portion of the Navy, demands that new approaches are identified, matured, and tested with the warfighters and systems developers. The product will be a validated and modeled methodology, based on web technology, whereby a matrix of capabilities are mapped to organizations and products, leading to prioritized and scoped C4ISR work elements for claimancy pursuits. This web site will contain the results of technology insertion experiments and "lessons learned" from those trials, so that successes can be applied to similar systems enhancement attempts. Included will be software reuse experiments, hardware applications, and networking trials.

- (U) ($964) Continue the migration of the Overarching C4ISR Operational Requirements Documentation to a web-based, fully interactive, collaborative site, where requirements generators, systems developers, and other users requiring such data, can gain access to automated databases and accompanying tools. Continue support to the C4ISR portion of the Joint Technical Architecture/Standards development/documentation and implementation effort, and publish periodic updates. Represent and coordinate Navy inputs into the Joint Technical Architecture developed in conjunction with both internal Naval and external service units and agencies including the and ASD(C3I) Joint Technical Architecture (JTA) Development Group (JTADG). Navy inputs to the C4ISR portion of the JTA Version 3.0 will be developed in accordance with direction from the Technical Architecture Steering Group (TASG) and the DoD Architecture Coordination Council (ACC). Coordinate the C4ISR JTA standards and protocols with the DON CIO's Information Technology Standards Guidance (ITSG) document. Coordinate the implementation of JTA standards and protocols throughout the C4ISR systems development community. Provide appropriate design guidance and resulting data inputs into the Naval Architecture Database (NAD). Support and coordinate NAD tools development for JTA products. Support the maturation of the Levels of Information Systems Interoperability (LISI) constructs as they relate to the JTA.

- (U) ($907) Enhance and refine the C4ISR Planned Systems Design for the POM years. Continue to develop and validate a Naval C4ISR systems design environment to support Naval missions in a Joint and Coalition Theater. Architectural development will consist of (1) assisting OPNAV, Navy Doctrine Command, and Fleet Commanders in the development of battlegroup-wide and hull specific designs, (2) maintaining documentation describing the Systems Architectures/shipboard and ashore configurations; and (3) providing system architecture parameters, attributes, and characteristics necessary to ensure that Program Executives and Managers acquire systems that achieve the desired operational objectives. Participate with the Joint Battle Center and Naval Battle Laboratories to verify and validate overall

systems designs and detailed implementation designs. The decomposition of the overarching POM C4ISR Systems Architecture will be accomplished. This involves breaking down the specifics of warfighter functions to lower levels of detail. From this, SPAWAR can develop the "ring charts" for Battle Groups/Amphibious Ready Groups, generic platform designs, and detailed designs for each platform. These developed documents, coupled with control measures, will allow configuration management of installed designs. Sponsor and/or participate in related IPTs within the claimancy and throughout the Navy Department and DoD, as required and participate in OSD and joint architectural working groups and panels. Define an end-to-end process model to document the C4ISR systems development process and relationships among the systems development components.

- (U) ($615) Augment/update/maintain the Overarching C4ISR Operational Requirements documentation. The composite operational capabilities of C4ISR systems must be designed so that they conform to the Naval C4ISR architecture as it relates to the National Defense Strategy and evolving joint visions and direction, such as Joint Vision 2010, "Copernicus...C4ISR for the 21st Century," "Forward...From the Sea", C4I for the Warrior and the Defense Science Board Summer Study Task Force Report on Information Architecture for the Battlefield, and are guided by CINC requirements. As operational requirements change, either through changes in mission, technological change, technical insertion into systems, or through systems integration efforts, these changes must be reflected in all applicable requirements documents. Additionally, support to related C4ISR projects as they define and maintain Theater and Battleforce C4ISR architectures must be maintained.

- (U) ($2,578) Enhance and develop the Navy's common repository for architectural and interoperability support, data integration, and systems design data and information. As part of the repository, the Naval Architecture Database (NAD) will encompass; establishment and population of the dynamic systems model, analysis of the criteria and requirements for the operational system architecture functional transition, continuation of the population of the data models and update the Hierarchical Data Dictionary to reflect Joint study inputs, and provision for C4ISR implementation of the Maritime Battle Center (MBC). This effort includes senior test engineers and laboratory coordinators to provide test/experimentation development planning with other Navy and service organizations for the conduct of Naval and Joint experiments including Fleet Warfare Experiments, JWID, IT-21, Theater Air Defense (TAD) Battle Management C4I (BMC4I), etc. Products include; expanded reference sets, a refined data model and schema, the addition of the SMIDB database, the Levels of Information Systems Interoperability Technical Reference Model, an expanded tool set, and documented relationships to related databases. Support additional user bases from the CINC Interoperability Program Office (CIPO), other Systems Commands, and Fleet users by providing comprehensive and authoritative databases for planning and programmatic information.

B. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

C. (U) ACQUISITION STRATEGY: Not applicable.

D. (U) SCHEDULE PROFILE: Not applicable.

FY 2001 RDT&E,N Program Element/Project Cost Breakdown DATE: FEBRUARY 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0604707N PROJECT NUMBER: X2144
PROGRAM ELEMENT TITLE: SEW Architecture/Eng PROJECT TITLE: SEW ENGINEERING

Exhibit R-3 Cost Analysis (page 1)										Date: SEP 1999		
APPROPRIATION/BUDGET ACTIVITY RDT&E,N		PROGRAM ELEMENT 0604707N								PROJECT NAME AND NUMBER SEW Engineering X2144		
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY-99 Cost	FY-99 Award Date	FY-00 Cost	FY-00 Award Date	FY-01 Cost	FY-01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal Product Development												
Remarks:												
SEW/C4I Technology Integration	Various	Various	4554							0	4554	4554
Systems A&E and Validation	Various	Various	10101							0	10101	10101
Systems Validation	Various	Various	1034							0	1034	1034
Systems Engineering			1850							0	1850	1850
Operational Requirements	Various	Various		200	TBD	1094	TBD	964	TBD	Cont.	Cont.	Cont.
Systems Design	Various	Various		2816	TBD	945	TBD	907	TBD	Cont.	Cont.	Cont.
Technical Standards	Various	Various		892	TBD	640	TBD	615	TBD	Cont.	Cont.	Cont.
Information Repository/Naval Architecture Database	Various	Various		1988	TBD	2685	TBD	2578	TBD	Cont.	Cont.	Cont.
C4ISR Capabilities	Various	Various		935	TBD	497	TBD	477	TBD	Cont.	Cont.	Cont.
Subtotal Support	Various	Various	17539	6831		5861		5541	TBD	Cont.	Cont.	Cont.
Remarks												

FY 2001 RDT&E,N Program Element/Project Cost Breakdown DATE: FEBRUARY 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0604707N PROJECT NUMBER: X2144
PROGRAM ELEMENT TITLE: SEW Architecture/Eng PROJECT TITLE: SEW ENGINEERING

Exhibit R-3 Cost Analysis (page 2)										Date: SEP 1999		
APPROPRIATION/BUDGET ACTIVITY RDT&E,N			PROGRAM ELEMENT 0604707N							PROJECT NAME AND NUMBER SEW Engineering X2144		
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY-99 Cost	FY-99 Award Date	FY-00 Cost	FY-00 Award Date	FY-01 Cost	FY-01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
SEW Engr/JWID	Various	Various	3815	758	N/A	2684	TBD	2613	TBD	Cont.	Cont.	Cont.
FY 1999 BTR/FBE-D				384								
Subtotal T&E	Various	Various	3815	1142	N/A	2684	TBD	2613	TBD	Cont.	Cont.	Cont.
Remarks												
Subtotal Management												
Remarks												
Total Cost			21354	7973		8545		8154		Cont	Cont.	Cont.

R-1 Line Item No 80

Budget Item Justification
(Exhibit R-3, page 20 of 28)

FY 2001 RDT&E,N Budget Item Justification DATE: FEBRUARY 2000

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng

(U) COST: (Dollars in Thousands)

PROJECT NUMBER TITLE	FY 1999 ACTUAL	FY 2000 ESTIMATE	FY 2001 ESTIMATE	FY 2002 ESTIMATE	FY 2003 ESTIMATE	FY 2004 ESTIMATE	FY 2005 ESTIMATE	TO COMPLETE	TOTAL PROGRAM
R2357 Maritime Battle Center	11,140	23,784	23,837	23,897	23,906	23,855	23,819	Cont.	Cont.

A. (U) MISSION DESCRIPTION AND BUDGET ITEM JUSTIFICATION: The mission of the Maritime Battle Center (MBC) is to execute the Naval Warfare Innovation Process. The process takes concepts developed by the Strategic Studies Group and approved by the Chief of Naval Operations into Fleet Battle Experiments; conducts preliminary sub-scale experiments and technological demonstrations focused on the advanced engineering and operational system development of systems related to all conflict levels of Littoral Battlespace. The MBC environment is a network centric environment that links the existing "core" Naval facilities to the Marine Corps Warfighting Lab (MCWL), the Joint Battle Center/Federated Battle Lab, and technologists in industry and academia as appropriate. The MBC is essential to the evolution of combat capabilities since it is the engine for validating the new network centric warfare techniques in conjunction with the Sea Based Battle Laboratories (SBBL), Science & Technology (S&T) initiatives and other initiatives that originate with the operating forces. The MBC will support the early and sustained involvement of Joint Warfighters in refining the technology to meet the tactics, techniques, and procedures needed for 2010-2020 Littoral Battlespace. The MBC will have multiple roles since it is a crosscutting organization involved in several facets of concept, platform, weapons, weapon systems and Information Technologies (IT),Information System (IS) and Information Management (IM) systems development and integration. These include collaborative planning, operational experimentation planning and execution, technology transition/acquisition support, systems engineering, and integration, technology assimilation and operational demonstrations.

FY 2001 RDT&E,N Budget Item Justification DATE: FEBRUARY 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0604707N PROGRAM ELEMENT TITLE: SEW Architecture/Eng PROJECT NUMBER: R2357 PROJECT TITLE: MARITIME BATTLE CENTER

(U) PROGRAM ACCOMPLISHMENTS AND PLANS:

1. (U) FY 1999 ACCOMPLISHMENTS

- (U) ($1,261) FBE Analysis and Core Support: The management and administration of MBC activities included oversight of the experimental planning phase, the execution and collection phases, the analysis phase, and the output decision phase. This entailed the integration of many preliminary experiments and technology demonstrations coupled with the inputs of experienced military leaders, current warfighting CINCs, and technologists from industry and academia.

- (U) ($973) Enabled Technical Development: Prior to any technology transition to the Numbered Fleet Commanders during the Fleet Battle Experiment (FBE) or Limited Objective Experiment (LOE). The technology utilized preliminary engineering experimentation to determine its compatibility and compliance with the Global Command and Control System (GCCS) architectures, IT 21 architectures, and the identification of high performance and interoperability issues. The objective of these preliminary experiments was to bring information superiority to Fleet operations while achieving a level of critical mass in the early identification of technologies with "production" potential. These technologies include commercially developed technologies in collaborative planning, interactive sharing, the correlation of decision data-reducing "decision time, and the exploration of dynamically managed circuits operating in sea, ground, and/or aerospace domains.

- (U) ($7,414) FBE Direct Experimentation: The Numbered Fleet Commanders were designated experimentation leads for FBEs and LOEs. The Fleet Commander in the AOR where the experiment was held lead the F|BE series and designated their flagship as Sea Based Battle Laboratories (SBBL) that worked with the MBC Director in the conduct of the FBE. This enabled the Fleet to directly participate in the development of future Navy concepts and capabilities and provided the Fleet an opportunity to provide immediate feedback to the technologist and concept developer.

- (U) ($1,492) Technical Evaluation: MBC planed and participated in the planning of other services and joint commands of exercises and tests that involved the Navy experimentation process. Its core competency was fleet operations, exercise designs, costing, equipping and exercise analysis and overall evaluations with recommendations for future related activities. The technical operations also evaluated the results of Advanced Concept Technology Demonstrations (ACTDs), Joint Warrior Interoperability Demonstration (JWIDs), and Joint Battle Center (JBC) activities and determined the most expeditious paths to transition such concepts into actual and sustainable Naval warfighting capability. As innovative technologies emerged from the commercial section, the technical operations element devised insertion strategies for prototypes. Using existing resources, the components used to provide the required set of capabilities was generated and brought into operation for testing and analysis purposes. Navy laboratory support from all claimancies was tasked dependent on the requirements. Knowledge of laboratory capabilities and projected needs of such laboratories was inherent in this support. Joint exercise support supplied by maritime forces was also coordinated using this organizational function.

2. (U) FY 2000 PLAN:

- (U) ($4,887) FBE Analysis and Core Support: The management and administration of MBC activities includes oversight of the experimental planning phase, the execution and collection phases, the analysis phase, and the output decision phase. This entails the integration of many preliminary experiments and technology demonstrations coupled with the inputs of experienced military leaders, current warfighting CINCs, and technologists from industry and academia.

- (U) ($4,082) Enabling Technical Development: Prior to any technology transition to the Numbered Fleet Commanders during a Fleet Battle Experiment (FBE) or Limited Objective Experiment (LOE). The technology needs preliminary engineering experimentation to determine its compatibility and compliance with the Global Command and Control System (GCCS) architectures, IT 21 architectures, and the identification of high performance and interoperability issues. The objectives of these preliminary experiments is to bring information superiority to Fleet operations while achieving a level of critical mass in the early identification of technologies with "production" potential. These technologies include commercially developed technologies in collaborative planning, interactive sharing, the correlation of decision data-reducing "decision time, and the exploration of dynamically managed circuits operating in sea, ground, and/or aerospace domains.

- (U) ($13,439) FBE Direct Experimentation: The Numbered Fleet Commanders are designated experimentation leads for FBEs and LOEs. The Fleet Commander in the AOR where the experiment is held will lead the F|BE series and designate their flagship as Sea Based Battle Laboratories (SBBL) that will work with the MBC Director in the conduct of the FBE. This enables the Fleet to directly participate in the development of future Navy concepts and capabilities and provides the Fleet an opportunity to provide immediate feedback to the technologist and concept developer.

- (U) ($1,376) Technical Evaluation: MBC will plan and participate in planning by other services and joint commands of exercises and tests that involve the Navy experimentation process. Its core competency will be fleet operations, exercise designs, costing, equipping and exercise analysis and overall evaluations with recommendations for future related activities. The technical operations will also evaluate the results of Advanced Concept Technology Demonstrations (ACTDs), Joint Warrior Interoperability Demonstration (JWIDs), and Joint Battle Center (JBC) activities and determine the most expeditious paths to transition such concepts into actual and sustainable Naval warfighting capability. As promising innovative technologies emerge from the commercial section, the technical operations element will devise insertion strategies for prototypes. Using existing resources, the components needed to provide the required set of capabilities will be generated and brought into operation for testing and analysis purposes. Navy laboratory support from all claimancies will be tasked dependent on the requirements. Knowledge of laboratory capabilities and projected needs of such laboratories will be inherent in this support. Joint exercise support supplied by maritime forces will also be coordinated using this organizational function.

3. (U) FY 2001 PLAN:

- (U) ($4,830) FBE Analysis and Core Support: The management and administration of MBC activities includes oversight of the experimental planning phase, the execution and collection phases, the analysis phase, and the output decision phase. This entails the integration of many preliminary experiments and technology demonstrations coupled with the inputs of experienced military leaders, current warfighting CINCs, and technologists from industry and academia.

- (U) ($3,229) Enabling Technical Development: Prior to any technology transition to the Numbered Fleet Commanders during a Fleet Battle Experiment (FBE) or Limited Objective Experiment (LOE). The technology needs preliminary engineering experimentation to determine its compatibility and compliance with the Global Command and Control System (GCCS) architectures, IT 21 architectures, and the identification of high performance and interoperability issues. The objectives of these preliminary experiments is to bring information superiority to Fleet operations while achieving a level of critical mass in the early identification of technologies with "production" potential. These technologies include commercially developed technologies in collaborative planning, interactive sharing, the correlation of decision data-reducing "decision time, and the exploration of dynamically managed circuits operating in sea, ground, and/or aerospace domains.

- (U) ($14,435) FBE Direct Experimentation: The Numbered Fleet Commanders are designated experimentation leads for FBEs and LOEs. The Fleet Commander in the AOR where the experiment is held will lead the F|BE series and designate their flagship as Sea Based Battle Laboratories (SBBL) that will work with the MBC Director in the conduct of the FBE. This enables the Fleet to directly participate in the development of future Navy concepts and capabilities and provides the Fleet an opportunity to provide immediate feedback to the technologist and concept developer.

- (U) ($1,343) Technical Evaluation: MBC will plan and participate in planning by other services and joint commands of exercises and tests that involve the Navy experimentation process. Its core competency will be fleet operations, exercise designs, costing, equipping and exercise analysis and overall evaluations with recommendations for future related activities. The technical operations will also evaluate the results of Advanced Concept Technology Demonstrations (ACTDs), Joint Warrior Interoperability Demonstration (JWIDs), and Joint Battle Center (JBC) activities and determine the most expeditious paths to transition such concepts into actual and sustainable Naval warfighting capability. As promising innovative technologies emerge from the commercial section, the technical operations element will devise insertion strategies for prototypes. Using existing resources, the components needed to provide the required set of capabilities will be generated and brought into operation for testing and analysis purposes. Navy laboratory support from all claimancies will be tasked dependent on the requirements. Knowledge of laboratory capabilities and projected needs of such laboratories will be inherent in this support. Joint exercise support supplied by maritime forces will also be coordinated using this organizational function.

B. (U) OTHER PROGRAM FUNDING SUMMARY: Not applicable.

C. (U) ACQUISITION STRATEGY: Not applicable.

D. (U) SCHEDULE PROFILE: Not applicable.

FY 2001 RDT&E,N Program Element/Project Cost Breakdown

DATE: FEBRUARY 2000

BUDGET ACTIVITY: 4

PROGRAM ELEMENT: 0604707N
PROGRAM ELEMENT TITLE: SEW Architecture/Eng

PROJECT NUMBER: R2357
PROJECT TITLE: MARITIME BATTLE CENTER

Exhibit R-3 Cost Analysis (page 1)												Date: SEP 1999
APPROPRIATION/BUDGET ACTIVITY RDT&E,N			PROGRAM ELEMENT 0604707N									PROJECT NAME AND NUMBER Maritime Battle Center R2357
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY-99 Cost	FY-99 Award Date	FY-00 Cost	FY-00 Award Date	FY-01 Cost	FY-01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
Subtotal Product Development												
Remarks:												
Subtotal Support												
Remarks												

R-1 Line Item No 80

Budget Item Justification
(Exhibit R-3, page 27 of 28)

FY 2001 RDT&E,N Program Element/Project Cost Breakdown DATE: FEBRUARY 2000

BUDGET ACTIVITY: 4 PROGRAM ELEMENT: 0604707N PROJECT NUMBER: R2357
PROGRAM ELEMENT TITLE: SEW Architecture/Eng PROJECT TITLE: MARITIME BATTLE CENTER

Exhibit R-3 Cost Analysis (page 2)										Date: SEP 1999		
APPROPRIATION/BUDGET ACTIVITY RDT&E,N			PROGRAM ELEMENT 0604707N							PROJECT NAME AND NUMBER Maritime Battle Center R2357		
Cost Categories	Contract Method & Type	Performing Activity & Location	Total PYs Cost	FY-99 Cost	FY-99 Award Date	FY-00 Cost	FY-00 Award Date	FY-01 Cost	FY-01 Award Date	Cost To Complete	Total Cost	Target Value of Contract
System Test and Evaluation	Various	Various	2551	9879		18897		19007		CONT	CONT	CONT
Subtotal T&E			2551	9879		18897		19007		CONT	CONT	CONT
Remarks												
Program Management	Various	Various	280	1261		4887		4830		CONT	CONT	CONT
Subtotal Management			280	1261		4887		4830		CONT	CONT	CONT
Remarks												
Total Cost			2831	11140		23784		23837		CONT	CONT	CONT